

# The Effect of Board Structure on Egyptian Mutual Fund Performance: A Structural Equation Model Analysis

Nancy Youssef<sup>1</sup> & Peng Zhou<sup>2</sup>

<sup>1</sup> School of Management and Technology, Arab Academy for Science, Technology & Maritime Transport, Egypt

<sup>2</sup> Cardiff Business School, Cardiff University, UK

Correspondence: Nancy Youssef, School of Management and Technology, Arab Academy for Science, Technology & Maritime Transport, Egypt. Tel: 203-562-2366. E-mail: nancyyoussef@aast.edu

Received: January 6, 2020

Accepted: January 28, 2020

Online Published: February 10, 2020

doi:10.5539/ijef.v12n3p1

URL: <https://doi.org/10.5539/ijef.v12n3p1>

## Abstract

**Purpose** – This paper empirically explores the causality between board structure and the fund performance in the mutual fund industry of an emerging market.

**Design** – Using a panel of 82 Egyptian funds spanning 10 years before and after the global financial crisis, we develop a Structural Equation Model to deal with the endogeneity between measures of governance and performance in a systematic and identified way.

**Findings** – Experimental results show a significant negative relationship between the equity ownership by the directors and the fund performance. Evidence shows little support for a significant effect of board structure on the performance after controlling for the endogeneity. It implies the misconduct of governance rules in Egypt, especially the weakness in board composition.

**Originality**– Given the important role of mutual fund industry in Egypt, this is the first study of its kind explores the causality between board structure and the fund performance in the mutual fund.

**Keywords:** corporate governance, mutual fund, endogeneity, structural equation model

**JEL Classification:** G34, G23, C3.

## 1. Introduction

Most studies on the nexus among performance, board structure and ownership structure are based on developed economies. Baysinger and Butler (1985) find that there is a positive relationship between the number of independent directors and performance in major US business corporations. Similarly, Khorana et al. (2007) also confirm this relationship in the US mutual fund industry. They distinguish three components of board composition: the executive component, the monitoring component, and the instrumental component. The executive component provides information and expertise necessary for corporate strategy and business policy. The monitoring component fulfils a policing function over management's performance and represents shareholders' interests. The instrumental component provides general knowledge, networking, and productive links between organizations. They conclude that inside directors provide the executive component; independent directors fulfil the monitoring component. Cochran et al. (1985) provide evidence to support this complementarity between the inside and outside/independent directors. Similarly, Rosenstein and Wyatt (1990) document positive abnormal returns when an outside director is appointed with more positive abnormal returns for impartial and financial outsiders compared to the appointment of corporate outsiders. Brickley et al. (1994) also support the independent director monitoring hypothesis and show that outsider-dominated boards accrue positive performance on the declaration of poison pill defences, among others (Yermack, 1996; Ding & Wermers, 2012).

However, many studies find that the proportion of outside directors have a negative impact on performance (Agrawal & Knoeber, 1998; Agrawal & Knoeber, 1996; Klein, 1998; Bhagat & Black, 2002). Additionally, other empirical work finds no significant relationship at all (Hermalin & Weisbach, 1991; Mehran, 1995; Ferris & Yan 2007). Due to the lack of experience of most of the independent directors, Adams et al. (2009) find that firms that suffer from essential financial problems during the 2008-2009 crisis, had more independent directors than others.

The empirical findings on the effect of board size on firm performance are also mixed. Agrawal and Knoeber

(1998), Yermack (1996), Eisenberg et al. (1998), Cheng (2008) and Guest (2009) all find a negative relationship, while Belkhir (2009), Ding and Wermers (2012) and Wintoki et al., 2012 find a positive relationship. Barnhart and Rosenstein (1998) show that the board composition, managerial ownership, and performance are endogenous. Brickley and James (1987) argue that there is a negative correlation between managerial consumption of perquisites and both proportion of independent directors and concentration of ownership. Similar conclusions are obtained by Mak and Li (2001). Recent evidence from Kryzanowski and Mohebshahedin (2016) also shows a positive relationship between directors' ownership and CEF returns of US closed-end funds (CEFs) during 1994-2013, where the generalized method of moments estimator is used to solve the endogeneity problem.

It has been gradually recognised that endogeneity exists widely in many corporate finance models (Agrawal & Knoeber, 1996; Cremers & Romano, 2011; Youssef et al., 2017; Sakr et al., 2017). The endogenous relationship between board structure and performance has received a special attention in the empirical literature (Durlauf & Quah, 1999; Asada et al., 1998; Wintoki et al., 2012). Evidence from developed countries with mature financial institutions shows that firms with stronger shareholder rights had higher firm value, higher profits, higher sales growth, lower capital expenditures, and made fewer corporate acquisitions, because the quality of fund governance is positively correlated to fund performance (Gompers et al., 2003). In particular, Cremers and Romano (2011) use difference-in-differences technique to examine the impact of the mutual fund voting disclosure regulation announced by the SEC in 2003. The endogeneity issue is handled by taking differences to purify the effect of the regime shift. In an earlier paper by Agrawal and Knoeber (1996), the potential endogeneity problem between internal governance measures and performance is addressed by spelling out the agency problem between managers and shareholders. They find that the effect of insider shareholding disappears when the simultaneous systems framework is used.

Structural models have gradually gained its popularity in the corporate governance literature. For example, Dalton et al. (1999) builds a structural model to explain board composition. Lin (2005) studies the influences of the board of directors and large external shareholders on CEO compensation. Tam and Tan (2007) examine the relationship between ownership types and firm performance. Zhang (2010) employs a similar tool to examine how corporate boards can create a sustainable competitive advantage. Similar to Cremers and Romano (2011) and Agrawal and Knoeber (1996), the current paper examines the role of corporate governance in mutual fund performance allowing for endogenous board structure and ownership structure. This structural equation model (SEM) approach explicitly spells out the endogeneity among the three key variables, corporate governance, and ownership structure and fund performance. The advantage of the SEM approach over the so-called limited information approach (e.g. 2SLS, GMM, difference-in-differences) is that it is more statistically efficient in data use and it paints a more complete picture of how endogenous variables interact with each other in a system. More importantly, we provide a better identification strategy by a clearly defined structural model, compared to the reduced-form models which underlie the limited information approach.

In this paper, we attempt to answer four questions by a systematic and structural approach in the context of an emerging market, Egypt:

- What are the determinants for the performance of mutual funds?
- What are the determinants for the board structure of mutual funds?
- What are the determinants for the ownership structure?
- Are these three questions inter-correlated?

The aim of this research is to improve a model to enhance the performance of mutual fund board of directors in the Egyptian Stock Market. To achieve the aim of this research, three research objectives are established. Objective one: to present a comprehensive literature review on mutual fund governance, and how it has become a very important issue for both developed and emerging countries. Objective two: to examine the ability of mutual funds managers to fulfil excess returns, and build system-based model (SEM) to analyse the mutual causality among endogenous variables. Objective three: to provide a set of recommendations to improve the performance of mutual funds in the Egyptian Stock Market.

The rest of this paper is structured as follows: section 2 reviews the previous literature; section 3 discusses the research gaps section 4 discusses the empirical hypothesis on the relationship between mutual fund board structure and performance; section 5 discusses the research design including the econometric approach and data description ; section 6 lays out the structural equation modelling analysis. Finally, section 7 concludes, and it presents research contributions and suggestions for future studies.

## 2. Literature Review

In corporate governance research, there has been a slow but constant increase in the use of SEM (Dalton et al., 1999; Lin, 2005; Tam & Tan, 2007; and Zhang, 2010). For example, Dalton et al (1999) uses a structural equation model to measure board composition. Lin (2005) studies the influence of the board of directors and large external shareholders on controlling CEO compensation using SEM. Tam and Tan (2007) examine the relationship between ownership types and firm performance through SEM. Zhang (2010) employs SEM to examine how corporate boards can create a sustainable competitive advantage (Azim, 2012). Similar to Cremers and Romano (2011) and Agrawal and Knoeber (1996), this paper examines the role of corporate governance in mutual fund performance through investigating the effect of the board of directors on mutual fund performance, and the effect of ownership on mutual fund performance which will be illustrated below.

In agency theory, the corporate boards, assuming the power to look after the firm, involve in arm's length transaction with CEO and design such compensation plans which provide CEO with efficient incentives to maximize the shareholder value, and hence reduce moral hazard problem arising from separation of ownership from control. This predicts a positive link between CEO compensation and firm performance (Ibrahim et al., 2019).

Baysinger and Butler (1985) suggest that there is a positive relationship between independent directors and performance. They further view that board composition as providing three components: the executive component, the monitoring component, and the instrumental component. The executive component provides information and expertise necessary for corporate strategy and business policy. The monitoring component fulfils a policing function over management's performance and represents shareholders' interests. The instrumental component provides general knowledge, networking, and productive links between organizations. They conclude that inside directors provide the executive component; independent directors fulfil the monitoring component. Similarly, Khorana et al. (2007) illustrate that independent directors enhance performance.

The results of Cochran et al. (1985) raise doubts about the theory that insider-dominated boards allow managers to consume higher levels of perquisites than do boards having other compositions. Similarly, Rosenstein and Wyatt (1990) document positive abnormal returns when an outside director is appointed with more positive abnormal returns for impartial and financial outsiders compared to the appointment of corporate outsiders.

Brickley et al. (1994) also supports the independent director monitoring hypothesis and shows outside dominated boards accrue positive performance on the declaration of poison pill defences. On the contrary, Agrawal and Knoeber (1998) find that the proportion of outside directors have a negative impact on performance.

Furthermore, (e.g., Agrawal & Knoeber, 1996; Klein, 1998; Bhagat & Black, 2002) find a negative relationship between independent directors and firm performance. Additionally, (Hermalin & Weisbach, 1991; Mehran, 1995; and Ferris & Yan, 2007) find no relationship at all. On contrary, Yermack (1996), and Ding and Wermers (2012) find a positive relationship. Due to the lack of experience of most of the independent directors, Adams et al. (2009) find that firms that suffer from essential financial problems during the 2008-2009 crisis, had more independent directors than others.

Additionally, (e.g., Agrawal & Knoeber 1998, Yermack, 1996; Eisenberg et al., 1998; Cheng, 2008; and Guest, 2009) find a negative relationship between firm performance and board size. On contrary, Belkhir (2009) and Ding and Wermers (2012) find a positive relationship between firm performance and board size (Wintoki et al., 2012).

Barnhart and Rosenstein (1998) find that the variables of board composition, managerial ownership, and performance are simultaneously determined. Recent empirical work supports the monitoring hypothesis for board of directors. Brickley and James (1987) find that there is a negative correlation between managerial consumption of perquisites and both proportion of independent directors and concentration of ownership. Similarly, Mak and Li (2001) find that there is a negative correlation between the proportion of independent directors and both board size and managerial ownership. Recent evidence of Kryzanowski and Mohebshahedin (2016) finds that there is a positive relationship between directors' ownership and CEF returns of U.S. closed-end funds (CEFs) during 1994-2013, using a dynamic panel two-step system generalized method of moment's estimator to solve the endogeneity problem.

Corporate governance for emerging economies is a topic of vital importance (Patel, 2019). This topic is much important for the emerging economies because they have different dynamics and are closely controlled. So due to this, the research results of developed economies cannot be used for policy development in an emerging economy context. Furthermore, the first Egyptian Code of Corporate Governance (ECCG) was issued in 2005 but lacks complete implementation.

### 3. Research Gaps

A large body of empirical research on corporate finance suggests that governance structures improve performance, but this research has serious issues with endogeneity (Wintoki et al., 2012). However, the implications for the empirical work will be usefulness if it does not deal with endogeneity problem, because the results will be biased and cannot be dependable (Roberts & Whited, 2012).

Consequently, when this research investigates the role of corporate governance mechanisms on performance, endogeneity come from the powerful association between past values of the regressand (performance), and current values of the regressors (corporate governance structure) (Wintoki et al., 2012; Agrawal & Knoeber, 1996; Rediker & Seth, 1995; Chandio, 2011; Klein & Zur, 2011; Westland, 2010; Rundle-Thiele et al., 2008; Cornett et al., 2007; Hair et al., 2006). There are many methods of overcoming this; including Maximum likelihood (ML) and Generalized Method of Moments (GMM).

The first method (2SLS/3SLS) requires finding an Instrumental Variable (IV). The solution to such problem is to change the way we estimate  $\beta$  to make it identifiable. For this, we should have an "instrument", a variable which we can refer to as  $z$ . There are two conditions that should be satisfied about  $z$  to consider it a valid instrument:

- 1)  $z$  must be uncorrelated with  $\varepsilon$ :  $E(\varepsilon z) = 0$ .
- 2)  $z$  must be correlated to  $x$ , and preferably, this correlation will be as high as possible:  $E(z x) \neq 0$ .

We can use lagged variable as (IV). Thus,  $X_{1t}$  is a current (present-time) exogenous variable, while  $X_{1(t-1)}$  is a lagged exogenous variable, with a lag of one time period. Additionally, (3SLS) method requires three steps: first-stage regressions to get predicted values for the endogenous regressors; a (2SLS) step to get residuals to estimate the cross-equation correlation matrix; and the final 3SLS estimation step. (2SLS/3SLS) is a Limited Information Maximum Likelihood (LIML) which estimates a single structural equation at a time.

Although, GMM and ML is a general framework for deriving estimators, there is a difference between the assumptions of the two methods. ML estimators use assumptions about the specific families of distributions for the random variables to derive an objective function. It selects the parameters that are probably have generated the observed data, which can be proceeded by maximizing an objective function. GMM estimators use assumptions about the moments of the random variables to derive an objective function. The assumed moments of the random variables present population moment conditions, which can be achieved by minimizing an objective function. Accordingly, ML can be more efficient than GMM, because ML uses the entire distribution instead of uses specified moments only (Breitung & Lechner, 1995).

The second method is (SEM) which is a multivariate technique that allows us to estimate a system of equations. Structural Equation Models are often drawn as Path Diagrams. Different likelihood values can be obtained when fitting the same model with SEM and GSEM because the normality of observed exogenous variables is never assumed with GSEM. SEM is a Full Information Maximum Likelihood (FIML) which estimates all the equations and all the unknown parameters jointly.

A variety of corporate governance mechanisms has been previously investigated by using various analytical techniques except SEM (e.g. Boo & Sharma, 2008; Coles et al., 2001; Fernández & Arrondo, 2005; and Ward et al., 2009). Therefore, the existence of endogeneity is the enormous restriction of these studies (Schultz et al., 2010). Therefore, to achieve the research objectives empirically, this paper depends on Structural Equation Modeling (SEM) which is a stringent statistical technique to solve the endogeneity problem (Hox & Bechger, 1998; Azim, 2012). Furthermore, SEM is a Full Information Maximum Likelihood (FIML) that estimates all the equations and all the unknown parameters jointly and obtains robust findings compared with (2SLS/3SLS) which is a Limited Information Maximum Likelihood (LIML) that estimates a single structural equation at a time.

Therefore, this paper utilizes SEM which is a multivariate technique that allows us to estimate a system of equations. Structural Equation Models are often drawn as Path Diagrams. SEM is a Full Information Maximum Likelihood (FIML), which estimates all the equations and all the unknown parameters jointly and obtains robust findings, compared with GMM.

### 4. Research Hypotheses

This paper expands the existing fund governance literature by exploring the impact of the board of directors on mutual fund performance. The objective aim of this study is to improve a model to enhance the performance of mutual fund board of directors in the Egyptian Stock Market. In particular, to examine the ability of mutual funds managers to fulfil excess returns using system-based model (SEM).

*Board size:* Lipton and Lorsch (1992), Jensen (1993), Cheng (2008), and Yermack (1996) find that there is negative

correlation between board size and performance, because larger board of directors needs more settlements to avoid conflicts, which might lead to harm firm value. Similarly, Conyon and Peck (1998) argue that board size has negative impact on firm performance in a number of European firms. Eisenberg et al. (1998) and Guest (2009) suggest that there is a significant inverse relationship between board size and profitability, because poor communication might lead to difficulty in decision-making process which restricts the influence of large board of directors. In contrast, Belkhir (2009) finds that there is a positive association between board size and performance in banking sector; this might be due to that board of directors has the ability to get rid of the poor performing managers. Similarly, Dalton et al. (1999) finds a positive correlation between board size and performance.

*H1: There is a positive relationship between board size and fund performance ( $Perf_{it}$ ).*

*Proportion of independent directors and inside directors:* the two ways inside outside director classification is used to measure the proportion of inside directors on the board, and the proportion of outside directors on the board. Ding and Wermers (2012) demonstrate that independent directors have a significant influence on pre-expense performance. In contrast, Ferris and Yan (2007) utilize a large sample of mutual fund families for 2002. They argue that there is no relationship between proportion of independent directors and fund performance

*H2: There is a positive relationship between the proportion of independent directors on the board and fund performance ( $Perf_{it}$ ).*

Fama (1980), Chau and Leung (2006), and Weir and Laing (2003) suggest that boards with a higher proportion of independent directors will increase the quality of monitoring over management because “they are not affiliated with the company as officers or employees, and thus are independent representatives of the shareholders’ interests” (Pincus et al., 1989). On the other hand, Eng and Mak (2003), Barako et al. (2006), and Gul and Leung (2004) report a significant negative association between the level of voluntary disclosure and board independence. Al-Moataz and Hussainey (2013) also find a negative association between corporate governance, voluntary disclosures and board independence in Saudi Arabia, and therefore leads to a lower level of CG Index.

*H3: There is a negative relationship between the proportion of independent directors on the board and corporate governance index (CGQ) of the fund management company.*

*Board committee structure:* to examine the role of board committee structure on the performance of mutual funds, this paper focuses on investment committees and audit committees. Similar to Chan et al. (2013) and Lassoued and Elmira (2012), the proportion of directors on the audit committee and the proportion of directors on the investment committee are included in the regression analysis. Furthermore, Klein (1998) finds a positive correlation between the percentage of inside directors on investment committees and stock returns. This result is consistent with Fama and Jensen’s (1983) argument that inside director presents prominent knowledge helping the board of directors to make the right investment decisions in the long-term strategy. Similarly, Lam and Lee (2012) find that there is a positive correlation between nomination committee and performance. Although, in this paper there is not any significant relationship neither between the proportion of directors in the investment committee and fund performance (measured by Absolute return, Sharpe ratio and Treynor ratio), nor between the proportion of directors in the audit committee and fund performance (measured by Absolute return, Sharpe ratio and Treynor ratio), the results are consistent with Dowers (1997) argument that investment committee and audit committee are not statistically significantly related to the fund return.

Empirical evidence suggests that audit committees which consist of non-executive directors play a complementary role to information disclosure to decrease agency costs (Forker, 1992; Barako et al, 2006 Fama, 1980; Collier, 1993). Samaha and Dahawy (2010 and 2011, in press) found an audit committee existence complementary effect on the general corporate voluntary disclosures in Egypt; and therefore leads to a higher level of CG Index (Samaha et al, 2012).

*H4: There is a positive relationship between the proportion of directors on the audit committee and corporate governance index (CGQ) of the fund management company.*

*Equity ownership by directors:* Morck et al (1988) examine the effect of managerial ownership on firm value, as measured by Tobin's Q. They find that there is a positive correlation between managerial ownership and firm value. Short and Keasey (1999) demonstrate that at higher levels of managerial ownership, firms in UK achieve better. Similarly, Mehran (1995) argues that there is a positive correlation between the proportion of equity held by managers and firm performance. Similar to Ferris and Yan (2007), equity ownership by each director is reported within one of five EGP ranges. The proportion of directors holding zero shares are used as the empirical measure of equity ownership by directors rather than the proportion of directors holding more than EGP 100,000 (or any other EGP range), because holding zero shares of the funds are highly revealing of the absence of any incentive

for the fund directors.

*H5: There is a negative relationship between the equity ownership by the directors ( $Dir_{own}$ ) and fund performance( $Perf_{it}$ ).*

*H6: There is a positive relationship between the equity ownership by the directors ( $Dir_{own}$ ) and the corporate governance index (CGQ) of the fund management company.*

*Corporate governance index:* Similar to Erkens et al (2012), the influence of corporate governance on firm performance is explored. A governance index is constructed - calculated as an average of six governance indicators - using the annual reports of the companies and the companies' websites - based on the OECD Corporate Governance Principles April 2004 (EFSA).

*H7: There is a positive relationship between the corporate governance index (CGQ) of the fund management company and fund performance( $Perf_{it}$ ).*

Erkens et al. (2012) find that powerful mutual fund governance is positively correlated to mutual fund performance. Similar to Kaufmann et al. (2009), a governance index is constructed - calculated as an average of six indicators of governance quality- using the annual reports of the companies and the companies' websites, based on the OECD Corporate Governance Principles April 2004 (EFSA), as illustrated below:

- 1) Effective Corporate Governance Framework: *the corporate governance framework should promote transparent and efficient markets, be consistent with the rule of law and clearly determine the responsibilities among different supervisory, regulatory and enforcement authorities.*
- 2) The rights of shareholders: *the corporate governance framework should protect and facilitate the exercise of shareholders' rights.*
- 3) The equitable treatment of shareholders: *the corporate governance framework should ensure the equitable treatment of all shareholders, including minority and foreign shareholders.*
- 4) The role of stakeholders in corporate governance: *the corporate governance framework should recognize the rights of stakeholders established by law or through mutual agreements and encourage active co-operation between corporations and stakeholders in creating wealth, and the sustainability of financially sound enterprises.*
- 5) Disclosure and transparency: *the corporate governance framework should ensure that timely and accurate disclosure is made on all material matters regarding the corporation, including the financial situation, performance, ownership, and governance of the company.*
- 6) The responsibilities of the board: *the corporate governance framework should ensure the strategic guidance of the company, the effective monitoring of management by the board, and the board's accountability to the company and the shareholders.*

A series of dummy variables is included to describe each of the six components of the corporate governance index of each company represented in the sample to take a value of 1 to indicate the presence of each governance indicator, and zero to indicate the absence of each governance indicator.

We assume that we can write the score of each company for each of the six components of governance index as follows:

$$CGQ_i = \text{Framework} + \text{Shareholders Rights} + \text{Shareholders Treatment} + \text{Stakeholders Role} + \text{Disclosure} + \text{Board Responsibilities}$$

$$CGQ_{it} = \frac{1}{n} \sum_{i=1}^n CGQ_i$$

where:

$CGQ_{it}$ : the average corporate governance score for company  $i$  at time  $t$ ;

$CGQ_i$  is the total corporate governance score for company  $i$ , and  $n$  is the number of governance indicators (six) included in the corporate governance index.

The following discussion contains a brief description of the control variables.

*Time:* the period of the study is the years between 2004 and 2013 due to data availability that can affect the performance of the fund. Jones (2007) suggests that investors who wish to maximize return should start their search by looking for younger funds. Similarly, Aggarwal and Jorion (2010) find strong evidence of out-performance of

hedge funds during the first two to three years of existence. Based upon the previous discussion, there is a negative relationship between the fund age – which increases over time – and fund performance. Accordingly, there is a negative relationship between the time and fund performance.

*Investment objective dummy variables:* the type of investment objective a fund adopts affects the risk of a fund's investment portfolio and the return that the fund earns (Williamson, 1972). Similar to Ferris and Yan (2007), Tufano, and Sevick (1997), a series of dummy variables is included to capture the investment objectives represented in the sample to take a value of 1 if the fund belongs to the same category under study and zero otherwise. The investment objectives represented in the sample are: Fund Obj1: Open End Fixed Income Fund, Fund Obj2: Open End Equity Fund, Fund Obj3: Open End Balanced Fund, Fund Obj4: Open End Islamic Fund, Fund Obj 5: Open End Money Market Fund, and Fund Obj 6: Others.

*Standard Deviation of the Stock Return:* Agrawal and Knoeber (1996) include standard deviation of the mutual fund return in their analysis as one of the indicators of the cost arises from holding undiversified portfolio, and they find a negative relationship between the standard deviation of the stock return and the percentage of shares owned by directors. Similar to them, the standard deviation of the mutual fund return is included on model (A) only to control for the total risk, because Perf1 (Absolute Performance) is not a risk-adjusted measure like the other two models. Finally, the following Table 1 summarizes the key studies in the previous literature that investigate the effect of board structure on funds' performance.

## 5. Research Design

### 5.1 The Data

The simple random sample for the study is nearly the entire population existing between 2004 and 2013, which are 82 mutual funds due to data availability. The sample is free from survivorship bias, since the sample includes both surviving and dead funds.

### 5.2 Endogenous and Exogenous Variables Measurements

This study uses different endogenous variables, exogenous variables, and control variables which might influence the fund performance (Huber & Mellace, 2013). The endogenous variables in this study are the financial performance of mutual funds in the Egyptian Stock Market, corporate governance index, and director ownership. The empirical analysis is carried out at different levels: firstly, an absolute performance analysis is presented before risk adjusted performance analysis ratios such as Treynor and Sharpe's are carried out.

Therefore, a mutual fund with large Treynor ratio and low Sharpe ratio indicates that it has a relatively larger unsystematic risk (Bodie et al., 2007). See, Table 2 providing a full set of variables of the study (Huber & Mellace, 2013).

Similar to Agrawal and Knoeber (1996), the standard deviation of the mutual fund return is included on model (A) only to control for the total risk, because Perf1 (Absolute Performance) is not a risk-adjusted measure like the other two models. Finally, the following Table 1 summarizes the key studies in the previous literature that investigate the effect of board structure on funds' performance.

### 5.3 Description of Sample Characteristics

This section presents descriptive statistics regarding board structure and fund performance. Table 3 includes four panels; Panel A: Fund and Governance Descriptive Statistics for the three models (A), (B), and (C), Panel B: Pearson Correlations for model (A), Panel C: Pearson Correlations for model (B), and Panel D: Pearson Correlations for model (C) which will be illustrated below. The results are based on a sample of 932 annual and semi-annual observations for 82 mutual funds from 2004 to 2013.

#### 1). Panel A: Fund and Governance Descriptive Statistics

Panel A provides fund and corporate governance statistics for the overall sample. Perf1, Perf2, and Perf3 for the overall sample, have mean values of, 0.16%, -49%, and -15%, respectively. Their mean values, however, vary somewhat more with perf2 having lower mean value than Perf1 (about 49.16%), and perf3 having lower mean value than Perf1 (about 15.16%). These differences in the mean values are driven by the divergence between Treynor ratio (Perf3), Sharpe ratio (Perf2), and the Absolute performance (Perf1) in ranking investment portfolios. Although both the Treynor ratio and Sharpe ratio are used as risk-adjusted measure to rank investment portfolios, Treynor's compensates for the systematic risk only, while the Sharpe ratio compensates for the total risk, comprising both systematic and unsystematic risk.

For the overall sample, on average, the board structure is comprised of eight directors, and about 80% of them are independent directors. The board composition, on average, consists of 27% of directors on the audit committee,

and 18% of directors on the investment committee. The board of directors, on average, includes 34% financial directors, and 41% professional directors. The average tenure of directors is 19 years. In terms of director ownership, about 84% of directors hold zero shares. Furthermore, the corporate governance index, on average, is 58%. The number of funds overseen by the fund management company, on average, is nine mutual funds. Furthermore, the major funds in the sample belong to open end equity fund.

## 2). Panel B: Pearson Correlations (Model A)

Panel B provides the correlations between all variables included in model (A). Interestingly, the correlations for BSize, and IndDir is positive for DirOwn suggesting that vigilant boards are associated with a high fraction of directors holding zero shares. Furthermore, the correlations for Perf1, BSize, AudComm, DirOwn, DirFn, FinDir, and ProfDir are positive for CGQ suggesting that vigilant boards are associated with a higher corporate governance index. Additionally, the correlations for AudComm, InvComm, and CGQ are positive for Perf1 suggesting that vigilant boards are associated with a higher performance.

## 3). Panel C: Pearson Correlations (Model B)

Panel C provides the correlations between all variables included in model (B). As indicated before in model (A), the correlations for BSize and IndDir are positive for DirOwn. Furthermore, the correlations for BSize, AudComm, DirOwn, DirFn, FinDir, and ProfDir are positive for CGQ. Additionally, the correlations for AudComm and DirTn are positive for Perf2 suggesting that vigilant boards are associated with a higher performance.

## 4). Panel D: Pearson Correlations (Model C)

Panel D provides the correlations between all variables included in model (C). As indicated previously in model (A) and model (B), the correlations for BSize and IndDir are positive for DirOwn. Furthermore, the correlations for BSize, AudComm, DirOwn, DirFn, FinDir, and ProfDir are positive for CGQ. Additionally, the correlation for IndDir is positive for Perf3 suggesting that vigilant boards are associated with a higher performance. Overall, the results are consistent with agency theory literatures suggest that firm good governance characteristics, including an independent and vigilant board, will enhance firm performance (Essen et al., 2013).

## 6. Empirical Evidence

To test the effect of board composition on mutual fund performance, this paper utilizes SEM technique to deal with the endogeneity problem through the following three stages model specification, model estimation, and goodness of fit indices (Hair et al., 2006).

### 6.1 Structural Model Specification

To establish the model for fund performance, we base our specification on Erkens et al. (2012) who argue that powerful mutual fund governance is positively correlated to mutual fund performance and on Short and Keasey (1999) and Mehran (1995) who argue that there is a positive correlation between the proportion of equity held by managers and firm performance. These two hypotheses are derived from literature on the developed economies, so we expect to see some different patterns in the context of an emerging market like Egypt. The first equation of the SEM can be modelled by the following specification:

$$\begin{aligned} Perf_{it} = & \alpha_{it} + \alpha_1 (B_{Size}) + \alpha_2 (Ind_{Dir}) + \alpha_3 (Fin_{Dir}) + \alpha_4 (Prof_{Dir}) + \alpha_5 (Dir_{Tn}) + \alpha_6 (CGQ) \\ & + \alpha_7 (Dir_{Own}) + \alpha_8 (Inv_{Comm}) + \alpha_9 (Aud_{Comm}) + \alpha_{10} (Dir_{Fn}) + \alpha_{11} (\sigma_i) + \alpha_{12} (Time) + \alpha_{13} (Dum_p) \\ & + \alpha_{14} (Fund_{Obj1}) + \alpha_{15} (Fund_{Obj2}) + \alpha_{16} (Fund_{Obj3}) + \alpha_{17} (Fund_{Obj4}) + \alpha_{18} (Fund_{Obj5}) + \varepsilon_1 \end{aligned}$$

Next, the corporate governance quality is assumed to be endogenous with a recursive dependence on the equity ownership by the directors, among other controls:

$$\begin{aligned} CGQ = & \beta_{it} + \beta_1 (B_{Size}) + \beta_2 (Ind_{Dir}) + \beta_3 (Fin_{Dir}) + \beta_4 (Prof_{Dir}) + \beta_5 (Dir_{Tn}) + \beta_6 (Dir_{Own}) + \\ & \beta_7 (Inv_{Comm}) + \beta_8 (Aud_{Comm}) + \beta_9 (Dir_{Fn}) + \beta_{10} (Fund_{Obj1}) + \beta_{11} (Fund_{Obj2}) + \beta_{12} (Fund_{Obj3}) \\ & + \beta_{13} (Fund_{Obj4}) + \beta_{14} (Fund_{Obj5}) + \varepsilon_2 \end{aligned}$$

Lastly, the determination of ownership structure is also endogenized using the following specification following the literature on ownership structure:

$$\begin{aligned} Dir_{Own} = & \gamma_{it} + \gamma_1 (B_{Size}) + \gamma_2 (Ind_{Dir}) + \gamma_3 (Fin_{Dir}) + \gamma_4 (Prof_{Dir}) + \gamma_5 (Dir_{Tn}) + \gamma_6 (Dir_{Fn}) \\ & + \gamma_7 (Inv_{Comm}) + \gamma_8 (Aud_{Comm}) + \gamma_9 (Fund_{Obj1}) + \gamma_{10} (Fund_{Obj2}) + \gamma_{11} (Fund_{Obj3}) \\ & + \gamma_{12} (Fund_{Obj4}) + \gamma_{13} (Fund_{Obj5}) + \varepsilon_3 \end{aligned}$$

Since there are three different measures of performances (Perf1, Perf2 and Perf3), we end up with three estimates.

The model using Perf1 (absolute performance), Perf2 (Sharpe ratio) and Perf3 (Treyner ratio) are respectively named as Model 1, Model 2 and Model 3. The detailed estimation results of the three models are reported in Table 4, and we illustrate the path diagram of the three endogenous variables in Figure 1.

The differences in the significance levels between the three models are driven by the divergence between Treynor ratio (Perf3), Sharpe ratio (Perf2), and the absolute performance (Perf1) - which are presented before risk adjusted performance analysis ratios such as Treynor and Sharpe's that are carried out - in ranking investment portfolios.

Furthermore, the major limitation of the Treynor Index is that it can be utilized to the schemes with positive betas which indicate a positive correlation with the market movement. The results will mislead if applied to the schemes with negative betas which indicate an inverse relationship with the market movement. In model (C), there are about 173 observations with negative betas, and due to the previous limitation of Treynor Ratio, results are misleading when applied to the schemes with negative betas. Therefore, in model (C) - Perf3 measured by Treynor Ratio - and unlike the previous two models, there is only one estimated coefficient for the path Fund Obj5 → Perf3 which is statistically significant and all other estimated coefficients are insignificant.

### 6.2 The Estimation Results

The results about the estimation of the structural model (A), (B), and (C) are presented in Table 4.

According to the previous, in testing the hypotheses, results reveal that there are eleven hypotheses in this study, and ten hypotheses i.e. H1, H2, H3, H4, H5, and H6 are statistically significant. Thus, these hypotheses are supported. While, one hypothesis i.e. H7 is found statistically not significant. Hence, this hypothesis is not supported.

Although the hypothesis is not supported, the result is consistent with Ebaid (2011) argument that the internal audit function in Egypt suffers from many weaknesses that affect negatively its effective role in corporate governance. First, internal audit in Egyptian firms does not enjoy a considerable level of organizational independence or management support, and it does not have the adequate level of qualification necessary to fulfill their new responsibilities.

Second, the internal audit function in the Egyptian firms still focuses on the traditional role pertaining to traditional financial audit and has not shifted to the new expanded role, whereas internal audit added value to the organization through providing assurance and consulting activities pertaining to monitoring, evaluating, and improving risk management, control, and governance process. Finally, there is a weak level of interaction between internal and external audit in Egyptian firm.

Furthermore, the result is consistent with Fawzy (2003) argument that however corporate governance standards in Egypt have improved significantly, as reflected in the overall assessment of all five OECD principles, the degree of progress is still far from properly implementing corporate governance principles.

### 6.3 The Direct, Indirect and Total Effects

Table 5 demonstrates direct, indirect, and total effects among all variables in the Structural Equation Model. It includes three panels (A), (B), and (C) respectively.

#### Panel A: The Effect of Board Structure on Mutual Fund Performance

Panel (A) demonstrates several significant direct, indirect, and total effects. Firstly, DirOwn, ProfDir, BSize, FinDir, and IndDir have significant direct influence on Perf2. Secondly, DirOwn, BSize, and IndDir have significant indirect influence on Perf2 through the mediating effect of CGQ (DirOwn → CGQ → Perf2, BSize → CGQ → Perf2, IndDir → CGQ → Perf2). Finally, DirOwn, ProfDir, and FinDir have significant total influence on Perf2. The Structural Equation Model indicates that evaluation of total effects on the determination of Perf2, arising from the combination of direct and indirect effects of the variables in the model.

#### Panel B: The Effect of Board Structure on Corporate Governance Index

Panel (B) demonstrates several significant direct, indirect, and total effects. Firstly, DirOwn, DirTn, ProfDir, AudComm, BSize, DirFn, FinDir, and IndDir have a significant direct influence on CGQ. Secondly, ProfDir, BSize, DirFn, FinDir, and IndDir have a significant indirect influence on CGQ through the mediating effect of DirOwn (ProfDir → DirOwn → CGQ, BSize → DirOwn → CGQ, DirFn → DirOwn → CGQ, FinDir → DirOwn → CGQ, IndDir → DirOwn → CGQ). Finally, DirOwn, DirTn, ProfDir, AudComm, BSize, DirFn, FinDir, and IndDir have a significant total influence on CGQ.

#### Panel C: The Effect of Board Structure on Ownership Structure

Panel (C) demonstrates several significant direct and total effects. Firstly, ProfDir, BSize, DirFn, FinDir, and

IndDir have a significant direct influence on DirOwn. Finally, ProfDir, BSize, DirFn, FinDir, and IndDir have a significant total direct influence on DirOwn. The Structural Equation Model indicates the evaluation of total effects on the determination of DirOwn arising from the direct effects of the variables in the model only because there are no indirect effects of the variables in this model.

#### 6.4 The Goodness of Fit

The fit indices shown in Table 6 indicate that the hypothesized structural model provides a good fit to the data. The fit indices indicate that the hypothesized structural model provides a good fit to the data. Firstly, the Likelihood Ratio Chi-squared Test (model vs. saturated) is insignificant for the three models showing that there is no significant difference between the model and saturated model - assuming that all variables are correlated - and therefore, indicating a good fit of the model. The Likelihood Ratio Chi-squared Test (baseline vs. saturated) is significant for the three models showing that there is a strong significant difference between saturated model and baseline model - assuming that no variables are correlated except for exogenous variables when endogenous variables are present - and therefore indicating a good fit of the model.

Secondly, Population error measure, i.e. RMSEA is 0.010, 0.021, 0.021 for the three models respectively, indicates a good fit of model because  $RMSEA < 0.05$ . Thirdly, Information criteria measure, i.e. AIC and BIC, indicate that model (A) with the low-est AIC and BIC absolute value 1904.801, 1658.097 respectively fits the data better than the other two models with the larger AIC and BIC value. Fourthly, Baseline comparison measure, i.e. CFI is 1.000, 1.000, and 1.000 for the three models respectively, and TLI is 0.999, 0.995, and 0.994 for the three models respectively, indicates a good fit of model because  $CFI > 0.95$ , and  $TLI > 0.95$ . Finally, Size of residuals measure, i.e. SRMR is 0.002, 0.002, and 0.002 for the three models respectively, and CD is 0.979, 0.988, and 0.975 for the three models respectively, indicates a good fit of model because  $SRMR < 0.08$ , and CD values closer to 1.

In Table 7 the (R-squared) value of Perf3 (measured by Treynor ratio) is 0.01 and is considered low. This might be due to the major limitation of the Treynor ratio that the results will mislead if applied to the schemes with negative betas, and in model (C), there are 173 observations with negative betas.

### 7. Conclusion

Achieving the aim of this study contributes to the finance literature at three levels, theoretical, methodological and empirical levels. At the theoretical level, firstly, this study bridges the gap between different disciplines including financial performance, mutual fund industry, and corporate governance. Unlike previous studies (Morck et al., 1988; Klein, 1998; Eisenberg et al., 1998), the theoretical model provides insights into the interrelations between board structure, and ownership structure as fundamental determinants of mutual fund performance rather than investigating the effect of each of these mechanisms separately. Secondly, by studying the relationship between board structure and investor welfare, this study indirectly examines the effect of the regulatory requirement.

At the methodological level, unlike previous studies that have addressed that the relationship between board characteristics and firm performance may be spurious because they are endogenously determined and use OLS, 2SLS, 3SLS to overcome this problem (Erkens et al., 2012; Hermalin & Weisbach, 2001; Coles et al., 2008; Bhagat & Black, 2002), this study has achieved the broad objective of developing sophisticated statistical technique of multivariate data analysis (SEM) using STATA (MP v.13). The sample size is large enough to distinguish between different fund performance measures and provide possible differences in the results due to using different measures.

At the empirical level, this study is undertaken in Egypt, and provides evidence from the emerging markets which differ significantly from the developing markets (Farooque et al., 2007). Finally, the study provides evidence against the argument that corporate governance has a significant impact on performance in Egypt, at the level of the mutual funds. However, the study provides evidence of a positive association between independent directors and performance, and a positive association between equity ownership by directors and performance. The findings suggest that governance rules are included in the Egypt Code of Corporate Governance: Guidelines and Standards are not mandatory and lack legislative force (Sharma et al., 2008).

For future research, the model in this study could be expanded to include more factors such as director compensation, because there is no data available for complex-level director compensation in the Egyptian mutual funds. Thus, this paper suggests that the Egyptian Stock Market should require funds to disclose the total director compensation by the complex rather than per fund. The availability of time series data on director compensation by the complex leads to higher quality compensation data for research on the relationship between compensation and performance.

This paper conclude that most of the hypothesized relationships are supported (e.g. BSize is positively associated

with Perf2 and CGQ, IndDir is positively associated with Perf2 and negatively associated with CGQ, ProfDir is positively associated with Perf2 and negatively associated with DirOwn, AudComm is positively associated with CGQ, DirOwn is negatively associated with Perf2, DirFn is negatively associated with Perf2, and DirTn is negatively associated with CGQ). One is not supported (e.g., CGQ is not associated with Perf1, Perf2, and Perf3).

Additionally, this paper is consistent with (Kryzanowski & Mohebsahedin, 2016) argument that there is a positive relationship between ownership by directors and CEF returns (closed-end funds).

The main conclusion of this paper is to provide evidence through robust statistical analysis around the usefulness of governance attributes Egyptian mutual funds' performance. The paper finds no evidence on a significant relation between the corporate governance index of the fund management company and fund performance – measured by Absolute performance, Sharpe ratio, and Treynor ratio.

Therefore, this paper is consistent with Kirkpatrick (2009) argument that the contribution of effective board oversight and robust risk management including reference to widely accepted standards is not limited to financial institutions. It is also an important, but often neglected, governance aspect in nonfinancial companies. Potential weaknesses in board composition have been obvious for some time and widely debated. The remuneration of boards and senior management also remains a highly controversial issue in many OECD countries.

### Acknowledgements

I would like to express our deepest gratitude to the editors for their time, valuable comments and kind support. I am also grateful for all the research support from AAST (Egypt), Cardiff Metropolitan University and Cardiff University.

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## Appendix

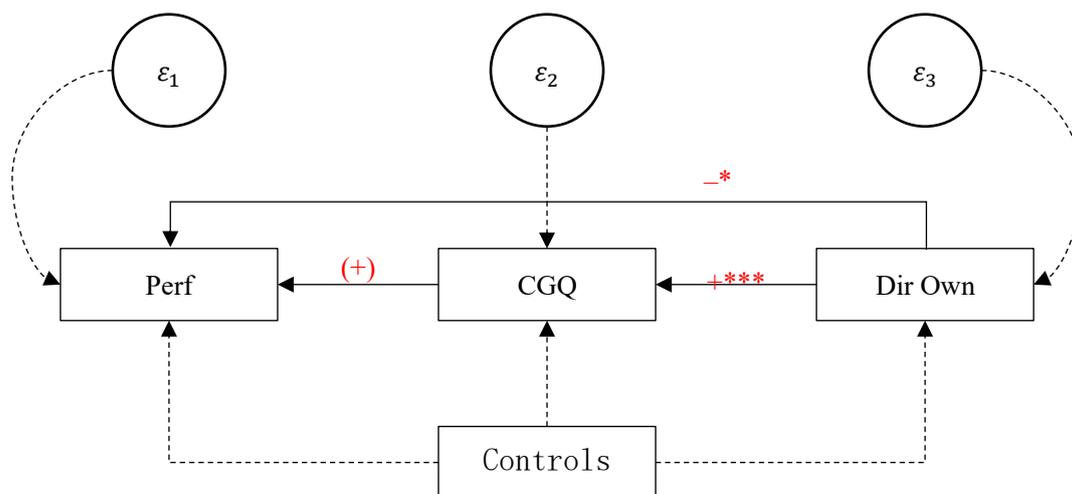


Figure 1. Path diagram of the structural equation model

Note. \* 10% level, \*\* 5% level, \*\*\* 1% level, (+) positive but not significant.

Table 1. Empirical analysis of the effect of board structure on performance

Paper	Sample	Period	Performance Measure	Methodology	Relationship
<i>Papers examining relationship between board independence and firm performance</i>					
Bhagat and Black (2002)	934	1988–1991	Q, ROA, ROS, Market	OLS, 2SLS	Negative
Coles, Daniel, and Naveen (2008)	8,165	1992–2001	Q	OLS, 3SLS	Negative for Development (R&D) firms
Ding and Wermers (2012)	2,689	1985–2002	(alpha) from four-factor model, (CS) measure	OLS	Positive
Ferris and Yan (2007)	531	2002–2003	fund's total return	OLS, 2SLS	None
Rashid <i>et al.</i> (2010)	90	2005–2009	Q, ROA	OLS	None
<i>Papers examining relationship between board size and firm performance</i>					
Coles, Daniel, and Naveen (2008)	8,165	1992–2001	Q	OLS, 3SLS	Positive for large diversified firms
Cheng (2008)	1,252	1996–2004	monthly stock returns, ROA, and Q,	OLS	Negative
Guest (2009)	2746	1981–2002	Q and ROA	OLS, GMM	Negative for large firms
Ding and Wermers (2012)	2,689	1985–2002	(alpha) from four-factor model, (CS) measure	OLS	Positive
Rashid <i>et al.</i> (2010)	90	2005–2009	Q, ROA	OLS	Negative

Source: Wintoki, et al. (2012).

Table 2. Summary of endogenous, exogenous and control variables

Endogenous Variables	Measures	Source
Mutual funds financial performance ( $Perf_{it}$ )	$R_{it} = \frac{1}{n} \sum_{i=1}^n R_i$	Calculated from mutual fund's prospectuses, mutual fund's financial statements, and economic review of Central Bank of Egypt.
	$TI_{it} = \frac{(R_{it} - R_{ft})}{\beta_i}$	
	$SI_{it} = \frac{(R_{it} - R_{ft})}{\sigma_i}$	
Corporate governance index ( $CGQ$ )	A constructed governance index calculated as an average of six governance indicators. A series of dummy variables is included to describe each of the six components of the corporate governance index of each company represented in the sample to take a value of 1 to indicate the presence of each governance indicator, and zero to indicate the absence of each indicator. $CGQ_i = Framework + Shareholders Rights + Shareholders Treatment + Stakeholders Role + Disclosure + Board Responsibilities$ $CGQ = \frac{1}{n} \sum_{i=1}^n CGQ_i$	Calculated from the annual reports of the fund management companies and the companies' websites.
Equity ownership by directors ( $Dir_{Owm}$ )	The number of directors holding zero shares divided by board size.	Board of director's annual reports of Egyptian funds.
Exogenous Variables	Measures	Source
Board size ( $B_{size}$ )	The size of the board .	Board of director's annual reports of Egyptian mutual.
Proportion of independent directors ( $Ind_{Dir}$ )	The number of independent directors on the board divided by board size.	Board of director's annual reports of Egyptian funds.
Director's background ( $Fin_{Dir}, Prof_{Dir}$ )	The directors' background.	Board of director's annual reports of Egyptian funds.
	The number of directors with a background in finance or investment divided by board size.	
Board committee structure ( $Inv_{Comm}, Aud_{Comm}$ )	The number of directors who are retired or serve on several different boards as professional directors divided by board size.	Board of director's annual reports of Egyptian mutual funds.
	The number of directors on the investment committee divided by board size.	
Number of funds overseen by the fund management company ( $Dir_{Fn}$ )	The number of directors on the audit committee divided by board size.	Board of director's annual reports of Egyptian mutual funds.
	The number of funds overseen by the fund management company.	
Director's tenure ( $Dir_{Tn}$ )	The average number of years the firm's directors have served on the board either the fund management company board or any other boards.	Board of director's annual reports of Egyptian mutual funds.

Control Variables	Measures	Source
Time	The years dummies between 2004-2013.	Sample Period.
Investment objective dummy variables ( $Fund_{obj}$ )	This study uses dummy variables for the investment objectives represented in the sample, to take a value of 1 if the fund belongs to the same category under study and zero otherwise.	Mutual fund prospectuses.
Standard Deviation of the Stock Return ( $\sigma_i$ )	The standard deviation of mutual fund returns.	Calculated.

Table 3. Descriptive statistics of board structure and fund performance

Panel A: Fund and Governance Descriptive Statistics												
Variable	Model 1				Model 2				Model 3			
	Number of obs = 932				Number of obs = 932				Number of obs = 932			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Perf1	0.0016	0.0049	-0.0153	0.016169								
Perf2					-0.4960	1.1348	-7.7820	1.0071				
Perf3									-0.1596	3.9083	-77.3124	33.8197
CGQ	0.5848	0.1650	0.1667	0.8333	0.5848	0.1650	0.1667	0.8333	0.5848	0.1650	0.1667	0.8333
DirOwn	0.8420	0.2348	0.0000	1.0000	0.8420	0.2348	0.0000	1.0000	0.8420	0.2348	0.0000	1.0000
FundObj5	0.2361	0.4249	0.0000	1.0000	0.2361	0.4249	0.0000	1.0000	0.2361	0.4249	0.0000	1.0000
FundObj4	0.1073	0.3097	0.0000	1.0000	0.1073	0.3097	0.0000	1.0000	0.1073	0.3097	0.0000	1.0000
FundObj3	0.1309	0.3375	0.0000	1.0000	0.1309	0.3375	0.0000	1.0000	0.1309	0.3375	0.0000	1.0000
FundObj2	0.3605	0.4804	0.0000	1.0000	0.3605	0.4804	0.0000	1.0000	0.3605	0.4804	0.0000	1.0000
FundObj1	0.0279	0.1648	0.0000	1.0000	0.0279	0.1648	0.0000	1.0000	0.0279	0.1648	0.0000	1.0000
Dump	0.5000	0.5003	0.0000	1.0000	0.5000	0.5003	0.0000	1.0000	0.5000	0.5003	0.0000	1.0000
Time	2009.79	2.6789	2004.00	2013.00	2009.79	2.6789	2004.00	2013.00	2009.79	2.6789	2004.00	2013.00
DirTn	19.0011	6.1760	6.0000	29.0000	19.0011	6.1760	6.0000	29.0000	19.0011	6.1760	6.0000	29.0000
ProfDir	0.4192	0.3156	0.0909	1.0000	0.4192	0.3156	0.0909	1.0000	0.4192	0.3156	0.0909	1.0000
AudComm	0.2741	0.1158	0.0909	0.5000	0.2741	0.1158	0.0909	0.5000	0.2741	0.1158	0.0909	0.5000
BSize	8.8680	3.1024	3.0000	17.0000	8.8680	3.1024	3.0000	17.0000	8.8680	3.1024	3.0000	17.0000
InvComm	0.1886	0.1269	0.0588	0.5455	0.1886	0.1269	0.0588	0.5455	0.1886	0.1269	0.0588	0.5455
DirFn	9.7135	5.0942	1.0000	15.0000	9.7135	5.0942	1.0000	15.0000	9.7135	5.0942	1.0000	15.0000
FinDir	0.3450	0.2171	0.0909	0.8000	0.3450	0.2171	0.0909	0.8000	0.3450	0.2171	0.0909	0.8000
IndDir	0.8096	0.2424	0.0000	1.0000	0.8096	0.2424	0.0000	1.0000	0.8096	0.2424	0.0000	1.0000
StdDev i	0.0184	0.0144	0.0000	0.0602								

Table 4. Estimated path coefficients of the SEMs

Equation	Model 1	Model 2	Model 3
<b>Perf</b>			
CGQ	0.0006	0.0145	0.6414
Dir Own	0.0020	-0.8908**	0.8654
Fund Obj5	-0.0023***	-1.4480***	-1.0128*
Fund Obj4	0.0021**	0.3722***	-0.1628
Fund Obj3	0.0012	0.3897***	-0.3382
Fund Obj2	0.0030***	0.3299***	-0.1568
Fund Obj1	-0.0014	-0.5204**	0.1519
Dump	0.0003	0.1009*	-0.2888
Time	-0.0005***	-0.0939***	-0.0245
Dir Tn	-0.0000	0.0066	0.0260
Prof Dir	0.0011	1.1817*	0.2290
Aud Comm	0.0020	-0.6722	0.1169
B Size	-0.0001	0.0591**	-0.0768
Inv Comm	-0.0000	0.1524	0.7073
Dir Fn	0.0001	-0.0202*	-0.0370
Fin Dir	-0.0028	-2.5017***	-0.4182
Ind Dir	-0.0018	0.5637*	0.1743
StdDev i	-0.2081***		
Constant	0.9205***	188.66***	48.8607

<b>CGQ</b>			
Dir Own	0.0998***	0.0998***	0.0998***
Fund Obj5	0.0443***	0.0443***	0.0443***
Fund Obj4	0.0465***	0.0465***	0.0465***
Fund Obj3	0.0307**	0.0307**	0.0307**
Fund Obj2	0.0216**	0.0216**	0.0216**
Fund Obj1	0.0521***	0.0521***	0.0521***
Dir Tn	-0.0095***	-0.0095***	-0.0095***
Prof Dir	0.4255***	0.4255***	0.4255***
Aud Comm	0.4015***	0.4015***	0.4015***
B Size	0.0124***	0.0124***	0.0124***
Inv Comm	-0.0333	-0.0333	-0.0333
Dir Fn	0.0146***	0.0146***	0.0146***
Fin Dir	-0.2357***	-0.2357***	-0.2357***
Ind Dir	-0.1463***	-0.1463***	-0.1463***
Constant	0.3177***	0.3177***	0.3177***
<b>Dir Own</b>			
Fund Obj5	0.0650***	0.0650***	0.0650***
Fund Obj4	0.0689***	0.0689***	0.0689***
Fund Obj3	0.1450***	0.1450***	0.1450***
Fund Obj2	0.0794***	0.0794***	0.0794***
Fund Obj1	0.0883***	0.0883***	0.0883***
Dir Tn	-0.0012	-0.0012	-0.0012
Prof Dir	-0.2624***	-0.2624***	-0.2624***
Aud Comm	0.0515	0.0515	0.0515
B Size	0.0440***	0.0440***	0.0440***
Inv Comm	0.0407	0.0407	0.0407
Dir Fn	-0.0095***	-0.0095***	-0.0095***
Fin Dir	0.2298**	0.2298**	0.2298**
Ind Dir	0.7272***	0.7272***	0.7272***
Constant	-0.0852**	-0.0852**	-0.0852**
var(e.Perf1)			
Constant	0.0000***		
var(e.Perf2)			
Constant		0.6082***	
var(e.Perf3)			
Constant			15.0616***
var(e.CGQ)			
Constant	0.0047***	0.0047***	0.0047***
var(e.DirOwn)			
Constant	0.0079***	0.0079***	0.0079***
Observations	932	932	932

*Note.* This table provides results from SEM of the effect of board structure on mutual fund performance for the sample of 82 funds from 2004-2013. In Model 1, mutual fund performance is measured by the absolute return, in Model 2 mutual fund performance is measured by Sharp ratio, and in Model 3, mutual fund performance is measured by Treynor ratio. \* Statistical significance at 10% level, \*\* Statistical significance at 5% level, \*\*\* Statistical significance at 1% level.

Table 5. Direct, indirect and total effects of the estimated structural equation model

**Panel A: The Effects of Board Structure on Mutual Fund Performance (Perf)**

	Direct Effect						Indirect Effect						Total Effect					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val
CGQ	0.001	0.790	0.015	0.969	0.641	0.730							0.001	0.790	0.015	0.969	0.641	0.730
DirOwn	0.002	0.220	-0.891	0.002	0.865	0.549	0.000	0.000	0.001	0.000	0.064	0.000	0.002	0.208	-0.889	0.002	0.929	0.520
FundObj5	-0.002	0.000	-1.448	0.000	-1.013	0.046	0.000	0.266	-0.057	0.033	0.089	0.477	-0.002	0.001	-1.505	0.000	-0.924	0.061
FundObj4	0.002	0.002	0.372	0.001	-0.163	0.771	0.000	0.265	-0.061	0.034	0.094	0.477	0.002	0.001	0.312	0.005	-0.069	0.899
FundObj3	0.001	0.057	0.390	0.000	-0.338	0.541	0.000	0.198	-0.129	0.004	0.155	0.475	0.002	0.009	0.261	0.011	-0.184	0.719
FundObj2	0.003	0.000	0.330	0.000	-0.157	0.735	0.000	0.204	-0.070	0.007	0.088	0.470	0.003	0.000	0.260	0.004	-0.069	0.877
FundObj1	-0.001	0.187	-0.520	0.003	0.152	0.863	0.000	0.254	-0.078	0.033	0.116	0.473	-0.001	0.259	-0.598	0.001	0.267	0.758
Dump	0.000	0.240	0.101	0.048	-0.289	0.256							0.000	0.240	0.101	0.048	-0.289	0.256
Time	-0.001	0.000	-0.094	0.000	-0.025	0.629							-0.001	0.000	-0.094	0.000	-0.025	0.629
DirTn	0.000	0.244	0.007	0.319	0.026	0.429	0.000	0.698	0.001	0.795	-0.007	0.684	0.000	0.104	0.008	0.180	0.019	0.498
ProfDir	0.001	0.692	1.182	0.017	0.229	0.926	0.000	0.761	0.240	0.187	0.029	0.974	0.001	0.758	1.421	0.002	0.258	0.911
AudComm	0.002	0.401	-0.672	0.110	0.117	0.955	0.000	0.698	-0.040	0.797	0.305	0.684	0.002	0.295	-0.712	0.071	0.422	0.829
BSize	0.000	0.612	0.059	0.001	-0.077	0.395	0.000	0.200	-0.039	0.004	0.049	0.467	0.000	0.498	0.020	0.095	-0.028	0.640
InvComm	0.000	0.976	0.152	0.598	0.707	0.623	0.000	0.581	-0.037	0.278	0.017	0.858	0.000	0.992	0.116	0.690	0.724	0.615
DirFn	0.000	0.365	-0.020	0.045	-0.037	0.460	0.000	0.739	0.009	0.158	0.001	0.986	0.000	0.378	-0.012	0.153	-0.036	0.359
FinDir	-0.003	0.491	-2.502	0.000	-0.418	0.906	0.000	0.594	-0.208	0.112	0.062	0.910	-0.003	0.542	-2.709	0.000	-0.356	0.919
IndDir	-0.002	0.239	0.564	0.037	0.174	0.897	0.001	0.245	-0.649	0.003	0.582	0.589	0.000	0.681	-0.085	0.606	0.756	0.355

**Panel B: The effects of board structure on Corporate Governance (CGQ)**

	Direct Effect						Indirect Effect						Total Effect					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val
DirOwn	0.100	0.000	0.100	0.000	0.100	0.000							0.100	0.000	0.100	0.000	0.100	0.000
FundObj5	0.044	0.000	0.044	0.000	0.044	0.000	0.007	0.001	0.007	0.001	0.007	0.001	0.051	0.000	0.051	0.000	0.051	0.000
FundObj4	0.047	0.000	0.047	0.000	0.047	0.000	0.007	0.001	0.007	0.001	0.007	0.001	0.053	0.000	0.053	0.000	0.053	0.000
FundObj3	0.031	0.002	0.031	0.002	0.031	0.002	0.015	0.000	0.015	0.000	0.015	0.000	0.045	0.000	0.045	0.000	0.045	0.000
FundObj2	0.022	0.008	0.022	0.008	0.022	0.008	0.008	0.000	0.008	0.000	0.008	0.000	0.030	0.000	0.030	0.000	0.030	0.000
FundObj1	0.052	0.001	0.052	0.001	0.052	0.001	0.009	0.003	0.009	0.003	0.009	0.003	0.061	0.000	0.061	0.000	0.061	0.000
DirTn	-0.010	0.000	-0.010	0.000	-0.010	0.000	0.000	0.086	0.000	0.086	0.000	0.086	-0.010	0.000	-0.010	0.000	-0.010	0.000
ProfDir	0.426	0.000	0.426	0.000	0.426	0.000	-0.026	0.002	-0.026	0.002	-0.026	0.002	0.399	0.000	0.399	0.000	0.399	0.000
AudComm	0.402	0.000	0.402	0.000	0.402	0.000	0.005	0.268	0.005	0.268	0.005	0.268	0.407	0.000	0.407	0.000	0.407	0.000
BSize	0.012	0.000	0.012	0.000	0.012	0.000	0.004	0.000	0.004	0.000	0.004	0.000	0.017	0.000	0.017	0.000	0.017	0.000
InvComm	-0.033	0.188	-0.033	0.188	-0.033	0.188	0.004	0.237	0.004	0.237	0.004	0.237	-0.029	0.252	-0.029	0.252	-0.029	0.252
DirFn	0.015	0.000	0.015	0.000	0.015	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000	0.014	0.000	0.014	0.000	0.014	0.000
FinDir	-0.236	0.000	-0.236	0.000	-0.236	0.000	0.023	0.020	0.023	0.020	0.023	0.020	-0.213	0.001	-0.213	0.001	-0.213	0.001
IndDir	-0.146	0.000	-0.146	0.000	-0.146	0.000	0.073	0.000	0.073	0.000	0.073	0.000	-0.074	0.000	-0.074	0.000	-0.074	0.000

**Panel C: The effects of board structure on director ownership (Dir Own)**

	Direct Effect						Indirect Effect						Total Effect					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val	Effect	P-val
FundObj5	0.065	0.000	0.065	0.000	0.065	0.000							0.065	0.000	0.065	0.000	0.065	0.000
FundObj4	0.069	0.000	0.069	0.000	0.069	0.000							0.069	0.000	0.069	0.000	0.069	0.000
FundObj3	0.145	0.000	0.145	0.000	0.145	0.000							0.145	0.000	0.145	0.000	0.145	0.000
FundObj2	0.079	0.000	0.079	0.000	0.079	0.000							0.079	0.000	0.079	0.000	0.079	0.000
FundObj1	0.088	0.000	0.088	0.000	0.088	0.000							0.088	0.000	0.088	0.000	0.088	0.000
DirTn	-0.001	0.057	-0.001	0.057	-0.001	0.057							-0.001	0.057	-0.001	0.057	-0.001	0.057
ProfDir	-0.262	0.000	-0.262	0.000	-0.262	0.000							-0.262	0.000	-0.262	0.000	-0.262	0.000
AudComm	0.052	0.249	0.052	0.249	0.052	0.249							0.052	0.249	0.052	0.249	0.052	0.249
BSize	0.044	0.000	0.044	0.000	0.044	0.000							0.044	0.000	0.044	0.000	0.044	0.000
InvComm	0.041	0.215	0.041	0.215	0.041	0.215							0.041	0.215	0.041	0.215	0.041	0.215
DirFn	-0.010	0.000	-0.010	0.000	-0.010	0.000							-0.010	0.000	-0.010	0.000	-0.010	0.000
FinDir	0.230	0.004	0.230	0.004	0.230	0.004							0.230	0.004	0.230	0.004	0.230	0.004
IndDir	0.727	0.000	0.727	0.000	0.727	0.000							0.727	0.000	0.727	0.000	0.727	0.000

Table 6. Structural equation model goodness of fit

Measure	Model 1	Model 2	Model 3	Description
Likelihood ratio				
chi2_ms	6.555	5.683	5.683	model vs. saturated
p > chi2	0.364	0.224	0.224	
chi2_bs	3638	4150	3464	baseline vs. saturated
p > chi2	0	0	0	
Population error				
RMSEA	0.01	0.021	0.021	Root mean squared error
90% CI, lb	0	0	0	Lower bound of confidence interval
90% CI, ub	0.045	0.057	0.057	Upper bound of confidence interval
Pclose	0.977	0.892	0.892	Probability RMSEA <= 0.05
Information criteria				
AIC	-1904.8	14049	17040	Akaike's information criterion
BIC	-1658.1	14291	17282	Bayesian information criterion
Baseline comparison				
CFI	1	1	1	Comparative fit index
TLI	0.999	0.995	0.994	Tucker-Lewis index
Size of residuals				
SRMR	0.002	0.002	0.002	Standardized root mean squared residual
CD	0.979	0.988	0.975	Coefficient of determination

Table 7. Structural equation model goodness of fit (R-squared)

Measures	Perf1	CGQ	DirOwn	Perf2	CGQ	DirOwn	Perf3	CGQ	DirOwn
Fitted	0.000	0.027	0.055	1.284	0.027	0.055	15.259	0.027	0.055
Variance Predicted	0.000	0.023	0.047	0.676	0.023	0.047	0.198	0.023	0.047
Residual	0.000	0.005	0.008	0.608	0.005	0.008	15.062	0.005	0.008
R-squared	0.182	0.827	0.857	0.526	0.827	0.857	0.013	0.827	0.857
MC	0.426	0.910	0.926	0.725	0.910	0.926	0.114	0.910	0.926
MC-squared	0.182	0.827	0.857	0.526	0.827	0.857	0.013	0.827	0.857

Note. MC = correlation between dependent variables and its predictions.

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