

# **Moderating Effect of Board Gender Diversity on the Relationship between Financial Structure and Operating Efficiency**

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## **Abstract**

This study aimed at determining the moderating effect of board members' gender diversity in the relationship between financial structure and operating efficiency of housing co-operative societies. The descriptive cross-sectional research design provided a framework for data gathering. A data collection form that comprised elements of financial structure and operating efficiency, and gender diversity information collected information from audited financial statements, chief executive officers/administrators and board members. Shannon index of diversity was applied to compute indices for gender. Data from 87 housing co-operatives constituting 435 observations yielding a 50.3% response rate were analysed. Data analysis was performed through descriptive statistics, data envelopment analysis and regression analysis. The efficiency scores obtained by DEA were later regressed in the second stage to establish the hypothesized relationship. The findings show that members' deposit was the only component of financial structure after adding the interaction term contributed to positive changes in operating efficiency. However, the inclusion of the interaction term in the model caused a positive change in adjusted  $R^2$  thus increasing the level of operating efficiency.

**Keywords:** Moderating effect. Board gender diversity. Financial structure. Operating efficiency. Housing co-operative societies. Shannon index.

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## **1. Introduction**

The link between financial structure and operating efficiency is not exemplified in the empirical literature. Alsas and Florysiak (2011) hold that the way a firm's management utilises capital invested determines the level of productivity. However, an array of factors particularly a suitable management team could contribute to a perfect financial structure that would translate to operating efficiency. Bretos and Marcuello (2017) state that financial constraints and factors related to the attributes of the management team of a co-operative contribute to co-operatives' performance. The current empirical literature on access to co-operatives' financing and financing strategies are based on socio-economic objectives of members. Apergis and Reztis (2004) link efficient operation of financial intermediaries and optimal mix of factors production, for instance, labour and capital to board demographic characteristics. Operating efficiency provides information about the optimal use of resources, and failure to measure and monitor performance could lead failure to achieve set goals (Marr & Tubaro, 2011). Darmadi (2011) notes that factors comprising attributes of managers, firm-industry classification, principal-agent relationship, and information asymmetry and ownership structure affect the level of operating efficiency. While the board members' attributes, according to Bereźnicka (2013) influence the choice of a mix of finances by a firm and gender diversity plays a critical role in the achievement of the firm's goals, thus gender differences have potential effect as a moderator. Dezso and Ross (2012) perceive potential benefits arising from the diversity of management as better decision-making, reduced groupthink, creativity and innovative decision-making. This, therefore, contributes to fresh and different perspectives in solving business problems and reduced board members' herding behaviour (Ararat et al. 2015, Erhardt, Werbel, & Shrader, 2003). However, there is limited empirical literature on the moderation effect of gender diversity index on the relationship between financial structure and operating efficiency. The effort to examine the effect of gender diversity has generally focused on investor-owned firms, and many studies have measured gender diversity using a nominal scale. Therefore, building on the current empirical literature, a Shannon index of diversity was used to compute the gender diversity index where the index was used to establish the moderation effect of gender diversity in the relationship between financial structure and operating efficiency among housing co-operative societies.

## **2. Literature Review**

Financing of firms could be all equity or debt-financed or a mix of the main strands of finance (Vo & Nguyen, 2014). The terms financial structure and capital structure are not clearly distinguished in finance literature. However, in the context of the financial sector, the inclusion of short-term finances in the finance structure distinguishes a financial structure from a capital structure. The elements of capital structure incorporate only share capital and long-term loans/debts as sources of finance for most investor-owned firms. Co-operatives emphasise on equity

management including equity accumulation and equity redemption without share price considerations (Wang, 2016). Irrespective, co-operatives face comparable market forces and market tests as investor-owned firms. This makes co-operatives' capital needs no different from those of their non-co-operative counterparts, despite different objectives (Li et al. 2015). As a result, they are not immune to market forces. While the issues of financial structure appear to be ignored in the housing co-operatives, several studies have documented its importance on the performance of firms.

It is widely held in the majority of studies reviewed that maximum performance is achievable when a firm optimizes its finance mix. However, according to Leary and Roberts (2010), the pecking order theory is hypothetical on financing and researchers have not achieved consensus about the assertion of the theory since it fails to consider who facilitates the attainment of the optimal financial structure. Co-operatives are generally funded by receivers of services and not by passive outside investors (Li et al., 2015), this has implications on financial decisions. Therefore, this limits the quality of monitoring of management activities hence increased agency problem. Although many studies have shed light on issues that co-operatives face, especially when acquiring financial capital, no known study on housing co-operatives explains how the diversity of board members influences co-operatives in attaining economic objectives (Yu & Nilsson, 2019).

Operating efficiency is the ability of an entity to deliver products or services to its customers in the most cost-effective manner (Kuosmanen & Johnson, 2017). Efficiency determines whether the resources utilized have achieved a maximum outcome (Mozaffari, Gerami, & Jablonsky, 2014). To achieve efficiency Coelli, Rao, O'Donnell, and Battese (2005) point out that firms should have the capacity to produce maximum outputs from a minimum level of inputs. That is the production of output per unit should be more than a given level of input. A decision-making unit has the option of increasing operating efficiency by increasing the output or decreasing input prices or even increasing the scale of the production process to reduce the average cost per unit. Farrell (1957) in his pioneering research measured the operating efficiency of firms in terms of production frontier and non-parametric framework. In assessing efficiency, Berger and Humphrey (1997) and Banker, Charnes and Cooper (1984) note that most studies have used ratios to measure the operating efficiency of decision-making units. Therefore, data envelopment analysis, as a managerial and performance measurement tool incorporates several predictors and criterion variables, to calculate efficiency scores of firms (Charnes, Cooper, & Rhodes, 1978).

Gender is among the most researched demographic diversity attribute (Terjesen, Sealy, & Singh, 2009). According to Ararat et al., (2015) diversity refers to equal opportunity accorded to all persons with different attributes. According to Hillman (2015) and Sener and Karaye (2014), female directors persist when providing solutions to problems, and are ethical when meditating over decisions, unlike their male counterparts. Nevertheless, the implementation of gender diversity policy remains a challenge due to citizens' cultural beliefs across countries (Ramly, Chan,

Mustapha, & Sapiei, 2015). Therefore, board membership of housing co-operatives is driven by members' aggressiveness. Moreover, since profit maximization is not the primary object of co-operatives, the user-owner principle would influence the choices of investment, financing and operations.

### **2.1 Financial structure and operating efficiency**

Financing of firms could be equity or debt-financed or a mix of the main strands of finance (Vo & Nguyen, 2014). A study by Li *et al.* (2015) revealed that co-operatives relying heavily on equity financing and loans contributed to mixed results in the short-run due to the financial constraints of the co-operatives. While a study by Berger, Ofek, and Yermack (1997) found out that managers doubling as a chief executive officer (CEO) and board member took less debt to avoid financial distress.

Hailu *et al.* (2007) did a study focusing on capital structure, firm size and operating efficiency of co-operatives in Canada. The data was from an unbalanced sample of 42 co-operatives from 115 different co-operatives in Canada from 1984-2001. The study applied the unrelated stochastic frontier model examining cost structure and cost-efficiency. The findings indicated a significant cost inefficiency in all co-operatives, though those that had financial structure sufficiency in equity capital exhibited variations in the cost efficiency and showed improved co-operative efficiency. The sampled co-operatives were from agriculture and petroleum sectors; this could pose difficulties in generalising the findings because the decision variables were heterogeneous and processes of their operations probably different. Rajan and Zingales (1995) analysed public firms in the G-7 countries on how they were financed. The study used international data and the findings revealed that firms that used retained earnings and less debt were more profitable compared to all debt-financed ones. Further examination on foreign evidence, the theoretical foundations of the observed associations of the findings were largely unclear in light of the fundamental principles of the theory of pecking order, and unique economic differences of firms could have limited the generalisation of findings. This could inhibit the interpretation of pecking order theory across the firms. This study focused on firms from a similar sector and operating from the same geographical region thus economic differences did not arise.

### **2.2 Moderating effect of board gender diversity**

Considering the benefits associated with a diversified board, a study by Ramly *et al.* (2015) determined the relationship between gender distribution and bank efficiency using efficiency scores for cost and profit elements in the second stage on a broad panel of data from 1999-2012, for listed commercial banks from Malaysia, Singapore, Indonesia, Thailand, and the Philippines. The findings showed that the gender diversity of bank board members had a significant and negative influence on cost and profit efficiency. On the other hand, a study by Brammer, Millington, & Pavelin (2007) on the gender diversity of boards of United Kingdom

firms found that gender diversity was restricted and less pronounced among executive positions. Erhardt et al. (2003) studied how directors' diversity affected the operating performance of firms. The findings show the existence of an unrelated association of female board members and profitability of firms. The heterogeneity of the firms could have contributed to the non-linear relationship of the variable of the study, an aspect addressed by this current study since all the firms were from similar sub-sector thus homogenous. Ishengoma (2012) established that microfinance co-operatives linked to formal financial institutions that charge high-interest rate and have low equity ratio made co-operatives bear the incidence of agency costs not directly related to the operations.

A study by Ekadah and Mboya (2011) analyzed how board members' gender diversity affects the performance of banks in Kenya from 1998-2009, using stepwise regression analysis. The findings disclosed that board members of banks in Kenya were male-controlled that a board comprising eight board members had only one female director. Consequently, the findings revealed that board diversity did not have any effect on the operating performance of commercial banks. The findings of Ekadah and Mboya's contradicted Erhardt et al. (2003) findings that a non-linear positive association existed between demographic attributes and different financial performance indicators of firms. Based on the empirical literature no known study was found to moderate the relationship between financial structure and operating efficiency, and studies on housing co-operatives were limited. As a result, this study formulated and tested the null hypothesis:

**H<sub>0</sub>** The moderating effect of gender diversity on the relationship between financial structure and operating efficiency of housing co-operative societies in Nairobi City County is not significant.

### **3. Research Methodology**

The section presents the research methodology for this study. The methodology consists of the research design, the population and sample of the study, the data collection methods and collection instruments. Also outlines data analysis methods and models formulation, diagnostic tests and hypotheses testing.

#### **3.1 Research Design**

The descriptive cross-sectional study design was adopted because the overall objective of the study was to establish a significant association of variables of study units over five years. The descriptive cross-sectional survey establishes the nature of the relationship of the variables by dividing a sample into appropriate subgroups (Zikmund, 2003). Several studies including Berežnicka (2013), and Irungu (2007) used the descriptive cross-sectional survey to test for the board effectiveness and performance across firms.

### 3.2 Population and Sample

The study population comprised housing co-operative societies registered by the commissioner of co-operatives before or during the year 2012 (GoK, 2016) in Nairobi City County. The sampling frame was drawn from the register of co-operatives at the state department of co-operatives (GoK, 2016) comprising 173 housing co-operative societies that had operated for more than five years as at December 31, 2016. A multistage sampling technique determined the selection of the sample from the study population. This technique used a combination of probability sampling techniques at several steps (Zikmund, 2003).

### 3.3 Data Collection

The data collection form was used to record the data extracted from financial statements. The financial structure and input and output data for operating efficiency were obtained from financial statements alongside gender diversity. Data for this study were collected from March 01, 2018 to July 2018. The latest audited financial statements registered by the commissioner for co-operatives were for the year ended December 31, 2016.

### 3.4 Operationalization of the Study Variables

The empirical literature on operating efficiency indicates that financial ratios are the commonly used measures of efficiency. However, this study computed efficiency ratio (rate) of each DMU using data envelopment analysis (DEA). Where the efficiency ratio is given as  $\frac{\sum_{i=1}^m u_i y_{is}}{\sum_{j=1}^n v_j x_{js}}$ . This infers that the efficiency ratio using DEA is the summation of the weights of the amount of output divided by the sum of the weights of the amount of inputs (Banker et al., 1984). Where efficiency ratio in DEA terminology is the constant returns to technical efficiency,  $v_j, j = 1, 2 \dots n$ , are weights assigned to  $j$ -th input,  $u_i, i = 1, 2 \dots m$ , are weights assigned to the  $i$ -th output ( $m$ ). ;  $u_i$  is the output weight;  $y_{is}$  is the amount of the output ( $m$ ) produced by a specific housing co-operative society ( $s$ );  $v_j$  is the input weight;  $x_{js}$  is the amount of input ( $n$ ) used by a specific housing co-operative society ( $s$ );  $i$  runs from one (1) to  $m$ ;  $j$  runs from one (1) to  $n$ . Whereas gender diversity was measured using the Shannon index of diversity (Ararat, Aksu, & Cetin, 2015). The index ascertained the dominance or evenness of an attribute in a population. The first step involved determining the percentage proportions for each gender attribute then the index was calculated using the Shannon index formula  $[\sum_{i=1}^s -(P_i * \ln P_i)]$ . Where  $P_i$  is the proportion ( $n/N$ ) of individuals of one particular species found ( $n$ ) divided by the total number of individuals found ( $N$ ) -that is a percentage of female/Male board members expressed as a percentage of total board members

$$p_i = \frac{\text{no.of members of each gender in the board}}{\text{total number of board members}}$$

ln is the natural logarithm,  $\Sigma$  is the sum of the calculations, and S is the number of species.

### 3.5 Data analysis

The presentation of analysis was through descriptive and inferential statistics. A two-stage approach comprising data envelopment analysis (DEA) and linear regression was used (Simar & Wilson, 2015). DEA programmed in STATA computed constant returns to scale technical efficiency (crs\_te) scores. DEA model is a managerial and performance measurement tool, which measures the performance of organisations' relative efficiency using pre-selected inputs and outputs (Dyson & Shale, 2010; Charnes, Cooper, & Rhodes, 1978). However, to establish the hypothesised relationship the gender diversity index moderated the association between financial structure and operating efficiency. The selection of gender diversity was informed by the significant effect it had on the study variables and confounding relationship in the model.

### 3.6 Diagnostic tests

The Shapiro-Wilk test using null hypothesis principle checked whether a sample came from a normally distributed population (Shapiro & Wilk, 1965). The results reported significance effect ( $p < 0.05$ ) thus indicating that the sample data was not from a normally distributed data set. While the Breusch-Pagan/Cook-Weisberg test checked for the heteroscedasticity. The results from the Breusch-Pagan test indicated that the chi-square was  $\chi^2(1) = 0.01$ , ( $p > 0.05$ ) (0.9220). This implies that the regression residuals were homoscedasticity and that there was no existence of heteroscedasticity in the regression estimation. To check for multicollinearity, the variance inflation factor (VIF) for the variables in each model was reported (Denis, 2011). The highest VIF was 2.87, and the mean VIF  $> 1$  in all models, suggesting that multicollinearity was not a problem. Lastly, based on the Hausman test, the chi-square statistics was 32.90 and a p-value of 0.0000, therefore we failed to accept the null hypothesis thus concluded that pooled OLS regression was the appropriate model for estimation.

### 3.7 Hypotheses testing

The analysis was based on multiple linear regression that established the nature of the relationship between the independent variable(s), the moderating variable and the dependent variable. Using a sequence of hierarchical multiple regression the null hypotheses were tested. The main regression function tested hypothesis regarding the moderating effect of gender diversity on the relationship between financial structure and operating efficiency, which was  $OE = \alpha_0 + \beta_1 FS + \beta_2 GD + (FS * GD) + \varepsilon$ , similar regression models were performed containing the 5 individual components of financial structure. Where FS is financial structure, GD is gender diversity and  $FS * GD$  is the interaction term for financial structure component and gender diversity.

## 4. Results

The section presents descriptive statistics and regression analysis for 435 observations (N) from 87 housing co-operatives.

### 4.1 Descriptive statistics

Measures of central tendency, namely the mean, standard deviations, range, coefficient of variation, skewness, and kurtosis were used to present the descriptive statistics. Tables 1 displays the descriptive statistics of the variables of the study.

**Table 1: Descriptive statistics**

Component	N	Mean	SD	CV	Min	Max	Skewness	Kurtosis
Share capital	435	8,792,854	34,173,684	3.9	2240	45,8971,697	10	122
Institutional Capital	435	29,604,817	252,936,643	8.5	-81,328,176	3,167,441,449	9.3	94
Members Deposits	435	55,300,176	157,663,428	2.9	32,500	1,372,965,712	4.8	29
Non-interest Bearing Liabilities	435	87,061,258	895,919,694	10	7,900	17,047,512,064	18	347
Interest Bearing	435	97,241,562	41,419,4471	4.3	108,061	4,282,967,179	8.9	89
Gender Diversity	435	0.5251	0.2051	0.3906	0.000	0.693	-1.653	4.647
CRS-TE scores	435	0.6776	0.3652	1.000	0.37	1	.5405	4.563

Results in Table 1 specify that the components of financial structure, gender diversity index and efficiency scores did not disperse widely from the mean. Despite the dispersion, the coefficient of variation points out that the efficiency score did not vary greatly across housing co-operatives. This validates that the management procedures and the scale of operations were not significantly unrelated across the housing co-operatives. The findings agree with the result of Worthington (1999) and Li et al. (2015) who established that measuring efficiency required very little distinction in geographic and institutional characteristics. The gender diversity index indicates the level of dominance or abundance (evenness) of the gender attribute in the board of directors. A high gender diversity index signifies equal representation, while an index of zero or close to zero indicates the dominance of one gender attribute; thus, inequality in representation. The statistics indicate that the spread of representation of board by gender was fairly distributed across all boards. For this reason, the effect of gender diversity as a moderator guided the interpretation of gender diversity index.



#### **4.2 Hypotheses test for moderator**

Table 2 reports the results of hierarchical regression analyses. This study tested three hypotheses about the effect of gender diversity (GD) and the individual components of financial structure (FS) over operating efficiency (OE). The main regression function was:

$OE = \alpha_0 + \beta_1 FS + \beta_2 GD + (FS * GD) + \varepsilon$ . Similar regression models for each of the five components of financial structure (FS) comprising the board diversity indices were analysed.

**Table 2: Regression Results for the Moderating Effect of Gender Diversity**

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
	CRS-TE	CRS-TE	CRS-TE
Share Capital	0.0429*** (0.007)	0.0479*** (0.002)	0.0526*** (0.004)
Institutional Capital	0.00803** (0.011)	0.00694** (0.026)	-0.000746 (0.966)
Members Deposits	-0.0127*** (0.002)	-0.0103*** (0.010)	-0.0517*** (0.000)
Non-Interest bearing Liabilities	0.000202 (0.816)	0.000236 (0.780)	0.00146 (0.693)
Interest Bearing	-0.00131 (0.589)	-0.00140 (0.555)	0.00555 (0.592)
Gender Diversity		-0.106*** (0.000)	-0.0708 (0.331)
Interaction Term (share capital * Gender Diversity)			-0.317 (0.190)
Interaction Term (Institutional capital * Gender Diversity)			-0.154 (0.374)
Interaction Term (Members Deposit * Gender Diversity)			0.297** (0.012)
Interaction Term (Non-interest Bearing * Gender Diversity)			0.0298 (0.541)
Interaction Term (Interest Bearing *Gender Diversity)			-0.0667 (0.463)
Constant	0.773*** (0.000)	0.828*** (0.000)	0.813*** (0.000)
Observations	435	435	435
R <sup>2</sup>	0.064	0.106	0.130
Adjusted R <sup>2</sup>	0.053	0.094	0.107
F-Stat	5.862	8.485	5.72
Degrees of Freedom	(5, 429)	(6, 428)	(11, 423)
P-value of F-stat	0.0000	0.0000	0.0000
<i>P-values in parentheses* indicates level of significance, * p&lt;0.10, ** p&lt;0.05, *** p&lt;0.01</i>			

In model 1 the results for individual components of financial structure on operating efficiency indicate that share capital, institutional capital and members' deposits had a significant effect on operating efficiency. Even though the non-interest bearing and interest-bearing liabilities were insignificant, the p-values of F-statistics at 1% was statistically significant in model 1.

Nevertheless, when gender diversity (moderator) was included - as indicated in model 2 – the share capital ( $\beta = 0.0479$ ), institutional capital ( $\beta = 0.00694$ ), members' deposits ( $\beta = -0.0103$ ), and gender diversity ( $\beta = -0.106$ ) were statistically significant while non-interest bearing and interest-bearing were insignificant. However, adjusted ( $R^2$ ) increased from 0.053 to 0.094 thus implying that gender diversity had a bearing on operating efficiency.

In model 3, the interaction term created by centering the product of the components of financial structure\*gender diversity index was introduced in the analysis to check whether the interaction affected operating efficiency. The findings show that when the interaction term was included into the model, there was insignificant effect for share capital (-0.317) (0.190), institutional capital (-0.154) (0.374), non-interest bearing (0.0298) (0.541) and interest-bearing liabilities (-0.0667) (0.463) except for members' deposits which was significant (0.374) (0.297). Despite the insignificant effect of most interaction terms, the adjusted ( $R^2$ ) changed from 0.053 to 0.107. This implies there was a positive change in model 3 thus concluding that gender diversity contributed to changes in financial structure and consequently operating efficiency. Comparing the results of gender diversity in models 1 and 3, the magnitude of the beta coefficient and adjusted  $R^2$  varied after adding the interaction term. The implication here is that attempts to enhance gender equality among board members of housing co-operatives contributed to a decline in operating efficiency. Therefore, based on the results of model 1 and 3, adjusted  $R^2$  had changed after the inclusion of the moderator, therefore, the null hypothesis was rejected.

## **5. Discussion and Implications**

Largely, this research provides empirical evidence for the moderating effect of gender diversity in the relationship between financial structure and operating efficiency. The findings are not generally consistent with the expectations since gender diversity was expected not to affect operating efficiency. The findings of Ramly et al.'s (2015) reported that gender diversity had a significant negative effect on cost and profit efficiency. Whilst Ekadah and Mboya (2011) findings show that gender diversity affected performance of commercial banks in Kenya. This implies that components of financial structure primarily triggered gender diversity would be an important matter in the election of the board of directors of housing co-operative societies. Therefore, housing co-operatives should consider gender diversity in the election of board members through bridging the gender gap gradually by encouraging either gender to offer themselves for election.

## 6. Conclusion and Recommendation

Regarding gender diversity as a moderator in the relationship between financial structure and operating efficiency. The findings indicate that gender diversity caused changes in the association between the independent variable and dependent variable therefore, members should advocate for equitable gender representation across boards of housing co-operatives. The research concludes that Shannon index of diversity should be advanced as a new approach for the computation of gender diversity index from traditional methods for instance Blau index, which is based on a nominal scale. The Shannon index of diversity reported a gender diversity index that showed a disproportionate representation of board members by gender across boards of housing co-operatives.

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