Managerial Social Capital and Firm Risk

Managerial Social Capital and Firm Risk: Evidence from the UK

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Abstract

There has been recent interest in the role of social capital in the business environment yet relatively little is known as to how social capital influences firm risk. We examine the relationship between managerial social capital (MSC), based on a structural definition of social capital (SC), and firm risk in the United Kingdom – a high social capital country. Using data on listed firms from 2006-2017 we find that MSC is associated with *lower* firm-risk (idiosyncratic and total). Furthermore, employing corporate social responsibility (CSR), an alternative SC measure more aligned with a cognitive SC perspective, we show it is associated with *higher* idiosyncratic and total firm-risks, consistent with a shareholder expense view. While our main results are robust to endogeneity concerns, we also conduct numerous robustness tests, including industry-adjusted our MSC measure, controlling for a firm's risk management committee, controlling for BoD national diversity mix, and using alternative risk estimations.

Keywords: Social Capital; Managerial Social Capital (MSC); Network theory; Firm Risk; Corporate Social Responsibility (CSR).
JEL Classifications: G3; G30.

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1. Introduction

Social capital is one of the three pillars of sustainable development, and one understood to influence many aspects of societal functioning, including within the business environment. Yet, extant literature has only recently begun to consider the implications of social capital for firm outcomes, with a recent interdisciplinary research highlights social capital as a key driver of corporate financial decisions, including capital structure, cash holdings, trade credit, corporate social responsibility (CSR), gender diversity, CEO pay, and dividend policy decisions (Renneboog and Zhao, 2011; Hasan et al., 2017; Huang and Shang, 2019; Hasan et al., 2020; Hossain et al., 2021; Javakhadze and Shelton, 2022; Andriosopoulos and Deepty, 2022), and that social capital can help mitigate unethical corporate behaviours, such as tax avoidance (Hasan et al., 2017), political and market competition risks (Andriosopoulos and Deepty, 2022), and insider trading (Chung et al., 2023), as well as improving firms' access to external capital (Cheng et al., 2017).

In this paper, we adopt a structural definition of social capital (SSC) (Bhandari and Bhuyan, 2023) and apply network theory (Ferris et al., 2017b), to examine the implications of managerial social capital (MSC) for firm risk. Our MSC measure is defined based on a network centrality measure (El-Khatib, Fogel and Jandik, 2015) and defined based on the social network capital of executive and non-executive board members gained through network ties (Renneboog and Zhao, 2011). In this way, our measure expands on the network centrality algorithm used in prior work (e.g., El-Khatib et al., 2015), in the sense we expand the focus from the network ties of chief executive officers (CEO) to also consider those of the entire top management team (TMT).

We set our study in an important institutional environment – the United Kingdom (UK) (Renneboog and Zhao, 2011; Horton et al., 2012), a collectivist society with high levels of social capital, and where there is ongoing debate regarding the effectiveness of the UK

Corporate Governance Code (CGC), we conjecture that MSC should play an important role in determining firm risk-taking, and argue that strategic firm choices that involve risk should not ignore the social capital dimension (Hasan et al., 2020).

Theoretically MSC could be associated with lower or higher risk. On one hand, MSC could be associated with lower firm risk. MSC, facilitated by network ties, can constitute important resources that can promote access to valuable resources, including information relevant to making better informed risk-taking choices (Javakhadze et al., 2016). For example, socially connected directors may be better positioned to monitor and discipline managerial risk-taking; one important reason being that social ties helps reduce asymmetrical information in labour markets, thereby facilitating access to more outside employment opportunities and thus lowering career concerns (Berger et al., 2013; Ferris et al., 2019). Consistent with these arguments, board social capital can positively influence shareholder value in cross border acquisitions (Basuil and Datta, 2017), while the extent of executive and director social connections are associated with reductions in the costs and breadth of legal interventions (Javakhadze et al., 2016) and firms' costs of equity (Ferris et al., 2017). Moreover, social capital can help mitigate political and market competition risks (Andriosopoulos and Deepty, 2022) as well as unethical corporate behaviours, such as tax avoidance (Hasan et al., 2017).

On the other hand, MSC could be associated with higher firm risk. Social ties can exacerbate agency costs, affording managers and directors greater power (Brass and Burkhardt, 1993), which could lead to higher managerial risk-taking as naturally risk averse managers increase risk-taking in response to greater outside employment options (Ferris et al., 2019). Moreover, changes in risk appetite, higher MSC could promote undesirable behaviours and firm outcomes, including excessive real earnings management (Griffin et al., 2021) and rent extraction in executive compensation (Keung et al., 2019). Such arguments are consistent with the notion that membership of a group or network can alter the risk preferences of individuals

within it towards greater appetite for risk, through the pooling of individual risks (Ferris et al. 2017a, 2017b; Ferris et al. 2019).

We begin by investigating the effects of MSC on firm risk using an unbalanced panel of UK FTSE 350 firms between 2006 and 2017. Employing the system-GMM estimator to address potential endogeneity concerns regarding the relationship between MSC and firm risk, we find that MSC is negatively associated with both idiosyncratic and total risk measures. This effect is economically meaningful. For example, a one-unit increase in MSC (using a standard deviation of 2.276) is associated with a 1.65 per cent reduction in idiosyncratic risk. Our main results therefore appear consistent with the idea that senior managers working in firms operating in a high trust setting (the UK) are less likely to take on risk and pursue private benefits (Huang and Shang, 2019).

We further consider CSR as an alternative measure of social capital, which could convey a different effect to MSC on firm risk (Lins et al., 2017; Amin et al., 2020). Importantly, we also demonstrate that our main results for MSC continue to hold even when controlling for CSR. We infer from these results that the impact of social capital on firm performance is complex and that future research should not ignore the potential influence of CSR. In doing so, we help address the lack on consensus regarding the nature of the relationship between corporate governance and CSR across different institutional contexts (Zaman, Jain, Samara, and Jamali, 2022). Pertinently, while our measure of MSC is closely aligned to a structural definition of social capital and based on network theory (Ferris et al., 2017b), CSR is more closely linked to a cognitive definition of social capital (CSC) (Sacconi and Antoni, 2009). Recent interdisciplinary studies establish a link between CSR and social capital (Jha and Cox, 2015, Lins et al, 2017) Amin et al., 2020) with Lins et al (2017) going as far to suggest that CSR performance can even be viewed as a form of firm-level social capital. Unlike our finding of a negative relationship between MSC and firm risk measures, we show that CSR (firms'

composite CSR scores) is positively associated with both firm-specific and total risks. This is interesting from the perspective of recent findings of an opposite relationship between CSR and firm risk in the case of US firms (Albuquerque et al., 2019). We consider this result may be reflective of differences in the institutional environmental within the UK as well as the role and levels of social capital in the UK; for instance, larger managerial social capital networks may encourage risk-taking through the pooling of individual risks (Ferris et al. 2017a, 2017b; Ferris et al. 2019).

Finally, we present a battery of further tests, and demonstrate that our results are robust to a battery of robustness tests, including use of an industry-adjusted indicator of MSC, controlling for the presence of a firm's risk management committee, a potential moderating effect from BoD national diversity mix, and alternative estimations of firm risk.

Our study makes several contributions. First, while we are not the first to consider the risk implications of social capital *per se*, we go further than much prior work by considering social capital ties beyond those of the firm CEO to all board members – thereby deriving a more holistic measure of a firm's social capital. Importantly, while prior studies focus on CEOs' social connections (El-Khatib et al., 2015; Ferris et al., 2017a; Ferris et al., 2019), by contrast, we expand the algorithm used in these studies to capture (CEO) MSC, to compute a MSC measure that captures the social connections of CEOs plus other top executives and non-executive members of the corporate board. We argue this is important given that non-executive board members are understood to contribute valuable resources through their professional and social connections (Amin et al., 2020). In this way, our study departs from the nascent literature to date (El-Khatib et al., 2015; Ferris et al., 2017a; Ferris et al., 2019).

Second, we study the implications of MSC for firm risk outcomes in a unique non-US setting, the UK characterized by high social capital in the business environment. Our focus help address the lack of non-US evidence regarding the role of MSC on firm outcomes and

contributes to our understanding of the links between corporate governance and CSR in different institutional contexts (Zaman, Jain, Samara, and Jamali, 2022). Although prior research on MSC has almost exclusively focused on the US (Lins et al., 2017; Ferris et al., 2017a; García-Feijóo et al., 2021), studying the effects of social capital in UK firms is of particular interest for at least several reasons. First, the levels and implications of managerial networked connections (social capital) may vary significantly in the UK compared to the US, attributable to differences in governance, culture, ownership structure and regulation (Renneboog and Zhao, 2011; Goergen et al., 2019; Hasan et al., 2020). Second, the strength and extent of social capital in the UK is much higher than in the US (Renneboog and Zhao, 2013; Elsayed et al., 2022, The Social Capital Index, 2023). These observations could lead to different corporate risk management decisions under the social capital perspective, and consequently differences in firm outcomes, including funding costs (Meng and Yin, 2019; Renneboog and Zhao, 2013; Filatotchev et al., 2018). Thirdly, although social capital embodies the concept of trust, high social capital is not necessary indicative of high societal trust. Notably, in the UK reported trust in other people has remained quite stable over time but other dimensions of social capital have not - introducing a potential and unusual disconnect between social capital levels and trust (Ortiz-Ospina and Roser, 2016).

Third, we go further than prior work by addressing important endogeneity concerns regarding the relationship between managerial social capital and firm risk-taking by using the system-GMM estimator and argue that fixed-effects are insufficient to fully address endogeneity concerns. In terms of existing studies, Ferris et al. (2017a) show that CEO social capital, under the structural definition, is associated with reductions in firm risk. However, they do not consider the social capital of other executives or directors, which may also play important, yet potentially different roles. Consequently, such findings may not be generalisable.

The remainder of the paper proceeds as follows: Section 2 introduces the study setting, reviews relevant literature, and develops the study hypotheses; Section 3 presents the empirical framework and describes the data and variables; Section 4 presents and discusses the study results; Section 5 presents tests of robustness; Section 6 concludes.

2. Study setting and literature review

2.1 UK institutional setting

This study adopts the empirical setting of the UK (Renneboog and Zhao, 2011; Horton et al., 2012), where corporate governance rules have been revised globally after the 2007-2009 financial crisis, with a focus on prudent risk-taking. During the crisis, the UK government implemented a £500 billion rescue package to bail out firms, and subsequently, more attention has been given to the roles of boards of directors and senior managers in shaping firm risk-taking (Erkens et al., 2012) The UK's 2010 Corporate Governance Code (CGC) stresses a board's fiduciary responsibilities in helping identify and manage substantive risks that affect a firm's operations, while the Financial Reporting Council (FRC) issued a report in 2011 clarifying the boards' tasks in risk management, including risk classification and crisis management. This report highlights the importance of considering cultural settings and risk-taking together, which is an under-investigated area in corporate finance literature. Furthermore, although the UK CGCs acknowledge the relationship between risk-taking and cultural settings, further research is needed, particularly concerning the roles played by social capital (Abdelbadie and Salama, 2019; Elsayed et al., 2022). More specifically, the impact of social capital as a board attribute in risk-taking decisions have been subject to little research (Mathew et al., 2016; Elsayed et al., 2022).

Under UK governance mechanisms, firms are expected to voluntarily follow governance recommendations or justify why they do not, which may depart from shareholders' best interests. Javakhadze et al. (2016) argue that MSC works as a disciplinary mechanism

which reduces agency problems between investors and insiders due to the potentially negative consequences of loss of managerial reputation. Similarly, Hirshleifer and Thakor (1992) demonstrate that managers ignore risky investments because of the pressure of reputation building. Accordingly, directors with high social capital may be expected to play a significant role to protect shareholder interests. In this vein, high MSC could reduce firm risk through the building of a reputation for honest dealing (Kandori, 1992; Harjoto and Wang, 2020), whereby managers and directors have incentives to protect their reputations in external labour markets (Fama and Jensen, 1983; Harjoto and Wang, 2020). In support, Elsayed et al. (2022) show that, in the case of UK firms, social capital created by boards of directors and senior managers through their social and managerial networks, can help protect companies from the risk of bankruptcy.

There are also likely to be notable differences in the roles played by social capital in UK firms compared to US firms, which is important given that a majority of prior work on MSC has focused on the US setting (Lins et al., 2017; Ferris et al., 2017a; Gupta et al., 2019; Hoi et al 2019; García-Feijóo, 2021; Griffin et al., 2021). First, there are differences in governance, culture, ownership structure and regulation (Renneboog and Zhao, 2011; Goergen et al., 2019; Hasan et al., 2020). For example, the Higgs Report (2003) shows that the US regulatory body overemphasises the monitoring role of non-executive directors while ignoring their prospective contribution to wealth creation. Accordingly, putting the expected monitoring role of non-executives and the reputation concern in an environment that implements the role of "follow or explain" for corporate governance regulations compared to the rigid view of non-executives like in the US, may result in key differences in relations between MSC and firm risk (Elsayed et al., 2022). Second levels of social capital are much higher in the UK compared to the US (Renneboog and Zhao, 2013; Elsayed et al., 2022, The Social Capital Index, 2023), which could result in a greater effect attributable to MSC on firm risk-taking. Third, though

social capital embodies the concept of trust, high social capital is not necessary indicative of high societal trust. Notably, in the UK reported trust in other people has remained quite stable over time but other dimensions of social capital have not - introducing a potential and unusual disconnect between social capital levels and trust (Ortiz-Ospina and Roser, 2016).

2.2 Social capital and risk-taking

The concept of social capital has received much attention over the last couple of decades and has grown to become one of the influential topics in the social sciences (Putnam et al., 1994; Nahapiet and Ghoshal, 1998; Woolcock, 1998; Dasgupta, 2005; Lins et al., 2017; Hasan et al., 2020; Javakhadze and Shelton, 2022).

Prior literature emphasises that social capital has value through the strength and number of social ties within networks. Such social networks can be formed to the extent that allows social relationships to acquire significant information and control (Bourdieu, 1986a, 1986b, 1989; Bourdieu and Wacquant, 1992; Larcker et al., 2013; Goergen et al., 2019; García-Feijóo et al., 2021). Consistent with this, Lin (1999) suggests that social capital theory can be defined as a set of resources embedded in a social network. Accordingly, subsequent research measures social capital based on the network theory by applying centrality measures, (Freeman, 1979; Wasserman and Faust, 1994), which infers that social capital can be measured by observing social network characteristics (Wasserman and Faust, 1994; Javakhadze et al., 2016).

There is no one-encompassing definition of social capital. Instead, social capital can have different meanings which determines how best to measure it. At a micro-level, it can be defined as representing the resources embedded in people's social networks (Lin, 2002), or at a macro-level, as "*resources embedded in a social structure that are accessed and/or mobilized in purposive actions*"(Lin, 2002, p. 29). Prior literature that examines MSC refers to both macro and micro-level aspects of social capital. While, the macro-social capital definition is community-based and focuses on civic norms, trust, membership of associations, and voluntary

works (Scrivens and Smith, 2013; Huang and Shang, 2019), the micro-level focuses on the SSC that is rooted in social networking between nodes and these nodes may reflect firms, individuals, etc. (Wasserman and Faust, 1994; El-Khatib et al., 2015; Fracassi, 2017). However, both definitions have similarities in that social capital represents a source of competitive advantage for its participants. For instance, micro-level social capital has an embedded asset value through the connections between network participants, whereas macro-level social capital offers a competitive advantage as means of public good (Javakhadze et al., 2016; Lins et al., 2017; Hasan et al., 2020).

Although social capital definitions vary, it is useful to differentiate between the two sources of social capital most relevant for studies of corporations: SSC (Bourdieu, 1986b, 1989; Bourdieu and Wacquant, 1992; Lin, 1999), which is closely related to agents such as BoD (Tuugi et al., 2014; Javakhadze et al., 2016); and CSC (Coleman, 1988; Putnam et al., 1994; Sacconi and Antoni, 2009; 2011), which captures the environment in which the firms operates. In other words, SSC is generally defined at a micro-social level, whereas CSC is defined at a macro-social level (e.g., Javakhadze et al., 2016; Hasan et al., 2020). Unlike SSC, CSC is more closely associated with investments in CSR, as CSR can be used to emphasize the beliefs and fiduciary duties of the BoD and managers to a firm's stakeholders (Sacconi and Antoni, 2009; Endrikat, Villiers, Guenther and Guenther, 2021).

Previous research investigates the impact of social capital on various corporate finance policies, including capital structure (Huang and Shang, 2019), risk-taking (Ferris et al., 2019), and firm performance (Larcker et al., 2013; Zona et al., 2018), and from differing perspectives. The first perspective is referred to as managerial opportunism and is based on agency theory (Jensen and Meckling, 1976). Here, social capital is considered to impede firm performance by facilitating managerial opportunistic behaviour (Fich, 2005, Perry and Peyer, 2005). Seemingly consistent with this view, Ferris et al. (2017a) focus on CEO social capital and find

that the relationship between MSC and risk-taking decisions is positive, yet can also be value-enhancing. Moreover, they also argue that this relationship is influenced by country-specific factors. Although these studies are informative as to how social capital may impact firm risk-taking behaviour, they do not explore the potentially important role played by executives other than the CEO and the wider corporate board.

Resource dependence theory (RDT) posits that senior managers and BoD can constitute important resources through the strength of their human and social capital (Hillman and Dalziel, 2003; Endrikat, et al., 2021). While human capital refers to managers' and directors', e.g., expertise, experience, and reputation, social capital refers to the provision of resources through networks and/or relationships (Tian et al., 2011). Considering this, social capital may influence firm policies in several ways.

Social capital can work as an information channel, whereby valuable information is transmitted through social networks. For example, Javakhadze et al. (2016) argue that social capital plays an important role in asset pricing by providing useful information to market participants through social networks that help alleviate information asymmetries. For instance, board directors can help provide legitimacy, contribute to advice and counsel senior managers, act as channels for information exchange between external institutions and firms, and help in the development of firm strategies (Hillman and Dalziel, 2003; Endrikat, et al., 2021). This is important because in imperfect capital markets seeking information from financial markets implies searching costs and the fear of contractual failure. Similarly, social capital can also play an important role through trust, which is a social capital mechanism that facilitates reliability and repeatability in transactions, thereby lowering transaction costs (Hasan et al., 2020; Pasiouras and Samet, 2022). Trust, built through social capital, can help to promote compliance with cooperative norms (Coleman, 1988; Hossain et al., 2021), efficient allocation of resources (Lins et al., 2017), and access to valuable firm resources including external capital

(Javakhadze et al., 2016). At the macro-level social capital can promote economic and financial growth (Dasgupta, 2005; Hasan et al., 2020), while at the micro-level, García-Sánchez and Noguera-Gámez (2017) argue that since every business transaction necessitates trust, social capital allows agents to operate even in markets characterized by high asymmetric information.

Agency theory identifies that conflicts of interest are rooted in the principal-agent relationship (Jensen and Meckling, 1976; Fama and Jensen, 1983). It also argues that non-executive directors are rather motivated to perform a monitoring role than insiders, and therefore they can exert a more positive influence in conditioning managerial behaviour (Tian et al., 2011; Amin et al., 2020). One reason for this stems from the fact that independent directors are more cautious to protect shareholder interests and to protect their reputations in director labour markets (Fama and Jensen, 1983). Thus firm risk-taking may be moderated by the managerial reputation view whereby the reputation effect underpins the monitoring role; such arguments can be extended to different board members i.e., those with high levels of social capital (Diamond, 1989, Kandori, 1992). Consistent with these arguments, Akbar et al. (2017) report that the presence of non-executive directors on corporate boards mitigates risk-taking in financial firms whereas board size has no significant effect. These results imply that managers are more risk-averse when they face higher reputational and employment risks. Relatedly, Javakhadze et al. (2016) argue that MSC works as a disciplinary mechanism that reduces agency problems between shareholders and insiders due to reputation loss consequences. Finally, Hirshleifer and Thakor (1992) suggest that managers may ignore riskier investments because of reputation concerns. Thus, social capital is related to the reputation and monitoring effects, which play a significant role in determining firms' risk-taking decisions (Fracassi and Tate, 2012; Ferris et al., 2019; Harjoto and Wang, 2020; Hasan et al., 2020)

A further perspective, based on RDT (Pfeffer and Salancik, 1978), is that social capital can contribute to firm performance through the relaxing of resource constraints (Pfeffer and

Salancik, 1978; Mizruchi, 1996; Zona et al., 2018). Indeed these contrasting perspectives yield very different expectations regarding the effects of MSC on firm outcomes, and, in the context of the BoD, whether social capital will, for example, enhance the performance of executives and non-executive directors (Fama, 1980; Adams et al., 2010). Alternatively, social capital can encourage directors to act in self-interest that deviates from that of shareholders and other key stakeholders (Adams and Ferreira, 2007).

Given that opposing arguments can be made for the impact of social capital on risk-taking, especially as we capture the social capital of both executive and non-executive members of the BoD, we specify the following hypotheses:

H1a*: The relationship between MSC and risk-taking is negative.*

H1b*: The relationship between MSC and risk-taking is positive.*

2.3 Controlling for Corporate Social Responsibility (CSR)

According to Uphoff (2000), social capital can be classified into cognitive (norms, values, attitudes, and beliefs) or structural (roles, rules, precedents, and procedures) perspectives. He argues that SSC is linked with different forms of social organization and a wide range of networks which contribute to cooperation, and particularly to mutually beneficial collective action (MBCA), while the CSC is derived from ideas and mental processes, bolstered by ideological and cultural backgrounds that support cooperative behaviour and MBCA.

Stakeholder theory (Freeman, 1984; Jones, 1995) and risk management theory postulate that CSR stimulates moral capital or represents a relationship-based intangible asset that provides the firm with a form of insurance-like protection (Godfrey, 2005). Accordingly, by defining CSR as a social capital measure, Lins et al. (2017) expand the scope of CSR as insurance against firm-specific risk (Godfrey, 2005; Dunbar et al., 2020). In support, Lins et

al. (2017) find that firms with high social capital, built up through CSR activities, hold an advantage during crisis periods where trust is lacking. They use CSR as a social capital measure by considering four explicit social capital dimensions: (i) personal relationships; (ii) social networks; (iii) civic engagements; and (iv) trust and cooperative norms. As illustrated in Scrivens and Smith (2013), this definition can be described under structural or cognitive social capital (Putnam et al., 1994; Andriosopoulos and Deepty, 2022). However, Lins et al. (2017) do not distinguish clearly between CSC and SSC (Javakhadze et al., 2016; Hasan et al., 2020). Krishna and Uphoff (2002) highlight some similarities between both levels of social capital, in that they can both stimulate a willingness and are associated with the mechanism, to pursue commonly advantageous collective actions. These mutual benefits evolve from social relationships, roles, and networks that motivate cooperative behaviour, and from values, norms, and other cognitive functions that motivate people to work collectively to obtain shared rewards. Yet, it is arguably not logical to use SSC and CSC interchangeably. For example, Krishna and Uphoff (2002) show that the set of norms and forms of interactions between people can vary across different cultures, so what might motivate people from specific cultures to work together for the shared benefit may not work in another.

Accordingly, as the present study seeks to examine the relationship between social capital and risk-taking, CSR is employed as an additional proxy for social capital (Lins et al., 2017) that is more aligned with the CSC perspective (Sacconi and Antoni, 2009), and which may convey a differential effect on firm risk. Prior studies on the association between social capital indexed through CSR and risk-taking present two contrasting outcomes. To illustrate, social capital is characterized by management's ability to transfer information to stakeholders, which can reduce information asymmetries and agency costs, such as between shareholders and management (Jiraporn et al., 2014; Lins et al., 2017). Accordingly, from one point of view, the firm's management might use CSR to improve its reputation, but this may, or may not, be

consistent with shareholder objectives – especially if these are more based on short-term investment horizons. Yet, there is growing support for the notion that the use of CSR enhances the firm's image in the long run by fostering social capital (Dunbar et al., 2020). For instance, Dunbar et al. (2020) argue that firms should improve (reduce) CSR performance by increasing (lowering) CEO risk-taking incentives, according to what they term the 'risk capacity hypothesis'. Comparably, Jiraporn et al. (2014) argue that a positive association between CSR and a firm's risk-taking can result from building long-term trust within society. They show that 'moral capital' can convey positive reputational effects that help offset negative valuations, and subsequent penalties by stakeholders, following firms' misbehaviours, as well as reducing the vulnerabilities of firms to adverse incidents. They support the 'risk mitigation view' where CSR works as 'insurance-like' protection (e.g, Godfrey et al., 2009; El Ghoul et al., 2011).

Nevertheless, and consistent with the earlier discussion regarding the use of CSR as a proxy for CSC, firms working in a socially responsible way can become more trustworthy, and better at civic engagement, which can lead to higher valuations (Hasan et al., 2020). Consequently, CSC pays off as a means of reciprocal moral obligation. Consistent with this, Dunbar et al. (2020) show that firms who act to enrich their CSR performance can increase their capacity to assume more risk, given that higher CSR performance (cognitive capital) can provide insurance-like protection to firms.

3. Research design

3.1 Sample construction and data

The sample consists of UK FTSE 350 index firms between 2006-2017 for which data is available on the social connections and biographical characteristics of firm executive and non-executive directors from BoardEx. The sample begins in 2006 because BoardEx coverage is poor prior to this year. We also require data on firm characteristics, which is sourced from

Thomson Datastream. BoardEx data is matched with Datastream data using the corporate International Securities Identification Number (ISIN) code, with each match carefully verified by all study authors. The final unbalanced panel dataset includes 4,325 firm-year observations for 333 unique firms. To mitigate the potential influence of outliers, we winsorize all variables at the 1st and 99th percentiles (Javakhadze et al., 2016). Appendix A1 provides details of all the study variables, including definitions and data sources.

3.2 Dependent variables

Risk-taking is commonly measured using the standard deviation of a performance measure over a specific time. When examining the influence of MSC on firm risk, idiosyncratic (or unsystematic) risk is of particular interest given that it captures the proportion of total risk that directly stems from the decision-making and actions of senior managers and the BoD (Jin, 2002). In contrast, systematic risk is more abstracted from the decisions of firm insiders since it captures the volatility of the firm's cash flows to business cycles and is beyond the direct influence of firms' management. Therefore, we focus on idiosyncratic risk[1] as our main measure of firm risk-taking, which accounts for more than 80% of total risk, and use total risk as our second measure (Goyal and Santa-Clara, 2003). We estimate firm-specific risk and total risk using the capital asset pricing model (CAPM), and, additional tests of robustness we use the market model.[2] We require at least 175 daily observations for all models to estimate the idiosyncratic risk, which is measured as the annualized standard deviation of the residuals of each of these models.[3]

[1] In this study, firm-specific risk and idiosyncratic risk are used interchangeably.
[2] In robustness tests, we use alternative models to estimate risk including the Fama and French (1993) model (FF3), a momentum factor as in Carhart (1997), and the Fama and French (2016) four-factor model (FF4). Our main results remain unchanged.
[3] For brevity, we do not present these models here given that these are fairly standard in finance literature.

3.3 Measuring managerial social capital (MSC)

The main variable of interest in our study is MSC. This measure captures the size/degree centrality of senior executives' and non-executives' directors social networks, and is based on a SSC perspective (Lin, 1999; Burt, 2000). Accordingly, we define the SSC between agents as an asset embedded in social networks, that can be utilized through connections between agents (Lin, 1999; Burt, 2000). An individual is considered as being highly connected if they have strong connections with other agents in the network (i.e., sample firms).

Following prior work (Fracassi and Tate, 2012; Javakhadze et al., 2016; Fracassi, 2017), we collect the number of connections for all agents in a specific firm to compute a firm-level measure of social capital. These connections are the summation of connections from (i) *current employment*, where two agents are connected through working together In the same firm; (ii) *past employment*, where two agents are connected from previously working in the same firm (distinct from current employment); (iii) *educational network*, where two agents attended the same higher education institution within a one-year overlap,[4] and (iv) *other social activities*, which represent the total number of connections between two agents if they hold a membership at the same social and charitable organization(s), including football clubs, golf clubs, charities, and other social organisations at the same time. However, to ensure connections are 'active', we only consider connections through, educational networks, and other social activities, if the agents also have connections from current or previous employment.

To compute the *MSC* measure, we aggregate all connections to capture the firm-level social capital from 2006 to 2017 as follows:

(1)

[4] We also ran analyses where we alternatively specified a two-year overlap and obtained very similar results.

Where *MSC* is the managerial social capital measure; *CEC* represents current employment connections; *PEC* captures previous employment connections; EDC represents connections through education; *OSAC* captures the other social activity connections; and subscripts *i* and *t* represent the firm and time, respectively. In further analyses we also use an alternative industry-adjusted measure of MSC (*ADJ-MSC*), which we calculate as the difference between the MSC at time for firm and the industry average value of the *MSC*, excluding the sample firm to have an unbiased industry-average measure of MSC. For further details on all these variables please refer to Appendix A1.

Moreover, in additional analyses where we consider CSR as an alternative proxy for social capital that is more closely aligned with the CSC perspective (Sacconi and Antoni, 2009). Our preferred CSR measure is based on the composite Refinitiv ESG scores for each firm-year, sourced from Datastream (Javakhadze et al., 2016). A higher score indicates a firm has higher CSR performance.[5]

Recent studies confirm a strong association between CSR and social capital (Javakhadze et al., 2016; Lins et al., 2017; Andriosopoulos and Deepty, 2022). In line with Lins et al. (2017), we argue that CSC and SSC are not mutually exclusive and that CSC can facilitate reciprocal flow of norms, information, and other social attributes across social network participants. In this respect, our use of CSR helps facilitates a more holistic treatment of the effect of social capital on corporate risk-taking (Lins et al., 2017; Andriosopoulos and Deepty, 2022).

3.4 Control variables

Motivated by prior literature we include a vector of control variables. Beginning with firm characteristics, we include: (i) return on assets (*ROA*), measured as the ratio of net income

[5] For further details on the scores and methodology please see: https://www.refinitiv.com/en/sustainable-finance/esg-scores

to total assets; (ii) firm size (*FSIZE*) using the natural logarithm of total assets; (iii) the turnover ratio (*TURN*), which captures the relative efficiency of use of a firm's assets (Pae et al. (2018), and is computed as the ratio of firm sales to total assets; (iv) financial leverage (*DEBTR*) (Adams et al., 2005), computed as the ratio of total debt to total assets (Huang and Shang, 2019); (v) firm dividend payout (*DIVTOASS*), the ratio of total dividends to total assets, which could influence managerial investment, since it implies greater or less access to retained capital; (vi) *Tobin's Q*[6] which captures the extent of a firm's growth opportunities (Huang and Shang, 2019), and is calculated as total shares outstanding multiplied by the stock price plus total liabilities divided by total assets; (vii) finally, given that established firms may differ in operations and risk, we also include control for firm age (*FAGE*), measured as the natural logarithm of years since a firm was incorporated (Cao et al., 2006; Akbar et al., 2017).

We also account for board and governance characteristics. We first control for board size (*BSIZE*), which captures the total number of directors on the corporate board (Fracassi, 2017). Previous studies provide conflicting results regarding optimal board size. For instance, Pathan (2009) shows that smaller boards are associated with both higher total and idiosyncratic risks, while Cheng (2008) finds that firms with larger boards go for less risky investments. Next, we control for the extent of board independence (*NED*), measured as the ratio of the number of non-executive directors to the total board size (Cheng, 2008). Jensen and Meckling (1976) suggest that the existence of independent directors on the board can mitigate agency conflicts, while Cheng (2008) adds that since independent directors bring more heterogenous views this can moderate board decision-making and lead to more stable performance. In a similar vein, Fama (1980) suggests that independent directors can provide effective monitoring given their reputation concerns and independence from management. The audit committee may

[6] In unreported analyses, we repeat all our main analyses using Total Q (Peters and Taylor, 2017) and obtain very similar results.

also play an important monitoring role. For example, Younas et al. (2019) show that audit committee quality can mitigate excessive risk-taking and that firms with higher social capital pay lower audit fees than firms with low social capital. We, therefore, control for the size of the audit committee (*ASIZE*), which is measured as the total number of directors sitting on the audit committee. Finally, since previous studies suggest that the presence of females on the board may influence firm risk, although the direction of this influence is unclear (Adams and Ferreira, 2003, Berger et al., 2014), we control for a potential gender effect (GEN), computed as the percentage of female directors relative to board size.

3.5 Descriptive statistics

Table 1 presents summary statistics for the final sample of 322 FTSE 350 firms from 2006-2017.

[Table 1 here]

Firm-specific (idiosyncratic) risk is computed as the residual value from the capital assets pricing model (CAPM) or the market model and is denoted as *IDO-CAPM* or *IDO-MKT*, respectively. In robustness checks, we also compute firm risk as the residual value calculated from the Fama–French (1993) three-factor model (*IDO-FF3*), and the Fama–French (2016) four-factor model (*IDO-FF4*). The mean value of *IDO-CAPM* is 0.29, which is similar to those of *IDO-MKT*, *IDO-FF3*, and *IDO-FF4* measures. The mean value of idiosyncratic risk is comparable to that found for the US (Chakraborty et al., 2019). The mean value for MSC (*ADJ-MSC*) is 5.04 (0.424) with a standard deviation of 2.276 (2.480). Control variables are also in line with those reported in the extant literature for both the UK and the US.

Appendix table A3 presents the evolution of social capital and corporate risk-taking over the sample period. As shown in the table, *MSC* and *ADJ-MSC* exhibit declining trends, which we interpret as tentative evidence of the tendency of UK firms to follow the CGC of 2010 - the

recommendation for FTSE 350 firms is that over 50% of board directors are independent.[7] However, corporate risk-taking variables (*IDO-MKT*, *IDO-CAPM*, *IDO-FF3*, *IDO-FF4*, and *TRISK*) have a very similar mean and standard deviation values suggesting no discernible time trends in firm risk, except for the global financial crisis (GFC) period where risk is more pronounced. In particular, the highest risk mean values were reported in 2008 and 2009, which likely reflects the consequences of the GFC (Pathan, 2009).

4. Results

4.1 Econometric framework

Our empirical framework seeks to provide a more rigorous treatment of potential endogeneity, which could affect the relationship between MSC and firm risk-taking, compared to prior related work (Mathew et al., 2016; Elsayed et al., 2022). Notably, in a dynamic estimation model a lagged dependent variable and fixed effects might be correlated, which would yield biased estimations of the OLS estimator. In other words, fixed effects would be suitable only if the unobserved individual effect is time-invariant. If this assumption does not hold, it is important to use another technique to address the endogeneity concerns. Moreover, endogeneity could arise from omitted factors, which may result in correlation across explanatory variables and with the error term and result in inconsistent OLS and fixed-effect estimates (Abdallah et al., 2015).

We mitigate such concerns by applying the dynamic panel generalized method of moments estimator (known as system-GMM), as recommended by Arellano and Bond (1991). This technique has several advantages. First, it helps mitigate simultaneity concerns, which may arise in our setting since we combine risk-taking variables with other financial variables

[7] Section (B.1.2) of the UK CGC 2010 states that *"Except for smaller companies, at least half the board, excluding the chairman, should comprise non-executive directors determined by the board to be independent.*" (UK Corporate Governance Code, 2010, p. 9).

concurrently. For example, if managers were to adjust firm debt levels to address a potential insolvency concern, then it would misrepresent the actual risk level in the firm. Second, it helps in accounting for unobservable heterogeneity and in mitigating dynamic endogeneity. As considered by Wintoki et al. (2012), this source of endogeneity is usually ignored in corporate governance research, yet it may have a significant influence on observed results. Pertinently, if financial variables are influenced by previous corporate risk-taking observations dynamic endogeneity would be present in model specifications. Therefore, applying the system-GMM estimator allows us to better control for potential sources of endogeneity, which could bias the results and lead to inaccurate conclusions regarding the influence of MSC on firm risk.

The system-GMM estimator has the effect of first transforming all explanatory variables (regressors) by differencing; it then builds on the assumption that the first instrumental variables differences are exogeneous and not correlated with the fixed effects; finally, it includes additional instruments to improve efficiency. Accordingly, we employ lags of the dependent variable (firm risk) to control for the dynamic effect of prior firm risk-taking on current firm risk, as well as other lagged regressors in our model.[8]

We estimate the effects of MSC on firm risk based on the following model estimated using system-GMM:

……. (2)

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where, is the dependent variable, which is either the idiosyncratic risk or total risk; and represent the first and second lags of , respectively. *represents* MSC or the industry MSC measure (*ADJ-MSC*). *Control* $_{it}$, represents the full vector of our control variables as detailed in Subsection 3.4 and Appendix A1. We also include year and industry dummies () which are

[8] We follow the guidance of Wintoki et al. (2012) in determining the correct number of lags. Specifically, the first and second lags of the dependent variable are used throughout to ensure a sufficient number of lags to capture the dynamic effect under the system-GMM.

treated as exogenous variables in the model. Finally, captures the unobserved firm effect, while denotes the error term.

4.2 MSC and corporate risk-taking

Table 2 presents the results of the baseline estimations. In models (1a) and (1b) the dependent variable is idiosyncratic firm risk estimated using the CAPM model (*IDO-CAPM*). In Models (2a) and (2b), the dependent variable is total firm risk (*TRISK*), which is also estimated based on this model.[9]

[Table 2 here]

MSC is negative and highly significant in all models, which infers that higher MSC is associated with both lower firm-specific and total risk. More specifically, and consistent with the hypothesis H1a, this suggests that firms with socially well-connected executive and non-executive directors are associated with a lower appetite for firm risk. This result is arguably most consistent with the managerial reputation model, according to which managers may forgo risky investments and directors exert greater control, because of reputational and career concerns (Hirshleifer and Thakor, 1992, Ferris et al., 2017b, Gupta et al., 2018).

The effect of MSC on risk-taking (i.e., idiosyncratic risk and total risk) is economically meaningful. For example, Model (1b) indicates that increasing *MSC* from the 25th percentile to 75th percentile is associated with an 0.065 (2.61*-0.025) reduction in idiosyncratic risk, where 2.610 represents the interquartile range of *MSC* as reported in Table 1 (6.561 - 3.951 = 2.610), and -0.025 is the coefficient estimate in Model (1b). The reported coefficient in Model (1b) further implies that a firm with an *MSC* value in the 75th percentile is associated with 1.66 times [(-0.025 * 6.561) / (-0.025 * 3.951)] lower idiosyncratic risk than firms in the 25th percentile of the distribution. Stated differently, an increase in *MSC* by one unit (using a standard

[9] As we discuss in subsection 5.3. we also reproduce our results but using the market model to estimate firm idiosyncratic and total risks.

deviation of 2.276 from Table 1)), would result in decreasing idiosyncratic risk by 1.65 per cent (ln2.276 * 0.025 / ln0.289 = -0.0165, where 0.289 is the mean value of idiosyncratic risk estimated using the market model).

Regarding financial control variables, *ROA* has a highly significant and negative effect on risk-taking in all cases. This suggests that more profitable firms have lower firm-specific and total risks (Pástor and Pietro, 2003; Cheng, 2008; Mathew et al., 2016). We also find some tentative evidence that larger firms (*FSIZE*) have higher total risk (Models 2a and 2b). The positive and significant coefficients for *TURN* in models ((1a)-(1b)), infer that higher asset turnover is associated with higher firm-specific risk. Previous literature provides very limited evidence regarding the effect of asset turnover on firm risk-taking. The positive relationship we find might reflect the fact that more active firms which utilize their assets effectively are exposed to higher firm-specific risk compared to less active firms, although this does not impact total risk (Pae et al., 2018). Consistent with prior studies, we also find that leverage (*DEBTR*) is positively associated with both idiosyncratic and total risks (Adams et al., 2005; Akbar et al., 2017). Moreover, more mature firms, based on firm age (*FAGE*), have lower idiosyncratic and total risks (Cao et al., 2006; Akbar et al., 2017).

In terms of governance variables, board size (*BSIZE*) has a negative and significant effect on both idiosyncratic and total risks - especially so in the case of total risk. This infers that larger UK boards are more effective in mitigating firm and managerial risk-taking (e.g., Cheng, 2008, Pathan, 2009, Mathew et al., 2016). Consistent with our earlier conjecture that boards with a higher percentage of non-executive directors (NED) should be better monitors of managerial risk-taking, we observe a significant and negative association between the proportion of non-executive directors and both firm-specific and total risks (Pathan, 2009; Mathew et al., 2016; Akbar et al., 2017).

Finally, we report test statistics that highlight the validity of the system-GMM estimator at the bottom of Table 2 (and subsequent tables). Wintoki et al. (2012) argue that while it is expected that the first differences AR(1) exhibit serial correlation, this should not be the case in the second difference AR(2). The results suggest that we have no serial correlation in the second difference[10]. Additionally, the Hansen test of over-identification indicates that the instruments used are valid.

4.3 Corporate social responsibility (CSR) and firm risk

In this section, we re-examine the relations between social capital and firm risk, using CSR as alternative social capital measure that captures a firm's CSR performance, and one more closely aligned with a CSC perspective (Sacconi and Antoni, 2009). We re-estimate our models by employing the CSR indicator measure as our dependent variable (Lins et al., 2017). We collect this CSR variable for our sample firms from the Thomson Reuters ESG database, which provides a composite equally-weighted indicator of a firm's CSR performance.[11] Such data has emerged as a key measure of CSR in corporate finance literature (Cheung, 2016, Duque-Grisales and Aguilera-Caracuel, 2019).

[Table 3 here]

The results, shown in columns 1a and 1b of Table 3, illustrate that the relationship between CSR and both idiosyncratic risk (columns 1) and total risk (column 2) is significant and positive (in contrast to the negative relationship between MSC and firm risk). Such collective behaviour can be explained under the cushioning hypothesis, which predicts more risk-taking in collectivistic countries and is reflective of CSR being more closely aligned with a CSC perspective of social capital than a SSC definition (Sacconi and Antoni, 2010). The intuition

[10] For brevity, we only report the AR (2).
[11] For a detailed overview of this variable, we kindly refer the reader to: https://www.esade.edu/itemsweb/biblioteca/bbdd/inbbdd/archivos/Thomson_Reuters_ESG_Scores.pdf

behind this prediction is that managerial decision-makers working in these environments, which are characterized by relatively high 'social solidarity', may be more receptive to risk-taking compared to managers working in countries characterized by weak social solidarity (Hsee and Weber, 1999; Schneider et al., 2017). We consider that this positive effect of the CSC indicator (i.e., CSR), which is different from the negative effect we documented earlier for our main social capital measures, is interesting and that future research should pay attention to both SSC and CSC dimensions.

4.4. MSC and firm Risk-taking: Controlling for CSR

Here we extend the previous analyses (in columns 1a and 1b of Table 3) that looked at the effect of firm CSR on risk, by re-examining the relationship between MSC and firm-risk, while controlling for CSR. Although CSR can be thought of as an alternative social capital measure (Lins et al., 2017), it arguably reflects different aspects of social capital and is more consistent with a CSC perspective than a SSC one (in contrast to MSC). It can be argued that managers and directors with high levels of *both* structural and cognitive social capitals are "resource-rich" and can provide valuable access to resources for firms as well as play important roles in monitoring managerial effort and behaviour, in addition to the advice and counsel they provide. Yet the impact on risk-taking according to both perspectives may differ. Such a view is also supported under RDT (Pfeffer and Salancik, 1978).

Given this, in Table 3 columns 2a and 2b we consider the effects of both MSC while controlling for CSR, which is a social capital proxy more closely aligned with a CSC perspective (Sacconi and Antoni, 2010). We continue to find that MSC has a significant negative effect on risk-taking decisions. Moreover, the effect of CSR on firm risk measures continues to be positive. These results confirm the importance of our MSC construct as a social capital measure that more closely captures structural social capital, while also providing interesting evidence that CSR represents a different dimension of social capital, and one more

consistent with a cognitive definition. Taken together, we consider that these results suggest that future researchers should account for both dimensions.

5. Robustness checks

In unreported tests, which are all available upon request, we conduct a battery of robustness checks to probe the reliability of our main findings.

5.1 Controlling for a firm's risk management committee

A relevant concern is that the impact of MSC on firm risk may be attenuated by the presence of a firm risk committee. For example, it could be argued that because the risk committee is responsible for setting and implementing and observing firm risk management policies, this could enhance monitoring – especially since this committee is independent of the BoD. Motivated by these concerns, we repeat our analyses but with the inclusion of RSKCOM. a dummy variable equal to one if a firm has a risk committee or zero otherwise (Akbar et al., 2017).

The results indicate that the effects of MSC and ADJ-MSC are similar. We continue to find significant and negative coefficients for both measures, implying that social capital helps in reducing firms' idiosyncratic and total risks. Our main results are therefore robust to controlling for the potential effect of the risk management committee.

5.2 Industry-adjusted managerial social capital (MSC)

In additional analyses, we depart from prior work by considering an industry-adjusted measure of MSC (*ADJ-MSC*) to further account for a differential impact of MSC based on industry context. Industry 'norms' are understood to often influence the strategic decisions of firms. In considering an industry-adjusted measure, we help mitigate the possibility that our main findings are driven by specific industries, although our main results do account for industry and year fixed effects.

In Appendix A2, we show how our sample firms are distributed according to industry and over time. The highest representation of firms is from the financial sector, followed by the industrial sector, which equates to 37.66% and 23.40% of the total sample, respectively. This lends support to our inclusion of financial firms in social capital studies (Mizruchi, 1996, Engelberg et al., 2012, Javakhadze et al., 2016).

To implement our empirical tests, we repeat the analyses from Table 2 but instead use the industry-adjusted MSC measure (ADJ-MSC) as our main variable of interest. Despite our conjecture that the results for industry-adjusted MSC may differ, we do not find any evidence to substantiate it. Contrarily and consistent with our baseline results, we find that the effect of industry-adjusted social capital on the firm's risk-taking decision is also negative and statistically significant. Noteworthy however, is the size of parameter estimates being slightly smaller, which suggests that industry differences matter.

5.3 Controlling for corporate board nationality mix

The UK corporate sector is characterised by the diversity of the BoD nationality mix. For instance, the 2021 UK Spencer Stuart Board Index shows that foreign directors (those who have a citizenship that differs from that of the firm) account for 34% of all board members, and on average, four members of the board are from different nationalities, where 81% of boards have a minimum one foreign member.[12]

While general board diversity has been associated with increased diffusion of knowledge and information transfer between senior managers and board members, similarly, BoD nationality diversity has been put forward as an important factor influencing firm performance (Estélyi and Nisar, 2016). BoD nationality diversity has been associated with changes in firm outcomes, such as earnings management Du et al. (2017) and both increases

[12] For more details and information, we refer the interested reader to https://www.spencerstuart.com/research-and-insight/uk-board-index/diversity.

(Estélyi and Nisar, 2016) and decreases in firm performance (García-Meca et al., 2015; Estélyi and Nisar, 2016). For example, (García-Meca et al., 2015) show that foreign board members participate actively in the board meetings of UK firms and that there is a positive relationship between UK board nationality diversity and firm operating performance. Conversely, Estélyi and Nisar (2016) find the opposite using the same UK setting.

Accordingly, here, we control for the nationality mix of the BoD as one important aspect of board diversity that may influence relations between social capital dimensions and firm risk-taking, although the direction of the effect is unclear. The BoD nationality mix measure we employ is constructed as follows: First, we extract the nationality mix variable from the BoardEx data and then standardise it using board size (i.e., the total number of directors on the board). Next, we create a dummy variable (*NATMIX*) that takes a value of 1 if the nationality mix variable is greater than the mean value and zero otherwise. In our sample, the mean value of the nationality mix in the BoD is about 38%.[13]

The results demonstrate that the nationality mix measure (*NATMIX*) has a significant and positive effect on firm idiosyncratic and total risk. This positive association seems consistent with findings by Guney et al. (2020) that according to the RDT, firms with more foreign directors can benefit from a wide number of opportunities. These include receiving more investments from foreign investors, exposure to diversified skills, and easier expansion into foreign markets.

We further consider whether BoD nationality mix can moderate the effect of social capital on risk-taking by including interactions between social capital (*MSC* and *CSR*) with the BoD nationality mix. The results reveal that the negative relationship between MSC and risk-taking intensifies when we include the interaction term (*MSC*NATMIX*). Similarly, results for

[13] Note: this is the mean of the national mix variable for the study sample; however, the standardized form of the variable is about 71% (from T table 1 the *NATMIX* mean is 0.709)

the interaction between CSR and BoD nationality mix (*MSC*NATMIX*) indicate that BoD nationality mix intensifies the positive effect of CSR on firm risk. The overall results infer that while the main results for MSC and CSR on firm risk do not change in significance or sign, BoD nationality mix can intensify their effect.

5.4 Alternative ways of calculating firm risk

We also run several tests of robustness in which we calculate firm risk using Fama-French three (FF3) and four (FF4) factor models and rerun our main regressions. The results remain very similar to the main results based on the market model and CAPM. Therefore, we conclude that our estimation of the effect of social capital on firm risk is not driven by the choice of methodology to estimate risk.

As a final test of robustness, we re-run the baseline regressions as well as all the robustness tests in this section but estimating idiosyncratic and total risk using the market model as an alternative to the CAPM. We find our results continue to hold and are very similar in both magnitude and statistical significance levels.

6. Conclusion

Social capital plays important roles throughout society including within the corporate environment. Understanding how the social capital of managers can influence corporate risk-taking is important in order to better understand the factors that can result in heterogeneity in firms' risk-taking. n this study, we contribute new evidence on the relationship between MSC and corporate risk-taking in the context of UK firms using a rich sample of FTSE 350 index firms over the period 2006 to 2017.

Our main analyses explore how MSC impacts firms' idiosyncratic and total risks. We employ the system-GMM estimator to help mitigate endogeneity concerns regarding a potentially endogenous relationship between social capital and firm risk. We find consistently that MSC is negatively associated with both idiosyncratic and total risk measures and

demonstrate that this effect is economically meaningful. While MSC closely embodies a structural social capital definition, we also expand the analyses to consider firms' CSR as alternative measure of firm social capital, and one more aligned with the cognitive social capital dimension. We find, interestingly, that CSR is associated with an increase in both measures of firm risk. We consider that this result can be explained according to the cushioning hypothesis, which predicts more risk-taking in collectivistic countries such as the UK and is also reflective of CSR being more closely aligned with a CSC perspective of social capital than the SSC definition (Sacconi and Antoni, 2010).

Finally, our study is not without its limitations. First, although we explore the effect of social capital on corporate risk-taking by considering several risk measures and social capital indicators, other variables such as ownership structure, ethnicity, and political connections may also play a role. Future research could build on our work and explore these dimensions, in addition to, as noted earlier, delving further into the origins of social ties. Finally, it would be interesting to explore the role of MSC during times of crisis, such as during the Covid-19 pandemic, since extant interdisciplinary research suggests that boards and directors should matter most during crisis periods.

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Table 1: Summary Statistics

This table provides summary statistics for the variables employed in this paper. The data forms an unbalanced panel of UK FTSE 350 firms between 2006 and 2017. It is worth noting that the variables descriptions and system of measurement correspond to the criteria specified in Appendix A1.

Variables	*No.*	*Mean*	*SD*	*Percentile*							*Skewness*	*Kurtosis*
				p5	*p25*	*p50*	*p75*	*p95*	*max*	*min*		
IDO-CAPM	*4102*	*0.289*	*0.176*	*0.113*	*0.179*	*0.248*	*0.341*	*0.604*	*2.486*	*0.045*	*2.920*	*19.397*
IDO-MKT	*4102*	*0.289*	*0.176*	*0.113*	*0.179*	*0.248*	*0.341*	*0.604*	*2.486*	*0.045*	*2.920*	*19.397*
TRISK	*4102*	*0.325*	*0.179*	*0.147*	*0.214*	*0.284*	*0.380*	*0.662*	*2.488*	*0.054*	*2.796*	*17.735*
ADJ-MSC	*4241*	*0.424*	*2.480*	*-5.052*	*-0.944*	*0.552*	*2.014*	*4.403*	*6.877*	*-5.641*	*-0.360*	*3.200*
MSC	*4241*	*5.040*	*2.276*	*0.000*	*3.951*	*5.308*	*6.561*	*8.114*	*11.790*	*0.000*	*-0.607*	*3.337*
ROA	*4115*	*0.048*	*0.105*	*-0.118*	*0.013*	*0.050*	*0.095*	*0.203*	*0.300*	*-0.428*	*-1.479*	*8.827*
FSIZE	*4115*	*13.639*	*1.879*	*11.183*	*12.339*	*13.295*	*14.577*	*17.224*	*20.512*	*10.599*	*1.157*	*4.781*
TURN	*4101*	*0.782*	*0.787*	*0.020*	*0.100*	*0.600*	*1.170*	*2.410*	*3.530*	*-0.070*	*1.243*	*4.260*
DEBTR	*4115*	*0.187*	*0.165*	*0.000*	*0.050*	*0.157*	*0.280*	*0.521*	*0.720*	*0.000*	*0.971*	*3.588*
DIVTA	*4089*	*0.026*	*0.026*	*0.000*	*0.008*	*0.019*	*0.033*	*0.079*	*0.141*	*0.000*	*1.994*	*7.931*
FAGE	*4216*	*3.561*	*0.786*	*2.303*	*2.944*	*3.434*	*4.331*	*4.771*	*4.852*	*1.792*	*-0.003*	*1.943*
Q	*4109*	*1.144*	*0.811*	*0.275*	*0.731*	*0.907*	*1.328*	*2.759*	*4.976*	*0.075*	*2.274*	*9.644*
BSIZE	*3941*	*2.023*	*0.318*	*1.609*	*1.792*	*2.079*	*2.197*	*2.565*	*2.773*	*1.386*	*0.107*	*2.444*
ASIZE	*4001*	*1.402*	*0.338*	*1.099*	*1.099*	*1.386*	*1.609*	*1.946*	*2.197*	*0.000*	*-0.821*	*5.659*
NED	*3203*	*0.706*	*0.321*	*0.300*	*0.500*	*0.636*	*0.857*	*1.333*	*1.800*	*0.200*	*1.087*	*4.293*
GEN	*3941*	*0.130*	*0.121*	*0.000*	*0.000*	*0.130*	*0.200*	*0.330*	*0.500*	*0.000*	*0.679*	*2.952*
Variables used in the further analysis												
IDO-FF3	*4102*	*0.279*	*0.172*	*0.108*	*0.174*	*0.239*	*0.331*	*0.571*	*2.481*	*0.043*	*3.007*	*20.667*
IDO-FF4	*4102*	*0.279*	*0.171*	*0.108*	*0.173*	*0.238*	*0.331*	*0.570*	*2.481*	*0.043*	*3.009*	*20.724*
CSR	*2,279*	*45.047*	*17.233*	*17.2*	*31.78*	*44.87*	*56.89*	*74.61*	*91.91*	*3.02*	*0.142*	*2.433*
RSKCOM	*4325*	*0.0377*	*0.190*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*4.855*	*24.573*
NATMIX	*3,673*	*0.709*	*.453*	*0*	*0*	*1*	*1*	*1*	*1*	*0*	*-0.924*	*1.85449*

Table 2: The relationship between MSC and firm risk

This table presents the results of multivariate analyses using the dynamic panel generalized method of moments estimator. The dependent variables are idiosyncratic risk or total risk estimated using the CAPM model. The reported p-values are enclosed in parentheses, while the t-statistics are based on robust standard errors. The symbols ***, **, and * signify significance levels of 1%, 5%, and 10% correspondingly. AR (2) represents the tests for second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. Hansen's test of over-identification is under the null that all instruments are valid. Risk(t-1) and Risk(t-2) are the first and second lags of the dependent variable respectively. Further details on variable definitions and measurements can be found in Appendix A1.

	Idiosyncratic Risk (IDO-CAPM)		Total Risk (TRISK)	
	Model (1a)	Model (1b)	Model (2a)	Model (2b)
MSC	-0.0263***	-0.0250***	-0.0325***	-0.0319***
	(-2.639)	(-2.673)	(-2.709)	(-2.680)
ROA	-0.555***	-0.500**	-0.509**	-0.435**
	(-2.871)	(-2.581)	(-2.432)	(-2.066)
FSIZE	0.0226	0.0207	0.0308*	0.0269*
	(1.411)	(1.356)	(1.86)	(1.781)
TURN	0.0703**	0.0713**	0.0472	0.0515
	(2.3)	(2.035)	(1.486)	(1.548)
DEBTR	0.449**	0.440**	0.435**	0.431**
	(2.518)	(2.496)	(2.135)	(2.083)
DIVTOASS	-0.302	-0.596	-0.0308	-0.0509
	(-0.330)	(-0.705)	(-0.0326)	(-0.0551)
FAGE	-0.0170**	-0.0114*	-0.0178*	-0.0135
	(-2.317)	(-1.665)	(-1.819)	(-1.488)
Q	-0.00271	0.00587	0.0186	0.0295
	(-0.0968)	-0.216	-0.419	-0.704
BSIZE	-0.237*	-0.252**	-0.374***	-0.367***
	(-1.950)	(-2.251)	(-3.202)	(-3.126)
ASIZE	0.0387	0.0444	0.0231	0.0281
	(1.071)	(1.217)	(0.624)	(0.74)
NED	-0.233**	-0.230**	-0.382***	-0.361***
	(-2.120)	(-2.377)	(-2.969)	(-2.948)
GEN	0.00391	0.00574	0.0501	0.0359
	(0.0505)	(0.0756)	(0.573)	(0.41)
$Risk_{(t-1)}$	0.470***	0.476***	0.456***	0.460***
	(7.326)	(7.711)	(6.937)	(7.033)
$Risk_{(t-2)}$	-0.0926**	-0.0937**	-0.0669*	-0.0649*
	(-2.296)	(-2.286)	(-1.887)	(-1.849)
Constant	0.459	0.529	0.747**	0.844**
	(1.327)	(1.533)	(2.059)	(2.274)
Observations	2512	2511	2513	2513
No. of firms	322	322	322	322
F-statistic	32.18***	28.04***	41.07***	31.32***
AR(2)	0.413	0.417	0.336	0.333
Hansen test (p-val)	0.432	0.352	0.648	0.628
Industry FE	NA	Yes	NA	Yes
Year FE	Yes	Yes	Yes	Yes

Table 3: Corporate social responsibility (CSR) and firm risk

This table presents the results of multivariate analyses using the dynamic panel generalized method of moments estimator. The dependent variables are idiosyncratic risk or total risk estimated using the CAPM model. We proxy for cognitive social capital (CSC) using CSR. Models 1a and 1b use CSR as an alternative proxy for social capital, while columns 2a and 2b include MSC while controlling for CSR, to explore the possibility that CSR and MSC capture different dimensions of social capital. The reported p-values are enclosed in parentheses, while the t-statistics are based on robust standard errors. The symbols ***, **, and * signify significance levels of 1%, 5%, and 10% correspondingly. AR (2) represents the tests for second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. Hansen's test of over-identification is under the null that all instruments are valid. Risk(t-1) and Risk(t-2) are the first and second lags of the dependent variable respectively. Further details on variable definitions and measurements can be found in Appendix A1.

	Idiosyncratic Risk (IDO-CAPM): CSR	Total Risk (TRISK-CAPM): CSR	Idiosyncratic Risk (IDO-CAPM): CSR and MSC	Total Risk (TRISK-CAPM): CSR and MSC
	Model (1a)	Model (1b)	Model (2a)	Model (2b)
			-0.00839*	-0.00783*
			(-1.845)	(-1.783)
CSR	0.0337**	0.0341**	0.0432**	0.0385**
	(2.145)	(2.038)	(2.428)	(2.222)
ROA	-0.521***	-0.478***	-0.518***	-0.483***
	(-3.286)	(-3.111)	(-3.289)	(-3.364)
FSIZE	-0.0132***	-0.0103***	-0.0134**	-0.0118**
	(-2.859)	(-2.597)	(-2.439)	(-2.311)
TURN	0.0247**	0.0234**	0.0215*	0.0203*
	(2.062)	(2.210)	(1.930)	(1.822)
DEBTR	0.105**	0.0825	-0.00727	-0.0405
	(2.118)	(1.424)	(-0.0942)	(-0.564)
DIVTOASS	0.164	0.165	-0.0838	-0.118
	(0.503)	(0.441)	(-0.303)	(-0.414)
FAGE	-0.00291	-0.00120	-0.00150	0.000596
	(-0.663)	(-0.275)	(-0.237)	(0.103)
Q	-0.00997	-0.0119	-0.00197	-0.000248
	(-0.820)	(-0.901)	(-0.207)	(-0.0274)
BSIZE	0.0151	0.0192	0.000168	0.0152
	(0.373)	(0.440)	(0.00415)	(0.347)
ASIZE	-0.00694	-0.00519	0.0456	0.0519
	(-0.301)	(-0.236)	(1.463)	(1.431)
NED	0.0148	0.0124	0.0368	0.0500
	(0.394)	(0.340)	(0.597)	(0.852)
GEN	0.116*	0.131**	0.0977	0.0648
	(1.674)	(1.981)	(1.193)	(0.773)
$Risk_{(t-1)}$	0.590***	0.610***	0.0432**	0.0385**
	(9.015)	(8.543)	(2.428)	(2.222)
$Risk_{(t-2)}$	-0.000323	0.00286	-0.00839*	-0.00783*
	(-0.00620)	(0.0528)	(-1.845)	(-1.783)
Constant	0.345***	0.332**	0.126	0.0301
	(2.994)	(2.567)	(0.631)	(0.158)
Observations	1334	1,334	1,334	1,334
Number of Firms	313	313	313	313
F-statistic	36.39***	43.06***	28.76***	35.23***
AR (2)	0.674	0.248	0.747	0.282
Hansen (p-val)	0.618	0.502	0.69	0.619
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Appendices

Appendix A1: Variable descriptions and data sources
The table details the variable names, calculations, and sources of all variables.

Variable	**Name**	**Source**	**Variable description**
Idiosyncratic risk	IDO-MKT	Authors' calculation	Idiosyncratic risk volatility estimated based on the market model.
Idiosyncratic risk	IDO-CAPM	Authors' calculation	Idiosyncratic risk volatility estimated based on the capital asset pricing model.
Total risk	TRISK	Authors' calculation	Standard deviation of the daily stock returns (annualised).
Managerial social capital	MSC	Authors' calculation based on Boardex data	Natural logarithm of a firm's aggregate social connections for each executive and non-executive corporate board member from current employment, previous employment, education, and social activity. This is computed using using NodeXL software. The measure is based on the aggregate sum of the following dimensions (Javakhadze et al., 2016): *Current employment (CE)*: Two individuals are socially connected if they work in the same company and set together either on the BOD's or on the top management group, this is include the traditional interlocking where two firms may have a common director) and connections where individuals from two firms setting together in a third firm; *Previous employment (PE)*: Two individuals are socially connected if they work concurrently with each other in the past in the same firm either on the BOD's or in the top management group; *Education (ED)*: Two individuals are socially connected if they attend the same school and graduated within one year of each other; *Other activities (OA)*: Two individuals are socially connected if they have a membership in clubs, organizations, or charities for at least one year.
Adjusted managerial social capital	ADJ-MSC	Authors' calculation	The MSC adjusted to industry excluding the focal firm
Return on assets	ROA	DataStream	The ratio of net income to total assets *(winsorised).*
Firm size	FSIZE	DataStream	Natural logarithm (total assets) *(winsorised).*
Turnover ratio	TURN	DataStream	Asset turnover is measured as ratio of annual sales to total assets *(winsorised).*
Debt ratio	DEBTR	DataStream	Short term debt and long-term debt divided by book value of total assets *(winsorised).*
Dividends to assets	DIVTOASS	DataStream	Total dividends (common and preferred) to total assets *(winsorised).*
Tobin's Q ratio	Q	DataStream	Tobin's Q measured as the number of shares outstanding times stock price plus total liabilities divided by total assets *(winsorised).*
Firm age	FAGE	DataStream / gov.uk	Number of years since incorporation of the firm *(winsorised).*
Board Size	BSIZE	BoardEx	Total number of directors sitting on the board *(winsorised).*
Board independence	NED	BoardEx	The ratio of the number of independent directors to the number of all directors *(winsorised).*
Audit committee size	ASIZE	BoardEx	Total number of directors sitting on the audit committee *(winsorised).*
Female director	GEN	BoardEx	The ratio of number of female directors to the total number of directors *(winsorised).*

Nationality mix	NATMIX	BoardEx	The nationality mix variable from BoardEx divided by the board size; then a dummy variable has been created that equals one if NATMIX > mean and zero otherwise.
Industry dummy	SIC	DataStream	A dummy for each micro-sector
Year dummy	YEAR		A dummy variable for each year based on the Industry Classification Benchmark (ICB) (FTSE Factsheet 2018)
Unsystematic risk	IDO-FF3	Authors' calculation based on DataStream	Idiosyncratic risk volatility estimated based on Fama–French three-factor model.
Unsystematic risk	IDO-FF4	Authors' calculation	Idiosyncratic risk volatility estimated based on Fama–French four-factor model.
Corporate social responsibility	CSR	DataStream	Composite corporate social responsibility score
Risk committee	RSKCOM	BoardEx	Firm risk committee represented by a dummy that equals one if the firm has a risk committee, zero otherwise

Appendix A2: Distribution of sample firms by industry and year

The table shows the distribution of FTSE350 (sample) firms by industry and over time. Industry names and codes are as reported according to the Industry Classification Benchmark (ICB) (FTSE Factsheet 2018).

Industry	Code	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Frequency	Percentage
Oil & Gas	1	8	8	8	8	8	8	8	8	9	9	9	9	100	2.31%
Basic Materials	1000	13	13	13	13	13	13	13	13	13	13	13	13	156	3.61%
Industrials	2000	84	84	84	84	84	84	84	84	85	85	85	85	1012	23.40%
Consumer Goods	3000	28	28	28	28	28	28	28	28	28	28	28	28	336	7.77%
Health Care	4000	11	11	11	11	11	11	11	11	11	11	11	11	132	3.05%
Consumer Services	5000	54	54	54	54	54	54	54	54	54	54	54	54	648	14.98%
Telecommunications	6000	4	4	4	4	4	4	4	4	4	4	4	4	48	1.11%
Utilities	7000	5	5	5	5	5	5	5	5	5	5	5	5	60	1.39%
Financials	8000	134	135	136	136	136	136	136	136	136	136	136	136	1629	37.66%
Technology	9000	17	17	17	17	17	17	17	17	17	17	17	17	204	4.72%
Total		358	359	360	360	360	360	360	360	362	362	362	362	4325	100.00%

Appendix A3: The evolution of MSC and risk over time

This table presents descriptive statistics for social capital and firm risk measures over time. It reports the mean, mean difference, percentage (%) difference, and standard deviation for MSC, ADJ-MSC, IDO-MKT, IDO-CAPM, IDO-FF3, IDO-FF4, and TRISK variables over the sample period. Variable definitions and measurements are as given in Appendix A1.

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
MSC	*Mean*	5.822	5.634	5.674	5.628	5.593	5.506	5.397	5.148	4.930	4.511	3.882	2.787
	Diff	-	-0.188	0.040	-0.046	-0.035	-0.087	-0.109	-0.249	-0.218	-0.419	-0.629	-1.095
	% diff		-0.032	0.007	-0.008	-0.006	-0.016	-0.020	-0.046	-0.042	-0.085	-0.139	-0.282
	St. Dev.	1.785	1.757	1.744	1.841	1.907	2.024	2.128	2.282	2.336	2.366	2.438	2.445
ADJ-MSC	*Mean*	1.209	1.020	1.059	1.013	0.978	0.891	0.782	0.533	0.312	-0.108	-0.737	-1.831
	Diff	-	-0.189	0.039	-0.046	-0.035	-0.087	-0.109	-0.249	-0.221	-0.420	-0.629	-1.094
	% diff		-0.156	0.038	-0.043	-0.035	-0.089	-0.122	-0.318	-0.415	-1.346	5.824	1.484
	St. Dev.	2.045	2.034	2.028	2.110	2.171	2.278	2.318	2.475	2.529	2.547	2.609	2.606
IDO-MKT	*Mean*	0.234	0.263	0.471	0.422	0.267	0.285	0.261	0.232	0.234	0.246	0.298	0.239
	Diff	-	0.029	0.208	-0.049	-0.155	0.018	-0.024	-0.029	0.002	0.012	0.052	-0.059
	% diff		0.124	0.791	-0.104	-0.367	0.067	-0.084	-0.111	0.009	0.051	0.211	-0.198
	St. Dev.	0.090	0.125	0.207	0.216	0.130	0.171	0.200	0.107	0.112	0.145	0.167	0.181
IDO-CAPM	*Mean*	0.234	0.263	0.471	0.422	0.267	0.285	0.261	0.232	0.234	0.246	0.298	0.239
	Diff	-	0.029	0.208	-0.049	-0.155	0.018	-0.024	-0.029	0.002	0.012	0.052	-0.059
	% diff		0.124	0.791	-0.104	-0.367	0.067	-0.084	-0.111	0.009	0.051	0.211	-0.198
	St. Dev.	0.090	0.125	0.207	0.216	0.130	0.171	0.200	0.107	0.112	0.145	0.167	0.181
IDO-FF3	*Mean*	0.226	0.256	0.451	0.407	0.261	0.278	0.255	0.227	0.227	0.240	0.278	0.233
	Diff	-	0.030	0.195	-0.044	-0.146	0.017	-0.023	-0.028	0.000	0.013	0.038	-0.045
	% diff		0.133	0.762	-0.098	-0.359	0.065	-0.083	-0.110	0.000	0.057	0.158	-0.162
	St. Dev.	0.090	0.124	0.198	0.207	0.129	0.169	0.200	0.107	0.111	0.144	0.165	0.179
IDO-FF4	*Mean*	0.225	0.255	0.450	0.405	0.261	0.277	0.254	0.226	0.226	0.239	0.278	0.233
	Diff	-	0.030	0.195	-0.045	-0.144	0.016	-0.023	-0.028	0.000	0.013	0.039	-0.045
	% diff		0.133	0.765	-0.100	-0.356	0.061	-0.083	-0.110	0.000	0.058	0.163	-0.162
	St. Dev.	0.090	0.090	0.123	0.198	0.207	0.128	0.168	0.200	0.107	0.111	0.144	0.164
TRISK	*Mean*	0.263	0.307	0.546	0.466	0.306	0.339	0.289	0.254	0.254	0.278	0.336	0.247
	Diff	-	0.044	0.239	-0.080	-0.160	0.033	-0.050	-0.035	0.000	0.024	0.058	-0.089
	% diff	-	0.167	0.779	-0.147	-0.343	0.108	-0.147	-0.121	0.000	0.094	0.209	-0.265
	St. Dev.	0.086	0.121	0.205	0.222	0.123	0.163	0.196	0.100	0.105	0.138	0.164	0.178