The impact of board characteristics on financial performance: Evidence from Dutch Hospitals

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Date: January 2022

ACKNOWLEDGEMENTS

This thesis is written to finalize the Master of Science in Business Administration with a specialization in Financial Management at the University of Twente. I would like to thank my first supervisor, Prof. Dr. R. Kabir of the department of Finance and Accounting, and my second supervisor, Dr. IR. W.J.A. Van Heeswijk from the department Industrial Engineering and Business Information Systems. Both supervisors guided me through the process by providing me with critical questions and valuable feedback. Their guidance helped me to improve and finalize this thesis. Finally, I would like to thank my family and friends who supported me during this period.

Kailin Chen

December 2021

ABSTRACT

In the last few decades, the environment for hospitals has changed. New health insurance laws have been introduced and for-profit hospitals are no longer prohibited in the Netherlands. So, an effective board of directors is necessary to ensure performance. Prior empirical evidence has confirmed that board characteristics can impact financial performance. This thesis examines the impact of board characteristics on financial performance in Dutch not-for-profit hospitals. No prior research has been done examining this effect, and thus this thesis contributes to the existing literature on the effect of financial performance and board characteristics and extends it to Dutch not-for-profit hospitals. The board characteristics analyzed in this thesis are board size, board independence, gender diversity, and including a member with a medical background.

To test the impact of board characteristics on financial performance, unbalanced panel data of 70 hospital organizations in the period 2015 to 2019 are included, which makes in total 322 hospital observations. Financial performance is measured through Return On Asset (ROA) and Profit Margin. Using the ordinary least square (OLS) regression method, the results indicate that board size does not impact financial performance, implying that large or small boards do not impact financial performance. However, there is some evidence in the robustness tests that larger boards have a negative effect on Profit Margin when an average five-year Profit Margin and lagged variables are used. Moreover, no evidence is found to support the negative effect of board independence on financial performance. Again, some evidence is found in the robustness tests, where a five-year average ROA and Profit Margin is used and variables are lagged. These results indicate that having more independent members on the board lowers the financial performance. The results show no effect between gender diversity and financial performance, indicating that the proportion of women does not influence financial performance. At last, results show no evidence that having a member with a medical background will improve the financial performance. On the contrary, evidence from the robustness test shows that medical professionals on the supervisory board has a negative impact on financial performance. This thesis concludes that board characteristics do not impact the financial performance in Dutch not-for-profit hospitals. However, this thesis has several limitations that cause the results to be insignificant including endogeneity and outliers problems, the small sample size, and the large proportion of hospitals with no women and/or members with a medical background on the board.

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1. INTRODUCTION

In the last few decades, the environment for hospitals has changed. New health insurance laws have been introduced and for-profit hospitals were no longer prohibited in the Netherlands. Also, a new Coronavirus has been discovered, also known as COVID-19. The virus was first discovered in Wuhan (China) and has spread quickly around the globe (Liu & Bing, 2020). Recently, over 231 million people have been infected[1]and around 4.4% require hospital admission (Walker et al., 2020). This resulted in an increased demand for healthcare and hospitals have become more important. So, the environment for hospitals has become more challenging and an effective board of directors is necessary to maintain the order. Their responsibility includes formal and legal forms of controlling and maintaining the organizational operations (Zald, 1969) and ensuring a good relationship with internal and external stakeholders (Daily, Dalton & Cannella, 2003).

It is difficult for the shareholder to verify what the top executive in a large corporation is actually doing, so the main role of the board of directors is to monitor the top executives (Fama & Jensen, 1983). This is necessary because "the desires or goals of the principal and the agent conflict and it is difficult or expensive for the principal to verify what the agent is actually doing" (p. 58, Eisenhardt; 1989). This conflicting principle is also known as 'the agency theory'. In order to align the interest of the board to the shareholder, board members are given incentives like stock options, bonuses, and salaries. By doing so, the firm should function more efficiently which leads to better financial performance. The effectiveness of the board depends on several individual factors that are also referred to as 'board characteristics' (Ujunwa, 2012). Board characteristics include board size, gender diversity, board diversity, CEO duality, board independence, and educational qualification. These characteristics can influence financial performance. For example, more board independence leads to higher financial performance (Dalton & Dalton, 2011; Kumar & Zattoni, 2013) or board size can have a negative impact on financial performance (Guest, 2009).

Typical in for-profit organizations, the firm tends to maximize the present value of profits, while not-for-profit organizations are found around social missions (Quarter & Richmond, 2001). The Netherlands has a unique healthcare system given that more than 90% of the hospitals are owned and managed on a private and not-for-profit basis (Daley, Gubb & Clarke, 2013). The remaining hospitals are either military hospitals owned by the government, academic hospitals, or specialization hospitals. The reason for the large number of not-for-profit hospitals is because for-profit hospitals were prohibited in the Netherlands, until 2006. The government was afraid that for-profit hospitals would decrease the quality of health (Groot & Vosselman, 2019). Kroneman et al. (2016) compared the Dutch healthcare system to international systems and concluded a low antibiotic use, low avoidable hospitalization, and relatively low avoidable mortality rate in the Netherlands. Besides, Dutch healthcare has a significant impact on the increasing life expectancy for Dutch citizens.

Kuntz, Pulm, Wittland (2016) investigated hospitals in Germany whether different hospital ownerships had an influence on financial performance. Based on this research, they concluded that ownership is a strong indicator for financial performance and that private for-profit hospitals had significantly better financial performance than government hospitals. They further argued that not-for-profit hospitals have a slightly better financial performance compared to government hospitals and

[1] As of 27 September 2021, 18:19 CEST. Retrieved from covid19.who.int

suggest that not-for-profit hospitals and government hospitals should reflect on the board characteristics. Especially board size seems to have a significant impact on the financial performance. They used five performance measures and found that larger boards lead to lower financial performance. They stated that having smaller boards is more effective and will lead to higher firm performance because of the different interests between managers and shareholders (agency theory). Also, board members should at least have some basic understanding of the financial structure and the market it operates in, in order to carry out their role. Hospitals should review the skills and knowledge of the board members to improve the firm performance.

So, it is interesting to look at the impact of board characteristics and financial performance in not-for-profit hospitals. No research has been done examining this impact for Dutch hospitals given their unique system. Similar research has been conducted for American and other European hospitals. For example, Thiel, Winter, and Büchner (2018) looked at German hospitals. In their research, they included board size and diversity of board members as board characteristics and occupational backgrounds as a control variable. They documented a significant correlation between gender diversity and financial performance. Kuntz et al. (2016), as described in the previous section, also examined German hospitals. Alexander and Lee (2006) conducted research using American hospitals on the effect between government and not-for-profit hospitals. In short, because there is no prior research, this research contributes to the existing literature on the effect of financial performance and board characteristics and extends it to Dutch hospitals.

As mentioned previously, the most commonly used board characteristics in literature include board size, board diversity, CEO duality, board independence, and educational qualification. Andres and Vallelado (2008), Johl, Kaur, and Cooper (2015), and Bathula (2008) also investigated board composition, director ownership, and board meetings. This thesis will examine four board characteristics. The first two characteristics that are examined are board size and gender diversity. This is due to the reason that in prior research focusing on the effect of board characteristics and financial performance, board size and board diversity (especially gender diversity) were usually included as board characteristics. To illustrate, Johl, Kaur, and Cooper (2015) included board size along with other characteristics and found out that board size has a positive effect on firm performance. Andres and Vallelado (2008) also examined board size and found an inverted U-shaped relation with performance. Adams and Ferreira (2009) added board size and gender diversity as control variables to their analysis. Liu, Wei, and Xie (2014) also included board size and gender diversity as control variables. The third board characteristic that is included is board independence. The Netherlands has a two-tier system consisting of a management board that operates in the day-to-day activities and a supervisory board monitoring the management board. Many previous empirical evidence performed their research using board characteristics from the US, where there is a one-tier system. The one-tier and two-tier systems will be explained in more detail in section 2.1.2. Due to the two-tier system, it is interesting to look at the impact of board independence in the Netherlands. Usually, the supervisory board can be seen as independent, because they monitor the management board. The last board characteristic is the educational qualification. Usually, in previous research, this means the educational level the board member has achieved. The educational levels are middle school or lower, high school education, college education, master education, and doctoral education. However, these types of education levels might not be interesting in terms of not-for-profit hospitals, given the fact that they have other priorities than for-profit firms. So, derived from the board characteristic educational qualification, it might be interesting to investigate, in a hospital environment, what the impact of having a member on the board with a medical background is on the financial performance. Besides, Molinari, Morlock, Alexander, and Leyles (1993) and Veronesi, Kirkpatrick, and Vallascas (2013) all found evidence that when a medical staff was included, the financial performance improved, because medical staff had a different perspective and understand clinicians challenges. To sum up, this thesis focuses on board size, board independence, gender diversity, and directors with a medical background as characteristics for the board.

Using the information given above, the following research question can be formulated:

"Do board characteristics influence the financial performance in Dutch hospitals?".

The analysis is performed using contemporary unbalanced panel data available on the website of the Dutch ministry of health and welfare[2], merged with data from annual reports, and hospitals' own websites, to gather information about the company and ownership structure in 2015-2019. Specialization, military, and academic hospitals are excluded from the sample, focusing only on the Dutch not-for-profit general hospitals. Information about the board of directors is taken on the hospital organization level since there is usually one board overseeing all activities[3]. The data is then analyzed using an Ordinary Least Square (hereafter referred to as OLS) regression. The total sample size is 322 year-observations with 70 unique hospitals organizations.

In order to answer the research question, sub-questions are formulated derived from 'board characteristics':

- What is the impact of board size on financial performance?
- What is the impact of board independence (supervisory board) on financial performance?
- What is the impact of a gender-diverse board on financial performance?
- What is the impact of including a board member with a medical background on financial performance?

This thesis contributes to the literature in a few ways. First, it adds to the existing literature about not-for-profit hospitals and the influence of board characteristics on financial performance. Not-for-profit hospitals are not widely examined in terms of financial performance and especially not in combination with board characteristics. Even though the literature in not-for-profit firms is not as extended as for listed firms. It is still important to examine the financial performance in not-for-profit firms since not-for-profit firms also need to reach a certain level of financial performance to ensure their continuity and for investments to improve their quality and research goals. Additionally, this paper gives an insight in the Dutch healthcare. Dutch healthcare is very unique given the large number of not-for-profit hospitals. There are no for-profit hospitals even after the governance allowed for-profit hospitals to operate in the Netherlands in 2006 (Jeurissen, 2010). The last contribution is that this thesis provides a unique analysis of board characteristics, also contributing to the existing literature. This

[2] Retrieved from https://www.jaarverantwoordingzorg.nl/gegevens-bekijken/verantwoordingsgegevens-per-verslagjaar-datasets

[3] A hospital organization contains (most of the time) multiple hospital locations. These hospitals are all controlled by the same board of directors. This will be explained in more detail in section 4.1.

thesis examines the impact of board gender diversity, board size, board independence, and having board members with a medical background on financial performance.

In the following chapters, the hypotheses are developed using theoretical arguments. Then the research design are explained and executed in the result chapter. After that, the main results are discussed, summarized and the sensitivity of the results will be examined using a robustness test. Finally, the conclusions are given along with limitations and future research.

2. LITERATURE OVERVIEW

This thesis focuses on the effect of board characteristics on financial performance in not-for-profit Dutch hospitals. In order to understand the Dutch hospitals, it is necessary to understand the Dutch healthcare system first. Dutch healthcare is aiming for accessible, affordable, and good quality care. There are 4 basic healthcare-related acts that form the foundation of the Dutch healthcare system: the Health Insurance Act, which provides hospital care. The Long-Term Care Act, that focuses on long-term care. The Social Support Act and the Youth act, which provide care and support for other forms (Ministry of Health, Welfare, and Sport, 2018). In 2006, the Dutch government introduced a new Health Insurance Act where all Dutch citizens have to take health insurance. These health insurance companies are practically all not-for-profit organizations where they allocate profits to the reserves or return the profits to the citizens like lower premiums (Ministry of Health, Welfare, and Sport, 2018).

In this chapter, a brief overview of the board characteristics and their impact on the financial performance of listed firms is given. Before all that, the impact of board size, board independence, gender diversity, and professional background on financial performance is discussed extensively starting from section 2.1. As mentioned prior, there is no previous research done examining the effect of board characteristics on financial performance in Dutch hospitals. Primarily all Dutch hospitals are not-for-profit organizations, while a majority of hospitals in other countries like Germany and America are for-profit organizations. There are many researches examining the effect of board members and financial performance in hospitals in countries other than the Netherlands. In section 2.2, earlier research examining this effect is discussed, focusing on non-Dutch hospitals. At last, different hospital ownerships and their effect on financial performance are explained. Based on the above-mentioned outcomes, hypotheses are derived from them.

2.1 BOARD CHARACTERISTICS

The board of directors "has the power to hire, fire and compensate senior management teams, serves to resolve conflicts of interest among decisionmakers and residual risk bearers" (p. 101, Baysinger & Butler, 1985). The governments' role for a not-for-profit hospital is to "ensure the organization's fidelity to its core mission" (Alexander & Lee, 2006; p. 733). Thus, it is not surprising that the board of directors is considered as one of the internal corporate governance mechanisms (Brennan, 2006). The board of directors acts on behalf of shareholders and has major decision-making powers. The decision-making and effectiveness of the board of directors are largely affected by the size (Kumar & Singh, 2013), independence (Johl et al., 2015) gender, and professional background (Walt & Ingley, 2003). Therefore, these elements are explained in detail here below.

2.1.1 SIZE

As mentioned before, the agency theory is related to the self-interest of the human being where information asymmetry and different goals occur, resulting in problems in ownership and control. Therefore, it is expected that a larger board of directors is more effective since this makes monitoring managers easier and more human capital is available to advise the managers (Andres & Vallelado, 2008; Thiel et al., 2018). However, the literature varies on what the board size should be in order to be effective.

The expectation that larger boards create better financial performance is mainly derived from the *resource dependency theory* and is first introduced by Pfeffer and Salancik in 1972. The resource dependency theory is based on the resources a firm needs in order to network and have social relationships. The resources include financial and physical resources (e.g. employees), and information from external resources (Pfeffer & Salancik, 2003). In this case, board size can be viewed as a potential link to critical resources. "The greater the need for effective external linkage, the larger the board should be (Pfeffer & Salancik, 1978; p.172) since large firms are viewed as more complex and have many different stakeholders.

In an earlier paper by Pfeffer (1972) the resource dependency theory was used as an indicator for board size and board compensation and found that board size was related to the firm's environmental needs. To his conclusion, board size and board compensation were not random factors but were the response of the firm towards the external environment and its conditions. These findings are in line with a more recent study by Dalton, Daily, Johnson, and Ellstrand (1999). The research conducted a meta-analysis of 131 samples and found a positive relationship between board size and financial performance using market-based and accounting-based financial performance measures. Dalton et al. (1999) explained that a possible explanation for this relationship is that a larger boards were more likely to provide increased and more diverse industrial and educational expertise. Johl et al. (2015) investigated listed firms in Malaysia also found a positive relationship between board size and firm performance.

Contrary to the existing literature, arguing that large boards leads to better financial performance. Many researchers argued that the more members on the board of directors, the less effective this is. They argued that the communication, decision-making, and coordination of tasks in a large group is harder and more expensive than in smaller groups. In their view, smaller boards would lead to less complex board structures and thus boards can act more effectively by reaching decisions faster. For example, Yermack (1996) included Fortune 500 largest US companies and found a negative correlation between board size and firm value. He found that the relationship was more significant when the board size is larger, stating that "companies with larger boards appear to use assets less efficiently an earn lower profits" (p. 201). Jensen (1993) confirmed this in his research on the modern industrial revolution and internal control systems. He explained that the CEO is the one giving information to the board. This information asymmetry limits the board from monitoring and evaluating the CEO and their performance. Lipton and Lorsch (1992) added that a larger board would have less cohesiveness because they are less likely to share the same goal and an agreement would be harder to reach due to the different views. Also, the free-riders in the board could increase since it is tough to judge every board member's contribution. Hence, Eisenberg, Sundgren, and Wells (1998) also found a negative relationship between board size and profitability in small and midsize Finnish firms. This finding is in line with a more recent article by Guest (2009). Investigating the UK-listed firms, he documented a negative correlation between board size and firm performance. Interesting about this research is the large sample size compared to other previous studies. Guest (2009) included over 25.000 firm-year observations and the results are therefore less biased. As a result of the strong negative relationship, for large boards, it is harder to carry out the advisory role than the monitoring role.

Andres and Vallelado (2008) confirmed the findings that a larger board helps to monitor, advise, and increase the return. However, there was a limit where the coordination and communication problems outweigh the benefits. The maximum in their paper was set at 19 board members. Beyond 19 members the relationship between board size and performance became an inverted U-shape. Jensen (1993) argued that seven to eight board members were the most effective, above that, the CEO can control them easier. This view is consistent with Lipton and Lorsch (1992), who also argued that having eight to nine board members is the ideal size, and Guest (2009) suggested a board with 10 or fewer members. On the other hand, Eisenberg et al. (1998) argued that there is no ideal board size. Smaller boards were also affected by communication and coordination problems, the ideal board size varies with firm size.

2.1.2 BOARD INDEPENDENCE

On the board, there are executive directors whose main task is to advise the management and to ensure the shareholders' interest and are full-time employees involved in the day-to-day operation. The non-executive directors monitor the management and executive directors (Fuzi, Halim & Julizaerma, 2016). These directors can either be independent or dependent directors. Dependent directors are directors who have ties with the management or the company and therefore the monitoring and advising role can be influenced. For instance, the dependent director was a former or is a current employee, has a relative on the management team, or is a shareholder (Abdullah, 2004). Dependent directors are usually also the executive director. Independent directors are, as the name indicates independent, which means that they are not influenced by the management or other insiders. They have an independent view and are actively present during the board meetings. Independent directors represent the shareholders on the board and its role is to monitor the executive directors and top management (Fuzi et al., 2016). The independent director is usually the non-executive director.

If the executive and non-executive directors are on the same board, this is also known as a one-tier board. Countries such as the United Kingdom, America, and Ireland have such a single board structure. On the other hand, there is also the two-tier board where the executive and non-executive have a clearer formal separation. The two-tier board allows the duality of a management board, meaning that the CEO of the company is also a board member, and has a separate supervisory board. Two-tier boards are common in the Netherlands, Germany, Austria, Finland, and Denmark. Some countries can choose between the one or two-tier board(s), including Belgium, Portugal, and Spain (Jungmann, 2006). So, the Dutch board structure is a two-tier system where the supervisory board is usually the independent directors who monitor the management board and the management board is dependent directors operating the day-to-day activities in the firm.

Besides the previously discussed agency theory, where managers and shareholders have different interests, there is also *the stewardship theory*. Stewardship theory is an additional theory, where the managers' interests are aligned with those of the organization. Managers place the corporate goal higher than their individual goal because the manager "perceives greater utilities in corporative behavior and behaves accordingly" (Davis, Schoorman & Donaldson, 1997; p. 24). Even if the interest of managers and shareholders are not aligned, the manager places higher value on the organization than personal value. Thus, stewardship theory is still good for the organization, since the manager behaves in objectives of the organization. Studies suggesting that board independence relies on the agency theory argued that independent directors are better at monitoring the management (Cadbury, 1992). Contrary, studies that were arguing that board independence relied on stewardship theory suggested that having more dependent directors on the board would lead to better leadership and decision-making since inside directors know more details about the firm (Davis et al., 1997).

It is expected that, based on the agency theory, board independence leads to better performance while stewardship theory argues that board independence leads to a lower with performance. Previous empirical evidence, however, did not always show this effect. Some indicated that independent directors had a positive effect on performance, while others found a negative association or some argued that there is no effect at all. In line with the agency theory, Liu, Miletkov, Wei, and Yang (2015) examined listed firms on the stock exchange of Shanghai and Shengzhen and found a positive correlation between board independence and firm performance. They further argued that the correlation was stronger in government-controlled firms and in firms with lower acquisition information and monitoring costs. These results were similar to the study carried out by Abdullah (2004). This research measured the proportion of independent directors and the effect on the firm's performance in Malaysia before the financial crisis in 1997-1998. They found a positive and significant relationship on the firm's financial performance using the performance measure return on asset, profit margin, and earnings per share. The measure return on equity was also used, however, the results were insignificant. It is important to note here that the results were only significant in the year 1996, indicating that high board independence had a positive effect on the firm's financial performance. The study was also carried out in 1994 and 1995 and showed no relationship with firm performance. The results in 1994 and 1995 by Abdullah (2004) are in line with the research performed by Johl et al. (2015) investigating firms in Malaysia. They found insignificant results between board independence and firm financial performance, suggesting that there was no relationship between board independence and firm performance. Controversy, Singh, and Gaur (2009) performed an analysis in India and China on the effect of board independence and firm performance and indicated a negative correlation. In a more developed market like New Zealand, Gaur, Bathula, and Singh (2015) also looked at the effect of board independence on firm performance. They argued that there is a negative association between board independence and firm performance when the ownership concentration is high.

Interestingly, Liu et al. (2015) had on average 9 members on the board where 3 of them were independent. Johl et al. (2016) had respectively 44% independent members on the board. Hence, Singh and Gaur (2009) found 31% of the board to be independent. Only Abdullah (2004) had the average percentage of independent directors much higher, around 70%. These percentages of board independence are no coincidence. The proportion of independent directors on the board was required by, for example, the Bursa Malaysia Listing Requirement as demonstrated by Fuzi et al. (2016), Johl et al. (2015) and Abdullah (2004), and the Chinese Securities Regulatory Commission (CSRC) as shown by Liu et al. (2015) to have at least one-third of outside directors (independent) on the board against two-third of inside directors (dependent).

2.1.3 GENDER DIVERSITY

Currently, board diversity is one of the most important government issues targeting managers, directors, and shareholders. Board diversity can be divided into two groups, namely observable (demographic) and non-observable (cognitive) diversity. Observable diversity is as the name implicates visible on the outside, such as size, independence, gender, age, race, and ethnicity. Non-observable diversity is not visible and is related to knowledge, education, values, perception, affection, and personality (Erhardt, Werbel & Shrader, 2003).

Most previous studies focusing on board diversity and financial performance include observable or demographic diversity, namely gender diversity. Researches indicate that gender diversity of the board members can affect the quality of the monitoring role of directors and therefore also affect the financial performance of the firm in a positive way (Campbell & Míngeuz-Vera, 2007; Adams & Ferreira, 2009; Liu et al., 2014; Lückerath-Rovers, 2011). Adams and Ferreira (2009) found in their research in US firms that women had overall a better attendance rate than men and were more inclined to join monitoring committees. So the monitoring role of the board was better carried out by women. Similar results were obtained by Lückerath-Rovers (2011) investigating 99 listed firms in the Netherlands. At the time of their research, only 5% of all executive and non-executive were female directors. Even though the proportion of women on the board was very low, they managed to find a positive effect on gender diversity and financial performance in Dutch firms. This might be due to the reason that more diverse boards had a wider range of perspectives and thus had a better understanding of the complexities and therefore could take better decisions. More board diversity could also improve a firm's competitive advantage by improving the image of the firm (Smith, Smith & Verner, 2006). Besides, women were more risk-averse, focused more on the long-term perspective (Marinova, Platenga & Remery, 2015), and acted in a more socially responsible way (Ferrero-Ferrero, Fernández-Izquierdo & Munoz-Torres., 2015). Liu et al. (2011) add that having more women on the board creates even better financial performance. They argue that a board with three or more female directors has a larger impact on financial performance than boards having two or fewer female directors. Generally, the literature suggests that firms with a more gender-diverse board have better financial performance and a higher firm value than boards that are not gender diverse.

On the other hand, not all previous researches found a positive link between gender diversity and financial performance. For example, Ahern and Dittmar (2012) documented a negative link. They looked at 248 public limited firms in Norway. At the end of 2003, Norwegian introduced a new law affecting public-limited firms to have at least 40% women on the board of directors by July 2005. This law was later delayed by two years. With this law introduction, the number of women on the board increased significantly over the past years. The number of women serving as chairman or CEO remained stable at 5% (Goldsmith, as cited in Ahern & Dittmar, 2012). Ahern and Dittmar found a significant negative impact on the firm value due to the mandated board changes. The reason for this is because new female board members were younger and thus had less CEO experience, were higher educated, and were "more likely to be employed as nonexecutive manager, compared to retained male directors" (Ahern & Dittmar, 2012; p. 140). Hence, Marinova et al. (2015) found no significant relationship looking at female directors in Denmark and the Netherlands. A possible explanation could be that the sample of total women on a position board used was only 6.4% (93 out of 1454) of the total available board positions. Therefore, the sample size could be too small and the results were not significant. Carter, Souza, Simkins, and Simpson (2010) also failed to found a relationship between gender diversity and financial performance. They argued that the effect of gender diversity may be positive, negative, or neutral on financial performance at the beginning, but over some time, the effects may cancel out, so then there is no relationship between gender diversity and financial performance anymore.

In the last decade, the number of women on the board of directors increased. In 2009, Heidrick and Struggles published their first survey in the US concluding that only 18% of the new directors were women. This number has increased to 40% in 2018 and is expected to grow to 50% in 2023 as shown in Figure 1. In 2018, the percentage of women on the board in Europe was lower than in the US, namely 38% (Heidrick & Struggles, 2019b). In Europe, the percentage of female members in 2020 raised to 48%, while female board members in the US dropped from 44% in 2019 to 41% in 2020 (Heidrick & Struggles, 2021). The decrease in female board members in the US was due to the increase in dark-skinned directors who raised from 10% in 2019 to 28% in 2020. This was a result of the Black Lives Matter movement after the death of George Floyd on May 25 (2020), where three-quarters of the diverse board change occurred. Overall, the number of women on the board is increasing over time.

According to Heidrick and Struggles (2019a), there were several reasons for the increasing number of women on the board. The first one was that when boards were searching for a new candidate they were more inclined to choose a more diverse candidate. Second, directors were pressured by customers, the future generation, and employees to increase the diversity on the board. For example, in 2018, California introduced a new law where public companies were forced to assign more female directors to the company. The last reason and is maybe less demonstrable, the #MeToo movement where women publicized against sexual abuse and harassment on social media. Heminway (2019) added that there was a significant number of accusations against men with high political and/or business power. There wis currently “a renewed attention on gender participation in governance – both political and corporate…. And follows closely on the rise of the #MeToo movement.” (p. 1088). Besides these arguments, the general literature suggesting that a more diverse board had positive benefits in terms of business performance and reputation, also played a role in the increasing number of female directors. Heidrick and Struggles (2019b) interviewed Cressida Hogg, the chairman of the largest commercial property development and investment company in the United Kingdom. She stated that having two female chair members in her company has caused great positive responses externally and many women showed appreciation.

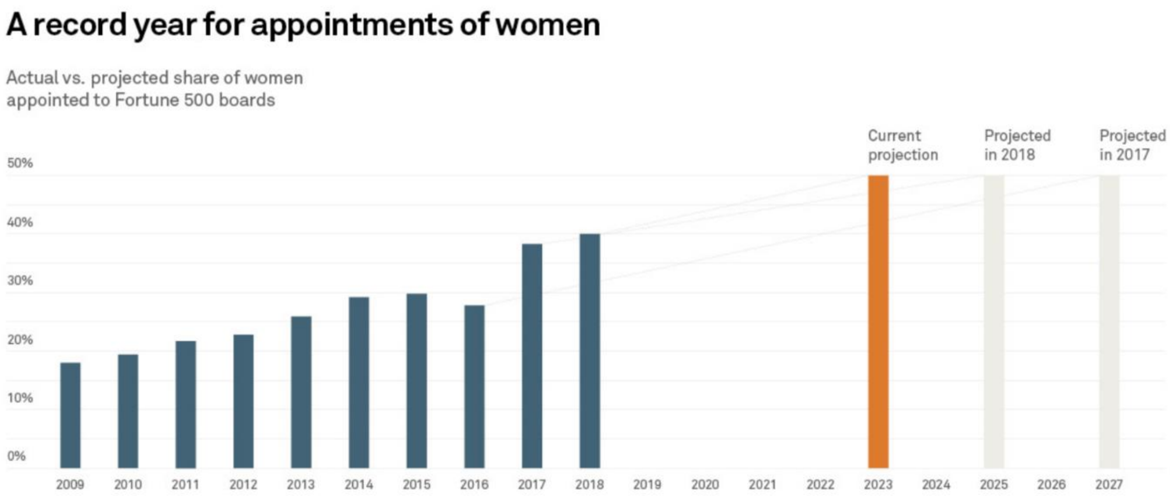

Figure 1. Heidrick & Struggles, *Board Monitor US 2019,* May 2019

2.1.4 MEDICAL BACKGROUND

In recent years, the role of health professionals has changed. More medical staff have moved towards technology, public expectations, population needs, and management functions (Kuhlmann & Annandale, 2012). Especially doctors and nurses have enrolled in a management function (Numerato, Salvatore & Fattore, 2012), in the direction of strategic direction, board members, or fund-holders for the commission of services (Veronesi et al., 2013).

The effect of clinicians on the board is explained in the literature. Molinari et al. (1993) found evidence in California hospitals that the involvement of medical staff on the board of directors led to a greater improvement in the hospital's financial performance including profitability, liquidity, capital structure, and intensity. In a later study, Molinari, Alexander, Morlock, and Lyles (1995) provided evidence that hospitals including a clinician on the board had better financial performance than hospitals with no clinicians involved. Veronesi et al. (2013) found similar results indicating that more clinical involvement had a large impact on performance, especially on the strategic level. It was argued that clinicians brought a unique set of skills to the management as they understood clinical challenges, general patient needs (Falcone & Satiani, 2008) and communicated better with medical staff. Overall, the literature provides evidence that clinicians directly influence the expenses, control patient admissions, and are generally responsible for the services and length of stay, which in turn will influence the financial performance of the hospital (Molinari et al., 1995).

Not all research found a positive effect of clinicians on the board. To illustrate, Alexander and Morrisey (1988) found a negative relationship between the involvement of medical staff in the hospital board. They argued that medical staff and the hospital administrators may conflict which would increase the different interests and negatively affect the medical staff´s productivity. Over time, this would lead to higher costs and lower hospital efficiency. While, Tasi, Keswani, and Bozic (2019) investigated 115 of the largest US hospitals and found out that having physicians leaders improved the hospital quality and more inpatient days per hospital bed. However, there was no evidence that physician leaders led to higher revenue or profit margins.

The proportion of members on the board with a medical background is not well explained in research. Veronesi et al. (2013) analyzed around 240 observations in the National Health Service hospitals in English and found out that a quarter of the members on the board were clinicians (26.03%), 13.84% were doctors, and 12.19% were other clinicians. Additionally, Gunderman and Kanter (2009) analyzed around 6500 US hospitals and only 235 (3.6%) hospitals were led by doctors. Comparing this percentage to that in 1935, there is a decrease of almost 90%. Back then, 35% of the CEOs were also doctors.

2.2 BOARD CHARACTERISTICS AND FINANCIAL PERFORMANCE IN LISTED FIRMS

As previously mentioned, the board of directors is the most important governance mechanism that protects the shareholders' interest by monitoring and advising the management. In other words, the board of directors tries to reduce the effect of agency theory. Ownership concentration is an example of a governance mechanism to address agency theory. This approach refers to the owners who can directly influence the management. When the ownership concentration is high and there are many owners, a single owner does not have to power to influence the management. In those cases, the board of directors has to protect the owners and monitor the management. Once the difference in interest is reduced, and the board of directors takes on an active role in monitoring and advising the management, the firm should increase its efficiency as well as the financial performance (Gaur et al., 2015). Considering that the board of directors has such an important role, board characteristics can also influence the efficiency and financial performance of a firm.

In literature, board characteristics and their impact on financial performance is a broad phenomenon and is largely investigated often using data from listed for-profit firms. The combination of characteristics and their effect on financial performance is different in every research. For instance, Gaur et al. (2015) looked at listed firms on the New Zealand Stock Exchange and included board characteristics such as independence, size, and qualification of the board, while also focusing on the ownership concentration, where shareholders could directly influence the managers to protect their interests. They concluded that independence, size, and having professional directors led to better financial performance. However, the positive effect reduced when a firm had high ownership concentration since a firm could not satisfy every owner. Johl et al. (2015) examined board independence, the number of board meetings, size, and board accounting expertise using data from financial and non-financial firms listed on the Bursa Malaysia market. They found out that size and the expertise of the board members had a positive effect on the financial performance, whereas board independence had no effect. Ujunwa (2012) included many characteristics such as size, educational qualification, nationality, gender, ethnicity, and CEO duality of firms listed on the Nigerian Stock Exchange Factbook. The results indicated that size, CEO duality, and gender were affecting firm performance negatively, while nationality, ethnicity, and the number of board members with a high educational background were found positively associated with firm performance. Andres and Vallelado (2008) sampled international commercial banks from six countries and investigated the effect of the dual role of board members while controlling for board characteristics like size, composition, and functioning. The outcome of their analysis indicated that size and composition had an effect on financial performance.

In short, it can be concluded that the above mentioned board characteristics have an effect on financial performance, whether this effect is positive or negative, at least for listed firms. The board characteristics and the effect on financial performance can be different in hospitals. In the next section, an extensive overview of hospital ownership is given before the board characteristics in hospitals and their effect on financial performance are examined in non-Dutch hospitals.

2.3 FOR-PROFIT AND NOT-FOR-PROFIT HOSPITALS

Depending on the main source of income, organization, producer, and distribution, a hospital can be classified as public or private. Private hospitals can be further narrowed down to for-profit or not-for-profit. Chletsos and Saiti (2019) state that public hospitals are mainly funded by the government and are therefore owned and operated by the government. If the hospital is not funded by the government, then it can be private, where the funds are raised by investors and the investors are the owners and operators, or not-for-profit, where the main source of income comes from the church, unions, and donors. Hansmann (2000) points out that ownership of a firm is (1) the right to control the firm and (2) the right to appropriate the firm's profit. Despite the different ownerships, hospitals all have common goals including providing healthcare and protection (e.g. vaccines) to patients and contributing to the further evolution of medical science (Ballou & Weisbrod, 2003; Sarros, Coopen & Santoro, 2011). Relatively speaking, not-for-profit covers the most percentage of all general medical and surgical hospitals in the U.S., around 60%, 25% are owned by the government, and the remaining 15% are for-profit (Bayindir, 2012). The different hospital ownership will be explained further in the following paragraphs.

2.3.1 PUBLIC HOSPITALS

The main goal of public hospitals is to meet the citizens' expectations since public hospitals are funded by the government and their fundings comes from tax revenue that is paid by citizens. Besides, public hospitals have to operate within guidelines set by the government. These guidelines regulate the degree of freedom public hospitals can operate in to increase collective actions (Chletsos & Saiti, 2019). Even though these guidelines are meant for public hospitals to adjust better to their environment, these guidelines can sometimes limit the dynamic of public hospitals. Moore (2000) refers to this as 'mission stickiness', meaning that a firm can stick to its mission even though the environment is changing. A possible explanation is that if these firms would "change their mission in response to changes in social conditions or donor enthusiasm, they would be accused of caring more for their survival than for their cause" (Moore, 2000; p. 192).

A characteristic of public hospitals is that the hospital does not aim to increase their income through the sale of healthcare services. Instead, they attract higher fundings by meeting the social needs and showing that they can generate higher goals (Moore, 2000). Another characteristic of public hospitals is that they aim for high-quality healthcare service instead of efficiency. To illustrate, costs that cannot be passed on to clients or donors will be subsidized. In other words, public hospitals are nonprofit organizations. Because of their public character, public hospitals care for citizens who have no health insurance and cannot afford to pay for healthcare services. So, hospitals often deal with difficult cases at considerable cost to the government (Chletsos & Saiti, 2019).

2.3.2 PRIVATE FOR-PROFIT HOSPITAL

As mentioned before, a private hospital can either be for-profit or not-for-profit. Regardless of this, the hospital's goal is to cure the patient. In other words, beyond an economic objective, for-profit hospitals also have a social objective, just not as important as not-for-profit hospitals. A characteristic of for-profit hospitals is that the performance is measured through earnings, the maximization of efficiency and they may share profit with their shareholders (Bayindir, 2012). The main source of revenue comes from the sale of healthcare services (Chletsos & Saiti, 2019) in the most efficient and cost-saving way possible, since more efficiency can generate greater profit margins. More efficiency is created by reducing the waiting and retention time of patients. This can be achieved because there are no complex bureaucratic procedures and decisions can be made fast. Therefore, for-profit hospitals are considered more efficient than not-for-profit hospitals.

According to Jeurissen (2010), for-profit hospitals can influence their market power and increase the prices when the market allows it. If there is a concentrated market, where the entry barrier is high, or when buyers have limited price sensitivity, then, hospitals can use their market power to increase the information asymmetry in favor of the hospital. Patients often have little knowledge about the illness they have or the proper way to treat them. Hence, when a patient is in desperate need of hospital service they are already suffering and have little time to compare hospitals. For-profit hospitals can make use of tactics like supplier-induced demand and upcoding (Silverman & Skinner, 2004). Supplier-induced demand refers to the manipulation of the patients' demands. For example, by encouraging the patient to take a greater amount of medical services. Patients do not have the expertise to judge whether the recommended amount was necessary. Upcoding refers to the bill of the health service that has been modified, where a more serious and expensive diagnose is given to the patient.

The patient cannot do much about this, since often they cannot choose the hospital they want to be cared for. Usually, the general physician refers the patient to a specific hospital (Hansmann, 1980).

2.3.3 PRIVATE NOT-FOR-PROFIT HOSPITAL

A private not-for-profit hospital's main source of income depends largely on donors and sponsors and their relationship with them (Brown & Moore, 2001; Lewis, 2002). In order to keep receiving the income, not-for-profit hospitals apply strict regulations to maintain a good relationship with customers and financial contributors. Unlike the hospitals in the US, hospitals in the Netherlands, which are all not-for-profit organizations, are financed through health insurance companies. As mentioned, all Dutch citizens are obligated to take a basic health insurance package at the health insurance companies. The hospital's board and the health insurance companies then discuss the rate and quality of the health care (Ministry of Health, Welfare, and Sport, 2018; Groot & Vosselman, 2019).

Another characteristic is that, unlike for-profit hospitals where profits may be shared with the shareholders, not-for-profit hospitals will not do this (Moscelli, Gravelle, Siciliani & Gutacker, 2018). The profit is instead used to improve healthcare to increase the well-being of the community. Private not-for-profit hospitals work for their financial contributors and the community. Thus, it is no surprise that private not-for-profit hospitals have a social related goal and are responsible towards society. Health is a social good and everyone has the right to have access to 'good healthcare' (Chletsos & Saiti, 2019; Stevens, Moray, Bruneel & Clarysse, 2015).

Unlike for-profit hospitals, not-for-profit hospitals do not have formal owners. Instead, members, directors, and officers control the firm and are forbidden to receive the organization's earnings. In other words, it is not allowed to distribute the firm's profit to the controlling persons, this is also known as a non-distribution constraint (Hansmann, 1980). This does not mean that not-for-profit hospitals cannot reward those providing capital and/or labor to the firm, only the residual earnings cannot be distributed (Hansmann, 2000; Moscelli et al., 2018). In order to satisfy the different stakeholders, CEOs of not-for-profit hospitals are more likely to manage earnings just above zero profits (Leone & Horn, 2005). The reason for this is that the CEOs can "achieve a target level of earnings that satisfies the budget constraint" (Hoerger, as cited in Leone & Horn, 2005).

Hoerger (1991) points out several ways CEOs of not-for-profit hospitals can manage reported profits. The first way to manage the desired earnings is to increase or decrease the expenses near year-end. However, managing the expenses in the short run can have consequences in the long run. For example, when the service expenses are decreased to match the budget, this can lead to real efficiency loss. Also, when decreasing the expenses before the real final earning is known can have consequences. Another way to manage earnings, but now without adjusting the real expenses involves the accounting standards. For example, adjusting the third-party settlement, which is a liability on the hospitals' financial statements. Instead of adjusting their expenses they can increase or decrease the value of a certain asset.

2.3.4 DIFFERENT FINDINGS IN LITERATURE BETWEEN FOR-PROFIT AND NOT-FOR-PROFIT HOSPITALS

As mentioned, for-profit hospitals try to work as efficiently as possible to create a larger net profit. However, many studies state that the total cost per unit-of-service of for-profit hospitals does not differ much from not-for-profit hospitals. Sloan (2000), for example, found no significant difference in cost efficiency. He found that the main difference was the distribution of accounting profit. Not-for-profit hospitals did not had to distribute profits to shareholders and had tax exemptions. Schlesinger and Bradford (2006) made a literature overview of 275 studies of hospitals, psychiatry, nursing homes, etc. with different ownerships. It concluded that 11 studies focusing on hospitals found no significant difference in the cost difference. However, most literature did find a difference in cost structure (Sloan, 2000; Carter, Massa & Power, 1997). For-profit hospitals had lower cost for personnel because they did not hire external clinicians, like not-for-profit hospitals, but had other high expenditures like overhead and capital costs. Regarding the cost-efficiency or different cost structure, it was clear that for-profit hospitals charged more for their services than not-for-profit hospitals or public hospitals (Currie, Donaldson & Lu, 2003; Devereaux et al., 2002; Sloan, 2000). Devereaux et al. (2002) added that in their article for-profit hospitals charged 19% more for their services. One possible reasoning could be that for-profit hospitals mainly relied on revenue-generating strategies, while for example, nursing homes relied on cost-containment strategies (Jeurissen, 2010).

Another difference is that for-profit hospitals have a higher risk-adjusted mortality rate compared to not-for-profit hospitals (Devereaux et al., 2002). They analyzed over 26,000 hospitals including 38 million patients and found a significantly higher risk of death for for-profit hospitals. These findings are in line with the research by Eggleston, Shen, Lau, Schmid, and Chan (2008). On the other hand, Milcent (2005) argued that for-profit hospitals had the lowest mortality rate compared to not-for-profit and public hospitals, but had the highest mortality rates for under the 80s. They stated that for-profit hospitals had a lower mortality rate but provided a poorer quality of care than not-for-profit hospitals. Yuan, Cooper, Einstadter, Cebul, and Rimm (2000) found similar results in their analysis looking at 10.6 million patients in a 10-year observation window. Yuan et al. (2000) added that patients at not-for-profit hospitals stayed relatively 10-20% longer at the hospital than for-profit hospitals.

2.4 BOARD CHARACTERISTICS AND FINANCIAL PERFORMANCE OF HOSPITALS

Depending on their main source of income, hospitals can be divided into different ownerships: government, for-profit, and not-for-profit. There are significant differences between hospital ownerships as illustrated by Kuntz et al. (2016), who investigated the differences in financial performances of hospitals focusing on the ownership, size, and composition of the boards. They included 246 German hospitals in their analysis and 14% of them are acute care hospitals. Of the remaining hospitals, 37,1% were not-for-profit, 46,9% government, and 16% were for-profit. He found that financial performance was largely affected by the hospital ownership type. Typically, private for-profit hospitals had the best financial performance based on the financial measures return on asset, profit margin, and EBIT margin. Public hospitals had the worst financial performance, and private not-for-profit laid between public and private for-profit. Also, public hospitals had the largest board size, with on average 11.7 members while for-profit had 7.4 and not-for-profit 8.4 members. Private for-profit and public hospitals had on average the most physicians and nurses on the board, while private for-profit had the least. These results were overall significant. Another example analyzing the board characteristics and the effect on financial performance in German hospitals was conducted by Thiel et al. (2018). They included private for-profit and private not-for-profit hospitals in their analyze on board characteristics like size, gender diversity, and occupational diversity. In order to do so, they made 4 clusters based on the composite factor variables. There were significant differences between the clusters on ownership, indicating that different ownership influences strategic objectives.

Other studies focusing on board characteristics and financial performance found evidence that there is a relationship between the variables. Collum, Menachemi, Kilgore, and Weech-Maldonado (2014), for example, investigated the impact of the inside and outside directors on the board of directors in US not-for-profit hospitals consisting of private not-for-profit (74.1%) and public hospitals (25.9%). They mainly examined the involvement of management on the board and concluded that having a large number of managers on the board would decrease the financial performance. These results were in line with the agency theory stating that having a large number of dependent board members would decrease the monitoring role of the board and therefore led to poorer financial results. Another research using US hospital data included Alexander and Lee (2006). They investigated the impact of corporate governance configurations on performance in not-for-profit hospitals. Performance was measured using five indicators, namely efficiency, occupancy, adjusted admission, market share, and cash flow. Based on their results, they documented that more corporate governance led to better performance in not-for-profit hospitals. The results were significant using the performance measures efficiency, adjusted admission, and market share. For occupancy and cash flow, there was no significant relationship.

In an earlier study by Blank and van Hulst (2010) examining Dutch hospitals. They investigated the corporate governance structure related to the management board and the supervisory board and the impact on cost efficiency. They only found a significant positive result on the remuneration of the supervisory board using both measures in cost efficiency. Remuneration of the management was only significant and positive in one of the cost-efficient measurements. The size of the management board had no impact on performance. Only when there were 3 or more members on the management board would lead to better cost-efficiency.

2.5 HYPOTHESES DEVELOPMENT

In this section, the hypotheses are developed. The impact of board size, board independence, gender diversity, and medical background of the board member on financial performance in Dutch hospitals will be predicted.

2.5.1 BOARD SIZE

Usually, hospitals are managed by at least one member of the board of directors. The structure and the number of members on the board differ across hospitals (Jha & Epstein, 2010). Typically, not-for-profit hospitals have one member on the board of directors that oversees all activities, while for-profit have multiple members. According to Gupta Strategists (2007), the most effective Dutch hospitals only have one member on the board, and the size of the board is related to the size of the hospital: larger hospitals have more members on the board. Also, most literature stating that there is a positive relationship between board size and financial performance includes the resource dependency theory. This theory is more common in the for-profit market rather than the not-for-profit. Given that this research is focused on the not-for-profit hospitals and most literature states that there is a negative correlation between board size and financial performance, the following hypothesis can be formed:

H1. Large board has a negative impact on financial performance

2.5.2 BOARD INDEPENDENCE

Research arguing that board independence relies on the agency theory state that board independence has a positive impact on financial performance because of the monitoring role independent directors has. Contrary, research arguing that board independence relies on the stewardship theory finds a negative impact on financial performance due to the aligned interest of the management and the firm. The stewardship theory argues that the independent directors have less knowledge about the company's internal functioning or resources and thus are less effective in advising the management. Moreover, many independent directors on the board increase the chance of conflicts and could delay the decision-making (Davis et al., 1997). Overall, papers examining the effect between the two variables indicate different results. This thesis expects to find a negative relationship between financial performance and board independence. As mentioned, the boards' main function is to monitor and advise the management. Prior papers mentioned in section 2.1.2 comprised around one-third of independent directors, whereas nonprofit organizations' boards largely consist of independent directors and there is little room for variation (Regan & Oster, 2015). As a result, it is expected that high board independence in Dutch hospitals will decrease the financial performance. Hypothesis 2 can be formulated as follows:

H2. High board independence has a negative impact on financial performance.

2.5.3 GENDER DIVERSITY

In the last decade, the number of women on the board increased. In some countries like Norway, the number of women on the board have increased mandatory. As a result of this new law, the proportion of women on the board increased, however, the financial performance in firms decreased significantly (Ahern & Dittmar, 2012). It is not clear if the negative effect is due to the effect of gender diversity or due to the sudden mandatory change of existing board members. In other studies, where women on the board increased naturally, results indicate that there is an overall significant improvement in the firm's financial performance. It is argued that a more gender-diverse board would have a wider perspective and therefore take better decisions. Liu et al. (2011) add that having more than 3 women on the board, the impact on financial performance will be even better. Overall, most previous researchers suggest that having women on the board will lead to better financial performance and firm reputation. So hypothesis 3 can be formulated as followed:

H3. Women directors have a positive impact on financial performance

2.5.4 PROFESSIONAL BACKGROUND

Literature examining the effect of physician leadership on hospital financial performance is limited. There is even less literature examining the consequences of having a physician (medical staff) included in the board and its effect on the financial performance. Earlier research on the effect of professional background indicates mixed results including some arguing that clinicians on the board will lead to improved financial performance, directly influencing the expenses and length of stay (Molinari et al, 1995; Veronesi et al., 2013). Other studies address the increasing conflicting interest as an argument to the negative impact of medical staff on the board (Alexander & Morrisey, 1988). Overall, most literature provides evidence that having medical staff on the board leads to better financial performance because of the wider perspective medical members bring to the board. Therefore, this thesis adapts these findings and the following hypothesis can be formulated:

H4. Including a director with a medical background has a positive impact on financial performance

3. RESEARCH METHOD

In this chapter, three different methods to analyze the effect between board characteristics and financial performance are explained along with the advantages and disadvantages of these methods. Then the research design including the robustness tests is presented and the dependent, explanatory, and control variables are briefly discussed.

3.1 OLS REGRESSION ANALYSIS

In prior research, the most commonly applied method to investigate the impact of board characteristics and financial performance is through the OLS multiple regression model (Guest, 2009; Johl et al., 2015; Thiel et al., 2018; Veronesi et al., 2013) provided by Allison (1999). The multiple regression approach considers one dependent (criterion) variable and this can be predicted or caused by one or more independent (predictor) variables. Also, multiple regression "examines the effects of some independent variables on the dependent variable while "controlling" for other independent variables" (Allison, 1999; p. 16). If the regression coefficient is known, then the dependent variable can be predicted through a linear equation. The coefficient is usually unknown, different methods are used to determine the ´best´ predicted value. This can be done by trying out different coefficients. Before that, the distance between the observed and predicted value needs to be calculated. This gives the so-called, error term. A 'good' predicted value is when the sum of the squared prediction error is as small as possible. This is also known as the least square criterion. In order to find the predictor, one could apply trial and error, as mentioned above. However, the number of possible guesses is infinite, so using a computer program like SPSS to calculate is better.

An advantage of OLS regression is that it is easy to combine different independent variables to predict the optimal dependent variable (Allison, 1999; De Veaux, Velleman & Bock, 2015). Besides, OLS regression can also separate the independent variables to see the unique impact on the dependent variable. This approach is easy to use and understand and is, therefore, one of the most used methods.

However, OLS regression also has disadvantages. For example, OLS performs badly when there are outliers. Outliers are extreme values that lie at an abnormal distance from other values. Since OLS makes use of the sum of squared error, any extreme points can impact the reliability of the test (Martin & Simin, 2003). Besides, extreme outliers can also lead to skewness, where the data is asymmetrically distributed. So it is important to check for outliers when using OLS regression. Another disadvantage of the OLS regression is that it is sensitive to multicollinearity. Multicollinearity is when independent variables are related to each other, which will bias the result. This disadvantage is similar to the joint endogeneity. Joint endogeneity is when the direction of the relationship is not clear, thus when it is unclear whether A causes the relationship with B or B causes the relationship with A.

Before exercising an OLS regression, a few assumptions need to be fulfilled. The first assumption in OLS regression is that the dependent and independent variables are metric (Hair, Black, Babin & Anderson, 2013). A variable is considered metric when the level of measurement is either interval or ratio. However, it is possible to include independent variables that are not metric by transforming the level of measurement into a dummy variable coding (Allison, 1999; Hair et al., 2013). A dummy variable is a numerical variable that can replace a category in a nonmetric independent variable. Dummy variable is often used to distinguish differences between categories. The dummy variable can be categorized as indicator coding and effects coding. In indicator coding, the categories can only be labeled as 0 or 1 and represent the differences of each group from the omitted group that received a 0 value. Effects coding is similar to indicator coding except that here -1 is used instead of 0. This represents the differences between all categories and means, whereas indicator coding shows the differences from the omitted category.

According to Hair et al. (2013), the second assumption is the sample size. The sample size has a direct impact on the statistical significance power, thus also influences the result. Small sample size is considered 30 or fewer observations and can only be used for regressions with one independent variable. Large sample size is considered over 1000 observations. These kinds of sample sizes make the possible relationship between variables overly sensitive. In other words, almost all relationships that can be derived are statistically significant. For most researchers, the sample size varies between 50-100 observations. The minimum required ratio of observations is 5:1, meaning that at least 5 observations are available for each independent variable. Ideally, the ratio should be between 15 to 20 observations per independent variable.

The last few assumptions by Hair et al. (2013) are linearity, heteroscedasticity, independency, and normality and can all be checked through visualization approaches, which is the most commonly used method in the literature. Linearity is related to the direct change of the dependent variable caused by the independent variable. Heteroscedasticity, or the presence of unequal variance, can also be checked by plotting the residuals against the predicted value and seeing if there is a cone-shaped pattern. If the heteroscedasticity assumption is not satisfied, a generalized least square (GLS) regression is preferred over an ordinary least square (OLS) regression (Woolridge, 2010). Independency relates to the fact that each predictor has to be independent and can be checked by plotting the residuals against possible sequencing variables. If the pattern looks random and similar to the null residual, then the independency is verified. At last, the normality is to check whether the data is normally distributed by plotting a histogram of the residuals. If the data is normally distributed, it should start and end at the same height with a peak in the middle. Besides visualization approaches, statistical computer programs like SPSS can be used for a statistical test. For example, heteroscedasticity can be checked via a Levene test for homogeneity of variance.

3.2 FIXED-EFFECTS AND RANDOM-EFFECTS MODEL

Another method to analyze the effect of board characteristics and financial performance is fixed-effects and random-effects. This too is a method that is widely used in prior researches (Campbell & Mínguez-Vera, 2007; Carter et al., 2010; Gaur et al., 2015; Liu et al., 2014). The fixed and random-effects are both meta-analyses and describe the result of each study by means of the numerical index and then conclude an overall or combined effect (Borenstein, Hedges & Rothstein, 2007). So, if all previous studies included in the analysis are evenly precise, then the mean effect can be easily calculated. In reality, this is almost never the case. Some studies provide more detailed information than others and in those cases, different weights are imputed to the results according to the given details. In other words, rather than calculating a simple mean, a weighted mean will be given instead. The amount of weight that can be calculated for the mean depends on the combined effect, and here is when fixed and random effect models are introduced. The combined effect, also known as the average effect size, is different based on the fixed and random effect model (Borenstein et al., 2007).

The fixed-effects model treats the effect size, as the name indicates, as fixed in all included studies (Borenstein, Hedges, Higgins & Rothstein, 2010), indicating that all effect size is the same.

Because of this approach, larger studies can overshadow smaller studies, whereby smaller studies can be ignored considering their small sample size or shorter observation window. While random-effects model views the effect size as ‘random’, indicating that the true effect size could be different in every study (Hedges & Vevea, 1998). All studies that are included in a meta-analysis are considered to be randomly sampled, so the combined effect is the mean effect in the included studies. So when comparing random-effects to fixed-effects model, the weights allocated to the random-effects model are more balanced. Larger studies are less likely to overshadow smaller studies.

Another difference between the fixed-effects and random-effects model is the precision of the combined effect, also referred to as error variance. The term *variance* has according to Borenstein et al. (2010) five different meanings. Here only three of them will be discussed and hereafter these three are referred to as the *error variance*. Error variance basically means the square of the standard error of estimation and depends on the sample size. There are the within-study, the overall study, and the meta-analysis error variance. Borenstein et al. (2007) add that under the fixed-effects model there is one level of sampling and that the only source of error is the random error within studies. So with a large sample size, the variance error can be reduced towards zero. This is only the case when the sample size is limited to one study or split throughout other studies. On the other hand, the random-effects model uses two levels of sampling and has two levels of error. The first one is used to calculate the true effect of a certain sample group. Depending on the number of subjects within studies and the total number of studies, the mean of the true effects can be derived from it. So the two sources of error here are the within-study and overall study.

The choice between the fixed-effects model and the random-effects model largely depends on the homogeneity of the effect size. If all studies in the analysis are estimated to have an average effect size, and thus are homogeny, then the fixed-effects model is preferred over the random-effects model. When the included studies show any form of heterogeny, then the random-effects model fits better than the fixed-effects model (Hedges & Vevea, 1999). However, when there is an average population effect size, and so fixed-effect is chosen, the results of the fixed-effect model and random-effect model are estimated to be similar. Hence, there are even situations including heterogenic effects, where the fixed-effects model is still preferred over the random-effects model. For example, when the study is mainly about a particular set of research that has already occurred.

An advantage of the fixed-effects model is that it can determine the unobservable variables and therefore control for missing values in a panel dataset (Yermack, 1996; Allison, 2009). This is what makes the fixed-effects model so appealing for analysis. The fixed-effects model creates a mean for the omitted variable since the fixed-effects model considers every effect size to be the same. The fixed-effects model allows a relationship between the unobservable variable and the variables included in the analysis. In order to determine the unobservable variables, a few assumptions has to be chekced first. The idea is that whatever the effect is of the unobservable variable, the effect remains the same in a later time of the analysis, this will be referred to as *time-invariant* values. So the effect remains consistent or fixed. For example, gender and race will remain the same over time. Also, the time-invariant effect must be consistent over time. So, gender has a certain effect at time t, the effect is still present and remains stable at time x.

This advantage is at the same time also a disadvantage. The fixed-effects model only generates unobservable variables when the variables do not change over time. In other words, when a variable can change over time, the fixed-effects model loses its advantage (Allison, 2009). Another disadvantage of the fixed-effects model is that it can generate larger standard errors and higher confidence intervals than using random-effects. Allison (2009) explains that random-effects use two levels of sampling, namely information from within and between individuals, while fixed-effects only use one level of sampling; the within-study and therefore excluding information about differences between individuals. However, the random-effects model is not always better. When the independent variables vary across the sample but have little differences over time for each sample, then the fixed-effects model will generate a better and more precise estimation.

3.3 TWO-STAGE LEAST SQUARE REGRESSION ANALYSIS

The next method used in literature is the two-stage least-square analysis, hereafter referred to as 2SLS. 2SLS is a regression for models where one or more predictors (independent variable) are believed to have a relationship with the error terms of the dependent variable. This method is applied by Marinova et al. (2015) and Vafeas (1999) and is mainly applied as an extension for OLS regression in order to control for endogeneity. In this case, the OLS regression wrongly connects some of the unexplained variables of the dependent variable to the independent variable. 2SLS tests the direct, indirect, and mutual effects to avoid endogenous variables (Benda & Corwyn, 1997).

In previous studies, Adams and Ferreira (2009) performed research on the effect of gender diversity on firm performance. They found a positive relationship between the variable using OLS regression and the fixed-effects model. However, they did not know if gender diversity causes financial performance to increase or if financial performance causes gender diversity to increase. In this case, omitted variables could have an effect on the coefficient of the relationship, thus endogeneity could not be excluded. The endogeneity in Adams and Ferreira's (2009) research was a warning for later research by Marinova et al. (2015). To control for endogenous variables, they included the 2SLS regression and added the OLS regression alongside it for comparison.

To apply the 2SLS, a new variable is created using the instrument variable, that predicts the value of the endogenous variable that has no relationship with the error term. The endogenous variable is usually the independent variable. The instrument variable "provides a powerful and flexible estimation strategy that can be used to tackle the problem of omitted-variables bias in a wide range of single-equation regression applications" (Angrist & Imbens, 1995, p.431). In other words, the endogenous variable will be regressed to the instrument variable in order to predict a score (James & Singh, 1978). This score is referred to as the *reduced* form. Then the reduced form replaces the predictor variable that is expected to be the endogenous variable to generate an OLS model for the response of interest (James & Singh, 1978).

Even though 2SLS can determine the endogeneity issues, the 2SLS regression has several disadvantages. One of the disadvantages is that it is hard to find the right instrumental variable. Adams and Ferreira (2009) explain in their analysis on governance regression that this is due to the variables that are most correlated with the endogenous variable are other characteristics that already is (or should be) included in the regression analysis in the first place, like board size and independence. Their solution to address this problem is to find variables that are not yet included in previous research as the explanatory variable. Another problem with 2SLS regression is multicollinearity. As mentioned, the 2SLS regression is calculated in two stages. It could be that the endogenous variable calculated in the first stage, has a much higher correlation with the exogenous variable than the original endogenous variable (Kritzer, 1976).

Besides endogenous variables, there are also exogenous instrumental variables. This refers to variables that are not caused by other variables, so the value is determined outside the model (Kritzer, 1976). The third disadvantage of 2SLS is that it is hard to find the right amount of exogenous instrumental variables to impose in the model. If you included as many endogenous variables as there are excluded endogenous variables, 2SLS regression seems to be just identified. If you included more exogenous variables than endogenous variables 2SLS regression appears to be overidentified (Kritzer, 1976).

In conclusion, the 2SLS regression is an extension of the OLS regression to address endogeneity problems. The 2SLS regression is calculated in two steps, wherein the first step the reduced form is calculated through the instrumental variable(s) that is (are) created and regressed to the endogenous variable. The second step is to replace the predictor variable with the reduced form in the regression. The 2SLS regression has some disadvantages including multicollinearity issues, hard to find the right instrumental variable, and the right number of instrumental variables.

3.4 RESEARCH DESIGN

The random and fixed-effects models are widely used in the literature. It is mainly used in researches examining the board characteristics and financial performance to estimate omitted variables (Guest, 2009, Liu, 2014; Yermack, 1996). 2SLS mainly targets the endogenous variable, however, this can also be controlled for by adding robustness and will be discussed further in section 3.9 robustness test. Therefore, OLS is preferred over the random and fixed-effects model and 2SLS. OLS regression is easy to use, analyze, and interpret. The disadvantages can be checked, so this method is carried out using the computing program SPSS like Kiel and Nicholson (2003) did in their research. The instructions on how to use SPSS regarding OLS regression are adapted from Allison (1999). Before any analysis, the assumption must be checked first.

The first assumption that needs to be checked is if the dependent and independent variables are metric. In this case, all variables are metric and thus the assumption is satisfied. Then the minimum required sample size is 5:1. This thesis has 4 independent variables, which makes the minimum number of observations 20. Ideally, the number of observations should be 15 to 20 observations per independent variable and thus should be between 60 and 80 observations. This thesis samples 70 observations and is further explained in Chapter 4. Therefore, this assumption is also met.

As mentioned, there are disadvantages to the OLS regression method that must also be checked. To address outliers, studies usually use the winsorizing method. Winsorizing is excluding values that lie above or below a certain percentage of the normally distributed data. For example, Liu et al. (2014) excluded values that are at the top and bottom 0.5% of the data, meaning that they only included 99% of their total sample size. Hence, Guest (2009) winsorized his data at 1-99%, so excluding 1% of the extreme values. Depending on the extremeness and the reasonability of the outliers, winsorizing may be applied to generate better reliable results. Another way to deal with outliers is to take the natural logarithm by normalizing the distribution of skewness (Adams & Ferreira, 2009; Carter et al., 2010; Eisenberg et al., 1998; Liu et al., 2015).

In order to exclude multicollinearity in the analysis, each independent variable will be tested separately in a Pearson's correlation matrix using SPSS to see its effect on the dependent variable and between the independent variables. The Pearson correlation provides a measure of strength for the linearity of the association between the variables. It ranges from -1, meaning that there is a perfect negative correlation, to 1, meaning that there is a perfect positive correlation (Ahlgren, Jarneving & Rousseau, 2003). Then the Variance Inflation Factor (VIF) is calculated for each independent variable also using SPSS. The VIF score should be below 10 in order to exclude multicollinearity (Alin, 2010), whereas James, Witten, Hastie, and Tibshirani (2013) state that a VIF between 5 and 10 can indicate multicollinearity. Endogeneity can simply be fixed through a robustness test by replacing a variable, by performing the two-stage least square test, or by lagging a variable. The first and last approach will be discussed in more detail in section 3.9 about robustness. When there appears to be multicollinearity, the correlated variable will be tested separately.

Besides the OLS regressions that will be carried out to analyze the impact of board characteristics on financial performance, an additional regression will be performed. The regression will separate the management board and the supervisory board to see the individual impact of the boards on financial performance. Board size, board gender diversity, and medical background will be separated. Board independence will not be added since all members on the management board are dependent directors and all members on the supervisory board are independent. These variables might bias the results. By doing so, it can be clear which board has a larger impact on financial performance.

To summarize, this thesis uses OLS regression to investigate the correlation between board characteristics and financial performance. The effect of the management board and supervisory board are also tested. OLS assumptions are checked and fulfilled. When there are extreme outliers that cannot be explained, these specific outliers will be winsorized. Then using Pearson correlation and VIF score, possible multicollinearity can be excluded. If there is multicollinearity, the correlated variables will be tested separately.

3.5 REGRESSION MODEL

After the assumptions of OLS are met, multicollinearity and outliers are controlled for, an OLS regression model can be made to examine the effect of board size, board independence, gender diversity, and the background of the board on financial performance, the following equation is conducted. The equation consists of the number of board members, the percentage of independent directors, the percentage of women on the board, the percentage of directors with a medical background, and all control variables (hospital size, multi-location, and the number of board meetings). For financial performance, ROA and the Profit Margin are used as predictors. This will be explained further in 3.6.2. Hypotheses 1 is checked via equation 1, hypothesis 2 is checked via equation 2, and so on, and can be found below. These models are adapted from Andres and Vallelado (2008), Carter et al. (2010), Guest (2009), Kumar and Singh (2013), and Liu et al. (2014) to name a few.

$$PERF_{it} = \beta_0 + \beta_1 NMEM_{it} + \beta_5 CONTROL_{it} + \varepsilon_{it} \quad (1)$$

$$PERF_{it} = \beta_0 + \beta_2 INDEP_{it} + \beta_5 CONTROL_{it} + \varepsilon_{it} \quad (2)$$

$$PERF_{it} = \beta_0 + \beta_3 WOMEN_{it} + \beta_5 CONTROL_{it} + \varepsilon_{it} \quad (3)$$

$$PERF_{it} = \beta_0 + \beta_4 BACK_{it} + \beta_5 CONTROL_{it} + \varepsilon_{it} \quad (4)$$

Where:

$PERF_{it}$ =	Financial performance of hospital *i* in year *t*
β_0 =	Constant, represents the expected value for firm performance when all independent variables are zero
$\beta_1 NMEM_{it}$ =	Number of board members of hospital *i* in year *t*
$\beta_2 INDEP_{it}$ =	Percentage independent director of hospital *i* in year *t*
$\beta_3 WOMEN_{it}$ =	Percentage women on the board of hospital *i* in year *t*
$\beta_4 BACK_{it}$ =	Medical background of directors of hospital *i* in year *t*
$\beta_5 CONTROL_{it}$ =	Control variables of hospital *i* in year *t*
ε_{it} =	Error terms

Results are labeled statistically significant when the p-value is below <.10, <.05 or <.01, where <.10 represents a significant relationship at 10%, <.05 shows a strong significant relationship at 5%, and <.01 indicates a very strong significant relationship at 1%. In the following sections, the dependent, independent, control variables, and robustness tests are discussed extensively. In the end, a summary of the discussed variables is presented in Table 1.

3.6 DEPENDENT VARIABLE

There are many ways to measure financial performance. These measurement ways can be categorized into two groups: accounting-based measures and market-based measures. Examples of the most commonly used accounting-based measures in similar researchers include Return on Equity (ROE), Return on Investment (ROI), Return on Sales (ROS), and Return on Asset (ROA). The most commonly used market-based measures are Tobin’s Q, market value added (MVA), stock returns, and earnings per share (Ujunwa, 2012).

3.6.1 MARKET-BASED MEASURE

Tobin’s Q is one of the most used market-based approaches to measure the firm value or financial performance (Ahern & Dittmar, 2012; Campbell & Minguez-vera, 2007; Carter et al., 2010; Guest, 2009; Marinova et al., 2015). It is calculated by the sum of the market value of stock and the book value of debt divided by the book value of total assets. Tobin's Q is a good predictor for the firm's competitive advantage since it considers the market's expected future earnings. A Tobin´s Q above 1.0 is considered good, the firm can create greater value using their current resources, while a firm with Tobin´s Q below 1.0 is considered that the firm creates poor performance. An advantage of a market-based measure is that it is focused on expectations of future performance (Campbell & Mínguez-Vera, 2007) and thus has little influence on the asset valuation, current operations, or past profitability (Kiel & Nicholson, 2003).

3.6.2 ACCOUNTING-BASED MEASURE

Generally, accounting-based measures are based on events that have already happened and focus on the historical performance (Campbell & Mínguez-Vera, 2007; Kiel & Nicholson, 2003). As mentioned, the most commonly used accounting-based measure is return on asset (ROA). ROA indicates how profitable a firm is related to its total assets. In other words, it indicates what the management has accomplished using the current assets. This measure is used by many researchers focusing on the board characteristics and financial performance (Gaur et al., 2015; Kiel & Nicholson, 2003; Erhardt et al., 2003). To calculate the ROA, the earnings before interest and tax (EBIT) must be calculated first. EBIT is calculated as the total revenue, which includes the income from day-to-day activities, subsidies, mutations, and other operating incomes, distracting the personnel cost, depreciation, and other operating charges. In other words, EBIT is the income that remains after all costs are paid for, except for the tax and interest. ROA is calculated as EBIT divided by total assets. Return on equity (ROE) is calculated as EBIT divided by total equity and represents the firm's profitability related to the shareholders' equity. Return on interest (ROI) (EBIT divided by invested capital) tells the gain or loss relative to the invested amount (Erhardt et al., 2003). Return on sales (ROS) is calculated as EBIT divided by total sales (Liu et al., 2014) and indicates the effectiveness of a firm to turn sales into profits.

Tobin's Q and ROA are by far the two most familiar performance measures. In many prior researchers, Tobin's Q and ROA are both included as an indicator for financial performance (Adams & Ferreira, 2009; Carter et al., 2010; Kiel & Nicholson, 2003; Kumar & Singh, 2013). This research, however, only adopts the accounting-based measurement to measure the financial performance of hospitals, since Dutch hospitals are non-listed firms.

The before-mentioned performance measures are often used for listed firms. For the hospital's financial performance, the most frequently used indicators are profitability ratios such as ROA, profit margin, and net income. Profit Margin as illustrated by Collum et al. (2014), Thiel et al. (2018), and Tasi et al. (2019) to name a few, is calculated as the total revenue minus the cost of goods sold (cogs), then divided by the total revenues and represents a firm ability to turn sales into profit. Profit Margin is similar to ROS, however, there is a difference between the two. Profit Margin uses the profit after the direct costs, that can be allocated to the product, are deducted, whereas ROS uses EBIT, where the indirect costs are also deducted from the profit. Performance measure net income is calculated as the gross income minus EBIT (Kuntz et al., 2016; Tasi et al., 2019). ROA and Profit Margin are used to test hypotheses 1 to 4 since ROA is the most used financial performance measure for hospital and non-hospital studies, while Profit Margin is the most used measure for hospital financial measure. The subsidies received by the hospitals are considered as income and taken into account in this thesis.

3.7 EXPLANATORY VARIABLES

The explanatory variables include size, board independence, gender, and professional background. These variables are derived from the members of the board. This thesis includes all active board members at year-end. For example, member x was a board member until March 31st in year *t* and is then taken over by member *y* on April 1st also in year *t*. In this case, only member *y* is taken into account. Since if both member *x* and *y* are included, the total number of board members would not represent the reality. To test hypotheses 1 to 4, each variable will be measured separately to see its individual effect on hospital performance.

The size of the board is measured as the total number of members on the board (Guest, 2009). As mentioned before, the Netherlands has a two-tier boards system including a management board and a supervisory board. In this thesis, the total number of board members is the management and the supervisory board combined.

Board independence is measured as a proportion of independent directors compared to total members. Johl et al. (2015) consider board members independent when they are non-executive directors whereas Liu et al. (2015) follow the CSRC guidance to indicate independent directors. However, the study by Johl et al. (2015) is performed in Malaysia that has a one-tier board system which is different from the two-tier system in the Netherlands. Liu et al. (2015) studied firms in China that do have a two-tier system but follow the CSRC guidelines, which the Netherlands does not have either. Therefore, the management board that consists of executive directors involved in the daily activities and decision-making, are considered dependent directors, and the supervisory board that consists of non-executive directors whose main purpose is to supervise the management board is considered independent directors unless additional information is given in the annual report stating that a member on the supervisory board is dependent. This approach is adapted from Marinova and Plantenga (2015) who also focus on the board and its effect on firm performance in Dutch and Danish firms.

Gender diversity is measured as a proportion of female board members compared to the total members on the board (Joecks, Pull & Vetter, 2013). In other words, the percentage of female directors (WOMEN) will be used to measure gender diversity (Adams & Ferreira, 2009, Ahern & Dittmar, 2012). The reason for using a percentage of women instead of a dummy variable is the study done by Liu et al. (2011) where they argue that having more women on the board leads to better financial performance. In their research, they only included 'women' as dummy variables. Using a dummy variable can only show the effect of having women on the board. So, this thesis uses the proportion of women on the board.

The professional background is measured as the proportion of board members with a medical background divided by the total number of board members. In the Netherlands, someone who is qualified to be a healthcare employee is registered in the BIG-system[4] and gets a BIG-number. These specifics are for the citizens to check their healthcare employees whether or not they are qualified to do the job. In this thesis, the BIG-register is used to check whether or not the board members have a medical background. The BIG-register also registers physiotherapists, pharmacy assistants, and dental hygienists. These healthcare employees are not considered a medical background in this thesis, because these are not commonly found in the general hospital.

3.8 CONTROL VARIABLE

In literature, there is little agreement regarding which control variables have to be included in order to control for financial performance. The most used control variable for financial performance is 'firm size', this can be measured using the total number of employees at year-end or total assets (Ahern & Dittmar, 2012; Carter et al. 2010; Johl et al. 2015; Liu et al. 2015). These measures are, however, less common to control for hospitals' financial performance. The most used control variable addressing hospital financial performance includes *hospital size* (SIZE_BED) as the number of hospital beds (Molinari et al., 1993; Molinari et al., 1995; Kuntz et al., 2016; Thiel et al., 2018). The reason for this is that larger hospitals have more beds and can spread their fixed and overhead cost, like administrative costs, over these beds and could lead to a positive financial effect (Molinari et al., 1993). The size of the hospital can be determined as small, medium, and large and is adapted from

[4] https://zoeken.bigregister.nl/zoeken/kenmerken

Wübker and Wuckel (2019), where less than 150 beds are considered small, between 150 and 400 beds is considered medium and big hospital should have more than 400 beds. So, hospital size is measured by the total number of hospital beds.

A dichotomous dummy variable is added when a hospital organization runs more hospitals in different locations. This is also referred to as *multi-location* (MULTIL). If a hospital is multi-located, then this will be given a 1, if the hospital is not multi-located, then 0. Multi-located hospitals are considered more difficult to control since they require higher organizational requirements (Kuntz et al., 2016).

Another control variable is the *meeting attendance* with the board of directors. Annually, the supervisory board has multiple meetings to discuss the current and past situation in the firm. The board of directors is not always present during these meetings. Having these board meetings is beneficial to improve the effectiveness of the board if the time is managed well (Conger, Finegold & Lawler, 1998; Johl et al., 2015; Lipton & Lorsch, 1992). By attending these meetings more frequently, the board of directors can monitor the management better. According to Lipton and Lorsch (1992), the board should at least meet once every month and each meeting should take a full day. The attendance rate can differ per person, as demonstrated by Adams and Ferreira (2009) stating that women experience on average fewer attendance problems than men. However, this cannot be checked for board members in Dutch hospitals, because the data is not available. It is hard to find these specific data, therefore, the number of meetings attended by the board of directors is used as the measure for the meeting attendance of the board (MEET). This approach is in line with the measurements performed by Johl et al. (2015).

Table 1
Variable definitions

Variable	Code	Definition	Sources
Financial performance		*(Dependent variable)*	
Return on Assets (%)	ROA	Annual EBIT divided by the book value of total assets at the end of the year	Adams & Ferreira, (2009); Erhardt et al. (2003); Eisenberg et al. (1998); Gaur et al. (2015); Kiel & Nicholson
Total profit margin (%)	PROFM	Total revenue minus cogs, then divided by the total revenue	Collum et al. (2014); Thiel et al. (2018); Tasi et al. (2019)
Return on Equity (%)	ROE	Annual EBIT divided by the total equity value at the end of year	Kumar & Singh (2015)
Return on Sales (%)	ROS	Annual EBIT divided by total revenue	Gaur et al. (2015); Liu et al.,(2014)
Board Size		*(Explanatory variable)*	
Number of members on the board	NMEM	Total numbers of members on the board	Guest (2009)
Number of members on the management board	NMEM_MB	The total number of members on the management board	Guest (2009)
Number of members on the supervisory board	NMEM_SB	The total number of members on the supervisory board	Guest (2009)
Board Independence		*(Explanatory variable)*	
Proportion of independence directors on the board (%)	INDEP	The number of independent directors divided by the total number of members on the board	Abdullah (2004); Johl et al. (2015); Liu et al. (2015)
Gender Diversity		*(Explanatory variable)*	
Proportion of female on the board (%)	WOMEN	Total number of female board members divided by the total number of members on the board	Adams & Ferreira, (2009); Carter et al. (2010); Erhardt et al. (2003); Marinova et al. (2015)
Proportion of female on the management board (%)	WOMEN_MB	Total number of female management board members divided by the total number of members on the board	Adams & Ferreira, (2009); Carter et al. (2010); Erhardt et al. (2003); Marinova et al. (2015)
Proportion of female on the supervisory board (%)	WOMEN_SB	Total number of female supervisory board members divided by the total number of members on the board	Adams & Ferreira, (2009); Carter et al. (2010); Erhardt et al. (2003); Marinova et al. (2015)
Professional background		*(Explanatory variable)*	
Proportion board member with medical background (%)	BACK	The number of members with a medical background divided by the total number of members on the board	Molinari et al. (1993); Veronesi et al. (2013)
Proportion members with a medical background on the management board (%)	BACK_MB	The number of members on the management board with a medical background divided by the total number of members on the board	Molinari et al. (1993); Veronesi et al. (2013)
Proportion members with a medical background on the supervisory board (%)	BACK_SB	The number of members on the supervisory board with a medical background divided by the total number of members on the board	Molinari et al. (1993); Veronesi et al. (2013)
		(Control variable)	
Hospital size	SIZE_BED	Total number of hospital beds	Dobrzykowski et al. (2016); Kuntz et al. (2016); Molinari et al. (1995)
Multi-Location	MULTIL	Dummy variable wherein hospital organization has multiple locations is 1, and if not multi located then 0	Kuntz et al. (2016)
Number of meetings attended by the board of directors	MEET	Total number of meetings attended by the board of directors	Andres & Vallelado, (2008); Vafeas (1999)

3.9 ROBUSTNESS TEST

To check the reliability of the OLS regression, several robustness tests will be carried out. By performing a robustness test, it can be checked if the results would remain the same under different circumstances, thereby reducing the possibility that the results are created by chance.

The first robustness test is carried out by taking a five-year average ROA and Profit Margin to reduce the impact of outliers. Kiel and Nicholson (2003), explain that the performance measures are subject to short-term fluctuations. In other words, it can differ from year to year, so in order to maintain stability, an average is taken.

The second robustness test is to replace the performance measure ROA and Profit Margin that is used in the equations in section 3.5 by ROS and ROE as predictors for financial performance. As previously explained, Profit Margin and ROS are similar to each other with the only difference being the use of EBIT and profit after only deducting the direct costs. ROE and ROS are other very commonly used measures for performance (Gaur et al., 2015; Kumar & Singh, 2013; Liu et al., 2014). This approach is adapted from Gaur et al. 2015, who also applied ROE along with ROS as a robustness test in their analysis.

The third robustness test is to control for endogeneity. As mentioned before, endogeneity is when the direction of the relationship is not clear. In this case, it can for example be, that a large board leads to higher financial performance or that a higher financial performance leads to a larger board. One way to address this problem is by using a one-year lagged variable. There is not one specific variable that should be lagged. To illustrate, Liu et al. (2014) only lagged the independent variable gender diversity to test the endogeneity in firm performance and gender diversity. Carter et al. (2010) also lagged all independent variables. Adams and Ferreira (2009) lagged the independent variable and the dependent variable Tobin's Q in another model. Consistent with the theory, all independent variables will be lagged by one year. Besides, dependent or independent variables, control variables also face the risk of endogeneity and are therefore also lagged. So to test hypotheses 1 to 4, the following equations will be used:

$$PERF_{it} = \beta_0 + \beta_1 NMEM_{it-1} + \beta_5 CONTROL_{it-1} + \varepsilon_{it} \quad (5)$$

$$PERF_{it} = \beta_0 + \beta_2 INDEP_{it-1} + \beta_5 CONTROL_{it-1} + \varepsilon_{it} \quad (6)$$

$$PERF_{it} = \beta_0 + \beta_3 WOMEN_{it-1} + \beta_5 CONTROL_{it-1} + \varepsilon_{it} \quad (7)$$

$$PERF_{it} = \beta_0 + \beta_4 BACK_{it-1} + \beta_5 CONTROL_{it-1} + \varepsilon_{it} \quad (8)$$

Where:

$PERF_{it}$ = Financial performance of hospital *i* in year *t*

β_0 = Constant ,represents the expected value for firm performance when all independent variables are zero

$\beta_1 NMEM_{i-1}$ = Number of board members of hospital *i* in year *t-1*

$\beta_2 INDEP_{i-1}$ = Percentage independent director of hospital *i* in year *t-*

$\beta_3 \mathrm{WOMEN}_{i-1}$ = Percentage women on the board of hospital *i* in year *t-1*

$\beta_4 BACK_{i-1}$ = Medical background of directors of hospital *i* in year *t-1*

$\beta_5 CONTROL_{i-1}$ = Control variables of hospital *i* in year *t-1*

ε_{it} = Error terms

The fourth robustness test is to test each observation year separately. It could be that in one specific year the results are more significant than other years. To see the significant difference between the years, for 2015 to 2019 different OLS regressions will be made.

The last test is a combination of the third and fourth robustness tests. It tests the effect of board characteristics and financial performance for each year while using lagged independent and control variables. As mentioned prior, accounting-based performance measures like ROA, Profit Margin, ROS, and ROE are based on historical performance, meaning that current board members are responsible for past performance. Therefore, by lagging the board characteristics and control variables, past board members are responsible for past performance. The effect of the board characteristics is more visible when performing the OLS regression per year.

4. DATA AND SAMPLE

This thesis uses panel data to examine the effect of board characteristics on financial performance over time. The source of data, year of sampling, and the final data used in the analyses will be further explained in this chapter.

4.1 DATA

As of 2019, there are 101 general hospitals divided into 64 hospital organizations, 8 academic hospitals, 7 children's hospitals, and 129 polyclinics in the Netherlands (Volksgezondheid en Zorg, 2019). This thesis focuses only on the Dutch general hospitals' organizations since these hospitals are the most accessible for the general public. Hospital organizations are used instead of the individual hospital because often hospitals have the same board of directors overseeing all activities in different hospitals. Usually, these hospitals are merged and have a consolidated financial statement. This thesis include all 64 hospital organizations as well as corporations that merged or went bankrupt before the sampling period. An overview of the included hospitals is given in Appendix B.

The initial data is collected in the period 2011-2019 by the Governance Institute and can be downloaded from the website Dutch ministry of health and welfare[5]. 2011 to 2014 are not included in the analysis, because there is no information available regarding the management board. The data from the Government website also contains no information about the management board in 2015 and 2016. However, 2015 and 2016 are still included in the analysis because some hospitals were declared bankrupt during those years, including 'Havenziekenhuis, 'Ijsselmeer ziekenhuis', and Slotervaart ziekenhuis'. In section 4.2 a more detailed explanation will be given why these years are still included. To complete the list of management board members of each hospital in 2015 and 2016, missing data are manually collected through published annual reports[6]. Data regarding the medical background of board members are hand collected from the BIG-register[7] and hospitals' annual reports. So, data on the management board from 2015 and 2016 are collected from hospitals' annual reports. Information about the medical background of the board members is hand collected from the BIG-register, All other data about the boards' characteristics and financial performance of the hospitals are collected from the Government website.

To summarize, the dataset used for this analysis is from 2015 to 2019. Academic and military hospitals are excluded due to their different cost structure compared to general hospitals (Blank & van Hulst, 2010), this can lead to possible outliers. The final data consists of 322 firm-year observations with 70 unique hospital organizations in the Netherlands.

Note that some hospitals merged during the observation window. These hospitals are considered as a unique hospital. For example, ´Westfriesgasthuis´ located in Hoorn and ´Waterlandziekenhuis´ located in Purmerend merged on April 1st , 2017. This thesis considers Westfriesgasthuis and Waterlandziekenhuis in 2015 and 2016 as two different hospitals and from 2017 on also as one hospital, which makes in total 3 unique hospitals.

Hospitals that merged before the observation window of 2015 are considered as one unique hospital. For example, 'Ziekenhuisgroep Twente' involves two ZGT hospitals located in Almelo and

[5] https://www.jaarverantwoordingzorg.nl/gegevens-bekijken/verantwoordingsgegevens-per-verslagjaar-datasets
[6] https://digimv8.desan.nl/
[7] https://zoeken.bigregister.nl/zoeken/kenmerken

Hengelo. They merged in 1998 and since then Ziekenhuisgroep Twente is seen as one hospital with one board. The same goes for 'Isala Klinieken' which is a fusion between 'Noorderboog' in Meppel and 'Isala' in Zwolle in 2014. Besides, Noorderboog also has a policlinic in Steenwijk and nursing homes, while Isala has policlinics in Kampen and Heerde. These hospitals have the same board overseeing all activities and have a consolidated financial statement so they can be seen as one hospital. To conclude, hospitals fused before the observation window are considered as one hospital organization after fusion.

Another important note is that the data for the control variable 'MEET' is not complete. Only for the first two-year observations, data on the number of board meetings are available, this leads to 133 observations. The number of board meetings is often not mentioned in annual reports, therefore, making it harder to complete the dataset. So, variable MEET is included as a control variable with only 133 observations. If it turns out that the variable is causing problems in the analysis, the variable will be dropped.

4.2 UNBALANCED DATA

In 2018, MC Slotervaart and MC Ijsselmeer were declared bankrupt and due to bad management and financial aspects (Dutch hospital bankruptcy investigation committee, 2020). BDO-benchmark (2019) did an analysis looking at the different financial ratios including the solvency, current ratio, return, debt service coverage ratio, and Ebitda/revenue. Based on these results, they gave the hospitals a grade ranging from 1-10 with 10 the best and 1 the worst. 11 out of 64 Dutch hospitals scored a 5 or lower, meaning that the financial performance of these hospitals is poor and they could face financial distress. Especially LangeLand Ziekenhuis which is part of Reinier Haga groepp scored bad. In 2017, they scored, based on the BDO-benchmark analysis (2019), a 3 on the financial aspect and in 2018 a 2. They scored -3% in solvability, meaning that they have way more debt than equity. The solvability indicate the ability of a firm to meet its long-term liabilities. A negative solvability is only possible when a firm has negative equity. It does not mean that the firm is bankrupt, but it can have negative consequences like not being able to get a bank loan. In this case, the firm was not able to pay back its long-term debts. According to the BDO-benchmark analysis (2019), they even did not take the debt of 20 million euros into account that was subordinated by financial providers. The HagaZiekenhuis also scored insufficient on the financial ratios, which is also part of Reinier Haga groep. On the other hand, Reinier de Graaf Ziekenhuis scored a 6 in 2017 and a 9 in 2018, while all being a part of the Reinier Haga groep. Therefore, it is interesting to look at the unbalanced sample to see the impact of the combination of board members on financial performance. Besides, when hospitals decide to merge they often fuse the board of directors or new directors are elected. Given the fact that hospitals that are part of Reinier Haga groep have different financial structure while also having the same board, Reinier Haga groep hospitals are all included separately. In other words, Reinier Haga groep, LangeLand Ziekenhuis, and HagaZiekenhuis are all included as different hospitals in the analysis.

In a more recent BDO benchmark (2020) analysis, still, 10 hospitals scored a 5 or lower. Again LangeLand Ziekenhuis scored the worst with a financial score of 2. On average the financial score dropped from 7.4 in 2018 to 7.3 in 2019. The main reason for the decrease was due to the medium-large hospitals that scored a 7.6 in 2018 to 6.8 in 2019 as a result of the increased personnel and other costs. Surprisingly, Haaglanden Medisch Centrum scored an average a 10 on the financial score in 2019, while in 2018 they only scored a 6. In 2019, the hospital declared a reorganization, where all board members were replaced by new board members. Consequently, the hospital improved its financial performance.

In conclusion, in 2018, HagaZiekenhuis, which is managed by the same board as Reinier de Graaf Ziekenhuis, scored low on the financial ratios, whilst Reinier de Graaf Ziekenhuis scored high. In 2019, Haaglanden Medisch Centrum had a perfect score, whilst in 2018 they only scored a 6. This was due to the change of board members. So, is interesting to use the unbalanced data to investigate the impact between board characteristics and financial performance.

5. RESULTS

This chapter discusses the results of the OLS regression analysis, including descriptive statistics, correlation matrix, main regression analysis, robustness tests, and additional regressions.

5.1 DESCRIPTIVE STATISTICS

The data used in the analysis contains 322 hospital observations in the Netherlands from 2015 to 2019. Table 2 presents the descriptive statistics of these data. The table includes the mean, median, standard deviation, minimum, quartile 1 (Q1), quartile 3 (Q3), and maximum. Variables 'NMEM', ‘NMEM_MB’, ‘NMEM_SB’, and 'SIZE_BED' are natural log variables. However, for descriptive purposes, these variables are represented as normal values. The table is divided into panels and represents the performance measures, independent variables, and control variables.

Table 2 panel A shows the performance measures that will be used in the analysis to represent the firm's financial performance. It can be noticed that all performance measures are slightly right-skewed since the median is smaller than the mean. For instance, ROA has a mean of 1.90% and a median of 1.63%. ROA in this study is seemingly lower than that in other research, which is usually around 3-4%. Adams and Ferreira (2009) had an average ROA of 3.19%, Carter et al. (2010) a ROA of 3.9%, Liu et al. (2015) found a ROA of 3.6%, and Liu et al. (2014) also described a ROA of 3.2%. The difference can be explained by the fact that this study is based on not-for-profit hospitals, whereas the above-mentioned studies were based on US and Chinese listed firms. It is no surprise that ROA is lower in not-for-profit hospitals than for listed for-profit organizations. Comparing this study's ROA to that of German not-for-profit hospitals, the difference becomes smaller. Kuntz et al. (2016) found a mean of 1.37%. The Profit Margin, on the other hand, did differ between these studies, namely, 1.1% and 3.1% for this study. Germany has government-owned, private not-for-profit, and private for-profit hospitals, whereas the Netherlands mostly consists of private not-for-profit hospitals. This can explain the difference since not-for-profit hospitals do not have to compete against for-profit hospitals. ROE has a mean of 5.89% with a minimum of -23% and a maximum of 86.33%, indicating that there are noticeable differences in ROE between Dutch hospitals. The high ROE is caused by one hospital observation, namely ‘Spijkenisse Medisch Centrum’ in 2017. Since the ROE will not be used in the main analysis and only is included in one robustness test, the outlier will not be reduced from the analysis. ROE is similar to the one given in the study by Liu et al. (2015), which was on average 5.7%. At last, ROS has a mean of 1.59% and a median of 1.48%. These percentages are, again, lower than that of other studies, like Liu et al. (2014) with a mean of 4.8%. To conclude, it is no surprise that the performance measures in this thesis are lower than that of studies including listed firms. When compared to other studies focusing on hospitals, the difference becomes smaller. There are seemingly differences between the performance measures when looking at the minimum and maximum value, this indicates to possible outliers. All performance measures have a negative minimum value, meaning that some hospitals suffer from a loss.

Panel B in Table 2 represents the independent variables board size, board independence, gender diversity, and medical background. On average, there are 8.29 members on the board, with a minimum of 4 and a maximum of 14. As expected, Spijkenisse Medisch Centrum (smallest hospital) only has 4 members on the board alongisde Groene Hart Ziekenhuis who also have 4 members. Zorgpartners Friesland has 14 members and has the largest board in Dutch hospitals. Isala Klinieken, the largest hospital has 11 members on the board. This is in line with Eisenberg et al. (1998) stating that the board size varies with firm size, smaller firms have smaller boards and larger firms have larger boards. The average board size is similar to other studies in countries that also adapt to the two-tier system. To illustrate, Liu et al. (2015), Marinova et al. (2015), Lückerath-Rovers (2011) documented the board size for Chinese, Dutch, and Danish listed firms and had on average 9.57 members, 7.77 members, and 7.82 members on the board. Remarkably, Eisenberg et al. (1998) only had on average 3.7 members on the board. They sampled small and medium-sized Finnish firms from 1992 to 1994. Smaller firms usually have smaller boards and it could be that the board size back then was smaller. Moreover, 70.89% of the board members are independent, meaning that they have no ties with the hospital. Compared to other studies on listed firms in the UK, China, Malaysia, Netherlands, and Denmark, the proportion of independent board members are high. Guest (2009) had 41% outside directors, Liu et al. (2015) 30.4% independent board members, Liu et al. (2014) 29.4%, Johl et al. (2016) 44%, and Marinova et al. (2015) 55.1%. There are studies with similar results, for example, Carter et al. (2010) analyzed firms in the US, mainly looking at the gender and ethnic diversity of the boards. They documented an average board size of 11.21 and 7.77 of the board members were independent, meaning that almost 70% of the board were independent directors. Abdullah (2004) also had an average independence rate of 70% in Malaysian-listed firms. The high proportion of independent boards can be explained by the two-tier board system including a management board and a supervisory board. The Dutch governance code healthcare state that the supervisory board should have at least 3 members on the board. This is not always the case as the minimum in Table 2 shows 2 members on the supervisory board. Hence, there are more members on the supervisory board (5.84) than on the management board (2.45). The supervisory board is smaller than that of Kuntz et al. (2016) and Thiel et al. (2018) focusing on German hospitals. They had on average 8.43 members and 10.14 members on the supervisory board. Moreover, on average, 29.80% of the board members are women, with a minimum of no women and a maximum of 62.5%. The proportion of female directors is similar to the papers by Veronesi et al. (2013), who investigated hospitals in the United Kingdom, where 34.7% of the board was female and Ujunwa (2012) focused on Nigerian firms, where females made up 40.2% of the board. Liu et al. (2014) documented that firms in China only had 10.2% female directors in the period 1999-2011. According to a boardroom analysis in China performed by Deloitte (2019), China only had 10.9% female directors, and this is due to some social ideas. Marinova et al. (2015) collected data from Dutch and Danish firms and documented that 25.5% of the Dutch companies had at least one female director on the board and Denmark 50%. The Netherlands had on average fewer women on the board compared to other countries. On average there are more women on the supervisory board (30.39%) than the management board (29.80%). The percentage of women on the supervisory board is similar to that of Kuntz et al. (2016), with an average of 28%. Moreover, 14.11% of the board members have a medical background, with a minimum of no members with a medical background and a maximum of 50%. As described in section 2.1.4 medical background, the proportion of board members with a medical background is not clear. To illustrate, Veronesi et al. (2013) included the proportion of clinicians and doctors on the board rather than 'a medical background'. Molinari et al. (1995) analyzed the impact of inside and outside medical staff on financial performance and looked at the number of inside and outside physicians. Therefore, the proportion of members with a medical background cannot be checked through prior research. The management board has on average 19.98% and thus more members with a medical background than the supervisory board (12.28%). The study by Kuntz et al. (2016) had on average 10.42% members on the supervisory board that are either physicians or nurses. Overall, the mean and median are close to each other, indicating that the independent variables are normally distributed. The board characteristics are similar to other studies focusing on hospitals. It is remarkable that there are hospitals in the dataset that have no female directors and/or no members with a medical background on the board.

At last, Table 2 panel C shows the control variables sizes, multilocation, and the number of meetings. The variable SIZE_BED indicates that the smallest hospital (Spijkenisse Medisch Centrum) has 48 beds and the largest (Isala Klinieken) has 1103 beds, the mean is 479 beds. Comparing this result to other studies, the number of beds are higher than Molinari et al. (1995) with on average 220 hospital beds, Alexander and Morrisey (1988) where only 13.4% had 400 or more beds, and Thiel et al. (2018) with an average of 315.3 hospital beds. Dutch hospitals have on average relatively large hospitals as described by Wübker and Wuckel (2019), stating that a large hospital had over 400 beds. This thesis uses the hospital organization instead of individual hospitals, which can consist of multiple hospital locations and thus have a larger number of beds as a result. The standard deviation is 250, meaning that the data is scattered. As mentioned earlier, the size variable is a logged variable, but for descriptive purposes is presented as normal variables. Therefore, the standard deviation is high and the median differs from the mean. Variable MULTIL is a dummy variable, where 1 indicates that the hospital is multi-located and 0 is not multi-located. The mean is 0.6, indicating that 60% of the hospitals included in the sample are multi-located. Finally, the number of meetings held by the board is on average 8.25, with a minimum meeting of 4 and a maximum of 28.

Table 2
Descriptive statistics

Variable	N	Mean	Median	St. Dev	Minimum	Q1	Q3	Maximum
Panel A: Performance measures								
ROA (%)	322	1.898	1.632	2.717	-17.58	.736	2.869	23.600
PROFM (%)	322	3.096	2.914	1.930	-4.250	2.025	4.049	16.070
ROE (%)	322	5.893	5.427	8.188	-23.000	2.562	8.609	86.333
ROS (%)	322	1.588	1.481	1.976	-6.99	.647	2.369	15.830
Panel B: Independent variables								
NMEM	322	8.290	8	1.788	4	7	10	14
NMEM_MB	322	2.45	2	1.099	1	2	3	7
NMEM_SB	322	5.84	6	1.281	2	5	7	9
INDEP (%)	322	70.885	71.429	9.580	50	63.636	77.778	90
WOMEN (%)	322	29.797	28.571	13.289	.000	22.222	37.500	62.500
WOMEN_MB (%)	322	27.567	25	28.5727	0	0	50	100
WOMEN_SB (%)	322	30.388	33.333	13.950	0	20	40	66.667
BACK (%)	322	14.107	12.500	10.556	.000	9.091	20	50
BACK_MB (%)	322	19.983	0	27.836	0	0	33.333	100
BAKC_SB (%)	322	12.279	14.286	11,149	0	0	20	42.857
Panel C: Control variables								
SIZE_BED	322	479.120	417.500	249.807	48	265	636.25	1103
MULTIL	322	.600	1	.491	0	.000	1	1
MEET	133	8.250	7	3.517	4	6	9	28

Notes: This table presents the summary statistics of the performance measures, independent variables, and control variables used in this thesis and are described in Table 1.

5.2 CORRELATION MATRIX

In Table 3, Pearson's correlation matrix is given along with the VIF score for the dependent variables, independent variables, and control variables used in the analysis. Only statistically significant correlation coefficients will be highlighted.

The first few rows represent the performance measures ROA, Profit Margin, ROE, and ROS and their correlation coefficient with each other. It is noticeable that they are all highly correlated to each other. For example, ROA has a significant positive correlation with Profit Margin (.783), ROE (.766), and ROS (.995). Remarkable is that ROS and ROA have a .955 coefficient, indicating almost a perfect linear relationship. They are highly correlated to each other since they all measure the financial performance of the hospitals and thus are similar to each other. These findings are in line with previous studies like Lückerath-Rovers (2013) who found significant coefficients between the performance measures ROE, ROS, EBIT, and ROIC (Return on Invested Capital), and Kiel and Nicholson (2013) who documented a significant relationship between three-year average Tobin's Q and three-year average ROA (.319). The VIF score is 4.464, 2.973, and 5.540, and is relatively high. According to Alin (2010), a VIF below 10 can exclude multicollinearity. However, James et al. (2013) state that a VIF score between 5 and 10 indicates multicollinearity. So, given that these performance measures are the dependent variables and in order to exclude multicollinearity, the performance measures are all analyzed separately.

As expected, the number of board members is significant and negatively correlated to the performance measures (-.156), (-.106), (-.197), and (-.169), indicating that a larger board has a negative relationship with financial performance. These findings are in line with Eisenberg et al. (1998) and Guest (2009). Only Kiel and Nicholson (2013) found a positive relationship between board size and financial performance. As mentioned in section 2.1.1, most studies documenting a positive correlation are mainly derived from the resource dependency theory focusing on for-profit firms, which is also the case for Kiel and Nicholson. INDEP is also negatively correlated to the performance measures, however, the results are not significant, meaning that the percentage of independent directors has no relationship with financial performance. Johl et al. (2015) also documented no relationship between the variables. On the other hand, INDEP is negatively related to NMEM (-.147) at the 1% level, implying that the proportion of independent directors has a negative correlation with board size. Liu et al. (2015) also showed a significant negative relationship between board size and board independence. Moreover, WOMEN shows a negative coefficient with ROA (-.109) and ROE (-.080), stating that a more gender-diverse board is found to be negatively correlated to financial performance. As reported by Ahern and Dittmar (2012), they also found a negative correlation between gender diversity and financial performance. However, their negative relationship can be caused by the mandatory change of directors, where at least 40% of the board has to be women. As a result, more young and inexperienced women became board members and is found to be negatively correlated the financial performance. For the independent variable BACK, results are insignificant for financial performance and board size, indicating that having a member with a medical background on the board is not correlated to financial performance and board size. Another noticeable correlation is board size and its significant correlation on board independence (-.147), gender diversity (.159), and medical background (.127). The relationship between board size and board independence is already explained above. Board size and its positive relationship with gender diversity and medical background indicate that a more gender-diverse board and having members with medical backgrounds lead to larger boards. The same results were observed by Ujunwa (2012) on the positive coefficients between board size and gender diversity. Moreover, the VIF score, ranges from 1.051 to 1.571, meaning that multicollinearity does not exist for the board characteristics.

At last, for the control variables, it can be seen that SIZE_BED is significant and negative related to the performance measures ROA, ROE, and ROS, only Profit Margin is not significant, indicating that large hospitals lead to poorer financial results. SIZE_BED is also positive and significant for board size (.554) and gender diversity (.124), implying that the larger the hospital, the larger the board and the more women on the board. Hence, SIZE_BED has a significant negative relationship with board independence (-.194), meaning that large hospitals have fewer independent directors. Liu et al. (2015) reported similar results for the control variables size, including Total assets and Leverage, indicating that firm size had a positive influence on board size. However, they also documented a positive relationship between firm size and board independence, meaning that larger firms had more independent members. This could be due to the fact that Liu et al. (2015) focud on Chinese listed firms, whereas this thesis focusses on non-profit hospitals. Variable MULTIL is overall not significantly related to the performance measures, so, if a hospital is (or not) multi-located, it does not affect the financial performance of the hospital. There is, however, a relationship between MULTIL and the board characteristics, including board independence (-.078), gender diversity (.094), and medical background (-.152). When a hospital is multi-located, there are fewer independent directors and fewer directors with a medical background on the board but do have more women on the board.

Table 3
Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	VIF
1 ROA	1											
2 PROFM	.783***	1										4.464
3 ROE	.766***	.721***	1									2.973
4 ROS	.955***	.868***	.790***	1								5.540
5 LN_NMEM	-.156***	-.106**	-.197***	-.169***	1							1.571
6 INDEP	-.062	-.061	-.052	-.054	-.147***	1						1.073
7 WOMEN	-.109**	-.028	-.080*	-.072	.159***	-.065	1					1.051
8 BACK	.034	-.032	.037	.011	.127**	-.039	-.002	1				1.071
9 LN_SIZE_BED	-.135***	.001	-.149***	-.125**	.554***	-.194***	.124**	.005	1			1.573
10 MULTIL	-.034	-.056	-.095**	-.053	-.060	-.078*	.094**	-.152***	.041	1		1.067
11 MEET	-.052	-.103	.098	-.069	-.201**	-.061	.044	-.115*	-.174**	.085	1	1.176

Notes: This table represents Pearson's correlation matrix and the VIF score. *, correlation is significant at 10% level. **, correlation is significant at 5% level. ***, correlation is significant at 10% level. LN_ represents the logged variables.

5.3 REGRESSION ANALYSIS

In order to answer the research question and test the hypotheses, an OLS regression analysis is executed. Tables 4 and 5 are used to test hypotheses 1 to 4, which were developed in section 2.5. As mentioned in section 4.1, variable MEET is included with 133 observations and if it turns out that the models are better without the MEET variable, the variable will be excluded from the further analyses. In section 5.3.1 the results of board characteristics and financial performance including and excluding the number of meetings are displayed. Section 5.3.2 reports the impact of the management board and supervisory board characteristics on financial performance. Finally, additional analyses are given in section 5.3.3.

5.3.1 REGRESSION ANALYSIS

Table 4 represents the impact of board size, board independence, gender diversity, and medical background on ROA and Profit Margin, including the control variables size, multi-location, and meetings. ROA is the dependent variable in panel A, and panel B uses Profit Margin as the dependent variable.

Before the analysis is discussed, the adjusted R^2 and F-statistics are presented for each model. Adjusted R^2 gives the explanatory power of the model. In other words, it tells how well the variables fit a curve or line. If more ´useless´ variables are added to the model, the adjusted R^2 will decrease, if more ´useful´ variables are added, the adjusted R^2 will increase. For example, an adjusted R^2 in panel A model 1 is .028 and indicates that board size (and included other variables) explains ROA for 2.8%. The adjusted R^2 in panel A ranges from 2.6% to 4.6%, which is lower than Carter et al. (2010) focusing on listed firms in the US, with an adjusted R^2 of .37 or even .81, and Guest (2009) in the UK with an average of .33. Moreover, the adjusted R^2 is still lower compared to studies examining German hospitals like Kuntz et al. (2016) ranging from .11 to .33, and Thiel et al. (2018) with an adjusted R^2 of .12. Moreover, the adjusted R^2 in panel B is smaller than in panel A, or even negative. A negative adjusted R^2 implies that the independent variable is a poor explanatory variable and can be improved by increasing the sample size. The sample size in the uneven-numbered models is 133 instead of 322 as shown in the even-numbered models. The cause of the reduced sample size is the control variable MEET. Variable MEET is included in the analysis with only 133 observations, due to missing data. It appears that the regression analysis only included the variables with data on the number of meetings and, therefore, reducing the sample size. The F-statistics indicate if the means of two populations are significantly different from each other. A significant F-statistic implies that the mean between the population is significantly different. In panel A, where the number of meetings is excluded, a significant F-statistic can be observed. It indicates that the mean between the variables are significantly different. Opposite results can be found in panel B when the number of meetings is included. The F-statistics are insignificant, therefore, confirming that the models are poor. It shows that by removing the number of meetings variable, the full sample size was being used and the explained variation increased for the performance measures. The F-statistics are also higher and more significant. So, variable MEET will be excluded from future analysis.

Table 4, panels A and B, models 1 and 2 provide no evidence that board size has an effect on financial performance. The results are insignificant. The relationship remains insignificant after adding all independent variables in models 9 and 10. There is no relationship between board size and ROA and Profit Margin when the number of meetings is added. The same can be observed in model 2, where the number of meetings is excluded from the analysis. Model 2 also indicates that board size does not influence ROA and Profit Margin. These findings are in line with Liu et al. (2014) and Liu et al. (2015), who also document no relationship between board size and ROA. Marinova et al. (2015) stated that board size has no impact on Tobin's Q. Besides studies on listed firms, Thiel et al. (2018) also found no impact on EBIT margin in German hospitals. The first hypothesis is that board size has a negative impact on financial performance. Guest (2009) argues that larger boards have more trouble carrying out the advisory role. Kuntz et al. (2016) support this finding in the hospital environment and add that a smaller board is in line with the principal-agent theory and that a smaller board is more effective. Based on Table 4, the first hypothesis can be rejected and no relationship between board size and financial performance can be observed.

Model 3 and 4 in Table 4 show the impact of board independence on financial performance. In both panels, no significant relationship can be obtained, meaning that the proportion of independent board directors has no influence on financial performance. Board independence is not related to ROA and Profit Margin. Although these findings contradict Liu et al. (2014) and Liu et al. (2015) focused on listed firms in China, it is in line with Abdullah (2004), Carter et al. (2010), Johl et al. (2015), and Marinova et al. (2015) who all focused on listed firms in Malaysia, the Netherlands, and the US. Besides listed firms, there is also evidence from Thiel et al. (2018) focusing on German hospitals, that board independence is not related to financial performance. Only panel A, model 10 shows a significant relationship at the 10% level. This indicates that if the number of independent directors increases by 1%, the ROA decreases by 9.3%, indicating that board independence has a negative impact on ROA. Hypothesis 2 expects to find a negative relationship between board independence and financial performance and cannot be supported by Table 4. A possible explanation is that independent directors in non-profit hospitals may be more interested in the hospital's quality rather than the hospital's financial performance.

Contrary to the third hypothesis, where gender diversity is expected to have a positive relationship with financial performance, no relationship can be observed from models 5 and 6. The coefficients represent an insignificant relationship in panels A and B. The same results were reported by Marinova et al. (2015) investigating the impact of female directors in Dutch and Danish firms in 2007. Their small number of observations and limited variables caused the results to be insignificant. This might also be the reason for this thesis to find insignificant results. For example, Adams and Ferreira (2008) included over 86,000 observations and found negative associations between female directors and firm performance for listed firms in the US. Liu et al. (2014) analyzed over 16,000 observations in China and reported significant positive effects. Thus, the third hypothesis can be rejected. The results are insignificant, implying no relationship between the number of women on the board and financial performance.

Again, based on Table 4, there is no evidence that having a director on the board with a medical background will improve the financial performance, as predicted in hypothesis 4. Models 7 and 8 in panels A and B show opposite insignificant effects between the variables. The insignificant relationship remains in models 9 and 10. Thereby implying that having a medical professional on the board does not improve nor worsen the financial performance of Dutch hospitals. Contradicting the research by Molinari et al. (1995) and Veronesi et al. (2013) who indicated that medical professionals

Table 4
Regression analysis between ROA and Profit Margin on board characteristics and control variables

Panel A: ROA										
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
INTERCEPT	9.641***	8.409***	11.342***	10.023***	8.998***	7.978***	8.998***	7.898***	12.050***	10.533***
	(3.422)	(5.085)	(3.399)	(5.016)	(3.425)	(5.159)	(3.360)	(5.035)	(3.311)	(4.918)
LN_NMEM	-.059	-.046							-.076	-.063
	(-.545)	(-.673)							(-.686)	(-.904)
INDEP			-.094	-.087					-.102	-.093*
			(-1.091)	(-1.580)					(-1.163)	(-1.684)
WOMEN					-.053	-.061			-.054	-.063
					(-.597)	(-1.074)			(-.604)	(-1.112)
BACK							.016	.026	.020	.030
							(.182)	(.467)	(.227)	(.537)
LN_SIZE_BED	-.199*	-.188***	-.244***	-.224***	-.220**	-.201***	-.232***	-.215***	-.186*	-.172**
	(-1.839)	(-2.737)	(-2.774)	(-4.076)	(-2.437)	(-3.577)	(-2.649)	(-3.917)	(-1.678)	(-2.460)
MULTIL	-.015	-.024	-.016	-.025	-.006	-.014	-.007	-.015	-.017	-.022
	(-.174)	(-.426)	(-.180)	(-.456)	(-.068)	(-.257)	(-.084)	(-.269)	(-.187)	(-.401)
MEET	-.099		-.101		-.089		-.092		-.101	
	(-1.121)		(-1.151)		(-1.015)		(-1.041)		(-1.130)	
Adjusted R^2	.028	.040	.035	.046	.029	.042	.026	.039	.019	.044
F-statistic	1.966	5.419***	2.202*	6.133***	1.981	5.663***	1.896	5.336***	1.363	3.436***
Observations	133	322	133	322	133	322	133	322	133	322

Panel B: PROFM										
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
INTERCEPT	6.299***	5.183***	6.832***	5.707***	5.445***	4.511***	5.671***	4.652***	8.205***	6.722***
	(3.103)	(4.337)	(2.827)	(3.934)	(2.861)	(4.017)	(2.934)	(4.092)	(3.123)	(4.330)
LN_NMEM	-.127	-.111							-.134	-.116
	(-1.158)	(-1.587)							(-1.193)	(-1.638)
INDEP			-.082	-.073					-.098	-.086
			(-.925)	(-1.293)					(-1.094)	(-1.512)
WOMEN					.002	-.008			.005	-.007
					(.018)	(-.139)			(.052)	(-.127)
BACK							-0.055	-.042	-.045	-.031
							(-.620)	(-.745)	(-.498)	(-.549)
LN_SIZE_BED	-.013	.001	-.096	-.072	-.087	-.063	-.089	-.066	-.022	-.002
	(-.114)	(.021)	(-1.071)	(-1.285)	(-.946)	(-1.097)	(-.994)	(-1.173)	(-.197)	(-.032)
MULTIL	-.052	-.062	-.045	-.056	-.040	-.050	-.047	-.057	-.065	-.073
	(-.586)	(-1.111)	(-.510)	(-1.004)	(-.451)	(-.899)	(-.534)	(-1.015)	(-.724)	(-1.281)
MEET	-.126		-.121		-.115		-.121		-.139	
	(-1.409)		(-1.356)		(-1.283)		(-1.348)		(-1.529)	
Adjusted R^2	.000	.006	-.004	.003	-.011	-.002	-.008	.000	-.013	.004
F-statistic	.994	1.626	.870	1.341	.652	.786	.750	.966	.762	1.235
Observations	133	322	133	322	133	322	133	322	133	322

Notes: This table represents the OLS regression analysis with ROA (panel A) and Profit Margin (panel B) as its dependent variables. This table reports the standardized coefficients and the t-value is in parentheses. *, Correlation is significant at 10% level. **, correlation is significant at 5% level. ***, correlation is significant at 10% level.

Improved the financial performance by influencing the service and length of stay of the patients and understanding other medical professionals' challenges. Kuntz et al. (2016) reported some evidence that physicians and nurses had an impact on financial performance measured by ROA. Their overall results, however, indicate no relationship between the variables. A possible explanation for the insignificant results can be due to the limited sample size.

As for the control variables, only variable SIZE_BED is negatively correlated to ROA at the 1% level, meaning that a high number of beds leads to lower financial performance. Contrary, other studies focusing on hospitals, like Kuntz et al. (2016) found a positive correlation between financial performance measures Net Income and EBIT. They found no relationship for performance measures ROA, Total Margin, and EBIT margin. Another study on German hospitals by Thiel et al. (2018) also found no relationship between the number of beds and financial performance. Although the results are not in line with studies focusing on hospitals, there is evidence that firm size has a negative impact on financial performance for listed firms. To illustrate, Liu et al. (2014) found a negative effect between leverage and ROA and ROS. Leverage was calculated as debt divided by total assets. Liu et al. (2015) also found a negative association between leverage and ROA and ROE. Liu et al. (2014), firm size as measured by the number of employees is significantly positive, suggesting that the number of employees increased the financial performance for hospitals. The findings are more significant for ROA than Profit Margin. Other control variables show no significant results, indicating that they have no impact on financial performance.

In short, according to Table 4, no significant relationships between the board characteristics and financial performance measured by ROA and Profit Margin can be observed for Dutch hospitals. Only hospital size measured by the number of hospital beds is found to affect the financial performance negatively. The adjusted R^2 and the F-statistic when the number of meetings variable is included indicate that the models are poorer than models excluding the number of meetings. So, the control variable MEET will be excluded in further analysis in order to increase the sample size, and thus improve the models.

5.3.2 REGRESSION ON MANAGEMENT BOARD AND SUPERVISORY BOARD

Table 5 represents the effect of board characteristics of the management board and supervisory board on ROA and Profit Margin. Panel A presents the management board characteristics on ROA and Profit Margin and no significant relationships can be observed. This implies that the board characteristics on the management board are not related to the financial performance. Only hospital size has a consistent significant negative relationship with ROA and this relationship remain on the supervisory board. Panel B indicates that the medical background of the supervisory board has a significant negative impact on Profit Margin. In other words, the more members with a medical background on the supervisory board, the lower the Profit Margin. The results remain significant and negative in model 4, where all characteristics are included. The adjusted R^2 and F-statistics are higher in panel B than panel A. These findings suggest that the supervisory board influences the financial performance more than the management board, since the characteristics of the supervisory board have higher explanatory power than characteristics on the management board.

Table 5
Regression analysis between ROA and Profit Margin on the characteristics of the management board and the supervisory board, including the control variables

PANEL A: MANAGEMENT BOARD

	ROA				PROFM			
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
INTERCEPT	8.119***	8.067***	7.781***	8.009***	4.486***	4.541***	4.603***	4.645***
	(5.149)	(5.218)	(4.850)	(4.906)	(3.924)	(4.047)	(3.956)	(3.919)
LN_NMEM_MB	.020			.025	-.008			-.007
	(.343)			(.423)	(-.133)			(-.116)
WOMEN_MB		-.065		-.063		-.048		-.051
		(-1.175)		(-1.123)		(-.843)		(-.882)
BACK_MB			.032	.024			-.017	-.024
			(.560)	(.429)			(-.289)	(-.410)
LN_SIZE_BED	-.223***	-.212***	-.210***	-.218***	-.062	-.063	-.068	-.064
	(-3.743)	(-3.872)	(-3.758)	(-3.612)	(-1.014)	(-1.120)	(-1.193)	(-1.040)
MULTIL	-.019	-.008	-.014	-.005	-.051	-.043	-.053	-.046
	(-.340)	(-.152)	(-.259)	(-.089)	(-.914)	(-.767)	(-.945)	(-.811)
Adjusted R^2	.039	.042	.039	.037	-.002	.000	-.002	-.006
F-statistic	5.301***	5.743***	5,370***	3.497***	.786	1.019	.808	.643
Observations	322	322	322	322	322	322	322	322

PANEL B: SUPERVISORY BOARD

	ROA				PROFM			
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
INTERCEPT	8.004***	7.957***	7.916***	7.865***	4.497***	4.528***	4.387***	4.405***
	(5.173)	(5.139)	(5.126)	(5.080)	(4.019)	(4.029)	(3.950)	(3.959)
LN_NMEM_SB	-.046			-.033	-.093			-.074
	(-.748)			(-.521)	(-1.470)			(-1.162)
WOMEN_SB		-.050		-.041		.015		.031
		(-.876)		(-.731)		(.263)		(.538)
BACK_SB			-.086	-.079			-.153***	-.147**
			(-1.544)	(-1.398)			(-2.726)	(-2.588)
LN_SIZE_BED	-.194***	-.203***	-.201***	-.177***	-.022	-.069	-.040	-.015
	(-3.123)	(-3.575)	(-3.635)	(-2.787)	(-.342)	(-1.189)	(-.715)	(-.229)
MULTIL	-.025	-.020	-.029	-.033	-.064	-.051	-.069	-.078
	(-.452)	(-.357)	(-.525)	(-.595)	(-1.126)	(-.908)	(-1.240)	(-1.382)
Adjusted R^2	.040	.041	.045	.042	.005	-.002	.021	.020
F-statistic	5.456***	5.529***	6.095***	3.812***	1.506	.803	3.276**	2.281**
Observations	322	322	322	322	322	322	322	322

Notes: This table represents the OLS regression analysis with ROA (panel A) and Profit Margin (panel B) as its dependent variables. This table reports the standardized coefficients and the t-value is in parentheses. *, Correlation is significant at 10% level. **, correlation is significant at 5% level. ***, correlation is significant at 10% level.

5.3.3 ADDITIONAL ANALYSES

After the main regression has been performed, additional analyses are executed in Appendix C. These additional analyses (partially) explain the insignificant results in the main regression. One of the possible explanations for the insignificant results could be outliers. Outliers are not taken care of in the main regression. The first additional analysis shows the descriptive statistics after outliers are winsorized. The second additional analysis shows an OLS regression between board characteristics and financial performance after outliers are reduced. The last additional analysis consists of a frequency table of hospitals with no women and/or medical backgrounds on the board.

Descriptive statistics after outliers are winsorized

The outliers in the performance measures are winsorized at the top and bottom 1% as demonstrated by Guest (2009). This is done by manually replacing the minimum outliers to a value that lies close to the normally distributed bottom 1% of the sample and replacing the maximum outlier to a value that lies close to the upper 99% of the data. A descriptive statistic is then given for ROA and Profit Margin. ROA has a new minimum of -3.5% respectively to -17.58% and a maximum of 8% to 23.6%. The minimum Profit Margin is -1.98% to 4.25% before winsorizing and the maximum is 7.82% as it was 16.07%.

OLS regression after outliers are winsorized

After the outliers are winsorized, a regression analysis is performed (Appendix C) similar to Table 4, where the number of meetings is included in the uneven-numbered models and excluded in the even-numbered models. The results indicate that, even when there are no outliers, the results are not significant and thus do not support the hypotheses. Remarkable, the adjusted R^2 and F-statistic became even worse. After the effect of outliers are reduced, the results do not change compared to Table 4. So, in further analysis outliers are not winsorized, since insignificant results in the main regression are not caused by outliers in the dataset.

Frequency table of women and medical background

As mentioned in section 5.1 descriptive statistics, there are hospitals included in the dataset that have no women and/or no member with a medical background on the board. Table 6 shows that there are 14 hospital observations that include no women on the board, which is 4.3% of the total observations. Almost half (42.9%) of the management board do not have women on the board, whereas only 5.9% of the supervisory board have no women. Moreover, 22.7% of the hospital observations do not have a member with a medical background on the board. Remarkable, 57.5% of the members on the management board do not have one member with a medical background. This frequency table indicates that the insignificant results in gender diversity and medical background can be caused by the large number of hospitals with no women and/or members with a medical background on the board.

Table 6
Frequency table of no women and no medical professional on the board

Variable	Frequency	Percent
WOMEN	14	4.3%
WOMEN_MB	138	42.9%
WOMEN_SB	19	5.9%
BACK	73	22.7%
BACK_MB	185	57.5%
BACK_SB	125	38.8%

5.4 ROBUSTNESS TESTS

Five robustness tests are performed to test the sensitivity of the analysis as mentioned in section 3.9. The first robustness test is performed using a five-year average of ROA and Profit Margin. The second test is to replace the performance measures ROA and Profit Margin with ROS and ROE. The third robustness test is to control for endogeneity by lagging all independent and control variables by one year. Then, all observation years will be tested separately to see their individual effect in the fourth robustness test. The fifth robustness test is similar to the third, where the analysis is performed per year, but now by lagging the independent and control variables by one year.

5.4.1 AVERAGE ROA AND PROFIT MARGIN

The results of the first robustness test using a five-year average ROA and Profit Margin on board characteristics are displayed in Appendix D. Board independence has a weak significant negative relationship with ROA. The relationship remains stable and became more significant in the full model. This indicates that having more independent members on the board will lead to a lower ROA. The same results can be observed in panel B, where board independence has a negative impact on financial performance measured by Profit Margin. These findings support hypothesis 2, stating that a high proportion of independent directors will lower the financial performance. Results in panel B also confirm hypothesis 1, where board size is expected to influence financial performance negatively. A highly significant negative relationship can be observed. Contradicting hypothesis 4, in panel B, a weak significant negative relationship between medical background and financial performance can be observed. The significant results do not remain in the full model, thus the effect of the medical background of directors disappeared when other characteristics are included. By using the average ROA and Profit Margin, the impact of outliers is reduced. The adjusted R^2 and F-statistics are better than in Table 4, implying that the effect of outliers in the main regression could have caused some trouble. Overall, the results contradict Table 4 and the results do not remain robust in all models. The results are more in line with hypotheses 1 and 2.

5.4.2 REPLACING ROA AND PROFIT MARGIN BY ROS AND ROE

Results of the second robustness test can be found in Appendix E. Panel A shows the effect between board characteristics and ROE, and panel B shows the effect between board characteristics and ROS. In all models where the board characteristics are tested separately, no significance between the board characteristics and financial performance can be found. Only in the full model, where ROE is the dependent variable, board size does show a weak negative significance. This finding is in line with hypothesis 1 stating that board size has a negative impact on financial performance. Moreover, hypothesis 2 can also be confirmed as board independence is found to have a negative relationship with ROE in the full model. However, the results are not consistent through the analysis and the hypotheses cannot be confirmed by these findings. Hospital size as measured by the number of beds indicates a significant negative relationship with both performance measures and thus remains in line with Table 4. So, the results remain robust after using additional performance measures and contradict all hypotheses.

5.4.3 LAGGED VARIABLES

The results of lagged variables and their effect on ROA and Profit Margin can be found in Appendix F. Board size has a significant negative relationship with Profit Margin and is in line with hypothesis 1. Hence, the results indicate that board independence has a significant negative impact on ROA and Profit margin, and thus confirming hypothesis 2. On the contrary of hypothesis 4, a negative correlation is found between board members with a medical background and Profit Margin. However, the relationship disappear when all board characteristics are added to the analysis. Results of the control variables remain the same as Table 4 and the first few robustness tests. The adjusted R^2 and the F-statistics are higher and more significant than in Table 4, indicating that the independent variables in this robustness test are better predictors for ROA and Profit Margin even when the sample is reduced to 253 observations. In conclusion, The third robustness test shows contradicting results to the previous analysis but does confirm hypotheses 1 and 2, implying that board size and board independence influence financial performance negatively. The results do not remain robust to Table 4, indicating that there might be endogeneity problems between board characteristics and financial performance.

5.4.4 SEPARATING OBSERVATION YEARS

The results for the effect between board characteristics and ROA and Profit Margin separated in years can be found in Appendix G. Panel A represents 2015, panel B 2016, and so on. In 2016, board size is negatively correlated to ROA and Profit Margin, indicating that a larger board has a negative impact on the financial performance of hospitals. This finding is in line with hypothesis 1. In all other included years, the results are insignificant. Hence, only in 2017, board independence has a significant negative impact on ROA and Profit Margin, as expected in hypothesis 2. Results in 2019 show little significance that gender diversity has a negative impact on ROA and contradicts hypothesis 3. The results for SIZE_BED remain the same in most years, suggesting that larger hospital (measured by the number of beds) has a negative impact on financial performance. Board characteristics in 2016 and 2017 seem to have the largest impact on financial performance. The adjusted R^2 and F-statistic in these years are better than the in the initial analysis Table 4. Overall, the results were not consistent and so do not support the hypotheses. The results remain robust to the main analysis.

5.4.5 LAGGED VARIABLES AND SEPARATING OBSERVATION YEARS

Results for the fifth robustness test where all years are tested separately and the independent and control variables are lagged by one year are displayed in Appendix H. Here too, the board size has a negative impact on ROA and Profit Margin in 2016 and confirms hypothesis 1. Remarkable is that the medical background of the board members have a positive impact on ROA in 2017. This effect remains significant and positive in the full model, where all board characteristics are added to the analysis. This finding is in line with hypothesis 4, stating that members with a medical background have a positive impact on financial performance. However, the results are not significant for Profit Margin and other included years. Also in 2017, board independence is found to have a negative impact on ROA and Profit Margin, indicating that high board independence leads to poorer financial performance. In 2018, medical background has a negative relationship with Profit Margin, contradicting hypothesis 4. Moreover, results in 2019 provide evidence that a high number of women on the board will lead to a lower ROA. Only the above-mentioned correlations show evidence that board characteristics have an impact on financial performance, other years present no significant results. Hospital size is found to be significant and negative in most of the models. In line with results in the fourth robustness test, in 2016 and 2017 board characteristics have a significant impact on financial performance. The adjusted R^2 and F-statistic are better in the fifth robustness test than Table 4, indicating that board characteristics in the fifth robustness test explain the financial performance better than Table 4. Although the analysis shows unexpected results, results are not consistent and show overall no significant relationship between board characteristics and financial performance and thus are in line with the main analysis.

In summary, the results remain robust when ROA and Profit Margin are replaced by ROE and ROS and when the analysis is performed by separating the observation years and lagging these years. However, the results do not remain robust when the average ROA and Profit Margin was used, indicating that there might be outliers impacting the results. Hence, the results are also not robust to the main regression when the variables are lagged by one year, results imply possible endogeneity problems. These results do confirm hypotheses 1 and 2.

6. CONCLUSION

This chapter draws the conclusion from the main analysis including the robustness tests and the research question will be answered. Further, a discussion will be given along with limitations and recommendations for future research.

6.1 MAIN FINDINGS AND DISCUSSION

This thesis examines the effect of board size, board independence, board gender diversity, and members with a medical background on financial performance in Dutch general hospitals. Dutch general hospitals are selected for the analysis because no prior research has been done examining these board characteristics. One of the contributions of this study is that it gives a first analysis between the board characteristics and financial performance in Dutch hospitals. The Netherlands has a unique healthcare where all hospitals are non-profit organizations. Moreover, the Netherlands has a two-tier board system where there is a management board that operates in the firm, and a supervisory board that monitors the management board. So, for this analysis, all Dutch general hospital organizations from 2015-2019 are included to answer the following research question: "Do board characteristics influence the financial performance in Dutch hospitals?". The final sample size consists of 70 hospital organizations from 2015 to 2019, which makes in total 322-hospital year observations.

In order to answer the research question, four hypotheses have been developed and are tested using the OLS regression method. The first hypothesis state that board size has a negative impact on financial performance. It is expected that smaller boards communicate easier, make decisions faster, and are less complex than larger boards. According to the main analysis, the hypothesis is rejected. There is no evidence that board size has a positive or negative influence on financial performance. On the other hand, there is evidence that a negative relationship exists when the independent and control variables are lagged by one year in the robustness tests and when the average Profit Margin is taken. It appears that the robustness tests show the impact of board size better than the main regression since the adjusted R^2 and F-statistics are higher and more significant. So, based on the main regression, the first hypothesis is rejected, stating that larger boards do not impact financial performance. Hence, based on evidence from the first and third robustness tests, it can be concluded that larger boards lead to lower financial performance.

The second hypothesis is that board independence has a negative impact on financial performance. Independent directors are expected to have less inside knowledge of the firm and cannot advise the management as well as inside directors. The main analysis shows no significant relationships between board independence and financial performance. There is evidence that supports hypothesis 2 in the robustness test when the average performance measures are used and when variables are lagged. These robustness tests show significant negative results between high proportion of independent directors and financial performance. The second hypothesis cannot be proved by the main regression but can be confirmed through the robustness tests. So, based on the main regression, larger independent boards do not impact financial performance. Based on the robustness tests, board independence has a negative impact on financial performance in Dutch hospitals.

In the last few decades, the number of women on the board increased. Firms find it more important to include diversity since women bring other perspectives to the firm. Women are on average more risk-averse and focus more on the long term. Thereby, the third hypothesis was to find a positive relationship between gender diversity and financial performance. The results of the main analysis and the robustness tests provide no evidence to support this hypothesis. Little evidence is found in the robustness test but is not consistent through the tests. Therefore, the third hypothesis is rejected. This suggests that having more women on the board does not influence the financial performance of Dutch hospitals.

The final hypothesis expects to find a positive correlation between medical background and financial performance. This hypothesis is derived from the board characteristics, diversity, where one aspect is the educational level of the board member. Given the fact that this thesis focuses on hospitals, and sometimes medical professionals are also board members, it can influence the financial performance. The medical professionals have the advantage that they understand the clinicians' challenges and look at things differently than, for example, a member with a business background. The results in the main analysis concluded otherwise. No evidence was found to support the hypothesis. Although limited evidence is found supporting the hypothesis in the robustness tests, there is also evidence found contradicting the hypothesis. Overall, there is not enough evidence to support hypothesis 4. So, having a member on the board with a medical background does not affect the financial performance and hypothesis 4 is rejected.

In summary, this thesis analyzes the effect of board size, board independence, gender diversity, and board medical background on financial performance in Dutch hospitals. In order to answer the research question “Do board characteristics influence the financial performance in Dutch hospitals?”, OLS regressions are performed. It appears that board characteristics do not influence the financial performance measured by ROA, Profit Margin, ROS, and ROE. However, there is evidence found that board size and board independence do affect financial performance in the robustness and thus confirming hypotheses 1 and 2. These findings indicate possible endogeneity problems and outliers in the main regression. This will be further explained in the limitation section. Overall, it can be concluded that board characteristics in Dutch hospitals do not increase or decrease the financial performance in Dutch general hospitals from 2015 to 2019.

6.2 LIMITATIONS AND FUTURE RESEARCH

Although this thesis contributes to the existing literature on board characteristics and financial performance, it has several limitations and recommendations for the future. The first limitation is the large number of insignificant results in the analysis. The data available is limited, which in turn caused a low adjusted R^2 and F-statistics, indicating that the included independent variables are weak predictors for financial performance. The adjusted R^2 and F-statistics can be increased by adding other board characteristics. As mentioned in the theory section, there are other board characteristics that can impact the financial performance, including ethnicity, age, educational level, and remuneration. Due to the lack of data, many of these characteristics cannot be included in the analysis. For example, the limited data on the number of board meetings causes the initial data to decrease. The number of board meetings can have a larger impact if more data are available. Furthermore, other control variables can also be considered, for example, hospital age and hospital growth. These variables are not included in the analysis since this thesis focuses on hospital organizations. Hospital organizations consist of different hospitals with different ages and growth rates, which make these variables hard to include. Besides, the frequency table shows that many hospitals have no women and/or members with a medical background on the board. These hospitals with no women/medical professional causes the results to be insignificant. Since the data was already limited and excluding hospitals will reduce the sample, these variables with no value are still included in the analysis. Even though all general Dutch hospital organizations from 2015 to 2019 are included, this was still a small sample size, since the Netherlands is a small country. By expanding the research to other countries that also adopt the two-tier system like Germany, Austria, and Denmark, the sample can be increased. So, future research can consider other board characteristics and control variables, and consider other countries.

The second limitation is the selected research method. OLS regression is performed to analyze the hypotheses. As mentioned before, a disadvantage of OLS regression is that it does not control for endogeneity and outliers. When lagged variables are introduced in the robustness test, the results do not remain consistent with the main analysis, indicating that there is an endogeneity problem. To illustrate, board independence suddenly has a significant negative impact on financial performance. It is not clear if a high proportion of independent directors leads to lower financial performance, or if a higher financial performance leads to fewer independent directors. This might also explain the low adjusted R2 and F-statistic, and the many insignificant results. So, for future research, it might be interesting to include an additional analysis like 2SLS to control for endogeneity.

Another limitation is the possible outliers in the main regression. After conducting the additional analysis where the top and bottom 1% were winsorized, it appears that the impact of outliers was not that large, and thus the analysis continued using the outliers. However, the average ROA and Profit Margin robustness test show that there might be extreme values impacting the results. So, future research can consider methods other than winsorizing to control for outliers or expand the winsorizing to the bottom 5% and top 95% instead of the initial 1%-99%.

The last limitation is that all female directors on the management board included in the analysis are equal. They are all categorized as women based on their sex, neglecting their education level, age, and experience. To illustrate, female directors who are also CEO and female directors who are not, are both included as female directors, even though female CEO directors have a larger influence on the firm than female directors that are not. In this research, it is not clear how many female management board directors are also CEO of the hospital. This limitation is also a suggestion for future research: include other female board characteristics that can influence the relationship between gender diversity and financial performance, like education level, age, and experience.

Another future research includes the observation years 2016 and 2017. In robustness tests where the observations years are separated (and lagged), it became clear that the robustness tests in 2016 and 2017 are better analyses than the main regression, based on the significant results between board characteristics and financial performance, higher adjusted R^2, and more significant F-statistic. It is, however, not clear why these years are more significant than other years. So, for the last future research suggesting, 2016 and 2017 can be observed in more detail and changes in board characteristics and financial performance should be highlighted.

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APPENDICES:

APPENDIX A: OVERVIEW OF METHODS AND PERFORMANCE MEASURES IN LITERATURE

Method	**Performance measure**	**Used by**
Ordinary Least Square regression	Tobin's Q	Guest (2009)
Two-stage least-square	Tobin's Q	Marinova, Plantenga and Remery (2015)
Regression	ROA	Eisenberg, Sundgren and Wells (1998)
Ordinary Least Square regression	Tobin's Q	Ahern and Dittmar (2012)
Random effects; generalized least square	ROA; ROS	Gaur, Bathula and Singh (2015)
Ordinary Least Square regression; pooled fixed effect	ROS; ROA	Liu, Wei and Xie (2014)
Fixed effect; Three-stage least-square	ROA; Tobin's Q	Carter, Souza, Simkins and Simpson (2010)
ANOVA	ROA; EBIT; Profit margin	Kunz, Pulm and Wittland (2016)
Hausman test; fixed and random effect	Tobin's Q	Campbell and Miguez-Vera (2007)
ANOVA	Operating margin	Thiel, Winter and Büchner, (2018)
Ordinary Least Square regression	Tobin's Q	Andres and Vallelado (2008)
Regression, Hierarchical regression	ROA; ROI	Erhardt, Werbel and Shrader (2003)
Linear regression	Tobin's Q; ROA; ROE	Kumar and Singh (2013)
Ordinary Least Square regression	Tobin's Q; ROA	Adams and Ferreira (2009)
Regression	Tobin's Q; ROA	Kiel and Nicholson (2003)
Ordinary Least Square regression	ROA	Johl, Kaur and Cooper (2015)
Ordinary Least Square regression; Two-stage least-square	ROA	Vafeas (1999)

APPENDIX B: OVERVIEW INCLUDED HOSPITALS

Hospital name	Included years	Reason
Admiraal de Ruyter Ziekenhuis (Stichting)	5	
Albert Schweitzer Ziekenhuis (Stichting)	5	
Algemeen Christelijk Ziekenhuis Groningen	5	
Algemeen Ziekenhuis Westfries Gasthuis (Stichting)	2	Fused
Alrijne Zorggroep (Stichting)	4	Missing data
Amphia (Stichting)	5	
Antonius Ziekenhuis (Stichting)	2	Fusion
Antonius Zorggroep (Stichting)	5	
Bernhoven (B.V)	5	
Bovenij Ziekenhuis (Stichting)	5	
Bravis Ziekenhuis (Stichting)	5	
Catharina Ziekenhuis (Stichting)	5	
Christelijk Algemeen Ziekenhuis Noordwest-Veluwe (Stichting)	5	
CuraMare (Stichting)	5	
Deventer Ziekenhuis (Stichting)	5	
Diakonessenhuis (Stichting)	5	
Elisabeth-TweeSteden Ziekenhuis (Stichting)	5	
Elkerliek Ziekenhuis (Stichting)	5	
Flevoziekenhuis (Stichting)	5	
Gelre Ziekenhuizen (Stichting)	5	
Groene Hart Ziekenhuis (Stichting)	5	
Haaglanden Medisch Centrum / HMC (Stichting)	5	
HagaZiekenhuis (Stichting)	5	
Havenziekenhuis en Instituut voor Tropische Ziekten B.V.	2	Bankrupt
IJsselland Ziekenhuis (Stichting)	5	
Interconfessionele Stichting Gezondheidszorg Rivierenland	5	
Isala Klinieken (Stichting)	5	
Jeroen Bosch Ziekenhuis (Stichting)	5	
Laurentius Ziekenhuis Roermond (Stichting)	5	
Maasstad Ziekenhuis (Stichting)	5	
Máxima Medisch Centrum (Stichting)	5	
MC IJsselmeerziekenhuizen (B.V)	2	Bankrupt
Meander Medisch Centrum (Stichting)	5	
Medisch Spectrum Twente (Stichting)	5	
Nijmeegs Interconfessioneel ziekenhuis (Stichting)	5	
Noordwest Ziekenhuisgroep (Stichting)	5	
OLVG (Stichting)	5	
Ommelander Ziekenhuis Groningen	5	
Pantein (Stichting)	5	
Protestants Christelijk Ziekenhuis Ikazia (Stichting)	5	
Reinier de Graaf Groep (Stichting)	5	
Rijnstate (Stichting)	5	
Rivas Zorggroep (Stichting)	5	
Rode Kruis Ziekenhuis B.V.	5	
Saxenburgh Groep (Stichting)	5	
Sint Antonius Ziekenhuis (Stichting)	5	

Sint Franciscus Vlietland Groep (Stichting)	5	
Slingeland Ziekenhuis (Stichting)	5	
Slotervaartziekenhuis B.V.	2	Bankrupt
Spaarne Gasthuis (Stichting)	5	
Spijkenisse Medisch Centrum B.V.	5	
St. Anna Zorggroep (Stichting)	5	
Stichting Dijklander Ziekenhuis	2	Fusion
Stichting St. Jans Gasthuis	5	
Streekziekenhuis Koningin Beatrix (Stichting)	5	
t Lange Land Ziekenhuis (Stichting)	5	
Tergooi (Stichting)	5	
Treant Zorggroep (Stichting)	5	
Viecuri, Medisch Centrum voor Noord-Limburg (Stichting)	4	Missing data
Waterlandziekenhuis (Stichting)	2	Fused
Wilhelmina Ziekenhuis Assen (Stichting)	5	
Zaans Medisch Centrum (Stichting)	5	
Ziekenhuis Amstelland (Stichting)	4	Missing data
Ziekenhuis Gelderse Vallei (Stichting)	5	
Ziekenhuis Nij Smellinghe (Stichting)	5	
Ziekenhuisgroep Twente (Stichting)	5	
Zorgpartners Friesland (Stichting)	5	
Zorgsaam Zeeuws-Vlaanderen (Stichting)	3	
Zuwe Hofpoort Ziekenhuis (Stichting)	1	Fused
Zuyderland Medisch Centrum (Stichting)	5	

APPENDIX C: ADDITIONAL ANALYSIS

Descriptive statistics of ROA and Profit Margin after the outliers are winsorized

Variable	N	Mean	Median	St. Dev	Minimum	Q1	Q3	Maximum
ROA (%)	322	1.878	1.632	2.009	-3.500	.736	2.869	8.000
PROFM (%)	322	3.051	2.914	1.669	-1.980	2.025	4.049	7.820

Regression analysis, after outliers in ROA and Profit margin are winsorized, between ROA and Profit Margin on board characteristics and control variables.

Panel A: ROA

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
INTERCEPT	4.997**	6.568***	4.046	6.441***	4.006*	6.289***	3.506	6.273***	5.039*	6.725***
	(2.092)	(5.366)	(1.533)	(4.338)	(1.876)	(5.490)	(1.628)	(5.401)	(1.737)	(4.218)
LN_NMEM	-.093	-.041							-.125	-.044
	(-.865)	(-.599)							(-1.119)	(-.632)
INDEP			.000	-.008					-.019	-.013
			(.002)	(-.139)					(-.211)	(-.224)
WOMEN					-.022	-.045			.009	-.045
					(-.247)	(-.799)			(.098)	(-.786)
BACK							.118	.011	.140	.017
							(1.326)	(.196)	(1.512)	(.297)
LN_SIZE_BED	-.044	-.185***	-.094	-.210***	-.089	-.199***	-.091	-.209***	-.025	-.174**
	(-.415)	(-2.695)	(-1.054)	(-3.811)	(-.962)	(-3.533)	(-1.024)	(-3.813)	(-.234)	(-2.471)
MULTIL	-.022	-.034	-.014	-.030	-.012	-.026	.004	-.028	-.005	-.029
	(-.246)	(-.610)	(-.155)	(-.547)	(-.141)	(-.473)	(.047)	(-.503)	(-.054)	(-.514)
MEET	-.049		-.040		-.039		-.028		-.039	
	(-.546)		(-.449)		(-.427)		(-.309)		(-.430)	
Adjusted R^2	-.016	.038	-.021	.037	-.021	.039	-.008	.037	-.021	.031
F-statistic	.495	5.198***	.306	5.080***	.322	5.296***	.750	5.086***	.608	2.705**
Observations	133	322	133	322	133	322	133	322	133	322

Panel B: PROFM

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
INTERCEPT	2.422	3.361***	1.461	3.162**	1.493	2.933***	1.398	3.115***	3.046	3.871***
	(1.212)	(3.239)	(.660)	2509	(.837)	(3.013)	(.769)	(3.165)	(1.254)	(2.867)
LN_NMEM	-.126	-.083							-.161	-.076
	(-1.191)	(-1.190)							(-1.454)	(-1.064)
INDEP			-.009	-.017					-.012	-.026
			(-.100)	(-.295)					(-.134)	(-.462)
WOMEN					.100	.018			.129	.020
					(1.109)	(.304)			(1.388)	(.342)
BACK							-.018	-.067	.017	-.059
							(-.198)	(-1.188)	(.188)	(-1.027)
LN_SIZE_BED	.187*	.064	.118	.012	.093	.010	.118	.013	.174	.052
	(1.772)	(.913)	(1.328)	(.217)	(1.025)	(.171)	(1.326)	(.229)	(1.625)	(.719)
MULTIL	-.078	-.065	-.068	-.057	-.073	-.057	-.070	-.066	-.086	-.076
	(-.893)	(-1.145)	(-.771)	(-1.018)	(-.831)	(-1.020)	(-.788)	(-1.169)	(-.967)	(-1.325)
MEET	-.076		-.064		-.072		-.065		-.089	
	(-.847)		(-.718)		(-.809)		(-.730)		(-.980)	
Adjusted R^2	.006	-.002	-.005	-.006	.005	-.006	-.004	-.002	-.002	-.007
F-statistic	1.210	.817	.848	.372	1.162	.374	.856	.816	.964	.632
Observations	133	322	133	322	133	322	133	322	133	322

This table represents the OLS regression analysis with ROA (panel A) and average Profit Margin (panel B) as its dependent variables. This table reports the standardized coefficients and the t-value is in parentheses. *, Correlation is significant at 10% level. **, correlation is significant at 5% level. ***, correlation is significant at 10% level.

APPENDIX D: ROBUSTNESS TEST – AVERAGE ROA AND PROFIT MARGIN

Regression analysis between a five-year average ROA and Profit Margin on board characteristics and control variables.

Panel A: ROA

Variable	(1)	(2)	(3)	(4)	(5)
INTERCEPT	8.497***	9.557***	7.971***	7.987***	10.253***
	(7.988)	(7.433)	(8.003)	(7.897)	(7.462)
LN_NMEM	-.088				-.104
	(-1.324)				(-1.542)
INDEP		-.101*			-.113**
		(-1.904)			(-2.109)
WOMEN			-.069		-.071
			(-1.269)		(-1.301)
BACK				.004	.013
				(.079)	(.239)
LN_SIZE_BED	-.275***	-.337***	-.312***	-.327***	-.260***
	(-4.150)	(-6.357)	(-5.720)	(-6.162)	(-3.864)
MULTIL	.007	.009	.021	.017	.005
	(.131)	(.167)	(.402)	(.309)	(.089)
Adjusted R^2	.103	.109	.103	.098	.112
F-statistic	13.323***	14.023***	13.271***	12.672***	7.736***
Observations	322	322	322	322	322

Panel B: PROFM

Variable	(1)	(2)	(3)	(4)	(5)
INTERCEPT	5.093***	5.383***	4.286***	4.509***	6.642***
	(6.784)	(5.862)	(6.011)	(6.279)	(6.869)
LN_NMEM	-.211***				-.213***
	(-3.064)				(-3.052)
INDEP		-.106*			-.130**
		(-1.886)			(-2.340)
WOMEN			.011		.014
			(.195)		(.249)
BACK				-.109*	-.089
				(-1.948)	(-1.586)
LN_SIZE_BED	.037	-.100*	-.093	-.092	.020
	(.533)	(-1.796)	(-1.610)	(-1.649)	(.291)
MULTIL	-.042	-.028	-.021	-.037	-.066
	(-.758)	(-.500)	(-.380)	(-.657)	(-1.177)
Adjusted R^2	.028	.010	.000	.011	.043
F-statistic	4.096***	2.135*	.952	2.216*	3.385***
Observations	322	322	322	322	322

This table represents the OLS regression analysis with average ROA (panel A) and average Profit Margin (panel B) as its dependent variables. This table reports the standardized coefficients and the t-value is in parentheses. *, Correlation is significant at 10% level. **, correlation is significant at 5% level. ***, correlation is significant at 10% level.

APPENDIX E: ROBUSTNESS TEST – ROE AND ROS

Regression analysis between ROE and ROS on board characteristics and control variables.

Panel A: ROE

Variable	(1)	(2)	(3)	(4)	(5)
INTERCEPT	28.645***	31.727***	25.886***	25.659***	35.224***
	(5.805)	(5.303)	(5.584)	(5.464)	(5.504)
LN_NMEM	-.106				-.125*
	(-1.563)				(-1.809)
INDEP		-.083			-.094*
		(-1.525)			(-1.712)
WOMEN			-.020		-.021
			(-.365)		(-.375)
BACK				.019	.031
				(.352)	(.557)
LN_SIZE_BED	-.163**	-.235***	-.222***	-.227***	-.156**
	(-2.406)	(-4.310)	(-3.969)	(-4.159)	(-2.252)
MULTIL	-.09	-.085	-.078	-.076	-.092*
	(-1.648)	(-1.565)	(-1.422)	(-1.386)	(-1.664)
Adjusted R^2	.059	.058	.052	.052	.060
F-statistic	7.673***	7.631***	6.853***	6.850***	4.410***
Observations	322	322	322	322	322

Panel B: ROS

Variable	(1)	(2)	(3)	(4)	(5)
INTERCEPT	6.267***	7.081***	5.741***	5.751***	7.802***
	(5.204)	(4.855)	(5.082)	(5.025)	(4.989)
LN_NMEM	-.083				-.097
	(-1.215)				(-1.385)
INDEP		-.079			-.089
		(-1.434)			(-1.591)
WOMEN			-.022		-.023
			(-.397)		(-.408)
BACK				.000	.008
				(.002)	(.149)
LN_SIZE_BED	-.149**	-.207***	-.194***	-.199***	-.144**
	(-2.170)	(-3.751)	(-3.427)	(-3.615)	(-2.056)
MULTIL	-.047	-.044	-.037	-.039	-.052
	(-.855)	(-.807)	(-.671)	(-.697)	(-.923)
Adjusted R^2	.038	.039	.034	.033	.037
F-statistic	5.197***	5.381***	4.720***	4.666***	3.037***
Observations	322	322	322	322	322

This table represents the OLS regression analysis with ROE (panel A) and ROS (panel B) as its dependent variables. This table reports the standardized coefficients and the t-value is in parentheses. *, Correlation is significant at 10% level. **, correlation is significant at 5% level. ***, correlation is significant at 10% level.

APPENDIX F: ROBUSTNESS TEST – LAGGED VARIABLES

Regression analysis between ROA and Profit Margin on lagged board characteristics by one year and lagged control variables by one year.

Panel A: ROA

Variable	(1)	(2)	(3)	(4)	(5)
INTERCEPT	12.037***	15.000***	11.355***	11.228***	15.829***
	(6.586)	(6.857)	(6.732)	(6.541)	(6.777)
LN_NMEM	-.068				-.087
	(-.934)				(-1.175)
INDEP		-.152**			-.161***
		(-2.559)			(-2.718)
WOMEN			-.089		-.093
			(-1.454)		(-1.533)
BACK				.034	.040
				(.566)	(.665)
LN_SIZE_BED	-.302***	-.360***	-.323***	-.342***	-.290***
	(-4.136)	(-6.075)	(-5.326)	(-5.737)	(-3.957)
MULTIL	.043	.042	.058	.056	.047
	(.714)	(.712)	(.970)	(.934)	(.771)
Adjusted R^2	.111	.130	.115	.109	.135
F-statistic	11.445***	13.591***	11.915***	11.237***	7.531***
Observations	253	253	253	253	253

Panel B: PROFM

Variable	(1)	(2)	(3)	(4)	(5)
INTERCEPT	8.339***	9.691***	7.246***	7.652***	11.323***
	(6.210)	(5.973)	(5.793)	(6.062)	(6.601)
LN_NMEM	-.160**				-.151**
	(-2.109)				(-1.981)
INDEP		-.144**			-.161***
		(-2.320)			(-2.622)
WOMEN			-.064		-.066
			(-1.010)		(-1.056)
BACK				-.116*	-.100
				(-1.848)	(-1.606)
LN_SIZE_BED	-.114	-.223***	-.193***	-.208***	-.125
	(-1.503)	(-3.609)	(-3.043)	(-3.380)	(-1.648)
MULTIL	-.028	-.018	-.005	-.030	-.048
	(-.447)	(-.295)	(-.076)	(-.485)	(-.770)
Adjusted R^2	.048	.052	.035	.045	.075
F-statistic	5.272***	5.597***	4.078***	4.912***	4.393***
Observations	253	253	253	253	253

This table represents the OLS regression analysis with ROA (panel A) and Profit Margin (panel B) as its dependent variables. Independent and control variables are lagged by one year. This table reports the standardized coefficients and the t-value is in parentheses. *, Correlation is significant at 10% level. **, correlation is significant at 5% level. ***, correlation is significant at 10% level.

APPENDIX G: ROBUSTNESS TEST – REGRESSION PER YEAR

Regression analysis between ROA and Profit Margin on board characteristics and control variables per year.

Panel A: 2015										
	ROA					PROFM				
Variable	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
INTERCEPT	-3.967	-3.484	-2.438	-2.832	-4.053	-4.518	-4.755	-3.923	-4.013	-4.778
	(-1.229)	(-.930)	(-.827)	(-.962)	(-1.008)	(-1.576)	(-1.440)	(-1.536)	(-1.537)	(-1.356)
LN_NMEM	.151				.105	.045				.027
	(1.058)				(.695)	(.329)				(.191)
INDEP		.051			.019		.036			.040
		(.414)			(.148)		(.311)			(.340)
WOMEN			.082		.079			.190		.181
			(.655)		(.614)			(1.639)		(1.505)
BACK				.130	.111				-.050	-.049
				(1.069)	(.844)				(-.433)	(-.397)
LN_SIZE_BED	.094	.174	.155	.167	.096	.317**	.341***	.300**	.343***	.291**
	(.658)	(1.424)	(1.246)	(1.378)	(.660)	(2.340)	(2.957)	(2.591)	(2.970)	(2.116)
MULTIL	-.038	-.034	-.042	-.025	-.029	-.155	-.151	-.162	-.160	-.163
	(-.315)	(-.275)	(-.343)	(-.209)	(-.230)	(-1.339)	(-1.304)	(-1.434)	(-1.377)	(-1.398)
Adjusted R^2	.003	-.011	-.007	.004	-.027	.096	.096	.131	.098	.092
F-statistic	1.073	.746	.835	1.080	.701	3.422**	3.418**	4.416***	3.453**	2.154*
Observations	69	69	69	69	69	69	69	69	69	69

PANEL B: 2016										
	ROA					PROFM				
Variable	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
INTERCEPT	19.391***	16.871***	13.659***	13.471***	22.727***	12.434***	11.081***	8.582***	8.549***	15.603***
	(5.159)	(3.955)	(4.007)	(3.839)	(4.880)	(4.266)	(3.396)	(3.252)	(3.169)	(4.286)
LN_NMEM	-.399***				-.420***	-.381**				-.426**
	(-2.824)				(-2.822)	(-2.522)				(-2.655)
INDEP		-.129			-.177		-.148			-.188
		(-1.120)			(-1.603)		(-1.214)			(-1.585)
WOMEN			-.152		-.061			-.071		.017
			(-1.259)		(-.506)			(-.555)		(.128)
BACK				.083	.116				.032	.071
				(.703)	(1.029)				(.258)	(.584)
LN_SIZE_BED	-.176	-.416***	-.371***	-.408***	-.147	-.037	-.267**	-.244*	-.261**	-.017
	(-1.272)	(-3.602)	(-3.098)	(-3.509)	(-1.062)	(-.251)	(-2.194)	(-1.905)	(-2.119)	(-.116)
MULTIL	-.078	.003	.022	.022	-.057	-.024	.052	.063	.062	-.025
	(-.683)	(.022)	(.188)	(.185)	(-.487)	(-.196)	(.428)	(.511)	(.493)	(-.201)
Adjusted R^2	.230	.147	.151	.136	.240	.119	.050	.032	.028	.117
F-statistic	7.367***	4.668***	4.801***	4.363***	4.372***	3.879**	2.122	1.703	1.616	2.407**
Observations	65	65	65	65	65	65	65	65	65	65

PANEL C: 2017										
	ROA					PROFM				
Variable	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
INTERCEPT	13.926**	27.430***	14.125**	13.947**	28.649***	12.661***	20.546***	12.511***	12.732***	21.955***
	(2.428)	(3.666)	(2.624)	(2.537)	(3.469)	(4.047)	(5.099)	(4.250)	(4.249)	(4.921)
LN_NMEM	.024				-.047	-.025				-.103
	(.150)				(-.301)	(-.165)				(-.690)
INDEP		-.302**			-.327**		-.323***			-.341***
		(-2.431)			(-2.511)		(-2.754)			(-2.770)
WOMEN			-.079		-.126			.037		-.005
			(-.584)		(-.945)			(.289)		(-.042)
BACK				.033	.034				-.052	-.051
				(.254)	(.276)				(-.425)	(-.431)
LN_SIZE_BED	-.299*	-.365***	-.266**	-.284**	-.311*	-.343**	-.444***	-.367***	-.360***	-.386**
	(-1.877)	(-2.924)	(-2.045)	(-2.248)	(-1.979)	(-2.250)	(-3.772)	(-2.950)	(-2.983)	(-2.590)
MULTIL	-.043	-.053	-.022	-.037	-.012	-.156	-.166	-.166	-.166	-.175
	(-.343)	(-.437)	(-.164)	(-.285)	(-.090)	(-1.291)	(-1.462)	(-1.321)	(-1.352)	(-1.418)
Adjusted R^2	.039	.127	.044	.039	.097	.122	.223	.123	.124	.191
F-statistic	1.817	3.964**	1.933	1.833	2.093*	3.826**	6.841***	3.848**	3.887**	3.404***
Observations	62	62	62	62	62	62	62	62	62	62

Panel D: 2018										
	ROA					PROFM				
Variable	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
INTERCEPT	8.248***	7.788***	8.299***	8.655***	8.882***	4.041**	3.669	3.492*	3.840*	5.188*
	(3.679)	(2.714)	(3.860)	(3.976)	(2.928)	(2.073)	(1.451)	(1.826)	(1.997)	(1.941)
LN_NMEM	-.035				-.027	-.217				-.212
	(-.217)				(-.162)	(-1.277)				(-1.192)
INDEP		.022			.003		-.020			-.056
		(.181)			(.027)		(-.150)			(-.411)
WOMEN			-.151		-.160			-.075		-.102
			(-1.222)		(-1.267)			(-.567)		(-.758)
BACK				-.163	-.164				-.156	-.139
				(-1.336)	(-1.285)				(-1.200)	(-1.021)
LN_SIZE_BED	-.320*	-.339***	-.316**	-.349***	-.304*	.112	-.029	-.013	-.033	.113
	(-1.993)	(-2.731)	(-2.563)	(-2.883)	(-1.816)	(.667)	(-.219)	(-.098)	(-.255)	(.634)
MULTIL	.034	.044	.052	.017	.022	-.033	.014	.020	-.008	-.052
	(.267)	(.359)	(.427)	(.140)	(.167)	(-.248)	(.103)	(.157)	(-.064)	(-.380)
Adjusted R^2	.072	.072	.094	.099	.077	-.022	-.050	-.044	-.025	-.044
F-statistic	2.606*	2.600*	3.151**	3.261**	1.860	.561	.024	.124	.497	.560
Observations	63	63	63	63	63	63	63	63	63	63

Panel E: 2019										
	ROA					PROFM				
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
INTERCEPT	6.270***	5.454*	6.275***	6.541***	5.134*	2.079	1.379	1.968	2.088	1.376
	(2.722)	(1.982)	(2.912)	(2.923)	(1.750)	(1.109)	(.615)	(1.096)	(1.143)	(.562)
LN_NMEM	.023				.017	-.026				-.027
	(.141)				(.099)	(-.155)				(-.151)
INDEP		.070			.091		.061			.068
		(.553)			(.693)		(.469)			(.495)
WOMEN			-.249*		-.253*			-.136		-.144
			(-1.948)		(-1.891)			(-1.012)		(-1.025)
BACK				-.075	-.034				-.043	-.012
				(-.591)	(-.261)				(-.332)	(-.087)
LN_SIZE_BED	-.261	-.244*	-.174	-.247*	-.182	.069	.054	.091	.051	.113
	(-1.583)	(-1.923)	(-1.353)	(-1.951)	(-1.044)	(.405)	(.413)	(.674)	(.392)	(.617)
MULTIL	-.001	.006	.006	-.010	.018	.055	.066	.062	.054	.069
	(-.010)	(.049)	(.047)	(-.077)	(.136)	(.414)	(.500)	(.481)	(.409)	(.503)
Adjusted R^2	.014	.018	.073	.019	.034	-.043	-.040	-.026	-.042	-.074
F-statistic	1.284	1.386	2.624*	1.401	1.364	.141	.207	.477	.170	.286
Observations	63	63	63	63	63	63	63	63	63	63

This table represents the OLS regression analysis with ROA and Profit Margin as its dependent variables. Panel A represents 2015, panel B; 2016, panel C; 2017, panel D; 2018, and panel E; 2019. This table reports the standardized coefficients and the t-value is in parentheses. *, Correlation is significant at 10% level. **, correlation is significant at 5% level. ***, correlation is significant at 10% level.

APPENDIX H: ROBUSTNESS TEST – REGRESSION PER YEAR AND LAGGED

Regression analysis per year, between ROA and Profit Margin on lagged board characteristics and lagged control variables by one year

Panel A: 2016 LAGGED

	ROA					PROFM				
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
INTERCEPT	18.794***	17.623***	13.726***	13.992***	21.271***	13.323***	11.692***	9.198***	9.737***	14.457***
	(5.041)	(4.098)	(4.002)	(3.945)	(4.866)	(4.779)	(3.574)	(3.470)	(3.700)	(4.356)
LN_NMEM	-.369***				-.339**	-.418***				-.367***
	(-2.892)				(-2.602)	(-3.180)				(-2.685)
INDEP		-.172			-.138		-.154			-.085
		(-1.492)			(-1.215)		(-1.267)			(-.717)
WOMEN			-.219*		-.178			-.121		-.103
			(-1.886)		(-1.566)			(-.972)		(-.862)
BACK				-.048	.023				-.198	-.123
				(-.411)	(.198)				(-1.636)	(-.995)
LN_SIZE_BED	-.212	-.396***	-.356***	-.397***	-.192	-.049	-.259**	-.237*	-.255**	-.051
	(-1.660)	(-3.433)	(-3.055)	(-3.379)	(-1.503)	(-.372)	(-2.134)	(-1.908)	(-2.120)	(-.382)
MULTIL	-.008	-.009	.003	-.003	-.012	-.125	-.123	-.113	-.135	-.141
	(-.073)	(-.074)	(.027)	(-.029)	(-.107)	(-1.099)	(-1.014)	(-.929)	(-1.114)	(-1.225)
Adjusted R^2	.223	.148	.166	.119	.241	.174	.062	.052	.077	.167
F-statistic	7.139***	4.707***	5.234***	3.892**	4.383***	5.491***	2.402*	2.162	2.791**	3.145**
Observations	65	65	65	65	65	65	65	65	65	65

Panel B: 2017 LAGGED

	ROA					PROFM				
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
INTERCEPT	17.206***	27.094***	18.757***	16.884***	24.987***	13.866***	19.149***	13.528***	13.407***	20.034***
	(2.902)	(4.016)	(3.541)	(3.241)	(3.350)	(4.100)	(5.047)	(4.483)	(4.382)	(4.656)
LN_NMEM	.081				-.009	-.039				-.080
	(.529)				(-.056)	(-.252)				(-.501)
INDEP		-.226*			-.207*		-.265**			-.269**
		(-1.930)			(-1.757)		(-2.301)			(-2.253)
WOMEN			.044		.018			.031		.020
			(.354)		(.144)			(.251)		(.158)
BACK				.231*	.214*				.016	.007
				(1.924)	(1.741)				(.132)	(.057)
LN_SIZE_BED	-.445***	-.415***	-.408***	-.395***	-.411***	-.390**	-.435***	-.421***	-.413***	-.392**
	(-2.950)	(-3.564)	(-3.294)	(-3.398)	(-2.775)	(-2.584)	(-3.790)	(-3.408)	(-3.456)	(-2.618)
MULTIL	.121	.088	.103	.165	.140	.038	.022	.041	.048	.007
	(.989)	(.756)	(.854)	(1.373)	(1.131)	(.308)	(.188)	(.341)	(.391)	(.060)
Adjusted R^2	.129	.178	.127	.177	.180	.130	.202	.130	.130	.163
F-statistic	4.015**	5.395***	3.953**	5.386***	3.233***	4.047**	6.143***	4.047**	4.029**	2.973**
Observations	62	62	62	62	62	62	62	62	62	62

Panel C: 2018 LAGGED

	ROA					PROFM				
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
INTERCEPT	8.866***	10.528***	8.687***	9.317***	11.538***	4.237**	5.688**	4.168**	4.877**	6.640**
	(3.827)	(3.449)	(4.039)	(4.287)	(3.451)	(2.058)	(2.097)	(2.169)	(2.579)	(2.266)
LN_NMEM	-.015				-.021	-.024				-.035
	(-.099)				(-.138)	(-.149)				(-.215)
INDEP		-.100			-.128		-.108			-.109
		(-.805)			(-.991)		(-.811)			(-.797)
WOMEN			-.115		-.133			.059		.048
			(-.891)		(-1.009)			(.424)		(.345)
BACK				-.155	-.152				-.263**	-.264*
				(-1.279)	(-1.242)				(-2.069)	(-2.032)
LN_SIZE_BED	-.361**	-.396***	-.341***	-.375***	-.362**	-.051	-.093	-.080	-.073	-.093
	(-2.407)	(-3.175)	(-2.737)	(-3.137)	(-2.373)	(-.316)	(-.696)	(-.595)	(-.585)	(-.577)
MULTIL	-.025	-.024	.004	-.051	-.017	-.061	-.060	-.075	-.106	-.118
	(-.206)	(-.201)	(.034)	(-.423)	(-.136)	(-.471)	(-.466)	(-.562)	(-.832)	(-.880)
Adjusted R^2	.095	.104	.106	.119	.099	-.042	-.031	-.039	.028	-.008
F-statistic	3.157**	3.404**	3.460**	3.786**	2.139*	.172	.386	.225	1.604	.918
Observations	63	63	63	63	63	63	63	63	63	63

Panel D: 2019 LAGGED

	ROA					PROFM				
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
INTERCEPT	6.032**	5.252*	6.148***	5.979***	5.629*	2.287	1.822	1.930	1.868	2.481
	(2.677)	(1.823)	(2.880)	(2.694)	(1.846)	(1.260)	(.778)	(1.092)	(1.037)	(.990)
LN_NMEM	-.037				-.075	-.169				-.199
	(-.221)				(-.434)	(-.988)				(-1.107)
INDEP		.045			.056		.002			-.003
		(.348)			(.424)		(.012)			(-.023)
WOMEN			-.216*		-.231*			-.101		-.126
			(-1.718)		(-1.765)			(-.770)		(-.925)
BACK				-.023	-.010				-.011	.013
				(-.176)	(-.072)				(-.083)	(.098)
LN_SIZE_BED	-.208	-.226*	-.194	-.233*	-.136	.175	.068	.086	.067	.217
	(-1.255)	(-1.758)	(-1.542)	(-1.832)	(-.787)	(1.038)	(.517)	(.649)	(.516)	(1.206)
MULTIL	.045	.058	.068	.050	.056	-.007	.032	.038	.030	-.003
	(.342)	(.457)	(.546)	(.391)	(.418)	(-.048)	(.241)	(.293)	(.225)	(-.024)
Adjusted R^2	.007	.008	.054	.007	.011	-.028	-.045	-.034	-.044	-.066
F-statistic	1.150	1.176	2.174	1.144	1.115	.446	.118	.317	.120	.361
Observations	63	63	63	63	63	63	63	63	63	63

This table represents the OLS regression analysis with ROA and Profit Margin as its dependent variables. Panel A represents 2016, panel B; 2017, panel C; 2018, and panel D; 2019. Independent and control variables are lagged by one year. This table reports the standardized coefficients and the t-value is in parentheses. *, Correlation is significant at 10% level. **, correlation is significant at 5% level. ***, correlation is significant at 10% level.