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Escuela de Doctorado

TESIS DOCTORAL

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Comprehensive Analysis of the Jordanian Firms: Privatization, Productivity and Financial Performance

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Preface

This research work is the origin of several scientific publications:

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Resumen

Esta tesis consiste en tres capítulos con el objetivo de analizar el mercado jordano y medir el impacto de los mecanismos de gobierno corporativo en la productividad de los empleados, la responsabilidad social corporativa y el desempeño financiero de las empresas públicas listadas en la Bolsa de Valores de Ammán durante el período posterior a la privatización.

Los mecanismos de gobierno corporativo seleccionados se refieren a la estructura de propiedad, el consejo de administración y director ejecutivo, ya que son las partes más importantes en el proceso de toma de decisiones financieras y no financieras en cada empresa.

Esta tesis contribuye a la literatura previa de varias maneras, es la primera investigación en resaltar la productividad de los empleados medida a través del análisis de envolvente de datos, en explorar e investigar qué motiva a las empresas a contribuir a la sociedad, en crear un índice de poder del director ejecutivo basado en tres dimensiones de poder: la estructura, la propiedad y el experto, en demostrar nueva evidencia sobre el valor significativo del tamaño del consejo de administración en los efectos del director ejecutivo a la empresa, por lo cual los directores ejecutivos poderosos mejoran la rentabilidad de la empresa cuando el tamaño del consejo de administración es grande, mientras que su impacto es negativo cuando el tamaño del consejo de administración es pequeño, y en extender la perspectiva teórica sobre el gobierno corporativo, la responsabilidad social corporativa y el poder de la alta gerencia en economías emergentes, como la economía de Jordania.

En esta investigación, la razón para seleccionar, examinar y analizar un mercado en economías emergentes, como la economía de Jordania, es que, a diferencia de los países desarrollados, los países en desarrollo como Jordania están siendo objeto de una investigación novedosa sobre gobierno corporativo. Otras razones incluyen la disponibilidad de datos, así como la alta concentración de propiedad caracterizada por la economía jordana, teniendo en cuenta que Jordania depende de una significativa inversión extranjera. Además, se busca examinar el rendimiento del mercado en el período posterior a la privatización, considerando que, durante la década de 1990, el gobierno jordano comenzó un proceso de privatización, que fue una reforma sin precedentes para aumentar el peso del sector privado en el producto interno bruto (PIB) de Jordania. Como resultado, se observó una disminución en la participación del gobierno jordano en las empresas cotizadas, pasando del 15% en la década de 1990 a menos del 6% en 2012. Además, Jordania está buscando hacer crecer y desarrollar su economía y mercado de capitales; por lo tanto, la Comisión de Valores de Jordania y la Bolsa de Valores de Amán han mejorado la transparencia y la divulgación de informes anuales de las empresas listadas durante las últimas dos décadas, comenzando con la implementación de las funciones del gobierno corporativo en 2002. En 2017 se emitieron nuevas instrucciones de gobierno corporativo, según las cuales todas las empresas listadas se vieron obligadas a

generar un informe detallado y separado de gobierno corporativo en sus divulgaciones anuales. Además, para mejorar y desarrollar la responsabilidad social corporativa (RSE) en las empresas listadas jordanas, la Bolsa de Valores de Amán se unió en 2016 a las Bolsas de Valores Sostenibles de las Naciones Unidas (SSE) y emitió directrices sobre la elaboración de informes de sostenibilidad para las empresas listadas con el fin de crear los informes anuales de sostenibilidad de las empresas (incluidos en el informe anual o en un informe separado), utilizando los estándares de la Iniciativa Global de Reportes (GRI) para lograr los objetivos de los informes de sostenibilidad. Así, los hallazgos de esta investigación serían útiles para añadir valor a los procesos mencionados anteriormente.

El objetivo del capítulo 1 es investigar el impacto de la concentración de la propiedad, la propiedad interna y el tamaño del consejo de administración en la productividad de los empleados de 136 empresas públicas listadas en la Bolsa de Valores de Amán desde 2012 hasta 2021. Utilizamos el Índice de Herfindahl-Hirschman para medir la concentración de propiedad, por sumando los cuadrados valores de 5 accionistas principales que posea 5% o más de las acciones de la empresa, y luego dividimos los resultados por 100 para tenerlos como porcentajes entre 0 y 100%. También, la propiedad interna es el porcentaje de acciones de los internos, el tamaño del consejo de administración es el número de miembros del consejo de administración. Por último, utilizamos el modelo de análisis de envolvente de datos (AED) para medir la productividad de los empleados. AED es un método no paramétrico para medir la productividad dentro de un grupo de unidades de toma de decisiones homogéneas, y para hacer observaciones considerando múltiples entradas y múltiples salidas para evaluar su eficiencia. consideramos el número de empleados como la entrada, y las ventas como la salida. El resultado de productividad varía de cero a uno, donde el uno representa la observación más eficiente y productiva, es decir, la que logra el mayor incremento del cambio proporcional en las ventas a partir del menor incremento del cambio proporcional en el número de empleados. Para el análisis, empleamos la regresión de mínimos cuadrados ordinarios, incluyendo efectos fijos por año y empresa, junto con la regresión Generalizada de los Momentos (GMM) para comprobar la endogeneidad. Nuestros resultados empíricos indican una relación no lineal entre la concentración de la propiedad y la productividad de los empleados, por lo cual la productividad incrementa en empresas con una proporción de concentración de la propiedad menor de 60%. Estos resultados son en la misma línea con la teoría del Stewardship, que postula que el accionista mayoritario afecta negativamente el desempeño de la empresa. También, una relación no lineal entre la propiedad interna y la productividad de los empleados, por lo cual la productividad incrementa en empresas con una proporción de la propiedad interna menor de 50%. Estos resultados son en la misma línea con la teoría de la agencia, que postula que alta proporción de la propiedad interna conducirá a problemas de agencia y, por lo tanto, afectará negativamente el desempeño de las empresas. Por último, una relación no lineal entre el tamaño del consejo de administración y la productividad de los empleados, por lo cual la productividad incrementa en empresas que tienen menos de 11 miembros en el consejo de administración. Estos resultados son en la misma línea

con la teoría del Stewardship, que postula que el consejo de administración más pequeño es mejor y más eficiente para monitorear y tomar decisiones. Nuestros resultados contribuyen en la literatura previa, como son los primeros en destacar la productividad de los empleados en economías emergentes, como la economía de Jordania.

Además, el objetivo del capítulo 2 es investigar el impacto de la concentración de la propiedad y la porción de la paga del director ejecutivo en la responsabilidad social corporativa (RSC) de 136 empresas públicas listadas en la Bolsa de Valores de Amán desde 2012 hasta 2022. Utilizamos el Índice de Herfindahl-Hirschman para medir la concentración de propiedad, por sumando los cuadrados valores de 5 accionistas principales que posea 5% o más de las acciones de la empresa, y luego dividimos los resultados por 100 para tenerlos como porcentajes entre 0 y 100%. Por otra parte, la porción de la paga del director ejecutivo es la proporción de la compensación anual del director ejecutivo sobre la compensación de los 5 ejecutivos principales, incluido el director ejecutivo, para medir el poder del director ejecutivo en relación con los demás de lo de más ejecutivos. Finalmente, utilizamos la donación corporativa como una medida de RSC. Para el análisis, la regresión de mínimos cuadrados ordinarios, con los efectos fijos por año y empresa ha utilizado, junto con la regresión Generalizada de los Momentos (GMM) para comprobar la endogeneidad. Nuestros resultados empíricos muestran efecto negativo de la concentración de la propiedad en la donación corporativa. También, encontramos una relación no lineal entre la porción de la paga del director ejecutivo y la donación corporativa, por lo cual la donación corporativa incrementa cuando la porción de la paga del director ejecutivo es menor de 50%. Estos resultados son en la misma línea con la teoría de la agencia, que postula que los grandes accionistas y los directores ejecutivos poderosos se centran más en sus beneficios personales y están menos dispuestas a donar. Nuestros resultados indican que los accionistas y directores ejecutivos en países en desarrollo deberían centrarse más en la RSC, como es beneficiosa para la sociedad y la economía en general, en lugar de usarla solo como una herramienta para obtener una mejor reputación y ganar más poder.

Por último, el objetivo del capítulo 3 es investigar el impacto del poder del director ejecutivo en la rentabilidad de la empresa. También, medimos el impacto mediador el tamaño del consejo de administración en la relación entre el poder del director ejecutivo y la rentabilidad de la empresa. Un índice para medir el poder del director ejecutivo ha creado de una muestra de 136 empresas públicas listadas en la Bolsa de Valores de Amán desde 2012 hasta 2022. El índice de poder del director ejecutivo se ha creado de dos maneras basadas en cuatro componentes de tres dimensiones del poder del director ejecutivo, que son: la porción de la paga del director ejecutivo y la dualidad del director ejecutivo, que reflejan el poder estructural; la propiedad del director ejecutivo, que refleja el poder de propiedad; y la tenencia del director ejecutivo, que refleja el poder experto. La primera manera, convertimos los componentes mencionados en variables ficticias, dado el valor de 1 si sus valores superan la mediana de la muestra del subsector y 0 de lo contrario. Después, combinamos los cuatro componentes ficticios, y el índice varía de cero a cuatro. La

segunda manera, aplicamos el análisis por componentes principales (PCA) para los cuatro componentes mencionados. También, el tamaño del consejo de administración es el número de miembros del consejo de administración. Utilizamos la rentabilidad sobre activos y el retorno sobre el capital como medidas de la rentabilidad de la empresa, ya que estas dos medidas reflejan el rendimiento de las inversiones de los accionistas. Para el análisis, la regresión de mínimos cuadrados ordinarios, con los efectos fijos por año y empresa ha utilizado, junto con la regresión Generalizada de los Momentos (GMM) para comprobar la endogeneidad. Nuestros resultados empíricos indican una relación no lineal entre el índice de poder del director ejecutivo y la rentabilidad de la empresa, por lo cual la rentabilidad disminuye en las empresas con un director ejecutivo poderoso. También, un efecto positivo de la interacción entre el director ejecutivo poderoso y el tamaño del consejo de administración en la rentabilidad sobre activos y el retorno sobre el capital, por lo cual la rentabilidad de la empresa disminuye con un director ejecutivo poderoso, y el tamaño del consejo de administración es menor de 9 miembros. Estos resultados son en la misma línea con la teoría de la agencia, que postula que los directores ejecutivos poderosos se concentran más en sus intereses personales. Por eso, los accionistas deben controlar y evaluar la eficiencia de los directores ejecutivos a través de consejos de administración grandes, para proteger sus intereses e incrementar la rentabilidad de la empresa en el caso de Jordania.

La conclusión de la tesis muestra que una alta concentración de propiedad afecta negativamente la productividad de los empleados y la contribución social de la empresa, que una alta propiedad interna afecta negativamente la productividad de los empleados, que un tamaño grande del consejo de administración afecta negativamente la productividad de los empleados pero es mejor para controlar la gestión ejecutiva, y que el director ejecutivo poderoso afecta negativamente el rendimiento financiero cuando el tamaño del consejo de administración es pequeño.

Estos resultados son importantes para la Comisión de Valores de Jordania y la Bolsa de Valores de Amán en su proceso continuo de mejorar y desarrollar las instrucciones de gobierno corporativo y la responsabilidad social corporativa. Finalmente, este análisis podría aplicarse a otros países del Medio Oriente.

Summary

Chapter 1 aims to investigate the impact of ownership concentration, insider ownership, and board size on employee productivity for 136 Jordanian public shareholding firms listed on the Amman Stock Exchange (ASE) from 2012 to 2021. Ownership concentration has been measured by Herfindahl–Hirschman Index (HHI), whereas insider ownership and board size have been represented as the proportion of shares held by insiders and by the number of board members, respectively. Lastly, employee productivity has been measured using a data envelopment analysis (DEA) tool. We employed ordinary least squares regression (OLS) including firm-year-fixed effects. Our empirical results indicate a non-linear relation between ownership concentration and employee productivity, whereby the productivity of employees increases in firms with a proportion of ownership concentration less than 60%. In addition, we found a non-linear relation between insider ownership and employee productivity, whereby the productivity of employees increases in firms with proportion of insider ownership less than 50%. Moreover, we found a non-linear relation between board size and employee productivity, whereby the productivity of employees increases in firms that have less than 11 board members. Our outcome contributed to the knowledge found in the previous literature, as it is the first to highlight the productivity of employees in emerging economies, such as the economy in Jordan.

Chapter 2 aims to investigate the impact of ownership concentration and chief executive officer (CEO) pay slice on corporate social responsibility (CSR) for 136 Jordanian public shareholding firms listed on the Amman Stock Exchange (ASE) from 2012 to 2022. Ownership concentration has been measured by Herfindahl–Hirschman Index (HHI), whereas CEO pay slice is the proportion of total CEO annual compensation over the top 5 executives' compensation including the CEO. Lastly, we took corporate donations as one of the most important practices within CSR strategies in Jordanian listed firms. We employed ordinary least squares regression (OLS) including firm-year-fixed effects. Our empirical results indicate a negative impact of ownership concentration on corporate donations. In addition, we found a non-linear relation between CEO pay slice and corporate donations, whereby when the CEO pay slice proportion is less than 50%, the increase in CEO pay slice leads to increased corporate donations. On the contrary, dominant CEOs with a pay slice proportion more than 50% are less willing to donate. These results are compatible with the *agency theory*, which states that large block holders are less willing to donate, powerful managers focus more on their personal benefits, and less powerful managers will use the social contributions and donation to gain more power. Our findings indicate that shareholders and managers in developing countries should focus more on CSR, as it is beneficial to society and the overall economy, rather than just use it as a tool to get a better reputation and gain more power.

Lastly, Chapter 3 aims to investigate the impact of chief executive officer (CEO) power on a firm's financial performance. In addition, we investigate the mediating impact of board size between CEO power and firm's performance. We created a CEO power index on a sample of 136 Jordanian listed firms on the Amman Stock Exchange (ASE) from 2012 to 2022. We used return on assets (ROA) and return on equity (ROE) as measures of a firm's performance. We employed ordinary least squares regression (OLS) including firm-year-fixed effects. Our empirical results indicate a non-linear relation between CEO power index and firm's profitability, whereby firm's profitability decreases in firms with powerful CEOs. In addition, the results indicate a positive impact of the interaction between powerful CEO and board size on ROA and ROE, whereby a firm's profitability decreases in firms with a powerful CEO, only when the board size is less than 9 members. These results are compatible with the *agency theory*, which posits that powerful managers concentrate more on their personal interests. Therefore, shareholders must control, monitor and evaluate managers' performance through large boards of directors, in order to protect the shareholder's interests and to improve the firm's performance.

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1. Corporate Governance and Employee Productivity: Evidence from Jordan

1.1 Introduction

Corporate governance (CG) has become a crucial issue (Parveen, 2021). Therefore, as per the Organization for Economic Cooperation and Development (OECD), many countries and organizations have become interested in implementing governance, as it helps to control corruption by creating an environment of transparency, trust, rule of law, and accountability, thus leading to the protection of financial stability, investments, and an increase in the growth rate (OECD, 2015). Akomea-Frimpong et al. (2022) argued that the objective of CG is to improve the monitoring and accountability of managers in order to decrease corruption and increase transparency, which would lead to greater benefits for shareholders. Accordingly, better CG is associated with a firm's better financial and non-financial performance and value (Aljifri and Moustafa, 2007; Tulcanaza-Prieto et al., 2020; Tulcanaza-Prieto and Lee, 2022).

This research contributes to the previous literature in several ways. To the best of our knowledge, this is the first article to consider employee productivity as a proxy of measuring a firm's performance in emerging economies and developing countries. Unlike the previous literature (Jaafar and El-Shawa, 2009; Qadorah and Fadzil, 2018; Sundarasen et al., 2024), which considered both a firm's profitability and market performance as proxies for measuring its overall performance. In addition, we utilized a data envelopment analysis (DEA) tool to measure employee productivity. DEA is a non-parametric method to measure productivity within a group of homogeneous decision-making units, and to make observations by considering multiple input and multiple outputs to evaluate its efficiency (Zhang and Li, 2020; Song et al., 2020). This is unlike the previous literature (Ngo and Le, 2019; Mia et al., 2023), which employed the DEA

to measure the financial efficiency of banks. Therefore, this research aims to bridge the research gap by highlighting the productivity of employees measured by DEA as an important proxy of a firm's performance in developing countries, with a focus on the ownership structure and board size as significant CG mechanisms. Furthermore, this research contributes to extending the theoretical perspective of CG and considers financial firms along with non-financial firms, providing that the former also play a considerable role in developing countries such as Jordan.

In this research, the reason for selecting and examining the CG in emerging economies, such as the economy of Jordan, is that, unlike developed countries, developing countries such as Jordan are under novel research on corporate governance. Additional reasons include the availability of data, as well as the high ownership concentration characterized by the Jordanian economy, considering that Jordan depends on significant foreign investment (Alzoubi, 2016). A supplementary reason is to examine the performance in the post-privatization period, bearing in mind that during the 1990s, the Jordanian government started a privatization process, which was an unprecedented reform to move towards increasing the weight of the private sector in the Jordanian gross domestic product (GDP). As a result, a decrease was observed in the Jordanian government's shareholding in listed companies from 15% in the 1990s to less than 6% in 2012 (Amman Stock Exchange, 2012). Moreover, Jordan is seeking to grow and develop its economy and capital market; hence, the JSC and ASE have improved the transparency and the disclosure of annual reports for the listed firms for the last two decades, starting with the roles of CG implemented in 2002 (Berg and Nenova, 2004). New governance instructions were issued in 2017, in which every public firm listed in the ASE became obligated to generate a separate, detailed CG report in their annual disclosures, as published

in the ASE by the end of the financial year of each firm (Securities Depository Center, 2017). Thus, the findings of this research would be useful to add value to the aforementioned process.

Accordingly, this research aims to measure the impact of two important parts of ownership structure: ownership concentration and insider ownership, along with board size on employee productivity for 136 Jordanian public shareholding firms listed on the ASE, from 2012 to 2021.

The basis of selection for the aforementioned mechanisms in relevance to the CG is due to the significance of large block holders, managerial shareholding power, and board size on the decision-making process and monitoring, which would naturally affect employee productivity and, in turn, reflect on the firm's overall performance.

The remainder of this research is structured as follows. Section 2 shows the theoretical framework. Section 3 shows the literature review and hypotheses. Section 4 shows the methodology and sample explanation. Section 5 shows the discussions and results. Finally, Section 6 shows the conclusions and limitations.

1.2 Theoretical Framework

In this research, we consider *agency theory* and *stewardship theory*, which are theories of CG. We aim to demonstrate the relationship between the parties involved in the functioning of a firm, which should lead to maximizing the wealth of the shareholders and stakeholders (Squires and Elnahla, 2020). *Agency theory* is the description of protecting the interests of shareholders from the separation between ownership and management functions (Jensen and Meckling, 1976). On the other hand, *stewardship theory* is the description of motivating managers to be executives rather than non-executives by providing them with more power, freedom, and responsibility to achieve the shareholders' interests (Turnbull, 2000).

Agency theory aims to limit any agency problems via CG mechanisms (Panda and Leepsa, 2017). Ownership concentration is considered one of the important mechanisms of CG to reduce agency problems by changing the paradigm of the investors; from only a capital supplier to agents with more managerial power and influence in the decision-making process (Reis and Pinto, 2021). Likewise, Burkart et al. (2014) argued that ownership structure and large block holders provide powerful and effective monitoring, as well as reduce the possibilities of takeovers. In addition, *agency theory* refers to the emergent conflict caused by managers who aim to increase their power in the firm. Therefore, the increase in holdings by insiders (board members and executive managers) means an increase in management power, which would lead to more agency problems (Fama and Jensen, 1983; Demsetz, 1983). Furthermore, *agency theory* emphasizes the monitoring role of the board of directors on behalf of the owners for the performance of managers to meet the interests of shareholders. Therefore, a larger board of directors is better for monitoring performance (Vitolla et al., 2019). On the other hand, *stewardship theory* focuses on increasing managerial power and authorities as a motivation to combine their interests with shareholder interest to maximize the wealth of the firm (Ho, 2005), in addition to minimizing the agency problems (Jensen and Meckling, 1976). Therefore, it facilitates an increase to insider holdings. Demsetz and Villalonga (2001) argued that the increase in the holdings of insiders would not lead to agency problems, because insiders are already representing their institutions as well as outsider shareholders who possess a large block of shares in the firm. Therefore, the insider's interests are identical to those of the outsider shareholders. Moreover, *stewardship theory* focuses on effective management. Therefore, there is no need for a large board size as this will decrease the efficiency of the decision-making process, while a smaller board size will enhance

performance (Kalsie and Shrivastav, 2016). Table 1.1 summarizes the chosen CG mechanisms in our research and their impact on employee productivity based on the above-discussed theories.

Table 1.1 Corporate governance (CG) mechanisms and theories.

CG Mechanism	***Agency Theory***	***Stewardship Theory***
Ownership Concentration	Solution to reduce the agency problems	Focus more in improving the insider ownership
Insider Shareholding	Obstruct the monitoring role of board of directors	Increase managerial power is better for monitoring firm's performance
Board Size	Bigger size is better for monitoring firm's performance	Smaller size is better for making efficient decisions

1.3 Literature Review and Hypotheses

1.3.1 Employee Productivity

Employee productivity is an important indication of a firm's performance, as it reflects the work value contributed by each employee (Claessens and Djankov, 1999; Cortés et al., 2017). Productivity is defined as the relation between the quality and the size of job tasks performed by employees to achieve the firm's goals (Rusdiyanto, 2021). In addition, it is the process of evaluating the performance of the employees in a similar job by comparing the output between them or the number of units or products that employees could accomplish within a preset schedule (Dorothy et al., 2020). Likewise, it is the level of employee performance based on having accomplished their duties and responsibilities, and it is calculated by dividing the number of products by the company's input (Saluy et al., 2021). It is considered to be the output divided by the input during a specific period of time (Obeng and Boachie, 2018). Edeh and Acedo (2021) identified productivity as the sales per worker, which is the definition that we considered in this research. Furthermore, Chiang and Lin (2007) measured productivity by considering labor and capital invested as inputs and sales as an output.

1.3.2 Ownership Concentration

Ownership concentration is an important mechanism of corporate governance, in which large block holders reduce agency problems. Horobet et al. (2019) referred to a positive relation between ownership concentration and firm's performance in Europe Western firms, but not for Europe Eastern firms after analyzing a sample of 3506 European firms over 2008 to 2016. Also, another study of 103 energy firms in Vietnam over 2007 to 2020 found that ownership concentration positively impacts the financial sustainability and profitability especially for smaller energy firms (Doung et al., 2022). A study of 304 firms from Arab countries over 2000 to 2002, found a positive significant impact of ownership concentration with a firm's financial performance. Moreover, the average ownership concentration of top three block holders in Jordan who own 10 % or more of shares was 40 % (Omran et al., 2008). As well, San Martin-Reyna and Duran-Encalada (2015) found a positive impact of ownership concentration between the same families on a firm's performance, which was measured by Tobin's Q for 75 firm's listed in Mexican Stock Exchange over 2005 to 2011. Also, Jaafar and El-Shawa (2009) found a positive impact of ownership concentration on a firm's financial performance for 103 Jordanian firms over 2002 to 2005. Zeitun and Tian (2007) assured that ownership concentration is necessary to increase the firm's financial performance for 59 Jordanian listed firms over 1989 to 2002. Drobetz, et al. (2019) found a positive impact of ownership concentration into higher firm value for 126 globally listed shipping firms over 1997 to 2016. Likewise, Huang (2020) considered ownership concentration as the most important mechanism of corporate governance, he analyzed the listed banks in China over 2007 to 2018, and found a positive impact of ownership concentration and banks profitability. As well, Iwasaki and Mizobata (2019) referred to the positive impact of ownership concentration and firms' performance after a meta-synthesis of 1517 estimated 69 studies. Claessens and Djankov (1999) analyzed 706 Czech firms over 1992 to 1997, they

found a high positive impact of ownership concentration, firm's financial performance and employee productivity. On the other hand, Lai et al. (2022) found a non-significant relation between ownership concentration and firm's performance for 1,658 entrepreneurial firms over 2004 to 2011. Demsetz and Lehn (1985) found a non-significant relation between ownership concentration and firm's profitability for 511 US firms over 1976 to 1980. A study of 31 firms listed at Malaysia's Stock Exchange over 2001 to 2012, found a non-significant correlation between ownership concentration and productivity efficiency (Janang et al., 2015).

Based on this previous literature, we propose the following hypothesis:

Hypothesis 1.1 *Ownership concentration is positively related to employee productivity.*

1.3.3 Insider Ownership

Several studies have examined the effect of insider ownership on a firm's performance. A study of 416 listed electronics firms in Taiwan over 1996 to 2001 found a negative relation between insider ownership and performance (Sheu and Yang, 2005). Likewise, Han and Suk (1998) emphasized about the negative relation between insider ownership and firm's performance for 5500 firms worldwide from Compustat database over 1988 to 1992. A study found no influence of insider ownership on performance for 490 Bulgarian manufacturing firms (Jones and Klinedinst, 2012). Furthermore, a study for 1833 Indian firms for the years 2000, 2001, 2003 and 2004 provided evidence about a positive non-monotonic relationship between low insider ownership and firm's performance (Pant and Pattanayak, 2007). Furthermore, Bhabra (2007) referred as well to the positive non-linear impact between insider ownership below 14% and over 40% on firm's performance in New Zealand over 1994 to 1998. On the same line, another study for 199 Indian firms over 2007 to 2018 found a positive non-linear impact between low level of insider ownership

and firm's performance and a negative non-linear impact between high level of insider ownership and firm's performance (Jain et al., 2020). On the other hand, Park and Jang (2010) referred to a positive impact of insider ownership and firm's performance for 251 worldwide restaurant firms from 2001 to 2006. In addition, Rose (2005) analyzed all Danish listed firms over 1998 to 2001 and found a high insider ownership is related to high performance. Furthermore, in Slovenia a positive impact of insider ownership on performance has been found after analyzing a sample of 488 firms (Hrovatin and Ursicˇ, 2002).

Based on this previous literature, we propose the following hypothesis:

Hypothesis 1.2 *Low insider ownership is positively related to employee productivity.*

1.3.4 Board Size

The previous literature mentioned the importance of board size as an important mechanism of corporate governance. Bermig and Frick (2010) did not find any impact of board size on 294 Germans firms over 1998 to 2007. Furthermore, Guest (2009) analyzed 746 UK listed firms over 1981 to 2002, and found no impact of board size on firm's performance. Moreover, he found a negative impact of board size on performance in large firms. Also, he referred that large board size obstructed communications and decision-making processes. Likewise, Cheng et al. (2008) found that the smaller board size increases firm's performance for 500 US firms from 1984 to 1991. In Australia, a significant negative impact of board size on firm's performance has been found for 1141 firms over 2001 to 2011 (Nguyen et al., 2015). As well, a study from the Irish stock market found a negative significant relation between board size and firm's performance for 77 listed firms in 2001 (O'Connell and Cramer, 2010). In addition, a study of 200 Shariah-compliant firms listed on the Kuala Lumpur Stock Exchange over 2014 to 2017 found a negative association between board size and firm's performance (Shahrier et al., 2018). On the other hand, Jaafar and El-Shawa

(2009) used return on assets and approximate Tobin's Q to measure firm's performance, and they found a positive association between board size and firm's performance for 103 Jordanian listed firms over 2002 to 2005. Likewise, a study of listed firms in India emphasized the positive significant impact of board size on firm's performance over 2008 to 2012 (Kalsie and Shrivastav, 2016).

Based on this previous literature, we propose the following hypothesis:

Hypothesis 1.3 *Large board size is negatively related to employee productivity.*

1.4 Methodology

1.4.1 Data Collection

Our sample contains firms listed on the ASE in the post-privatization period from 2012 to 2021. Firms for which annual reports are not available during the complete afore-mentioned period are excluded. Accordingly, the final sample consists of 136 financial and non-financial firms listed on the ASE, out of a total population of 172 listed firms as of 2021. Therefore, the sample represents 79% of the population.

1.4.2 Definitions and Measures of the Variables

Regarding the dependent variable, employee productivity *(EP)*, we employed a data envelopment analysis (DEA) tool. A DEA is a non-parametric tool to measure the productivity within a group of homogeneous decision-making units by considering multiple inputs and multiple outputs to evaluate efficient productivity (Zhang and Li, 2020; Song et al., 2020). Moreover, it is a tool to measure the efficient productivity of the decision-making units (DMUs) based on the proportional change in inputs and outputs (Yong-bae and Choonjoo, 2009). Thus, a DEA is one of the most efficient and accurate tools to measure the efficient productivity scale of employees by considering the constant returns to scale (CRS) and the variable returns to scale (VRS), based on the input-oriented DEA model or the output-oriented DEA model.

In this research, we employ the input-oriented DEA model because the goal of this model is to minimize the input to obtain an efficient score of productivity. As shown in Figure 1.1, the number of employees *(EMPNO)* is considered as the input, and total sales *(SALES)* is considered as the output (Chiang and Lin, 2007; McConaughy et al., 1998; Tian and Twite, 2011).

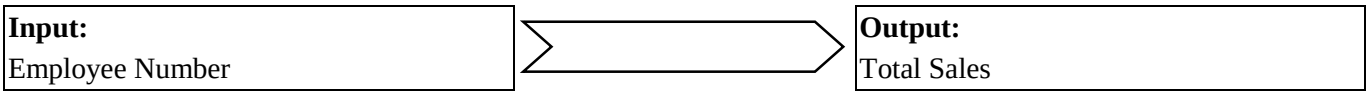


Figure 1. 1 Number of employees is the input, and total sales is the output of the Data Envelopment Analysis (DEA) model.

Equation (1.1) shows the input-oriented CRS DEA model, whereby the change in the input results in a constant change in the output:

$$\max \sum_{r=1}^{m} \frac{y_r\, SALES}{v_r\, EMPNO} \tag{1.1}$$

Subject to

$$\sum_{r=1}^{m} \frac{y_r\, SALES}{v_r\, EMPNO} \leq 1 \ (r = 1,\ldots..,m)$$

$$y_r \geq 0 \ (r = 1,\ldots..,m)$$

$$v_r \geq 0 \ (r = 1,\ldots..,m)$$

Equation (1.2) shows the input-oriented VRS DEA model, whereby the change in input may result in either synergistic, constant or antagonistic change in the output:

$$\max \sum_{r=1}^{m} y_r\, SALES + y0 \tag{1.2}$$

Subject to

$$\sum_{r=1}^{m} y_r \, SALES - v_r \, EMPNO + y0 \leq 0 \; (r = 1,\ldots..,m)$$

$$\sum_{r=1}^{m} v_r \, EMPNO = 1$$

$$y_r \geq 0 \; (r = 1,\ldots..,m)$$

$$v_r \geq 0 \; (r = 1,\ldots..,m)$$

In order to measure *(EP)* of each DMU, the following Equation (1.3) is considered (Ngo and Le, 2019; Mia et al., 2023; Yong-bae and Choonjoo, 2009):

$$EP = \frac{\text{VRS model}}{\text{CRS model}} \tag{1.3}$$

where y_r and v_r are the weights of output and input, respectively; *EP* = Employee productivity; CRS = Constant returns to scale; VRS = Variable returns to scale; m = Number of DMU; *SALES* = Total sales (output); *EMPNO* = Number of employees (Input).

In our sample, we have a total of (1,360) DMUs, as every DMU represents one firm-year observation. The results for *(EP)* are between 0 and 1, where 1 is the efficient and most productive DMU, i.e., achieving the highest increment of the proportional change of sales from the lowest increment of the proportional change of employees number. The data has been obtained from the firm's annual reports and disclosures from the ASE. Figure 1.2 shows the average employee productivity by year.

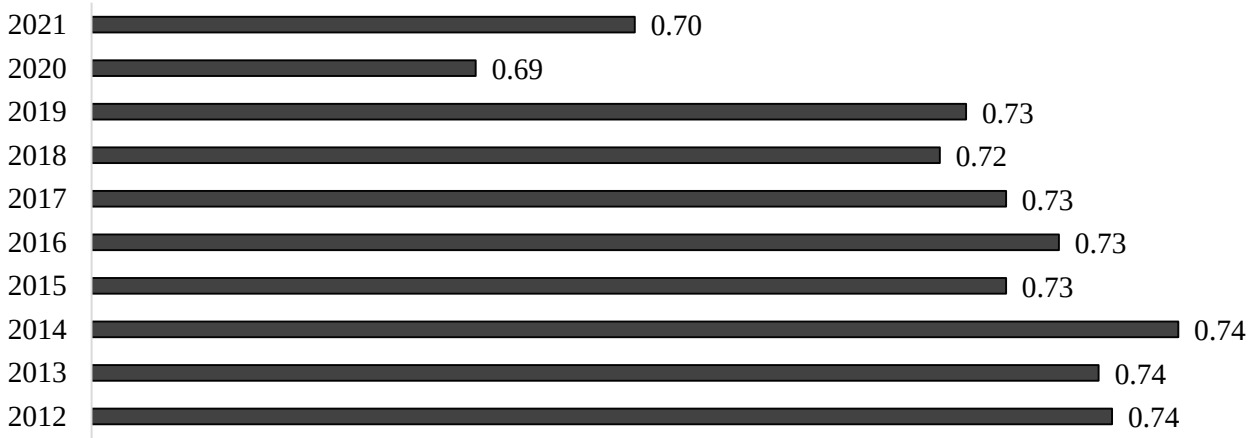


Figure 1. 2 Average employee productivity by year.

It is notable that the decrease in employee productivity in 2020 was due to the closing and restrictions that the government implemented to lessen and control the spread of the COVID-19 pandemic.

Regarding the independent variables, the first independent variable is ownership concentration *(OC)*, for which we implemented the Herfindahl–Hirschman Index (HHI) (a method considered one of the best to measure the concentration) by summing the square values of the top 5 major shareholdings who held 5% or more of shares, then we divided the results by 100 to interpret them as a percentage between 0 and 100%, as per the following Equation (1.4) (Demsetz and Lehn, 1985; Claessens and Djankov, 1999; Waheed and Malik, 2019):

$$OC = (T1^2 + T2^2 + T3^2 + T4^2 + T5^2) / 100 \quad (1.3)$$

where OC = Ownership concentration; T = The proportion of shares held by the shareholder.

The data have been obtained from the firm's annual reports and disclosures from the ASE. The second independent variable is insider shareholding *(INSH)*, which is the percentage of insider shareholding (board members, executive management, or their relatives) who hold 5% or more of shares (Welch, 2003; Sheu and Yang, 2005). The data have been obtained from the Refinitiv Eikon Database. The third independent variable is board size *(BMS)*, which is the number of members on a board of directors (Jaafar and El-Shawa, 2009; Kalsie and Shrivastav, 2016). The data has been obtained from the firm's annual reports and disclosures from the ASE.

Regarding the control variables, we employed several; firm size *(SIZE)*, measured by the natural logarithm of total assets (Adams and Hardwick, 1998; Hoi et al., 2020); firm leverage *(LVRG)*, measured by total debt divided by total assets (Hoi et al., 2020); firm age *(AGE)*, measured by subtracting the year of

incorporation from the current financial year to capture a firm's age and reputation (Choi and Hong, 2022); capital expenditure *(CAPEX)*, measured by dividing the net investment on property, plant, and equipment on total assets, as capital expenditure positively impacts a firm's transparency as payoffs from tangible assets are clearer to shareholders (Roy et al., 2022); market value to book value ratio *(MVBV)*, measured by dividing the market capitalization on the total equity to capture a firm's ability to grow (Alzoubi, 2016); gross domestic product per labor force growth rate *(GDPL)*, which is the growth rate of the GDP divided by the total labor force to capture the impact of any change of macroeconomics and employment rates on a firm's performance and labor force (Bolt et al., 2012; Fidanoski et al., 2018). The data have been obtained from the World Bank national accounts data (World Bank, 2024); financial firm *(FIN)*, which is a dummy variable, takes the value of 1 if the firm is related to financial sector, 0 otherwise, to avoid any bias between financial and non-financial firms, knowing that we considered the ASE classification for the subsectors (banks, insurance, diversified financial service and real estate) as financial. In this research, we have resorted to the ASE to obtain the data from the firm's annual reports and disclosures published by the end of each firm's financial year, from 2012 to 2021. Table 1.2 summarizes the variables' description, descriptive statistics and data source.

1.4.3 Research Model

We developed an ordinary least squares (OLS) regression model. In addition, firm-fixed effects were employed to capture the variation within firms, and year-fixed effects were employed to capture the variation over time; for instance, COVID-19 pandemic crisis in 2020. This is represented in Equation (1.5):

$$EP = \beta 0 + \beta 1\ OC + \beta 2\ INSH + \beta 3\ BMS + \beta 4\ SIZE + \beta 5\ LVRG + \beta 6\ AGE + \beta 7\ CAPEX + \beta 8\ MVBV + \beta 9\ GDPL + \beta 10\ FIN + YEAR\ FE + FIRM\ FE + \mathcal{E} \quad (1.4)$$

where *EP* = Employee productivity; β0 = the intercept; βn = the coefficients; *OC* = Ownership concentration; *INSH* = Insider ownership; *BMS* = Board size; *SIZE* = Firm size; *LVRG* = Firm leverage ratio; *AGE* = Firm age; *CAPEX* = Capital expenditure; *MVBV* = Market value to book value ratio; *GDPL* = Growth rate of GDP per labor force; *FIN* = Financial firm; *YEAR FE* = Year fixed effects; *FIRM FE* = Firm fixed effects; Ɛ = error term to capture the uncertainty and chaos of financial markets (Omane-Adjepong et al., 2024).

Table 1.2 Variables' description and descriptive statistics.

Variable Name Variable Label	**Description**	**Obs** [e]	**Mean**	**Std. dev.**	**Min**	**Max**
Dependent Variable:						
Employee Number *EMPNO* [b]	Number of employees	1,360	462	836	2	7,191
Total Sales *SALES* ($) [b]	Non-financial firms: total revenues; Financial firms: total Interest income; Insurance firms: total premiums income	1,360	$109 \cdot 10^6$	$413 \cdot 10^6$	29,930	$6510 \cdot 10^6$
Employee Productivity *EP* [a]	Measured by DEA tool, *EMPNO* is input and *SALES* is output	1,360	0.73	0.285	0.008	1
Independent Variables:						
Ownership Concentration *OC* (%) [a b]	HHI of Top 5 Major Shareholders who held 5% or more	1,360	20.6	22.33	0.25	99.99
Insider Shareholding *INSH* (%) [c]	Proportion of shares held insiders who held 5% or more of shares	1,360	24.3	25	0	99
Board Size *BMS* [b]	Number of board of directors members	1,360	8	2	3	13
Control Variables:						
Firm Size *SIZE* [a b]	Natural Logarithm of Total Assets	1,360	18.1	1.774	14.79	24.88
Leverage Ratio *LVRG* (%) [a b]	Total Debt/Total Assets	1,360	41.7	28.09	0	100
Firm Age *AGE* [a b]	Number of Years: Financial Year—Year of Incorporation	1,360	29	17.52	3	92
Capital Expenditure *CAPEX* (%) [a b]	Net property, plant and equipment/Total Assets	1,360	25.7	27.05	0	98.9
Market to Book Value *MVBV* [a b]	Market Value of Equity / Book Value of Equity	1,360	1.13	2.969	0.13	104.8
GDP Growth per Labor *GDPL* (%) [a d]	Annual Growth rate of (Jordanian GDP/Total Labor force)	1,360	−0.32	5.29	−8.05	7.69
Financial Firm *FIN* [b]	Dummy: 1 if the firm is related to financial sector, 0 otherwise	1,360	0.49	0.5	0	1

Data Source: [a]: Own calculation from ASE firm's annual reports; [b]: ASE firm's annual reports; [c]: Eikon Data-base; [d]: World Bank national accounts data; [e]: 136 firms x 10 years = 1,360.

1.5 Results and Discussion

1.5.1 Correlations

We employed the variance inflation factor test (VIF), and the results show that there is no multicollinearity problem. Table 1.3 presents the results of pairwise correlations and VIF test results.

Table 1.3 Pairwise correlations and multicollinearity VIF test.

Variable	VIF	*EP*	*OC*	*INSH*	*BMS*	*SIZE*	*LVRG*	*AGE*	*CAPEX*	*MVBV*	*GDPL*
OC	1.16	**0.12**	1								
INSH	1.08	−0.04	**−0.06**	1							
BMS	1.74	**0.43**	**−0.24**	**−0.22**	1						
SIZE	2.20	**0.58**	**0.07**	**−0.23**	**0.56**	1					
LVRG	1.73	**0.51**	**0.1**	**−0.16**	**0.35**	**0.61**	1				
AGE	1.38	**0.35**	**−0.10**	**−0.11**	**0.41**	**0.45**	**0.38**	1			
CAPEX	1.08	**0.13**	0.005	0.04	**−0.14**	**−0.20**	**−0.25**	**−0.09**	1		
MVBV	1.02	**0.07**	**0.08**	−0.004	−0.03	0.05	**0.1**	0.01	0.04	1	
GDPL	1.00	0.004	0.003	0.002	0.02	−0.01	0.01	−0.02	0.01	0.03	1
FIN	1.84	**0.27**	0.02	−0.01	**0.08**	**0.16**	**0.24**	0.01	**−0.66**	**−0.09**	−0.001
Mean VIF	1.50										

Bold numbers indicate <5% significance.

1.5.2 Regression Results

To examine the associations between ownership concentration, insider ownership, board size, and employee productivity, we employ a robust standard errors ordinary least square (OLS) regression, as the P value of Breusch–Pagan/Cook–Weisberg test for heteroscedasticity (Het. test) is (0.00) for all regression models to avoid the heteroscedasticity problem and obtain more accurate results for our analysis, of which the results are presented in Table 1.4. Furthermore, all the regression models include firm-year-fixed effects to capture the variation over time within firms. In the first model, we examined the impact of ownership concentration, control variables and firm-year-fixed effects; the results indicate a positive non-significant impact of ownership concentration on employee productivity. In the second model, we performed the likelihood ratio test for linearity, the P value result is (0.00), which means that the relation between ownership concentration and employee productivity is a non-linear relation.

Therefore, we added the quadratic ownership concentration *(OCQ)* along with ownership concentration, control variables and firm-year-fixed effects in order to have an accurate result for the impact of ownership concentration on employee productivity; the results indicate a positive, significant impact of ownership concentration on employee productivity at a 5% level of significance (t-value = 2.2), and a negative significant impact of quadratic ownership concentration on employee productivity at a 5% level of significance (t-value = −2). In the third model, we examined the impact of insider ownership, control variables, and firm-year-fixed effects, whereby the results indicate a positive, non-significant impact of insider ownership on employee productivity. In the fourth model, we performed the likelihood ratio test for linearity, and the P value result is (0.00), which means that the relation between insider ownership and employee productivity is a non-linear relation.

Therefore, we added the quadratic insider ownership *(INSHQ)* along with insider ownership, control variables and firm-year-fixed effects in order to have an accurate result for the impact of insider ownership on employee productivity, and the results indicate a positive, significant impact of insider ownership on employee productivity at a 1% level of significance (t-value = 3.1), and a negative, significant impact of quadratic insider ownership on employee productivity at a 1% level of significance (t-value = −3.4). In the fifth model, we examined the impact of board size, control variables, and firm-year-fixed effects, whereby the results indicate a positive, non-significant impact of board size on employee productivity. In the sixth model, we performed the likelihood ratio test for linearity, and the P value result is (0.04), which means that the relation between board size and employee productivity is a non-linear relation.

Therefore, we added the quadratic board size *(BMSQ)* along with board size, control variables, and firm-year-fixed effects in order to have an accurate result for the impact of board size on employee

productivity; the results indicate a positive, significant impact of board size on employee productivity at a 10% level of significance (t-value = 1.92), and a negative, significant impact of quadratic board size on employee productivity at a 10% level of significance (t-value = −1.89). In the seventh model, we examined the impact of ownership concentration, quadratic ownership concentration, insider ownership, quadratic insider ownership, board size, quadratic board size, control variables, and firm-year-fixed effects, whereby the likelihood ratio test for linearity, and the P value result is (0.00), which proves the non-linear relation between ownership concentration, insider ownership, board size, and employee productivity. The results indicate a positive, significant impact of ownership concentration on employee productivity at a 5% level of significance (t-value = 2.41), and a negative, significant impact of quadratic ownership concentration on employee productivity at a 5% level of significance (t-value = −2.02); thus, these results are not compatible with our expected hypothesis (1.1). By contrast, these aforementioned results are in line with the results found in the previous literature (Claessens and Djankov, 1999; Drobetz et al., 2019). In addition, the results indicate a positive, significant impact of insider ownership on employee productivity at a 1% level of significance (t-value = 3.16), and a negative, significant impact of quadratic insider ownership on employee productivity at a 1% level of significance (t-value = −3.59); thus, these results are compatible with our expected hypothesis (1.2). Likewise, these aforementioned results are in line with the results found in the previous literature (Sheu and Yang, 2005; Pant and Pattanayak, 2007; Bhabra, 2007; Jain et al., 2020). Moreover, the results indicate a positive, significant impact of board size on employee productivity at a 10% level of significance (t-value = 1.96), and a negative, significant impact of quadratic board size on employee productivity at a 10% level of significance (t-value = −1.91); thus, these results are compatible

with our expected hypothesis (1.3). Similarly, these aforementioned results are in line with the results found in the previous literature (Cheng et al., 2008; Guest, 2009).

In addition, a positive, significant impact of firm size on employee productivity was found at a 1% level of significance (t-value = 11.71), which indicates that employees in large firms are more productive than employees in smaller firms. A negative, significant impact of firm leverage on employee productivity was found at a 1% level of significance (t-value = −2.98), which indicates that employees in firms with high debt ratios are less productive. A negative, significant impact of firm age on employee productivity was found at a 1% level of significance (t-value = −4.97), which indicates that employees in older firms are less productive. No impact was found of capital expenditure on employee productivity. A negative, significant impact of market value to book value ratio on employee productivity was found at a 1% level of significance (t-value = −4). No impact was found of GDP per labor force growth rate on employee productivity. A negative, significant impact of financial firms on employee productivity was found at a 1% level of significance (t-value = −9.38), which indicates that employees in financial firms are less productive.

Furthermore, as presented in Table 1.5, to check for possible endogeneity between ownership structure and employee productivity, we employed dynamic panel-data estimation, two-step system generalized method of moments regression (GMM), since a GMM model deals with heteroscedasticity, simultaneity, reduces errors over time, and controls endogeneity (by internally transforming the data and by including lagged values of the dependent variable). The P values results of the post estimation of the GMM regression are as follows: Arellano–Bond test for AR (1) is (0.01), Arellano–Bond test for AR (2) is (0.11), Sargan test of overid is (0.12), and Hansen test of overid is (0.21); which means that the model and the instrumental variables are well specified and valid. Moreover, the P value result of the GMM test for endogeneity is

(0.18), which means that we cannot reject the null hypothesis of the test that the variables are exogenous. Therefore, we consider the results of the seventh regression model presented in Table 1.4 as the final results of our hypotheses.

Table 1.4 Regression analysis.

Model	**1**	**2**	**3**	**4**	**5**	**6**	**7**
EP	Coefficient t-value	Coefficient t-value	Coefficient t-value	Coefficient t-value	Coefficient t-value	Coefficient t-value	Coefficient t-value
OC	0.001 1.65	** 0.003 2.2					** 0.003 2.41
OCQ		** −0.0001 −2					** −0.0001 −2.02
INSH			0.0001 0.23	*** 0.002 3.1			*** 0.002 3.16
INSHQ				*** −0.0001 −3.4			*** −0.0001 −3.59
BMS					0.003 0.84	* 0.032 1.92	* 0.032 1.96
BMSQ						* −0.002 −1.89	* −0.002 −1.91
SIZE	*** 0.179 11.4	*** 0.179 11.52	*** 0.180 11.43	*** 0.181 11.85	*** 0.178 11.18	*** 0.177 11.15	*** 0.177 11.71
LVRG	*** −0.103 −2.82	*** −0.098 −2.67	*** −0.106 -2.88	*** −0.126 -3.37	*** −0.105 −2.85	*** −0.100 −2.7	*** −0.113 −2.98
AGE	*** −0.007 −7.34	*** −0.006 −6.02	*** −0.007 −8.42	*** −0.007 −8.64	*** −0.008 −8.03	*** −0.007 −7.58	*** −0.005 −4.97
CAPEX	−0.026 −0.33	−0.03 −0.38	−0.029 −0.36	−0.029 −0.36	−0.029 −0.36	−0.031 −0.39	−0.031 −0.39
MVBV	*** −0.002 −4.1	*** −0.002 −4.21	*** −0.002 −4.3	*** −0.002 −4.33	*** −0.002 −4.28	*** −0.002 −4.23	*** −0.001 −4
GDPL	0.004 0.39	0.011 0.94	−0.003 −0.31	−0.004 −0.36	−0.006 −0.53	−0.003 −0.3	0.013 1.08
FIN	*** −0.367 −10.25	*** −0.4 −10.01	*** −0.366 −8.66	*** −0.385 −9.45	*** −0.36 −10.32	*** −0.371 −10.46	*** −0.425 −9.38
Obs	1,360	1,360	1,360	1,360	1,360	1,360	1,360
R-squared	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Firm FE	Included	Included	Included	Included	Included	Included	Included
Year FE	Included	Included	Included	Included	Included	Included	Included
Het. test	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Likelihood-ratio test		0.00		0.00		0.04	0.00

*** p < 0.01; ** p < 0.05; * p < 0.10.

Table 1.5 GMM regression analysis.

EP	Coefficient t-value
EP t-1	*** 1.011 4.94
OC	** 0.004 2.43
OCQ	** −0.0001 −2.46
INSH	* 0.001 1.92
INSHQ	* −0.00002 −1.89
BMS	0.014 1.05
BMSQ	−0.001 −0.87
SIZE	0.001 0.32
LVRG	0.028 1.27
AGE	−0.0001 −0.11
CAPEX	−0.008 −0.41
MVBV	*** −0.002 −3.72
GDPL	0.00004 0.07
FIN	−0.013 −1.09
Obs	1,088
Year FE	Included
Arellano-Bond test for AR(1)	0.01
Arellano-Bond test for AR(2)	0.11
Sargan test of overid	0.12
Hansen test of overid	0.21
GMM Hansen test	0.3
GMM Difference (null H = exogenous)	0.18

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

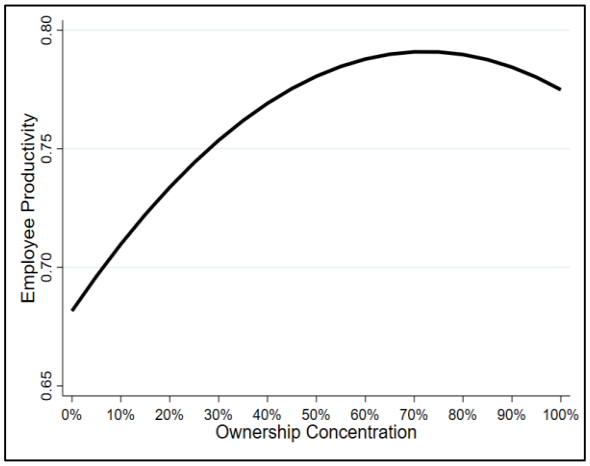
Considering the found result of the non-linear relation between ownership concentration, insider ownership, board size, and employee productivity, we employed the margins analysis for further

interpretation of this non-linear relation finding, as presented in Table 1.6. The results of this margin analysis indicate a positive, significant impact of ownership concentration on employee productivity when the proportion of ownership concentration is less than 60%. Furthermore, the results indicate a positive, significant impact of insider ownership on employee productivity when the proportion of insider ownership is less than 50%. Lastly, the results indicate a positive, significant impact of board size on employee productivity when the number of board members is less than 11. Figure 1.3a–c, generated using the margins analysis, visualizes the U-shape non-linear relation between ownership concentration, insider ownership, board size, and employee productivity, respectively.

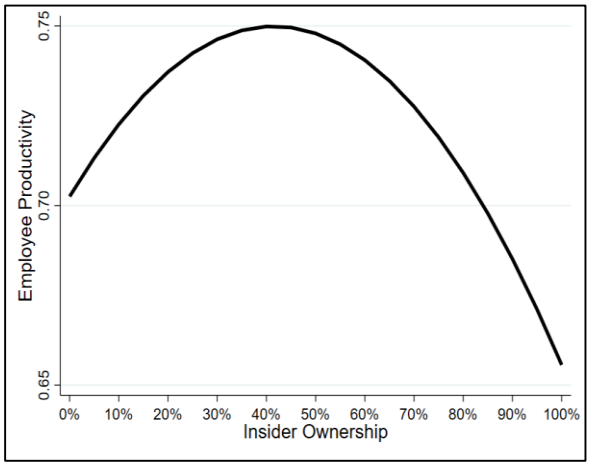
Table 1.6 Margins analysis.

OC		***INSH***		***BMS***	
EP	Coefficient t-value	*EP*	Coefficient t-value	*EP*	Coefficient t-value
OC = 0%	*** 0.003 3.01	*INSH* = 0%	*** 0.002 3.57	*BMS* = 3	*** 0.042 3.65
OC =10%	*** 0.003 3.15	*INSH* = 10%	*** 0.002 3.44	*BMS* = 4	*** 0.038 3.9
OC = 20%	*** 0.002 3.34	*INSH* = 20%	*** 0.001 3.12	*BMS* = 5	*** 0.033 4.25
OC = 30%	*** 0.002 3.55	*INSH* = 30%	** 0.001 2.25	*BMS* = 6	*** 0.029 4.71
OC = 40%	*** 0.001 3.63	*INSH* = 40%	0.0001 0.33	*BMS* = 7	*** 0.025 5.27
OC = 50%	*** 0.001 2.93	*INSH* = 50%	−0.0005 −1.59	*BMS* = 8	*** 0.020 5.49
OC = 60%	0.001 1.39	*INSH* = 60%	** −0.001 −2.55	*BMS* = 9	*** 0.016 4.34
OC = 70%	0.0001 0.19	*INSH* = 70%	*** −0.002 −2.98	*BMS* = 10	** 0.011 2.48
OC = 80%	−0.0003 −0.5	*INSH* = 80%	*** −0.002 −3.19	*BMS* = 11	0.007 1.14
OC = 90%	−0.001 −0.9	*INSH* = 90%	*** −0.003 −3.31	*BMS* = 12	0.002 0.31
OC = 100%	−0.001 −1.16	*INSH* = 100%	*** −0.003 −3.39	*BMS* = 13	−0.002 −0.21

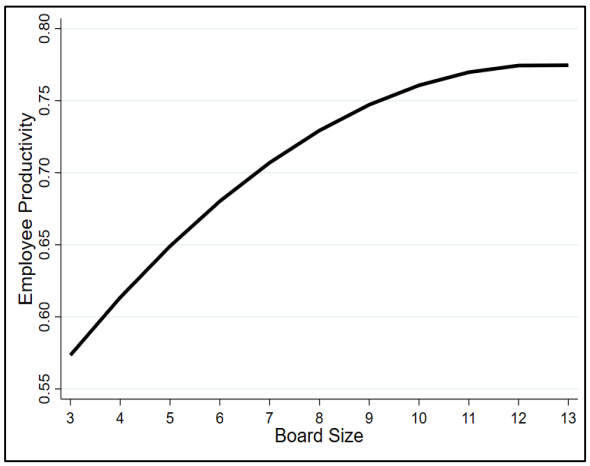
*** p < 0.01; ** p < 0.05; * p < 0.10.



(a)



(b)



(c)

Figure 1. 3 (a) The non-linear relation between employee productivity and ownership concentration; **(b)** The non-linear relation between employee productivity and insider ownership; **(c)** The non-linear relation between employee productivity and board size.

1.6 Conclusions and Limitations

This research aims to investigate the impact of ownership concentration, insider ownership, and board size on employee productivity for 136 Jordanian public shareholding firms listed in the ASE from 2012 to 2021.

Our empirical results indicate a non-linear relation between ownership concentration and employee productivity, whereby the productivity of employees increases in firms with a proportion of ownership concentration less than 60%. This result is compatible with the *stewardship theory*, which posits that large block holders negatively affect a firm's performance. In addition, we found a non-linear relation between insider ownership and employee productivity, whereby the productivity of employees increases in firms with a proportion of insider ownership less than 50%. This result is compatible with *agency theory*, which posits that higher insider ownership will lead to agency problems and thus, negatively affect a firm's performance. Furthermore, we found a non-linear relation between board size and employee productivity, whereby the productivity of employees increases in firms that have less than 11 board members. This result is compatible with *stewardship theory*, which posits that a smaller board size is better and more efficient for monitoring and making decisions.

Herein lies the importance and the value added by this research to the knowledge found in the previous literature; our research is the first to highlight the productivity of employees in emerging economies such as the Jordanian economy. Moreover, our empirical findings provided evidence about the impact of CG on employee productivity for a large sample of Jordanian listed firms in the ASE. In addition, our findings could be useful for the JSC and ASE in their continuous process to improve and develop CG instructions.

Finally, this research has some limitations, that being the exclusion of some mechanisms of CG, such as the independent, non-executive board members and committees emanating from boards of directors,

because the majority of the selected firms in our sample reported information about independent, non-executive board members and committees emanating from the board of directors in their annual reports and disclosures since 2017; that is, after the issuance of governance instructions by the JSC. Another limitation is the geographical boundary of the sample, because taking the sample from Jordan renders it somewhat difficult to generalize the obtained results to a broader context. Regarding further research, this analysis could be applied to other countries in the Middle East.

2. Ownership Concentration, CEO Pay Slice and Corporate Donations: Evidence from Jordan

2.1 Introduction

Corporate social responsibility (CSR) has drawn the attention of many researchers, considering that it is important for the society and contributes in reducing the concerns of poverty and unemployment, which consequently leads to improving the economy. Therefore, firms should focus on their commitment to environmental and social issues and activities, alongside with the traditional goal of maximizing the profits (Brammer and Pavelin, 2008; Cormier et al., 2011; Abu Qa'dan and Suwaidan, 2018; Pinto, 2023). In addition, CSR is important to improve a firm's reputation and its market value (Esen, 2013). CSR is defined as the way of considering the economic, social, and environmental sustainability while doing firm business activities to improve their contribution to society (Tian and Wang, 2024). CSR is also a set of dimensions, which are employees' development, employee's compensations, customer care, clarity in advertising and pricing, providers and suppliers, and donation and contribution for society (Rowley and Berman, 2000; Campbell, 2007). This set of dimensions is illustrated in Figure 2.1. In our study, we focus on companies' donations to the overall society, as one of the dimensions of CSR, considering that corporate donation measures the firms' contribution for society.

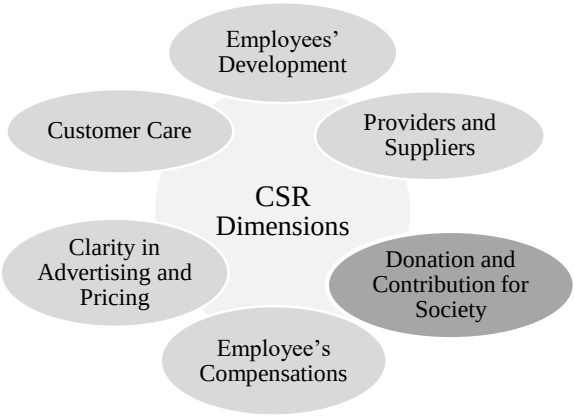


Figure 2. 1 CSR set of dimensions, as referenced from (Rowley and Berman, 2000; Campbell, 2007). CSR dimension (Donation and Contribution for Society) in contrast shading is the CSR dimension studied in this article.

This research contributes to previous literature in several ways. To the best of our knowledge, this is the first article to highlight corporate donations in developing countries, being unlike the previous literature (Ghazali, 2007; Reverte, 2009; Jiraporn and Chintrakarn, 2013; Ducassy and Montandrau, 2015; Jouber, 2019; Harper and Sun, 2019), which considered corporate social donations in developed countries. Therefore, this article aims to bridge the research gap about social contributions (as one of the dimensions of CSR) in developing countries, by investigating what motivates firms to contribute in the society, with a focus on shareholders and CEO's given their significant role in the decision making process for every firm. Additionally, this research expands the theoretical perspective on corporate social contributions by including both financial and non-financial firms, as the former also play a significant role in developing countries like Jordan.

This research focuses on the CSR of emerging economies, specifically examining Jordan. Unlike developed nations, developing countries like Jordan are relatively new subjects of CSR research. Key factors for this focus include the availability of data and the high concentration of ownership typical in Jordan, a nation that relies heavily on foreign investment (Alzoubi, 2016). Another important aspect is the exploration of CSR practices following the privatization era that began in the 1990s, when the Jordanian

government initiated reforms to bolster the private sector's contribution to the country's gross domestic product (GDP). Consequently, the government's stake in publicly listed companies decreased from 15% in the 1990s to under 6% by 2012 (Amman Stock Exchange, 2012). Furthermore, Jordan is committed to enhancing its economy and capital market. Over the past two decades, the Jordan Securities Commission (JSC) and the Amman Stock Exchange (ASE) have worked to improve transparency and disclosure in annual reports for listed companies. This effort began with corporate governance guidelines issued in 2009 and updated in 2017, whereby firms should disclose their policy regarding the local community and the environment to improve the transparency of firms' disclosures (Securities Depository Center, 2017). Moreover, in order to improve and develop CSR in Jordanian listed firms, ASE joined the United Nations Sustainable Stock Exchanges (SSE) in 2016. In addition, ASE has issued guidance on sustainability reporting for the listed firms in order to create firms' annual sustainability reports (included in the annual report or on separate report) using the Global Reporting Initiative (GRI) standards in order to achieve the goals of sustainability reports (Amman Stock Exchange, 2022). Thus, the findings of this article would be useful to add value to the aforementioned process by evaluating CSR practices in Jordan.

Accordingly, this research aims to measure the impact of ownership structure, i.e., ownership concentration and CEO pay slice, on corporate donations for 136 Jordanian public shareholding firms listed in the ASE, from 2012 to 2022.

The basis of selection for ownership concentration and CEO pay slice is due to the significant role of large block holders and CEO on the decision-making process, which are expected to affect the financial and non-financial decisions of each firm and in turn reflect on the firm's overall social contributions.

The remainder of the research is structured as follows. Section 2 shows the theoretical framework. Section 3 the literature review and hypotheses. Section 4 the methodology and sample explanation. Section 5 the discussions and results. Finally, Section 6 the conclusions and limitations.

2.2 Theoretical Framework

Four theories shape the theoretical framework that supports our research. According to the *Agency theory*, the ownership and managerial functions should not have conflicting objectives, in order to avoid the conflict of interests between shareholders and managers. Therefore, concentrated ownership leads to more controlling power for the large block shareholders. Thus, shareholders will pay more attention to maximizing their profits rather than spending on donations and social responsibility (Jensen and Meckling, 1976; Ducassy and Montandrau, 2015). In addition, the *Agency theory* posits that social responsibility and donations expenditures would increase the personal benefits of managers. As a result, CEOs will pay more attention to spending on social responsibility and donations (Jiraporn and Chintrakarn, 2013).

The *Stakeholder theory* posits that the stakeholders, which are shareholders, creditors, employees, customers, suppliers, public interest groups, government and the community, are playing the main role of CSR of the firms, as they try to push shareholders to pay more attention on interests and needs of non-shareholder groups and CSR alongside increasing their benefits and wealth (Mitchell et al., 1997; Freeman, 2010; Ma et al., 2024; Zihan et al., 2024).

Moreover, *Legitimacy theory* defends that the motivation of CSR is that firms are operated within the norms of the society and to assure the society that their activities are legitimate (Ting-Ling et al., 2018).

Furthermore, *Upper echelons theory* claims that CEOs play a main role in influencing the company's CSR, as this theory considers that firms are represented by their CEOs. Furthermore, CEOs' characters,

skills, experience, and power affect firms' strategies, values, decisions and disclosures (Hambrick and Mason, 1984; Hambrick, 2007; Ting et al., 2024).

2.3 Literature Review and Hypotheses

2.3.1 Ownership Concentration and Corporate Donations

Ownership concentration is an important mechanism of corporate governance as it impacts corporate financial and non-financial performance. A study of 100 listed firms in the London Stock Exchange in 1994, found no impact of ownership concentration on corporate donations (Adams and Hardwick, 1998). Also, Ghazali (2007) found no impact of ownership concentration on corporate social disclosures for 87 non-financial Malaysian firms in 2001. However, Godos-Díez et al. (2014) found a positive impact of ownership concentration on CSR for 101 non-listed Spanish firms in 2006. On the other hand, a study of 1000 Chinese firms in 2008 found that firms with less concentrated ownership are positively related to CSR (Li and Zhang, 2010). Furthermore, Ducassy and Montandrau (2015) found that large block holders do not focus on CSR for 41 French listed firms in 2011. In addition, a study of 691 European firms in 2005, found that ownership concentration negatively impacts CSR (Dam and Scholtens, 2013). Similarly, a study found that the institutional investors and corporate investors negatively impact corporate donations for 380 Taiwanese electronics firms over 2011 to 2013 (Lin et al., 2018). Crifo et al. (2016) also found a negative impact of ownership concentration on CSR for 898 firms from the Vigeo CSR overall ratings, over 2004 to 2012. Another study referred to the negative impact of ownership concentration on corporate social and environmental disclosures for 450 large British firms in 2000 (Brammer and Pavelin, 2008). On the same line, Reverte (2009) found a negative impact of ownership concentration on corporate social responsibility for the Spanish listed firms in 2005 and 2006.

Based on the analysis if this literature, we propose the following hypothesis:

Hypothesis 2.1 *Ownership concentration is negatively related to corporate donations.*

2.3.2 CEO Pay Slice and Corporate Donations

Several literatures have linked powerful CEO and CEO pay slice with CSR. Jiraporn and Chintrakarn (2013) analyzed worldwide data from EXECUCOMP and COMPUSTAT databases of 4489 firm-year observations over the period 1995 to 2007, whereby they utilized CEO pay slice as a measurement of CEO power and found a non-monotonic relation between CEO pay slice and CSR, whereby when the CEO pay slice is low, the increasing in CEO pay slice positively impacts CSR. On the contrary, when the CEO pay slice is high, this leads to reducing the investments on CSR. Another study analyzed 180 Canadian, United States, French and Spanish listed firms over the period 2010 to 2017, and found that CEO pay slice is positively related to CSR (Jouber, 2019). Likewise, a meta-analysis of 54 empirical studies referred to a positive impact of CEO compensation on CSR (Bhaskar et al., 2023). Yasir et al. (2020) referred to the positive impact of a powerful CEO on CSR practice of the firm, after analyzing the responses of a questionnaire, which targeted the executive management of hotels and tourism industries in Pakistan in 2018 and 2019. On the other hand, Sheikh (2019) analyzed data from MSCI database (formerly KLD) over 2003 to 2015 and found a negative impact of CEO structural power on CSR. Furthermore, Harper and Sun (2019) analyzed 1574 firms in the United States over 1992 to 2014, whereby they utilized CEO pay slice to measure CEO power and found a negative impact of CEO power on CSR. Similarly, Muttakin et al. (2016) found a negative impact of CEO power on CSR for Dhaka Stock Exchange in Bangladesh over 2005 to 2013.

Taking into account this literature, we propose the following hypothesis:

Hypothesis 2.2 *Low CEO pay slice is positively related to corporate donations.*

2.4 Methodology

2.4.1 Data Collection

Our sample contains firms listed on the ASE in the post-privatization period from 2012 to 2022. Firms for which annual reports are not available during the complete, aforementioned period are excluded. Accordingly, the final sample consists of 136 financial and non-financial firms listed in ASE. Table 2.1 summarizes the percentage of market capitalization and number of firms of our sample out of a total population on the ASE by year.

Table 2. 1 Percentage of market cap and number of firms of our sample out of a total population.

Year	Market Capitalization	Number of Firms	Share in Total ASE Listed Firms
2012	93.85%	136	55.97%
2013	93.40%	136	56.67%
2014	93.01%	136	57.63%
2015	93.60%	136	59.65%
2016	93.37%	136	60.71%
2017	94.47%	136	70.10%
2018	94.46%	136	69.74%
2019	94.83%	136	71.20%
2020	95.17%	136	75.98%
2021	95.68%	136	79.07%
2022	98.34%	136	80.00%
Average (2012-2022)	94.56%	136	66.97%

2.4.2 Definitions and Measures of the Variables

Regarding the dependent variables, we referred to previous literature (Liang and Renneboog, 2017; Chourou, 2023) and hence employed total corporate donations as a proxy to measure CSR, whereby the dependent variable corporate donations *(D)* is measured by the natural logarithm of 1 plus total firm annual donations divided by total sales times 10 to the power 3. In addition, we created another alternative variable *(NLD)* using the natural logarithm of 1 plus total firm's annual donations for robustness check (Adams and Hardwick, 1998; Hoi et al., 2019). The data has been manually obtained from the firms' annual reports and disclosures from the ASE. Figure 2.2 shows the average corporate donations by year.

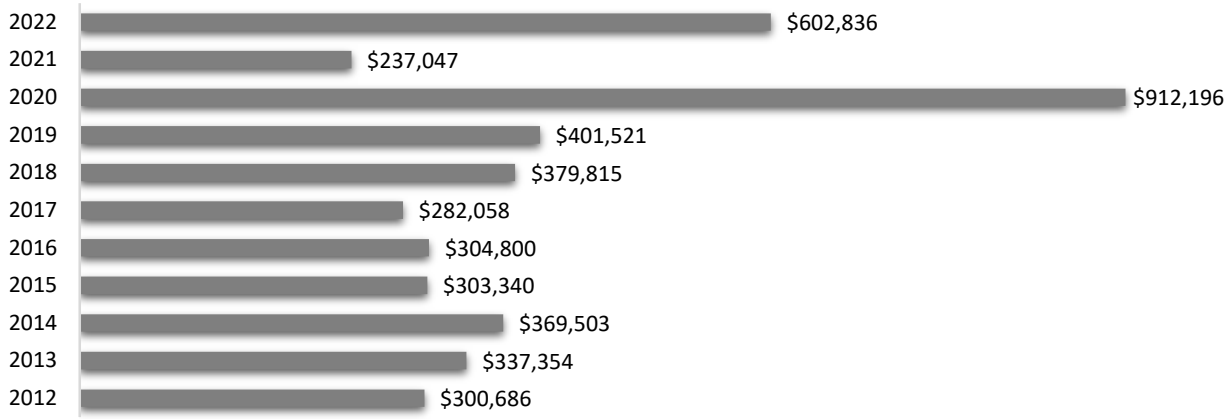


Figure 2. 2 Average corporate donations by year.

The noticeable increase of corporate donations in 2020 was due to the solidarity of the Jordanian firms in fighting COVID-19, by donating to the coronavirus relief fund "Himmat Watan" established by the Jordanian government.

Regarding the independent variables, the first independent variable is ownership concentration *(OC)*, for which we implemented Herfindahl–Hirschman Index (HHI) (a method considered one of the best to measure the concentration) by summing the square values of the top 5 major shareholdings who held 5% or more of shares, then we divided the results on 100 to interpret them as a percentage between 0 and 100%, as per the following equation (2.1) (Demsetz and Lehn, 1985; Claessens and Djankov, 1999; Waheed and Malik, 2019):

$$OC = (T1^2 + T2^2 + T3^2 + T4^2 + T5^2) / 100 \quad (2.1)$$

Where *OC* = Ownership concentration; *T* = the proportion of shares held by the shareholder.

The data has been obtained from the firms' annual reports and disclosures from the ASE. The second independent variable is CEO pay slice *(CPS)*, which is a proxy that shows how much the CEO is powerful over the executive management (to the best of our knowledge, this is the first article that uses CPS as a proxy to measure the CEO power in the case of Jordan). *CPS* is calculated as the proportion of total CEO

compensation over the addition of the top five executive's compensations including the CEO (Bebchuk et al., 2011; Jiraporn and Chintrakarn, 2013; Munir et al., 2017; Sheikh, 2018). The data has been obtained from the firms' annual reports and disclosures from ASE.

Our control variables are firm size *(SIZE)*, firm leverage *(LVRG)*, firm age *(AGE)*, capital expenditure *(CAPEX)*, sales growth *(GRWTH)*, cash flow from operations *(OCF)*, return on assets *(ROA)*, stock volatility *(V)*, gross domestic product annual growth rate *(GDP)* and financial firm *(FIN)*. Firm size *(SIZE)* is measured by the natural logarithm of total assets, as larger firms are more willing to contribute to society to avoid additional costs from the government (Adams and Hardwick, 1998; Hoi et al., 2019). The data has been obtained from the firms' annual reports and disclosures from ASE. Firm leverage *(LVRG)* is calculated by total debt divided by total assets, as the increase in debt may affect firms' social contribution decisions (Hoi et al., 2019). Adams and Hardwick (1998) found a negative impact between firm leverage and corporate donations. The data has been obtained from the firms' annual reports and disclosures from ASE. Firm age *(AGE)* was obtained by subtracting the year of incorporation from the current financial year to capture firms age and reputation (Choi and Hong, 2022). The data has been obtained from the firms' annual reports and disclosures from ASE. Capital expenditure *(CAPEX)* was computed by dividing the net investment on property, plant and equipment on total assets, as capital expenditure positively impacts firms' transparency as payoffs from tangible assets are clearer to shareholders (Roy et al., 2022). The data has been obtained from the firms' annual reports and disclosures from ASE. To build sales growth *(GRWTH)*, we subtracted previous year's sales from current year's sales, then divided the result over the previous year's sales, to capture firms' sales growth. Finally, we multiplied by 100, to have it in percent scale (Choi and Hong, 2022). The data have been obtained from the firms' annual reports and disclosures from ASE.

Cash flow from operations *(OCF)* measured by dividing cash flow from operations over total assets to capture firms' ability to generate cash to be able to donate (Choi and Hong, 2022). The data have been obtained from the firms' annual reports and disclosures from ASE. Return on assets *(ROA)* measured by dividing net income by average total assets, to capture firms' ability to generate profitability, as greater profitability positively impacts corporate donations (Adams and Hardwick, 1998; Choi and Hong, 2022). The data have been obtained from the firms' annual reports and disclosures from ASE. Stock volatility *(V)*, which is the standard deviation of daily stock returns of the last 12 months prior to the end of each firm's fiscal year, to capture the uncertainty and chaos of financial markets (Omane-Adjepong et al., 2024). The data has been obtained from the firms' annual reports and disclosures from ASE; gross domestic product *(GDP)* growth rate, which is the annual growth rate of the Jordanian GDP, to capture the impact of macroeconomics (Bolt et al., 2012; Fidanoski et al., 2018). The data has been obtained from World Bank national accounts data (World Bank, 2024); financial firm *(FIN)*, which is a dummy variable that is assigned the value of 1 if the firm is related to the financial sector, and 0 otherwise, to avoid any bias between financial and non-financial firms, knowing that we considered ASE classification for the subsectors (banks, insurance, diversified financial service and real estate) as financial. In this research, we have resorted to ASE to obtain the data from the firms' annual reports and disclosures published by the end of each firm's financial year, from 2012 to 2022. Table 2.2 summarizes the variables' description, descriptive statistics and data source.

Table 2. 2 Variables' description and descriptive statistics.

Variable Name Variable Label	**Description**	**Obs** [d]	**Mean**	**Std. dev.**	**Min**	**Max**
Dependent Variables:						
Total Donations *D* [a] [b]	Natural Logarithm of ((1+Total Donations) / Total Sales)*10^3)	1,496	-3.16	4.20	-13.75	5.89
Total Donations *NLD* [a] [b]	Natural Logarithm of (1+Total Donations) for robustness check	1,496	6.1	5.22	0	17.22
Independent Variables:						
Ownership Concentration *OC (%)* [a] [b]	HHI of Top 5 Major Shareholders who held 5% or more	1,496	20.75	22.50	0.25	99.99
CEO Pay Slice *CPS (%)* [a] [b]	CEO Compensation / Top 5 Executives Compensation Including CEO	1,496	47.88	22.29	0	100
Control Variables:						
Firm Size *SIZE* [a] [b]	Natural Logarithm of Total Assets	1,496	18.12	1.79	14.79	24.89
Leverage Ratio *LVRG (%)* [a] [b]	Total Debt / Total Assets	1,496	42.13	28.30	0	100
Firm Age *AGE* [a] [b]	Number of Years: Financial Year - Year of Incorporation	1,496	29	17.56	3	93
Capital Expenditure *CAPEX (%)* [a] [b]	Net property, plant and equipment / Total Assets	1,496	25.66	27.19	0	98.90
Sales Growth *GRWTH (%)* [a] [b]	(SALES t - SALES t-1) / SALES t-1	1,496	79.35	19.14	-98	595.59
Operations Cash Flow *OCF (%)* [a] [b]	Cash Flow from Operations / Total Assets	1,496	4.21	8.47	-30.4	59.9
Return on Assets *ROA* [a] [b]	Net Income / Average Total Assets	1,496	1.96	7	-59.96	47.87
Stock Volatility *V* [a] [b]	Standard deviation of daily stock returns of last 12 months	1,496	0.16	0.45	0	8.05
GDP Growth Rate *GDP (%)* [c]	Annual Growth rate of the Jordanian GDP	1,496	2.02	1.22	-1.61	3.38
Financial Firm *FIN* [b]	Dummy: 1 if the firm is related to financial sector, 0 otherwise	1,496	0.49	0.50	0	1

Data Source: [a]: Own calculation from ASE firms' annual reports; [b]: ASE firms' annual reports; [c]: World Bank national accounts data; [d]: 136 firms x 11 years=1,496

2.4.3 Research Model

We developed an ordinary least squares (OLS) regression model. In addition, firm-fixed effects were employed to capture the variation within firms, and year-fixed effects were employed to capture the variation over time; for instance, COVID-19 pandemic crisis in 2020. This is represented in Equation (2.2):

$$D = \beta 0 + \beta 1\, OC + \beta 2\, CPS + \beta 3\, SIZE + \beta 4\, LVRG + \beta 5\, AGE + \beta 6\, CPAEX + \beta 7\, GRWTH + \beta 8\, OCF + \beta 9\, ROA + \beta 10\, V + \beta 11\, GDP + \beta 12\, FIN + YEAR\ FE + FIRM\ FE + \varepsilon \quad (2.2)$$

Where β0 = the intercept; Ɛ = the error term; βn = the coefficients; *FIRM FE* = Firm fixed effects, *YEAR FE* = Year fixed effects. *D* = Total corporate donations. *OC* = Ownership concentration; *CPS* = CEO pay slice; *SIZE* = Firm size; *LVRG* = Firm leverage ratio; *AGE* = Firm age; *CAPEX* = Capital expenditure; *GRWTH* = Sales growth; *OCF* = Cash flow from operations; *ROA* = Return on assets; *V* = Stock volatility; *GDP* = Annual growth rate of the Jordanian GDP; *FIN* = Financial firm.

2.5 Results and Discussion

2.5.1 Correlations

We employed the variance inflation factor test (VIF), and the results show that there is no multicollinearity problem. Table 2.3 presents the results of pairwise correlations and VIF test results.

Table 2. 3 Pairwise correlations and multicollinearity VIF test.

Variable	**VIF**	***D***	***OC***	***CPS***	***SIZE***	***LVRG***	***AGE***	***CAPEX***	***GRWTH***	***OCF***	***ROA***	***V***	***GDP***
OC	1.06	-0.05	1										
CPS	1.11	-0.01	-0.05	1									
SIZE	1.94	**0.41**	**0.08**	**-0.22**	1								
LVRG	1.89	**0.16**	**0.11**	**-0.16**	**0.60**	1							
AGE	1.39	**0.28**	**-0.10**	**-0.18**	**0.45**	**0.38**	1						
CAPEX	1.95	**-0.14**	-0.01	**-0.12**	**-0.21**	**-0.23**	**-0.09**	1					
GRWTH	1.00	-0.02	-0.001	0.03	-0.001	0.02	0.01	-0.01	1				
OCF	1.38	**0.10**	0.03	**-0.07**	-0.02	**-0.16**	0.02	**0.21**	-0.03	1			
ROA	1.52	**0.19**	**0.08**	-0.04	**0.09**	**-0.18**	0.03	-0.04	0.005	**0.45**	1		
V	1.24	**0.15**	0.03	**-0.10**	**0.19**	-0.04	**0.19**	**0.06**	0.003	**0.24**	**0.34**	1	
GDP	1.03	-0.04	-0.09	-0.01	-0.01	-0.03	**-0.08**	-0.01	0.01	**0.07**	**0.14**	0.04	1
FIN	1.95	0.02	0.03	0.03	**0.17**	**0.22**	0.01	**-0.66**	0.01	**-0.30**	**-0.14**	**-0.16**	0.01
Mean VIF	1.46												

Bold numbers indicate < 5% significance

2.5.2 Regression Results

To examine the associations between ownership concentration, CEO pay slice and corporate donations, we employed Robust standard errors ordinary least square (OLS) regression, as the P value of Breusch–Pagan/Cook–Weisberg test for heteroscedasticity (Het. test) is (0.00) for all regression models to avoid the heteroscedasticity problem and obtain more accurate results for our analysis, of which the results are presented in Table 2.4. Furthermore, all the regression models include firm-year-fixed effects to capture

the variation over time within firms (except model 4 for robustness check). In the first model, we examined the impact of ownership concentration, control variables and firm-year-fixed effects, whereby the result indicates a negative, significant impact of ownership concentration on corporate donation *(D)* at 5% level of significance (t-value = -2.21). In the second model, we examined the impact of CEO pay slice, control variables and firm-year-fixed effects, whereby the results indicate a negative, non-significant impact of CEO pay slice on corporate donation *(D)*. In the third model, we employed the Likelihood-ratio test for linearity, and the P value result is (0.00), which means that the relation between CEO pay slice and corporate donation *(D)* is a non-linear relation.

Therefore, we added the quadratic CEO pay slice *(CPSQ)* alongside with CEO pay slice, control variables and firm-year-fixed effects in order to have an accurate result for the impact of the CEO pay slice on corporate donation *(D)*, and the results indicate a positive, significant impact of CEO pay slice on corporate donation *(D)* at 1% level of significance (t-value = 2.74), and a negative, significant impact of quadratic CEO pay slice on corporate donation *(D)* at 1% level of significance (t-value = -3.42). In the fourth model, we examined the impact of ownership concentration, CEO pay slice, quadratic CEO pay slice and control variables, without firm-year-fixed effects for the robustness check, whereby the results indicate a negative, significant impact of ownership concentration on corporate donations *(D)* at 5% level of significance (t-value = -2.43), a positive, significant impact of CEO pay slice on corporate donations *(D)* at 1% level of significance (t-value = 3.41), and a negative, significant impact of quadratic CEO pay slice on corporate donations *(D)* at 5% level of significance (t-value = -2.46). In the fifth model, we examined the impact of ownership concentration, CEO pay slice, quadratic CEO pay slice, control variables and firm-year-fixed effects, whereby we employed the Likelihood-ratio test for linearity, and the P value result is

(0.00), which proves the non-linear relation between CEO pay slice and corporate donations *(D)*. The results indicate a negative, significant impact of ownership concentration on corporate donations *(D)* at 5% level of significance (t-value = -2.19), thus, this result is compatible with our expected hypothesis (2.1). Likewise, this aforementioned result is in line with the results of the previous literatures (Reverte, 2009; Li and Zhang, 2010; Dam and Scholtens, 2013; Ducassy and Montandrau, 2015; Lin et al., 2018). In addition, the results indicate a positive, significant impact of CEO pay slice on corporate donations *(D)* at 1% level of significance (t-value = 2.76), and a negative, significant impact of quadratic CEO pay slice on corporate donations *(D)* at 1% level of significance (t-value = -3.41), thus, these results are compatible with our expected hypothesis (2.2). Likewise, these aforementioned results are in line with the result of the previous literature (Jiraporn and Chintrakarn, 2013).

In addition, a positive, significant impact of firm size on corporate donation *(D)* was found at 5% level of significance (t-value = 2.59), which indicates that large firms are more willing to donate. A negative, significant impact of firm leverage on corporate donation *(D)* was found at 1% level of significance (t-value = -4.87), which indicates firms with high debt ratios are less willing to donate. A negative, significant impact of firm age on corporate donation *(D)* was found at 10% level of significance (t-value = -1.76), which indicates that older firms are less willing to donate. A positive, significant impact of capital expenditure on corporate donation *(D)* was found at 1% level of significance (t-value = 2.93), which indicates that firms with more investments in tangible assets are more willing to donate. No impact was found of sales growth, cash flow from operations, return on assets, stock volatility and GDP growth rate on corporate donation *(D)*. A positive, significant impact of financial firms on corporate donation *(D)* was

found at 1% level of significance (t-value = 4.3), which indicates that financial firms are more willing to donate.

In the sixth model, we examined the impact of ownership concentration, CEO pay slice, quadratic CEO pay slice, control variables and firm-year-fixed effects on corporate donations *(NLD)* as an alternative measurement of corporate donation *(D)*, for the robustness check, whereby we employed the Likelihood-ratio test for linearity, and the P value result is (0.00), which proves the non-linear relation between CEO pay slice and corporate donations *(NLD)*. The results indicate a negative, significant impact of ownership concentration on corporate donations *(NLD)* at 10% level of significance (t-value = -1.82). In addition, the results indicate a positive, significant impact of CEO pay slice on corporate donations *(NLD)* at 1% level of significance (t-value = 3.25), and a negative, significant impact of quadratic CEO pay slice on corporate donations *(NLD)* at 1% level of significance (t-value = -3.85). It is notable that the results of the sixth model support our results in the fifth model.

Furthermore, as presented in Table 2.5, in order to check for possible endogeneity between ownership concentration, CEO pay slice and corporate donations *(D)*, we employed dynamic panel-data estimation, two-step system generalized method of moments regression (GMM), since GMM model deals with heteroscedasticity, simultaneity, reduces errors over time and controls endogeneity (by internally transforming the data and by including lagged values of the dependent variable). The P values results of the post estimation of the GMM regression are as follows: Arellano-Bond test for AR (1) is (0.00), Arellano-Bond test for AR (2) is (0.17), Sargan test of overid is (0.24), and Hansen test of overid is (0.45), which means that the model and the instrumental variables are well specified and valid. Moreover, the P value result of the GMM test for endogeneity is (0.26), which means that we cannot reject the null hypothesis of

the test that the variables are exogenous. Therefore, we consider the results of the fifth regression model presented in Table 2.4 as the final results of our hypotheses.

Table 2. 4 Regression analysis.

Model	**1**	**2**	**3**	**4**	**5**	**6**
Dep Var.	*D*	*D*	*D*	*D*	*D*	*NLD*
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
	t-value	t-value	t-value	t-value	t-value	t-value
OC	**-0.026			**-0.012	**-0.025	*-0.022
	-2.21			-2.43	-2.19	-1.82
CPS		-0.005	***0.043	***0.052	***0.043	***0.050
		-1.13	2.74	3.41	2.76	3.25
CPSQ			***-0.001	**-0.0004	***-0.0005	***-0.0006
			-3.42	-2.46	-3.41	-3.85
SIZE	***0.856	**0.758	**0.697	***1.018	**0.77	***1.86
	2.88	2.32	2.15	15.72	2.59	5.97
LVRG	***-4.687	***-4.449	***-4.48	***-1.882	***-4.656	***-4.967
	-4.91	-4.62	-4.68	-3.92	-4.87	-5.13
AGE	*-0.04	-0.007	-0.003	***0.026	*-0.035	-0.013
	-1.93	-0.34	-0.16	4.23	-1.76	-0.63
CAPEX	***2.913	***2.876	***2.977	***-1.568	***2.907	**2.68
	3	2.86	2.95	-3.04	2.93	2.49
GRWTH	0.007	0.007	0.007	-0.003	0.007	*0.007
	1.2	1.21	1.37	-0.83	1.4	1.75
OCF	0.124	0.243	0.211	**2.832	0.14	0.387
	0.12	0.23	0.2	2.28	0.14	0.39
ROA	0.019	0.02	0.019	***0.062	0.02	*0.032
	1.14	1.17	1.13	3.67	1.18	1.83
V	0.035	0.033	0.053	-0.058	0.045	0.076
	0.34	0.33	0.51	-0.32	0.42	0.68
GDP	3.715	-1.407	-1.737	**-0.194	3.54	-3.516
	0.79	-0.3	-0.38	-2.23	0.76	-0.75
FIN	***3.13	***2.934	***3.138	*-0.485	***3.324	-0.117
	4.06	3.75	4	-1.84	4.3	-0.14
Firm effects	Included	Included	Included	not-Included	Included	Included
Year effects	Included	Included	Included	not-Included	Included	Included
Obs	1,496	1,496	1,496	1,496	1,496	1,496
R-squared	0.74	0.74	0.74	0.24	0.74	0.83
Likelihood-ratio test			0.00	0.01	0.00	0.00
Het. test	0.00	0.00	0.00	0.00	0.00	0.00

***p<0.01; **p<0.05; *p<0.10

Table 2. 5 GMM regression analysis.

D	Coefficient
	t-value
D t-1	***0.523
	10.58
OC	*-0.019
	-1.84
CPS	*0.063
	1.79
CPSQ	**-0.001
	-2.16
SIZE	***0.179
	2.76
LVRG	*-0.799
	-1.67
AGE	-0.005
	-0.86
CAPEX	-0.054
	-0.1
GRWTH	***-0.010
	-5.49
OCF	0.81
	0.89
ROA	0.019
	1.27
V	-0.067
	-0.65
GDP	3.51
	0.73
FIN	0.341
	1.43
Year effects	Included
Obs	1,088
Arellano-Bond test for AR(1)	0.00
Arellano-Bond test for AR(2)	0.17
Sargan test of overid	0.24
Hansen test of overid	0.45
Difference (null H = exogenous)	0.26

***p<0.01; **p<0.05; *p<0.10

Considering the found result of the non-linear relation between CEO pay slice and corporate donations, we employed the margins analysis for further interpretation of this non-linear relation finding, as presented in Table 2.6. The results of this margin analysis indicate a positive, significant impact of CEO pay slice on

corporate donation when the proportion of CEO pay slice is less than 50%, whereby CEOs with a pay slice proportion less than 50% are more willing to donate than dominant CEOs with a pay slice proportion more than 50%. Figure 2.3, generated using the margins analysis, visualizes the U-shape non-linear relation between CEO pay slice and corporate donations.

Table 2. 6 Margins analysis.

Dependent Variable	***D***	***Dependent Variable***	***D***
CPS	dy/dx t-value	*CPS*	dy/dx t-value
CPS = 0%	***0.075 4.71	*CPS* = 55%	*-0.01 -1.89
CPS = 5%	***0.068 4.65	*CPS* = 60%	***-0.017 -2.99
CPS = 10%	***0.06 4.58	*CPS* = 65%	***-0.025 -3.69
CPS = 15%	***0.052 4.47	*CPS* = 70%	***-0.033 -4.12
CPS = 20%	***0.044 4.32	*CPS* = 75%	***-0.041 -4.39
CPS = 25%	***0.037 4.1	*CPS* = 80%	***-0.048 -4.56
CPS = 30%	***0.029 3.76	*CPS* = 85%	***-0.056 -4.68
CPS = 35%	***0.021 3.23	*CPS* = 90%	***-0.064 -4.76
CPS = 40%	**0.014 2.39	*CPS* = 95%	***-0.072 -4.82
CPS = 45%	0.006 1.15	*CPS* = 100%	***-0.079 -4.86
CPS = 50%	-0.002 -0.4		

***p<0.01; **p<0.05; *p<0.10

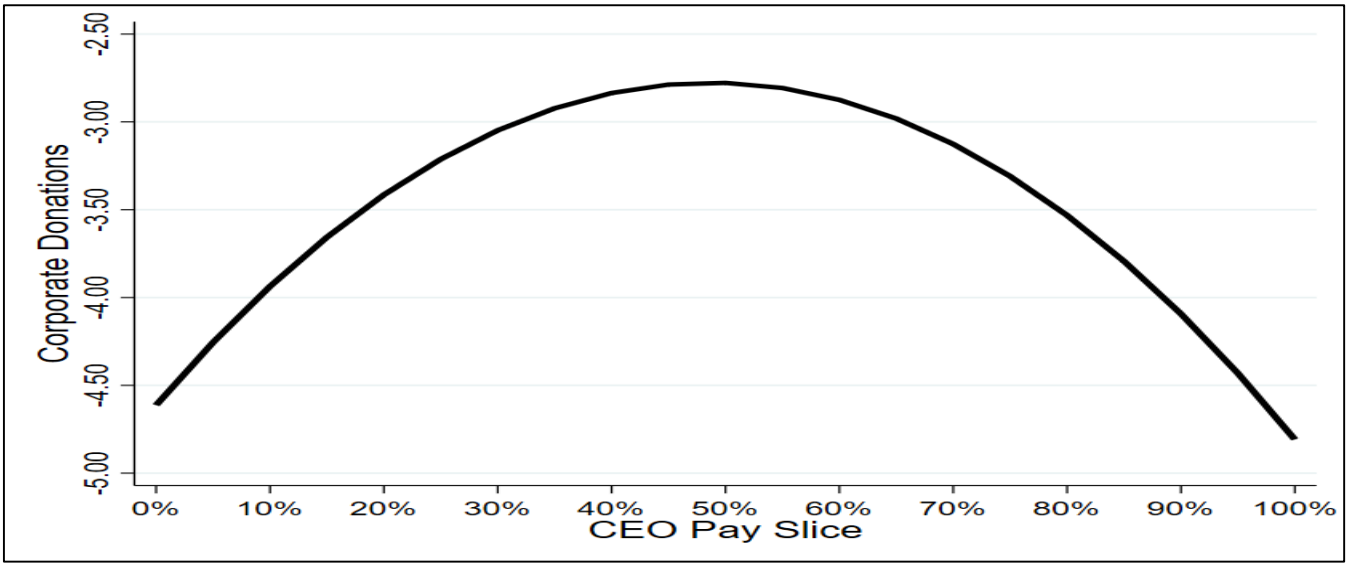


Figure 2. 3 The non-linear relation between corporate donations and CEO pay slice.

2.6 Conclusions and Limitations

This research aims to investigate the impact of ownership concentration and CEO pay slice on corporate charity donations for 136 Jordanian public shareholding firms listed in the ASE from 2012 to 2022, in order to investigate and clarify the reasons behind the motivations that lead firms to pay more attention to their social responsibility in the developing countries.

Our empirical results indicate a negative impact of ownership concentration on corporate donations. This result is compatible with the *agency theory*, which posits that large block holders are less willing to donate. In addition, we found a non-linear relation between CEO pay slice and corporate donations, whereby when the CEO compensation proportion is less than 50% of the top 5 executive's compensation including the CEO, the increasing in CEO pay slice leads to increased corporate donations. On the contrary, dominant CEOs with a pay slice proportion more than 50% are less willing to donate. This result is compatible with the *agency theory*, which posits that powerful managers focus more on their personal benefits, and less powerful managers will use the social contributions and donation to gain more power.

Herein lies the importance and the value added by this research to the knowledge of the previous literature; our empirical findings provide evidence about the impact of large blocks of shareholders and powerful CEOs, which are two important parts of the financial and non-financial decision making process of each firm, on corporate social contributions, for a large sample that covers an average of 94.56% of total market capitalization for the listed firms and an average of 66.97% of the total number of listed firms over 2012 to 2022. Accordingly, shareholders and managers in the developing countries in general and especially in Jordan should focus more on CSR as it is beneficial to society and the economy, rather than just use it as a tool to get a better reputation and gain more power. In addition, our findings would be useful for the JSC and the ASE in their process to improve and develop the sustainability, environmental and social responsibility disclosures for the Jordanian firms.

Finally, this research has some limitations, as the majority of the listed Jordanian firms have neither the environment, social and governance (ESG) scores, nor CSR scores. Another limitation is the geographical scope of the sample; collecting data from Jordan makes it challenging to generalize the findings to a wider context. For future research, this analysis could be conducted in other Middle Eastern countries.

3. Powerful CEO, Board Size and Firm's Performance: Evidence from Jordan

3.1 Introduction

The influence of the chief executive officer (CEO) on a company's performance has garnered considerable interest among researchers in corporate governance. Given the CEO's crucial role for the company, shareholders, and stakeholders, particularly in decision-making and financial disclosures, which would naturally affect the firm's overall performance. (Hamori and Kakarika, 2009; Sheikh, 2018). Several works have found a positive impact of a powerful CEO on a firm's performance (Quinn, 1985; Boyd, 1995; Tien et al., 2013; Ting et al., 2017; Fang et al., 2020). However, other works found a negative impact of a powerful CEO on a firm's performance (Huson et al., 2004; Bebchuk et al., 2011).

This research contributes to the previous literature in several ways. To the best of our knowledge, this is the first research to create CEO power index and link it with board size and firm's performance in developing countries, being unlike the previous literature (Bebchuk et al., 2011; Munir et al., 2017; Sheikh, 2018; Fang et al., 2020), which created CEO power index for the developed countries, and unlike the previous literature (Jaafar and El-Shawa, 2009; Qadorah and Fadzil, 2018; Saidat et al., 2020; Alhmood et al., 2020), which linked the CEOs' characteristics separately on firms' performance in the developing countries. Therefore, this article aims to bridge the research gap about CEO power in developing countries, by creating a power index that contains components from *structural*, *ownership* and *expert* power dimensions. Additionally, this research presents new evidence regarding the significant influence of board size on the effects of the CEO, whereby powerful CEOs enhance firm performance when the board is large, while their impact is negative when the board is small. This contrasts with previous literature (Jensen, 1993;

Yermack, 1996; Huson et al., 2004; Bebchuk et al., 2011; Ting et al., 2017), that suggested a negative effect of powerful CEOs on firm performance, asserting that smaller boards are more effective in monitoring CEOs, thereby positively influencing performance. Furthermore, this article contributes to extending the theoretical perspective about CEO and upper management power by examining both financial and non-financial firms, highlighting the significant role that financial institutions play in developing countries like Jordan.

This research focuses on emerging economies like Jordan due to the availability of data on the executive management of listed firms. Additionally, it aims to connect the CEO power index with firm performance during the post-privatization period. Notably, in the 1990s, the Jordanian government initiated a privatization process, representing a significant reform aimed at increasing the private sector's contribution to the country's gross domestic product (GDP). Consequently, the government's shareholding in listed companies declined from 15% in the 1990s to less than 6% by 2012 (Amman Stock Exchange, 2012). Furthermore, Jordan aims to enhance its economy and capital market. To this end, the Jordan Securities Commission (JSC) and the Amman Stock Exchange (ASE) have been working to improve transparency and the disclosure of annual reports for listed firms over the past two decades. This effort began with the corporate governance instructions issued in 2009 and continued with further guidelines released in 2017, whereby firms should disclose information about the executive management to improve the transparency of firms' disclosures (Securities Depository Center, 2017). Thus, the findings of this article would be useful to add value to the aforementioned process.

Accordingly, this research aims to measure the impact of CEO power and the mediating impact of board size on firms' performance, measured by return on assets (ROA) and return on equity (ROE), for 136 Jordanian public shareholding firms listed on the ASE, from 2012 to 2022.

The basis of the selection criteria for CEO power stem from the crucial role that CEOs play in the decision-making process within a firm. Meanwhile, the mediating effect of board size is linked to the board's important function in overseeing the efficiency of executive management. Thus, to assess the impact of these roles on the firm's profitability (measured by ROA and ROE) it's essential, as profitability reflects the returns on shareholders' investments.

The remainder of the research is structured as follows. Section 2 shows the theoretical framework. Section 3 the literature review and hypotheses. Section 4 the methodology and sample explanation. Section 5 the discussions and results. Finally, Section 6 the conclusions and limitations.

3.2 Theoretical Framework

Several governance theories of corporate governance have linked CEO power with a firm's performance. According to the *Agency theory*, powerful managers (agents) will be focused more on their personal interests rather than shareholders' (principals), and thus their main focus will not be the company's financial performance. Therefore, in order to avoid this conflict, shareholders must control, monitor and evaluate managers' performance through large boards of directors, the majority of whose members are independent and outsiders. Thus, this separation between owners and manager's responsibilities will reduce the CEO power, in order to protect the shareholder's interests and to improve firm performance (Jensen and Meckling, 1976; Fama, 1980; Fama and Jensen, 1983; Zahra and Pearce, 1989).

The *Stewardship theory* posits that powerful managers are capable and trusted to act as stewards of the firm's resources and to maximize the returns and profits of the shareholders and improve the firm's performance as they respond quickly to the changes in market and have more ability to take strategic decisions. Moreover, shareholders must motivate board members to become executives rather than non-executives because more executives in board will improve its power especially when there are large block shareholdings, and will improve the efficiency of controlling and monitoring roles (Donaldson, 1990; Tricker, 1990; Donaldson and Davis, 1991; Donaldson and Davis, 1994; Finkelstein and D'Aveni, 1994; Boyd, 1995; Turnbull, 2000).

Furthermore, *Upper echelons theory* posits that the CEO plays the main role of influencing the decision making process of the firm. As it believes that firms are represented by their CEOs. Moreover, the personalities, skills, experiences, and influence of CEOs impact the strategies, values, decisions, and disclosures of their firms (Hambrick and Mason, 1984; Hambrick, 2007). In sum, this is the theoretical framework that underpins our research. Figure 3.1 shows the impact of CEO power on the firm's financial performance, mediated by board of directors' size.

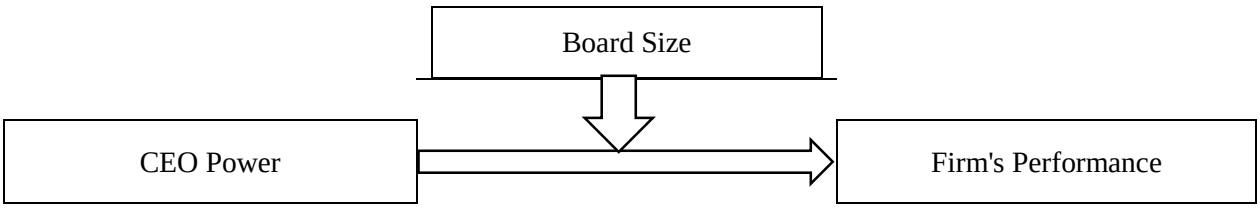


Figure 3. 1 A theoretical model of the impact of CEO power on the firm's financial performance, mediated by board size.

3.3 Literature Review and Hypotheses

3.3.1 CEO Power

Finkelstein (1992) referred to the four dimensions of CEO power which are: *structural power*: hierarchical organizational structure; *ownership power*: CEO shareholdings and CEO relation with the co-

founders; *expert power*: time of serving the firm as a CEO; *prestige power*: CEO reputation and educational level.

Previous literature has utilized these four dimensions of power and their components to construct a CEO power index using two approaches. The first method involves converting the components into dummy variables, assigning a value of 1 if the component's value exceeds the firm sample median and 0 otherwise. The CEO power index is then calculated as the average or sum of these component values (Shinong et al., 2011; Sheikh, 2018; Chowdhury et al., 2023). The second method employs first principal component analysis (PCA) (Shinong et al., 2011; Munir et al., 2017; Chowdhury et al., 2023). This research applies both methods.

3.3.2 CEO Power and firm's Performance

Several works have linked CEO power with a firm's performance. Bebchuk et al. (2011) used CEO pay slice (CPS) as a measurement of CEO power, which is the percentage of CEO compensation by total top five executive's compensations, and found a negative impact of CEO power on worldwide firms' profitability over 1993 to 2004. Moreover, Huson et al. (2004) referred to the negative impact of CEO turnover (leaving the firm) of firm performance in the USA over 1971 to 1994. Ting et al. (2017) studied the Chinese financial institutions over 1999 to 2011 and found that structurally powerful CEOs negatively impact a firm's performance. Moreover, they found that CEO tenure which indicates expert power, positively impacts the ROA. Furthermore, Olaniyi and Richard Olayeni (2020) analyzed 63 non-financial Nigerian listed firms over 1998 to 2010. They measured the CEO pay by the natural logarithm of total CEO compensation and the firm's performance by ROA. They found that the decrease of CEO compensation due to governance measures negatively affects firm performance. Another study of Chinese firms listed in

Shenzhen Stock Exchange over 2004 to 2008, found a positive impact of CEO power on firm's performance in state-owned firms compared to non-state-owned firms (Shinong et al. 2011). Sheikh (2018) analyzed 2805 firms worldwide over 1992 to 2015 and found that CEO power in strong governance firms and highly competitive markets positively influences the firm's value. Gao et al. (2023) used ROA, ROE and firm leverage as measurements of firm's performance, and found a positive impact of the near-retirement CEOs on firm's performance for 1417 listed Chinese firms over 2007 to 2017. Furthermore, a study of 36 Chinese banks over 2006 to 2016, found that CEO structural power and prestige power positively influences the ROA. Moreover, CEO expert power positively affects ROE (Fang et al., 2020). Shen and Cannella (2002) analyzed 300 public firms in the USA over 1988 to 1994, and found that CEO turnover positively impacts the ROA. Akhigbe et al. (1997) found a positive relation between the firm's accounting performance and CEO compensation for 49 commercial banks in the USA for the 1994. Moreover, a study of 112 firms in the USA over 2001 to 2005, found that CEO short-term pay and long-term pay positively impact ROA (Tien et al., 2013).

In Jordan, the literature so far has focused more on the relation between CEO duality as the main measure of CEO power of corporate governance and firm's performance. In this vein, Jaafar and El-Shawa (2009) found a positive impact of CEO duality on ROA for 103 Jordanian listed firms over 2002 to 2005. Qadorah and Fadzil (2018) referred to a negative significant impact of CEO duality on ROA for a sample of 64 industrial firms listed in the ASE in 2013. Moreover, Saidat et al. (2020) analyzed 56 firms listed in the ASE over 2009 to 2015, and found that the CEO who belongs to the family that owns the firm negatively impacts the ROA.

Based on the previous literature, we propose the following hypotheses:

Hypothesis 3.1a *High CEO power is positively related to ROA.*

Hypothesis 3.1b *High CEO power is positively related to ROE.*

3.3.3 The Mediating Impact of Board Size between CEO Power and firm's Performance

Most of the previous literature indicates that smaller boards are more efficient (Pablo et al., 2005). Yermack (1996) found that smaller boards are more efficient in monitoring the CEO and positively impacts a firm's performance for a sample of 452 US industrial firms over 1984 to 1991. As well, Jensen (1993) concluded that large boards are less efficient to monitor the CEO and negatively impact performance for 432 worldwide firms over 1979 to 1990. In addition, Core et al. (1999) referred to a positive impact of board size on CEO compensation and power, and negative impact on firm's performance for 205 US firms over 1982 to 1984. Furthermore, Eisenberg et al. (1998) referred to a negative impact of board size on firm's profitability of 879 Finnish firms over 1992 to 1994. Moreover, another study of 50 largest Chinese banks over 2003 to 2010, found a negative impact of board size on firm performance (Liang et al., 2013). In addition, Fang et al. (2020) found a negative impact of board size on shareholder's profitability for 36 Chinese banks over 2006 to 2016. This negative impact was due to the difficulties in holding meetings, exchanging opinions and reviewing the performance in large boards (Lipton and Lorsch, 1992).

Based on the previous literature, we propose the following hypotheses:

Hypothesis 3.2a *The mediating impact of large board size between CEO power and ROA is negative.*

Hypothesis 3.2b *The mediating impact of large board size between CEO power and ROE is negative.*

3.4 Methodology

3.4.1 Data Collection

Our sample contains firms listed on the ASE in the post-privatization period from 2012 to 2022. Firms for which annual reports are not available during the complete, aforementioned period are excluded. Accordingly, the final sample consists of 136 financial and non-financial firms listed in ASE. Table 3.1 summarizes the percentage of market capitalization and number of firms of our sample out of a total population on the ASE by year.

Table 3. 1 Percentage of market cap and number of firms of our sample out of a total population.

Year	Market Capitalization	Number of Firms	Share in Total ASE Listed Firms
2012	93.85%	136	55.97%
2013	93.40%	136	56.67%
2014	93.01%	136	57.63%
2015	93.60%	136	59.65%
2016	93.37%	136	60.71%
2017	94.47%	136	70.10%
2018	94.46%	136	69.74%
2019	94.83%	136	71.20%
2020	95.17%	136	75.98%
2021	95.68%	136	79.07%
2022	98.34%	136	80.00%
Average (2012-2022)	94.56%	136	66.97%

3.4.2 Definitions and Measures of the Variables

Regarding the dependent variables, we measure the firm's performance using accounting profitability measures, which are: *ROA* which is the operating income before interests and taxes (EBIT) divided by total average assets, and *ROE* which is the net income after taxes divided by total shareholders' equity. The data has been obtained from the firms' annual reports and disclosures from the ASE.

Regarding the independent variable, we developed a CEO power index based on four components from three dimensions of CEO power. First, CEO pay slice *(CPS)* measures *structural power*, indicating the extent of the CEO's influence over executive management. *(CPS)* is calculated as the proportion of total CEO compensation by the top five executive's compensation including the CEO, the compensation includes total annual salary, bonuses, transportation and allowances for the CEO and the executive management (Bebchuk et al., 2011; Munir et al., 2017; Sheikh, 2018; Chowdhury et al., 2023). Second, CEO duality

(DT) also reflects *structural power* and is represented as a dummy variable, where it equals 1 if the CEO serves as the chairman and 0 otherwise. Third, CEO shareholdings *(SH)* measures *ownership power*, calculated as the proportion of shares held by the CEO out of the total outstanding shares (Finkelstein, 1992; Tang et al., 2011; Ting et al., 2017; Fang et al., 2020). Lastly, CEO tenure *(TN)* indicates *expert power*, representing the number of years since the CEO was appointed (Huson et al., 2004; Ting et al., 2017; Sheikh, 2018). The data of CEO power components has been obtained from the firms' annual reports and disclosures from the ASE. Subsequently, we converted *CPS*, *SH*, and *TN* into dummy variables, assigning a value of 1 if their values exceed the subsector sample median and 0 otherwise. The ASE sub sector classification was used for all dummy variables.

Accordingly, we constructed the CEO power index in two ways. First, by combining the four dummy components (*CPS*, *DT*, *SH*, and *TN*), the index ranges from zero to four *(CP)*. Second, as an alternative measurement for robustness check, we applied first principal component analysis (PCA) using the aforementioned four components of CEO power *(CPP)*, in line with prior research (Shinong et al., 2011; Munir et al., 2017; Chowdhury et al., 2023). PCA helps create new variables from complex datasets by reducing dimensionality while preserving data variation (Çoban and Topcu, 2013). Table 3.2 summarizes the variables' description, descriptive statistics and data source for the components of CEO power index. Moreover, Table 3.3 presents the correlation between the components of CEO power and *(CP)*.

Table 3. 2 Variables' description and descriptive statistics for the components of CEO power index.

Variable Name Variable Label	**Description**	**Obs** [c]	**Mean**	**Std. dev.**	**Min**	**Max**
Structural Power						
CEO Pay Slice *CPS (%)* [a] [b]	CEO Compensation / Top 5 Executives Compensation Including CEO	1,496	47.9	22.3	0	100
CEO Duality *DT* [b]	Dummy, 1 if the CEO is the Chairman, 0 otherwise	1,496	0.14	0.4	0	1
Ownership Power						
CEO Shareholdings *SH (%)* [a] [b]	Shares Hold by CEO / Outstanding Shares	1,496	2.64	6.9	0	65.3
Expert Power						
CEO Tenure *TN* [b]	Current Financial Year – Appointment Year as CEO	1,496	9.05	8.1	1	46

Data Source: [a]: Own calculation from ASE firms annual reports; [b]: ASE firms annual reports; [c]:136 firms x 11 years=1,496

Table 3. 3 Pairwise correlations of the components of CEO power index.

Variable	***CP***	***CPS***	***DT***	***SH***
CPS	**0.39**	1		
DT	**0.44**	0.04	1	
SH	**0.32**	0.04	**0.34**	1
TN	**0.52**	**0.16**	**0.05**	**0.10**

Bold numbers indicate < 5% significance

Regarding the control variables, we employed several; board size *(BMS)* captures the impact of board size on the monitoring role of the board (Pablo et al., 2005; Muchemwa et al., 2016). The data has been obtained from the firms' annual reports and disclosures from the ASE; firm size *(SIZE)* measures the size effect, calculated by natural logarithm of total assets (Sheikh, 2018; Fang et al, 2020). The data has been obtained from the firms' annual reports and disclosures from the ASE; firm leverage *(LVRG)* gauges the debtors monitoring impact (Jensen and Meckling, 1976). The data has been obtained from the firms' annual reports and disclosures from the ASE; firm age *(AGE)* represents the impact of age as the firm's experience grows by time (Berger and Udell, 1998; Shahrier et al., 2018). The data has been obtained from the firms' annual reports and disclosures from the ASE; capital expenditure *(CAPEX)* measured by dividing the net investment on property, plant and equipment on total assets (Roy et al., 2022). The data has been obtained from the firms' annual reports and disclosures from the ASE; sales growth *(GRWTH)* is the sales' annual growth rate (Shinong et al., 2011). The data has been obtained from the firms' annual reports and

disclosures from the ASE; stock volatility *(V)*, which is the standard deviation of daily stock returns of the last 12 months prior to the end of each firm's fiscal year, to capture the uncertainty and chaos of financial markets (Chen et al., 2013; Omane-Adjepong et al., 2024). The data has been obtained from the firm's annual reports from the ASE; gross domestic product *(GDP)* growth rate, which is the annual growth rate of the Jordanian GDP, to capture the impact of macroeconomics on firm's profitability (Bolt et al., 2012; Fidanoski et al., 2018). The data has been obtained from World bank national accounts data (World Bank, 2024); financial firm *(FIN)*, which is a dummy variable that is assigned the value of 1 if the firm is related to the financial sector, and 0 otherwise, to avoid any bias between financial and non-financial firms, knowing that we considered ASE classification for the subsectors (banks, insurance, diversified financial service and real estate) as financial. In this research, we have resorted to ASE to obtain the data from the firms' annual reports and disclosures published by the end of each firm's financial year, from 2012 to 2022. Table 3.4 summarizes the variables' description, descriptive statistics and data source.

3.4.3 Research Model

We developed an ordinary least squares (OLS) regression model. In addition, firm-fixed effects were employed to capture the variation within firms, and year-fixed effects were employed to capture the variation over time, for instance, COVID-19 pandemic crisis in 2020. This is represented in Equation (3.1):

$$FP = \beta0 + \beta1\ CP + \beta2\ BMS + \beta3\ CP*BMS + \beta4\ SIZE + \beta5\ LVRG + \beta6\ AGE + \beta7\ CAPEX + \beta8\ GRWTH + \beta9\ V + \beta10\ GDP + \beta11\ FIN + FIRM\ FE + YEAR\ FE + \varepsilon \quad (3.1)$$

Where β0 = intercept; Ɛ = error term; βn = coefficients; *FIRM FE* = firm fixed effects, *YEAR FE* = year fixed effects. *FP* = *ROA* and *ROE* respectively. *CP* = CEO power index; *BMS* = board size; *CP*BMS* = interaction between CEO power and board size; *SIZE* = firm size; *LVRG* = firm leverage ratio; *AGE* = firm

age; *CAPEX* = Capital Expenditure; *GRWTH* = sales growth; *V* = Stock Volatility; *GDP* = Annual Growth rate of Jordanian GDP; *FIN* = Financial firm.

Table 3. 4 Variables' description and descriptive statistics.

Variable Name Variable Label	**Description**	**Obs** [d]	**Mean**	**Std. dev.**	**Min**	**Max**
Dependent Variables:						
Return on Assets *ROA* [a] [b]	EBIT / Average Total Assets	1,496	2.79	6.87	-30.12	51.54
Return on Equity *ROE* [a] [b]	Net Income / Total Shareholders' Equity	1,496	3.29	14.35	-100	96.16
Independent Variables:						
CEO Power Index *CP* [a] [b]	Sum of four CEO power dimensions: *CPS*, *DT*, *SH*, and *TN*	1,496	1.55	1.14	0	4
CEO Power Index *CPP* [a] [b]	PCA analysis of *CPS*, *DT*, *SH*, and *TN*	1,496	0.00	1.23	-1.64	2.56
Control Variables:						
Board Size *BMS* [b]	Number of Board Members	1,496	8	2.33	3	13
Firm Size *SIZE* [a] [b]	Natural Logarithm of Total Assets	1,496	18.12	1.79	14.79	24.89
Leverage Ratio *LVRG (%)* [a] [b]	Total Debt / Total Assets	1,496	42.13	28.3	0	100
Firm Age *AGE* [a] [b]	Number of Years: Financial Year - Year of Incorporation	1,496	29	17.6	3	93
Capital Expenditure *CAPEX (%)* [a] [b]	Net property, plant and equipment / Total Assets	1,496	25.66	27.2	0	98.90
Sales Growth *GRWTH (%)* [a] [b]	(SALES t - SALES t-1) / SALES t-1	1,496	79.35	19.14	-98	595.59
Stock Volatility *V* [a] [b]	Standard deviation of daily stock returns of last 12 months	1,496	0.16	0.45	0	8.05
GDP Growth Rate *GDP (%)* [c]	Annual Growth rate of Jordanian GDP	1,496	2.02	1.22	-1.61	3.38
Financial Firm *FIN* [b]	Dummy: 1 if the firm is related to financial sector, 0 otherwise	1,496	2.02	1.22	-1.61	3.38

Data Source: [a]: Own calculation from ASE firms' annual reports; [b]: ASE firms' annual reports; [c]: World Bank national accounts data; [d]: 136 firms x 11 years=1,496

3.5 Results and Discussion

3.5.1 Correlations

We employed the variance inflation factor test (VIF), and the results show that there is no multicollinearity problem. Table 3.5 presents the results of pairwise correlations and VIF test results.

Table 3. 5 Pairwise correlations and multicollinearity VIF test.

Variable	**VIF**	***ROA***	***ROE***	***CP***	***BMS***	***SIZE***	***LVRG***	***AGE***	***CAPEX***	***GRWTH***	***V***	***GDP***
CP	1.04	-0.02	0.01	1								
BMS	1.54	**0.07**	**0.18**	0.01	1							
SIZE	2.22	**0.13**	**0.25**	**0.07**	**0.56**	1						
LVRG	1.75	**-0.14**	-0.001	**-0.10**	**0.35**	**0.60**	1					
AGE	1.40	-0.01	**0.12**	**-0.05**	**0.41**	**0.45**	**0.38**	1				
CAPEX	1.83	-0.04	**-0.11**	**0.10**	**-0.14**	**-0.21**	**-0.23**	**-0.09**	1			
GRWTH	1.00	0.01	0.01	-0.004	-0.03	-0.001	0.02	0.01	-0.01	1		
V	1.15	**0.37**	**0.23**	**-0.10**	**0.12**	**0.19**	-0.04	**0.19**	**0.06**	0.003	1	
GDP	1.01	**0.11**	**0.10**	0.002	0.005	-0.01	-0.03	**-0.08**	-0.01	0.01	0.02	1
FIN	1.85	**-0.15**	0.003	-0.03	**0.09**	**0.70**	**0.22**	0.01	**-0.66**	0.01	**-0.16**	0.01
Mean VIF	1.48											

Bold numbers indicate < 5% significance

3.5.2 Regression Results

To examine the associations between CEO power index (*CP* and *CPP*), the interaction between the CEO power index and board size, CEO power index components and firm's profitability, we employed Robust standard errors ordinary least square (OLS) regression, as the P value of Breusch–Pagan/Cook–Weisberg test for hetero-scedasticity (Het. test) is (0.00) for all regression models to avoid the heteroscedasticity problem and obtain more accurate results for our analysis of which the results are presented in Tables 6, 7 and 9. Furthermore, all the regression models include firm-year-fixed effects to capture the variation over time within firms.

As presented in Table 3.6, in the first model, we examined the impact of CEO power index *(CP)*, control variables and firm-year-fixed effects, whereby the result indicates a negative, non-significant impact of CEO power index *(CP)* on *ROA*. In the second model, we employed the Likelihood-ratio test for linearity,

and the P value result is (0.01), which means that the relation between CEO power index *(CP)* and *ROA* is a non-linear relation.

Therefore, we added the quadratic CEO power index *(CPQ)* alongside with CEO power index *(CP)*, control variables and firm-year-fixed effects in order to have an accurate result for the impact of the CEO power index *(CP)* on *ROA*, and the results indicate a positive, significant impact of CEO power index *(CP)* on *ROA* at 5% level of significance (t-value = 2), and a negative, significant impact of quadratic CEO power index *(CPQ)* on *ROA* at 5% level of significance (t-value = -2.59). In the third model, we examined the impact of CEO power index *(CP)*, quadratic CEO power index *(CPQ)*, the interaction between the CEO power index *(CP)* and board size, the interaction between the quadratic CEO power index *(CPQ)* and board size, control variables and firm-year-fixed effects, and the results indicate a positive, significant impact of CEO power index *(CP)* on *ROA* at 1% level of significance (t-value = 2.74), a negative, significant impact of quadratic CEO power index *(CPQ)* on *ROA* at 5% level of significance (t-value = -2.53), thus, these results are not compatible with our expected hypothesis (3.1a). By contrast, these aforementioned results are in line with the result of the previous literature (Huson et al., 2004; Bebchuk et al., 2011; Ting et al., 2017). Furthermore, the results indicate a negative, significant impact of the interaction between CEO power index *(CP)* and board size on *ROA* at 5% level of significance (t-value = -2.44), a positive, significant impact of the interaction between the quadratic CEO power index *(CPQ)* and board size on *ROA* at 5% level of significance (t-value = 2.05), thus, these results are not compatible with our expected hypothesis (3.2a). By contrast, these aforementioned results are in line with the result of the previous literature (Jensen, 1993; Yermack, 1996).

In addition, no impact was found of board size on *ROA.* A positive, significant impact of firm size on *ROA* was found at 1% level of significance (t-value = 4.23). A negative, significant impact of firm leverage on *ROA* was found at 1% level of significance (t-value = -7.63). A negative, significant impact of firm age on *ROA* was found at 1% level of significance (t-value = -2.61). A negative, significant impact of capital expenditure on *ROA* was found at 1% level of significance (t-value = -5.22). No impact was found of sales growth on *ROA.* A positive, significant impact of stock volatility on *ROA* was found at 1% level of significance (t-value = 3.56). No impact was found of GDP growth rate on *ROA.* A negative, significant impact of financial firms on *ROA* was found at 1% level of significance (t-value = -4.98). In the fourth model, we examined the impact of CEO power index *(CP),* control variables and firm-year-fixed effects, of which the result indicates a positive, non-significant impact of CEO power index *(CP)* on *ROE*. In the fifth model, we employed the Likelihood-ratio test for linearity, and the P value result is (0.02), which means that the relation between CEO power index *(CP)* and *ROE* is a non-linear relation.

Therefore, we added the quadratic CEO power index *(CPQ)* alongside with CEO power index *(CP),* control variables and firm-year-fixed effects in order to have an accurate result for the impact of the CEO power index *(CP)* on *ROE*, and the results indicate a positive, significant impact of CEO power index *(CP)* on *ROE* at 5% level of significance (t-value = 2.12), and a negative, significant impact of quadratic CEO power index *(CPQ)* on *ROE* at 5% level of significance (t-value = -2.33). In the sixth model, we examined the impact of CEO power index *(CP),* quadratic CEO power index *(CPQ),* the interaction between the CEO power index *(CP)* and board size, the interaction between the quadratic CEO power index *(CPQ)* and board size, control variables and firm-year-fixed effects, and the results indicate a positive, significant impact of CEO power index *(CP)* on *ROE* at 1% level of significance (t-value = 2.69), a negative, significant impact

of quadratic CEO power index *(CPQ)* on *ROE* at 5% level of significance (t-value = -2.23), thus, these results are not compatible with our expected hypothesis (3.1b). By contrast, these aforementioned results are in line with the result of the previous literature (Huson et al., 2004; Bebchuk et al., 2011; Ting et al., 2017). Furthermore, the results indicate a negative, significant impact of the interaction between CEO power index *(CP)* and board size on *ROE* at 5% level of significance (t-value = -2.35), a positive, significant impact of the interaction between the quadratic CEO power index *(CPQ)* and board size on *ROE* at 10% level of significance (t-value = 1.76), thus, these results are not compatible with our expected hypothesis (3.2b). By contrast, these aforementioned results are in line with the result of the previous literature (Jensen, 1993; Yermack, 1996).

In addition, no impact was found of board size on *ROE.* A positive, significant impact of firm size on *ROE* was found at 1% level of significance (t-value = 4.19). A negative, significant impact of firm leverage on *ROE* was found at 1% level of significance (t-value = -6.35). No impact was found of firm age on *ROE*. A negative, significant impact of capital expenditure on *ROE* was found at 1% level of significance (t-value = -4.26). No impact was found of sales growth on *ROE*. A positive, significant impact of stock volatility on *ROE* was found at 1% level of significance (t-value = 3.21). No impact was found of GDP growth rate on *ROE.* A negative, significant impact of financial firms on *ROE* was found at 5% level of significance (t-value = -2.33).

Furthermore, as presented in Table 3.7, we examined the impact of CEO power index *(CPP),* as an alternative measurement of CEO power index *(CP),* on *ROA* and *ROE* respectively, for the robustness check. We employed the Likelihood-ratio test for linearity, and the P value results are (0.02) and (0.03) for *ROA* and *ROE* respectively, which means that the relation is non-linear between CEO power index *(CPP),*

and, *ROA* and *ROE*. The results indicate a positive, non-significant impact of CEO power index *(CPP)* on *ROA*, a negative, significant impact of quadratic CEO power index *(CPPQ)* on *ROA* at 5% level of significance (t-value = -2.45), a negative, non-significant impact of the interaction between the CEO power index *(CPP)* and board size on *ROA*, and a positive, significant impact of the interaction between quadratic CEO power index *(CPPQ)* and board size on *ROA* at 5% level of significance (t-value = 1.98). In addition, the results indicate a positive, significant impact of CEO power index *(CPP)* on *ROE* at 5% level of significance (t-value = 2.5), a negative, significant impact of quadratic CEO power index *(CPPQ)* on *ROE* at 5% level of significance (t-value = -2.15), a negative, significant impact of the interaction between CEO power index *(CPP)* and board size on *ROE* at 5% level of significance (t-value = -2.59), a positive, significant impact of the interaction between the quadratic CEO power index *(CPPQ)* and board size on *ROE* at 10% level of significance (t-value = 1.73). It is notable that these results support our results in the third and the sixth models presented in Table 3.6.

Furthermore, as presented in Table 3.8, in order to check for possible endogeneity between CEO power index *(CP)*, and, *ROA* and *ROE* respectively, we employed dynamic panel-data estimation, two-step system generalized method of moments regression (GMM), since GMM model deals with heteroscedasticity, simultaneity, reduces errors over time and controls endogeneity (by internally transforming the data and by including lagged values of the dependent variable). The P values results of the post estimation of the GMM regression for both models *(ROA* and *ROE)* are as follows: Arellano-Bond test for AR (1) are (0.00) (0.01) respectively, Arellano-Bond test for AR (2) is (0.31) for both models, Sargan test of overid are (0.53) and (0.86) respectively, and Hansen test of overid are (0.72) and (0.95) respectively, which means that the models and the instrumental variables are well specified and valid. Moreover, the P value results of the

GMM test for endogeneity are (0.65) and (.50) respectively, which means that we cannot reject the null hypothesis of the test that the variables are exogenous. Therefore, we consider the results of the third and the sixth models presented in Table 3.6 as the final results of our hypotheses.

Table 3. 6 Regression analysis.

Model	**1**	**2**	**3**	**4**	**5**	**6**
Dep. Var.	*ROA*	*ROA*	*ROA*	*ROE*	*ROE*	*ROE*
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
	t-value	t-value	t-value	t-value	t-value	t-value
CP	-0.147	**0.687	***3.298	0.155	**2.055	***9.888
	-1.15	2	2.74	0.45	2.12	2.69
CPQ		**-0.269	**-0.959		**-0.6122	**-2.133
		-2.59	-2.53		-2.33	-2.23
BMS	-0.12	-0.113	0.089	0.1417	0.159	0.932
	-0.75	-0.7	0.54	0.32	0.36	1.64
CP x BMS			**-0.325			**-0.957
			-2.44			-2.35
CPQ x BMS			**0.087			*0.188
			2.05			1.76
SIZE	***3.158	***3.184	***3.228	***6.358	***6.417	***6.527
	4.16	4.2	4.23	4.11	4.13	4.19
LVRG	***-12.829	***-12.714	***-12.761	***-41.901	***-41.64	***-41.846
	-7.61	-7.58	-7.63	-6.3	-6.28	-6.35
AGE	**-0.138	***-0.144	***-0.143	0.142	0.127	0.14
	-2.53	-2.64	-2.61	1.46	1.32	1.48
CAPEX	***-11.885	***-11.741	***-11.783	***-23.703	***-23.376	***-23.538
	-5.22	-5.18	-5.22	-4.26	-4.21	-4.26
GRWTH	0.007	0.007	0.007	0.01	0.01	0.009
	0.84	0.79	0.77	1.01	0.91	0.88
V	***4.250	***4.283	***4.233	***4.142	***4.217	***4.071
	3.6	3.62	3.56	3.32	3.37	3.21
GDP	0.792	0.501	-0.24	-6.57	-7.232	-11.445
	0.08	0.05	-0.02	-0.25	-0.28	-0.45
FIN	***-9.980	***-10.061	***-10.287	**-6.721	**-6.906	**-7.64
	-4.88	-4.9	-4.98	-2.09	-2.17	-2.33
Firm effects	Included	Included	Included	Included	Included	Included
Year effects	Included	Included	Included	Included	Included	Included
Obs	1,496	1,496	1,496	1,496	1,496	1,496
R-squared	0.69	0.69	0.69	0.52	0.52	0.52
Het. test	0.00	0.00	0.00	0.00	0.00	0.00
Likelihood-ratio test			0.01		0.02	

***p<0.01; **p<0.05; *p<0.10

Table 3. 7 Robustness regression analysis.

Model	**1**	**2**	**3**	**4**
Dep. Var.	*ROA*	*ROA*	*ROE*	*ROE*
	Coefficient	Coefficient	Coefficient	Coefficient
	t-value	t-value	t-value	t-value
CPP	-0.142	0.166	0.172	**2.919
	-1.21	0.37	0.56	2.5
CPPQ	**-0.226	**-0.823	**-0.535	**-1.926
	-2.41	-2.45	-2.25	-2.15
BMS	-0.113	-0.208	0.155	-0.125
	-0.71	-1.17	0.35	-0.27
CPP x BMS		-0.036		**-0.329
		-0.71		-2.59
CPPQ x BMS		**0.076		*0.173
		1.98		1.73
SIZE	***3.171	***3.216	***6.377	***6.468
	4.18	4.21	4.11	4.16
LVRG	***-12.759	***-12.812	***-41.753	***-42.013
	-7.6	-7.64	-6.3	-6.38
AGE	**-0.141	**-0.142	0.133	0.146
	-2.59	-2.57	1.38	1.53
CAPEX	***-11.721	***-11.747	***-23.376	***-23.512
	-5.17	-5.2	-4.2	-4.25
GRWTH	0.007	0.007	0.01	0.009
	0.79	0.77	0.91	0.87
V	***4.28	***4.228	***4.218	***4.051
	3.62	3.56	3.38	3.18
GDP	0.285	-0.133	-7.825	-12.132
	0.03	-0.01	-0.3	-0.48
FIN	***-9.979	***-10.181	**-6.730	**-7.37
	-4.87	-4.93	-2.11	-2.24
Firm effects	Included	Included	Included	Included
Year effects	Included	Included	Included	Included
Obs	1,496	1,496	1,496	1,496
R-squared	0.69	0.69	0.52	0.52
Het. test	0.00	0.00	0.00	0.00
Likelihood-ratio test		0.02	0.03	

***p<0.01; **p<0.05; *p<0.10

Table 3. 8 GMM regression analysis.

Dep. Var.	*ROA*	*ROE*
	Coefficient	Coefficient
	t-value	t-value
ROA t-1	***0.345	
	3.42	
ROE t-1		0.037
		0.36
CP	**15.237	*199.007
	2.04	1.77
CPQ	*-4.690	*-58.505
	-1.96	-1.75
BMS	*0.956	*10.180
	1.83	1.75
CP x BMS	**-1.753	*-22.23
	-1.98	-1.75
CPQ x BMS	*0.493	*6.542
	1.9	1.73
SIZE	*0.657	**3.390
	1.85	2.23
LVRG	**-4.814	*-16.459
	-2.44	-1.95
AGE	0.023	0.092
	0.8	0.98
CAPEX	**-3.667	**-15.424
	-2.22	-2
GRWTH	***0.046	0.009
	4.94	0.42
V	***3.430	2.817
	8.95	1.28
GDP	2.184	**1.707
	1.25	2.25
FIN	-1.24	-1.609
	-1.05	-0.45
Year effects	Included	Included
Obs	1,088	1,088
Arellano-Bond test for AR(1)	0.00	0.01
Arellano-Bond test for AR(2)	0.31	0.31
Sargan test of overid	0.53	0.86
Hansen test of overid	0.72	0.95
Difference (null H = exogenous)	0.65	0.50

***p<0.01; **p<0.05; *p<0.10

For extra regression analysis, as presented in Table 3.9, we tasted the impact of the four CEO power components *CPS, DT, SH,* and *TN* separately on *ROA* and *ROE* respectively. We have done the Likelihood ratio test for linearity, the results of P value are (0.01) and (0.08) respectively, which means that the relations of *TN* with *ROA* and *ROE* are non-linear. Therefore, we added the quadratic CEO tenure *(TNQ)*. The results indicate a positive, significant impact of *CPS* on *ROA* at 5% level of significance (t-value = 2.5), a negative, significant impact of *DT* on *ROA* at 5% level of significance (t-value = -2.43), no impact was found of *SH* on *ROA*, a positive significant impact of *TN* on *ROA* at 10% level of significance (t-value = 1.84), a negative significant impact of *TNQ* on *ROA* at 5% level of significance (t-value = -2.13), a positive, significant impact of the interaction between *DT* and *BMS* on *ROA* at 5% level of significance (t-value = 2.28), a negative, significant impact of the interaction between *TN* and *BMS* on *ROA* at 10% level of significance (t-value = -1.66), and no impact was found of the interaction between *CPS, SH, TNQ* and *BMS* on *ROA.* In addition, a positive, significant impact of *CPS* on *ROE* at 5% level of significance (t-value = 2.17), a positive, significant impact of *TN* on *ROE* at 10% level of significance (t-value = 1.90), a negative, significant impact of *TNQ* on *ROE* at 5% level of significance (t-value = -2.01), no impact was found of *DT*, and *SH* on *ROE,* a negative, significant impact of the interaction between *TN* and *BMS* on *ROE* at 10% level of significance (t-value = -1.75), and no impact was found of the interaction between *CPS, DT, SH, TNQ* and *BMS* on *ROE.* It is notable that the impact of CEO pay slice on the firms' profitability is positive, being unlike (Bebchuk et al., 2011), that found a negative, impact of CEO pay slice on firms' performance, that is because in the case of Jordan, board size plays a significant role on the impact of CEO pay slice on firms' profitability, whereby, the impact the CEO pay slice on firms' profitability is positive, only when the board size is small.

Table 3. 9 CEO power components regression analysis.

Model	**1**	**2**	**3**	**4**
Dep. Var.	*ROA*	*ROA*	*ROE*	*ROE*
	Coefficient	Coefficient	Coefficient	Coefficient
	t-value	t-value	t-value	t-value
CPS	***0.03	**0.066	***0.058	**0.167
	3.8	2.05	2.63	2.17
DT	**-1.093	**-6.886	0.059	6.126
	-2.01	-2.43	0.05	1.24
SH	***0.089	0.103	*0.086	-0.008
	3.93	1.57	1.95	-0.06
TN	0.07	*0.362	0.159	*0.927
	1.18	1.84	0.9	1.9
TNQ	**-0.006	**-0.017	-0.01	**-0.031
	-2.49	-2.13	-1.48	-2.01
BMS	-0.039	0.218	0.269	**1.226
	-0.23	0.8	0.62	2.02
CPS x BMS		-0.005		-0.014
		-1.19		-1.56
DT x BMS		**0.758		-0.769
		2.28		-1.37
SH x BMS		-0.001		0.011
		-0.18		0.71
TN x BMS		*-0.034		*-0.086
		-1.66		-1.75
TNQ x BMS		0.001		0.002
		1.63		1.49
Control Var.	Included	Included	Included	Included
Firm effects	Included	Included	Included	Included
Year effects	Included	Included	Included	Included
Obs	1,496	1,496	1,496	1,496
R-squared	0.70	0.70	0.52	0.52
Hetro. test	0.00	0.00	0.00	0.00
Likelihood-ratio test		0.01	0.08	

***p<0.01; **p<0.05; *p<0.10

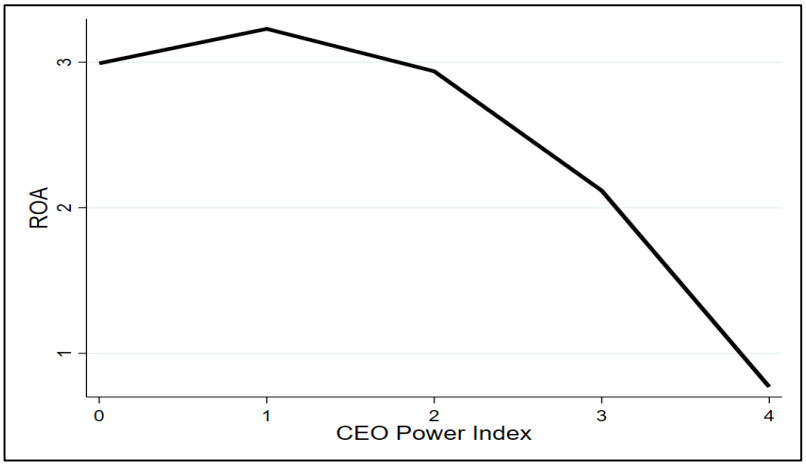
Finally, as presented in Table 3.10, we employed the margins analysis for further interpretation of the mediating impact of board size between CEO power index and firm's profitability (*ROA* and *ROE* respectively). The results indicate a positive, significant impact of CEO power index *(CP)* on a firm's

profitability, when board size is less than 9 members. In addition, a negative, significant impact of CEO power index *(CPQ)* on a firm's profitability, when board size is less than 9 members. Thus, to increase a firm's profitability, board size should be more than 9 members only if the CEO is powerful, otherwise, smaller board size is more efficient in increasing firm's profitability. Furthermore, Figure 3.2a–b generated using the margins analysis, visualizes the U-shape non-linear relation between CEO power index and firm's profitability (*ROA* and *ROE* respectively).

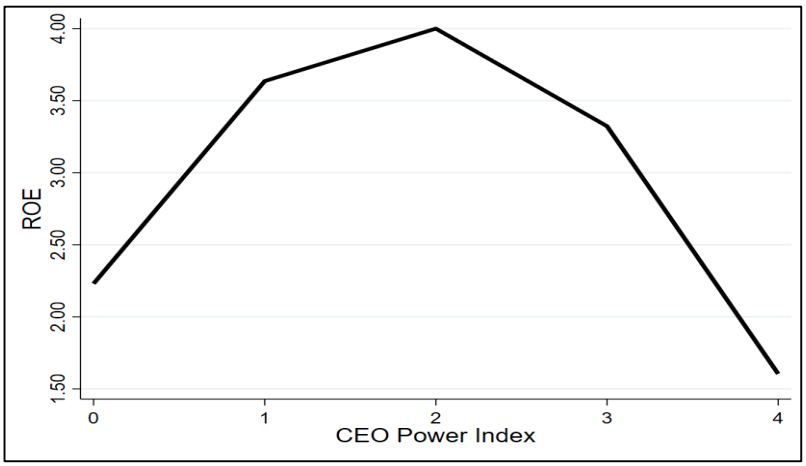
Table 3. 10 Margins analysis.

Dependent Variable	*ROA*		*ROE*	
	CC	*CCQ*	*CC*	*CCQ*
	dy/dx t-value	dy/dx t-value	dy/dx t-value	dy/dx t-value
BMS = 3	**2.578 2.59	***-0.822 -2.89	***6.99 2.84	**-1.744 -2.48
BMS = 4	**2.169 2.59	***-0.71 -2.98	***6.017 2.91	***-1.542 -2.62
BMS = 5	**1.760 2.56	***-0.597 -3.06	***5.044 2.97	***-1.34 -2.78
BMS = 6	**1.351 2.44	***-0.485 -3.07	***4.07 2.97	***-1.138 -2.91
BMS = 7	**0.942 2.06	***-0.373 -2.83	***3.097 2.74	***-0.936 -2.87
BMS = 8	0.533 1.28	**-0.260 -2.1	**2.124 2.06	**-0.734 -2.39
BMS = 9	0.125 0.28	-0.148 -1.07	1.151 1.03	-0.531 -1.56
BMS = 10	-0.284 -0.52	-0.035 -0.21	0.178 0.13	-0.329 -0.8
BMS = 11	-0.693 -1.02	0.077 0.37	-0.795 -0.47	-0.127 -0.25
BMS = 12	-1.102 -1.33	0.19 0.76	-1.769 -0.87	0.075 0.12
BMS = 13	-1.511 -1.53	0.302 1.01	-2.742 -1.12	0.277 0.38

***p<0.01; **p<0.05; *p<0.10



(a)



(b)

Figure 3. 2 (a) The non-linear relation between ROA and CEO power index; **(b)** The non-linear relation between ROE and CEO power index.

3.6 Conclusions and Limitations

This research aims to investigate the impact of CEO power on a firm's financial performance (measured through ROA and ROE), and the mediating impact of board size on the aforementioned impact, for 136 Jordanian public shareholding firms listed in the ASE from 2012 to 2022.

Our empirical results indicate a non-linear relation between CEO power index and firm's profitability, whereby firm's profitability decreases in firms with powerful CEOs. This result is compatible with the *agency theory*, which posits that powerful managers concentrate more on their personal interests rather than the company's financial performance. In addition, the results indicate a positive impact of the interaction

between powerful CEO and board size on ROA and ROE, whereby a firm's profitability decreases in firms with a powerful CEO, only when the board size is less than 9 members. These results are compatible with the *agency theory*, which posits that shareholders must control, monitor and evaluate managers' performance through larger board size, in order to protect the shareholder's interests and to improve firm's performance.

Herein lies the importance of this research, unlike most of previous literature about Jordanian firms, we created a CEO power index based on several CEO characteristics and components. Furthermore, this article covers on average 94.56% of total market capitalization and on average 66.97% of the total number of listed firms over 2012 to 2022.

Finally, this research has some limitations, we can mention that we could not add the proportion of independent directors on the board to measure its mediation impact alongside with board size between CEO power and firm's performance, because the majority of the selected firms in our sample reported information about the independent board members in their annual reports and disclosures since 2017. That is, after the issuance of governance instructions by JSC. Another limitation is the exclusion of a component of CEO power index, i.e., CEO age, this is due the data of the aforementioned component is not available for all firms. Lastly, the geographical scope of the sample poses challenges for generalizing the results to a wider context, as focusing solely on Jordan limits applicability. For future research, this analysis could be extended to include other countries in the Middle East.

Research Statistical Appendix

Table A. 1 Average ownership concentration *(OC)* by sub-sector and year in the study (%).

Sub-Sector	Number of Firms	Year										
		2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Financial Sector												
Banks	14	18.3	18.5	18.5	18.5	18.5	19.0	18.5	18.6	19.0	19.0	19.0
Insurance	20	22.3	21.9	22.4	22.3	22.8	23.9	24.1	28.7	27.8	27.8	27.1
Diversified Financial Services	15	11.4	11.8	12.2	12.8	13.7	14.0	12.7	13.3	14.6	15.1	14.5
Real Estate	17	16.3	17.1	17.1	17.0	18.5	17.5	17.5	17.6	22.4	23.3	23.5
Service Sector												
Health Care Services	1	15.8	16.1	16.3	7.0	9.3	9.3	7.5	8.7	8.7	8.7	8.7
Educational Services	5	10.4	10.3	10.4	10.6	10.3	10.5	9.8	10.0	10.7	10.7	10.7
Hotels and Tourism	7	16.2	19.5	19.6	19.6	14.6	15.1	14.9	15.7	15.4	15.4	15.4
Transportation	7	15.8	15.5	14.7	14.6	14.5	14.8	15.0	15.0	14.9	14.7	14.5
Technology and Communication	2	19.0	19.0	28.0	28.0	28.0	28.0	30.3	26.1	26.9	26.9	26.7
Media	1	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2
Utilities and Energy	5	45.7	45.3	45.0	43.4	44.6	44.6	44.6	44.6	41.6	41.6	41.4
Commercial Services	7	20.8	20.9	20.9	21.0	29.0	39.7	39.9	41.8	43.6	43.5	44.2
Industrial Sector												
Pharmaceutical and Medical Industries	3	6.1	6.9	6.8	7.3	7.7	7.6	7.8	8.0	9.3	9.3	10.8
Chemical Industries	4	8.6	8.2	8.1	8.1	6.8	8.8	8.3	7.5	7.2	7.2	7.3
Food and Beverages	6	39.0	40.6	40.5	40.6	25.0	25.7	25.2	25.6	25.0	25.0	24.2
Tobacco and Cigarettes	2	37.9	37.7	38.3	38.8	38.9	34.9	35.7	39.5	29.4	73.0	67.2
Mining and Extraction Industries	9	21.1	21.7	23.9	24.0	24.4	24.3	24.4	24.5	25.2	25.2	24.7
Engineering and Construction	6	25.5	26.2	26.6	24.0	21.0	24.6	24.9	24.6	25.3	25.3	25.0
Electrical Industries	3	7.8	8.8	9.2	8.0	9.8	8.7	9.0	8.1	8.3	8.3	8.3
Textiles Leathers and clothing	2	7.3	7.2	7.6	7.7	8.1	8.6	9.2	10.3	8.5	8.5	8.5

The ASE classification for the sectors and sub-sectors has been taken into account.

Table A. 2 Average insider ownership *(INSH)* by sub-sector and year in the study (%).

Sub-Sector	Number of Firms	Year										
		2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Financial Sector												
Banks	14	19.5	20.1	18.6	18.6	18.3	17.5	16.1	14.7	18.1	17.8	17.9
Insurance	20	23.1	26.7	28.7	29.0	28.0	28.0	27.7	29.6	28.5	27.2	27.1
Diversified Financial Services	15	20.3	21.5	22.4	22.1	24.1	23.9	27.2	26.5	30.9	31.5	32.5
Real Estate	17	21.3	21.1	23.7	26.1	27.3	26.0	23.2	22.7	21.1	23.8	28.7
Service Sector												
Health Care Services	1	16.0	16.0	18.0	19.0	50.0	49.0	52.0	37.0	52.0	52.0	52.0
Educational Services	5	45.0	45.4	43.6	43.0	43.6	42.8	39.4	42.2	43.6	43.8	40.6
Hotels and Tourism	7	28.6	31.6	25.3	25.3	18.1	23.3	24.3	24.3	28.1	25.6	26.0
Transportation	7	25.7	24.7	24.0	20.1	16.3	17.9	17.3	17.7	18.3	18.4	16.1
Technology and Communication	2	6.0	6.0	0.0	0.0	0.0	0.0	5.0	5.0	8.0	8.0	8.0
Media	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Utilities and Energy	5	20.2	20.2	20.0	19.8	19.0	19.4	19.0	19.2	19.2	17.4	16.4
Commercial Services	7	28.6	28.6	28.6	28.7	29.7	29.6	29.6	15.4	16.1	27.3	27.3
Industrial Sector												
Pharmaceutical and Medical Industries	3	43.0	46.3	53.0	51.7	50.7	48.7	45.0	45.0	47.3	53.3	42.0
Chemical Industries	4	18.0	21.8	27.5	25.3	21.3	24.3	29.5	28.3	29.0	31.3	32.8
Food and Beverages	6	36.3	36.0	36.8	31.3	34.9	36.7	41.3	41.5	42.2	42.7	46.8
Tobacco and Cigarettes	2	14.5	12.0	12.0	12.5	12.5	18.0	7.0	29.5	9.0	50.0	50.0
Mining and Extraction Industries	9	18.9	18.6	20.0	20.1	12.3	11.8	13.6	14.1	14.8	16.2	15.8
Engineering and Construction	6	30.5	30.7	32.3	30.0	16.8	15.2	15.2	13.8	13.0	15.5	19.3
Electrical Industries	3	24.7	22.3	22.3	23.3	25.0	27.3	29.0	27.3	28.7	24.0	24.7
Textiles Leathers and clothing	2	0.0	6.0	0.0	2.5	2.5	2.5	6.0	7.5	7.5	6.5	3.5

The ASE classification for the sectors and sub-sectors has been taken into account.

Table A. 3 Average number of board members *(BMS)* by sub-sector and year in the study.

Sub-Sector	Number of Firms	Year										
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Financial Sector												
Banks	14	11	11	11	11	12	12	12	12	12	12	12
Insurance	20	9	9	9	9	9	9	9	9	9	9	9
Diversified Financial Services	15	8	7	7	7	7	7	7	8	8	8	8
Real Estate	17	7	7	7	7	7	7	7	7	7	7	7
Service Sector												
Health Care Services	1	7	7	7	7	7	7	9	9	9	9	9
Educational Services	5	10	10	9	10	10	10	10	10	10	10	10
Hotels and Tourism	7	10	10	10	10	10	10	10	10	10	10	10
Transportation	7	8	8	8	8	8	8	7	7	7	7	7
Technology and Communication	2	7	7	7	7	7	7	7	7	7	7	7
Media	1	9	9	9	9	9	9	9	9	9	9	9
Utilities and Energy	5	9	9	9	9	9	9	10	10	10	10	9
Commercial Services	7	7	7	7	7	7	7	7	6	6	6	6
Industrial Sector												
Pharmaceutical and Medical Industries	3	8	8	8	8	8	8	9	9	8	8	8
Chemical Industries	4	8	8	7	7	7	7	7	7	6	6	6
Food and Beverages	6	7	7	7	7	6	6	7	7	7	7	7
Tobacco and Cigarettes	2	9	9	9	7	7	7	7	7	7	7	4
Mining and Extraction Industries	9	8	8	8	8	8	8	8	8	7	7	7
Engineering and Construction	6	9	9	8	8	8	8	8	8	8	8	8
Electrical Industries	3	9	8	8	8	8	8	8	8	7	7	7
Textiles Leathers and clothing	2	12	12	12	12	12	12	12	13	13	13	13

The ASE classification for the sectors and sub-sectors has been taken into account.

Table A. 4 Average CEO pay slice *(CPS)* by sub-sector and year in the study (%).

Sub-Sector	Number of Firms	Year										
		2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Financial Sector												
Banks	14	36.6	36.1	39.8	32.6	38.3	36.6	35.6	38.2	36.0	40.5	41.9
Insurance	20	46.4	43.8	43.6	40.7	39.9	44.6	40.8	42.3	43.0	40.6	45.7
Diversified Financial Services	15	52.8	59.8	62.3	63.3	62.5	54.5	66.0	58.8	64.5	70.2	64.9
Real Estate	17	39.9	34.5	48.0	45.7	53.2	47.3	52.5	55.6	56.7	57.7	59.5
Service Sector												
Health Care Services	1	35.2	42.5	56.4	51.6	61.1	54.9	47.3	47.3	49.3	74.8	80.6
Educational Services	5	55.4	59.1	58.6	62.0	57.8	42.7	45.1	48.4	45.8	46.0	40.1
Hotels and Tourism	7	51.8	54.1	51.1	51.1	43.2	43.8	46.4	49.7	48.1	52.4	45.4
Transportation	7	48.5	53.0	50.4	45.3	41.2	41.8	47.3	47.5	50.2	50.8	62.3
Technology and Communication	2	44.5	49.4	49.4	47.4	49.5	51.5	48.3	46.9	46.6	45.8	45.3
Media	1	59.4	1.9	4.1	15.1	15.5	17.7	18.5	24.0	23.4	22.9	24.0
Utilities and Energy	5	28.0	27.8	37.7	37.4	38.4	36.9	34.3	33.7	35.1	34.2	34.8
Commercial Services	7	50.7	62.8	54.9	53.5	66.1	61.9	58.7	64.1	72.3	64.9	59.1
Industrial Sector												
Pharmaceutical and Medical Industries	3	45.6	52.4	62.6	48.2	37.4	44.3	42.2	48.8	45.0	47.8	50.9
Chemical Industries	4	60.5	55.5	57.5	58.8	45.5	42.0	45.3	43.1	40.9	41.2	40.3
Food and Beverages	6	41.6	43.1	48.0	40.7	38.8	38.0	37.9	37.2	37.8	29.3	34.3
Tobacco and Cigarettes	2	28.9	28.9	26.1	35.7	34.8	16.7	20.5	20.5	20.5	20.5	20.5
Mining and Extraction Industries	9	51.5	43.2	45.5	47.3	52.2	47.3	53.0	34.5	49.3	45.9	43.4
Engineering and Construction	6	52.2	52.4	52.1	59.8	63.7	61.9	61.9	62.6	52.0	52.3	54.9
Electrical Industries	3	33.8	32.6	32.5	38.4	38.1	46.3	38.0	61.0	47.6	54.6	55.7
Textiles Leathers and clothing	2	68.3	70.1	65.1	67.6	69.6	69.6	70.6	70.6	61.8	68.1	62.3

The ASE classification for the sectors and sub-sectors has been taken into account.

Table A. 5 Average CEO shareholdings *(SH)* by sub-sector and year in the study (%).

Sub-Sector	Number of Firms	Year										
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Financial Sector												
Banks	14	0.4	0.4	0.4	0.4	0.4	0.1	0.1	0.1	0.1	0.1	0.1
Insurance	20	3.2	3.4	3.7	2.7	2.8	2.9	3.5	2.5	2.7	1.9	1.4
Diversified Financial Services	15	3.0	3.2	3.7	3.7	3.9	4.4	2.5	2.1	2.1	2.1	2.2
Real Estate	17	4.0	3.6	5.6	5.6	2.9	2.9	2.0	1.9	2.1	2.1	2.1
Service Sector												
Health Care Services	1	0.3	0.4	0.5	0.5	7.9	7.3	7.3	7.6	7.6	9.5	9.5
Educational Services	5	11.0	11.2	16.6	16.8	17.1	8.7	9.3	8.9	8.9	9.0	7.2
Hotels and Tourism	7	17.9	18.1	11.8	11.9	5.0	5.4	5.4	5.2	5.2	6.1	6.3
Transportation	7	2.6	2.6	1.5	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Technology and Communication	2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2
Media	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Utilities and Energy	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Commercial Services	7	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.3
Industrial Sector												
Pharmaceutical and Medical Industries	3	8.3	8.3	8.3	7.0	6.2	8.1	8.1	4.5	4.6	2.8	3.6
Chemical Industries	4	4.7	5.2	0.3	0.3	0.3	0.3	5.9	1.6	2.1	4.6	4.8
Food and Beverages	6	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	1.0	1.3	1.3
Tobacco and Cigarettes	2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mining and Extraction Industries	9	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4
Engineering and Construction	6	0.4	0.2	0.3	0.4	0.4	0.4	0.6	0.7	1.1	1.1	1.2
Electrical Industries	3	6.7	5.7	5.7	5.7	5.7	6.7	8.1	3.6	3.7	6.7	7.2
Textiles Leathers and clothing	2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

The ASE classification for the sectors and sub-sectors has been taken into account.

Table A. 6 Average years of CEO tenure *(TN)* by sub-sector and year in the study.

Sub-Sector	Number of Firms	Year										
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Financial Sector												
Banks	14	8.8	9.8	10.8	10.5	11.5	8.6	9.4	7.0	7.8	6.6	6.7
Insurance	20	9.9	10.5	11.2	12.6	11.1	12.1	11.5	9.9	10.7	11.1	10.7
Diversified Financial Services	15	3.8	4.8	5.8	6.8	7.3	7.4	8.4	8.1	8.0	9.0	9.7
Real Estate	17	3.7	4.6	5.1	4.6	5.4	5.8	4.5	4.6	5.6	6.6	7.6
Service Sector												
Health Care Services	1	5.0	6.0	7.0	8.0	1.0	2.0	3.0	4.0	5.0	1.0	2.0
Educational Services	5	5.4	6.4	5.4	6.4	7.4	8.4	9.4	8.4	9.4	10.4	7.8
Hotels and Tourism	7	8.1	9.1	8.9	9.4	9.3	10.3	11.3	12.3	13.3	14.3	15.3
Transportation	7	5.1	6.1	6.9	6.3	5.3	6.3	7.3	8.3	9.3	9.4	9.6
Technology and Communication	2	2.0	3.0	4.0	3.5	4.5	5.5	5.0	6.0	7.0	8.0	9.0
Media	1	1.0	1.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
Utilities and Energy	5	8.6	9.6	10.6	10.8	11.8	12.4	13.4	14.4	6.0	7.0	8.0
Commercial Services	7	9.6	10.6	10.7	10.3	9.7	10.7	11.3	11.6	12.6	13.6	10.7
Industrial Sector												
Pharmaceutical and Medical Industries	3	3.3	4.3	5.3	5.3	5.0	5.3	6.3	5.7	6.7	7.7	6.7
Chemical Industries	4	9.3	10.3	11.3	12.3	13.3	8.0	6.8	7.8	8.8	9.8	7.5
Food and Beverages	6	10.8	11.8	12.8	13.8	12.0	13.0	14.0	13.8	14.8	7.8	8.8
Tobacco and Cigarettes	2	9.5	10.5	10.5	11.5	12.5	1.0	2.0	3.0	4.0	5.0	6.0
Mining and Extraction Industries	9	8.6	9.3	9.3	9.8	10.8	9.2	10.2	8.3	6.4	7.4	8.4
Engineering and Construction	6	5.0	5.5	6.2	7.2	8.2	9.2	10.2	11.2	12.2	13.2	14.2
Electrical Industries	3	16.0	7.0	8.0	9.0	10.0	11.0	10.3	11.3	10.0	10.7	11.7
Textiles Leathers and clothing	2	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5

The ASE classification for the sectors and sub-sectors has been taken into account.

Table A. 7 Average CEO power index *(CP)* by sub-sector and year in the study (scaled from 0 to 4).

Sub-Sector	Number of Firms	Year										
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Financial Sector												
Banks	14	1.3	1.2	1.5	1.4	1.7	1.4	1.4	1.2	1.1	1.4	1.4
Insurance	20	1.6	1.6	1.7	1.5	1.3	1.5	1.5	1.5	1.5	1.3	1.5
Diversified Financial Services	15	1.5	1.7	1.8	1.8	1.7	1.6	1.7	1.5	1.5	1.5	1.7
Real Estate	17	1.6	1.2	1.4	1.2	1.5	1.7	1.5	1.2	1.4	1.7	1.8
Service Sector												
Health Care Services	1	2.0	2.0	3.0	2.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0
Educational Services	5	1.6	1.6	1.4	2.0	1.8	1.6	2.2	1.6	1.8	1.8	1.6
Hotels and Tourism	7	2.7	2.9	2.6	2.6	2.6	2.4	2.6	2.6	2.7	3.0	2.9
Transportation	7	1.6	2.0	1.7	1.0	0.9	0.9	1.1	1.1	1.6	1.7	2.0
Technology and Communication	2	0.0	0.5	1.5	0.5	1.0	1.5	2.0	1.0	1.5	1.5	1.5
Media	1	1.0	0.0	0.0	0.0	0.0	0.0	2.0	3.0	3.0	3.0	3.0
Utilities and Energy	5	1.0	1.0	1.4	1.6	2.0	2.0	1.6	1.6	1.4	1.2	1.4
Commercial Services	7	1.4	1.4	1.1	0.9	1.1	1.1	1.4	1.9	2.0	1.9	1.6
Industrial Sector												
Pharmaceutical and Medical Industries	3	1.3	1.3	2.0	2.0	1.7	1.7	1.3	1.3	1.0	1.3	1.3
Chemical Industries	4	2.0	2.0	2.3	2.3	2.5	1.8	2.3	2.3	2.0	2.0	1.8
Food and Beverages	6	1.3	1.7	2.2	2.0	1.5	1.8	1.7	1.5	1.7	0.7	1.0
Tobacco and Cigarettes	2	2.0	2.0	1.5	2.0	2.0	1.0	1.0	0.5	0.5	0.5	1.5
Mining and Extraction Industries	9	1.3	1.4	1.2	1.1	1.6	1.0	1.4	0.7	0.8	0.7	0.8
Engineering and Construction	6	1.2	0.8	1.0	1.5	1.7	1.8	1.8	2.0	2.2	2.3	2.2
Electrical Industries	3	1.7	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.3	2.3
Textiles Leathers and clothing	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

The ASE classification for the sectors and sub-sectors has been taken into account.

Table A. 8 Average employee productivity *(EP)* by sub-sector and year in the study (scaled from 0 to 1).

Sub-Sector	Number of Firms	Year									
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Financial Sector											
Banks	14	0.97	0.97	0.97	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Insurance	20	0.82	0.84	0.85	0.86	0.86	0.86	0.88	0.88	0.87	0.88
Diversified Financial Services	15	0.35	0.37	0.37	0.35	0.37	0.36	0.33	0.37	0.30	0.32
Real Estate	17	0.41	0.36	0.38	0.37	0.37	0.34	0.34	0.33	0.29	0.32
Service Sector											
Health Care Services	1	0.86	0.85	0.85	0.82	0.85	0.87	0.88	0.88	0.86	0.89
Educational Services	5	0.90	0.91	0.92	0.92	0.91	0.91	0.91	0.90	0.89	0.89
Hotels and Tourism	7	0.83	0.82	0.83	0.81	0.81	0.80	0.80	0.80	0.58	0.67
Transportation	7	0.78	0.74	0.73	0.71	0.70	0.72	0.72	0.73	0.67	0.62
Technology and Communication	2	0.92	0.92	0.89	0.92	0.95	0.95	0.96	0.95	0.95	0.95
Media	1	0.92	0.90	0.90	0.89	0.88	0.88	0.84	0.81	0.78	0.65
Utilities and Energy	5	0.94	0.94	0.93	0.93	0.93	0.94	0.96	0.95	0.96	0.97
Commercial Services	7	0.75	0.76	0.74	0.72	0.73	0.74	0.73	0.74	0.72	0.77
Industrial Sector											
Pharmaceutical and Medical Industries	3	0.69	0.80	0.87	0.87	0.84	0.85	0.86	0.88	0.87	0.86
Chemical Industries	4	0.83	0.83	0.80	0.66	0.62	0.63	0.66	0.65	0.61	0.62
Food and Beverages	6	0.87	0.86	0.86	0.85	0.85	0.85	0.86	0.86	0.85	0.87
Tobacco and Cigarettes	2	0.97	0.97	0.97	0.96	0.95	0.91	0.80	0.83	0.84	0.79
Mining and Extraction Industries	9	0.82	0.79	0.81	0.78	0.87	0.86	0.86	0.83	0.79	0.79
Engineering and Construction	6	0.82	0.81	0.82	0.77	0.78	0.77	0.75	0.75	0.70	0.74
Electrical Industries	3	0.81	0.85	0.86	0.84	0.77	0.73	0.68	0.63	0.56	0.60
Textiles Leathers and clothing	2	0.83	0.84	0.82	0.83	0.80	0.81	0.76	0.77	0.78	0.62

The ASE classification for the sectors and sub-sectors has been taken into account.

Table A. 9 Average donations *(D)* by sub-sector and year in the study (US dollars $).

Sub-Sector	Year										
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Financial Sector											
Banks	$14{\cdot}10^5$	$16{\cdot}10^5$	$22{\cdot}10^5$	$14{\cdot}10^5$	$16{\cdot}10^5$	$15{\cdot}10^5$	$24{\cdot}10^5$	$24{\cdot}10^5$	$42{\cdot}10^5$	$14{\cdot}10^5$	$34{\cdot}10^5$
Insurance	22,298	11,257	14,253	13,155	13,198	15,065	18,219	16,267	63,938	14,266	15,321
Diversified Financial Services	4,857	3,010	3,190	5,456	5,585	6,302	3,794	4,690	78,203	3,991	2,503
Real Estate	425	118	476	189	184	286	762	64	5,016	291	2,092
Service Sector											
Health Care Services	0	0	0	704	0	0	0	0	0	0	0
Educational Services	$15{\cdot}10^4$	$17{\cdot}10^4$	$20{\cdot}10^4$	$20{\cdot}10^4$	97,742	55,937	47,162	68,835	$16{\cdot}10^4$	46,436	67,092
Hotels and Tourism	64,331	17,003	16,573	18,908	16,012	62,457	17,313	14,714	7,174	3,134	16,505
Transportation	19,521	14,928	17,837	11,699	16,691	24,966	18,919	31,177	60,057	8,729	17,768
Technology and Communication	56,127	55,275	87,148	$10{\cdot}10^4$	95,049	89,263	91,900	85,000	$82{\cdot}10^4$	$14{\cdot}10^4$	$25{\cdot}10^4$
Media	2,331	2,500	1,810	704	0	0	0	0	0	0	0
Utilities and Energy	80,926	79,465	$15{\cdot}10^4$	$23{\cdot}10^4$	$16{\cdot}10^4$	$21{\cdot}10^4$	$14{\cdot}10^4$	$19{\cdot}10^4$	$90{\cdot}10^4$	87,869	$35{\cdot}10^4$
Commercial Services	20,342	24,209	18,663	20,834	22,406	34,872	39,252	19,375	$31{\cdot}10^4$	9,126	10,329
Industrial Sector											
Pharmaceutical and Medical Industries	87,237	53,360	$10{\cdot}10^4$	94,338	78,638	$10{\cdot}10^4$	40,634	35,589	58,488	67,194	26,897
Chemical Industries	0	1,497	211	528	528	1,162	951	1,004	13,866	2,548	211
Food and Beverages	21,357	12,722	11,989	21,284	25,582	23,501	17,983	47,589	$13{\cdot}10^4$	61,680	90,446
Tobacco and Cigarettes	$23{\cdot}10^4$	$22{\cdot}10^4$	$44{\cdot}10^4$	$35{\cdot}10^4$	$30{\cdot}10^4$	$33{\cdot}10^4$	$35{\cdot}10^4$	$25{\cdot}10^4$	0	0	0
Mining and Extraction Industries	$19{\cdot}10^5$	$22{\cdot}10^5$	$16{\cdot}10^5$	$18{\cdot}10^5$	$15{\cdot}10^5$	$12{\cdot}10^5$	$15{\cdot}10^5$	$19{\cdot}10^5$	$57{\cdot}10^5$	$11{\cdot}10^5$	$32{\cdot}10^5$
Engineering and Construction	19,665	22,993	39,042	16,963	23,991	23,920	18,404	9,713	4,224	8,854	5,056
Electrical Industries	1,147	3,873	8,014	2,769	2,012	2,025	6,770	2,216	728	704	704
Textiles Leathers and Clothing	$10{\cdot}10^4$	92,799	55,183	$10{\cdot}10^4$	$13{\cdot}10^4$	$33{\cdot}10^4$	66,591	51,361	57,743	42,668	$12{\cdot}10^4$

The ASE classification for the sectors and sub-sectors has been taken into account.

Table A. 10 Average return on assets *(ROA)* by sub-sector and year in the study.

Sub-Sector	Number of Firms	Year										
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Financial Sector												
Banks	14	1.7	2.1	2.0	2.0	1.8	1.8	1.7	1.7	1.0	1.4	1.5
Insurance	20	0.2	2.0	3.7	3.2	4.0	1.8	2.3	3.1	3.7	-0.2	0.7
Diversified Financial Services	15	0.0	1.4	0.8	1.3	1.2	0.7	0.3	2.8	-0.1	1.2	0.3
Real Estate	17	1.6	0.9	0.4	1.2	-0.5	0.6	1.0	0.8	0.2	0.6	-0.5
Service Sector												
Health Care Services	1	3.4	-0.7	-7.7	-21.1	3.4	4.2	3.8	4.5	-4.1	3.2	3.7
Educational Services	5	16.3	15.2	14.3	12.4	12.1	10.8	9.5	8.2	6.8	5.6	4.0
Hotels and Tourism	7	5.1	4.2	4.7	3.6	3.6	3.3	2.6	1.7	-6.7	-2.5	1.5
Transportation	7	2.4	2.9	2.5	1.9	2.9	3.3	3.1	2.4	-5.8	-1.1	2.7
Technology and Communication	2	7.1	4.9	3.7	3.7	5.1	3.1	3.5	3.3	4.1	5.8	4.5
Media	1	13.4	2.3	1.0	0.3	-4.3	-3.7	-4.2	-10.0	-14.9	-21.6	-24.4
Utilities and Energy	5	4.9	2.4	2.9	6.1	3.1	5.6	5.3	4.6	3.7	7.4	8.0
Commercial Services	7	5.9	7.9	9.7	10.0	10.6	11.1	10.6	9.3	5.4	1.9	7.3
Industrial Sector												
Pharmaceutical and Medical Industries	3	2.4	15.2	26.3	19.3	10.6	4.9	6.7	7.2	6.9	7.1	8.1
Chemical Industries	4	6.7	5.9	3.3	0.8	2.2	-0.9	-0.8	-0.6	2.0	2.8	1.1
Food and Beverages	6	5.4	7.1	9.3	8.9	7.0	6.7	4.9	6.8	5.7	7.2	6.1
Tobacco and Cigarettes	2	10.7	12.7	12.2	15.4	14.5	12.6	12.8	12.1	5.2	4.1	6.0
Mining and Extraction Industries	9	5.6	0.6	6.0	5.6	2.4	1.7	1.2	0.6	0.6	3.3	8.5
Engineering and Construction	6	2.2	2.9	3.5	1.7	3.7	2.4	-0.4	-3.9	-4.2	0.0	1.7
Electrical Industries	3	-1.1	0.4	1.7	1.5	-0.1	-2.8	-5.0	-6.2	-5.1	-5.6	-11.5
Textiles Leathers and Clothing	2	2.1	4.3	3.7	3.2	0.5	-1.9	0.4	-0.7	-4.2	0.5	-2.7

The ASE classification for the sectors and sub-sectors has been taken into account.

Table A. 11 Average return on equity *(ROE)* by sub-sector and year in the study.

Sub-Sector	Number of Firms	Year										
		2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Financial Sector												
Banks	14	9.0	11.5	10.3	9.3	8.6	8.1	8.8	8.1	4.9	7.8	8.4
Insurance	20	-1.9	1.7	7.0	4.7	7.9	1.5	3.9	6.8	7.1	-5.6	4.5
Diversified Financial Services	15	0.7	0.0	2.1	2.7	2.1	1.6	0.2	4.0	-0.1	2.7	0.5
Real Estate	17	-3.0	1.1	-1.7	-3.8	1.1	0.1	0.7	-3.0	-1.2	-0.1	-1.4
Service Sector												
Health Care Services	1	6.5	-3.2	-11.4	-38.2	5.2	4.5	5.6	4.3	-6.0	4.1	4.2
Educational Services	5	18.9	18.6	17.7	15.0	14.3	12.6	11.3	9.3	7.1	6.1	5.4
Hotels and Tourism	7	4.9	4.2	5.3	3.8	4.6	3.4	2.4	2.7	-8.9	-2.8	1.6
Transportation	7	0.3	0.8	3.1	1.3	4.1	4.5	4.0	5.0	-13.1	-8.3	-0.2
Technology and Communication	2	-7.2	-18.6	-8.3	-8.4	3.9	1.5	4.7	3.6	4.8	7.0	9.0
Media	1	17.0	3.0	-10.2	-2.7	-7.4	-6.6	-7.6	-17.6	-28.1	-61.9	-100.0
Utilities and Energy	5	18.5	10.1	15.9	15.4	14.4	14.6	15.4	13.6	8.7	18.2	24.9
Commercial Services	7	-0.5	5.5	8.7	7.3	10.2	10.4	12.3	11.4	5.6	1.8	9.0
Industrial Sector												
Pharmaceutical and Medical Industries	3	-5.8	15.5	26.2	17.8	9.7	-0.3	4.1	-2.4	14.0	6.2	7.6
Chemical Industries	4	7.1	7.5	4.1	-0.2	1.7	-5.3	-5.2	-5.6	-3.2	-1.5	-16.2
Food and Beverages	6	6.7	8.1	10.8	10.2	5.8	8.5	6.6	8.8	4.8	11.3	6.2
Tobacco and Cigarettes	2	17.0	21.6	18.9	17.5	17.2	12.3	6.3	-1.5	-23.0	-32.2	59.8
Mining and Extraction Industries	9	8.4	6.7	8.6	5.7	3.7	1.3	0.3	-1.4	-5.8	2.6	4.5
Engineering and Construction	6	-2.7	3.7	3.7	1.4	4.9	2.2	-3.4	-11.4	-18.4	-2.6	-0.7
Electrical Industries	3	-4.1	-1.0	-0.1	0.6	-3.6	-7.8	-12.7	-14.7	-13.7	-7.8	-6.4
Textiles Leathers and clothing	2	0.1	5.4	4.9	4.4	-1.7	-10.4	-3.4	-6.5	-31.3	5.4	-33.0

The ASE classification for the sectors and sub-sectors has been taken into account.

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