

Nyeadi, Joseph Dery; Kamasa, Kofi; Kpinpuo, Stephen

Article

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*Corresponding author: Joseph Dery Nyeadi, Department of Banking and Finance, SD-Dombo University of Business and Integrated Development Studies, Box 64, Wa, Ghana
E-mail: josephnyeadi@yahoo.com

Reviewing editor:
Christian Nsiah, School of Business,
Baldwin Wallace University, Berea,
US

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Female in top management and firm performance nexus: Empirical evidence from Ghana

Joseph Dery Nyeadi^{1*}, Kofi Kamasa² and Stephen Kpinpuo³

Abstract: This study investigates empirically the link between females in top management and firm performance in Ghana. This study employs the Instrumental Variable (IV) Two Stage Least Squares (2SLS) technique of estimation in determining the impact of females in top management on firm performance using World Bank Enterprise Survey (WBES) data across 720 firms in Ghana. This technique is very robust as it has the power to control for any possible endogeneity bias, which can lead to spurious results. After controlling for reverse causality, our results reveal that the inclusion of females in top management impacts positively on firm performance in Ghana. We further note that though innovation has direct positive impact on firm performance, there is no evidence of any moderating roles played by innovation or education in the link between female in top management and firm performance in Ghana. The results of our study should however be interpreted with a bit of caution as we have not been able to examine the time dynamics of our findings due to lack of reliable panel data. Apart from serving as a reference

ABOUT THE AUTHORS

Joseph Dery Nyeadi is a senior lecturer and a chartered accountant with the SD-Dombo University of Business and Integrated Development Studies (SDD-UBIDS) in Ghana. His areas of interest range from Corporate Finance to Corporate governance in African context. He has widely published in a number of renowned journals including *Cogent Finance and Economics*, *Journal of Accounting and Management*, *Cogent Business and Management*, *Journal of Global Responsibility*, etc.

Kofi Kamasa is a lecturer with University of Mines and Technology in Ghana. He has a PhD in Economics. His areas of interest include; Resource Economics, International Finance and Trade, Financial Econometrics, etc.

Stephen Debar Kpinpuo is a senior lecturer with SDD-UBIDS and he received a PhD in Organisational Leadership and Supervision from Purdue University in the United States of America. Currently, Dr. Kpinpuo is Head of the Department of Administration and Management Studies at (SDD-UBIDS), Ghana.

PUBLIC INTEREST STATEMENT

This paper investigates empirically the impact of females in top management on firm performance in Ghana. In recent times, firm diversity and female inclusion in corporate leadership have been a topical issue for discussion both in the boardroom and in the academic arena especially in developing world. This is simply because, most researchers have argued that diversified boards perform better than undiversified ones. One of the features of a diversified firm leadership is a good representation of women on the firm's leadership or management. Our study is thus, focused on examining the impact of females on top management and firm performance in Ghana. This link has been tested empirically in a number of economies but not much is known as far as Ghana is concerned. This paper therefore sheds light on the link between females in top management and firm performance in the Ghanaian economy. The work is thus very useful to both academic and policy makers in general.

literature for future studies, the study is very useful to both government and firms who make decisions in respect of females in management.

Subjects: Economics; Finance; Business, Management and Accounting

Keywords: Female; management; firm performance; Ghana; instrumental variable

1. Introduction

Throughout the world, there has been much outcry over the inclusion of women in corporate, state, and global governance systems. As a result, various governments have introduced varied mechanisms in a bid to boost gender participation in governance. On the corporate front, this stance has been defended time and again for a number of reasons. First, it is often observed as unfair the exclusion of certain groups in the management and governance of businesses by virtue of race, sex or other human categorizations in society (Singh et al., 2001). Second, gender diversity is opined to be a sign of the adoption of corporate social responsibility, better creativity in decision making and the provision of new concerns and sensitivity in debates tabled at board and management meetings (Klasen, 2006; Erhardt et al., 2003; Cabrera-Fernández et al., 2016). More so, gender diversity does not only increase the diversity of opinions on issues, but it also creates female role models and mentors for females in the firm (Catalyst, 1995).

Notwithstanding the enormous benefits firms stand to gain on the diversified top management, most boards and by extension top management are dominated by males. This has even become worst in Africa due to cultural and traditional beliefs (IFC, 2018). Globally women in senior management positions ranges from only 3% to 12% (Ganguli et al., 2014). In Sub-Saharan Africa and Latin America and the Caribbean, the situation is more pathetic as only one out of 26 women make it to senior management while out of six to nine men make it to top management (Jackson, 2009). The exclusion of women at top management is not however influenced by any legislation. It is noted to be caused by political, social and economic structures in nations (Terjesen & Singh, 2008). It is interesting to note that some African countries including Kenya, Malawi, Nigeria and South Africa are advocating to formally integrate gender diversity into principles of good corporate governance (IFC, 2018). In Ghana also, the Affirmative Action Policy of 1998 requires a 40% quota of women representation on all government and public boards (IFC, 2018).

In spite of the arguments in favour of female inclusion in top management of organisations, empirical studies have been very mixed in their findings on the relationship between females in top management and firm performance. While a host of studies have concluded that female in top management results in high firm performance, (see: Dezsö & Ross, 2012; Reinert et al., 2016; Faccio et al., 2016; Wu et al., 2017; Moreno-Gómez et al., 2018), other studies have established a negative relationship between female in top management and firm performance (see: Darmadi, 2013; Ryan & Haslam, 2005; Ujunwa, 2012; Wellalage & Locke, 2013). Apart from these two groups of contrary findings, other studies have findings that suggest that females in top management have no influence on firm performance (see: Cabrera-Fernández et al., 2016; Pletzer et al., 2015; Ming & Eam, 2016; Marinova et al., 2016). The inconclusive results of these findings have however been greatly attributed to the use of inappropriate econometric techniques and the varied economic background of the studies (Moreno-Gómez et al., 2018). Following this link, we have employed a more robust econometric technique (instrumental variable-IV) to examine the link between female in top management and firm performance in the case of Ghana. The question we seek to answer in this study is whether or not firms that have females in their top management perform better than their counterparts that do not have females as part of their top management.

Our paper has made some significant contributions to the body of knowledge in female management and firm performance literature. First, unlike some previous studies (see: Dezsö & Ross, 2012; Rodriguez-Dominguez et al., 2012; Darmadi, 2013; Isidro & Sobral, 2014; Wu et al., 2017; Moreno-

Gómez et al., 2018 etc.), our study has used a unique and efficient econometric estimation technique in the form of IV two stage least squares to investigate the link between females in top management (FTM) and firm performance. Theoretically, the link between the FTM and firm performance is argued to be endogenous and have reverse causality link (Wu et al., 2017). The implication here is that, while FTM could cause firms to increase performance, firm performance, on the other hand, could also lead to an organization having good representation of females in top management. For instance, top performing firms may have excess resources to be able to advocate and bring more women onto their management so as to satisfy other stakeholder demands. In such situations, there is often self-selection bias as low performing firms will not be able to compete with their top performing firm counterparts. In this paper, we have argued that this trend has contributed to some of the varied results obtained in the past, as some studies failed to account for this reverse causality problem. To address this, we have used the IV 2SLS technique which controls for endogeneity problem in econometric estimations.

Second, our paper has been able to extend previous studies by exploring the moderating effects of education and innovation on the link between FTM and performance of firms. In most of the earlier studies noted above, the moderating effect of some variables such as human capital development and innovative capacity of firms have been ignored. This paper has extended the literature by including these issues in our theoretical models and thus testing for them empirically.

Third, we have departed from earlier studies (see: Dezsö & Ross, 2012; Rodriguez-Dominguez et al., 2012; Darmadi, 2013; Isidro & Sobral, 2014; Wu et al., 2017; Moreno-Gómez et al., 2018) by using non-financial measure of performance (sales growth). Financial measures such as return on assets, return on equity are said to be bedeviled by managerial manipulations and hence sometimes do not reflect the real performance of the firm (Fowowe, 2017). We did not only use the non-financial measure, but we also conducted further estimations using employee growth as an alternative measure for our performance thus making our results very stable and consistent.

Finally, to the best of our knowledge this is the first study of its kind that has been carried out in Ghana using IV and also extending the investigations beyond what previous studies did. Most of the previous studies on the subject matter have been conducted in developed and emerging markets to the neglect of context in developing countries like Ghana. We are basing our studies on Ghana because, Ghana is developing country and most of the studies carried out on the subject matter are skewed towards the advanced countries. When it comes to FTM and firm performance, cultural, institutional dynamisms and economic levels are very critical in determining the link. Thus, the need to situate this study in an African economy to observe this link. The only study that is close to what we have is Agyapong and Ofori Appiah (2015). However their study focused on gender diversity on board using a few datasets from Ghana Stock Exchange on non-financial firms only. Their study has not also been able to account for endogeneity issues as we have explained above.

We sourced our data from the World Bank Enterprise Survey Dataset in Ghana. Ghana has two data points, 2007 and 2013. We relied on the 2013 data which is more current and hence has more coverage than the 2007 one. The survey was conducted on manufacturing and service firms in general. It included both listed and non-listed firms. In all, 720 firms took part in the 2013 survey.

Using an IV technique for estimation, we realised that the inclusion of females in top management impacts positively on firm performance in Ghana. We further note that though innovation has direct positive impact on firm performance, there is no evidence of any moderating roles played by innovation or education in the link between females in top management and firm performance in Ghana.

The rest of the paper is structured as follows. Section 2 reviews related theoretical and empirical literature for this study. Section 3 covers the methodological issues while section 4 discusses the results. Section 5 concludes the paper.

2. Related literature

2.1. Theoretical review

In reviewing our theoretical literature, we have categorised our theoretical literature into three parts. The first portion is devoted to looking at role congruent theory which took its root from social roles theory. The second part focuses on how females in top management impacts positively on the performance of top management duties whereas the last part looks into the impact of females in top management on middle management task performances.

2.2. Role congruent theory

This theory takes its source from social role theory which believes that sexes pertain to communal and agentic attributes (Bakan, 1966; Eagly, 1987). Social role theory ascribes communal characteristics more strongly to women indicating that women are mainly concerned with the welfare of others such as being affectionate, helpful, kind, sympathetic, interpersonally sensitive, nurturant and gentle. On the contrary agentic characteristics such as being assertive, controlling, aggressive, ambitious, dominant, forceful, independent, self-sufficient are ascribed more strongly to men. In this social role theory, women are supposed to be communal and not agentic in their behaviour while men are expected to be more agentic and not also communal. Any deviation from the above calls for criticism against that sex.

The role congruity theory however goes beyond the social role theory to look at the congruity between gender roles and leadership roles and factors that influence them and how they can be moderated. Eagly and Karau (2002) in developing this role congruity theory establish two prejudices about women towards leadership roles. First, women are perceived less favourable than men and second, there is an evaluation of behaviour that fulfills the prescriptions of a leader role less favourably when enacted by a woman. In their conclusion, they noted that attitudes are less positive toward females than male leaders and potential leaders. This theory believes that people tend to have dissimilar beliefs about leaders and women and similar beliefs about leaders and men. In examining these beliefs earlier, Schein (1975) tested this with empirical data from USA. From this study, respondents perceived successful middle managers as significantly more similar to men than women on a large number of mainly agentic characteristics.

One of the prejudices explained by this theory is that women receive less favourable evaluation than men in potentials for leadership. This is because leadership ability is more stereotypical of men than women. This comes from the activation of descriptive beliefs about women's characteristics which leads to the ascription of female-stereotypical qualities which are not the qualities expected and desired in leaders. The second prejudice examined by this theory is less favorable evaluation of the actual leadership behavior of women than men because such behavior is perceived as less desirable in women than men. This emanates from the activation of beliefs about how women are supposed to behave. Following these perceptions, a woman who takes on a leadership role may get negative reactions though she may equally receive some positive evaluation for her performance in that role. The work of Heilman et al. (1995) provides evidence to support this. They noted in their study that where researchers described female managers as successful, respondents referred to these women as more hostile and less rational than successful male managers. Women leaders are hence constrained by threats from two opposite directions. If they conform to their gender role they will fail to meet the requirements of their leadership role and conforming to their leadership role on the other hand will make them fail to meet the requirements of their gender roles. Eagly and Karau (2002) argue that these two forms of prejudices will lead to less favourable attitudes toward female than male leaders and potential leaders. Besides, they will make women have lesser access to leadership roles than men while having more obstacles than men in becoming successful in their leadership roles.

As part of their study, Eagly and Karau (2002) have proposed some moderators for these two prejudices about women leadership. For the first prejudice where women are seen as less qualified than men for leadership, this is greatly attributed to for instance, the greater incongruity between

the descriptive norms that define the female gender role and a leader role. In this case women will be perceived more as less qualified for leadership than men. This greater incongruity exists because of the way leadership roles are defined in a masculine terms. Leadership qualities are described to be more agentic and less communal in nature. If leadership qualities are defined to be less masculine, they would be more congruent with the female gender role. In this way women being viewed as less qualified than men in leadership should diminish or weaken.

The second form of prejudice which is in the form of evaluating the behaviour of women to be less favourable in leadership roles than the behaviour of men. This is because if a leadership role is defined as more agentic and a woman is able to fulfill it, she is seen as deviating from the norms and hence she would be referred to as good leader but bad woman. To moderate this, Eagly and Karau (2002) propose that communal features such as friendliness and participation as long as these are not seen as inappropriate for the leader role should be added as requirements even if they are not strictly required by the leader. This will make women able to fulfill those roles perfectly and hence would not be viewed in a different form.

2.3. Top management team task performance

Top management team is noted as the main pillar of every organization and thus any improvement made to top management team translates directly into enhanced firm performance of the organization (Dezsö & Ross, 2012). All major decisions for an organization are taken at this level hence the need to have a very effective, efficient and a productive people at this level of every organization if the organization will function well. Globally, firms are represented at the top level by men and with no or few females included at this level (Dezsö & Ross, 2012). To have females properly represented at the top management of an organization makes that firm a diversified one. But interestingly, a gender diversified firm arguably performs better due to benefits from informational and social diversity, enhanced social corporate image as well as gender differences in managerial behavior (Smith et al., 2006).

First, when females are represented in top management, the firm has the benefits of making quality decisions. This is because females are known to be more cooperative, operate more inclusion leadership than men thus allowing all views to be aired on an issue before decisions are taken finally (Dezsö & Ross, 2012). Females though lovers of power are seen to also be more power sharing than men (Huse et al., 2009). Females thus operate a democratic and participatory leadership which allows for more discerning views and opinions. More also, females by nature are noted to be very creative in their thinking and are able to incubate new ideas (Huse et al., 2009; Isidro & Sobral, 2014). Secondly, females are able to obtain quality information timely and easily. Besides, females are said to be very versatile in both male and female dominated world (Dezsö & Ross, 2012). Due to the diverse exposure of females in dealing with both men and females through the family level by way of nurturing and upbringing of children, females are better able to understand customers, employees and partners of both sexes and hence they are in a better position to obtaining information from such people easily and timely for decision making in organisations. Besides knowing and understanding clients and customers better, females are also able to serve such customers properly and expediently.

Third, females due to their dynamic nature are noted to exert better monitoring and management qualities than men (Adams & Ferreira, 2009). For every entity, the effectiveness of their operations largely depends on how efficient and effective their monitoring and management mechanisms are in place. Moreover, females dedicate more attention to qualitative issues such as social responsibility and philanthropic issues (Hafsi & Turgut, 2013). That is why it is argued that men are more likely to engage in unethical issues than females (Huang & Kisgen, 2013). Again men are arguably more competitive and overconfident than females, thus leading to hasty and riskier decisions taken by men which normally generate lower returns in the long run for a firm (Huang & Kisgen, 2013).

2.4. Middle management team task performance

As noted above, females in management impact significantly on corporate performance through two channels. Hence apart from stimulating higher performance through influencing top management in their critical day-to-day functions, females in top management also enhance performance in firms through their positive impacts made on middle management and their task performances. When females are represented at the top management level, career progression from middle management is seen as very steady, rapid and smooth for middle level managers. Females by the virtue of having motherly instincts and leadership qualities tend to motivate, encourage and give proper directions to their subordinates at work place. Thus, subordinates are found to rise faster in their field of operations working under females in top management than working under superiors who are men (Bilimoria, 2000). Once these middle managers are sure of faster progression into higher ranks with time, they do not only stay in the company for long time, but they also get committed more in their assigned tasks. This thus increases performance through enhanced efficiency and specialization.

Besides, females in top management also serve as mentors and motivation to middle-level females managers (Bilimoria, 2000). Knowing well that hard work, creativity and performance can lead one to the top ladder of a firm and not because one belongs to any privileged sex, females at middle management are greatly motivated and encouraged to pursue hard work and dedication to their roles. This makes them able to excel and achieve greater performance in their assigned roles. Moreover, such females are able to introduce ingenuity in their work in order to be noticed for creativity. Again, with the availability of females at the top management echelon, deliberate mentorship is carried out by such females on other young females working under the top females (Smith et al., 2006). With the provision of regular mentorship, the young females in middle management are able to learn faster, the rubrics of effective management and leadership skills needed in the proper functioning in their roles. Again as these females are being mentored by their direct supervisors working in the same firm, they put up their best when it comes to their work in order to impress their mentors that they are learning very well and faster under their mentorships. This in all goes to boost the firm's general performance as a company.

Finally, having females in top management sends a signal to all the females in middle management that the firm is a non-discriminatory one as far as gender is concerned and that gender diversity is respected by the firm (Wu et al., 2017). Cognizance of this, females at the middle level see that organization as one that does not discriminate against gender but rather it respects and recognizes the dignity of females in the organization, these middle level management females put up their best at the work place so as to also support the organization to grow and achieve its vision and objectives. Apart from that the organization is able to attract and retain very qualified middle management females when hiring for its activities. With the right and qualified females hired into the middle management level, the right decisions and actions are taken which feed into top management quality of decision taken.

In summary, female in top management influences firm performance positively through either making big and positive contributions in the top management daily tasks or contributing greatly to middle management performances in an organization which lead to higher management performance of an organization at large.

2.5. Empirical review

There are three strands of the empirical findings. First, there is the strand that provides evidence that females in top management significantly impact positively on firm performance. Reinert et al. (2016) using panel data ranging from 1999 to 2013 in the banking sector in Luxembourg established that there is significant positive relationship between female in management and firm performance. They further note that the impact of females in top management on firm performance is as twice as large during the financial crisis than in stable market conditions. This implies that female management style is very dynamic and can even withstand shocks better than male dominated management. A similar finding by Jamali and Daouk (2007) in the Lebanese banking sector indicates that low

females representation in management is an impediment on board performance. The authors believe that female's board representation can reflect positively on the status of females at work and hence enhancing corporate performance. In a more recent study, Moreno-Gómez et al. (2018) using 54 Colombian listed firms find that female representation in firm is associated with positive subsequent business performance. In an earlier study in the US economy with 1,500 firms from the standard and poor, Dezsö and Ross (2012) find that female top management representation improves firm performance but only to the extent that a firm's strategy is focused on innovation in its operation.

Faccio et al. (2016) conducted a study on CEO gender and efficiency of capital allocation in 18 European countries. Using propensity score matching estimation, their findings revealed that females in top management impacts positively on firm performance. The reason for their findings was that female CEOs have lower leverage, less volatile earnings and have higher chances of survival than those run by men. Similarly Perryman et al. (2016), realize that greater gender diversity in top management does not only lower risk but it enhances firm performance. Kim and Starks (2016) also discover that gender diversity improves firm value. They note that when females are appointed as corporate directors, diversified set of boards' expertise are achieved. They further stress that females bring unique skills on boards and thus the positive relationship between females in top management and firm performance. Again using 125 non-financial firms in Spain, Reguera-Alvaredo et al. (2015) find that the increase in the number of females on boards is positively related to higher firm economic value. Flabbi et al. (2017) find that companies with females' board members are likely going to appoint more female executives than their counterparts with no females on board. They further established that female leadership is correlated with firm performance where the representation is greater than 30%.

Again, female participation in top management promotes the growth performance of SMEs and there is significant inverted U-shaped relationship (Wu et al., 2017). Gender diversity is noted as an important determinant of stock market performance in the Nigerian stock market (Ayadi et al., 2015). They noted that the appointment of females in the management of the Nigerian stock exchange is associated with better performance. Kyaw et al. (2017) establish that there is an indirect positive link between females in top management and firm performance in Europe. They discover that board gender diversity improves environmental and social performance and consequently corporate social performance and subsequently environmental, social performance, corporate social performance and firm performance.

The second strand of empirical literature is the group of studies that establish no significant relationship between females in top management and firm performance. For example, in their study, Cabrera-Fernández et al. (2016) find that there is no impact of the presence of females in the performance of firms. A similar study notes that the presence of females directors on companies board do not purport to have any significant linear or non-linear impact on the financial performance of the companies except for the companies in the top 80th percentile of return on equity (Ming & Eam, 2016). Using random and fixed effect estimators on 88 Italian wine firms for 2007–2014, D'Amato (2017) establishes that females in top position in firms do not affect firm performance. The relation is however noted to be moderated by family firms' negatively. This means where females are on top management in family firms, firm performance is lowered. In a related study, Pletzer et al. (2015) find that mere representation of females on corporate boards has no impact on financial performance of such firms if other factors are not considered. While noticing that females are more risk-averse and more focused on long-term perspective, board diversity has no relationship with firm performance in the Netherlands and Denmark (Marinova et al., 2016).

There is yet a third strand of literature which indicates that females in top management rather reduce firm performance and thus it may not be a good policy to diversify boards and firm management representations. For instance, using 383 listed firms in Indonesia, Darmadi (2013) indicates that the representation of females on top executives impacts negatively on firm performance using both ROA and Tobin's q. They further reveal that smaller firms seem to have more

female representation than bigger firms. The argument for this is that bigger firms may be too tough for females. In another study in Sri Lanka by Wellalage and Locke (2013), it is realized that females' representation on top management has significant negative relationship with firm value. They attribute the negative relationship to an agency cost imposed by diversity in board. Ryan and Haslam (2005) using UK companies on the FTSE 100 find also a negative relationship between females on board and the performance of shares. In the African continent, Ujunwa (2012) studied the link between gender diversity and firm performance using 122 listed firms on the Nigerian stock exchange and concludes that gender diversity negatively relates to corporate performance.

In summary, it can be noted that there is inconclusiveness in the empirical literature on the subject matter. This inconclusiveness may be due to a number of reasons. First, geographical differences could lead to differences in results realized on the subject matter. Cultural variation between countries and continent can bring about differences in the findings. Besides, lumping economies together to explore this link may also blur this link in the study. Thus we centre our study only on a Ghanaian economy in an African context. Second, the methodology adopted by the previous studies could be a reason for the ambiguities in the studies. Most of the studies have not taken care of endogeneity and reverse causality thus making it difficult to obtain robust results. Our study uses a very robust instrumental variable estimation technique to overcome these problems.

3. Methodology

3.1. Data and sample

The study uses only data sourced from World Bank Enterprise Survey (WBES) dataset. This dataset is made up of data randomly collected from firms from over 125 countries across the globe on manufacturing and services firms. The dataset is made up of both subjective and objective responses which were provided by owners and top managers of the firms. The questionnaires solicited information pertinent to the performance and challenges facing businesses. They focused on areas such as: general background of the firm, infrastructure and services, sales and supplies, degree of competition, capacity, land and permits, crime, finances, business and government relationship, labour and performance.

Most of the countries in the dataset have just one datapoint. However, in Ghana our study area has two data points, 2007 and 2013. We relied on the 2013 data which is more current and hence has more coverage than the 2007 one. We have not combined the two data points to generate panel data because some firms which are in the latest dataset were not either in existence during the 2007 survey or were not captured in the survey. Similarly, some firms which were captured in the 2007 dataset were also left out in the 2013 dataset thus leaving us with just a few firms which have two data points and can constitute panel. 720 firms were covered in the 2013 survey and that serves as our sample for the study though some firms did not respond to some of the questionnaires. The data is made up of both listed and non-listed firms in manufacturing and services sectors of the economy.

3.2. Variables

3.2.1. Dependent variable: corporate performance

Firm performance can be measured using both financial and non-financial measures (Fowowe, 2017). Financial measures can be proxied by profit, revenue, returns on investment (ROI), returns on equity (ROE), earnings per share (EPS) and Tobins'q (Dezsö & Ross, 2012; Flabbi et al., 2017; Wu et al., 2017). It is argued that though the financial measures have the advantage of being simple, objective and easy to understand, they are often bedeviled with manipulation and incompleteness (Fowowe, 2017). Non-financial measures are proxied with sales growth, revenue growth, employee growth, sales per employee, market share, customers' satisfaction, customers' referral rates, employee satisfaction, social and environmental performance. This measure has the limitation of being subjective (Fowowe, 2017). Following the inherent limitation in both measures, it is ideal to combine these measures in

a study. We, however, used the non-financial measures only due to the constraints we face in our dataset. Following the work of Fowowe, 2017, we measure the firm's performance using sales growth. The sales growth is computed as the log difference between the current year sales and sales of three years before the survey year, divided by the difference between the survey years. This data is also sourced from the WBES data. Though the data has only one point, it has questions that solicited for information on the firm current year and also three years ago. This is given as:

$$SG_{it} = [(S_{it} - S_{it-3})/S_{it-3}]$$

Where SG_{it} is the sales growth, S_{it} is the current sales, and S_{it-3} is the sales in last three years preceding the survey.

3.2.2. Main independent variable: female in top management (FTM)

This refers to the proportion of females who are part of top management of a firm. This is measured in varied ways. In our study, we have used a dummy variable to capture it. It is a binary dummy of one (1) if a firm has at least a female as part of their top management team and zero (0) if otherwise.

3.2.3. Education and innovation

We measure education here as the percentage of permanent employees who completed secondary school. It ranges from 0 to 100. We use the interaction between the females in top management and education (FTM*Edu) to test the moderating effect of education on the link between females in top management and firm performance. Innovation here refers to process innovation and it is the implementation of a new or significantly improved production or delivery method. We adopt the World Bank Enterprise Survey database definitions with modifications where innovation is made up of four elements: usage of email, possession of website, possession of internationally recognized quality certificate and having audited financial statements. It is an index computed by the usage of Multiple Correspondence Analysis (MCA) technique to arrive at a continuous variable instead of binary variable. Again, we use the interaction between females in top management and innovation (FTM*Inno) in examining the moderating power of innovation on the link between females in top management and firm performance.

3.2.4. Other control variables

Following previous studies (see: Dezsö & Ross, 2012; Wu et al., 2017; Moreno-Gómez et al., 2018 etc.), we include a number of other control variables. *i) age*, refers to the number of years the firm has been in existence. It is determined as the difference between the year of the survey and the year the firm was incorporated. *ii) size*, is the measured in varied ways in literature. We proxy it here with the number of permanent employees of the firm. *iii) Access to finance* is measured as the access to loan from financial institutions by the firm. It is a binary dummy variable of one if the firm has access to loan from financial institutions and otherwise zero. *iv) Female ownership* refers to females' ownership status of the firm. It is a binary dummy variable of one if at least the firm has one owner of the firm being woman and otherwise zero. *v) Top management experience* refers to the number of years' experience gained by top management in that industry. *vi) Export dummy* represents a binary variable of whether or not the firm exports its product. All the variables are defined in [Table 1](#).

3.2.5. Instrumental variable

From previous studies (see: Adams & Ferreira, 2009; Reguera-Alvaredo et al., 2015), it is noted that endogeneity and causality problems are critical reasons for some of the inconclusiveness and different findings obtained in studies on the link between FTM and firm performance. For instance, firms which are performing very well may have the resources to be able to advocate for gender diversity and therefore will have more females in top management than firms not performing well. Thus while FTM may lead to higher performance, higher performance of firm on the other hand may also signal FTM. In such situation, Ordinary Least Squares (OLS) will produce biased and

inconsistent results. In order to overcome these problems, we need instrument(s) that correlate with FTM but does not correlate with the dependent variable (firm performance).

Baum (2006) noted that for an instrument to be valid, it must satisfy two of the following conditions: First, it must not correlate with the error term in the model except through control variables and second, it must be correlated with the endogenous variable (FTM). Thus the instrument must be able to predict reasonably the endogenous variable (in our case FTM) and does not correlate with the disturbance terms in our model (firm performance). Under these strict conditions, only one variable was found to be valid (proportion of female employees). This variable was also chosen in line with earlier studies (see Marinova et al., 2016). The proportion of female employees is measured as the proportion of permanent female employees on the firm. Firms which have higher proportion of permanent female employees have a greater chance of having more females being part of their top management. Hence female employees would predict FTM positively. However, the presence of female employees in a firm does not necessarily lead to higher performance. Thus we used female employees as our instrumental variable to instrument FTM.

3.2.6. Estimation techniques

The statistical technique employed in this study is a two-stage instrumental variable (IV) regression. The first stage of the IV is based on ordinary least squares (OLS), while the second stage uses two-stage least squares (2SLS). The rationale behind the estimation technique is to be able to address the endogeneity and causality problems which theoretically exist between FTM and firm performance. We empirically tested the existence of the endogeneity in the link as proposed by Baum et al. (2007). The results are shown below in Table 2. The null hypothesis is that FTM is exogenous. We reject the null hypothesis meaning the FTM is endogenous to firm performance. The test goes to confirm the theoretical argument of the relationship between FTM and firm performance is endogenously determined.

The test goes to confirm the theoretical argument of the relationship between FTM and firm performance is endogenously determined.

In line with earlier studies (Adams & Ferreira, 2009; Reguera-Alvaredo et al., 2015; Marinova et al., 2016), we estimate a system of simultaneous equations (1) and (2) below:

$$FTM = \beta_0 + \sum^{\beta} z + v \quad (1)$$

$$Corporate\ Performance = \alpha_0 + \alpha_1 FTM + \sum^{\alpha} x + \mu z + \varepsilon \quad (2)$$

Where x is a vector of control variables and z represents the instrumental variable (proportion of female employees).

4. Results and discussions

4.1. Preliminary findings

Table 3 displays the descriptive statistics of the paper. It is identified that only 15% of the sample studied has at least one female on its top management. This means that females are woefully underrepresented in the top management of firms in Ghana. Though this phenomenon is common in the corporate world, it is probably very worst in the case of Ghana as over 85% of firms surveyed do not have even one woman on their top management level. This is a confirmation from the literature as globally women in senior management positions range from only 3% to 12% (Ganguli et al., 2014) and in Sub-Saharan Africa and Latin America and the Caribbean, the situation is worst as only one out of 26 women makes it to senior management while out of six to nine men make it to top management (Jackson, 2009). This also goes to reinforce the role congruity theory where women are seen to

Table 1. Variable Description

Variable	Definition
Sales Growth (SG)	It is the difference between the current year sales and sales of three years before the survey year, divided by sales of three years ago. $\Rightarrow SG_{it} = [(S_{it} - S_{it-3})/S_{it-3}]$
Employee Growth (EG)	It is the difference between the current number of permanent employees and the number of permanent employees three years before the survey year, divided by the permanent employees three years before the survey. $\Rightarrow EG_{it} = [(Size_{it} - Size_{it-3})/Size_{it-3}]$
Female in top management (FTM)	Dummy variable equal to one if the firm has at least a female top manager and otherwise zero
Innovation(Inno)	It is an index computed by the usage of Multiple Correspondence Analysis (MCA) technique. It is made of the following: Ownership of Website, Usage of Email to communicate with clients, having Audited financial statements by external auditors and possessing internationally recognized quality certificate.
Female Ownership(FO)	Dummy variable equal to one if the firm has at least one woman being owner of the firm and otherwise zero.
Age	Log difference between the year of Survey and the year the firm started operation
Size	It refers to the log of number of employees of the firm.
Education(Edu)	It refers to the percentage of employees who had at least secondary education in the firm. It is measured in percentage thus the least being zero and the highest 100
Access to finance(AF)	Dummy variable equal to one if the firm has access to loan from financial institutions and otherwise zero
Top Management Experience (TME)	The number of years of experience gained by top managers in the sector of the firm
Export (Exp)	Dummy variable equal to one if the firm exported any of its final product.

be less favourable than men in leadership roles (Eagly & Karau, 2002). This view about women leadership could have accounted for a fewer or non-availability of women in some of the firms.

The average size of firms in Ghana as represented by the number of employees is seen as about 12 employees per firm whereas the largest firm has about 500 permanent employees. While the mean age of firm is 45 years, the oldest firm in the study has about 150 years before the survey. Access to finance measured as a dummy variable of 1 if the organization has access to loan from financial institutions is noted to be about 11%. Ironically, whereas FTM are few, female ownership of shares in firms is relatively high. About 30% of firms surveyed indicate that they have at least a woman as part of their ownership structure.

Table 4 also shows the correlation matrix among the independent variables. From the results of the correlation matrix, none of the variables has got multi-collinearity problems as the highest coefficient is 0.55.

4.2. Empirical findings and discussions

Table 6 presents our first-stage 2SLS results. From the results, our instrumental variable proxied by permanent female employees of the firm is found to be a good predictor of females in top management as it is positively significant at 1%. This goes to confirm our theoretical argument that if a firm has more females in its employees, it will lead to higher females representation in top

Table 2. Results of test of endogeneity

FTM	
Test Statistics	2.312**
P-value	0.002

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

Table 3. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
EG	336	0.32	1.08	-1.09	4.20
SG	392	10.42	2.51	4.19	18.64
FTM	720	0.15	0.36	0	1
Edu	679	66.61	33.88	0	100
Inno	720	0.09	1.07	-1.80	2.59
Size	646	11.94	27.56	1	500
Age	720	45.00	20.01	3	150
AF	720	0.11	0.31	0	1
FO	712	0.30	0.46	0	1
Exp	717	0.09	0.29	0	1
TME	706	16.24	9.32	2	64

management (Dezsö & Ross, 2012). The validity of our instrumental variable is very crucial in determining the stability of our results. Every valid instrument must satisfy the condition of instrument relevance and instrument exogeneity. Where an instrument fails to pass the test of relevance the instrument is said to be weak and the results produced from such an instrument will be biased. According to Stock and Watson (2007), the rule of thumb in checking for weak instrument is that in a situation where there is a single endogenous regressor, a first-stage F-statistic less than 10 indicates that the instrument is weak. Stock and Yogo (2005) have however provided for a formal test for weak instrument. In their test, the null hypothesis is that the instruments are weak and the alternative hypothesis is that the instruments are strong.

This test entails the comparison of the F-statistic with a critical value that depends on the number of instruments. To test for the relevance of the instruments chosen, we employed the critical values of Stock and Yogo (2005) and the minimum Eigen value of Cragg and Donald (1993). To reject the null hypothesis and conclude that the instruments are valid, the Cragg and Donald (1993) minimum Eigen value must be greater than the Stock and Yogo (2005) critical value. As shown in Table 5, our minimum eigen value of Cragg and Donald (1993) is greater than the Stock and Yogo (2005) critical values of LIML size of nominal 5% Wald test at 10% or 15%. We did not test for instrument validity in our models since our models are just identified (our endogenous variables are equal to the instruments). After noticing the fitness of our instrument, we used it in estimating our 2SLS models with the results presented in Table 7. The Table is divided into 3 columns with column 1 being just the estimation without any interactive terms while columns 2 and 3 have interactive terms in the form of FTM and innovation and FTM and education respectively.

In the first column, our main independent variable, FTM is found to be positively significant at 10% with a coefficient of 4.22. This implies that firms that have females as part of their top management team perform better than their counterparts which do not have females on their top management team. This finding goes to support earlier studies which concluded that gender diversity enhances firm performance (Dezsö & Ross, 2012; Wu et al., 2017; Moreno-Gómez et al.,

Table 4. Correlation Matrix among the independent variables

	FTM	Size	Age	Inno	Edu	AF	Exp	ME	FO
FTM	1.00								
Size	-0.08	1.00							
Age	0.05	-0.02	1.00						
Inno	-0.12*	0.27	-0.05	1.00					
Edu	-0.01	0.05	-0.08*	0.34*	1.00				
AF	0.06	0.18*	0.01	0.11*	0.02	1.00			
Exp	-0.01	0.20*	0.02	0.25*	0.10*	0.01	1.00		
TME	-0.01	0.02	0.03	0.036	-0.01	-0.06	0.08*	1.00	
FO	0.55*	-0.06	0.02	0.04	0.03	-0.03	-0.01	0.04	1.00

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

Table 5. Post Estimation Tests on the Instrumental Variable Model

First Stage regression Test

Process Innovation	Critical Values			
	10%	15%	20%	30%
Stock and Yogo (2005)	16.38	8.96	6.66	5.53
2SLS size of nominal 5% Wald test	16.38	8.96	6.66	5.53
LIML size of nominal 5% Wald test	16.38	8.96	6.66	5.53
Cragg and Donald (1993)	Minimum Eigen Value Statistics = 17.1397			
Summary Statistics	R-sq = 0.3490; Adj R-sq = 0.4188; Partial R-sq = 0.1105; Prob>F = 0.0000			

Note: R-sq refers to R square while Adj refers to Adjusted. Prob refers to probability and F refers to F-Statistics.

2018). It is in line with our theoretical model and earlier studies that females in top management bring on board unique leadership skills in the form of mentorship to young female employees and also serves as morale boosters to all subordinates due to their inclusive leadership skills (Smith et al., 2006; Wu et al., 2017). Besides, the positive correlation between FTM and firm performance in our study could be attributed heavily to the enhanced monitoring, ethical and risk averse leadership nature of females as argued by others (Adams & Ferreira, 2009; Hafsi & Turgut, 2013).

Among the control variables, innovation, size, access to finance and female ownership are found to be significant. Innovation access to finance and size have positive coefficient implying that adopting innovative processes, having access to finance and the increase in the size of firm enhance the firm performance in Ghana. On the contrary, an increase in the ownership structure of firms by females reduces firms' performance. This means that the mere ownership by females does not lead to higher performance as ownership may not necessarily translate into more females being found on the top management team. Surprisingly, education, age of firms and top management experience in firms are all found to be insignificant though with positive coefficients. It therefore means that age, top management experience and education have no direct impact on performance.

In column 2 as indicated earlier on, we included an interactive term of FTM and process innovation into the model in column 1 to see the effect of process innovation on the link between FTM and firm

Table 6. Results of the first stage of the 2SLS regression

Independent Variables	(1) FTM
Employee	0.01***(0.01)
Edu	-0.01(0.02)
Inno	-0.02(0.02)
Size	-0.07***(0.02)
Age	-0.02(0.02)
AF	-0.09(0.05)
FO	0.42***(0.04)
Exp	0.08(0.07)
TME	0.01(0.01)
Constant	0.11**(0.08)
F-test	20.15
Prob> χ^2	0.000
R-squared	0.35

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

Table 7. IV2SLS Regression Results

Independent Variables	(1) SG	(2) SG	(3) SG
FTM	4.22*(2.28)	4.22*(2.25)	11.08*(6.45)
Edu	0.01(0.01)	0.01(0.01)	0.02**(0.01)
Inno	0.86***(0.20)	0.86***(0.21)	0.78***(0.19)
Size	0.76***(0.22)	0.76***(0.22)	0.80***(0.22)
Age	0.28(0.32)	0.28(0.32)	0.18(0.32)
AF	1.33**(0.59)	1.33(0.61)	1.71**(0.01)
Exp	0.11(0.72)	0.11(0.72)	0.37(0.73)
TME	-0.01(0.3)	-0.01(0.03)	-0.01(0.03)
FO	-1.52*(0.81)	-1.52(0.49)	-1.34(0.71)*
FTM*Inno		-0.01(0.49)	
FTM*Edu			-0.11(0.07)
Constant	7.76***(1.02)	7.76***(1.02)	7.28***(1.02)
Wald χ^2 (9)	86.77	83.85	83.77
Prob> χ^2	0.000	0.000	0.000
R-squared	0.29	0.29	0.29

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

performance. The interactive term, FTM*Inno is insignificant. This means that there is no evidence of any significant impact of the interactive term on firm performance in Ghana. Thus our findings are not able to support the view that females are innovative in their operations and will do very well in firms that have great penchant for innovation (Wiersema & Bantel, 1992; Dezsö & Ross, 2012). Though innovation enhances performance directly, interacting it with FTM does not moderate the link between FTM and firm performance in Ghana. We are therefore not able to find any evidence to

Table 8. IV2SLS Regression Results using an alternative measure (EG)

Independent Variables	(1) EG	(2) EG	(3) EG
FTM	4.73**(2.24)	4.84**(2.40)	15.62**(6.45)
Edu	-0.01(0.01)	-0.05(0.01)	0.03(0.02)
Inno	0.52***(0.18)	0.56**(0.24)	0.23(0.21)
Size	0.41**(0.18)	0.41**(0.18)	0.53*(0.27)
Age	-0.26(0.30)	-0.28(0.32)	-0.89(0.73)
AF	0.25(0.48)	-0.27(0.50)	0.89(0.79)
Exp	-0.56(0.59)	-0.52(0.59)	0.29(0.77)
TME	0.01(0.02)	0.01(0.20)	-0.01(0.03)
FO	-2.01**(0.95)	-2.08**(1.01)	-1.77(1.14)
FTM*Inno		-0.21(0.43)	
FTM*Edu			-0.16(0.11)
Constant	0.16***(0.88)	0.21**(0.92)	0.75***(1.15)
Wald χ^2 (9)	15.46	15.36	16.15
Prob> χ^2	0.002	0.000	0.000
R-squared	0.23	0.20	0.21

Standard errors in parentheses

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

support our third hypothesis that “innovation positively moderates the link between FTM and firm performance”.

Similarly in column 3, we added an additional interactive term in the form of FTM and education to our model in column 2 to further explore other moderating factors of the FTM-performance link. We interact education with FTM because theoretically it is argued that education sharpens the problem-solving skills and ability of employee to process information quickly and accurately (Smith et al., 2006). This, we believe, will create a good platform for any leader or manager including the woman manager to be able to function efficiently and effectively in the discharge of her duties. We noted however that our interactive term, FTM*Edu is not significant and hence has no significant impact on firm performance in Ghana. It therefore means that there is no evidence of education moderating the link between FTM and firm performance.

4.2.1. Check of robustness

To assure ourselves that our results are indeed consistent and robust, we replaced our main dependent variable (sales growth) with employee growth to perform another regression. The results are shown below in Table 8. From the results, it is realized that no much changes have occurred with the adoption of an alternative dependent variable as a measure of firm performance. While the coefficients of our main variable of interest (FTM) have changed slightly in all the columns, the relationship between females in top management and corporate performance still persist in a significant positive way implying that irrespective of the measure of performance, females in top management impacts positively on firm performance in Ghanaian firms. This makes our results very consistent, robust and reliable.

5. Conclusion and recommendations

In this study, we extend the theoretical model developed by Dezsö and Ross (2012) by incorporating into its education of employees so as to examine how females representation in top management influence firm performance in Ghana. We test our hypotheses by using a cross-section dataset of 720 firms surveyed by the World Bank in 2013. After controlling for endogeneity arising from reverse causality by the use of a very robust econometric technique (IV2SLS), we establish the following

findings: a) female representation in top management indeed improves firm performance. This is in line with our theoretical model, which indicates that females in top management lead to improved firm performance because females have very good mentorship skills, risk-averse, ethical and very disciplined in monitoring of subordinates and activities. Thus firms that have greater female representation are rewarded positively with enhanced corporate performance. b) we however have no evidence to support the moderating power of both innovation and education on the link between FTM and firm performance in Ghana.

Our study has a number of contributions made to the body of knowledge in FTM-performance link. First, to the best of our knowledge, it is the first study in Ghana that has explored the relationship between FTM and performance using an empirical approach. Prior studies on the subject matter have all been centred on developed and emerging world to the neglect of African countries partly due to the unavailability of appropriate dataset to investigate this link. We see this as a contextual lacuna in the literature as cultural and geographical differences can lead to different behaviours and attitudes exhibited by female managers in firms which have consequential impacts on firm performance. As a result, we capitalized on the recent release of World Bank enterprise survey dataset in Ghana in 2013 to bridge this gap of knowledge in the literature.

Second, our study unlike most of the previous studies have given consideration to the distortion power of reverse causality in models by adopting a robust instrumental variable technique in examining the link between FTM and firm performance. The inconclusiveness noted among most of the studies in the past can be greatly attributed to the use of inappropriate econometric techniques which have no power to control for endogeneity arising from reverse causality. Theoretically, there is a reverse causality link between FTM and firm performance in the sense that as FTM can influence the performance of firms, firms on the other hand can also lead to the adoption of females in top management. Thus, self-selection bias is introduced into the link with high performing firms being in the position to attract and balance their top management structure by adding more females while low performing firms are unable to balance their top management structure due to resource constraints. If this effect is not controlled, the real effect of females in top management to firm performance is blurred. Third, this study goes beyond the level of investigating the link between FTM and firm performance by examining the moderating factors to this link. Our study examines whether the presence of educated employees and innovative processes can enhance the link between FTM and firm performance.

Our study thus has a serious policy ramifications. Due to the significant rewards firms stand to gain when they give chance for females to be part of their echelon of management, we recommend that managers of firms in Ghana should consider increasing the presence of females in their top management consciously. This could be done by directly employing females into top management positions or by increasing the proportion of females employed into the firm and thus giving them the enabling environment to rise to the top. This can be done by a legislation at government level instead of leaving it at the discretion of corporate managers.

Notwithstanding the robust results and policy recommendations we have made in this study, the study is not without limitations. First, due to the data challenge we are not able to explore the time dynamisms in the study as we could not get panel data to use. It would be more interesting to see whether over time the results are consistent. Besides, our dataset has not given us the opportunity to use financial measures of performance such as ROA, ROE and Tobin's q. It would have been very revealing to also use them as alternative measure of performance to examine our link between FTM and corporate performance. We thus recommend that in future with the availability of data researchers should endeavour to use panel data to explore the time impact and possibly add financial measure of performance proxies.

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Author details

Joseph Dery Nyeadi¹

E-mail: josephnyeadi@yahoo.com

Kofi Kamasa²

Stephen Kpinpuo³

¹ Department of Banking and Finance, SD-Dombo University of Business and Integrated Development Studies, Box 64, Wa, Ghana.

² Department of Management Studies, University of Mines and Technology, Box 237, Tarkwa, Ghana.

³ School of Business, SD-Dombo University of Business and Integrated Development Studies, Box 64, Wa, Ghana.

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