The impact of corporate governance on the cancer waiting time target of the English National Health Service hospitals

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Abstract

Purpose–This paper examines the impact of a board-level governance bundle (i.e. size, independence, expertise, meetings, gender diversity, and multiple directorships) on the non-financial performance of National Health Service (NHS) hospitals – and, separately, by hospital type (i.e. trusts hospitals and foundation trusts hospitals).

Design/methodology/approach–A logit regression for panel data is used for a sample of 128 NHS trusts and foundation trusts across England from 2014 to 2018. The data was hand-collected from NHS hospitals' annual reports and Care Quality Commission (CQC) reports. The cancer waiting time target (i.e. 62-day cancer referral and treatment target) is used to measure non-financial performance.

Findings–The main findings for NHS hospitals indicate that multiple directorships positively and significantly affect non-financial performance. However, board expertise and gender diversity have a negative and significant influence. When the sample is partitioned, the results remain the same for the NHS foundation trusts hospitals. For NHS trust hospitals, except for multiple directorships having a positive and significant effect, all remaining governance attributes have an insignificant impact.

Practical implications–The findings have implications for policymakers and practitioners as they move to implement measures to improve hospital performance against the cancer waiting time targets in the English NHS.

Originality/value–To the best of the authors' knowledge, this is the first study to examine the impact of corporate governance on cancer waiting time targets in public hospitals. Overall, this paper contributes to the corporate governance literature, especially in the context of public hospitals, and has significant practical and theoretical implications.

Keywords: Corporate governance, non-financial performance, hospitals, cancer waiting time, National Health Service, England.

1. Introduction

More than half of the UK's population born after 1960 will probably be diagnosed with cancer, necessitating timely and effective healthcare services to improve patient outcomes and experiences (Morris, 2018). In this regard, cancer waiting time targets, established as indicators of care quality (Di Girolamo *et al.*, 2018), aim to ensure earlier diagnosis and treatment, reduce complications, and enhance patient (The Nuffield Trust, 2016). Extended waiting times, however, pose ethical, social, and political challenges (Saint-Jacques *et al.*, 2007), reducing survival rates, increasing patient anxiety, and undermining public trust in the healthcare system (Paul *et al.*, 2012).

Accordingly, the National Health Service (NHS) in England incorporated waiting time targets into national cancer care standards to enhance various aspects of the cancer pathway (Department of Health, 1998). Initially, eight operational standards existed before the ninth standard for faster diagnosis was introduced in April 2020 (Morris, 2018). These targets, from urgent GP referral to diagnosis and treatment, aim to improve cancer outcomes (Morris, 2018). However, cancer waiting time targets in England have continually been breached. For example, the target of less than 15% waiting over two months for treatment post-urgent GP referral has been met only once in four and a half years. Similarly, the 8% target for waiting over 18 weeks and the 1% target for waiting six weeks for diagnostic tests have consistently been missed (Appleby, 2019). Additionally, delays in routine diagnosis have increased avoidable deaths, as only urgent symptomatic cases were prioritised during the COVID-19 pandemic (Maringe *et al.*, 2020).

This paper explores the role of hospital boards in terms of hospital performance against cancer waiting time targets. Non-profit hospital boards should different stakeholder groups' expectations (Pointer and Orlikoff, 2002; Achiro *et al.*, 2024). The purpose of the NHS hospital board is to (i) govern the hospitals effectively to reinforce the patient, public, and stakeholder confidence in the quality and safety of healthcare services and (ii) effectively invest resources to deliver optimal health outcomes (Bennett and Flory, 2013). Therefore, since the boards have the ultimate authority and accountability for the hospitals they oversee, this paper examines the relationship between corporate governance (CG), focusing on hospital boards, and cancer waiting time targets. Hospital boards are increasingly accountable for their statutory responsibility for overseeing the quality and safety of care delivered in the hospitals (Mannion *et al.*, 2015; Jones *et al.*, 2017). Much of the academic literature recognises that effective governance is fundamental for advancing the quality of care (e.g., patient experiences, safety,

and effectiveness) (Goeschel *et al.*, 2010; Bismark and Studdert, 2014). Hence, it is feasible that the board of directors, as the cornerstone of CG (Naciti, 2019) with the overall responsibility for an organisation's internal control system and functioning (Jensen, 1993), can affect hospital performance using the metric of cancer waiting time targets.

According to Goeschel *et al.* (2010), board structure, committee types, and inter-board relationships within the governance structure affect board effectiveness and efficiency. Nevertheless, much attention has been directed to how the co-optation of clinicians on the hospital boards impacts non-financial performance. Previous studies show that the presence of clinicians in hospitals has a positive impact, for instance, on quality ranking (Goodall, 2011), delivering high-quality care (Bai and Krishnan, 2015), and quality ratings (Aly *et al.*, 2023). However, opposing arguments suggest that empirical hospital studies have not consistently demonstrated that clinician participation in hospital management and governance enhances hospital efficiency or performance outcomes (Succi and Alexander, 1999). For example, Bai (2013) finds that clinicians on the board do not significantly affect social performance in non-profit hospitals. In this regard, investigating other board attributes reveals that the hospital's efficacy is related to the board of directors' structure (Aly *et al.*, 2023). Prior studies document that board attributes, such as board gender diversity (Aly *et al.*, 2023) and board size (Bai, 2013), influence hospital effectiveness and performance. On the other hand, other studies (e.g., Veronesi *et al.*, 2014) indicate that traditional CG variables (e.g., board size) are insignificantly related to hospitals' non-financial performance.

Most of the studies that have investigated the relationship between CG and performance have predominantly used hospitals in the US as the research context (e.g., Molinari *et al.*, 1993; Goes and Zhan, 1995; Molinari *et al.*, 1995; Succi and Alexander, 1999). Only a few studies have attempted to investigate this phenomenon outside the context of the US (Kuntz and Scholtes, 2013; Veronesi *et al.*, 2013; Veronesi *et al.*, 2014; Chen *et al.*, 2021; Aly *et al.*, 2023). This means that most hospitals investigated are private or not-for-profit because the US has a hybrid healthcare service where healthcare services are provided by the private sector and government, an overall varying model to other OECD countries with a universal healthcare service (Kumar *et al.*, 2011). This limits the generalisation of the results from the US hospitals to health service providers in other countries because of the different healthcare delivery systems and models.

Furthermore, there is a dearth of evidence on the impact of CG on non-financial performance when compared to the number of studies that have explored the impact on the financial performance of hospitals (e.g., Alexander and Morrisey, 1988; Molinari *et al.*, 1993; Goes and Zhan, 1995; Molinari *et al.*, 1995; Succi and Alexander, 1999; Veronesi *et al.*, 2014; Chen *et al.*, 2021; Achiro *et al.*, 2024). The emphasis on financial performance is unsurprising, given that most studies are based on private hospitals (Sarto and Veronesi, 2016). Nonetheless, NHS hospitals should balance both financial viability and non-financial performance, making it imperative to explore the relationship between CG and non-financial performance, which is measured through the hospitals' performance against the cancer waiting time targets in this paper.

Moreover, several studies have explored the impact of CG on hospital performance while concentrating on the contribution of clinicians on the board to hospital performance (Goes and Zhan, 1995; Veronesi *et al.*, 2013; Veronesi *et al.*, 2014). Thus, much of the existing evidence disproportionately explores one aspect of CG. In contrast, several other CG variables (e.g., board size, board independence, and board meetings) have not been explored in the context of hospitals. Their impact on the non-financial performance of hospitals in the English NHS is, therefore, under-explored.

This paper investigates the impact of CG on NHS hospitals' non-financial performance (i.e. 62-day waiting time target) in England. Our findings show that multiple directorships have a significant and positive effect, while board expertise and gender diversity have a significant but negative impact. In contrast, board size, independence, and meetings have no influence. Then, the paper takes a further step and examines this relationship by hospital type (i.e. NHS trusts and NHS foundation trust hospitals). The results remain the same for NHS foundation trusts, while for NHS trusts, apart from multiple directorships having a significant and positive impact, all remaining variables have no effect. Most of the results are confirmed in the robustness checks.

This paper makes several contributions to the research and theory, especially in public hospitals. *First*, the study extends the existing research that has predominantly focused on investigating the relationship between CG and corporate performance in publicly listed firms (e.g., Peni, 2014; Duppati *et al.*, 2020; Puni and Anlesinya, 2020) to cover NHS hospitals. Relatedly, the research context in hospitals furthers the existing research in the UK, distinct from the US studies that have been the predominant context for CG research in hospitals

(Molinari *et al.*, 1993; Jha and Epstein, 2010). *Second*, several CG variables were explored in this paper, compared to previous hospital studies that mainly concentrated on the clinicians on the board (Molinari *et al.*, 1993; Molinari *et al.*, 1995; Veronesi *et al.*, 2014). The paper presents findings on how other CG variables impact hospital non-financial performance. Thus, the results are insightful for policymakers and practitioners in developing board practices and composition elements that can enhance the performance of hospitals. *Finally,* the paper makes theoretical contributions, providing evidence for the resource dependence and upper echelons theories in explaining the relationship between CG and hospital performance. Specifically, the findings on multiple directorships give credibility to the resource dependence theory, while the findings on board diversity and board expertise give credence to the upper echelons theory.

The rest of the paper is structured as follows. Section 2 presents the theoretical framework, existing empirical literature, and hypotheses development. Section 3 defines and discusses the methodology used to address the research questions, while Section 4 presents and discusses the study's findings. The study is then concluded in Section 5.

2. Literature Review

2.1 Theoretical framework

The relationship between CG and the non-financial performance of hospitals in the NHS can be explained by three fundamental theories. First, the stakeholder-agency theory can explain elements of strategic behaviour, the structure of contracts between management and stakeholders, and the institutional arrangements used to monitor these contracts (Hill and Jones, 1992). Stakeholder-agency theory posits that managers, based on their contractual relationships, are perceived as the agents of firms' stakeholders (Zolotoy *et al.*, 2021) and have direct control in decision-making (Collier, 2008). In this regard, the board of directors should monitor and enforce the implicit contracts between management and the various stakeholders (Hill and Jones, 1992). They also represent various stakeholders' perspectives while handling complex trade-offs between staff, patients, and the public (Mannion *et al.*, 2015). Although efficient resource management is vital for public entities, hospitals' critical stakeholders are mainly concerned with service quality issues (Garcia-Lacalle *et al.*, 2023). In this regard, the stakeholder-agency theory directs the board towards meeting conflicting objectives of those whose entities are affected or can affect the hospitals.

Second, the resource dependence theory has also been popularly used to explain the dynamics of board composition (Hillman *et al.*, 2000; Hillman and Dalziel, 2003). The board of directors

manages external dependencies on the environment, whereby their misuse can affect firm performance (Pfeffer, 1972). Consequently, the decisions taken concerning board composition are used to manage external dependencies on the environment (Pfeffer and Salancik, 2003), whereby board capital in the form of human capital encompassing elements of experience, expertise, reputation and relational capital in terms of ties to other firms, and external contingencies, support the board in its role of resource provision (Hillman and Dalziel, 2003). The basis of directors appointed to the board lies in their background, contacts and skills in arbitrating and boundary-spanning (Mannion *et al.*, 2015).

Third, we adopt the upper echelons theory, which predicts that "organizational outcomes - both strategies and effectiveness are viewed as reflections of the values and cognitive bases of powerful actors in the organization" (Hambrick and Mason, 1984, p. 193). The upper echelons theory predicts that top managers in an organisation play a pivotal role in influencing organisational processes and outcomes (Garcia-Lacalle *et al.*, 2023). The prediction utilises the perspective that the executive demography is a proxy for cognition and behaviours (Carpenter *et al.*, 2004). Therefore, the theory's central premise lies in the executive cognitions, values and perceptions, and their effect on the strategic choice processes and performance outcomes. In hospital settings, the theory's applicability lies on the premise that hospitals as institutions are knowledge-based; therefore, educational background and staff skills can affect management practices and patient outcomes (Agarwal *et al.*, 2016). Therefore, the cognition and values of the managers are critical in influencing their interpretations of the situations they face and their responses (Kaiser *et al.*, 2020).

2.2 Hypotheses development

2.2.1 Board size

According to stakeholder-agency and resource dependence theories, larger boards can effectively address conflicting claims of the NHS hospitals' stakeholders and to support access to the required resources. The optimal board size has long been debated in academic literature (Merendino and Melville, 2019). The stakeholder-agency and resource dependence theories support large boards (Guest, 2009; Gaur *et al.*, 2015; Arora and Sharma, 2016) for various reasons. Large boards are better placed for increased access to resources (Berezinets *et al.*, 2017) and bring various views in the decision-making process (Albitar *et al.*, 2020), given the broader scope of group intellect (Naseem *et al.*, 2017) and expertise (Allam, 2018). Furthermore, their vast diversification increases stakeholder representation and perspectives

(Gaur *et al.*, 2015). They are also more efficient and knowledgeable and incur lower costs in monitoring management (Arslan *et al.*, 2010). However, communication (Guest, 2009; Arslan *et al.*, 2010), coordination, control, and information processing challenges (Achiro *et al.*, 2024; Alta'any *et al.*, 2024b) affect decision-making in larger boards.

On the other hand, the smaller boards are better equipped to monitor, control and resolve free rider issues (Berezinets *et al.*, 2017) and fire a CEO for unsatisfactory performance (Yermack, 1996). The trade-off is that they need more perspectives and diversity (Lipton and Lorsch, 1992). NHS hospitals have various stakeholders, require a sufficient board size to accommodate the necessary roles (Mannion *et al.*, 2015), and need to engage in strategic actions to secure sustenance from the environment (Pfeffer and Salancik, 2003). Hospital board size is dependent on its specific function. For instance, when the board of directors is used as a linkage between the hospital and its environment, the board will be large, while hospitals that are closely linked with their local environment and used mainly for managing and administration tend to be smaller (Pfeffer, 1972). Studies report that board size is negatively related to social performance in for-profit hospitals but positively related in non-profit hospitals (Bai, 2013). Other studies indicate that the smaller boards are more effective than the larger boards of Ghana hospitals (Abor, 2015). However, a few other studies reveal that board size has an insignificant effect on hospital performance (Kirkpatrick *et al.*, 2017; Garcia-Lacalle *et al.*, 2023). Our first hypothesis based on the above discussion and prior findings is that:

H1: Board size has a significant impact on non-financial performance.

2.2.2 Board independence

Both the stakeholder-agency and resource dependence theories are great advocates of board independence. Stakeholder-agency theory represents the different needs of hospitals' stakeholders. As per resource dependence theory, board members facilitate connections between hospitals and external factors, resulting in uncertainty and dependencies (Hillman *et al.*, 2000). For instance, the Code requires that aside from the board chair, at least half of the foundation trust board directors are independent (Garcia-Lacalle *et al.*, 2023). Several studies argue that independent directors enhance board effectiveness (Alta'any *et al.*, 2024b) and reduce potential agency costs (Malagila *et al.*, 2021; Gerged *et al.*, 2023). Their diverse backgrounds and expertise are also pivotal for decision-making (Abidin *et al.*, 2009). They also maintain close relationships with stakeholders, understand their demands, and know how to meet them (Garcia-Lacalle *et al.*, 2023).

In contrast, there are some negative connotations associated with independent directors. For example, when their independence is compromised, they tend to work for those who appointed them, thus impacting their efficacy in monitoring management (Jackling and Johl, 2009; Vintila and Gherghina, 2013). Moreover, in some cases, independent directors need more motivation and firm-specific knowledge of operational activities and tend to have multiple directorships, which impact their contribution to performance (Zhou *et al.*, 2018). Information asymmetry, lack of support from inside directors (Yasser *et al.*, 2017), and incompetence of the outside directors (Assenga *et al.*, 2018) cause independent directors to negatively impact performance. Hospital studies report inconclusive findings on board independence, reporting an insignificant association between board independence and performance (Ellwood and Garcia-Lacalle, 2015; Kirkpatrick *et al.*, 2017). Given the opposing viewpoints and the findings from previous studies, we hypothesise as follows:

H2: Board independence has a significant impact on non-financial performance.

2.2.3 Board expertise

The board expertise hypothesis represents the co-optation of clinicians to the boards of hospitals. Involving clinicians on the boards is a distinguishing feature of the new public management reforms (Veronesi *et al.*, 2014) and is a policy goal in the NHS (Mannion *et al.*, 2015). All three theories of stakeholder-agency, resource dependence and upper echelons point to a significant underlying association between clinicians on the board and the non-financial hospital performance. From the stakeholder-agency perspective, the various claims of hospital stakeholders, namely the medical staff and patients, are represented by appointing clinicians to the board (Veronesi and Keasey, 2011). Resource dependence theory emphasises the strategic composition of the board of directors to enhance access and linkages to vital resources that the organisation needs to survive. The upper echelons theory, on the other hand, argues that the values and cognitive abilities of top managers and organisational outcomes are linked (Hambrick and Mason, 1984). According to prior studies, appointing clinicians to the boards can benefit and harm performance. Firstly, based on their ethical beliefs, professional norms and patient focus, clinicians pay attention to providing and improving healthcare quality (Bai, 2013; Chen *et al.*, 2021). Clinicians influence hospital performance by leveraging their expertise, training, as well as their efficiency in overseeing the quality of care (Bai and Krishnan, 2015). They also contribute to influencing clinician behaviour, aligning hospital and medical staff interests, and adopting cost-effective clinical practices and new policies (Goes

and Zhan, 1995; Succi and Alexander, 1999; Veronesi *et al.*, 2013; Veronesi *et al.*, 2014). Their ability to align medical staff to support and comply with board policies reduces overall costs and adherence to quality assurance standards (Molinari *et al.*, 1993; Molinari *et al.*, 1995). They also contribute understanding, credibility, and political capital and information advantages, which benefit the board in decision-making (Molinari *et al.*, 1993; Veronesi *et al.*, 2013; Veronesi *et al.*, 2014). Experienced nurses also contribute positively to board debates and decision-making, given the size of the nursing workforce and their impact on the quality of patient care and costs (Prybil, 2006).

However, appointing clinicians to the board may be detrimental to hospital performance due to their weakened monitoring capability over management (Collum *et al.*, 2014). They might also find it challenging to balance their managerial and clinician roles, as they tend to network with fellow clinicians (Clay-Williams *et al.*, 2017). Their streamlined focus on patient outcomes might lead them to pursue opportunistic and ineffective policies at the expense of the hospitals (Molinari *et al.*, 1993). Moreover, the divergent interests result in conflicts between clinicians and non-clinicians on the board, impacting board dynamics (Alexander and Morrisey, 1988; Succi and Alexander, 1999). Several hospital studies find that clinicians positively impact healthcare quality (Veronesi *et al.*, 2013). Prior studies also document that clinician involvement in governance positively affects care quality (Bai and Krishnan, 2015), quality ratings (Aly *et al.*, 2023), and results in higher-quality outcomes (Kuntz and Scholtes, 2013). On the contrary, physician representation on the board has a negative impact on donations (Brickley *et al.*, 2010). Findings also show that clinician involvement on the board has a negative relationship with hospital efficiency (Alexander and Morrisey, 1988; Succi and Alexander, 1999). Using the above contrary arguments of the theories and the evidence from prior findings, our third hypothesis is as stated below:

H3: Board expertise has a significant impact on non-financial performance.

2.2.4 Board meetings

The frequency of meetings determines how effectively a board manages its monitoring function (Lipton and Lorsch, 1992). The arguments of the stakeholder-agency theory posit that governance structures are required to monitor, evaluate and prioritise the competing stakeholder needs of the hospitals (Collier, 2008). Therefore, the central premise of having meetings is to monitor and evaluate stakeholder claims to satisfy their competing demands. Frequent meetings are encouraged to ensure that the board is effectively monitoring (Lipton

and Lorsch, 1992). Having frequent meetings allows the board to deliberate, effectively monitor, advise and discipline management (Puni and Anlesinya, 2020; Mardawi *et al.*, 2023). However, there are arguments that the frequency of meetings increases with events such as mergers and acquisitions, restatement of financial statements, increased regulatory pressure, crisis periods and poor firm performance (Brick and Chidambaran, 2010; Malik and Makhdoom, 2016). In fact, NHS hospitals face most of these issues, such as mergers between trusts and regulatory pressure to meet stipulated targets.

However, the argument is that these events result in frequent meetings as a reaction to these critical events or difficulties (Garcia-Lacalle *et al.*, 2023). Likewise, frequent meetings can harm performance, especially when the board dynamics are imbalanced. For instance, in the NHS boards, the expert model allows the experts to dominate board discussions while non-experts defer decision-making to those with expertise (Veronesi and Keasey, 2011). This, therefore, reduces the diversity of opinions, thus skewering decision-making. From the hospital studies, empirical evidence shows that board meetings are associated with lower occupancy and higher discharge rates (Abor, 2015). Similarly, some studies indicate that meeting diligence has a negative association with the quality of service of foundation trust hospitals (Garcia-Lacalle *et al.*, 2023). Based on the above discussion and empirical results from prior findings, our fourth hypothesis is as follows:

H4: Board meetings have a significant impact on non-financial performance.

2.2.5 Board gender diversity

The stakeholder-agency and upper echelons theories can explain the connection between gender diversity and performance. The stakeholder-agency theory argues for the representation of organisations' stakeholders, while the upper echelons theory argues that the characteristics of top managers can impact performance outcomes. There are certain inherent traits of women that would influence their decision-making. For example, women are suitable for institutions requiring comprehensive stakeholder management, such as highly competitive consumer product markets (Harjoto *et al.*, 2015). The NHS is an institution with several stakeholders requiring effective management and representation. Females represent various stakeholder claims, particularly inclined towards enhancing firms' social performance through customer and employee satisfaction, gender representation, and corporate social responsibilities (Harjoto *et al.*, 2015). Additionally, certain attributes of female directors, e.g., knowledge, creativity, cautious decision-making (Scholtz and Kieviet, 2018), enhanced advisory (Gerged *et al.*,

2022), monitoring abilities (Albitar *et al.*, 2020; Mardawi *et al.*, 2023), and strategy-making from a knowledgeable perspective (Moreno-Gómez *et al.*, 2018) contribute to improving hospital performance. Assimilating female directors in leadership positions enables NHS hospitals to reap the benefits of female representation (Green and Homroy, 2018). Some benefits include establishing and maintaining legitimacy with the public, given that a positive signal is conveyed to the public about the organisation's efficiency and ethical position (Terjesen *et al.*, 2016; Duppati *et al.*, 2020) of the hospitals. The proportion of independent female directors (Wang, 2020) and their ability to change board dynamics due to the symbolism effect leads to improved performance (Mahadeo *et al.*, 2012).

However, female directors may negatively impact hospital performance due to over-monitoring (Adams and Ferreira, 2009), group conflict (Carter *et al.*, 2010) and the fact that their positive qualities are diminished as they adopt male behaviourism in a bid to fit in (Rose, 2007). The adverse effects of gender diversity on performance are often attributed to tokenism (Malagila *et al.*, 2021) and their inability to effectively transfer expertise, knowledge and skills to influence improved hospital performance (Kweh *et al.*, 2019). Gender-based attributes contribute to females' impact on performance (Peni, 2014). In hospital settings, studies find that only prominent positions, such as a female chair, significantly impact service quality (Ellwood and Garcia-Lacalle, 2015; Garcia-Lacalle *et al.*, 2023). Meanwhile, some studies indicate that gender diversity is significantly and positively related to the discharge rate of hospitals (Abor, 2015), while other studies indicate no positive association between gender diversity and non-financial hospital performance (Aly *et al.*, 2023). Furthermore, findings indicate no significant relationship between gender diversity and hospitals' service quality (Kirkpatrick *et al.*, 2017). Considering the existing empirical evidence and theoretical underpinnings, our fifth hypothesis is stated below:

H5: Board gender diversity has a significant impact on non-financial performance.

2.2.6 Multiple directorships

The idea that multiple directorships are good boundary spanners can be traced back to the predictions of the resource dependence theory. Hospitals, for instance, attempt to gain access to requisite resources by interlocking directorates. Interlocking directorates is one way of securing an organisation's resources for survival (Mizruchi and Stearns, 1988). The practice facilitates information exchange, develops relationships with counterparts and social networks, and establishes legitimacy (Hillman *et al.*, 2000; Pfeffer and Salancik, 2003). In the hospital

settings, their survival depends on their response to the demands of their immediate environment (Pfeffer and Salancik, 2003). For example, hospital boards will comprise financial representatives who will gain access to financial and capital requirements (Mizruchi and Stearns, 1988; Kiel and Nicholson, 2006). Busy directors, especially in healthcare institutions like NHS hospitals, have their benefits and pitfalls. Several studies argue that busy directors are better and more knowledgeable, experienced, networked, committed in their roles and better at overseeing (Sarkar and Sarkar, 2009). Also, they are outstanding advisors, especially for young firms, and enhance their strategic decisions based on their networks (Chen *et al.*, 2015). The busy directors can also serve on several board committees, given their level of competence, without shirking their roles (Ferris *et al.*, 2003; Mishra and Kapil, 2018).

However, performance is only good with the reputation effect whereby director skills and incentives for performance dominate and decline when the directors become overwhelmed with duties and the dedication effect takes on (López Iturriaga and Morrós Rodríguez, 2014). The busy directors also have reduced work efficiency and limited attention and time to get through the learning curve and become competent in their roles (Chen *et al.*, 2015). They tend to be over-committed and overburdened, affecting their service, value addition and monitoring capabilities (Jackling and Johl, 2009). Their huge workloads also affect their attendance rates at meetings (Gray and Nowland, 2018), which, in the long run, affects their contribution to board deliberations and participation in decision-making. Given that the NHS is a busy institution facing increased healthcare demands, we can hypothesise, based on the theoretical underpinnings and prior evidence, that:

H6: Multiple directorships have a significant impact on non-financial performance.

3. Data and Methodology

3.1 Sample selection and data sources

Our sample includes NHS hospitals in England from 2014 to 2018. In this regard, a unique dataset was created comprising 130 NHS trusts and NHS foundation trusts in 2014, 129 in 2015 and 128 in 2016 to 2018. Only trusts and foundation trusts with accessible information were used. The year 2014 was selected because it followed the enactment of the impactful Health and Social Care Act 2012, enforced in April 2013. The Act compels the NHS to act as a 'market player', which breeds competition among them, thus encouraging the improvement of the quality and efficiency of the health services provided (Davies, 2013). Table I summarises the sample description regarding sample size and hospital type (i.e. trusts and foundation trusts).

We manually collect data for all examined variables from NHS hospitals' annual reports, websites, and the Care Quality Commission (CQC) reports.

[TABLE I ABOUT HERE]

3.2 Dependent variable: Non-financial performance

We measure non-financial performance using the 62-day cancer referral and treatment target, a nationally recognised performance standard for NHS hospitals. The operational target set for NHS hospitals is 85%. Therefore, as a dichotomous variable, NHS hospitals that met the target were assigned "1", and those that did not were assigned "0". The waiting times target for cancer treatment demonstrates the hospital's commitment to promptly evaluate and treat patients with serious conditions, effectively improving health outcomes. This measure helps drive performance and set a precedence for good practice in the NHS (Goddard *et al.*, 1999) while playing a valuable role in assessing hospital performance (Kludacz-Alessandri, 2016).

3.3 Independent variables: Corporate governance

To test our hypotheses, we examine a bundle of board-level characteristics since governance mechanisms should be considered and assessed as a whole (Wahba, 2015). In greater detail, we identify six board attributes (i.e. board size, board independence, board expertise, board meetings, board gender diversity, and multiple directorships) collectively representing the board's composition, characteristics, and processes (Zahra and Pearce, 1989). We measure these variables in line with the previous CG studies conducted in hospitals (e.g., Veronesi *et al.*, 2014; Abor, 2015; Ellwood and Garcia-Lacalle, 2015; Aly *et al.*, 2023). The measurement of these variables is illustrated in detail in Table II.

3.4 Control variables

We control for two sets of variables (i.e. individual-level governance variables and hospital-specific variables) to circumvent model mis-specification. For the first set, and due to their impact on management practices and hospital performance, we control for CEO background (Agarwal *et al.*, 2016) and CEO tenure (Aly *et al.*, 2023). Concerning the second set and following prior studies (Collum *et al.*, 2014; Veronesi *et al.*, 2014; Abor, 2015), we control for age, size, and type. Moreover, the year fixed effect and location fixed effect are controlled.

3.5 Empirical model

Given the dichotomous nature of the dependent variable, and following the accounting literature (Dwekat *et al.*, 2022; Meqbel *et al.*, 2024), the statistical approach used in data

analysis was the logit regression, The waiting time targets take on an ordinal variable of whether the hospital meets the national operation standard of 85% (1) or not (0). Thus, the following model is used to test our hypotheses:

$$NFP = \alpha + \beta_1 BS + \beta_2 BI + \beta_3 BE + \beta_4 BM + \beta_5 BGD + \beta_6 MD + \beta_7 CB + \beta_8 CT + \beta_9 HA + \beta_{10} HS + \beta_{11} HT + [Year, Location\ Indicators] + \varepsilon$$

Where NFP is non-financial performance. The definitions of all dependent and independent variables are included in Table II.

[TABLE II ABOUT HERE]

4. Empirical Results and Discussion

4.1 Descriptive analysis

Table III presents the descriptive analysis of all the variables in the NHS hospitals. The target requires that at least 85% of patients start receiving treatment no more than 62 days after an urgent referral for suspected cancer. The results indicate that 47.2% of sampled NHS hospitals have met the operational standard, where the average performance against this target time is 83.3%. The main reason is the increased patient demand for cancer services (NHS Providers, 2022). The rise in GP referrals for cancer treatment is attributed to the evolving population age demography of the UK, growing cancer cognizance due to national campaigns and the evolving practices in medicine, and the guidelines and referral thresholds (NHS Providers, 2022).

The findings indicate that boards in NHS hospitals, on average, have around 15 members. The results also show that the mean of board independence and board expertise is 43% and 21.4%, respectively. Regarding board meetings, the results show that the frequency of meetings, on average per annum, is about 11 for NHS hospitals. For board gender diversity and multiple directorships, the mean is 39.7% and 13%, respectively. These findings are consistent with previous studies conducted in hospital settings. For instance, Veronesi *et al.* (2014) report that the mean values for board size, board independence, and board gender diversity are 13 members, 51%, and 33.8%, respectively. Similarly, Ellwood and Garcia-Lacalle (2015) indicate that in NHS foundation trusts, the mean values for board size, board independence, and board gender diversity are 13 members, 48%, and 36%, respectively. Outside England, Abor (2015), for example, demonstrates that in Ghanaian hospitals, the mean values for board independence and board gender diversity are 51% and 37%, respectively.

[TABLE III ABOUT HERE]

4.2 Correlation analysis

The correlations between dependent, independent, and control variables used in this study are presented in Table IV. The findings demonstrate a significant correlation between several variables and the dependent variable (i.e. 62-day wait elective cancer target). The findings also indicate that the highest correlation is between CEO background and hospital type at 0.281, which falls below the threat value (i.e. 0.8 or 0.9), as Field (2013) recommended. This indicates that the multicollinearity issue does not affect the investigated model in this study. Still, a certain multicollinearity problem can exist even if no high correlation value is found (Myers, 1990). Accordingly, and following the accounting literature (e.g., Achiro *et al.*, 2024; Kayed *et al.*, 2024), the VIF-test is also used to detect multicollinearity. The results show that the mean VIF is less than 10, confirming that multicollinearity does not affect the examined model.

[TABLE IV ABOUT HERE]

4.3 Regression analysis

The baseline findings in this study are presented in Table V. The value of the Pseudo R-squared from the logistics model is 0.176, indicating an overall good fit for the model. The empirical results indicate that board size has an insignificant and negative influence on the cancer waiting time target. Thus, we reject H1. These results are not in line with stakeholder-agency theory (Hill and Jones, 1992), resource dependence theory (Hillman *et al.*, 2000), or upper ecology theory (Hambrick and Mason, 1984), which suggest board size affects organisation performance. Still, these results are consistent with previous studies conducted in hospital settings (e.g., Kirkpatrick *et al.*, 2017; Garcia-Lacalle *et al.*, 2023). One reason for the insignificant results is that as board size increases, this may lead to communication and coordination problems and less control of organisation governance (Alta'any *et al.*, 2024b).

[TABLE V ABOUT HERE]

Likewise, the results show an insignificant association between board independence and cancer waiting time target. Hence, H2 is rejected. These findings are neither consistent with stakeholder-agency theory (Hill and Jones, 1992) and resource dependence theory (Hillman *et al.*, 2000) nor with upper ecology theory (Hambrick and Mason, 1984). Nevertheless, these results align with previous studies (e.g., Ellwood and Garcia-Lacalle, 2015; Garcia-Lacalle *et al.*, 2023), showing an insignificant impact on hospitals' performance. According to Alta'any *et al.* (2024b), independent directors may not exhibit true independence in practice, either

because they are external to the firm or due to the impact of dominant CEOs, thus undermining their decision-making, which may be the case in the examined sample.

For board expertise, the results show a significant and negative impact on the cancer waiting time target. Thus, H3 is confirmed. This is consistent with the predictions of the upper echelons theory and prior studies (e.g., Alexander and Morrisey, 1988; Succi and Alexander, 1999; Brickley *et al.*, 2010). Our findings give credence to the prior empirical hospital evidence that the disjointed decision-making process in the NHS hospital boards and the competing dynamics and goals between clinicians and non-clinicians (Alexander and Morrisey, 1988; Succi and Alexander, 1999; Veronesi and Keasey, 2011) affect performance. In addition, the clinicians are not necessarily trained managerial professionals and may have trouble reconciling their roles as clinicians and managers (Clay-Williams *et al.*, 2017).

Moreover, board meetings are positively but significantly associated with the cancer waiting time target. Therefore, we reject H4. These results do not follow all adopted theoretical perspectives (i.e. stakeholder-agency, resource dependence, and upper ecology theories). One reason for the insignificant impact is that NHS hospitals encounter several challenges (e.g., mergers between trusts and regulatory pressure to achieve specified targets), which lead to frequent meetings in response to these critical events or difficulties (Garcia-Lacalle *et al.*, 2023). Another possible reason is that in NHS boards, where board dynamics may be imbalanced, the expert model allows the experts to dominate board discussions while the non-experts defer decision-making to those with expertise (Veronesi and Keasey, 2011).

The proportion of females on the board significantly and negatively influences the cancer waiting time target. Accordingly, we accept H5. Our findings align with the upper echelons theory's conceptual framework, where top management's characteristics affect performance outcomes. Our findings provide evidence to support the assertion that gender-based disparities impact performance (Peni, 2014). Women are known to over-monitor management, adversely affecting firm performance (Adams and Ferreira, 2009). With over-monitoring, strategic advisory declines, managerial myopia increases, and innovation weakens (Faleye *et al.*, 2011). Our findings also offer further credibility to findings which indicate that female directors only have a significant positive impact on service quality when they are in more prominent positions on the board, for example, board chair (Ellwood and Garcia-Lacalle, 2015; Garcia-Lacalle *et al.*, 2023).

Board members who hold several positions on other firms' boards are found to have a significant and positive impact on the NHS hospitals' 62-day cancer pathway. Hence, H6 is supported. The positive result is in line with prior studies (Pandey *et al.*, 2019) and the resource dependence theory, which suggests that interlocking directorships are effective for co-opting sources of environmental uncertainty (Mizruchi and Stearns, 1988) and as a means of bonding relationships between firms (Booth and Deli, 1996). These results align with the view that busy directors provide hospitals with diverse experience (Ferris *et al.*, 2003) and good networks.

4.4 Robustness analysis

Several estimation tests were performed to confirm the validity and reliability of the results shown in Table V above. Following previous accounting literature (e.g., Alta'any *et al.*, 2024b), a one-year lag is applied to address reverse causality and endogeneity issues. Likewise, and in line with Meqbel *et al.* (2024), a probit model is used as a substitute for the logit model. In this regard, we also use the probit model after lagging all explanatory variables. Still, the results for all these model specifications, shown in Table VI, align with our baseline results in Table V.

[TABLE VI ABOUT HERE]

Furthermore, we use two alternative measures for the dependent variable. First, in our baseline regression, we measure the dependent variable using a dummy variable equal to one if NHS hospitals met the operational target (85%) and zero otherwise (i.e. 62-day cancer referral and treatment *target*). Alternatively, we measure it using the point values (i.e. 62-day cancer referral and treatment *score)*. However, the results presented in Table VII are similar to our baseline results in Table V. The only remarkable change is regarding board gender diversity having an insignificant impact compared with a significant and negative impact.

Second, we measure non-financial performance alternatively using the 14-day cancer waiting time pathway. The 14-day waiting time target within which patients with suspected cancer should have their first appointment with a specialist after a referral by a GP. In this regard, the operational standard is 93% for NHS England, denoted by "1" for those above 93% and "0" for those who breached the target. As shown in Table VI, all examined variables have an insignificant impact on the 14-day cancer pathway for NHS hospitals. This suggests that board attributes have a greater impact on strategic decisions and resource allocation over extended periods (i.e. 62-day target), which includes more complex and multi-step processes (e.g., referrals, diagnostic tests, and treatment planning), rather than short-term operational targets (i.e. 14-day target), which may be more standardised.

[TABLE VII ABOUT HERE]

4.5 Further analysis

This paper further investigates this given nexus by hospital type (i.e. NHS trust and NHS foundation trust hospitals). The results, as indicated in Table VIII, show that, except for multiple directorships having a significant and positive impact, all remaining governance mechanisms do not influence NHS trusts' non-financial performance. On the other hand, the results for NHS foundations show that board expertise and board gender diversity have a significant and negative influence, while multiple directorships have a significant and positive impact. In contrast, all other remaining variables have no effect. This indicates that NHS foundation trusts drive the results for all NHS hospitals. One reason for this is the autonomy and flexibility that foundation trusts have in decision-making compared to the NHS trusts that are responsible to the Secretary of State. Consistent with the arguments of the upper echelons theory that managers require discretion to perform their roles, the board of directors of the NHS trusts have limited discretion to make decisions, which might affect the extent of their contribution to improving performance. That is, the influences of CG mechanisms on the NHS foundation trusts are impactful compared to the NHS trusts that may have no overall autonomy in decision-making.

[TABLE VIII ABOUT HERE]

5. Conclusion

In this paper, we examine the effect of CG on the performance of English NHS hospitals against the cancer waiting time target. Using a sample of 128 NHS hospitals from 2014 to 2018, we find that multiple directorships significantly and positively impact non-financial performance (i.e. the 62-day cancer referral and treatment target). On the other hand, board expertise and board diversity have a significant and negative influence. In contrast, the results show that the remaining variables have an insignificant impact. After we split the sample, the results show that results remain the same for NHS foundation trusts. In contrast, except for multiple directorships having a significant and positive effect, all remaining CG variables do not affect NHS trusts' non-financial performance.

Our results give credibility to the idea that, for CG to affect the institution's outcomes substantially, the governance arrangements have to be configured based on the organisational objectives. Interestingly, the boards of public sector institutions were developed based on those

of the private sector, despite the public sector boards having an ambiguous purpose and accountability framework compared to the private institutions (Addicott, 2008). Both issues of conformity and performance need to be addressed in public sector governance (Hodges *et al.*, 1996). Given the differences in objectives and management structures between public and private sector entities, adopting private sector models suggests that these issues should be appropriately addressed. This argument is particularly relevant to the NHS hospital model, which must balance maintaining financial viability while providing quality healthcare services.

Our findings reveal that multiple directorships positively and significantly impact non-financial performance, suggesting that directors with broader networks can enhance strategic decision-making and operational efficiency, directly contributing to better patient outcomes. However, the negative and significant influence of board expertise and gender diversity on non-financial performance highlights potential challenges in integrating specialised knowledge and diverse viewpoints, which may mitigate the timely achievement of performance targets. This indicates a need for improved integration and collaboration strategies within the board to align with the NHS's dual objectives effectively. Furthermore, the lack of significant impact from board size, independence, and frequency of meetings suggests that these factors alone do not enhance performance metrics like cancer waiting time targets. Instead, the focus should be on the quality of contributions and strategic alignment of board activities with organisational goals. Thus, our study suggests that NHS boards, modelled after private institutions, may struggle to balance their conflicting objectives, potentially leading to a focus on one goal at the expense of the other. This finding highlights the need for public sector boards to develop governance practices that address their unique organisational objectives and challenges.

The results of this study should be interpreted in line with the following limitations. We used data from only one country in the United Kingdom due to data incomparability challenges (Bevan *et al.*, 2014). The four countries in the United Kingdom (England, Wales, Ireland, and Scotland) have different demographic structures, policies, and reporting standards. These disparities affect data compatibility; therefore, our study focuses on England, the largest of the four countries in terms of NHS scale. Moreover, our sample covers the period before the Covid-19 pandemic. Thus, it would be interesting for future studies to examine the effect of the Covid-19 pandemic on this given nexus. Such studies could provide valuable insights into how public health crises affect governance structures and operational outcomes, building on the baseline understanding provided by this study. Besides, since this study relies on secondary data, future research can apply other research methods (e.g., surveys and interviews). Such analysis may

increase the research's rationality (McNulty *et al.*, 2013; Alta'any *et al.*, 2024a), thus capturing a more in-depth depiction of CG practices in the NHS.

This paper has significant theoretical, academic, and practical implications. Regarding theoretical implications, our findings on board expertise, gender diversity, and multiple directorships support the upper echelons and resource dependence theories. The upper echelons theory posits that top managers' characteristics influence organisational outcomes, aligning with the findings for board expertise and gender diversity. The resource dependence theory highlights the role of board members in resource provision, as evidenced by the positive impact of multiple directorships. For academic implications, this paper expands performance measurement in governance research to include non-financial indicators (e.g., cancer waiting time targets), advocating for a holistic evaluation of governance impacts. This encourages academics to consider financial and non-financial performance indicators to better understand governance effectiveness. Additionally, academics can build on the paper's findings to investigate the mechanisms and factors influencing these relationships, thereby advancing the theoretical framework of CG.

In terms of practical implications, the results have important implications for CG reforms aimed at enhancing hospitals' healthcare services. Our findings show a significant positive relationship between multiple directorships and cancer waiting time targets, irrespective of hospital type, offering valuable insights for further CG reforms. Thus, policymakers and hospitals focus on multiple directorships in their CG reforms. This can bring diverse perspectives and extensive experience to the board, enhancing decision-making and strategic oversight. Also, our results show that board gender diversity does not always lead to positive outcomes, potentially because of existing board dynamics and socialisation pressures that cause women to conform to the prevailing norms (Rose, 2007). Hence, policymakers and hospitals should foster an environment that values diverse perspectives and mitigates socialisation pressures. Implementing mentorship programs and diversity training can help achieve this goal.

Moreover, our findings suggest that having more clinicians on hospital boards does not necessarily improve hospital performance (i.e. cancer patient care) and may lead to inefficiencies, supporting other studies' arguments (Alexander and Morrisey, 1988; Succi and Alexander, 1999). Although clinicians are medical experts (Chen *et al.*, 2021), they may lack management capabilities. Thus, policymakers and hospitals should ensure that clinician board members receive adequate training in management and governance to effectively contribute to

hospital administration and strategic planning. Overall, our findings imply that regular evaluations and adjustments to board composition and governance practices are crucial. Policymakers and hospitals should establish mechanisms for periodic reviews of board performance and effectiveness to ensure governance structures remain responsive to the hospital's needs. This can improve patient experience, reduce stress and anxiety from long waiting times, enhance public trust in the healthcare system, and support societal well-being.

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Tables

Table I: Sample description

	Number of Trusts and Foundation Trusts per year				
Type of Trust	**2018**	**2017**	**2016**	**2015**	**2014**
NHS Trusts	46	46	46	47	47
NHS Foundation trusts	82	82	82	82	83
Total final sample	**128**	**128**	**128**	**129**	**130**
Firm Years	**640**	**512**	**384**	**258**	**130**

Source: Created by authors.

Table II: Definition of variables

Name	Abbreviation	Definition	Data Source
Dependent Variable			
62-day wait elective cancer target	*62-day wait*	Dummy variable equals one if NHS hospitals met the operational target (i.e. 85%) and zero otherwise.	Annual Reports & CQC Reports
Independent Variables			
Board Size	*BS*	Total number of directors on the board.	Annual Reports
Board Independence	*BI*	Proportion of independent directors on the board.	
Board Expertise	*BE*	Proportion of qualified clinical directors on the board.	
Board Meetings	*BM*	Total number of board meetings held per year.	
Board Diversity	*BGD*	Proportion of female directors on the board	
Multiple Directorships	*MD*	Proportion of directors who hold other board positions on the board.	
Control variables			
CEO Background	*CB*	Dummy variable equals one if the CEO has clinical background and zero otherwise.	Annual Reports & Website
CEO Tenure	*CT*	Length of time the CEO has served on the board.	
Hospital Age	*HA*	Natural log of years the (foundation) trust has existed.	
Hospital Size	*HS*	Natural log of total assets.	
Hospital Type	*HT*	Dummy variable equals one if the hospital is a foundation trust and zero if it is a trust.	
Location	*Location*	Represents the nine regions of England; "1" for (foundation) trusts located in London, "2" for North East, "3" for North West, "4" for Yorkshire, "5" for East Midlands, "6" for West Midlands, "7" for South East, "8" for East of England, and "9" for South West.	

Source: Created by authors.

Table III: Descriptive statistics for all variables

Variable	N	Mean	Median	SD	Skewness	Kurtosis
62-day wait	599	0.472	0	0.500	0.110	1.012
BS	627	14.541	14	2.223	0.647	3.992
BI	623	0.430	0.429	0.067	0	2.984
BE	623	0.214	0.200	0.093	0.739	3.750
BM	627	10.568	11	2.898	0.523	5.788
BGD	626	0.397	0.385	0.113	0.370	3.163
MD	617	0.130	0.067	0.172	1.554	5.172
CB	621	0.390	0	0.488	0.452	1.205
CT	601	4.930	3	4.826	2.225	8.377
HA	640	2.602	2.565	0.727	-0.284	4.337
HS	630	19.373	19.331	0.626	0.295	2.892
HT	645	0.625	1	0.485	-0.516	1.266

Note: This table shows descriptive statistics for all variables of the NHS hospitals. Detailed definition of all the variables is in Table II.
Source: Created by authors.

Table IV: Pearson correlation

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. 62-day wait	1											
2. BS	-0.090**	1										
3. BI	0.009	-0.245***	1									
4. BE	-0.078*	-0.215***	0.154***	1								
5. BM	0.017	-0.136***	0.033	0.099**	1							
6. BGD	-0.035	-0.118***	0.006	0.097**	-0.001	1						
7. MD	-0.019	-0.072*	0.043	0.155***	0.024	-0.060	1					
8. CB	0.060	-0.003	-0.063	0.193***	-0.045	0.176***	-0.053	1				
9. CT	0.107**	0.034	0.036	-0.049	-0.018	0.014	-0.065	-0.085**	1			
10. HA	-0.052	0.021	-0.080**	-0.025	-0.059	-0.023	-0.019	-0.122***	-0.036	1		
11. HS	-0.265***	0.255***	0.149***	0.004	-0.039	-0.038	0.098**	-0.087**	0.081**	-0.023	1	
12. HT	0.188***	-0.022	0.124***	0.212***	0.044	0.116***	-0.220***	0.293***	0.099**	-0.202***	-0.121***	1

Note: Detailed definition of all the variables is in Table II.

*Significance at 0.1 level; **significance at 0.05 level; ***significance at 0.01 level.

Source: Created by authors.

Table V: Baseline regression results

	62-Day cancer referral and treatment target
BS	-0.038
	(0.050)
BI	0.881
	(1.587)
BE	-4.222***
	(1.200)
BM	0.035
	(0.037)
BGD	-1.780*
	(0.948)
MD	1.847***
	(0.652)
CB	0.179
	(0.226)
CT	0.057***
	(0.022)
HA	0.256
	(0.157)
HS	-1.195***
	(0.199)
HT	0.972***
	(0.261)
Year FE	Yes
Location FE	Yes
Pseudo R^2	0.176
Observations	550

Note: This table presents the baseline results on the impact of governance mechanisms on the cancer waiting time target (i.e. 62 days). Robust standard errors are in parentheses. Year-fixed and location-fixed effects are included in the estimations but not reported. A detailed definition of all the variables is in Table II.
*Significance at 0.1 level; **significance at 0.05 level; ***significance at 0.01 level.
Source: Created by authors.

Table VI: Different model specifications

62-Day cancer referral and treatment target			
	Model 1 Lagged Logit	**Model 2 Probit**	**Model 3 Lagged Probit**
BS	-0.028	-0.023	-0.017
	(0.057)	(0.030)	(0.034)
BI	1.879	0.463	1.041
	(1.812)	(0.944)	(1.082)
BE	-3.120**	-2.435***	-1.788**
	(1.316)	(0.708)	(0.781)
BM	0.069	0.023	0.041
	(0.042)	(0.022)	(0.025)
BGD	-1.830*	-1.053*	-1.070*
	(1.043)	(0.564)	(0.628)
MD	1.249*	1.105***	0.759*
	(0.716)	(0.385)	(0.426)
Control variables	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Location FE	Yes	Yes	Yes
Pseudo R^2	0.157	0.175	0.156
Observations	436	550	436

Note: This table presents the results considering different model specifications. All Models examine the impact of governance mechanisms on the cancer waiting time target. Model 1 uses the logit regression model after lagging all the explanatory variables. In Model 2, a probit model is employed as a substitute for the logit model, while Model 3 applies a probit model after lagging all the explanatory variables. Control variables, year-fixed effect, and location-fixed effect are included in the estimations but not reported. Robust standard errors are in parentheses. A detailed definition of all the variables is in Table II.

*Significance at 0.1 level; **significance at 0.05 level; ***significance at 0.01 level.

Source: Created by authors.

Table VII: Sensitivity analysis

	Model 1 62-Day cancer referral and treatment score	Model 2 14-Day cancer referral and treatment target
BS	0.001 (0.001)	0.082 (0.063)
BI	0.028 (0.037)	0.659 (1.880)
BE	-0.097*** (0.027)	-2.048 (1.444)
BM	0.001 (0.001)	0.011 (0.045)
BGD	-0.007 (0.022)	-0.431 (1.121)
MD	0.042*** (0.015)	-0.714 (0.717)
Control variables	Yes	Yes
Year FE	Yes	Yes
Location FE	Yes	Yes
R^2	0.279	-
Pseudo R^2	-	0.131
Observations	550	500

Note: This table presents the results after using alternative measures for the cancer waiting time target. In Model 1, the cancer waiting time target is measured as a 62-day cancer referral and treatment score, while in Model 2, it is measured as a 14-day cancer referral and treatment target. Control variables, year-fixed effect, and location-fixed effect are included in the estimations but not reported. Robust standard errors are in parentheses. A detailed definition of the remaining variables is in Table II.
*Significance at 0.1 level; **significance at 0.05 level; ***significance at 0.01 level.
Source: Created by authors.

Table VIII: Regression results for NHS trusts and NHS foundation trusts

	62-Day cancer referral and treatment target	
	NHS Trusts	**NHS Foundation Trusts**
BS	0.067	-0.065
	(0.098)	(0.066)
BI	5.962	-0.474
	(3.527)	(1.896)
BE	-3.232	-5.662***
	(2.860)	(1.483)
BM	0.028	0.047
	(0.101)	(0.045)
BGD	-1.403	-2.058*
	(1.780)	(1.226)
MD	2.148*	1.395*
	(1.236)	(0.839)
Control variables	Yes	Yes
Year FE	Yes	Yes
Location FE	Yes	Yes
Pseudo R^2	0.198	0.180
Observations	175	375

Note: This table presents the results after partitioning the sample into NHS trusts and NHS foundation trusts. Control variables, year-fixed effect, and location-fixed effect are included in the estimations but not reported. Robust standard errors are in parentheses. A detailed definition of all the variables is in Table II.
*Significance at 0.1 level; **significance at 0.05 level; ***significance at 0.01 level.
Source: Created by authors.