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Social Capital and Stock Price Crash Risk: Cross-Country Evidence

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Abstract

We use a comprehensive cross-country sample to investigate whether and how the country-level social capital influences the firm-level stock price crash risk. We document a negative and statistically significant effect, which is robust to various tests including IV estimations that account for endogeneity concerns. When we disaggregate social capital into its various components, we find that the results are driven by civic and social participation, institutional trust, and family relationships, whereas social networks and interpersonal trust do not appear to matter. Furthermore, we find that the impact of social capital is channeled through firm-level reporting opacity and price informativeness. Finally, the impact of social capital on stock price crash risk is moderated by formal institutions, like property rights and law and order.

Keywords: Stock price crash risk, Social capital, Informal institutions, Formal institutions

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1. Introduction

Stock price crash risk, defined as the negative skewness in the distribution of returns for individual stocks (Chen et al., 2001; Habib et al., 2018), has important implications for the wealth of shareholders. Therefore, it is not surprising that many studies try to shed light on its driving factors. These studies can broadly be classified in two strands of literature. The first group of studies focuses on firm-specific factors as potential determinants of stock price crash risk (e.g. Chen et al., 2017a, 2017b; Fu et al., 2021; Lu and Qiu, 2023). The second strand examines external drivers of crash risk and has received less attention (Cao et al., 2016; Cao et al., 2019), with some studies exploring the role of formal institutions, like accounting and enforcement regulations (Kubick and Lockhart, 2016; Abedifar et al., 2019), and others focusing on the role of informal institutions and the surrounding social environment, like religion (Callen and Fang, 2015), social trust (Cao et al., 2016; Li et al., 2017; Su and Song, 2022), social integrity (Liu and Liu, 2024), local gambling preferences (Ji et al., 2021), and national culture (Dang et al., 2019; Zuo et al., 2023).[1] Our paper extends the second strand of this literature by exploring the association between the country-level social capital and the firm-specific stock price crash risk.

The underlying idea in the literature of stock price crash risk is that managers behave unethically and withhold bad news from investors for as long as possible (i.e., bad news hoarding), because of career and short-term compensation concerns. Thus, agency theory, information asymmetries and the ethical dilemma faced by managers in disclosure choices (Fu et al., 2021) have a central role in this phenomenon, and it is not surprising that stock price crash risk has received a lot of attention in the finance and business ethics literature (e.g. Chen

[1] Formal institutions are written rules (e.g. laws and regulations), while informal institutions are unwritten rules that encompass a society's norms, values, and beliefs that create expectations for social interactions and appropriate and inappropriate social behavior (Dau et al., 2022; Pasiouras and Samet, 2022).

et al., 2019; Fu et al., 2021; Gu et al., 2022; Liu and Liu, 2024).[2] At the same time, another strand of the literature argues that regional social capital mitigates agency issues and opportunistic managerial behaviour, and it facilitates the flow of information (Hasan et al., 2017; Jha, 2019, Hoi et al., 2019; Gupta et al., 2023). In general, this is attributed to certain features of social capital that relate to social organization, like trust, social norms, and social networks, which can improve societal efficiency by facilitating coordinated actions (Putnam, 1993).

Consistent with the socialized (or "embedded") view of corporate principal-agent relationships (Lubatkin et al., 2007) and the social theory of agency (Wiseman et al., 2012), the underlying idea in our work is that principal-agent relationships cannot be examined in isolation of the firm's social context, and that managers surrounded by a greater amount of integrity and morality face higher social pressure to conform to local norms. Therefore, due to internal and external social sanctions, they may avoid unethical practices, like withholding bad news through the manipulation of financial statements and information flow, that are condemned by members of their community. Furthermore, in maximizing their utility, managers are expected to weigh the financial rewards from bad news hoarding with the potential socially related costs should they be caught. Such social costs are expected to be more severe in places with higher social capital. As a result, one would expect firms operating in regions with higher social capital to be associated with lower stock price crash risk. Nonetheless, social capital also has a dark side (Gargiulo and Benassi, 1999; Dasgupta, 2005),

[2] A well-known example of such unethical managerial behaviour is that of Carlos Ghosn who was widely perceived as a charismatic leader and "*C-suite superhero"* (Stevenson and Du, 2021) of Nissan and Renault, until he was arrested over alleged financial misconduct. The allegations included accusations of understating his salary by around $44 million between 2011 and 2015 and having mis-used company funds to cover up personal investment losses (CBS News, 2018; Holmes, 2019). Not surprisingly, the shares of Nissan and Mitsubishi plunged when markets opened in Japan on the day after the arrest, falling by 6.5% and 6.9% respectively, while the stock price of Renault fell by nearly 10% in the days that followed the arrest (Derhally, 2018; Winton, 2018).

that could have negative implications. Consequently, its impact on stock price crash risk is ambiguous.

Our knowledge on this topic remains limited with a handful of studies that provide some evidence on the association between social trust or social capital and stock price cash risk. However, the existing studies focus on either U.S. firms (Zadeh, 2023; Mun et al., 2024) or Chinese firms (Cao et al., 2016; Li et al., 2017; Su and Song, 2022), exploring differences in social capital or social trust across U.S. counties and Chinese provinces, respectively. In contrast, we take a global perspective and use a sample from 47 countries. Our study answers to the call of Habib et al. (2018) for more research in an international context, to enhance our understanding on the effect of country-specific idiosyncratic characteristics on stock price crash risk. However, this is not simply a matter of cross-country versus single-country study. Instead, we differentiate our work in two important respects.

First, in contrast to the three Chinese studies, we focus on social capital rather than social trust. Our social capital indicator, like in the case of the two U.S. studies, captures various aspects of social capital suggested in the literature like personal and family relationships, social networks, civic and social participation, as well as interpersonal and institutional trust. This may have important implications in the context of stock price crash risk. For instance, civic and social participation and social networks may play an important role in this case, over and beyond what can be accomplished by trust alone. Furthermore, information asymmetries have a central role in the crash stock price risk literature. At the same time, the social capital literature suggests that social capital may facilitate the flow of information. To the extent that information flowers faster in countries with higher social capital, this could enhance stock price crash risk. On the other hand, one of the mechanisms through which social capital works is through social stigma that may be more important in countries with enhanced social

participation and networking. Again, trust alone is not a sufficient measure to capture all these aspects.

Second, and most importantly, the use of an international sample allows us to examine the role of social capital under different formal institutional environments. This issue has not been explored in any of the earlier country-specific studies. However, this global approach is of paramount importance considering the potential substitutional or complementarity effects between formal (e.g., law and order) and informal (e.g., social norms) institutions. For instance, informal institutions - like social capital - may have a less important role in constraining opportunistic behavior and mitigating agency problems in countries with good regulatory quality and more developed rule of law. This is because in countries with high quality regulations and laws, parties to a transaction have confidence that they are protected from opportunistic behaviour (e.g. cheating and illegal deviations from agreed terms). Knack and Keefer (1997), for example, mention that "*Societies characterized by high levels of trust are also less dependent on formal institutions to enforce agreements*" (p. 123). At the same time, while the conventional wisdom is that social capital comes with certain advantages, there is also a literature on the dark-side of social capital. Within this context, García-Albacete (2010) argues that it is not necessary that the same positive outcomes of social capital will work in every context. Thus, whether social capital comes with advantages or disadvantages may depend on the formal institutional environment. Apparently, the perception that formal and informal institutions interact in shaping corporate or individual behaviour and decisions is not new. However, we are the first to empirically investigate it in the case of stock price crash risk.

Using a sample of 35,770 firms from 47 countries over the period 2008-2019, we find that country-level social capital lowers firm-specific stock price crash risk. This finding holds when we use a 2SLS IV approach to mitigate endogeneity concerns. Additionally, we explore two possible channels through which social capital influences stock price crash risk. We show

that social capital reduces firm-level reporting opacity, which in turn decreases crash risk. We observe the opposite in the case of firm-level price informativeness. When we split the social capital into tis various components, we find that the results are driven by civic and social participation, family relationships, and institutional trust. In contrast, interpersonal trust and social networks do not appear to matter. Hence, our results contradict the ones of earlier studies that documented a negative association between interpersonal trust or firm trustworthiness and stock price crash risk in the case of China (Cao et al., 2016; Li et al., 2017). As discussed earlier, such differences could be explained by differences in the formal institutional environment. To account for this, we examine the conditional role of property rights and law and order. In both cases, the interaction of social capital with the indicator of formal institutions enters the regression with a positive and statistically significant coefficient. It seems that in the presence of strong formal institutions (good property rights and law and order) that are known to mitigate opportunistic behaviour and enhance transparency, social capital becomes a less important driver of stock price crash risk.

The rest of the manuscript is as follows. Section 2 provides a background discussion. Section 3 describes the data and methodology. Section 4 discusses the results, and Section 5 concludes.

2. Background discussion

2.1. Social capital and stock price crash risk: a socialized framework

Empirical research on stock price crash risk draws primarily on the agency theoretical framework of Jin and Myers (2006), who refer to information asymmetries between corporate insiders and external stakeholders (Habib et al., 2018). The underlying idea is that such asymmetric information allows self-interested managers to hide bad news for an extended period because of career and short-term compensation concerns (Kothari et al., 2009); however,

after a sufficiently long run period managers tend to give up, leading to all the negative firm-specific shocks becoming public at once. This sudden release of accumulated negative information leads to stock price crash (Hutton et al., 2009). In the discussion that follows we outline the unethical practices of the managers that may result in stock price crash risk, and the potential role of regional social capital.

The literature on stock price crash risk suggests that managers may attempt to hide news through various unethical or even illegal practices like earnings management (Hutton et al., 2009), tax avoidance (Kim et al., 2011), ESG report greenwashing (Liu et al., 2024), and accounting fraud (Richardson et al., 2022). Furthermore, managers may engage in several other actions that violate their moral commitment towards either the shareholders or the stakeholders of the firm. For example, Xu et al. (2019) argue that the ethical thoughts of loyalty and trustworthiness assert that managers should honour their contractual commitment to maximize shareholder value. In a similar, albeit broader context, the stakeholder theory asserts that managers have an ethical obligation towards all stakeholders of the firm, not just its shareholders (Freeman, 1984). Clearly, managerial actions like overinvestment or excessive risk-taking, commonly identified in the literature as channels or strategies that lead to stock price crash risk (Benmelech et al., 2010; Dang et al., 2019; Andreou et al., 2022), could be seen as a breach of the moral obligations, and be deemed as unethical, under either the shareholder or the stakeholder theory.

Drawing on solutions originating from the agency theory literature, existing studies largely focused on the role of mechanisms like reporting conservatism, internal and external auditing, internal control, and other corporate governance tools (e.g. independent directors, CEO inside debt holdings) in decreasing stock price crash risk (He, 2015; Kim and Zhang, 2016; Chen et al., 2017; Kao et al., 2020; Cho et al., 2023). However, as outlined in Liu and

Liu (2024), such studies on stock price crash risk largely overlook the ethical environment in which firms operate.

In the present study we take a step towards this direction to extend our knowledge on the impact of social capital on stock price crash risk**.** We focus on social capital for three reasons. First, existing conceptual work associates social capital with the ethical values and practices of the society (Heuser, 2005; Ayios et al., 2014). Second, empirical literature confirms that social capital mitigates the opportunistic and unethical behaviour of managers along various dimensions. For example, Huang et al. (2021) emphasize in their discussion about bad and good share buybacks, that executives who respect both the letter and the spirit of ethical norms are not born, rather they are shaped by their home communities. As they also mention, executives who take core principles seriously are most likely to be found in communities with a high degree of social capital. In the case of stock price cash risk, social capital may play a role through at least two channels, namely by diminishing managerial opportunism and enhancing the flow of information. Third, a shortcoming of the microeconomic approach of the principal-agent relationship is that it ignores the socioeconomic context in which transactions take place (Pena Lopez and Sanchez Santos, 2014) or in other words it ignores that the transactions are socially embedded (Lubatkin et al., 2007; Wiseman et al., 2012). The standard principal-agent model assumes that attitudes predict behaviours regardless of the social context, with executives aiming to maximize their utility based solely on economic rationality (Lubatkin et al., 2007). As discussed in Lubatkin et al (2007) this is an undersocialized view of human behaviour, since it is not possible to understand whether agents will behave opportunistically or act as good steward without first considering their social context. Therefore, our approach leverages on the socialized (or "embedded") framework of Lubatkin et al. (2007) as well as on the social theory of agency of Wiseman et

al. (2012), which asserts that economic behavior is shaped by social mechanisms not only at the margin but also at the core.

2.2. How does social capital work? The good side

The literature suggests that the benefits of social capital, like community cohesion and information flow, are not limited to those individuals that possess social capital but also to people living in regions with a high level of social capital even if they do not have high levels of personal capital themselves (Kwon et al., 2013). Thus, people surrounded by a higher level of social capital are less selfish, cooperate and trust each other more, and feel obliged to behave ethically and morally (Hartlieb et al., 2020; Bai et al., 2022), subsequently constraining the norm-deviant and opportunistic behaviour of individuals and organizations (Hoi et al., 2019; Gao et al, 2021; Papadimitri et al., 2021; Bai et al., 2022). For example, recent empirical research shows that high social capital in the region where the firm is headquartered lowers the probability of committing fraud by misrepresenting financial information (Jha, 2019), mitigates managerial opportunism around share repurchase announcements (Gupta et al., 2023), and decreases tax avoidance (Hasan et al., 2017), asymmetric cost behaviour (Hartlieb et al., 2020), excessive CEO compensation (Hoi et al., 2019), misuse of corporate resources (Gao et al., 2021), bank misconduct (Martin-Flores, 2024) and risk-taking (Panta, 2020).

One way through which social capital works is social norms, which are rules and standards that specify what "should" be done. Thus, these are the moral rules of the group that guide and/or constrain social behaviour by promising social rewards or by imposing sanctions by the social networks (Cialdini and Trost, 1998). Furthermore, a primary motivation for engaging in socially responsible behaviour may be our desire to see ourselves as good, kind and helpful people (Cialdini and Trost, 1998). Therefore, an environment with higher levels of social capital tends to encourage honest behaviours and behaviours that conform to legitimate

moral variables for at least two reasons. First, managers may feel inherently uncomfortable in engaging in opportunistic behaviours as this contradicts their internalized ethical values, like honest sincerity, and respecting others' rights and interests (Liu and Liu, 2024). Violating social norms may also result in other internal sanctions like feelings of embarrassment, anxiety, guilt and shame (Elster, 1989). In other words, social capital through implicit moral norms and ethical principles will impose internal moral constraints on managerial unethical behaviour, reducing stock price crash risk. Second, assuming that managers aim to maximize their expected utility, each manager will weigh the expected gain of hoarding bad news (i.e. personal wealth) against the expected litigation costs and the costs of breaking social norms (i.e. social sanctions like reputation loss, social stigma, loss of trustworthiness). Managers of firms headquartered in areas with high levels of social capital will face a higher cost for activities deviating from social norms (e.g. bad news hoarding), and therefore they should attach a higher social cost to it. Furthermore, corporate fraud and bad news hoarding may come to light due to employees' whistleblowing (Dyck et al., 2010; Association of Certified Fraud Examiners, 2024). Whistleblowing involves numerous and important moral conflict (Murphy, 1981; Jensen, 1987; O'Sullivan and Ngau, 2014) and community social capital may play an important role in this complex decision.[3] For example, firms located in places with a higher level of social capital are more likely to have a larger percentage of employees that conform and behave in accordance with social norms. Furthermore, employees with ties to their community are likely to have greater awareness of the social harm of the misconduct. Therefore, it is not surprising

[3] A study of 1,921 cases from 138 countries, conducted by the Association of Certified Fraud Examiners (2024) reveals that 43% of occupational frauds were uncovered due to a tip from a whistleblower, which is more than twice than the next most common detection method of internal audit (14%). Interestingly around 52% of all tips came from employees. Dyck et al. (2010) reach a similar conclusion. They examine all the reported fraud cases in large U.S. companies between 1996 and 2004 to conclude that fraud detection does not rely on standard corporate governance actors (investors, and auditors), but instead on nontraditional ones (media, industry regulators, employees) with employees being the most important ones (17% of the cases).

that existing evidence shows a greater incidence of whistle blowing in firms located in areas with higher social capital (Bereskin et al., 2020).

Based on the above discussion, we hypothesize that managers in regions with higher social capital are more likely to internalize the social norms of their environment, making it less likely to manipulate the flow of corporate information. Even in cases where managers are tempted to withhold bad news for personal gain (e.g. compensation being tied to earnings), the cost of social stigma that would be associated with the manipulation becoming public knowledge could prompt them to forgo the gain from the additional compensation (Callen and Fang, 2015). Consistent with this view, Gupta et al. (2023) report evidence that U.S. firms headquartered in high social capital states are associated with a smaller likelihood of information manipulation such as revealing bad news before share repurchases.

Another major feature of a community's social capacity is that not only it facilitates the flow of knowledge and information between its economic agents (Tiepoh and Reimer, 2004), but it also accelerates the timing, relevance and quality of information (Adler and Kwon, 2002). Others argue that frequent social interactions and dense networks between people that may be maintained for other purposes eventually result in better communication and enforcement of the prescribed norm (Coleman, 1988; Hasan et al., 2017). This is because such social connections improve information flow, and in turn effective information exchange may facilitate the exposure of unethical behaviour and lead to more severe social sanctions upon individuals who violated the local code of conduct (Bai et al., 2022). As discussed in Baker and Faulkner (2004) most investors in the informal capital market obtain information about investment opportunities from their network, like friends and business associates (Gaston and Bell, 1988).

Thus, social ties reduce information asymmetry *ex ante* and opportunism in economic exchanges *ex post* (Albano and Barbera, 2010). These two effects lead to the same prediction

for stock price crash risk, and we do not attempt to unpack them. Instead, we formulate our first hypothesis as follows:

H1a: *The country-level social capital is negatively associated to the firm-level stock price crash risk*

2.3. How does social capital work? The dark side

In contrast to the above, another strand of the literature points out the "dark sides" or "unsocial" and "bad" forms of social capital (Zmerli, 2010; Iglic, 2010; Van Deth and Zmerli, 2010). For example, Van Deth and Zmerli (2010) mention that social capital may come with discontent, disaffection, intolerance, the persistence of social inequality, biased representation, and economic obstacles. Iglic (2010) also discusses that close social ties may carry the seeds of intolerance, especially when they contribute to the development of strong group identities at the expense of more general identities and sentiments. Gargiulo and Benassi (2000) add to this that strong bonds may serve as a filter for information and perspectives reaching the actors, generating a cognitive lock-in that isolates them from the outer world (Grabher, 1993). Furthermore, the literature suggests that networks of trust, social proximity and centrality in social networks may lead to corrupt practices (Uribe, 2014; Romero, 2022). Furthermore, just like social capital can enhance whistleblowing, it is also possible that strong bonds and loyalty in regions with high social capital could make prospective whistleblowers feel that they violate (betray) the principles of loyalty and mutual trust and prevent them from coming forward (O'Sullivan and Ngau, 2014). Alternatively, social ties may increase vulnerability to fraud because investors may place trust in social relationships without conducting a proper due diligence of the investment and its provider, hence failing to reduce ex ante information asymmetry (Baker and Faulkner, 2004). For instance, Ahern (2017) examines the association between social relationships and illegal insider trading networks, to conclude that inside

information flows through strong social ties based on family, friends, and geographic proximity. Similarly, the expectation that social capital is associated with social integrity and trustworthiness may offer further opportunities for information manipulation to unethical managers. As discussed in Liu and Liu (2024), it is likely that trust will result in lower monitoring by outsiders, hence giving more room for corporate misreporting to the self-interest managers, eventually leading to higher stock price crash risk. Based on these views, we formulate an alternative hypothesis that is as follows:

H1b: *The country-level social capital is positively associated to the firm-level stock price crash risk*

2.4. The moderating role of formal institutions

Many studies show that formal (i.e. regulations) and informal (e.g. social capital, trust) institutions interact in shaping firm outcomes and behaviours (e.g. Kanagaretnam et al., 2018; Fuentelsaz et al., 2020; Pasiouras and Samet, 2022). Helmke and Levitsky (2004) discuss three situations in which people are inclined to create and use informal rules even when formal institutions are in existence. These situations arise when: (i) formal institutions are incomplete, in which case informal institutions may address problems not anticipated by formal rules; (ii) informal institutions may be a "second best" strategy. This may happen in cases where the actors prefer, but cannot achieve, a formal institutional solution or in cases where formal institutions exist on paper but are ineffective in practice; (iii) informal institutions allow actors to pursue activities, ranging from the unpopular to the illegal, that are otherwise not considered publicly acceptable. In general, the literature provides mixed results as for whether these two types of the institutional environment are substitutes or complements (Méon and Sekkat, 2015).

Given the conflicting views and the complex relations that appear to exist, in what follows we outline and formulate two alternative hypotheses.

The substitutional relationship view asserts that informal institutions could substitute for formal laws, and it assumes that informal institutions are supposed to solve the same problems of opportunism, moral hazard and collective actions as do formal institutions (e.g. Meon and Sekkat, 2015). For example, existing evidence documents the beneficial effects of strong formal institutions on stock price crash risk (Xiaorong and Hongye, 2015; Obaydin et al., 2021; Jin et al., 2022).[4] While the interaction of formal and informal institutions has not been explored in the context of stock price crash risk, some studies from other fields confirm this substitutional relationship (Guiso et al., 2004; Yu et al., 2015; Cassar et al., 2014; Pasiouras and Samet, 2022).[5] Based on the above views, we formulate our substitutional relationship hypothesis as follows:

H2a: *There exists a substitutional relationship between social capital and formal institutions as it concerns their impact on stock price crash risk*

Contrary to the above, the complementary relationship view asserts that the joint use of formal and informal arrangements provides more efficient outcomes than the use of either arrangement in isolation (Lazzarini et al., 2004). For example, according to Fafchamps (2020) it is incorrect or even futile to perceive formal institutions as a substitute to informal

[4] Xiaorong and Hongye (2015) show that lower level of government intervention and better legal environment reduce the risk for stock price crashes. Additionally, Obaydin et al. (2021) document a significant reduction in crash risk among firms incorporated in U.S. states that have adopted universal demand laws. Furthermore, Jin et al. (2022) conclude that the impact of the executives' geographical proximity on stock price crash risk is more pronounced when the company is located in areas with weaker formal legal environment.

[5] Guiso et al. (2004) conclude that the effect of social capital on financial development is stronger where legal enforcement is weaker. Yu et al. (2015) find that in cases where the legal institutions in the importing country are not as well-developed as in the exporting country, then traders rely on informal institutions - such as trust - to assess future payoffs and deal with the uncertainty concerning potential expropriation and defaults. Similarly, Cassar et al. (2014) find that trust and trustworthiness influence market participation and opportunistic behavior in the absence of formal enforcement or when formal enforcement is based on personalized networks; however, they do not seem to matter in the presence of strong and impartial formal institutions. Finally, Pasiouras and Samet (2022) conclude that the association of social capital with the cost of bank equity becomes weaker in countries with strong formal institutions.

institutions. Instead, he argues that it is more accurate to consider that formal institutions facilitate the functioning of informal institutions. As he explains, these features do not disappear with the introduction of formal institutions, even if the focus of social exchange may evolve to reflect the different opportunities made possible by formalization. Consequently, good formal institutions aim to reinforce the forms of social interactions that lead to a more efficient, more inclusive outcome, and to discourage those interactions that decrease efficiency and exclude certain groups and individuals. Others approach the topic from a slightly different angle, referring to the complementary of informal institutions. For example, Helmke and Levitsky (2004) mention that complementary informal institutions "fill in gaps" either because they deal with contingencies not addressed in the formal rules or because they enable the pursuit of individual goals within the formal institutional framework. Additionally, they mention that such informal institutions may also serve as a foundation for formal institutions, creating or strengthening incentives to comply with formal rules that might otherwise exist merely on paper.

In addition, some scholars discuss these ideas in the context of investments and financial markets. For example, Méon and Sekkat (2015) outline that trust and formal regulations can be complements, because, for example, the positive impact of trust on investment is bound to be larger in cases where formal regulations are investment-friendly, since citizens will abide with such rules. Others provide empirical evidence that efficient political institutions augment the effectiveness of culture, jointly promoting financial development in a cross-country setting (Mukherjee and Dutta, 2013). Finally, McCannon et al. (2018) use social preferences from both a trust game and a social values survey as explanatory variables in a contract game, to conclude that both increased contract enforcement and high trusting preferences lead to enhanced rates of contract formation and larger investments. However, they also reveal an interaction effect, where trusting individuals enter into

agreements at a greater rate and make larger investments when enforcement is greater. Thus, they conclude that contracts and trust complement one another. Based on the above views, we formulate our complementary relationship hypothesis as follows:

H2b: *There exists a complementary relationship between social capital and formal institutions as it concerns their impact on stock price crash risk*

3. Data and methodology

3.1. Sample selection

To address our research question, we collect data from various sources. Initially, we consider all countries included in the MSCI Developed and Emerging Markets. By doing so, we ensure that our sample is representative of the leading stock markets around the globe. Furthermore, this approach secures a substantial degree of heterogeneity both in terms of social capital and stock returns.

We retrieve data on the countries' social capital from the Legatum Institute. Then, we collect stock return data from Datastream over the period 2007 to 2019. Although our examination period starts at 2008, we also collect stock return data for 2007 because we control for a one-year-lagged value of crash risk in our analysis. Our examination period starts from 2008 because: (1) social capital data are available from 2007, and (2) we rely on a lead-lag relationship between crash risk and social capital. Furthermore, our examination period ends in 2019 to exclude the turbulent covid-19 period.

To filter our sample, we apply the following two criteria as in Eun et al. (2015): (i) we include stocks that have at least 30 weeks of available stock return data in a year, and (ii) we

exclude country-year observations where there are fewer than 25 stocks satisfying the first criterion.[6]

After applying these criteria, we collect data for our control variables. In terms of firm-level controls, we obtain accounting data from Worldscope. Finally, country-level controls are collected from various World Bank databases.[7] Our final sample consists of an unbalanced panel of 35,770 unique firms headquartered in 47 countries, resulting in an unbalanced dataset of 275,695 firm-year observations.

3.2. Crash risk measures

We follow several steps to calculate our stock price crash risk measures. First, we compute firm-specific stock returns as in Morck et al. (2000), Jin and Myers (2006), Eun et al. (2015), among others. More specifically, for every firm-year, we estimate the following expanded market model:

$$\begin{aligned} r_{i,j,t} = a_{i,j} + b_{1,i} r_{m,j,t} + b_{2,i}\left[r_{U.S.,t} + ER_{j,t}\right] + b_{3,i} r_{m,j,t-1} + b_{4,i}\left[r_{U.S.,t-1} + ER_{j,t-1}\right] \\ + b_{5,i} r_{m,j,t-2} + b_{6,i}\left[r_{U.S.,t-2} + ER_{j,t-2}\right] + b_{7,i} r_{m,j,t+1} + b_{8,i}\left[r_{U.S.,t+1} + ER_{j,t+1}\right] + \\ b_{9,i} r_{m,j,t+2} + + b_{10,i}\left[r_{U.S.,t+2} + ER_{j,t+2}\right] + \varepsilon_{i.j,t} \end{aligned} \quad (1)$$

To account for calendar anomalies such as the Monday effect, we follow Francis et al. (2015), and we use weekly returns (Wednesday-to-Wednesday). In eq. (1) i is a firm index, j is a country index, and t is the time indicator (week). Therefore, $r_{i,j,t}$ denotes the weekly return of firm i of country j in week t of a year, and $r_{m,j,t}$ denotes the domestic market index return in

[6] By applying the second criterion, Czech Republic is entirely excluded from our sample. Moreover, to control for the presence of outliers, we follow Francis et al. (2015), and we winsorize each firm's stock returns at the 1% and the 99% levels.

[7] From our sampled countries, we also lose Taiwan, as there are no available data on stock market capitalization to GDP in the World Bank database.

week t of the same year.[8] In addition, $r_{U.S.,t} + ER_{j,t}$ represents the return of the U.S. market, adjusted for the local currency changes compared to the U.S. dollar. Leads and lags are included to alleviate thin trading issues (Dimson, 1979).

Finally, the firm-specific return w of firm i in country j in week t is defined as follows:

$$w_{i,j,t} = ln(1+\varepsilon_{i,j,t}) \tag{2}$$

To proxy for crash risk, we use the two continuous measures of Chen et al. (2001), which are the most frequently used measures in the relevant literature (Hutton et al., 2009; Kim et al., 2011; DeFond et al., 2015; Balachandran et al., 2020; Gkoumas et al., 2025). More precisely, we use the negative skewness (*NSkew*), and the "down-to-up volatility" (*Duvol*). *NSkew* is defined as follows:

$$NSkew_{i,j,T} = -\frac{n(n-1)^{3/2}\sum_{t=1}^{n} w_{i,j,t}^3}{(n-1)(n-2)\left(\sum_{t=1}^{n} w_{i,j,t}^2\right)^{3/2}} \tag{3}$$

where n is the number of weekly firm-specific returns in a year T. Higher value of *NSkew* represents higher stock price crash risk.

Duvol is calculated as follows:

$$Duvol_{i,j,T} = log\left(\frac{\sum_{Down} w_{i,j,t}^2 \Big/ (n_{Down}-1)}{\sum_{Up} w_{i,j,t}^2 \Big/ (n_{Up}-1)}\right) \tag{4}$$

where n_{Down} and n_{Up} stand for the number of up and down weeks in a year T. A down (up) week is the week where the firm-specific return is lower (higher) than the mean firm-specific return in a year T. Similar with *NSkew*, higher values of *Duvol* translate to higher stock price

[8] We use the Datastream Global Equity Indices to find the domestic market return for each country j.

crash risk. In addition, *Duvol* does not include the third moment, and as a result it is less affected by a small number of extreme returns (Callen and Fang, 2015).

3.3. Social capital

The social capital index that we use in our analysis reflects the following five dimensions.[9] The first is the civic and social participation dimension, which refers to the extent to which people participate within a society, broadly split into the civic and social spheres, by considering donations to charity, voter turnout, volunteering to organizations, and voicing opinion to a public official. The second is the institutional trust dimension, which reflects the degree to which individuals trust their institutions, in terms of confidence in: (i) local police, (ii) politicians, (iii) financial institutions and banks, (iv) judicial system and courts, (v) national government, and (vi) military. The third is the interpersonal trust component, which reveals whether people believe that most people can be trusted as well as whether they would help a stranger. The fourth is the personal and family relationships dimension, which indicates whether help from family and friends would be available if needed and whether the family provides positive energy. The fifth is the social networks dimension, which reflects whether people feel respected, whether they are satisfied with the opportunity to meet people and make friends, and whether they recently helped another household financially.

3.4. Control variables and model specification

We use several firm- and country-level controls in our regressions, all measured at time *t*-1. In detail, following earlier crash risk studies (Hutton et al., 2009; Callen and Fang, 2015; DeFond

[9] Each one of the five dimensions accounts for 20% of the overall social capital index. For a detailed guide one may consult the methodology report of the Legatum Institute (2019). As discussed in Pariouras and Samet (2022) these dimensions and the criteria used by the Legatum Institute reflect, in general, aspects discussed in theoretical work and are similar to the ones used in: (i) U.S. and other country-specific studies to capture social capital differences across region, (ii) international work that primarily resorts on generalized (i.e. interpersonal) trust as a central element of social capital, and (iii) European studies that make use of survey-based databases like the European Social Survey, European Value Survey, etc.

et al., 2015; Andreou et al., 2021), we control for the following firm characteristics: (i) the stock's turnover (*Dturn*), using the detrended turnover measure of Chen et al. (2001); (ii) the natural logarithm of firms' market value of equity, as a proxy for firm size (*Size*); (iii) the return on assets (*ROA*), as a measure of profitability; (iv) the book-to market ratio (*BTM*); (v) the ratio of total debt to total assets (*Leverage*); (vi) the first central moment of firm-specific returns (*Returns*), as in Chen et al. (2001) and Campbell et al. (2008); (vii) the natural logarithm of firm's age (Ln(Age)), since younger firms are more prone to crashes (Yousefi et al., 2023), (viii) the absolute discretionary accruals (|DACC|) as in Xu et al. (2014) and Balachandran et al. (2020). In line with Callen and Fang (2015), Chang et al. (2017), and Andreou et al. (2023), among others, we also use the one-year lagged value of *NSkew* as a control.

For country-level controls, we follow similar studies which examine crash risk determinants in an international setting (Hong et al., 2017; An et al., 2018; Balachandran et al., 2020). Hence, we control for the countries' macroeconomic conditions using the natural logarithm of the gross domestic product (Ln(GDP)) and the countries' stock market capitalization relative to GDP (Market cap-to-GDP). Following Jin and Myers (2006) and Eun et al. (2015), we also use the firm Herfindahl index (*Firm HHI*) and the industry Herfindahl index (*Industry HHI*) to proxy for firm-and-industry competition. All variables are defined in the Appendix.

To examine the effects of social capital on stock price crash risk, we estimate the following model:

$$Crash\ risk_{i,j,t} = a + b_1 Social\ capital_{j,t-1} + b_2 X_{t-1} + Country\ FE + Industry\ FE + Year\ FE + e_{i,j,t} \quad (5)$$

where $Crash\ risk_{i,j,t}$ is either *NSkew* or *Duvol* of firm *i* in country *j* at year *t*, $Social\ capital_{j,t-1}$ is the country's *j* social capital at year *t-1*, and X_{t-1} denotes a vector of our control variables at year *t*-1. In all regressions, we include country, industry, and year fixed effects. Following

Petersen (2008) standard errors are clustered at the firm level. Finally, all variables are winsorized at the 1% and 99% levels.

4. Empirical results

4.1. Social capital and stock price crash risk (Hypothesis 1)

4.1.1. Main results

Table 1 presents the sample distribution by country together with the average of the main variables of interest. Table 2 presents summary statistics, and Table 3 presents the correlation coefficients of the variables in our sample. The average social capital is 56.76, ranging from 31.9 to 81.6. Looking at Table 1, we observe that the highest and lowest average country-level figures over the period of our study are recorded in Turkey (38.88) and Denmark (80.80), respectively. The average firm-level NSkew in Table 2 is –0.18 ranging from –2.52 to 2.23. In this case, the highest and lowest average country-level figures in Table 1 are recorded in the USA (–0.04) and Tukey (–0.41), respectively. Turning to Duvol, the firm-level average in Table 2 is –0.10 ranging from –1.04 to 0.94, with the country-level averages in Table 1 taking values between –0.03 (USA) and –0.22 (Turkey). Table 3 shows that except from the pair of firm HHI and industry HHI, the pairwise correlation coefficients are well below the rule of them of 0.7 (Tabachnick and Fidell, 2001), and hence there should be no major concerns about multicollinearity.

[Insert Tables 1, 2 and 3 Around Here]

The results in Table 4 show that our indicator of social capital enters the regressions with a negative and statically significant coefficient. Therefore, our results support H1a, showing that firms from countries with higher social capital are associated with lower stock price crash risk.

This finding holds regardless of whether we measure crash risk by the negative skewness (*NSkew*) in Column 1 or the "down-to-up volatility" (*Duvol*) in Column 2.

[Insert Table 4 Around Here]

Results for our firm-level control variables are in line with what was reported in previous studies. Consistent with Hutton et al. (2009), Callen and Fang (2015), and Chang et al. (2017), among others, the lagged value of negative skewness ($NSkew_{t-1}$) is positive and statistically significant at the 1% level in both models. Chen et al. (2001) argue that higher turnover, as a proxy for heterogeneity of investors' beliefs, leads to higher crash risk. In line with this prediction, *Dturn* is positive and highly statistically significant in both models. Furthermore, *Size*, *ROA*, and *Leverage* are positively correlated with crash risk (Chen et al., 2001; Callen and Fang, 2015; Zhu, 2016), while firms with lower book to market values and older firms are less likely to crash (Balachandran et al., 2020; Zhang et al., 2022). Finally, the absolute value of discretionary accruals |*DACC*|, which serves as an earning management proxy, is positively correlated with crash risk (Hutton et al., 2009).

In terms of our country level controls, crash risk is higher in countries with higher GDP per capita but lower in countries with higher stock market capitalization relative to their GDP (An et al., 2018). Finally, firms operating in a more competitive environment (lower firm HHI) are more likely to crash, since higher competition incentivizes managers to conceal bad news (Li and Zhan, 2019).

4.1.2. Endogeneity

In this section, we attempt to address the potential endogeneity concerns that may challenge the validity of our baseline findings. The results presented in Section 4.1.1. are unlikely to be

driven by reverse causality. We have no reason to believe that the stock price crash risk of individual firms could have an impact on country-level societal values, like social capital. We are also unaware of any theory suggesting such a reverse relation. Also, the use of lagged values for social capital should mitigate further such concerns. Furthermore, the inclusion of various control variables used in earlier studies should mitigate major concerns about omitted variables. Nonetheless, there could still be some endogeneity concerns. For example, one could argue that there still exist omitted unobservable firm characteristics or that social capital indicators are subject to measurement error since they are primarily based on survey responses.

To address such concerns, to the extent that it is possible, we rely on a 2SLS IV regression with the use of exogenous instruments. While acknowledging that it not possible to completely rule out endogeneity, these estimations should enhance confidence in the reported results. We use information from the 2018 revision of the dataset of Putterman and Trainor (2006) to instrument social capital by the natural logarithm of the time between a country's transition to agriculture and the present. Gaganis et al. (2020) and Papadimitri et al. (2021), among others, also use data related to agriculture as an instrument for country-level trust and social capital. We use this instrument because we expect it to be: (i) correlated with the first stage dependent variable (i.e. social capital), and (ii) uncorrelated with the second stage error term.

As it concerns (i), the rationale for the use of this instrument is that differences among societies in the time at which the countries experienced a transition from hunting and gathering to agriculture, resulted in differences in levels of technological development and social organization that persisted into the era of European colonization as well as to the present day (Diamond, 1998; Hibbs and Olsson, 2004; Olsson and Hibbs, 2005; Putterman and Trainor, 2006). Bogucki (2019) argues, for example, that: "*The transition to agriculture had consequences on a global scale, leading to social complexity and, in many cases, urban*

societies that would be impossible to imagine without agriculture". In more detail, as discussed in Meggers (1954), in places that are not appropriate for agriculture, subsistence derived from hunting, fishing and gathering normally supports only small groups that must be constantly on the move. As a result, social organization is largely based on kinship lines, with the social unit being a single family or, at best, an extended family or lineage. In contrast, the transition to agriculture was associated with permanent settlement and the creation of cities and civilizations. Hofstede et al. (2010) add that farmers not only lived in much greater numbers than hunter-gatherers or herders, but they also had to collaborate in monotonous, season-bound work. This required a certain meekness, possibly related to larger collectivism (and by extension to higher social capital). Ashkanasy et al. (2004) refer to the work of Ouchi (1981), mentioning that due to low suitability for agriculture in Japan, the planning and harvesting of rice can only be achieved with the cooperation of 20 or more people. Therefore, the Japanese had to learn to work together in harmony, and this explains the societal value assigned to group welfare over individual considerations. Further to this, Hofstede et al. (2010) mention that the possession of storable food that could pass from one person to another in agricultural societies led to inheritance. To avoid widespread theft, there should be trust within the groups, followed by heavy sanctions against offenders (Hofstede et al. 2010). Table 5 presents the analysis of the 2SLS IV regressions with the instrumented social capital. Our main findings hold.

[Insert Table 5 Around Here]

4.1.3. Robustness analyses

Table 6 presents additional robustness analyses. In Column 1 we re-estimate the baseline regression using an alternative crash risk measure (*Count*), which refers to the difference between the number of crash and jump weeks in a year. In Columns 2 and 3 we re-estimate the

baseline regressions with 2-way clustered standard errors (firm and year clustering). In Columns 4 and 5, we re-estimate the baseline regression with the inclusion of firm fixed effects. In Columns 6 and 7 we re-estimate the baseline specification while excluding the U.S. firms from the sample. Finally, in Columns 8 and 9 we exclude the period of the financial crisis (2008-2009). In all the cases the results hold. Social capital continues to enter the regressions with a negative and statistically significant coefficient.

[Insert Table 6 Around Here]

4.1.4. Exploring possible channels

We conduct two tests to explore the possible channels through which social capital affects stock price crash risk, namely, reporting opacity and price informativeness. Following Chen et al. (2018) and Dang et al. (2019) we use a two-step regression approach. In the first step, we examine the relation between: (i) social capital and reporting opacity, and (ii) social capital and price informativeness. In the second step, we examine the association between: (i) reporting opacity and stock price crash risk, and (ii) price informativeness and stock price crash risk.

In the relevant literature, financial reporting opacity is the most prominent explanation of stock price crash risk (Habib et al., 2018). For instance, Jin and Myers (2006) propose that managerial bad news hoarding through opaque financial statements is the main driver of stock price crashes. The underlying hypothesis in our study is that by reducing opportunistic behaviour and imposing discipline on managers, social capital reduces reporting opacity, subsequently decreasing crash risk. Thus, we expect a negative relation in the first step regression and a positive relation in the second step regression.

To measure financial reporting opacity, we use the performance-controlled accruals model of Tucker and Zarowin (2006). This approach improves the accrual models of Jones

(1991) by adding the firms' return on assets as an additional control.[10] More precisely, for each country *j* at year *t*, we estimate the following cross-sectional regression:

$$\frac{TACC_{i,t}}{TA_{i,t-1}} = \alpha_0\left(\frac{1}{TA_{i,t-1}}\right) + \alpha_1\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \alpha_2\left(\frac{GPPE_{i,t}}{TA_{i,t-1}}\right) + \alpha_3 ROA_{i,t} + \varepsilon_t \qquad (6)$$

where $TACC_{i,t}$ is the total accruals of firm *i* at year *t*, $\Delta REV_{i,t}$ is the change in revenue of firm *i* from year *t-1* to year *t*, $GPPE_{i,t}$ is the level of gross property, plant, and equipment of firm *i* at year *t*, $ROA_{i,t}$ is the return on assets of firm *i* at year *t*, and $TA_{i,t-1}$ is the total assets of firm *i* at year *t-1*. The residuals from these regressions are used as proxies for discretionary accruals (Hu et al., 2020). Finally, we follow Hutton et al. (2009) and Callen and Fang (2015), and we measure financial reporting opacity as the 3-year moving sum of the absolute discretionary accruals.

As an alternative to the agency-driven explanation of Jin and Myers (2006), Hong and Sten (2003) propose a financial market explanation of stock price crashes. More precisely, the authors suggest that investors' disagreement over firms' fundamental value leads to more stock price crashes. In other words, more (less) homogeneity in investors beliefs should decrease (increase) stock price crash risk. To proxy for investors' homogeneity in beliefs, we use the price informativeness measure developed by Bai et al. (2016). This measure is based on the ability of current market prices to forecast future earnings. Conceptually, when stock prices are more informative about future earnings, investors' disagreement about firms' value should be lower. As discussed in Section 2, social capital enhances the flow of knowledge and information between economic agents and accelerates the timing, relevance, and quality of

[10] To proxy for financial reporting opacity, Hutton et al. (2009) develop an earnings management measure using the discretionary accruals model of Jones (1991). This proxy has been used in various crash risk studies in their channel analysis (e.g. Andreou et al., 2023). However, many others suggest that the Jones model is misspecified for well-or poor-performing firms (Dechow et al., 1995; Kothari et al., 2005).

information. This could decrease disagreement among investors, enhance price informativeness, and reduce crash risk. However, there are additional ways through which social capital could influence price informativeness. In more detail, Bai et al. (2016) discuss that managers have access to internal information, some of which they disclose to the market. Then, investors combine this disclosure with their own independent information to trade, and this causes prices to incorporate both types of information. Finally, managers then filter out as much of the independent information contained in prices as they can and combine it with their own internal information to set investment optimally. Social capital may play an important role here for various reasons. First, by imposing restrictions on the opportunistic behaviour of managers, it may influence the degree of internal information released in the market. Second, enhanced social trust among market participants could influence the extent to which investors trust the released information when combining the managerial disclosures with their own independent information. Similarly, social trust could influence the way managers filter out the information contained in the prices. Finally, as discussed earlier, social capital may influence the speed and quality of the dissemination of information within social networks. Thus, we expect a positive relation in the first step regression and a negative relation in the second step regression.

To construct our measure of price informativeness, we run cross-sectional regressions of future earnings of current market prices. More precisely, for every country *j* at year *t* and for a horizon *h* (3 years ahead from year *t*), we estimate the following regression:

$$\frac{EBIT_{i,t+h}}{Assets_{i,t}} = a_{t,h} + b_{t,h}\log(\frac{MV_{i,t}}{Assets_{i,t}}) + c_{t,h}(\frac{EBIT_{i,t}}{Assets_{i,t}}) + Industry\ FE + e_{i,t,h} \qquad (7)$$

where $EBIT_{i,t+h}$ is the earnings before interest and taxes of firm *i* at year *t+3*, $MV_{i,t}$ is the market value of equity of firm *i* at year *t*, $EBIT_{i,t}$ is earnings before interest and taxes of firm *i* at year *t*, $ROA_{i,t}$ is the return on assets of firm *i* at year *t*, and $TA_{i,t}$ is the total assets of firm *i*

at year *t.* Industry fixed effects are based on 2-digit SIC codes. Finally, our measure of price informativeness is computed as follows:

$$Price\ informativeness = \hat{b}_{t,h}\sigma_t(\log(\frac{MV_{i,t}}{Assets_{i,t}})) \quad (8)$$

where according to Bai et al. (2016), $\hat{b}_{t,h}\sigma_t(\log(\frac{MV_{i,t}}{Assets_{i,t}}))$ equals the square root of the predicted variance of future cash flows from market prices.

We present the results of this analysis in Table 7. Consistent with our expectations we find that social capital reduces reporting opacity and enhances price informativeness. In turn, reporting opacity increases stock price crash risk. We observe the opposite in the case of price informativeness.

[Insert Table 7 Around Here]

4.1.5. Disaggregating Social Capital, alternative indicator of social capital, and national culture

In this section we attempt to shed further light on our findings and provide additional analysis by: (i) disaggregating the index of social capital into its various components, (ii) use a slightly different indicator of social capital, and (iii) control for other societal values, like national culture.

The estimates in Table 8 show that the results are mainly driven by civic and social participation, institutional trust, and family relationships, all three carrying a negative and statistically significant coefficient. In contrast, both interpersonal trust and social networks are statistically insignificant, and hence they do not appear to matter. Therefore, our results differ from the ones of Cao et al. (2016) and Li et al. (2017) who find that social trust is an important

driver of stock price crash risk in China. It is possible that this is due to differences in formal institutions across countries, an issue that we examine in the next section.

[Insert Table 8 Around Here]

In Columns (1) and (2) of Table 9 we re-estimate our specification while using an alternative overall indicator of social capital. More detailed, one could argue that the component of institutional trust of the Legatum index relates to aspects of the formal institutional environment. To address this concern, we re-calculate the overall social capital indicator while excluding this indicator. The results hold.

In Columns (3) and (4) we follow An et al. (2018) and add the following indicators of national culture in the specifications: (i) individualism, (ii) uncertainty avoidance, (iii) power distance, and (iv) masculinity. From a conceptual perspective national culture also reflects societal values, and it could undermine the effect of social capital on firm-specific crash risk. Including these indicators in the analysis allows us to separate the effects of culture from social capital. Consistent with the firm-level regressions of An et al. (2018) we find that all four indicators are statistically significant, with the coefficients of individualism and masculinity carrying a positive sign, and those of power distance and uncertainty avoidance a negative one. However, the inclusion of these national culture indicators in our analysis does not influence the so far obtained results about social capital.

[Insert Table 9 Around Here]

4.2. Social capital, stock price crash risk and the role of formal institutions (Hypothesis 2)

Having provided robust evidence that social capital has a negative effect on the stock price crash risk, we turn our attention to the second hypothesis, and investigate the potentially conditional role of formal institutions.

In Table 10, we interact social capital with two indicators of formal institutions, namely property rights (Columns 1 and 3) and law and order (Columns 2 and 4).[11,12] Both the social capital indicator and the indicator of formal institutions enter the regression with negative and statistically significant coefficient. However, it should be noted that with the inclusion of the interaction term the interpretation of the coefficients of the main effects is not the same as if they were ordinary coefficients in a strictly additive model. In more detail, the coefficient of the social capital indicator shows the effect of social capital on the stock price crash risk while holding the property rights indicator or the law-and-order indicator fixed at zero (i.e., in the absence of formal institutions). Similarly, the coefficients of the property rights and the law and order indicators show the effect of formal institutions on stock price crash risk, while holding the social capital indicator fixed at zero (i.e., in the absence of informal institutions).

[11] The property rights indicator is from the Heritage Foundation. It provides an assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. It measures the degree to which a country's laws protect private property rights and the degree to which its government enforces those laws. It also assesses the likelihood that private property will be expropriated and analyzes the independence of the judiciary, the existence of corruption within the judiciary, and the ability of individuals and businesses to enforce contracts. It takes values between 0 and 100. A score of 100, for example, reflects that private property is guaranteed by the government, that the court system enforces contracts efficiently and quickly, that the justice system punishes those who unlawfully confiscate private property, as well as that there is no corruption or expropriation. A score of 20, for example, would indicate that private property is weakly protected. The court system is so inefficient and corrupt that outside settlement and arbitration is the norm. In such cases, property rights are difficult to enforce, judicial corruption is extensive, and expropriation is common. For the purposes of our study, to ease interpretation of the regression coefficients, all the scores have been divided by 100. Thus, in theory, property rights may take values between 0 and 1.

[12] The law and order indicator is from the International Country Risk Guide. While being a single component, it is based on the assessment of two elements. To assess the "Law" element, the ICRG considers the strength and impartiality of the legal system. The "Order" element is an assessment of popular observance of the law.
Each component is assessed separately from 0 to 3, a country can enjoy a high rating (i.e., 3) in terms of its judicial system, but a low rating (i.e., 1) if it suffers from a very high crime rate if the law is routinely ignored without effective sanction (for example, widespread illegal strikes). Hence, the law and order indicator may take values from 0 to 6 with higher values denoting better outcomes.

Thus, the key variable of interest is the interaction term of social capital with property rights in columns 1 and 3, and the one of social capital with law and order in columns 2 and 4. In all the cases, the interaction term is positive and statistically significant. Therefore, formal institutions play a moderating role in the relationship between social capital and stock price crash risk. In countries with strong formal institutions, the effect of social capital becomes less pronounced. In other words, it seems that in the presence of strong formal institutions that mitigate opportunistic behaviour and enhance transparency, social capital becomes a less important driver of stock price crash risk. This evidence is consistent for example with the one by Pasiouras and Samet (2022) in the case of bank cost of equity and provides support to the literature that views the formal and informal institutions are substitutes.

[Insert Table 10 Around Here]

To provide a better interpretation of this finding, Table 11 shows the average marginal effect of the social capital indicator on NSkew (Column 2) and Duvol (Column 4) for different values of the property rights index shown in Column 1. Columns 7 and 9 present the corresponding marginal effects for different values of the law and order indicator shown in Column 6. For example, we find that the effect of social capital on NSkew ranges between -0.0136 (when the property rights index equals 0.20) and 0.0013 when the property rights index takes the value of 0.90.[13] Therefore, the effect of social capital on stock price crash risk diminishes as property rights improve, and for values of property rights over 0.76 this effect becomes insignificant in the case of both NSkew and Duvol. We observe a similar pattern in the case of law and order, in this case the impact of social capital becoming insignificant for

[13] The values of 0.20 and 0.90 for property rights are close to the 5th and 95th percentile, respectively, in our sample. The same applies to the values of 3 to 6 in the case of law and order.

values of law and order in excess of 4.80. Collectively, our results show that in countries with very strong formal institutional frameworks, investors are possibly protected by formal rules, and the role of social capital becomes less important and even statistically insignificant.

[Insert Table 11 Around Here]

In Table 12 we re-estimate the specifications with the moderation terms, while replacing social capital by its components. We find that the interaction of property rights with the social capital components is positive and statistically significant in all cases, except for the case of the family relationships component. Thus, in this case, the impact of the family relationship indicator on stock price crash risk does not differ across different values of property rights. Turning to the moderation of law and order with the social component indicators, we observe that this is statistically significant only in the case of institutional trust and interpersonal trust. In these two cases, the negative impact of trust on stock price crash risk becomes less pronounced as the institutional environment of the law and order improves.

[Insert Table 12 Around Here]

5. Conclusions

This study investigates whether and how country-level social capital influences the firm-level stock price crash risk. Using a large cross-country sample of 35,770 firms from 47 countries over the period 2008-2019, we document a negative and statistically significant effect. This finding remains robust to various tests including IV estimations that account for endogeneity. Furthermore, we find that the impact of social capital is channeled through firm-level reporting opacity and price informativeness. When we disaggregate social capital into its components, we find that the results are driven by civic and social participation, institutional trust, and family

relationships, whereas social networks and interpersonal trust do not appear to matter. Finally, the results show that the impact of social capital is moderated by formal institutions, like property rights and law and order. In more detail, the negative effect of social capital becomes less pronounced in the presence of strong formal institutions in terms of property rights and law and order, which is consistent with the literature that views the formal and informal institutions are substitutes.

Our findings have important implications. First, consistent with a socialized or "embedded" view of corporate principal-agent relationships and the social theory of agency we show that principal-agent relationships cannot be examined in isolation of the firm's social context. It seems that the ethical environment of the society, as reflected in the regional social capital, can play an important role in mitigating bad news hoarding through for example lowering reporting financial opacity. As a result, this lowers stock price crash risk. Thus, regional social capital may complement firm-specific corporate governance mechanisms (e.g. auditing, independent directors, inside debt holdings) proposed as potential solutions to bad news hoarding. While we have not examined this issue empirically due to data (un)availability, it is an avenue for future research. Second, there is no doubt that the introduction of regulations and policies that will influence deep-rooted social norms related to social capital is a challenging task. However, this is not impossible. For example, Clark et al. (2021) highlight that certain government actions can influence social capital, referring for example to ethnic diversity (Easterly and Levine, 1997; Alesina et al., 1999) and education (Gradstein and Justman, 2002). Therefore, policy makers can mitigate the extent of crash stock price risk by designing policies to strengthen the degree of social capital. Alternatively, given the documented substitutional relationship between formal and informal institutions, policy makers can strengthen the formal institutional environment, by implementing actions related to property rights and law and order, a task that is under their control.

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Table 1

Sample distribution by country

This table reports the average *Social capital*, *NSkew*, and *Duvol* by country. The sample consists of 275,695 firm-year observations (35,770 unique firms).

Country	Social capital	NSkew	Duvol	# of unique firms
Argentina	47.14	–0.34	–0.19	90
Australia	68.03	–0.11	–0.06	2,303
Austria	68.31	–0.12	–0.06	87
Belgium	56.74	–0.13	–0.07	138
Brazil	45.78	–0.14	–0.08	228
Canada	71.48	–0.14	–0.08	1,158
Chile	50.49	–0.35	–0.16	201
China	51.37	–0.16	–0.09	3,460
Colombia	53.24	–0.31	–0.15	53
Denmark	80.80	–0.10	–0.05	177
Egypt	45.87	–0.34	–0.19	212
Finland	73.20	–0.14	–0.08	126
France	57.06	–0.18	–0.10	876
Germany	66.46	–0.16	–0.09	747
Greece	46.28	–0.10	–0.06	282
Hong Kong	57.63	–0.33	–0.18	1,860
Hungary	48.93	–0.34	–0.18	51
India	45.24	–0.23	–0.13	1,488
Indonesia	65.10	–0.30	–0.15	572
Ireland	68.77	–0.10	–0.05	45
Israel	53.52	–0.14	–0.08	514
Italy	55.63	–0.25	–0.14	289
Japan	48.05	–0.16	–0.08	4,312
Malaysia	56.22	–0.28	–0.15	1,109
Mexico	46.92	–0.27	–0.13	150
Netherlands	73.58	–0.14	–0.08	138
New Zealand	75.84	–0.05	–0.04	167
Norway	77.86	–0.14	–0.08	285
Pakistan	42.14	–0.32	–0.18	325
Peru	39.64	–0.24	–0.10	106
Philippines	59.25	–0.32	–0.15	261
Poland	50.81	–0.21	–0.11	679
Portugal	53.56	–0.16	–0.09	56
Qatar	60.45	–0.29	–0.15	47
Russia	45.46	–0.35	–0.17	280
Saudi Arabia	55.39	–0.16	–0.10	183
Singapore	56.98	–0.15	–0.08	881
South Africa	51.73	–0.10	–0.06	410
South Korea	43.77	–0.28	–0.15	2,427
Spain	58.59	–0.14	–0.08	221
Sweden	73.55	–0.14	–0.08	418
Switzerland	72.83	–0.12	–0.07	267
Thailand	62.49	–0.25	–0.13	749
Turkey	38.88	–0.41	–0.22	396
United Arab Emirates	57.89	–0.21	–0.10	107
United Kingdom	64.39	–0.18	–0.09	1,662
United States	68.22	–0.04	–0.03	5,177
Total				35,770

Table 2

Summary statistics

This table presents the summary statistics for a sample of 47 countries over the period 2008 to 2019. The sample consists of firm-year observations. All variables are defined in the Appendix.

Variables	# obs	Mean	Std. dev	Min	Max
Panel A: Crash risk					
NSkew	275,695	–0.177	0.653	–2.515	2.232
Duvol	275,695	–0.097	0.326	–1.037	0.943
Panel B: Social capital					
Social capital	275,695	56.762	9.985	31.900	81.600
Civic and social participation	275,695	46.374	19.359	4.100	83.200
Institutional trust	275,695	57.070	12.680	16.000	93.200
Interpersonal trust	275,695	47.315	14.806	12.000	85.000
Family relationships	275,695	72.016	11.615	28.100	90.700
Social networks	275,695	61.039	15.887	23.300	85.100
Panel C: Firm controls					
Dturn	275,695	–0.007	0.130	–0.554	0.487
Size	275,695	5.122	2.204	–1.204	10.041
ROA	275,695	0.299	18.008	–102.060	33.870
BTM	275,695	0.987	1.017	–1.087	6.250
Leverage	275,695	21.991	20.580	0.000	92.350
Returns	275,695	–0.002	0.002	–0.016	0.000
Ln(Age)	275,695	2.426	0.852	–0.356	3.740
|DACC|	275,695	0.186	0.265	0.005	0.984
Panel D: Country controls					
Ln(GDP)	275,695	10.044	1.037	6.896	11.201
Market cap-to-GDP	275,695	142.538	218.111	6.532	1098.940
Firm HHI	275,695	0.024	0.024	0.004	0.156
Industry HHI	275,695	0.076	0.031	0.044	0.267

Table 3

Correlation matrix

This table presents pairwise correlation between the variables of our sample. The sample consists of firm-year observations for a sample of 47 countries over the period 2008 to 2019. The sample consists of firm-year observations. All variables are defined in the Appendix. The symbols *c*, *b,* and *a* denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Social capital (1)	1.000												
Dturn (2)	0.024[a]	1.000											
Size (3)	0.129[a]	0.026[a]	1.000										
ROA (4)	–0.164[a]	–0.016[a]	0.294[a]	1.000									
BTM (5)	–0.125[a]	–0.026[a]	–0.334[a]	0.042[a]	1.000								
Leverage (6)	–0.047[a]	0.016[a]	0.034[a]	–0.026[a]	–0.066[a]	1.000							
Returns (7)	–0.103[a]	–0.117[a]	0.430[a]	0.448[a]	–0.004[c]	0.001	1.000						
Ln(Age) (8)	–0.005[b]	0.073[a]	0.166[a]	0.085[a]	0.090[a]	0.030[a]	0.174[a]	1.000					
|DACC| (9)	0.246[a]	0.009[a]	–0.079[a]	–0.214[a]	–0.084[a]	–0.004[c]	–0.211[a]	–0.064[a]	1.000				
Ln(GDP) (10)	0.446[a]	0.012[a]	0.142[a]	–0.158[a]	0.004[c]	–0.063[a]	–0.037[a]	0.091[a]	0.088[a]	1.000			
Market cap-to-GDP (11)	0.082[a]	0.002	0.039[a]	–0.016[a]	0.060[a]	–0.034[a]	–0.048[a]	–0.015[a]	0.195[a]	0.170[a]	1.000		
Firm HHI (12)	0.146[a]	–0.005[c]	–0.037[a]	0.017[a]	0.008[a]	0.033[a]	0.008[a]	–0.084[a]	–0.101[a]	–0.031[a]	–0.105[a]	1.000	
Industry HHI (13)	0.106[a]	0.002	–0.005[c]	0.041[a]	–0.014[a]	0.054[a]	0.013[a]	–0.096[a]	–0.078[a]	–0.134[a]	–0.135[a]	0.889[a]	1.000

Table 4

Baseline regressions

This table presents panel regression results for a sample of 47countries over the period 2008 to 2019. The sample consists of firm-year observations. The dependent variable is *NSkew* in model 1, and *Duvol* in model 2, respectively. All continuous variables are winsorized at 1% and 99% level. *T*-statistics (in parentheses) are based on standard errors with firm clustering. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	NSkew	Duvol
Variables	(1)	(2)
Social capital	–0.003***	–0.002***
	(–4.86)	(–5.82)
$NSkew_{t-1}$	0.074***	0.036***
	(22.39)	(24.96)
Dturn	0.019**	0.002
	(2.05)	(0.40)
Size	0.033***	0.015***
	(34.74)	(33.04)
ROA	0.023**	0.014***
	(2.51)	(3.04)
BTM	–0.018***	–0.010***
	(–11.20)	(–13.31)
Leverage	0.018**	0.009**
	(2.43)	(2.44)
Returns	–1.551*	–0.522
	(–1.83)	(–1.29)
Ln(Age)	–0.024***	–0.010***
	(–14.27)	(–12.46)
|DACC|	0.011**	0.006**
	(2.04)	(2.24)
Ln(GDP)	0.177***	0.112***
	(9.17)	(11.13)
Market cap-to-GDP	–0.001***	–0.000***
	(–8.14)	(–7.66)
Firm HHI	–1.018***	–0.455***
	(–2.88)	(–2.66)
Industry HHI	0.212	0.136
	(0.87)	(1.14)
Constant	–1.789***	–1.124***
	(–9.44)	(–11.39)
Country FE	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
N	275,695	275,695
Adjusted R^2	0.046	0.048

Table 5

Endogeneity controls

This table presents 2SLS IV regressions for a sample of 47 countries over the period 2008 to 2019. The sample consists of firm–year observations. Model 1 presents the first-stage regression, where *Social capital* is the dependent variable. Models 2 and 3 present the 2-stage regressions where the dependent variable is either *NSkew* or *Duvol*, respectively. All continuous variables are winsorized at 1% and 99% level. *T*–statistics (in parentheses) are based on standard errors with firm clustering. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2–tail test.

	Social capital	NSkew	Duvol
Variables	(1)	(2)	(3)
Transition to Agriculture	60.367***		
	(24.00)		
Social capital (Instrumented)		–0.030**	–0.013**
		(–2.36)	(–1.98)
$NSkew_{t-1}$	–0.038***	0.073***	0.035***
	(–6.18)	(21.83)	(24.30)
Dturn	0.338***	0.029***	0.006
	(12.86)	(2.76)	(1.09)
Size	–0.001	0.033***	0.015***
	(–0.62)	(34.66)	(32.96)
ROA	0.078***	0.025***	0.014***
	(3.47)	(2.68)	(3.18)
BTM	–0.001	–0.018***	–0.010***
	(–0.15)	(–11.22)	(–13.31)
Leverage	0.037*	0.019**	0.009**
	(1.82)	(2.56)	(2.55)
Returns	–0.669	–1.522*	–0.510
	(–0.25)	(–1.80)	(–1.26)
Ln(Age)	0.044***	–0.023***	–0.010***
	(8.87)	(–12.81)	(–11.21)
|DACC|	0.002	0.011**	0.006**
	(0.14)	(2.08)	(2.28)
Ln(GDP)	12.121***	0.495***	0.240***
	(112.91)	(3.28)	(3.16)
Market cap-to-GDP	–0.018***	–0.001***	–0.000***
	(–35.15)	(–4.13)	(–3.59)
Firm HHI	–126.172***	–4.367***	–1.807**
	(–35.81)	(–2.72)	(–2.23)
Industry HHI	100.722***	2.844**	1.198*
	(42.34)	(2.25)	(1.89)
Constant	–571.085***	–3.483***	–1.808***
	(–26.34)	(–4.24)	(–4.37)
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Kleibergen-Paap rk LM stat (*Underidentification test)*	610.681		
Kleibergen-Paap Wald F stat (*Weak identification test)*	575.864		
N	275,695	275,695	275,695
Adjusted R^2	0.408	0.046	0.048

Table 6

Robustness tests

This table presents our robustness tests. Model 1 repeats the baseline regressions using an alternative crash risk measure (*Count*). Models 2 and 3 repeat the baseline regressions with 2-way clustered standard errors (firm and year clustering). Models 4 and 5 repeat our baseline regression with the inclusion of firm fixed effects. Models 6 and 7 repeat our baseline models by excluding the U.S. from the sample. Models 8 and 9 repeat our baseline models without the financial crisis years (2008-2009). All variables are defined in the Appendix. All continuous variables are winsorized at 1% and 99% level. Robust standard errors, clustered at the firm level, are reported in the parentheses. The symbols **, and *** denote statistical significance at the 5% and 1% levels, respectively, using a 2-tail test.

		2-way clustering		Firm FE		Excluding U.S.		Excluding GFC	
	Count	NSkew	Duvol	NSkew	Duvol	NSkew	Duvol	NSkew	Duvol
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Social capital	–0.001**	–0.003**	–0.002***	–0.003***	–0.002***	–0.004***	–0.002***	–0.004***	–0.002***
	(–2.03)	(–2.94)	(–3.50)	(–4.77)	(–5.58)	(–5.41)	(–6.52)	(–5.68)	(–6.48)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes	Yes	No	No	No	No
Country FE	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	275,695	275,695	275,695	275,695	275,695	234,572	234,572	226,718	226,718
Adjusted R^2	0.025	0.046	0.048	0.114	0.111	0.113	0.108	0.118	0.113

Table 7
Channels

This table presents the results of a two–stage regression analysis tests for a sample of 47 countries over the period 2008 to 2019. The sample consists of firm-year observations. In the first stage regressions (models 1 and 4), the dependent variable is either *Reporting opacity* or *Price informativeness*. In the second stage regressions (models 2, 3, 5, and 6) the dependent variable is either *NSkew* or *Duvol*. All variables are defined in the Appendix. All continuous variables are winsorized at 1% and 99% level. Robust standard errors, clustered at the firm level, are reported in the parentheses. The symbols **, and *** denote statistical significance at the 5% and 1% levels, respectively, using a 2–tail test.

	Reporting Opacity	NSkew	Duvol	Price informativeness	NSkew	Duvol
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Social capital	–0.006***			0.001**		
	(–3.88)			(1.99)		
$\widehat{\text{Reporting opacity}}$		0.514***	0.305***			
		(4.49)	(5.47)			
$\widehat{\text{Price informativeness}}$					–7.937***	–4.645***
					(–4.58)	(–5.43)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	268,263	268,263	268,263	224,520	224,520	224,520
Adjusted R^2	0.300	0.046	0.048	0.061	0.052	0.054

Table 8

Components of social capital

This table presents panel regression results for a sample of 47 countries over the period 2008 to 2019. The sample consists of firm-year observations. In Panel A, the dependent variable is *NSkew* while in Panel B the dependent variable is *Duvol*. All continuous variables are winsorized at 1% and 99% level. *T*-statistics (in parentheses) are based on standard errors with firm clustering. The symbols **, and *** denote statistical significance at the 5% and 1% levels, respectively, using a 2-tail test.

Panel A: NSkew	(1)	(2)	(3)	(4)	(5)
Civic and social participation	–0.001**				
	(–2.19)				
Institutional trust		–0.002***			
		(–5.56)			
Interpersonal trust			0.000		
			(0.72)		
Family relationships				–0.005***	
				(–11.04)	
Social networks					0.000
					(1.24)
Controls	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	275,695	275,695	275,695	275,695	275,695
Adjusted R^2	0.046	0.046	0.046	0.046	0.046
Panel B: Duvol	(1)	(2)	(3)	(4)	(5)
Civic and social participation	–0.001***				
	(–2.96)				
Institutional trust		–0.001***			
		(–5.96)			
Interpersonal trust			0.000		
			(0.76)		
Family relationships				–0.003***	
				(–11.75)	
Social networks					0.000
					(0.43)
Controls	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	275,695	275,695	275,695	275,695	275,695
Adjusted R^2	0.048	0.048	0.048	0.049	0.048

Table 9

Alternative social capital indicator and national culture

This table presents additional robustness tests for a sample of 49 countries over the period 2007 to 2019. The sample consists of firm-year observations. The first two columns report results with an alternative measure of Social Capital, while the last two columns report our baseline results with the addition of the four cultural dimensions of Hostede (1980). The dependent variable is *NSkew* in column 1 and 3, and *Duvol* in column 2 and 4. All continuous variables are winsorized at 1% and 99% level. *T*-statistics (in parentheses) are based on standard errors with firm clustering. The symbols **, and *** denote statistical significance at the 5% and 1% levels, respectively, using a 2-tail test.

	Excluding institutional trust		Controlling for culture	
	NSkew	Duvol	NSkew	Duvol
Variables	(1)	(2)	(3)	(4)
Social capital	–0.002***	–0.001***	–0.001***	–0.001**
	(–3.10)	(–3.95)	(–3.04)	(–2.42)
Individualism			0.001***	0.001***
			(13.13)	(12.35)
Uncertainty avoidance			–0.001***	–0.001***
			(–11.34)	(–11.64)
Power distance			–0.001***	–0.000***
			(–6.41)	(–6.07)
Masculinity			0.001***	0.000***
			(5.98)	(7.83)
Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	No	No
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	275,695	275,695	275,695	275,695
Adjusted R^2	0.046	0.048	0.041	0.044

Table 10

Moderation effects

This table presents panel regression results for a sample of 47 countries over the period 2008 to 2019. The sample consists of firm-year observations. The dependent variable is *NSkew* in models 1 and 2, and *Duvol* in models 3, and 4, respectively. All continuous variables are winsorized at 1% and 99% level. *T*-statistics (in parentheses) are based on standard errors with firm clustering. The symbol *** denote statistical significance at the 1% level using a 2-tail test.

	NSkew		Duvol	
Variables	(1)	(2)	(3)	(4)
Social capital	–0.018***	–0.011***	–0.010***	–0.006***
	(–10.24)	(–4.57)	(–11.52)	(–5.34)
Property rights	–1.056***		–0.548***	
	(–8.11)		(–8.77)	
Social capital × Property rights	0.021***		0.011***	
	(9.00)		(9.94)	
Law & order		–0.091***		–0.054***
		(–3.01)		(–3.71)
Social capital × Law & order		0.002***		0.001***
		(3.60)		(4.09)
Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	260,791	275,695	260,791	275,695
Adjusted R^2	0.044	0.046	0.046	0.048

Table 11

Marginal effects

This table presents the marginal effects of the regressions presented in Table 7. The first column presents the 11 values of either *Property rights* or *Law & order* variables. Columns 2 and 4 report the marginal effects when the moderating variable is *Property rights*. Columns 7 and 9 report the marginal effects when the moderating variable is *Law & order*. Columns 3, 5, 8, and 10 report *Z*-statistics based on standard errors obtained with the Delta-method. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

Property rights					Law & order				
	NSkew		Duvol			NSkew		Duvol	
c	dy/dx	Z-score	dy/dx	Z-score	c	dy/dx	Z-score	dy/dx	Z-score
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0.20	–0.0136***	–10.34	–0.0074***	–11.69	3.00	–0.0052***	–5.57	–0.0030***	–6.66
0.27	–0.0121***	–10.32	–0.0066***	–11.7	3.30	–0.0046***	–5.64	–0.0027***	–6.77
0.34	–0.0106***	–10.23	–0.0058***	–11.63	3.60	–0.0040***	–5.57	–0.0023***	–6.70
0.41	–0.0091***	–10.00	–0.0050***	–11.41	3.90	–0.0034***	–5.22	–0.0020***	–6.30
0.48	–0.0076***	–9.52	–0.0042***	–10.92	4.20	–0.0028***	–4.47	–0.0017***	–5.45
0.55	–0.0062***	–8.62	–0.0034***	–9.97	4.50	–0.0022***	–3.39	–0.0013***	–4.21
0.62	–0.0047***	–7.11	–0.0027***	–8.35	4.80	–0.0015**	–2.22	–0.0010***	–2.87
0.69	–0.0032***	–5.00	–0.0019***	–6.05	5.10	–0.0009	–1.18	–0.0007*	–1.68
0.76	–0.0017**	–2.57	–0.0011***	–3.38	5.40	–0.0003	–0.35	–0.0003	–0.71
0.83	–0.0002	–0.29	–0.0003	–0.84	5.70	0.0003	0.28	0.0000	0.03
0.90	0.0013	1.58	0.0005	1.26	6.00	0.0009	0.77	0.0004	0.61

Table 12

Moderation effects on the components of social capital

This table presents the moderation effects of Table 7 for the components of social capital. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

Panel A: Civil and social participation	NSkew		Duvol	
Civil and social participation	–0.003***	–0.002*	–0.001***	–0.001**
	(–4.44)	(–1.77)	(–4.71)	(–2.41)
Property rights	0.004		0.021	
	(0.11)		(1.26)	
Civil and social participation × Property rights	0.002***		0.001***	
	(3.62)		(3.30)	
Law & order		0.010		–0.001
		(0.73)		(–0.23)
Civil and social participation × Law & order		0.000		0.000*
		(1.25)		(1.70)
Panel B: Institutional trust	NSkew		Duvol	
Institutional trust	–0.008***	–0.010***	–0.004***	–0.005***
	(–7.89)	(–5.30)	(–8.93)	(–5.73)
Property rights	–0.474***		–0.251***	
	(–5.30)		(–5.91)	
Institutional trust × Property rights	0.009***		0.005***	
	(6.72)		(7.74)	
Law & order		–0.083***		–0.046***
		(–3.41)		(–3.99)
Institutional trust × Law & order		0.002***		0.001***
		(4.50)		(4.80)
Panel C: Interpersonal trust	NSkew		Duvol	
Interpersonal trust	–0.004***	–0.004***	–0.002***	–0.002***
	(–5.02)	(–2.90)	(–6.70)	(–3.06)
Property rights	–0.126**		–0.081***	
	(–2.61)		(–3.39)	
Interpersonal trust × Property rights	0.005***		0.003***	
	(5.26)		(6.92)	
Law & order		–0.024		–0.016**
		(–1.45)		(–2.03)
Interpersonal trust × Law & order		0.001***		0.001***
		(3.23)		(3.39)
Panel D: Family relationships	NSkew		Duvol	
Family relationships	–0.007***	–0.006***	–0.003***	–0.004***
	(–5.58)	(–3.47)	(–5.53)	(–4.22)
Property rights	–0.026		0.029	
	(–0.21)		(0.47)	
Family relationships × Property rights	0.002		0.001	
	(1.17)		(0.75)	
Law & order		–0.019		–0.020
		(–0.69)		(–1.48)
Family relationships × Law & order		0.000		0.000
		(0.62)		(1.11)
Panel E: Social networks	NSkew		Duvol	
Social networks	–0.002***	–0.001	–0.001***	–0.001
	(–2.80)	(–0.85)	(–3.33)	(–1.43)
Property rights	–0.154**		–0.071**	
	(–2.10)		(–2.00)	
Social networks × Property rights	0.004***		0.002***	
	(3.54)		(3.89)	
Law & order		–0.003		–0.009
		(–0.16)		(–0.90)
Social networks × Law & order		0.000		0.000
		(1.12)		(1.56)

Appendix
Table A1
Description of variables

Variable	Description
Nskew	The firms' negative skewness obtained from eq. (3).
Duvol	The firm's down-to-up volatility obtained from eq. (4).
Count	The difference between the number of crash and jump weeks in a year. Crash (jump) week is a week where its firm-specific return is less (more) than 3.09 standard deviation below (above) the mean firm-specific return.
Social capital	The social capital score. Overall index estimated by the Legatum Institute, considering the five sub-components described below under an equal weighting approach.
Civic and social participation	The civic and social participation score. It is calculated by the Legatum Institute considering: (i) the percentage of people responding "Yes" to the Gallup survey question: "Have you donated money to a charity in past month?", (ii) A measure of voter turnout (% of registered electors) * democracy score * election occurred in last 7 year, (iii) The percentage of people responding "Yes" to the Gallup survey question: "Have you volunteered time to an organization in past month?", (iv) The percentage of people responding "Yes" to the Gallup survey question: "In the past month, have you voiced your opinion to a public official?"
Institutional trust	The institutional trust score. It is calculated by the Legatum Institute considering: (i) The percentage of people responding "Yes" to the Gallup survey question: "Do you have confidence in the local police force?" (ii) The answer to the following question from the Expert's Survey of the World Economic Forum Global Competitiveness Index "In your country, how would you rate the ethical standards of politicians?" (iii) The percentage of people responding "Yes" to the Gallup survey question: "Do you have confidence in financial institutions or banks?" (iv) The percentage of people responding "Yes" to the Gallup survey question: "Do you have confidence in the judicial system and courts?" (v) The percentage of people responding "Yes" to the Galup survey question: "Do you have confidence in national government?" (vi) The percentage of people responding "Yes" to the Gallup survey question: "Do you have confidence in the military?"
Interpersonal trust	The interpersonal trust score. It is calculated by the Legatum Institute considering: (i)The percentage of people responding "Most people can be trusted" to the question "Generally speaking, would you say most people can be trusted, or you can't be too careful?" in the Integrated Values Survey, Afrobarometer, Arab Barometer, and Latinobarometro, (ii) The percentage of people responding "Yes" to the Gallup survey question: "Have you helped a stranger or someone you didn't know who needed help in past month?"
Family relationships	The personal and family relationships score. It is calculated by the Legatum Institute considering: (i) The percentage of people responding "Yes" to the Gallup survey question: "If you were in trouble, do you have relatives or friends you can count on to help?" (ii) The percentage of people responding "Strongly Agree/Agree" to the Gallup survey question: "Thinking about your life in general 'My family give me positive energy'"
Social network	The social Networks score. It is calculated by the Legatum Institute considering: (i) The percentage of people responding "Yes" to the Gallup survey question: "Were you treated with respect all day yesterday?" (ii) The percentage of people responding "Yes" to the Gallup survey question: "Are you satisfied with opportunities to meet people and make friends? (iii) The percentage of people responding "Yes" to the Gallup survey question: "Has your household sent financial help to another household in last year?" (same country)"
Property rights	It provides an assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. It measures

	the degree to which a country's laws protect private property rights and the degree to which its government enforces those laws. It also assesses the likelihood that private property will be expropriated and analyzes the independence of the judiciary, the existence of corruption within the judiciary, and the ability of individuals and businesses to enforce contracts. The Property rights index by the Heritage Foundation takes values between 0 and 100. For the purposes of our study, to ease interpretation of the regression coefficients, all the scores have been divided by 100. Thus, in theory the property rights in our sample may take values between 0 and 1.
Law & order	The "Law" element of the International Country Risk Guide (ICRG) reflects the strength and impartiality of the legal system. The "Order" element is an assessment of popular observance of the law. Each component is assessed separately from 0 to 3, but then combined into a single indicator by the ICRG. Thus, the ICRG law and order indicator may take values from 0 to 6 with higher values denoting better outcomes.
Dturn	The firm's average monthly share turnover of the fiscal year minus the average monthly share turnover of the previous year. Monthly share turnover is calculated as the monthly share trading volume divided by shares outstanding.
Size	The natural logarithm of the firm's market value of equity.
ROA	The ratio of the firm's net income to the book value of assets.
BTM	The ratio of the firm's book value of equity to market value of equity.
Leverage	The ratio of the firm's book value of debt to the book value of assets.
Returns	The cumulative firm-specific weekly returns over the fiscal year.
Ln(Age)	The natural logarithm of the firm's age plus one. Age is defined as the number of years since the IPO year.
|DACC|	The absolute value of discretionary accruals measured as the residuals of the performance-controlled accruals model of Tucker and Zarowin (2006).
Ln(GDP)	The natural logarithm of GDP (measured in USD)
Market-cap-to-GDP	The ratio of stock market capitalization to GDP
Firm HHI	Firm concentration ratio, as measured by the firm Herfindahl index on an annual basis.
Industry HHI	Industry concentration ratio, as measured by the industry Herfindahl index on an annual basis.
Reporting opacity	The 3-year moving sum of absolute discretionary accruals as in Hutton et al. (2009)
Price informativeness	This measure examines the ability of current market prices to forecast future earnings. To compute this measure, we first estimate eq. (7). Then, for every year, we multiply the estimated coefficient $b_{h,t}$ with the standard deviation of the logarithmic ratio of market value to total assets, as in eq. (8).
Transition to Agriculture	Natural logarithm of the time between a country's transition to agriculture (i.e. transition from reliance mainly on gathered wild and hunted food sources to reliance mainly on cultivated crops and livestock) and the present. Data are from 2018 revision of the dataset of Putterman and Trainor (2006), which reports the number of years before the present, or more precisely, before 2000 C.E. (A.D.), at which the transition is estimated to have taken place. To create a time-varying indicator, we add a time trend to the original country-specific value that increases by 1 (compared to the year before) for every additional year in the sample.