Economic Policy Uncertainty and Environmental, Social, and Governance (ESG) Disclosure: The Moderating Effects of Board Network Centrality and Political Connections

Purpose
This study examines the relationship between economic policy uncertainty (EPU) and Environmental, Social, and Governance (ESG) disclosure and the moderating role of board network centrality and political connections on the nexus between EPU and ESG.

Design/methodology/approach
Using a sample of the UK Financial Times Stock Exchange (FTSE) 350 firms during 2007 to 2018, this study examines the relationship between EPU and the ESG disclosure and the moderating effects of board centrality and board political connections using the multivariate regression analysis.

Findings
The results show that firms tend to increase their ESG disclosure when EPU rises. The results also reveal that EPU is negatively associated with firms' financial performance and ESG performance are less evident for firms with higher ESG disclosure score and are observed only when board centrality is relatively low and the political connections are absent. The study finds further evidence to support the hypotheses during periods of heightened conflicts (i.e., Global Financial Crisis (GFC) and the Brexit referendum).

Practical implications
This study offers practical insights for corporate managers who attempt to preserve and enhance their firms' competitive advantages via maintaining its stakeholders support through greater ESG disclosure during heightened EPU periods.

Originality/value
By integrating the resource-based view (RBV) and the signaling theory, this study extends the signaling theory and RBV by examining the relationship between EPU and ESG disclosure as a signal to its stakeholders and information advantages that board centrality and political connections bring to the company to reduce information asymmetry between the firms and its stakeholders during EPU.

Keywords: ESG disclosure, Economic policy uncertainty, Board network centrality, Political connections, Signaling theory, Resource-based view

1. Introduction

The global financial crisis, debt crisis in European Union (EU), the Brexit referendum and the Russia-Ukraine war have led to political upheavals and significant waves of economic policy uncertainty (hereon EPU) around the world. For instance, during the global financial crisis, which occurred from 2007 to 2009, there was a severe worldwide economic downturn characterized by the collapse in the housing market, the meltdown of financial sectors, and significant credit crunch (Johnstone et al., 2019). On the other hand, the Brexit referendum was a highly divisive and contentious period of conflict in the UK's history, with debates around political, economic and social issues (Hill et al., 2019). These events have not only drawn public attention but also raised growing concerns among corporate managers regarding how to conduct their business (Duong et al. 2020; Gulen & Ion 2016). Baker et al. (2016) define EPU as the likelihood that government policies will change from current year to future years and how these changes could affect economic activities at the firm level and adversely affects the firm-level outcomes (i.e., revenues, stock volatility, investment rates and employee hiring). Since then, there is a growing literature that examines the relationship between EPU and firm-level strategic decisions such as firm investment (Chen et al., 2019a; Gulen & Ion 2016; Wu et al., 2020), firm value (Borghesi & Chang, 2019), corporate innovation (Xu, 2020), CSR performance (Dai et al., 2020; Zhang et al., 2020; Zhao et al., 2021), mergers and acquisitions (Bonaime et al., 2018), stock price crash risk (Jin et al., 2019), financial reporting quality (Bermpei et al., 2021), environmental disclosure (Pan et al., 2020) and tax avoidance (Nguyen & Nguyen, 2020). However, the relationship between EPU and ESG disclosure has not received much attention from the researchers (Tsang et al., 2023). Hence, we aim to fill the gap and extend previous studies by examining the relationship between EPU and

firms' ESG disclosure and consequently ascertain whether board centrality and political connections can moderate the nexus between EPU and ESG disclosure.

We choose to examine the UK listed firms as our setting to test our research questions for two reasons. First, since the UK voted to leave the European Union (EU) in 2016 (the Brexit referendum), Brexit has caused significant disruptions to the UK economy and UK firms, such as investors' loss of confidence, increased stock market volatility, capital outflows, the depreciation of British pound and reduced investments and productivity (Bloom et al., 2019; BOE, 2019; EPU, 2016). Studies have shown that EPU from the Brexit increases trade policies risks and conflicts between the UK and the EU countries that brings significant adverse effects to corporations (Graziano et al., 2018; Hill et al., 2019).

Second, UK is one of the leading countries that have been promoting greater ESG initiatives and disclosures through the enactment of the UK Statutory Instruments 2013 No. 1970 and the UK Financial Reporting Council of the Stewardship Code[1] (Christensen, et al., 2022; Lopez-de-Silanes et al., 2020; Camilleri, 2015). For example, all the publicly listed firms need to provide information about the company's environmental, employee, social, human rights issues in the strategic report (The Companies Act 2013). Figure 1 shows that the level of UK EPU is correlated with the UK firms' ESG disclosure score. By relying on the UK context, our study offers insights on how EPU firms' ESG disclosure are related and the moderating role of board centrality and the presence of political connection during sustained economic and policy uncertainties.

[Insert Figure 1 here]

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[1] See https://www.legislation.gov.uk/uksi/2013/1970/pdfs/uksi_20131970_en.pdf and https://www.frc.org.uk/investors/uk-stewardship-code.

We utilize signaling theory (Spence, 1973; 2002) and resource-based view (Barney, 1991; 2018) to explain the mechanisms for the relationship between EPU and firms' ESG disclosure and consequently the moderating effects of board network centrality and political connections on the relationship between EPU and firms' ESG disclosure. First, based on signaling theory (Spence, 1973; 2002), we hypothesize that firms provide greater ESG disclosures to send a credible information signal of their commitments to meet the stakeholders' interests especially when EPU is heightened in order to continuously maintain the trust and support from their stakeholders to insulate firms from EPU.

Second, we draw upon resource-based view (Barney, 1991; 2018) and posit that greater board centrality and political connections provide valuable resources to the firm in a form of information advantage that are rare, inimitable and non-substitutable during EPU. Therefore, firms are able to gain critical, relevant and timely information advantage from greater board network centrality and political connections that allow firms to have better and more accurate assessments about the association between EPU and stakeholders' interests. In turn, firms with greater board network and political connections have less pressing need to utilize ESG disclosure as information channels to address their stakeholders' interests during the EPU because they have access to alternative information channels to their stakeholders from the board network and political connections. Therefore, we expect that higher board network centrality and political connections negatively moderate the firms' need for signaling of their commitments to the stakeholders through ESG disclosure during EPU. Using a sample of UK listed firms with 1,854 firm-year observations during 2007 to 2018, our study reveals a significant positive association between firms' ESG disclosure and EPU. Our study demonstrates that corporate governance, i.e., board network centrality and board with political connections, negatively moderate the relationship between ESG

disclosure and EPU. Furthermore, we find that greater ESG disclosure is positively related to firms' value (Tobin Q) and firms' ESG performance when EPU increases and board network centrality is low or when the firm has no political connections. We also examine the two distinct periods characterized by escalated global conflicts (i.e. Global Financial Crisis and the Brexit referendum) and find empirical evidence to support our hypotheses.

Our study makes a number of important contributions to literature. First, in contrast to existing studies that primarily focus on the direct relationship between EPU and firms' ESG performance (Dai et al., 2020; Zhang et al., 2020), the relationship between board centrality and firms' ESG performance (Amin et al., 2021; Vo et al., 2020), and the relationship between firms' political connections and firms' ESG performance, our study connects and extends these strands of literature by exploring the relationship between EPU and ESG disclosure as opposed to ESG performance, and examining how board centrality and political connections play a moderating role in meeting the stakeholders' interests during periods of EPU.

Second, we make a theoretical contribution by conceptualizing the relationship between EPU and firms' ESG disclosure, which draws upon signaling theory. Additionally, we examine the moderating effects of board network centrality and firm political connections, employing the resource-based view. Since firms' ESG disclosure is driven by the stakeholders' pressures (Christensen et al., 2021; Reid & Toffel, 2009; Semenova & Hassel, 2019) to reduce information asymmetry between corporate managers and firms' stakeholder related to firms' ESG initiatives (Brooks & Oikonomou, 2018; Gray et al., 1995; Pham & Tran, 2020), signaling theory provides a rationale for firms' tendency to enhance their ESG disclosure as a means of reducing information asymmetry between the firms and their stakeholders. ESG disclosure serves as a medium to disseminate information about firms' commitments to their stakeholders such that they can

maintain and continue to secure supports from their stakeholders especially when EPU increases. Given greater board network centrality and the presence of political connections represent firms' ability to gain information advantage through the board central locations of information flows in their social network (Intintoli et al., 2018; Amin et al., 2020) and firms' ability to gain insightful information from their political ties, greater board centrality and the presence of political connections reduce information asymmetry between the firm and its stakeholders in such that the firm could maintain their commitments and good relationship with their stakeholders. Hence, we anticipate that greater board centrality and the presence of political connections will lead to a decreased necessity for signaling through ESG disclosure, especially during the EPU.

Third, we provide practical insights for managers by emphasizing the critical role of board network centrality and political connections. These factors could moderate the pressing need of signaling through higher ESG disclosure because firms with greater board network and political connections enjoy information advantages to offset increased information asymmetry during the EPU and global conflicts. This access to information advantage reduces the relationship between EPU and global conflicts. Hence, board network centrality and political connections are acting as substitutes for ESG disclosure to reduce the association between EPU and firm financial and ESG performance. The remainder of this study is structured as follows. The next section reviews prior studies and presents our hypotheses, followed by the research methodology. The findings are presented in the next section, followed by the conclusion and recommendations for future studies.

2. Literature Review and Hypotheses Development

2.1 Economic policy uncertainty (EPU) and firms' ESG disclosure

Baker et al. (2016) demonstrate that EPU significantly affects both macro-level and firm-level outcomes. Prior studies find that uncertainty in economics and politics affects consumer spending, government purchases and stock markets (Li, 2020; Piñeiro-Chousa et al., 2022), while others show that EPU could affect corporate strategic decisions (Ahsan et al., 2021; Bonaime et al., 2018; Borghesi & Chang 2019; Chen et al., 2019a; Jin et al., 2019; Wu et al., 2020; Xu, 2020). For example, Gulen and Ion (2016) show that firms' capital expenditure is adversely affected by EPU. Chen et al. (2019a) find a negative relationship between EPU and firms' investment. Xu (2020) demonstrates that high EPU has a detrimental effect on corporate innovation due to increasing firms' cost of capital. Zhang et al. (2020) examine the firms' reaction to EPU and find that firms' CSR engagement increases when EPU is heightened. They argue that firms strategically increase their CSR engagements to obtain sustained competitive advantages during EPU. They indicate that CSR engagements provide insurance-like protection to offset the negative relationship between EPU and the demand for their products and services. Based on a sample of Chinese listed firms, they find evidence to support their hypothesis. Similarly, based on a sample of firms in 15 European countries, Vural-Yavas (2021) also finds a positive relationship between firms' CSR performance and EPU.

Dai et al. (2020) also examine the relationship between firms' CSR performance and EPU in the US. They also argue that EPU induces firms to build their social capital to insulate the negative association between EPU and firms' CSR performance. Further, CSR is considered as a civic engagement to build trust and cooperative norms with their key stakeholders. Therefore, stakeholders are more likely to reciprocate positively that brings favorable outcomes to the firm especially during EPU. Based on a sample of US firms, they find a positive relationship between firms' CSR and EPU.

We extend this strand of literature by examining the relationship between EPU and firms' decision to disclose their ESG (ESG disclosure) as opposed to ESG performance (Dai et al. 2020; Zhang et al. 2020). Literature has demonstrated that ESG disclosure is different from ESG performance. Gray et al. (1995) argue that social disclosure represents a dialogue (information exchange) between the company and its stakeholders while social performance represents a negotiation between the firm's interests and its stakeholders' interests. Brooks and Oikonomou (2018) define social disclosure as any information that a firm makes public that is related to its performance, standards or activities related to CSR. Pham and Tran (2020) highlight that ESG disclosure focuses on firms' information and communication channel about their action in relation to environmental, social and corporate governance that may affect their stakeholders (i.e., employees, communities, environment, etc.), while ESG performance is related to the action itself. Singhania and Saini (2023) conduct a meta-analytic study and find that ESG disclosures are intended to reduce information asymmetry between the firms and their stakeholders. Therefore, the emphasis of ESG disclosure is on information dissemination to reduce information asymmetry about firms' ESG initiatives as opposed to the firms' ESG actions.

Spence (1973) develops the signaling theory which demonstrates that better quality employee candidates can provide more information about the number of years of their schooling to send positive signals to potential employers that their qualifications (i.e., productivity) are higher relative to other candidates. In economic contexts, signaling theory is commonly used to explain how firms or individuals with superior qualities, skills, or attributes can signal or communicate this information to others to gain a competitive advantage (Connelly et al., 2011). Since Spence's (1973) seminal study, researchers have applied the signaling theory to explain the reason why

firms provide disclosures to investors and stakeholders (e.g., Campbell, 2004; Connelly et al., 201;

Lev & Penman, 1990; Ross, 1977).

There is a growing literature that examines the signaling property of firms' ESG disclosure toward

firms' shareholders and stakeholders. Lys et al. (2015) find that corporate accountability reporting

represents a positive signal toward firms' future financial performance. Similarly, Li et al. (2018)

show that firms' ESG disclosure is positively related with firms' value and suggest that higher

ESG disclosure increases shareholders and stakeholders' trust. Francis et al. (2019) argue that more

labor-friendly practices can serve as a positive signal about firms' financial performance that leads

to lower firms' borrowing cost and less financial covenants. Bolton and Kacpercyzk (2021) show

that firms' carbon disclosure serves as a signal that reduces firms' cost of equity. Clarkson et al.

(2013) find that firms' environmental disclosure enhances shareholders and stakeholders'

perceptions about firms' performance. Lee et al. (2022) demonstrate that ESG disclosure acts as a

positive signal that enhances firms' brand value.

We extend this literature by examining the relationship between EPU and firms' decision to

provide ESG disclosure. Extant literature has shown that EPU adversely affect firms' performance

(Borghesi & Chang 2019; Jin et al., 2019). Recent studies also indicate the importance of

maintaining firms' stakeholders' support during EPU because stakeholders' support provide

insurance-like protection to reduce the negative relationship between EPU and firms' performance

(Dai et al., 2020; Zhang et al., 2020). Spence (2002) asserts that signaling is needed to fill the

information gap or to reduce information asymmetry among the market participants. Since the

main focus of ESG disclosure is about disseminating information about firms' ESG initiatives to

stakeholders (Gray et al., 1995; Brooks & Oikonomou, 2018; Pham and Tran 2020), based on

signaling theory, we argue that firms tend to utilize ESG disclosure to send information as a signal

about their commitments to meet their stakeholders' interests, especially when the EPU is heightened. Baker et al. (2016) indicate that EPU increases information asymmetries among market participants. Therefore, ESG disclosure becomes a critical information dissemination channel to send credible signals to the stakeholders to reduce information asymmetry between the firm and its stakeholders. Such credible information dissemination channels (signals) can isolate the firm from EPU by maintaining the support from its stakeholders. In other words, by enhancing ESG disclosure, firms can maintain their communication and information channel with their stakeholders and reduce information asymmetry to continue to secure stakeholders' trust and supports. This trust and supports act as a form of insurance-like protection for firms and safeguard them against the EPU (Godfrey, 2005; Godfrey et al., 2009). Therefore, we expect firms' ESG disclosure tends to increase when EPU is heightened. Thus, our first hypothesis is stated as the following:

H1: Firms' ESG disclosure is positively related to EPU.

2.2 Moderating effect of board network centrality

Social network literature (Bonacich, 1972; Freeman, 1977; Sabidussi, 1966) measures the centrality based on the positions of individuals in the social network. Bourdieu (1972: 1985) indicated that individuals can accrued social capital through their social network of "more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu and Wacquant 1992, p. 119). Therefore, social capital is accumulated from social connections (networks) that they can mobilize toward their advantages. Literature have integrated the social capital theory to explain the benefits of social networks in corporate settings. More specifically, studies have examined the benefits of having access to more accurate and timely information (information

advantages) from corporate board of directors' network centrality (Amin et al., 2020; Horton et al., 2012; Larcker et al., 2013) toward enhancing firms' performance. Renneboog and Zhao (2011) show that board centrality networks are important to the firm because through its directors a firm can "gain access to information, even prior to its public disclosure" (p. 1133). Directors with stronger networks can also increase the firms' reputation in the society due to their close network relationships with firms' key stakeholders (e.g., employees' organization, regulatory agencies, etc.). Cai and Sevilir (2012) study the relationship between board networks and M&A transactions and find that acquiring firms achieve higher returns when acquiring firm and targeting firm are connected, which indicate that board networks allow the firms to access and gather private information that leads to value creating acquisition decisions.

Recent literature has begun to examine the relationship between CEO and corporate board network centrality and firms' ESG performance. Bouchet et al. (2022) document that there is a positive relationship between CEO network centrality and firms' ESG performance. Amin et al. (2020) find that board centrality is positively related to firms' ESG performance, which indicates that having well-connected boards can enhance firms' ESG performance. Similarly, Vo et al. (2020) find that firms with higher board centrality tend to have higher CSR performance. However, as we have indicated earlier, ESG disclosure differs from ESG performance since the main objective of ESG disclosure is to disseminate information related to ESG initiatives to firms' stakeholders (Brooks & Oikonomou 2019; Gray et al., 1995; Pham & Tran 2020).

We posit that higher board centrality increases the firms' access to more accurate and timely information through their board members. Hence, firms with greater board centrality tend to have more superior information advantages over firms with lower board centrality. Drawing from resource-based view (Barney, 1991; 2018), we argue that this information advantages from having

boards with greater and well-connected networks generate resources (i.e., information resources) can be considered as rare, inimitable, and non-substitutable resources to the firm (Barney et al., 2001)[2]. Therefore, firms with greater board centrality can maintain their sustained competitive advantages through this information advantage during the EPU. Board networks provide opportunities for social interactions as well as create a communication channel between the firms and stakeholders which allows the firms to reduce the influence of external uncertainties (Hung, 2011).

Furthermore, we argue that firms with greater board centrality tend to have better and more updated information that allows them to make better assessments about the stakeholders' interests as well as greater access to disseminate relevant and timely information about the firms' commitments to their stakeholders such that the stakeholders can have better assessments about the firms' effort to meet their interests during EPU. In other words, greater board centrality creates more effective information channels between the firm and its stakeholders and reduces information asymmetry between the firm and its stakeholders. As information asymmetry between the firm and its stakeholders decreases, the need for ESG disclosure as a credible information channel between the firm and its stakeholders during the EPU is also expected to decrease. Therefore, we expect that board centrality tends to reduce the need for signaling through ESG disclosure during EPU. Our second hypothesis is stated as follow:

H2: Board network centrality negatively moderates the relationship between EPU and firms' ESG disclosure.

2.3 Moderating effect of political connections

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[2] We checked our sample and we do not find two firms with exactly the same board members and the same board centrality measures (both direct and indirect network centrality measures).

Literature indicates that political connections provide valuable resources to firms and affect firms' strategic choices (e.g., Faccio, 2006; Guedhami, et al., 2014; Leuz & Oberholzer-Gee, 2006). Faccio et al. (2006) show that politically connected firms are more likely to receive a bail out from the government. Claessens et al. (2008) find that firms which provide political contributions to elected public officials experience higher stock returns and increased access to bank loans. Boubakri et al. (2012) find that politically connected firms have a lower cost of equity capital. Prior studies provide empirical evidence that firms with political connections have more access to the value-relevant information related to their business (e.g., Goldman et al., 2009 and 2013; Cooper et al., 2010; Faccio et al., 2009; Lester et al., 2008; Wellman, 2017). Lester et al. (2008) indicate that politically connected firms could bring both the depth and the breadth of human and social capital that affect firms' competitive positions and future performance. Wellman (2017) demonstrates that the negative effect of EPU is less pronounced for politically connected firms, because politically connected firms can gain access to value-relevant information to decipher the relationship between EPU and corporate strategic decisions. Consistent with this stream of literature, we argue that firms' political connections could bring valuable information to reduce uncertainties related with the EPU. Therefore, having access to such relevant information from the existing political connections could affect firms' decisions to provide ESG disclosure during economic and policy uncertainty.

Barney et al. (2001) suggest that firms' access to superior information can be considered as firms' valuable resources that are rare, inimitable, and non-substitutable. Ali et al. (2022) show that having access to superior information through political connections could significantly reduce information asymmetry. Similarly, Hou et al. (2022) show that political connections can provide firms with information regarding the forthcoming government policies and stakeholders' opinions

that allow corporate managers to make more optimal corporate decisions. Therefore, we posit that firms with political connections tend to have more access to superior information regarding their stakeholders and also establish indirect communication channels with their stakeholders during EPU. Having access to such information, managers could make more informed decisions about whether they should increase ESG disclosure as a signal of their commitment to meet stakeholders' interests during EPU. We argue that having access to information regarding the stakeholders' opinions through political connections during EPU may reduce the need for the firm to send signals about their commitments to the stakeholders through ESG disclosure. Hence, we expect that firms with political connections may have lower ESG disclosure during EPU. Therefore, our third hypothesis is stated as the follow:

H3: Political connections negatively moderate the relationship between EPU and firms' ESG disclosure.

Figure 2 shows the structure of our three hypotheses. Based on our first hypothesis (H1), we expect that EPU is related to the firms' strategic decision making to provide greater ESG disclosure as a signal (signaling) to their stakeholders as indicated by the horizontal arrow between EPU and firms' ESG disclosure. Based on our second and third hypotheses (H2 and H3), we expect that the board centrality and political connections tend to moderate the relationship between EPU and firms' ESG disclosure.

[Insert Figure 2 here]

It is imperative to distinguish ESG disclosure from ESG performance as the former serves the crucial function of disseminating information about firms' ESG initiatives and reducing

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information asymmetry between the firm and its stakeholders (Brooks & Oikonomou, 2018; Pham & Tran, 2020; Singhania & Saini, 2023). Thus, we further investigate the interactive relationship between ESG disclosure and EPU and firms' ESG performance. Specifically, we explore whether firms with greater ESG disclosure tend to increase their ESG performance when the EPU is heightened as found in recent studies (Qureshi et al., 2023; Zheng & Chen, 2023). Furthermore, considering the moderating effects of board centrality and the presence of board with political connections (as discussed in H2 and H3), we examine the interaction between ESG disclosure, EPU, firms' financial performance and ESG performance under varying conditions: when board centrality is above median versus when it below median and when the board has political connections versus when it does not.

3. Data and Methodology

3.1 Sample and data

We collect the data of UK firms listed in the FTSE 350 index which includes the largest 350 firms by market capitalization on the London Stock Exchange (LSE) during 2007 to 2018[3]. We exclude 125 firms that operate in financial services, insurance and real estate investment trusts (REITs) since these firms are under more stringent regulatory restrictions. We collect firms' ESG disclosure scores from Bloomberg and the EPU index from Baker et al. (2016) website at https://www.policyuncertainty.com/. We obtain board network centrality and board characteristics (e.g., board size, independent boards, etc.) and CEO characteristics (e.g., CEO age, female CEO, etc.) from the BoardEx where we have 1,978 firms-year observations across 225 firms. Following Faccio (2006), we manually collect firms' political connections data from the Bloomberg terminal

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[3] We select our sample period due to the availability of ESG disclosure from the Bloomberg and board network centrality data from the BoardEx.

by examining whether the CEO, president, vice-president, chairman, secretary or the board members or the highest 20 shareholders is/was a member of parliament, a minister, or closely related to a top politician or a political party or not. We collect firms' financial information, institutional ownership from Bloomberg and after excluding firms with missing data, we are left with a final sample of 1,854 firms-year observations across 200 firms during 2007 to 2018.

3.2 Measurements of dependent variables, independent variables and control variables

Following previous literature (Patel et al., 2021; Pham & Tran, 2020; Radu & Smailli, 2021), we measure firms' ESG disclosure based on the firms' environmental, social and corporate governance (ESG) disclosure scores from Bloomberg. Bloomberg ESG scores have been considered as the most comprehensive measure of firms' ESG disclosure since it tracks more than 300 different metrics covering all aspects of firms' ESG disclosure (Alareeni and Hamdan, 2020; Christensen et al., 2022; Grewal et al., 2020)[4]. We measure EPU in the UK based on UK EPU index from Baker et al. (2016) that is constructed from the news coverages "to capture uncertainty about who will make economic policy decisions, what economic policy actions will be undertaken and when, and the economic effects of policy actions (or inaction)" (pg. 1598). Consistent with the literature, we annualized the monthly UK EPU by calculating the mean of monthly EPU downloaded from https://www.policyuncertainty.com/uk_monthly.html website and take the natural log of annualized EPU (LNEPU) (Baker et al., 2016; Duong et al., 2020; Nguyen & Nguyen 2020).

Consistent with existing literature (Amin et al., 2020; Intintoli et al., 2018; Larcker et al., 2013; Renneboog & Zhao 2011), we measure board network centrality based on four different measures:

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[4] Further information on Bloomberg ESG disclosure score can be found at
https://data.bloomberglp.com/professional/sites/10/1148330431.pdf

degree centrality, closeness centrality, eigenvector centrality, and betweenness centrality where

the direct network (i.e., degree and eigenvector centrality) captures the power of the boards in their

network and the indirect network (i.e., closeness and betweenness centrality) captures the level of

connectedness in terms of information transfers through the boards[5]. Following the prior literature

(El-Khatib et al., 2015; Intintoli et al., 2018), we also aggregate these four measures into one single

board network centrality measure by taking the average of four board centrality measures

(CENTRAL). Following Amin et al. (2020), we also construct the board centrality for independent

board who serve on finance/investment/strategy committee and/or the executive committee (IA-

CENTRAL) as an alternative measure of board network centrality. Independent boards are more

likely to bring superior information that is beneficial (information advantages) to the firm than

non-independent boards. More importantly, independent boards who serve on

finance/investment/strategy committee and/or the executive committee have greater advisory roles

to the top management of the firm and advice they bring from their networks carry information

advantages to the firm. Consistent with Faccio (2006), we manually identify firms' political

connections from the Bloomberg by examining whether the CEO, president, vice-president,

chairman, secretary or the board members or the highest 20 shareholders is/was a member of

parliament, a minister, or closely related to a top politician or a political party (POLITICAL).

Based on existing literature (Brammer & Pavelin 2006; Horton et al., 2012; Larcker et al., 2013;

Money & Schepers, 2007; Nekhili et al., 2021), we also control for corporate governance and

firms' characteristics variables. Specifically, board size is the total number of executive and non-

executive directors sitting on the board as a proxy for complexity of board decision making. Board

independence is calculated as the number of independent non-executive directors divided by total

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[5] See Appendix A and Appendix B in Intintoli et al. (2018) for detailed descriptions and examples for four board centrality measures.

number of board members. We also control for CEO tenure, measured by the number of years the current CEO has served as the CEO of the firm. We use CEO's age as a proxy for CEO experience. We control for CEO education, measured by the number of qualifications at undergraduate level and above. CEO gender is a dummy variable equals to 1 if CEO is female and 0 otherwise. Interlocking board is used to represent less effective (busy) board, measured by a dummy variable equals to 1 if more than half of the directors hold three or more directorships and 0 otherwise. Institutional ownership is used to control for monitoring by large institutional investors measured by the percentage of shares held by institutional shareholders to total firm ordinary shareholdings. We also control for firm size, measured by the natural log of firms' total assets, profitability or ROA is defined as firms' profit before tax as percentage of total asset and firms' financial leverage defined as the ratio of total debt to total assets. Detailed variable definitions are reported in the Appendix.

3.3 Empirical models

We estimate two empirical models to test our three hypotheses stated above. To examine our first hypothesis (H1), we establish our baseline regression model as follow:

$$\text{ESG Disclosure }_{it} = \alpha + \beta_1 \text{ LNEPU}_t + \Sigma\gamma_i \text{ Controls}_{it} + \varepsilon_{it} \tag{1}$$

Where ESG Disclosure is measured as the aggregate environmental (ENV), social (SOC) and governance (GOV) disclosure scores of firm i in year t. EPU is measured by Baker et al.'s (2016) annualized EPU Index at year t and takes the natural log of EPU (LNEPU). Controls refer to a set of control variables, which are the board size (BODSIZE), board independence (INDEP), CEO tenure (CEOTENUR), CEO age (AGE), CEO education (EDU), CEO gender (WCEO), busy board

(INTERLOC), institutional ownership (INSTI), firm size (LNSIZE), profitability (ROA) and leverage (LEV).

To examine our second and third hypotheses (H2 and H3), we construct the following regression model:

$$\text{ESG Disclosure}_{it} = \alpha + \beta_1 \text{LNEPU}_t + \beta_2 \text{CENTRAL}_{it} + \beta_3 \text{LNEPU}_t \times \text{CENTRAL}_{it}$$

$$+ \beta_4 \text{POLITICAL}_{it} + \beta_5 \text{LNEPU}_t \times \text{POLITICAL}_{it}$$

$$+ \Sigma\gamma_i \text{Controls}_{it} + \varepsilon_{it} \qquad (2)$$

Where CENTRAL is calculated as the aggregate four centrality measures: degree centrality, closeness centrality, eigenvector centrality, and betweenness centrality (Intintoli et al., 2018; Larcker et al., 2013; Renneboog & Zhao 2011) or information advantage centrality (IA-CENTRAL) based on Amin et al. (2020). POLITICAL is an indicator variable whether a firm has political connection or not, where political connection is defined based on Faccio (2006). The moderating effect of board network centrality (CENTRAL or IA-CENTRAL) on the relationship between EPU (LNEPU) and firms' ESG is indicated by β_3 in model (2). The moderating effect of political connections (POLITICAL) on the relationship between EPU (LNEPU) and firms' ESG is indicated by β_5 in model (2). Controls refer to a set of control variables, which are the board size (BODSIZE), board independence (INDEP), CEO tenure (CEOTENUR), CEO age (AGE), CEO education (EDU), CEO gender (WCEO), busy board (INTERLOC), institutional ownership (INSTI), firm size (LNSIZE), profitability (ROA) and leverage (LEV).

We also include industry dummies in all the regressions. Consistent with existing EPU studies (Baker et al., 2016; Gulen & Ion 2016; Nguyen & Nguyen 2020), we do not include the year dummies in our models because the UK EPU is estimated annualized by taking the mean of monthly UK EPU within each year. Hence, including the year dummies causes a multicollinearity

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problem between year dummies and the EPU measure. We estimate our regression models using the pooled ordinary least square method with two-way clustering for standard errors of the slope coefficients (Petersen 2009). We report the variance inflation factor (VIF) in each of the regression results to indicate any potential multicollinearity problem.

4. Empirical Findings and Discussions

4.1 Descriptive statistics

Table 1 provides descriptive statistics for all the variables. On average, our sample firms have 35.56, 25.01, 38.15 and 57.44 on firms' ESG, environmental (ENV), social (SOC), and corporate governance (CGOV) disclosure scores respectively. This indicates that most UK firms listed in FTSE 530 index have better corporate governance disclosure score than social and environmental disclosure scores. The average score of economic policy uncertainty (EPU) during our sample period is 147.91. The average of board network centrality (CENTRAL) is 5.03. This average of ESG disclosure scores and board centrality measures are consistent with previous studies that examine UK listed firms (Renneboog & Zhao 2011; Horton et al., 2012). The average board information advantage centrality (IA-CENTRAL) is 2.98. We find that 30% of our sample firms have political connections through their top executives, board or top 20 shareholders (POLITICAL).

The average board size and percentage of independent boards are 9 and 60.48%. The averages of CEO tenure (CEOTENUR) and CEO age (CEOAGE) are 6.23 years and 54.22 years old. On average, CEOs in our sample firms earned close to two undergraduate degree qualifications (CEOEDU is 1.86). Approximately, 5% of CEOs are women (WCEO) and 24.92% of the boards have interlocking positions (%INTERLOC). The average of the top institutional investor

ownership (%INSTI) is 11.45%. On average, total assets is 10.072 billion pounds and firms' return on assets (ROA) and debt to total assets (LEV) are 7% and 24.07% respectively.

[Insert Table 1 here]

Table 2 presents the correlation coefficients for all variables that we use for our regression analyses. Consistent with recent literature (Amir et al., 2020; Dwekat et al., 2020; Vo et al., 2020), we find that firms' ESG disclosure scores (both overall ESG and disaggregated ENV, SOC and GOV) are positively correlated with board centrality measures. We also find that economic policy uncertainty (EPU and LNEPU) is positively correlated with firms' ESG disclosure scores (both overall ESG and disaggregated ENV, SOC and GOV), which lends support to our first hypothesis (H1). Board centrality measures (CENTRAL and IA-CENTRAL) are positively correlated with firms' ESG disclosure scores, while political connection (POLITICAL) is negatively correlated with firms' ESG disclosure scores. Firms' ESG disclosure scores are positively correlated with board size, percentages of independent board and institutional ownership but negatively correlated with CEO tenure. ESG disclosure scores are also positively correlated with CEO age, CEO level of education, women CEOs, percentage of interlocking directors, and firm size.

The correlation coefficients among independent variables are below 0.4 and therefore, it is less likely that we have a multicollinearity problem in our multivariate regression. We also estimated the variance inflation factors (VIFs) on Table 2 and at the bottom of each multivariate regression tables to ensure that our results are not driven by the potential multicollinearity issue.

[Insert Table 2 here]

4.2 Multivariate regression results

The multivariate regression results presented in Table 3 show that firms' overall ESG disclosure score (ESG) and individual components of ESG (ENV, SOC, and GOV) disclosure scores are positively associated with EPU. One percentage increase in EPU is associated with 3.77 increase in firms' overall ESG disclosure score and 2.746, 5.011, and 2.292 increase in firms' ENV, SOC and GOV scores, which represents 10.6%, 11%, 13.14% and 4% of the corresponding means (averages) of ESG, ENV, SOC and CGOV as presented in Table 1. Hence, the magnitudes of the relationship between EPU and firms' ESG disclosure are economically significant. Overall, we find strong empirical evidence to support our first hypothesis (H1) which may imply that firms tend to utilize ESG disclosure as a signal about their commitment to meet their stakeholders' interests when the EPU is heightened. This positive relationship may also suggest that when the information asymmetry between market participants increases during EPU (Baker et al., 2016), ESG disclosure may become a critical information dissemination channel to send credible signals to the stakeholders to reduce information asymmetry between the firm and its stakeholders.

In addition, we find firms with higher interlocking board, larger firms and higher institutional ownership are positively related to firms' ESG disclosure, while firms with higher financial leverage tend to have lower ESG disclosure. This latter finding is consistent with findings of recent literature (Amin et al., 2020; Bouchet et al., 2022).

[Insert Table 3 here]

We empirically test our second hypothesis (H2) by examining the moderating effect of the board network centrality on the relationship between economic policy uncertainty (EPU) and firms' ESG disclosure. The first four columns of Table 4 shows that the slopes of the interaction term between EPU and board centrality (LNEPU x CENTRAL) are negative and statistically significant for

firms' ESG disclosure (ESG) and three ESG disclosure components (ENV, SOC, and GOV). We find that board centrality moderates the relationship between EPU and ESG disclosure by approximately 0.371. Similarly, the last four columns of Table 4 present the slopes of the interaction term between EPU and board information advantage centrality based on Amin et al. (2020) (LNEPU x IA-CENTRAL) are negative and statistically significant. We find the board information advantage centrality moderates the relationship between EPU and ESG disclosure by 0.281. We find similar results across three pillars of ESG (ENV, SOC, and GOV). Therefore, we find empirical evidence to support our second hypothesis (H2) that firms with greater board network centrality tend to provide less ESG disclosure when EPU is heightened because higher board network centrality brings information advantages that reduces the information asymmetry between the firms and their stakeholders. Hence, the role of ESG disclosure as an information channel between the firm and its stakeholders during EPU decreases as board network centrality increases.

[Insert Table 4 here]

Table 4 also presents the moderating effect of political connections on the relationship between EPU and ESG disclosure. We find that the slopes of the interaction term between EPU and the firms with political connections (LNEPU x POLITICAL) are negative throughout all columns, regardless whether we use board network centrality (CENTRAL) or board information advantage centrality (IA-CENTRAL). We find that political connections moderate the relationship between EPU and ESG disclosure by approximately 0.506 to 0.529. Hence, we find evidence to support our third hypothesis (H3) that firms with political connections may reduce the need for ESG disclosure as an information channel between the firm and its stakeholders during EPU. We argue

that firms with political connections tend to have more access to superior information regarding their stakeholders and also establish indirect communication channels with their stakeholders during EPU, thus the need for the firms to send signals about their commitments to the stakeholders through the ESG disclosure may reduce.

4.3 Robustness tests

We perform several robustness tests to evaluate the reliability of our findings. First, we use the global economic policy uncertainty instead of UK EPU and our results (columns 1 to 4 of Table 5) are consistent with the results in Table 3. Second, we use the one-year lag of EPU as the independent variable and our results (columns 5 to 8 of Table 5) are similar to the results reported in Table 3. Third, we use one-year lag of Global EPU as the independent variable and our results (columns 9 to 12 of Table 5) remain the same as the results shown in Table 3. Fourth, we include the EPU-squared as an independent variable to examine the potential non-linear relationship between EPU and firms' ESG disclosure. Our results (untabulated) show that the estimated slopes of EPU-squared are statistically insignificant, hence the relationship between EPU and ESG disclosure is linear. Fifth, we use the fixed-effects panel data and the system of generalized method of moment (SGMM) estimation methods instead of pooled OLS regression estimation. Our untabulated results for both the fixed-effects and SGMM are also consistent with the results presented in Tables 3 and 4. Therefore, we believe that our main results are robust across different estimation methods that address endogeneity and reverse causality concerns.

[Insert Table 5 here]

4.4 Additional analyses

Since the literature has demonstrated the positive effect of ESG during the time of crisis (Godfrey et al., 2009; Hannah et al., 2021), we conduct additional analyses to examine the relationship between ESG disclosure and firms' financial performance and ESG performance when EPU is heightened. Specifically, we investigate the signaling outcomes of firms' ESG disclosure for both shareholders and stakeholders and the relationships between board centrality and political connections and ESG disclosure, financial and ESG performance[6], and the association between EPU and firms' ESG disclosure during two periods of conflicts (i.e. the global financial crisis or GFC and the Brexit). We argue that the shareholders are more concerned with the firms' value while the stakeholders are concerned with the firms' ESG performance. We use the Tobin's Q as a proxy for firms' value and ESG rating score to represent firms' ESG performance. We use the one-year lag of firms' ESG disclosure (ESG Disclosure (t-1)) as the independent variable and Tobin's Q and ESG performance score during the current year as the dependent variables to account for the lag of signaling from ESG disclosure on shareholders and stakeholders' perceptions about firms' commitments to meet their interests during the EPU. Literature has utilized Sustainalytics ESG rating score to measure firms' ESG performance and higher ESG scores indicate lower ESG risk ratings (e.g., Bendell & Huvaj 2020; Surroca et al., 2010; Wolf, 2014; Harjoto et al., 2022)[7]. While MSCI ESG (KLD) is considered as the most widely used database to measure firms' ESG (CSR) performance (e.g., Chen et al., 2019b; Gul et al., 2020), we also construct firms' ESG (CSR) performance from the MSCI ESG database (MSCI ESG performance) as a robustness test. The MSCI ESG Stats 2018 database manual shows that the MSCI ESG Stats

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[6] ESG disclosure score is based on the firm's disclosures through various reports issued by the company on their Environmental, Social, and Governance (ESG) activities collected from the Bloomberg ESG disclosure (Christensen et al., 2022; Grewal et al., 2020). ESG performance is measured by the Sustainalytics ESG Risk Rating score represents firm's social responsibility performance across various stakeholder groups, i.e., environment, employees, customers, suppliers, and communities (Bendell and Huvaj, 2020, p.689).

[7] The firms' ESG risk rating score is compiled from the Sustainalytics database and the methodology to construct the ESG risk rating score is available at https://connect.sustainalytics.com/esg-risk-ratings-methodology.

Universe E database contains UK firms listed in the MSCI Europe Investible Market Index (IMI)[8], which allow us to collect ESG scores for UK firms from the MSCI ESG Stats database.

First, we investigate the moderating effect of ESG disclosure during year (t-1) on the relationship between EPU and firms' value and ESG performance during year(t) across all sample, a subsample of firms with below median board centrality and a subsample of firms with above median board centrality. The first column of Table 6 shows that EPU is negatively associated with firms' value (Tobin's Q) by 0.532. However, firms' ESG disclosure moderates the negative relationship between EPU and firms' value for the full sample by 0.012. This implies that ESG disclosure indeed provides a positive signal to the shareholders that reduces the negative relationship between EPU and firms' financial performance for firms with greater ESG disclosure. The second and third columns of Table 6 show that the significant moderating effect of firms' ESG disclosure is driven by the subsample of firms with board centrality below the median (second column) while the moderating effect for firms' ESG disclosure is not statistically significant for the subsample of above median board centrality (third column). This indicates that the shareholders only value the signaling role of ESG disclosure when firms' board centrality is low. Hence, the signaling role of ESG disclosure to the shareholders become less important for firms with greater board centrality. Using ESG performance from Sustainalytics, the fourth column of Table 6 shows that the EPU is positively associated with firms' ESG performance score by 4.929. The result is consistent with findings from existing studies (Dai et al., 2020; Zhang et al., 2020). More importantly, we find that firms' ESG disclosure positively moderates the relationship between EPU and firms' ESG performance for the full sample by 0.108. The fifth and sixth columns of Table 6 show that the positive and significant moderating effect of firms' ESG disclosure is driven by the subsample of

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[8] See https://wrds-www.wharton.upenn.edu/documents/1454/MSCI_ESG_KLD_STATS_2018_Data_Set_Methodology_Final.pdf

firms with board centrality below the median (fifth column) while the moderating effect for firms'

ESG disclosure is not statistically significant for the subsample of firms with above median board

centrality (sixth column). Similarly, when we use the MSCI ESG Stats database to construct firms'

ESG performance, the seventh column of Table 6 indicates that firms' ESG disclosure positively

moderates the relationship between EPU and firms' ESG performance for the full sample.

Moreover, the positive and significant moderating effect of firms' ESG disclosure is only found

when the board centrality is below the median (eighth column). This indicates that the stakeholders

value the signaling role of ESG disclosure when firms' board centrality is low.

[Insert Table 6 here]

Second, we examine the moderating effect of ESG disclosure during year (t-1) on the relationship

between EPU and firms' value and ESG performance during year(t) across a subsample of firms

with political connections and a subsample of firms without political connections[9]. The first two

columns of Table 7 show that the moderating effect of firms' ESG disclosure on firms' value is

driven by the subsample of firms without political connections (second column). This implies that

shareholders only value the signaling role of ESG disclosure when firms have no political

connections. The third and fourth columns of Table 7 show that the moderating effect of firms'

ESG disclosure on firms' ESG performance (measured by ESG score from the Sustainalytics) is

only significant for a subsample of firms without political connections (fourth column). Similarly,

the fifth and sixth column of Table 7 that the moderating effect of firms' ESG disclosure on firms'

ESG performance (measured by ESG score from the MSCI ESG) is only significant for a

subsample of firms without political connections (sixth column). Hence, we find that both

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[9] We do not report the full sample in Table 6 since the full sample results are the same as the full sample results in Table 5.

shareholders and stakeholders value the ESG disclosure to moderate the negative relationship between EPU and firm value and ESG performance when firms do not have political connections. Overall, those results provide further evidence to support our hypotheses that firms' ESG disclosure acts as a critical signal to both shareholders and stakeholders and that board centrality and political connections moderate the need for ESG disclosure as a valuable signal to both shareholders and stakeholders.

[Insert Table 7 here]

Finally, we identify two major economic and policy uncertainties/conflicts during our sample period (i.e., the Global Financial Crisis (GFC) during 2007 to 2009 and the Brexit referendum (BREXIT) during 2016 to 2018). Specifically, during the Global Financial Crisis (GFC), there was a period of global conflict characterized by financial turmoil, government interventions, regulatory debates, and economic challenges (Johnstone et al., 2019). Similarly, the Brexit referendum, which took place in 2016, was a significant period of conflict in the context of the UK's relationship with the European Union (EU). The referendum campaign was marked by intense debates and conflicts, both within the political establishment and among the general public (Hill et al., 2019). Therefore, we conduct further investigations during these two periods where UK economic and policy uncertainty were heightened and the conflicts among stakeholders (i.e. shareholders, employees, customers, environment, community, and society in general) were expected to be higher. First, we examine the relationship between EPU and ESG disclosure during GFC and Brexit by re-estimating the regression on Table 3. The results reported in Table 8 show that firms' ESG disclosures are indeed higher during these two periods of conflicts (GFC and Brexit). The EPU during the GFC increases the ESG disclosure score by 4.833 and the EPU during the Brexit

increases ESG disclosure score by 5.329. Thus, we find evidence to further support our first hypothesis (H1) that firms tend to provide greater ESG disclosure as a signal to their stakeholders especially during the periods where conflicts among stakeholders are expected to be heightened.

[Insert Table 8 here]

Second, we examine the moderating effects of board centrality (CENTRAL) and board with political connections (POLITICAL) during these two periods of conflicts. Based on the slopes of three-way interaction variables between board centrality and EPU during GFC and Brexit, the results presented in the first column of Table 9 show that the association of GFC and Brexit on the moderating effect of board centrality is negative and significant (-2.268 and -2.051), which implies that firms with greater board centrality during these two periods of conflicts provided less ESG disclosures. Thus, our findings provide additional evidence in support of both our H2 and the resource-based view. We observed that greater board centrality leads to the establishment of more efficient information channels between the firm and its stakeholders. As a result, the demand for ESG disclosure as an information channel during periods of conflicts is reduced.

The first column of Table 9 also shows that the slopes of three-way interactions between board with political connections and EPU during GFC and Brexit are negative and significant (-1.378 and -0.807), especially for the environmental (-1.394 and -0.758) and social disclosures (-1.432 and -0.808). This implies that firms with politically connected boards during these two periods of conflicts provided less environmental and social disclosures. Therefore, we find more evidence to support our H3 and the resource-based view that political connections through the firm's boards bring valuable insights, information and critical connections that reduces needs for ESG disclosure

as a signal for an information channel between the firm and its stakeholders during periods of heightened conflicts.

Furthermore, we find that the slopes of LNEPU during the GFC and Brexit are still positive and significant, which supports our H1 that during these two periods of conflicts, firms tend to provide more ESG disclosures. We also find the slopes of interaction variables between board centrality and the GFC and Brexit are negative. This provides further evidence to support H2 that firms with greater board centrality also provide less disclosure, especially environmental and social disclosure, during the GFC and Brexit periods. Similarly, we find the slopes of interaction variables between board with political connections and the GFC and Brexit are negative, which further support our H3 that firms with politically connected board tend to provide less disclosure especially environmental and social disclosure, during the GFC and Brexit periods.

[Insert Table 9 here]

5. Conclusion

As the political divide and conflicts among countries around the world continue to rise, economic policy uncertainty (EPU) has become major concerns for corporate managers. Along with increasing EPU, the growing pressure for environmental, social and corporate governance (ESG) disclosure have attracted corporate managers to utilize ESG disclosure as an information channel (signal) to build and to maintain the firm's reputation among its stakeholders. While recent literature has examined the relationship between EPU and firms' ESG performance, our timely study focuses on the relationship between EPU and firms' ESG disclosure. ESG disclosure differs from ESG performance since the main goal of providing ESG disclosure is to disseminate information about firms' ESG initiatives and to reduce information asymmetry between the firm

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and its stakeholders. Our study also differs from existing studies that examine the relationship between EPU and ESG performance (Dai et al., 2020; Zhang et al., 2020) by examining the moderating effects of board network centrality and political connections on the relationship between firms' ESG disclosure and EPU.

Our study strives to make a conceptual contribution by employing the signaling theory to explain the rationale for firms to provide greater ESG disclosure during EPU in order to send positive signals to their stakeholders. We also conceptualize the moderating effect of board centrality and political connections from the resource-based view and argue that greater board centrality and political connections bring rare, inimitable and non-substitutable resources in a form of valuable information to the firm. Greater board centrality and higher political connections may bring information advantages to the firm and firms can also disseminate information to their stakeholders such that it reduces information asymmetry and the need for signaling through ESG disclosure.

Our study offers practical insights for corporate managers aiming to preserve and enhance their firms' competitive advantages by maintaining stakeholders support through greater ESG disclosure during periods of heightened EPU. Our finding indicates that boards with greater social network (centrality) and political connections enable firms to gain access to information channels with their stakeholders, reducing the need for greater ESG disclosure when EPU is heightened. Greater board network centrality and higher political connections act as substitutes for ESG disclosure that moderate the relationship between EPU and firms' financial and ESG performance. The latter finding also raises a concern to our society as global political and economic conflicts persist, major corporations are expected to continue to seek for political connections to protect their competitive advantages. Hence, we expect that corporate engagement in political processes that allow them to gain and maintain supports and connections with politicians are expected to

increase. Thus, this trend is likely to escalate existing political divisions during periods of heightened conflict.

Our study advances the existing literature that examine the relationship between EPU and corporate strategic decision (i.e., ESG disclosure), corporate governance, and corporate political activity by demonstrating that firms' information advantages through board network centrality and political connections play an important role to moderate the relationship between EPU and firms' ESG disclosure. Our study also extends recent literature that demonstrates a positive relationship between EPU and firms' ESG performance (Qureshi et al., 2023; Zheng & Chen, 2023). Specially, we document that increased ESG disclosure during heightened EPU is associated with greater subsequent financial and ESG performance. Thus, greater ESG disclosure during EPU serves as a signal of firms' commitments to stakeholders that are valued by both investing stakeholders (shareholders) and non-investing stakeholders.

Future studies could further explore the relationship between EPU and firms' ESG disclosure and the role of board centrality from different theoretical perspectives such as fairness, coalitions, solidarity, and social collective actions. Our study also limited to the sample period between 2007-2018. Recent developments in mandatory climate (ESG) disclosure regulations, such as the UK Climate-related Financial Disclosure Regulations (2022) (Glen & Hands, 2021) and the European Union's Sustainable Finance Disclosure Regulation (SFDR) (EU, 2019) could potentially impact our findings. Notably, recent studies show that the effect of mandatory ESG disclosure is still mixed (Gerged et al., 2021; Krueger et al., 2023). Hence, future studies could explore the relationship between EPU and ESG disclosure during both pre- and post-mandatory ESG disclosure periods across different countries and industries.

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APPENDIX

Variable Definitions

Variables	Definitions
ESG Disclosure	Firms' environmental, social, and corporate governance score. It represents the firms' overall ESG disclosures.
ENV Disclosure	Firms' environmental measures a company's disclosure on its impact on living and non-living natural systems, including the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long-term shareholder value.
SOC Disclosure	Firms' social measures a company's disclosure on its capacity to generate trust and loyalty with its workforce diversity, society (community), and customer relations through its use of best management practices. It reflects the company's social reputation and its ability to generate long-term shareholder value.
GOV Disclosure	Firms' corporate governance measures a company's disclosure on its systems and processes, which ensure that its board members and executives act in the best interests of its long-term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long-term shareholder value.
LNEPU	Natural log of UK economic policy uncertainty (UK EPU) or natural log of EPU score for the United Kingdom (Baker et al., 2016)
CENTRAL	Board network centrality defined as the composite of board degree, closeness, eigenvector and betweenness centrality that represents greater information advantages the board could bring to the company through their social networks.
IA-CENTRAL	Board information advantage centrality based on the network centrality for independent directors who serve on finance/investment/strategy and/or executive committee (Amin et al., 2020).
POLITICAL	Firm's political connections is equal to one if at least one of its top 20 shareholders or one of top officers (CEO, president, vice-president, chairman, or secretary or one of the board members is/was a member of parliament, a minister, or is closely related to a top politician or a political party or zero otherwise (Faccio, 2006).
Control variables:	
BODSIZE	Number of executive and non-executive directors sitting on the board.
%INDEP	% independent non-executive directors sitting on the board.
CEOTENUR	Number of years of CEO tenure.
CEOAGE	CEO age.
CEOEDU	The number of qualifications at undergraduate level and above.
WCEO	Dummy variable that equals 1 if CEO is female, 0 otherwise.
INTERLOC	Dummy variable equals to 1 if more than half of the directors hold three or more directorships and 0 otherwise.
%INSTI	The percentage of shares held by institutional shareholders to total firm ordinary shareholdings.
LNSIZE	Natural log of firm total assets (TOTAL ASSET is in million Pound).
ROA	Firms' return on assets.
LEV	Firms' total debt to total assets.

Figure 1
ESG Disclosure and EPU
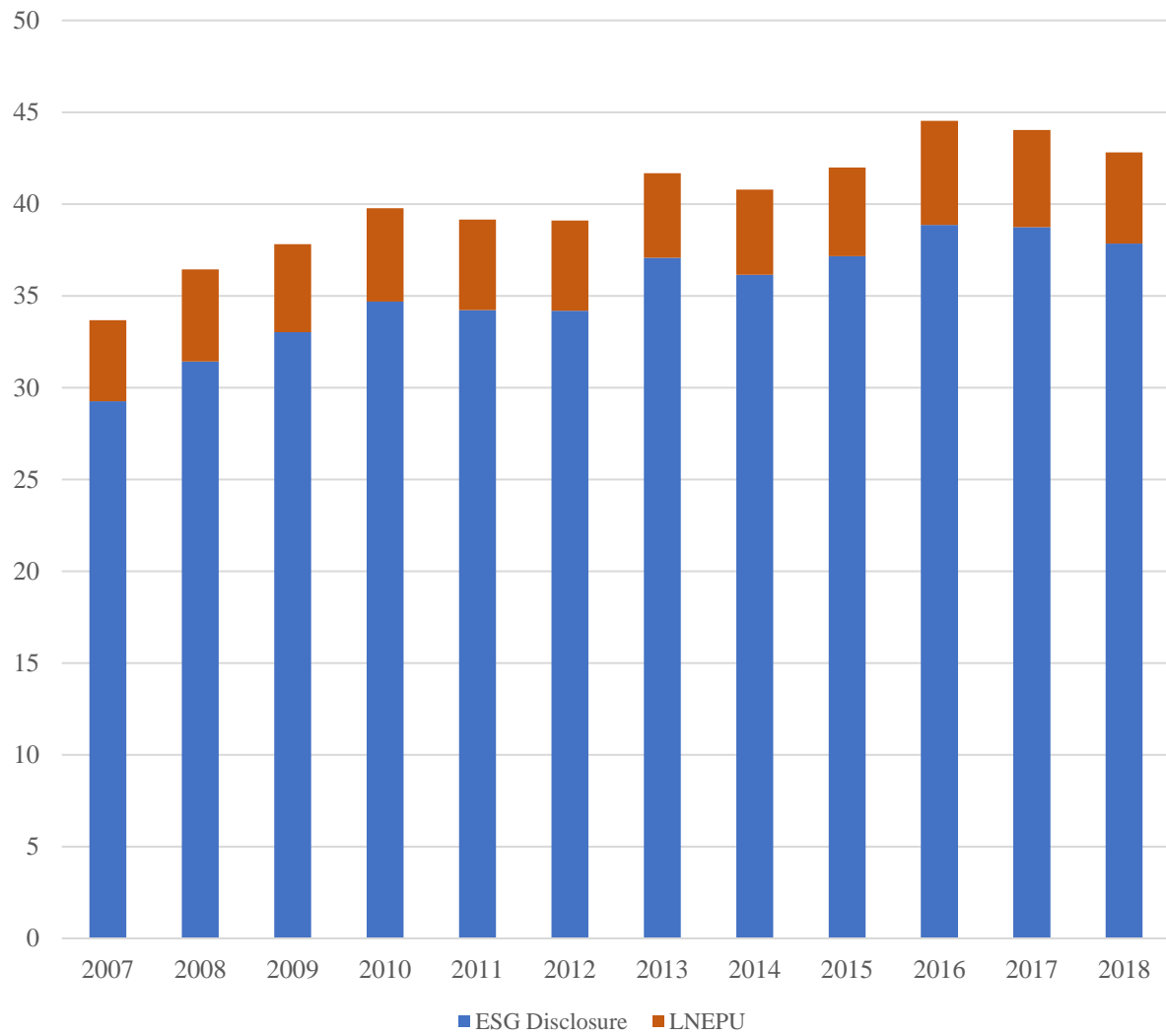
Figure 2
The Relationship between ESG and EPU and the Moderating effects of Board Network Centrality and Political Connections
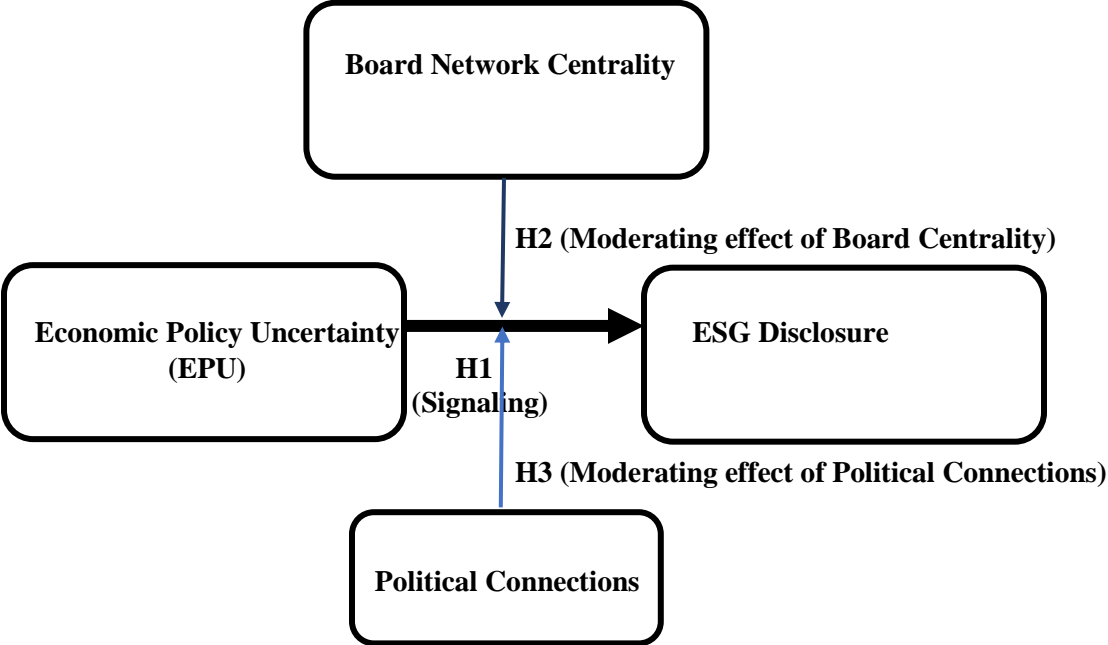
Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	p25	Median	p75	Max
ESG Disclosure	1,854	35.56	11.22	11.11	27.27	33.88	41.83	70.12
ENV Disclosure	1,854	25.01	14.03	1.55	14.73	22.48	33.33	68.60
SOC Disclosure	1,854	38.15	13.11	8.77	28.07	38.60	43.86	89.47
GOV Disclosure	1,854	57.44	7.09	33.93	53.57	57.14	62.50	82.14
EPU	1,854	147.91	54.44	82.75	116.52	134.42	160.90	289.14
CENTRAL	1,854	5.03	2.32	1.42	3.4	4.76	6.16	18.02
IA-CENTRAL	1,854	2.98	3.08	0	0.32	1.98	5.36	11.48
POLITICAL	1,854	0.30	0.46	0	0	0	1	1
%INDEP	1,854	60.48	12.84	0	50	60	70	92.86
CEOTENUR	1,854	6.23	5.93	0.08	2.08	4.75	8.48	41.5
CEOAGE	1,854	54.22	5.39	35	51	54	57	77
CEOEDU	1,854	1.86	1.10	0	1	2	3	6
WCEO	1,854	0.05	0.22	0	0	0	0	1
%INTERLOC	1,854	24.92	29.01	0	0	16.67	50	100
%INSTI	1,854	11.45	3.32	0	9.75	11.48	12.66	46.06
TOTAL ASSET	1,854	10,072.11	28,546.06	40.09	800.62	2,092.2	5,407.8	305,690
ROA	1,854	7.00	9.16	-68.95	3.20	6.17	10.45	72.03
LEV	1,854	24.07	17.37	0.00	10.84	22.87	34.58	81.45

See Appendix for variables definitions.

Table 2. Correlation Matrix

No	Variables	VIF	1	2	3	4	5	6	7	8	9
1	ESG Disclosure	-	1								
2	ENV Disclosure	2.58	0.95*	1							
3	SOC Disclosure	2.00	0.81*	0.66*	1						
4	GOV Disclosure	2.03	0.76*	0.67*	0.56*	1					
5	LNEPU	1.04	0.11*	0.08*	0.14*	0.08*	1				
6	CENTRAL	1.63	0.22*	0.19*	0.19*	0.19*	0.07*	1			
7	IA-CENTRAL	1.45	0.09*	0.06*	0.12*	0.08*	0.08	0.54*	1		
8	POLITICAL	1.12	-0.19*	-0.16*	-0.20*	-0.19*	0.01	0.06*	0.05	1	
9	BODSIZE	1.69	0.39*	0.37*	0.30*	0.40*	-0.03	0.19*	0.05	0.30*	1
10	%INDEP	1.44	0.37*	0.35*	0.34*	0.27*	0.12*	0.30*	0.16*	0.07*	0.16*
11	CEOTENUR	1.23	-0.09*	-0.09*	-0.04	-0.08*	0.01	-0.11*	-0.07*	-0.02*	-0.01
12	CEOAGE	1.20	0.10*	0.09*	0.09*	0.12*	0.03	-0.01	0.03	0.16*	0.12*
13	CEOEDU	1.09	0.11*	0.15*	0.13*	0.19*	-0.01	0.04	0.01	0.10*	0.19*
14	WCEO	1.04	0.07*	0.06*	0.08*	0.04	0.06*	0.05*	0.05	-0.01	0.001
15	%INTERLOC	1.18	0.17*	0.14*	0.18*	0.11*	0.10*	0.25*	0.18*	-0.01*	-0.05*
16	%INSTI	1.11	0.19*	0.18*	0.17*	0.13*	-0.03	-0.16*	-0.10*	-0.06*	-0.12*
17	SIZE	2.92	0.65*	0.62*	0.49*	0.57*	0.06*	0.30*	0.14*	0.24*	0.61*
18	ROA	1.12	0.12*	0.09*	0.14*	0.11*	-0.09*	-0.01	-0.02	-0.02	-0.01
19	LEV	1.18	0.01*	0.06*	0.04	0.06*	0.02	0.02	0.04	0.07*	0.14*

No	Variables	10	11	12	13	14	15	16	17	18
10	%INDEP	1								
11	CEOTENUR	-0.19*	1							
12	CEOAGE	0.05*	0.27*	1						
13	CEOEDU	0.11*	0.08*	0.10*	1					
14	WCEO	0.08*	-0.05*	-0.09*	0.07*	1				
15	%INTERLOC	0.25*	-0.04	-0.11*	0.005	0.05*	1			
16	%INSTI	-0.21*	-0.002	0.03	-0.07*	0.03	-0.11*	1		
17	SIZE	0.32*	-0.18*	0.13*	0.15*	0.03	0.07*	-0.18*	1	
18	ROA	-0.06*	0.08*	0.02	-0.05*	-0.02	-0.09*	-0.06*	-0.17*	1
19	LEV	-0.001	-0.13*	-0.05*	0.06*	-0.03	-0.02	-0.03	0.27*	-0.19*

* indicates statistically significant at 5% level. See Appendix for variables definitions.

Table 3. The relationship between EPU and ESG Disclosure

Variables	ESG Disclosure	ENV Disclosure	SOC Disclosure	GOV Disclosure
LNEPU	**3.770*****	**2.746****	**5.011*****	**2.292*****
	(4.473)	**(2.236)**	**(6.019)**	**(2.989)**
BODSIZE	0.252	0.170	0.342	0.302**
	(1.019)	(0.532)	(1.125)	(2.028)
%INDEP	0.082***	0.094**	0.147***	-0.001
	(2.865)	(2.370)	(3.928)	(-0.053)
CEOTENUR	0.059	0.059	0.128	-0.014
	(0.922)	(0.703)	(1.354)	(-0.387)
CEOAGE	0.010	0.008	-0.015	0.048
	(0.133)	(0.080)	(-0.159)	(1.013)
CEOEDU	0.295	0.391	-0.066	0.485*
	(0.764)	(0.729)	(-0.147)	(1.861)
WCEO	2.402	2.116	3.656	1.060
	(1.129)	(0.773)	(1.351)	(0.965)
%INTERLOC	0.036***	0.038**	0.038***	0.017**
	(3.214)	(2.437)	(2.745)	(2.333)
%INSTI	0.235**	0.262**	0.328***	0.072
	(2.520)	(2.034)	(2.689)	(1.186)
SIZE	3.940***	4.937***	3.059***	2.259***
	(9.891)	(9.191)	(6.484)	(8.621)
ROA	-0.014	0.020	-0.083	-0.004
	(-0.268)	(0.315)	(-1.151)	(-0.161)
LEV	-0.061**	-0.074*	-0.059*	-0.027
	(-2.138)	(-1.954)	(-1.666)	(-1.599)
Intercept	-6.171	-20.551**	-2.948	31.005***
	(-0.867)	(-2.203)	(-0.357)	(7.672)
Industry dummies	Yes	Yes	Yes	Yes
Observations	1,854	1,854	1,854	1,854
Adj. R-squared	0.515	0.455	0.387	0.401
Variance inflation factors (VIFs)	1.98	2.01	1.99	1.98

***, **, and * indicate statistically significant at 1%, 5% and 10% level respectively. The robust standard errors of the slope coefficients are clustered based two-way clustering of firm and year (Petersen, 2009). See Appendix for variables definitions.

Table 4. Moderating Effects of Board Centrality and Political Connections on the Relationship between EPU and ESG Disclosure

Variables	ESG Disclosure	ENV Disclosure	SOC Disclosure	GOV Disclosure	ESG Disclosure	ENV Disclosure	SOC Disclosure	GOV Disclosure
LNEPU	2.819***	1.785*	4.338***	1.425***	2.842***	1.978**	4.711***	1.460***
	(3.359)	(1.830)	(3.531)	(2.633)	(4.078)	(2.077)	(5.183)	(2.796)
CENTRAL	1.767*	1.442*	1.679*	1.274*				
	(1.893)	(1.813)	(1.906)	(1.694)				
LNEPU x CENTRAL	*-0.371****	*-0.317***	*-0.356***	*-0.250***				
	(-2.818)	*(-2.130)*	*(-2.423)*	*(-2.587)*				
IA-CENTRAL					1.323*	1.071*	1.979*	0.422*
					(1.818)	(1.919)	(1.898)	(1.716)
LNEPU x IA-CENTRAL					*-0.281****	*-0.245***	*-0.389****	*-0.187**
					(-2.718)	*(-2.116)*	*(-2.880)*	*(-1.744)*
POLITICAL	-1.149**	-3.405**	-7.372*	-3.217	-1.288**	-3.358**	-7.496*	-3.393
	(-2.229)	(-2.499)	(-1.844)	(-0.862)	(-2.256)	(-2.495)	(-1.769)	(-0.896)
LNEPU x POLITICAL	*-0.506***	*-0.261***	*-1.634***	*-0.663**	*-0.529***	*-0.258***	*-1.646***	*-0.701**
	(-2.531)	*(-2.198)*	*(-2.402)*	*(-1.919)*	*(-2.554)*	*(-2.198)*	*(-2.418)*	*(-1.956)*
BODSIZE	0.300	0.251	0.362	0.301*	0.295	0.238	0.359	0.306**
	(1.167)	(0.754)	(1.136)	(1.953)	(1.155)	(0.723)	(1.131)	(2.021)
%INDEP	0.082***	0.096**	0.148***	-0.004	0.082***	0.095**	0.145***	-0.003
	(2.886)	(2.419)	(3.938)	(-0.206)	(2.844)	(2.394)	(3.880)	(-0.147)
CEOTENUR	0.057	0.054	0.132	-0.014	0.056	0.052	0.134	-0.015
	(0.890)	(0.643)	(1.393)	(-0.386)	(0.874)	(0.618)	(1.418)	(-0.421)
CEOAGE	0.018	0.022	-0.012	0.049	0.019	0.024	-0.015	0.050
	(0.237)	(0.210)	(-0.133)	(1.030)	(0.253)	(0.239)	(-0.164)	(1.042)
CEOEDU	0.340	0.458	-0.032	0.484*	0.332	0.451	-0.036	0.478*
	(0.868)	(0.838)	(-0.072)	(1.819)	(0.846)	(0.827)	(-0.081)	(1.795)
WCEO	2.522	2.319	3.740	1.061	2.520	2.340	3.658	1.076
	(1.233)	(0.884)	(1.405)	(0.978)	(1.235)	(0.899)	(1.366)	(0.989)
%INTERLOC	0.037***	0.040**	0.039***	0.017**	0.037***	0.040**	0.037***	0.018**
	(3.241)	(2.521)	(2.792)	(2.266)	(3.261)	(2.523)	(2.653)	(2.369)
%INSTI	-0.239**	-0.269**	-0.332***	-0.069	-0.243***	-0.274**	-0.331***	-0.073
	(-2.577)	(-2.120)	(-2.746)	(-1.110)	(-2.629)	(-2.165)	(-2.713)	(-1.168)
SIZE	4.072***	5.145***	3.162***	2.255***	4.066***	5.138***	3.123***	2.270***
	(10.107)	(9.452)	(6.885)	(8.424)	(10.119)	(9.495)	(6.733)	(8.473)
ROA	-0.008	0.028	-0.080	-0.003	-0.008	0.027	-0.082	-0.003
	(-0.165)	(0.448)	(-1.159)	(-0.119)	(-0.170)	(0.440)	(-1.169)	(-0.104)
LEV	-0.059**	-0.072*	-0.057*	-0.026	-0.059**	-0.071*	-0.058*	-0.027
	(-2.097)	(-1.891)	(-1.666)	(-1.545)	(-2.099)	(-1.883)	(-1.662)	(-1.579)
Intercept	-17.560**	-30.774***	-14.570	23.975***	-12.694*	-26.776***	-11.225	28.710***
	(-2.177)	(-2.823)	(-1.418)	(4.187)	(-1.740)	(-2.800)	(-1.268)	(6.303)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854
Adj. R-squared	0.518	0.454	0.392	0.401	0.516	0.457	0.389	0.400
Variance inflation factors (VIFs)	6.36	6.44	6.37	6.39	4.96	4.56	4.44	4.49

***, **, and * indicate statistically significant at 1%, 5% and 10% level respectively.

The robust standard errors of the slope coefficients are clustered based two-way clustering of firm and year (Petersen, 2009). See Appendix for variables definitions.

Table 5. Global Economic Policy Uncertainty (Global EPU) and one-year lag of UK EPU and one-year lag of Global EPU as instrumental variable for UK EPU

Variables	ESG	ENV	SOC	GOV	ESG	ENV	SOC	GOV	ESG	ENV	SOC	GOV
lnGlobalEPU	3.354***	2.381**	5.838***	1.687***								
	(4.315)	(2.288)	(6.212)	(2.664)								
lnlagUKEPU					2.167***	1.712***	3.439***	1.153***				
					(4.924)	(2.981)	(6.640)	(3.044)				
lnlagGlobalEPU									3.824***	2.809***	6.501***	2.097***
									(4.994)	(2.720)	(6.969)	(3.478)
BODSIZE	0.291	0.216	0.375	0.321**	0.291	0.219	0.370	0.322**	0.293	0.219	0.377	0.324**
	(1.159)	(0.667)	(1.240)	(2.157)	(1.163)	(0.676)	(1.225)	(2.170)	(1.176)	(0.678)	(1.254)	(2.187)
%INDEP	0.079***	0.093**	0.139***	-0.001	0.080***	0.094**	0.142***	-0.001	0.076***	0.091**	0.134***	-0.004
	(2.749)	(2.338)	(3.739)	(-0.062)	(2.795)	(2.349)	(3.830)	(-0.042)	(2.622)	(2.269)	(3.609)	(-0.173)
CEOTENUR	0.036	0.033	0.106	-0.023	0.038	0.034	0.111	-0.022	0.027	0.026	0.091	-0.028
	(0.543)	(0.379)	(1.129)	(-0.636)	(0.567)	(0.385)	(1.170)	(-0.617)	(0.402)	(0.298)	(0.974)	(-0.789)
CEOAGE	0.016	0.016	-0.017	0.052	0.014	0.015	-0.020	0.051	0.025	0.023	-0.002	0.057
	(0.197)	(0.145)	(-0.176)	(1.083)	(0.170)	(0.133)	(-0.213)	(1.057)	(0.308)	(0.208)	(-0.018)	(1.192)
CEOEDU	0.372	0.510	-0.029	0.502*	0.362	0.506	-0.051	0.498*	0.384	0.521	-0.011	0.510*
	(0.928)	(0.902)	(-0.065)	(1.869)	(0.905)	(0.897)	(-0.116)	(1.857)	(0.959)	(0.922)	(-0.026)	(1.902)
WCEO	2.214	1.919	3.462	0.974	2.274	1.948	3.597	0.998	2.254	1.945	3.537	0.984
	(1.025)	(0.694)	(1.248)	(0.886)	(1.054)	(0.705)	(1.300)	(0.908)	(1.034)	(0.702)	(1.255)	(0.885)
%INTERLOC	0.029**	0.033**	0.026*	0.014*	0.031***	0.034**	0.031**	0.015**	0.025**	0.029*	0.019	0.011
	(2.508)	(2.001)	(1.883)	(1.883)	(2.705)	(2.083)	(2.186)	(2.014)	(2.066)	(1.749)	(1.338)	(1.489)
%INSTI	-0.234**	-0.268**	-0.310***	-0.075	-0.232**	-0.265**	-0.310***	-0.074	-0.212**	-0.251*	-0.274**	-0.063
	(-2.519)	(-2.059)	(-2.682)	(-1.237)	(-2.494)	(-2.040)	(-2.654)	(-1.213)	(-2.351)	(-1.949)	(-2.554)	(-1.025)
SIZE	3.846***	4.820***	2.980***	2.258***	3.841***	4.812***	2.976***	2.254***	3.844***	4.818***	2.978***	2.255***
	(9.591)	(8.859)	(6.495)	(8.780)	(9.579)	(8.846)	(6.490)	(8.765)	(9.662)	(8.895)	(6.550)	(8.799)
ROA	-0.020	0.011	-0.089	-0.006	-0.023	0.009	-0.094	-0.007	-0.019	0.011	-0.087	-0.005
	(-0.382)	(0.170)	(-1.246)	(-0.220)	(-0.436)	(0.141)	(-1.328)	(-0.267)	(-0.368)	(0.178)	(-1.247)	(-0.192)
LEV	-0.058**	-0.073*	-0.054	-0.026	-0.058**	-0.072*	-0.054	-0.026	-0.056*	-0.071*	-0.050	-0.025
	(-2.047)	(-1.918)	(-1.546)	(-1.532)	(-2.043)	(-1.911)	(-1.544)	(-1.526)	(-1.968)	(-1.874)	(-1.441)	(-1.446)
Intercept	-12.198	-24.599**	-13.861	27.846***	-6.275	-21.221**	-2.011	30.532***	-14.622*	-26.822**	-17.301**	25.786***
	(-1.549)	(-2.345)	(-1.569)	(6.350)	(-0.821)	(-2.108)	(-0.235)	(7.564)	(-1.830)	(-2.458)	(-1.990)	(5.795)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854
Adj. R-squared	0.523	0.462	0.399	0.419	0.523	0.463	0.398	0.419	0.525	0.463	0.405	0.421

***, **, and * indicate statistically significant at 1%, 5% and 10% level respectively.

Table 6. The Effect of Board Centrality on the Relationship between ESG Disclosure, Financial and ESG Performance

Variables	All Sample Tobin's Q	Below Median Board Centrality Tobin's Q	Above Median Board Centrality Tobin's Q	All Sample Sustainalytics ESG Perform.	Below Median Board Centrality Sustainalytics ESG Perform.	Above Median Board Centrality Sustainalytics ESG Perform.	All Sample MSCI ESG Performance	Below Median Board Centrality MSCI ESG Performance	Above Median Board Centrality MSCI ESG Performance
LNEPU	-0.532**	-0.511***	-0.512*	4.929***	4.064***	4.463	2.075*	3.061*	1.859
	(-2.699)	(-2.594)	(-1.689)	(2.881)	(3.095)	(1.560)	(1.836)	(1.782)	(0.966)
ESG Disclosure	0.046*	0.066*	0.053	0.197*	0.630*	0.245	0.312**	0.466**	0.222*
	(1.918)	(1.757)	(1.462)	(1.810)	(1.662)	(0.743)	(2.168)	(2.011)	(1.889)
LNEPU x ESG Disclosure	*0.012***	*0.017***	0.012	*0.108***	*0.189****	0.023	*0.047**	*0.083**	0.024
	(2.600)	*(2.302)*	(1.581)	*(2.296)*	*(2.629)*	(0.353)	*(1.719)*	*(1.963)*	(0.460)
BODSIZE	0.136***	0.090**	0.195***	-0.085	0.145	-0.399	0.036	0.101	0.233*
	(4.925)	(2.547)	(5.883)	(-0.390)	(0.523)	(-1.422)	(0.421)	(1.070)	(1.804)
%INDEP	0.006**	0.003	0.009**	0.047	0.040	0.042	0.001	-0.001	0.002
	(2.118)	(0.875)	(2.327)	(1.611)	(0.973)	(1.284)	(0.056)	(-0.082)	(0.090)
CEOTENUR	-0.003	-0.005	0.007	-0.043	-0.018	-0.095	-0.003	0.005	-0.043
	(-0.414)	(-0.515)	(0.633)	(-0.674)	(-0.240)	(-1.119)	(-0.215)	(0.259)	(-1.362)
CEOAGE	-0.002	0.002	-0.011	-0.050	-0.071	-0.061	-0.042*	-0.024	-0.076**
	(-0.243)	(0.174)	(-1.226)	(-0.828)	(-1.035)	(-0.763)	(-1.852)	(-0.925)	(-2.544)
CEOEDU	-0.021	0.002	-0.050	-0.126	0.202	-0.328	-0.027	-0.087	0.060
	(-0.707)	(0.059)	(-1.437)	(-0.387)	(0.432)	(-0.895)	(-0.215)	(-0.458)	(0.391)
WCEO	-0.086	-0.112	-0.068	2.159*	1.962	2.301	0.814	1.421	-0.080
	(-0.502)	(-0.581)	(-0.327)	(1.700)	(1.181)	(1.514)	(1.282)	(1.443)	(-0.127)
%INTERLOC	0.003**	-0.002	0.004**	0.046***	0.061***	0.032**	0.015***	0.020***	0.005
	(2.147)	(-1.388)	(2.547)	(4.351)	(4.533)	(2.518)	(2.759)	(2.823)	(0.728)
%INSTI	0.015	0.001	0.049**	0.417***	0.366***	0.464***	0.024	0.003	0.069
	(1.510)	(0.104)	(2.573)	(4.935)	(4.418)	(2.925)	(0.669)	(0.093)	(1.161)
SIZE	-0.381***	-0.351***	-0.457***	0.689	1.086**	0.708	0.212	0.230	0.224
	(-6.362)	(-3.451)	(-8.779)	(1.606)	(2.188)	(1.420)	(1.321)	(1.071)	(1.150)
ROA	0.050***	0.043***	0.053***	-0.061*	-0.080*	-0.050	0.010	0.023	0.001
	(7.892)	(5.188)	(7.323)	(-1.811)	(-1.719)	(-1.202)	(0.699)	(1.196)	(0.062)
LEV	0.001	0.002	-0.001	-0.035	-0.065**	-0.007	-0.010	-0.003	-0.026*
	(0.416)	(0.807)	(-0.220)	(-1.507)	(-2.262)	(-0.238)	(-1.233)	(-0.264)	(-1.934)
Intercept	4.643***	5.531***	6.051***	72.990***	86.599***	56.648***	-10.714*	-16.829*	-6.577
	(4.061)	(3.492)	(3.220)	(7.371)	(6.151)	(3.694)	(-1.872)	(-1.871)	(-0.682)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,852	926	926	1,344	672	672	652	326	326
Adj. R-squared	0.410	0.379	0.505	0.439	0.475	0.440	0.267	0.322	0.280
VIFs	8.30	8.46	7.98	8.94	8.82	9.49	3.48	3.59	4.47

***, **, and * indicate statistically significant at 1%, 5% and 10% level respectively. See Appendix for variables definitions.

Table 7. The Effect of Political Connections on the Relationship between ESG Disclosure, Financial and ESG Performance

Variables	With Political Connection Tobin's Q	Without Political Connection Tobin's Q	With Political Connection Sustainalytics ESG Perform.	Without Political Connection Sustainalytics ESG Perform.	With Political Connection MSCI ESG Performance	Without Political Connection MSCI ESG Performance
LNEPU	-0.547	-0.658**	4.668	3.781	0.174	3.663*
	(-1.543)	(-2.534)	(1.610)	(1.604)	(0.134)	(1.683)
ESG Disclosure	0.025	0.080**	0.281	0.415**	0.044	0.484*
	(0.660)	(2.346)	(0.661)	(2.047)	(0.258)	(1.817)
LNEPU x	0.009	*0.018****	0.109	*0.179***	-0.094*	*0.155****
ESG Disclosure	(1.086)	*(2.708)*	(1.349)	*(2.219)*	(-1.797)	*(2.451)*
BODSIZE	0.041	0.173***	0.141	-0.224	-0.254*	0.022
	(1.623)	(4.824)	(0.339)	(-0.994)	(-1.905)	(0.193)
%INDEP	0.009**	0.006	0.076*	0.034	0.003	0.002
	(2.353)	(1.615)	(1.762)	(0.967)	(0.135)	(0.159)
CEOTENUR	-0.002	-0.003	-0.029	-0.056	0.022	-0.008
	(-0.177)	(-0.370)	(-0.274)	(-0.819)	(0.663)	(-0.451)
CEOAGE	0.011	-0.009	0.005	-0.087	-0.001	-0.076***
	(1.183)	(-0.866)	(0.054)	(-1.290)	(-0.024)	(-2.684)
CEOEDU	-0.033	0.001	0.443	-0.367	0.410*	-0.311**
	(-0.706)	(0.029)	(0.826)	(-1.055)	(1.914)	(-2.011)
WCEO	-0.235	-0.015	1.477	2.747*	2.020*	-0.080
	(-0.834)	(-0.076)	(0.846)	(1.790)	(1.945)	(-0.140)
%INTERLOC	0.000	0.003**	0.031**	0.063***	0.008	0.016***
	(0.010)	(1.990)	(2.003)	(5.021)	(1.006)	(2.623)
%INSTI	-0.014	-0.021	-0.426***	-0.370***	-0.024	-0.024
	(-1.026)	(-1.553)	(-3.197)	(-3.842)	(-0.371)	(-0.614)
SIZE	-0.310***	-0.409***	0.598	0.729	0.482**	0.118
	(-4.377)	(-5.330)	(1.084)	(1.361)	(2.381)	(0.584)
ROA	0.026***	0.060***	0.026	-0.098**	0.002	0.019
	(4.216)	(7.652)	(0.502)	(-2.382)	(0.137)	(0.969)
LEV	-0.000	0.001	0.006	-0.042*	-0.029	-0.002
	(-0.005)	(0.246)	(0.140)	(-1.654)	(-1.611)	(-0.250)
Intercept	4.432**	5.681***	68.403***	68.333***	-19.240*	0.836
	(2.268)	(3.835)	(4.503)	(5.280)	(-1.901)	(0.138)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	554	1,298	454	890	226	426
Adj. R-squared	0.413	0.461	0.411	0.441	0.289	0.347
VIFs	9.21	8.26	9.81	8.44	4.88	3.93

***, **, and * indicate statistically significant at 1%, 5% and 10% level respectively. See Appendix for variables definitions.

Table 8. The relationship between EPU and ESG Disclosure during Global Financial Crisis (GFC) and Brexit

Variables	ESG Disclosure	ENV Disclosure	SOC Disclosure	GOV Disclosure
LNEPU x GFC	*4.833****	*4.112****	*4.802****	*3.839**
	(5.692)	*(3.686)*	*(6.508)*	*(1.800)*
LNEPU x BREXIT	*5.329****	*4.040**	*5.512****	*4.968**
	(3.673)	*(1.919)*	*(4.958)*	*(1.827)*
LNEPU	2.029***	1.995*	2.342***	1.842*
	(3.382)	(1.944)	(5.312)	(1.892)
GFC	-1.620***	-1.209***	-1.521***	-1.931***
	(-4.593)	(-2.842)	(-3.213)	(-4.293)
BREXIT	1.518***	1.0825*	1.391**	1.682***
	(2.632)	(1.92)	(2.312)	(2.831)
BODSIZE	0.372	0.381	0.465	0.307**
	(1.456)	(1.176)	(1.648)	(2.023)
%INDEP	0.039	0.056	0.069*	-0.002
	(1.169)	(1.229)	(1.742)	(-0.100)
CEOTENUR	-0.022	-0.034	0.039	-0.033
	(-0.336)	(-0.409)	(0.439)	(-0.728)
CEOAGE	0.071	0.053	0.044	0.059
	(0.877)	(0.500)	(0.449)	(1.351)
CEOEDU	0.735*	0.820	0.482	0.520*
	(1.866)	(1.520)	(1.041)	(1.938)
WCEO	3.066	2.815	4.284	1.234
	(1.272)	(0.940)	(1.388)	(1.074)
%INTERLOC	0.015	0.022	0.003	0.008
	(1.152)	(1.208)	(0.174)	(1.044)
%INSTI	-0.081	-0.158	-0.154	-0.012
	(-0.838)	(-1.211)	(-1.401)	(-0.198)
SIZE	3.914***	4.839***	2.894***	2.273***
	(10.032)	(9.570)	(6.343)	(9.404)
ROA	-0.002	0.026	-0.035	0.009
	(-0.038)	(0.416)	(-0.516)	(0.338)
LEV	-0.022	-0.038	-0.024	-0.007
	(-0.797)	(-1.027)	(-0.712)	(-0.461)
Intercept	28.116***	7.680	27.817***	28.029***
	(2.664)	(0.561)	(4.717)	(4.777)
Industry dummies	Yes	Yes	Yes	Yes
Observations	1,854	1,854	1,854	1,854
Adj. R-squared	0.523	0.462	0.406	0.439
Variance inflation factors (VIFs)	2.19	2.31	2.15	2.23

***, **, and * indicate statistically significant at 1%, 5% and 10% level respectively. LNEPU x GFC is natural log of UK EPU during the Global Financial Crisis 2007-2009 and LNEPU x BREXIT is the natural log of UK EPU during the Brexit 2016-2018. See Appendix for rest of variables definitions.

Table 9. Moderating Effects of Board Centrality and Political Connections on the Relationship between EPU and ESG Disclosure during Global Financial Crisis (GFC) and Brexit

Variables	ESG Disclosure	ENV Disclosure	SOC Disclosure	GOV Disclosure
LNEPU x GFC	1.253***	1.191***	1.397***	1.176*
	(4.208)	(3.622)	(4.088)	(1.672)
CENTRAL x GFC	-0.245**	-0.262***	-0.276*	-0.175
	(-2.481)	(-2.619)	(-1.878)	(-1.217)
LNEPU x CENTRAL x GFC	**-2.268****	**-3.319****	**-2.156***	**-1.153***
	(-2.414)	**(-2.580)**	**(-1.772)**	**(-1.738)**
LNEPU x BREXIT	1.239***	1.371**	1.279***	0.907
	(3.227)	(2.433)	(4.200)	(1.308)
CENTRAL X BREXIT	-0.393**	-0.324**	-0.464***	-0.271
	(-2.338)	(-2.233)	(-2.816)	(-1.315)
LNEPU X CENTRAL X BREXIT	**-2.051****	**-2.637****	**-3.133****	**-0.190**
	(-2.500)	**(-2.400)**	**(-2.823)**	**(-0.348)**
LNEPU X POLITICAL	-1.317**	-1.342**	-1.447**	-1.043**
	(-2.419)	(-2.095)	(-2.523)	(-2.134)
POLITICAL x GFC	-0.318**	-0.321*	-0.310**	-0.296
	(-2.250)	(-2.286)	(-2.276)	(-0.482)
LNEPU x POLITICAL x GFC	**-1.378****	**-1.394****	**-1.432****	**-0.689**
	(-2.286)	**(-2.329)**	**(-2.287)**	**(-0.321)**
POLITICAL x BREXIT	-1.710**	-1.640**	-1.868**	-1.775**
	(-2.109)	(-2.353)	(-2.268)	(-1.972)
LNEPU x POLITICAL x BREXIT	**-0.807****	**-0.758****	**-0.808****	**-0.769***
	(-2.002)	**(-2.313)**	**(-2.361)**	**(-1.768)**
LNEPU	1. 461***	1.231**	1.622**	1.454***
	(4.344)	(2.031)	(2.089)	(4.932)
GFC	-1.358**	-1.132**	-1.309*	-1.434**
	(-2.481)	(-2.294)	(-1.697)	(-2.521)
BREXIT	1.492**	1.031**	1.294**	1.506**
	(2.391)	(1.982)	(2.219)	(2.459)
CENTRAL	1.321**	1.213*	1.429**	1.185*
	(1.992)	(1.892)	(1.995)	(1.729)
POLITICAL	-1.124**	-1.032**	-2.301*	-1.192*
	(-2.102)	(-2.197)	(-1.803)	(-1.713)
Intercept	72.391***	65.804***	75.167***	64.243**
	(4.446)	(2.871)	(4.976)	(2.327)
Control variables	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	1,854	1,854	1,854	1,854
Adj. R-squared	0.538	0.473	0.434	0.434
Variance inflation factors (VIFs)	7.45	7.89	7.43	7.48

***, **, and * indicate statistically significant at 1%, 5% and 10% level respectively. LNEPU x GFC is natural log of UK EPU during the Global Financial Crisis 2007-2009 and LNEPU x BREXIT is the natural log of UK EPU during the Brexit 2016-2018. The three-way interactions represent the interactions with board centrality (CENTRAL) and board with political connections (POLITICAL). See Appendix for rest of variables definitions.