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Organization capital and firm risks

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Abstract

Purpose – This paper aims to investigate how organization capital influences different forms of corporate risk. It also explores how the relationship between organization capital and risks varies in the cross-section of firms.

Design/methodology/approach – To test the hypothesis, this study employs the ordinary least squares (OLS) regression model using a large sample of the United States (US) data over the 1981–2019 period. It also uses an instrumental variable approach and an errors-in-variables panel regression approach to mitigate endogeneity problems.

Findings – The empirical results show that organization capital is positively related to both idiosyncratic risk and total risk but negatively related to systematic risk. The cross-sectional analysis shows that the positive relationship between organization capital and idiosyncratic risk is significantly more pronounced for the subsample of firms with high information asymmetry and human capital. Moreover, the negative relationship between organization capital and systematic risk is significantly more pronounced for firms with greater efficiency and firms facing higher industry- and economy-wide risks.

Practical implications – The findings have important implications for investors and policymakers. For example, since organization capital increases idiosyncratic risk and total risk but reduces systematic risk, investors should take organization capital into account in portfolio formation and risk management. Moreover, the findings lend support to the argument on the recognition of intangible assets in financial statements. In particular, the study suggests that standard-setting bodies should consider corporate reporting frameworks to incorporate the disclosure of intangible assets into financial statements, particularly given the recent surge of corporate intangible assets and their critical impact on corporate risks.

Originality/value – To the best of the authors' knowledge, this is the first study to adopt a large sample to provide systematic evidence on the relationship between organization capital and a wide range of risks at the firm level. The authors show that the effect of organization capital on firm risks differs remarkably depending on the kind of firm risk a particular risk measure captures. This study thus makes an original contribution to resolving competing views on the effect of organization capital on firm risks.

Keywords Organization capital, Corporate risks, Agency problems

Paper type Research paper

1. Introduction

Organization capital represents a firm's stock of knowledge, capabilities, culture, business processes and systems that facilitates an efficient match between human skills and physical capital to enhance production efficiency. Prior studies suggest that organization capital is

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embedded partly within the organization and partly in key talents such as managers, engineers, marketing people and research employees (Eisfeldt & Papanikolaou, 2013, 2014).

The empirical evidence on organization capital is puzzling. On the one hand, studies show that organization capital improves the productivity, efficiency and performance of firms (Corrado, Hulten, & Sichel, 2009; Lev, Radhakrishnan, & Zhang, 2009; Li, Qiu, & Shen, 2018); therefore, firms with higher organization capital are associated with a higher Tobin's Q and (excess) stock returns (Eisfeldt & Papanikolaou, 2013, 2014; Leung, Mazouz, Chen, & Wood, 2018). This stream of studies relates the higher stock returns to the idea that organization capital is risky for shareholders as it escalates the agency problems between key talents and shareholders. On the other hand, consistent with the idea that talented employees can develop a system or process that reduces the likelihood of engaging in imprudent risk-taking activities, Attig and El Ghoul (2018) find that organization capital is negatively associated with firms' cost of equity capital, suggesting that firms with higher organization capital are less risky. Motivated by this puzzling evidence, in this study, we investigate whether and to what extent organization capital is related to the idiosyncratic, systematic and total risk of firms. We argue that a study on the relationship between organization capital and different forms of risk is vital because of their importance in and implications for portfolio formation, risk management and executive compensation (March & Shapira, 1987).

Idiosyncratic risk is unique to a firm in the sense that it has little or no association with the market (Campbell, Lettau, Malkiel, & Xu, 2001; Morck, Yeung, & Yu, 2000). Systematic risk, conversely, measures the sensitivity of a firm's stock return to the market (Montgomery & Singh, 1984). Finally, total risk consists of both idiosyncratic and systematic risk. While relating organization capital to idiosyncratic, systematic and total risk, we take the resource-based view and the agency- and information asymmetry-based theories into account.

The resource-based view suggests that organization capital provides a sustainable competitive advantage and allows productive interaction between tangible and intangible resources (Carlin, Chowdhry, & Garmaise, 2012; Hasan & Cheung, 2018). As a result, firms with high organization capital are associated with efficient production, stable business operation, and superior firm productivity and performance (Hasan & Cheung, 2018; Lev *et al.*, 2009; Li *et al.*, 2018). Therefore, organization capital is likely to reduce the heterogeneity of investor beliefs about the future cash flow and return and, thus, the idiosyncratic risk. In addition, organization capital, in the course of its accumulation, stores, retains, integrates and institutionalizes knowledge about business practices, processes and systems within databases, documents, patents and manuals (Youndt, Subramaniam, & Snell, 2004), guiding the *future* actions of firms in a productive, efficient and sustainable manner (Zahra, Ireland, & Hitt, 2000). Therefore, organization capital is instrumental in bringing about stability during shocks and restructuring (Mishra, 2014). Thus, the accumulated stock of knowledge stemming from organization capital enhances firms' ability to cope successfully with general market movement, making them less susceptible to macroeconomic shocks and systematic risk. As both idiosyncratic risk and systematic risk are expected to be lower for firms with higher organization capital, the total risk is also expected to be lower. In sum, following the resource-based theory, we predict that organization capital is associated negatively with idiosyncratic risk, systematic risk and, thus, total risk.

The agency theory suggests that joint ownership and property rights governing organization capital allow both key talents and shareholders to have claims on the cash flow accruing from organization capital (Eisfeldt & Papanikolaou, 2013, 2014). Moreover, since the key talents of firms with high organization capital have better outside options, organization capital exposes firms to the threat not only of the loss of key personnel but also of the loss of invaluable information to rival firms. Furthermore, key talents have incentives to over-invest in organization capital and other projects to improve their outside options further or to maximize their private benefits (Eisfeldt & Papanikolaou, 2013). Thus, the disproportionate division of cash flows between key talents and shareholders, possible loss of key talents and business secrets, and over-investment behavior of key talents of high organization capital increase the uncertainty about future cash flows and return and, thus, increase idiosyncratic risk. Furthermore, the tacit and idiosyncratic nature of organization capital increases the information asymmetry and valuation uncertainty, which in turn increase the idiosyncratic risk.

Prior studies show that key talents often face substantial and unhedged exposure to the total risk of the firm that they work for but are rewarded for bearing systematic risk only. To maximize their interest in the firm, they have incentives to increase its exposure to systematic risk, for which key talents of high organization capital can more efficiently cater (Duan & Wei, 2005; Meulbroek, 2001). Note that an increase in both idiosyncratic risk and systematic risk results in an increase in total risk as well. In sum, based on the agency and information asymmetry views, we predict that organization capital is associated positively with idiosyncratic risk, systematic risk and, thus, total risk.

It is important to note that both the resource-based view and the agency theory can hold at the same time. Depending on whether a particular view is dominant for a particular type of risk(s), it is possible that, for example, the efficiency view may hold only for idiosyncratic risk but the agency view is dominant for systematic risk. After all, which prevailing view is supported by the data for a particular type of risk is an empirical issue.

Following Eisfeldt and Papanikolaou (2013) and Peters and Taylor (2017), we estimate the stock of organization capital in each year by accumulating a fraction of past selling, general and administrative (SG&A) expenditure using the perpetual inventory method. To estimate idiosyncratic and systematic risk, we use the Fama–French (1993) three-factor model with and without a momentum factor (Carhart, 1997). We also use the standard deviation of the stock return as a proxy for total risk.

Using a large sample of the United States (US) data from 1981 to 2019, we find that organization capital is associated positively with idiosyncratic and total risk, while it is associated negatively with systematic risk. In terms of economic significance, we find that, for a one standard deviation increase in organization capital scaled by total assets (OC/TA), idiosyncratic risk and total risk (systematic risk) increase by 3.97–3.99% and 3.54% (1.28–1.56%) relative to the mean. These results remain robust to several robustness checks, including alternative specifications of firm risks, alternative measures of organization capital and alternative regression specifications. Our cross-sectional analysis shows that the positive relationship between organization capital and idiosyncratic risk is significantly more pronounced for firms with high information asymmetry and human capital. Moreover, the negative relationship between organization capital and systematic risk is significantly more pronounced for firms with greater efficiency and for firms that are subjected to higher industry- and economy-wide risks.

Additional analysis indicates that organization capital is related positively to the operating risk of firms (using the rolling standard deviation of cash flow, return on assets (ROA) and return on equity (ROE) as proxies) and debt holders' risk. To mitigate concerns about the endogeneity problems, we use dynamic panel regression, two-stage least-squares regression (Lewbel, 2012) and errors-in-variables panel regression (Erickson & Whited, 2002; Erickson, Parham, & Whited, 2017). We find evidence that our documented results are not driven by the endogeneity problems.

This study contributes to both the organization capital and the risk-taking literature. Prior studies show that organization capital affects stock returns (Eisfeldt & Papanikolaou, 2013), the implied cost of equity (Attig & El Ghoul, 2018), innovation (Francis, Mani, Sharma, & Wu, 2021), corporate payouts (Hasan & Uddin, 2022), tax avoidance (Hasan, Lobo, & Qiu, 2021), and executive pay-for-performance sensitivity (Gao, Leung, & Qiu, 2021). To our knowledge, this is the first empirical study to investigate systematically the relationship between organization capital and a wide range of risks (including total risk, systematic risk, idiosyncratic risk operating risk and debt holder's risk) at the *firm* level. We provide novel evidence that the effect of organization capital on firm risks differs remarkably depending on the kind of firm risk that a particular risk measure captures. This study thus makes an important contribution to resolving competing views about the direct impact of organization capital on firm risks. We also provide new evidence that organization capital is related positively to the operating risk and debt holders' risk.

The rest of the paper is organized as follows. Section 2 reviews the literature and develops testable hypotheses. The research design, data collection and sample selection are presented in Section 3. Section 4 explains the results, while Section 5 concludes the paper.

2. Literature review and hypothesis development

2.1 Organization capital

Organization capital has become an increasingly important production factor in today's knowledge-based economy (Eisfeldt & Papanikolaou, 2013, 2014; Peters & Taylor, 2017). Lev *et al.* (2009, p. 277) define organization capital as the "agglomeration of technologies—business practices, processes and designs" that "enables superior operating, investment and innovation performance."

Two general views on organization capital exist in the literature. The resource-based view suggests that organization capital is a valuable asset because it allows productive interaction between tangible and intangible resources for creating economic value and growth (Carlin *et al.*, 2012). The extant studies lend support to this view and demonstrate that organization capital, in the form of superior business practices, processes, culture and organization design, is associated with more efficient production and stable business operation and transactions, all of which lead to superior firm productivity and performance (Hasan & Cheung, 2018; Lev *et al.*, 2009). Research also shows that organization capital is an important driver of a competitive advantage (Gao *et al.*, 2021; Youndt *et al.*, 2004) and that firms with more organization capital are more productive, have a higher Tobin's Q and higher stock returns, and display a higher level of executive compensation (Eisfeldt & Papanikolaou, 2013). Francis *et al.* (2021) show that organization capital has a positive impact on innovation, which is vital for companies' success. Studies also suggest that organization capital alleviates capital market imperfections and capital constraints (Attig & Cleary, 2014), improves optimal resource planning (Venieris, Naoum, & Vlismas, 2015), and is more valuable during times of shock and restructuring (Mishra, 2014; Venieris *et al.*, 2015). Attig and El Ghoul (2018) show that organization capital decreases the implied cost of equity in medium-sized manufacturing firms. Taken together, the extant literature demonstrates that organization capital is a valuable resource, provides a sustainable competitive advantage, and enhances firm-level and macroeconomic productivity and performance.

Alternatively, the agency view suggests that organization capital is embodied both within the organization and in the firms' key talents (Eisfeldt & Papanikolaou, 2013, 2014). Therefore, both shareholders and key talents have claims on the cash flow accruing from organization capital. Importantly, the division of the cash flow between financiers and key talents depends on the outside options of the key talents: a condition that exposes shareholders to additional risk. Moreover, since key talents have better outside options, firms with high levels of organization capital are exposed not only to the loss of key personnel but also to the threat of losing invaluable information to rival firms. This in turn exposes firms to adverse financial shocks, which will further increase their business risk. Furthermore, since the costs and benefits of organization capital are not shared equally between key talents and shareholders, key talents may decide to overinvest in organization capital and other projects to improve their outside options further or to maximize their private benefits (Eisfeldt & Papanikolaou, 2013). Thus, the disproportionate division of cash flows between key talents and shareholders exacerbates the agency problem. Accordingly, shareholders require higher risk premia to invest in firms with high levels of organization capital (Eisfeldt & Papanikolaou, 2013). Using data from 20 Organisation for Economic Co-operation and

Development (OECD) countries, Leung *et al.* (2018) document that the positive relationship between organization capital and expected returns is more prominent when labor market flexibility allows key talents to relocate between firms, taking tacit knowledge with them.

In addition to the above two general views, the information asymmetry view indicates that organization capital is predominately tacit and idiosyncratic and that it is neither fully tracked by firms nor reported publicly (Lev *et al.*, 2009). Therefore, financial analysts and other information intermediaries fail to comprehend fully the value of firms' organization capital (Lev & Radhakrishnan, 2005), leading to higher valuation uncertainty.

2.2 Systematic risk, idiosyncratic risk and total risk

The total risk at the firm level can be disaggregated into two parts: systematic risk and idiosyncratic risk. Systematic risk measures the degree to which a firm's stock return co-varies with the economy as a whole. This risk is an important metric in understanding the vulnerability of the stock of publicly listed firms to market downturns. Idiosyncratic risk, on the other hand, reflects firm-specific return volatility, which arises primarily from a firm's actions and is independent of the common market movement.

There is an ongoing debate about the usefulness of idiosyncratic risk in explaining stock returns. Traditional asset-pricing models suggest that investors can diversify away idiosyncratic risk by constructing a portfolio of stocks with imperfectly correlated returns, implying that investors cannot demand a premium for bearing it. Accordingly, systematic risk is the only priced risk factor (Lintner, 1965; Markowitz, 1952; Sharpe, 1964). Nonetheless, the subsequent literature indicates that investors, in reality, may not hold well-diversified portfolios for a number of reasons, including (i) transaction and search costs (Merton, 1987); (ii) attraction to stocks with certain features (e.g. higher volatility, greater skewness, higher turnover and local stock) (Goetzmann & Kumar, 2008); (iii) excessive exposure to a single firm; (iv) an "erroneous" diversification strategy (Goetzmann & Kumar, 2008); and (v) investor sophistication and investor-specific attributes (Dorn & Huberman, 2005).

Therefore, undiversified investors require compensation for bearing the idiosyncratic risk of their stocks (Merton, 1987). A number of studies provide evidence that idiosyncratic volatility has a price (e.g. Eiling, 2013; Fu, 2009; Goyal & Santa-Clara, 2003; Huang, Liu, Rhee, & Zhang, 2010; Taylor & Verrecchia, 2015). Despite the above evidence, another stream of literature presents a negative relationship between idiosyncratic risk and stock returns (Ang, Hodrick, Xing, & Zhang, 2006, 2009; Peterson & Smedema, 2011), which other studies suggest to be driven by methodological choices (Bali & Cakici, 2008; Han & Lesmond, 2011) or because idiosyncratic volatility serves as a proxy for other firm characteristics, including lottery-like payoffs (Bali, Cakici, & Whitelaw, 2011), earnings surprises (Jiang, Xu, & Yao, 2009) and idiosyncratic skewness (Boyer, Mitton, & Vorkink, 2010).

Prior studies consistently demonstrate that idiosyncratic risk, rather than systematic risk, constitutes 80–85% of the variation in a firm's stock returns (Goyal & Santa-Clara, 2003; Lui, Markov, & Tamayo, 2007). Since high idiosyncratic risk reflects high uncertainty about expected cash flows, it can put the survival of a firm at risk, hinder efforts to acquire or divest firm shares and affect the value of stock options. Thus, given the importance of risks in portfolio construction and investment decisions, understanding the determinants of such risks is important. In this study, we investigate whether organization capital affects idiosyncratic risk, systematic risk and total risk.

2.3 Relationship between organization capital and idiosyncratic risk

Extant studies suggest that the heterogeneity of investor beliefs about future returns and cash flows give rise to idiosyncratic risk (Irvine & Pontiff, 2009; Pástor & Veronesi, 2003). They also indicate that information asymmetry between insiders and outsiders impedes the proper valuation of firms, which, in turn, increases idiosyncratic volatility (e.g. Diamond & Verrecchia, 1991; Easley & O'Hara, 2004; Rajgopal & Venkatachalam, 2011).

Following the resource-based theory, we predict that organization capital is negatively associated with idiosyncratic volatility. This is because organization capital provides a sustainable competitive advantage, which leads to superior business practices and processes, stable business operation, efficient production, and high future operating and stock return performance (Hasan & Cheung, 2018; Lev *et al.*, 2009). Thus, organization capital may alleviate the heterogeneity of investor beliefs about future returns, cash flows and firm value and, thus, idiosyncratic volatility.

However, based on the agency and information asymmetry theory, we predict that organization capital is positively associated with idiosyncratic volatility for four reasons. First, firms with high organization capital are exposed to valuation uncertainty. This is because tacit and idiosyncratic organization capital is not only difficult to measure (Brynjolfsson, Hitt, & Yang, 2002) but also neither fully tracked by a firm nor completely disclosed in financial statements (Brynjolfsson *et al.*, 2002; Lev *et al.*, 2009). Thus, the valuation uncertainty associated with organization capital leads to a higher level of idiosyncratic volatility. Second, since organization capital is embodied within both the firm and its key talents, both shareholders and key talents have claims on the cash flow accruing from organization capital (Eisfeldt & Papanikolaou, 2013). Importantly, the allocation of the cash flow to the shareholders depends on the outside options of the key talents. As a result, there is considerable uncertainty about the amount of the cash flow that shareholders are entitled to receive, which exposes shareholders to additional cash flow risk and thus idiosyncratic risk. Third, firms with high levels of organization capital are exposed not only to the loss of key personnel but also to the threat of losing invaluable information to rival firms, which may expose them to adverse financial shocks and idiosyncratic risk.

Finally, investment in organization capital involves a substantial cash outflow, subjective decision making, trial and error, and unexpected successes and failures for firms. Brynjolfsson *et al.* (2002) suggest that firms may invest in certain business models, practices, processes and culture, some of which turn out to be effective, and that it may take several years to realize the desired benefits, which signify the outcome uncertainty associated with organization capital. In sum, because of valuation uncertainty, return and cash flow uncertainty, and outcome uncertainty, organization capital is associated with higher idiosyncratic volatility.

Given the competing prediction above, we develop the following hypothesis.

H1. Organization capital is not associated with idiosyncratic volatility.

2.4 Relationship between organization capital and systematic risk (beta)

In line with the resource-based theory, we predict that organization capital is negatively associated with systematic risk (beta). This is because, though learning by doing, firms accumulate organization capital (Ericson & Pakes, 1995), most of which can be documented and archived. Such firm-specific knowledge can guide firms' future actions and enable them to cope with industry- and economy-wide challenges more effectively (Lev *et al.*, 2009; Zahra *et al.*, 2000). Therefore, organization capital is likely to weaken the comovement among the firms, leading firms with more organization capital to be less susceptible to systematic risk (Ahn, 2019). Moreover, through the efficient integration of human capital and other tangible and intangible resources, organization capital reduces the downside risks associated with changes in technologies and manufacturing techniques (Lev, Radhakrishnan, & Evans, 2016) and the resulting adjustment costs (Lev & Kunitzky, 1974). Overall, organization capital improves firms' efficiency and enhances their ability to cope with the business environment; therefore, we predict a negative relationship between organization capital and systematic risk.

Based on the agency theory, however, we predict a positive relationship between organization capital and systematic risk. Our prediction is based on the evidence that, while individual shareholders can diversify their investment, managers are largely undiversified. Since undiversified managers bear the total risk (both idiosyncratic and systematic risk), but they are compensated only for the systematic risk, this prompts them to increase the systematic portion of risk to increase their expected return (Duan & Wei, 2005; Meulbroek, 2001). For example, Montgomery and Singh (1984) find that firms with high general, financial and managerial competencies pursue unrelated diversification. These activities are generally regarded as a source of systematic risk (Montgomery & Singh, 1984; Porter, 1985).

Thus, given the competing arguments on the relationship between organization capital and systematic risk, we develop the following hypothesis.

H2. Organization capital is not associated with systematic risk.

2.5 Relationship between organization capital and total risk

The total risk of a firm entails both idiosyncratic risk and systematic risk. Prior studies show that idiosyncratic risk constitutes 80–85% of total risk (e.g. Goyal & Santa-Clara, 2003; Lui *et al.*, 2007). Considering the differential roles of the resource-based and agency views in affecting idiosyncratic and systematic risk, as discussed above, a natural question is how organization capital affects the total risk of a firm. Since the efficiency view of organization capital indicates that it reduces both idiosyncratic and systematic risk, we predict a negative relationship between organization capital and total risk. However, given that both the agency and the information asymmetry view suggest a positive relationship between organization capital and idiosyncratic and systematic risk, it is reasonable to predict a positive relationship between organization capital and total risk. Therefore, we develop the following hypothesis.

H3. Organization capital is not associated with total risk.

3. Research design

3.1 Dependent variables: firm risks

We source annual estimates of idiosyncratic risk, systematic risk and total risk from the Wharton Research Data Services (WRDS) Beta Suite, which provides stocks' loading on various risk factors. While sourcing the risks from Beta Suite, following prior studies (e.g. Bali, Engle, & Tang, 2017; Chen, Singal, & Whitelaw, 2016), we use a 252-day estimation window (minimum window of 126 days). Idiosyncratic risk and systematic risk are estimated using the three-factor model (Fama & French, 1993) and the four-factor model (Carhart, 1997) [1].

3.1.1 Three-factor model (Fama & French, 1993). The Fama and French (1993) three-factor model used to estimate systematic risk and idiosyncratic risk is as follows:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{i,mkt} MKTRF_t + \beta_{i,smb} SMB_t + \beta_{i,hml} HML_t + \varepsilon_{i,t}, \quad (1)$$

where $R_{i,t}$ is the return of stock i during period t; $MKTRF_t$ is the Fama–French excess return on the market during period t; SMB_t is the Fama–French small minus big (Size) factor during period t; and HML_t is the Fama–French high minus low (Value) factor during period t. In addition, α_i (or alpha) is the intercept term; $\beta_{i,\mathrm{mkt}}$ (or beta) is the slope coefficient that captures systematic risk (BETA_FF3); and $\varepsilon_{i,t}$ is an error term. The standard deviation of the residuals from the above regression model is our annual measure of idiosyncratic risk (IVOL_FF3).

3.1.2 Four-factor model (Carhart, 1997).

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{i,mkt} MKTRF_t + \beta_{i,smb} SMB_t + \beta_{i,hml} HML_t + \beta_{i,umd} UMD_t + \varepsilon_{i,t}, \quad (2)$$

where UBM_t is the Carhart up minus down (Momentum) factor during period t and the other variables are as defined earlier. $\beta_{i,\text{mkt}}$ (or beta) is the slope coefficient that captures systematic risk (BETA_FF4), and the standard deviation of the residuals from the above regression model is our annual measure of idiosyncratic risk (IVOL_FF4).

Similar to the estimation of idiosyncratic and systematic risk, we use a 252-day estimation window (minimum window of 126 days) to estimate the annual measure of total risk (TVOL_RET).

3.2 Independent variable: organization capital

We follow Peters and Taylor (2017) and use a *fraction* of SG&A expenses in the estimation of organization capital. This is because "a large part of SG&A consists of expenses related to labor and IT (white collar wages, training, consulting and IT expenses), consistent with the idea that any accrued value will be somewhat firm specific and must be shared with key talent . . . Hence, any spending on the part of the firm to increase its organization capital will be included in SG&A expenses" (Eisfeldt & Papanikolaou, 2013, pp. 1380–1381).

We calculate the stock of organization capital in each year by accumulating a fraction of past SG&A expenditure using the perpetual inventory method as follows:

$$OC_{i,t} = (1 - \delta_{OC})OC_{i,t-1} + (SG\&A_{i,t} \times \lambda_{OC}). \tag{3}$$

The initial stock of overall organization capital is estimated as follows:

$$OC_{i,0} = \frac{(SG\&A_{i,t} \times \lambda_{OC})}{g + \delta_{OC}}, \tag{4}$$

where $OC_{i,t}$ denotes the organization capital of firm i at time t; δ_{OC} denotes the depreciation rate of OC; $SG\&A_{i,t}$ indicates the SG&A expenses of firm i at time t; λ_{OC} represents the percentage of SG&A expenditure that is invested in organization capital; and g denotes the growth in the flow of organization capital estimated as the average growth of firm-level SG&A expenses. The above technique to estimate organization capital is widely used in recent studies (Eisfeldt & Papanikolaou, 2014; Hasan *et al.*, 2021; Leung *et al.*, 2018). Following the prior literature (Eisfeldt & Papanikolaou, 2013, 2014; Peters & Taylor, 2017), we include 30% of SG&A (λ_0 = 0.30) in estimating organization capital. We also follow Eisfeldt and Papanikolaou (2014) and Peters and Taylor (2017) to include a depreciation rate of 20% (δ_0 = 0.20).

In our empirical tests, we scale organization capital by total assets (OC/TA). In the sensitivity analysis, we construct organization capital based on Eisfeldt and Papanikolaou's (2013) measure, which uses the deflated value of *total* SG&A expenses rather than a fraction of past SG&A expenses. Their method is as follows:

$$OC_{i,t} = (1 - \delta_{OC})OC_{i,t-1} + \frac{SG\&A_{i,t}}{cpi_t}, \tag{5}$$

where cpi_t represents the consumer price index at time t and the other variables are as explained earlier. Organization capital is then scaled by total assets.

Finally, in the sensitivity test, we use the organization capital measure of Ewens, Peters, and Wang (2020), which employs industry-level parameter estimates (fraction of SG&A and depreciation rates) in estimating organization capital (OC/TA_EPW).

3.3 Control variables

Our regression models incorporate a number of control variables that prior studies suggest affect idiosyncratic, systematic and total risk (Dhaliwal, Judd, Serfling, & Shaikh, 2016;

Ferris, Javakhadze, & Rajkovic, 2017; Kim, Patro, & Pereira, 2017). They include firm size (SIZE), leverage (LEV), market-to-book ratio (MTB), firm profitability (ROA), firm life cycle (AGE), cash flow volatility (σ(CF)), industry competitiveness (IND_CON), stock return (RET), dividend payment (DIV), research and development (R&D), intangibles (INTAN), managerial ability (MA_SCORE), property, plant and equipment (PPE), and sales growth (ΔSALE). Furthermore, following prior studies (e.g. Bakke, Mahmudi, Fernando, & Salas, 2016; Coles, Daniel, & Naveen, 2006; Faccio, Marchica, & Mura, 2016; Serfling, 2014), we control for the chief executive officer's (CEO's) age (CEO_AGE), gender (CEO_FEMALE) and overconfidence (CEO_OVRCON), equity-type compensation (DELTA and VEGA), the total current compensation of the CEO (TOTAL_CURR) and the CEO tenure (CEO_TENURE). In addition, we control for industry fixed effects and year effects to capture industry-level time-invariant unobserved heterogeneity and year effects, respectively.

3.4 Empirical model

We test the relationship between organization capital and firm risk using the ordinary least-squares (OLS) regression model with standard errors adjusted for heteroskedasticity and within-firm clustering:

$$RISK_{i,t+1} = \alpha_0 + \beta_1 OC_{i,t} + \boldsymbol{\beta_2} CONTROLS_{i,t} + YEAR\,FE_t + IND\,FE + \varepsilon_{i,t}, \tag{6}$$

where RISK is the measure of idiosyncratic, systematic or total risk (see 3.1), OC is the organization capital (see 3.2), and CONTROLS indicates the firm- and executive-level (i.e. CEO) controls (see 3.3). All the variables are defined in the Appendix.

In the sensitivity analysis, we estimate the above regression model using firm fixed-effect, high-dimensional fixed-effect and dynamic panel models.

3.5 Sample and data

We collect financial data from the Center for Research in Security Prices (CRSP)/Compustat merged data file; stock return and price data from the CRSP; idiosyncratic, systematic and total risk data from the Beta Suite, which is available through WRDS; and executive-level data from Execucomp.

Our study covers data from 1981 to 2019 [2]. We exclude financial and utility firms (71,978 firm-years) because these firms are subject to substantially different accounting practices and regulations, which may affect the accumulation of organization capital and risk taking differently. We also drop firm-year observations with missing dependent (i.e. risk), main independent (i.e. organization capital) and control variables (59,914 firm-years) from the regression model, yielding a final sample of 119,309 firm-year observations (12,397 unique firms). Panel A of Table 1 presents the sample selection process; to avoid the undesirable influence of outliers, we winsorize the key variables in the extreme 1% of the respective distributions.

Panel B of Table 1 shows the distribution of the sample across the twelve Fama–French industry groups. As shown in Panel B, business equipment represents the largest share of our sample (22.17%), whereas consumer durables account for the smallest share (3.21%). Overall, Panel B exhibits a considerable variation in the distribution of the sample across industries.

4. Empirical findings and discussion

4.1 Descriptive statistics

Table 2 presents the descriptive statistics of the variables used in this study. We find that the annual estimates of mean (median) idiosyncratic volatility based on the Fama–French three- and four-factor models are 3.51% and 3.49% (2.84% and 2.83%), with a corresponding Q1

Panel A: Sample selection Description	Total number of observations
Financial data available in CRSP/Compustat merged file from 1981 to 2019	251,201
Less	
Financial and utility firms (63,842 + 8,136)	(71,978)
Firms with missing values for the organization capital, firm risks and control variables used in the main regression model	*(59,914)*
Final sample	*119,309*
Number of unique firms	12,397

Panel B: Industry distribution Industry	Observations	% *N*
Consumer nondurables	8,448	7.08
Consumer durables	3,832	3.21
Manufacturing	17,747	14.87
Oil, gas and coal extraction and products	7,324	6.14
Chemicals and allied products	3,890	3.26
Business equipment	26,450	22.17
Telephone and television transmission	4,024	3.37
Wholesale, retail and some services	14,789	12.40
Healthcare, medical equipment and drugs	13,226	11.09
Other	19,579	16.41

Note(s): This table reports sample selection (Panel A) and industry distribution of sample (Panel B)

Table 1. Sample selection and industry distribution

(Q3) value of 1.90 (4.36) and 1.89 (4.34), respectively. Moreover, the mean (median) systematic risk values (i.e. beta) based on these models are 0.92 and 0.91 (0.91 and 0.91), respectively. The mean (median) total volatility of stock returns (TVOL_RET) is 3.74% (3.10%), with a standard deviation of 2.31%. The Q1 (Q3) value for TVOL_RET is 2.13% (4.60%). The sample firms have mean (median) organization capital (OC/TA) of 32.1% (22.6%) of their total assets, with a standard deviation of 33.2%. Moreover, the Q1 and Q3 values of OC/TA are 9.5% and 43% of their total assets, respectively. The descriptive statistics show that the sample firms are, on average, moderately large (SIZE = 5.34) and have moderate LEV (LEV = 18.2%), growth (MTB = 1.91, ΔSALE = 18.9%, and R&D = 4.5%), profitability (ROA = 6.6% and RET = 13.1%) and cash flow volatility (δ(CF) = 8.8%).

4.2 Correlation

Table 3 reports the Pearson correlation between the key variables included in the regression models. We find that OC/TA is positively correlated ($p < 0.01$) with both idiosyncratic risk (correlation = 0.19) and total risk (correlation = 0.17), while its correlation with systematic risk (BETA) is negative and significant (correlation = −0.11; $p < 0.01$). We also find that total risk (TVOL_RET) is correlated positively ($p < 0.01$) with both idiosyncratic risk and systematic risk. Moreover, the correlations of different risks with the controls are significant and largely in line with our expectation. The variance inflation factor (VIF) values reported in Table 3 are far below 10, suggesting that multicollinearity is not a major concern for our study (Wooldridge, 2006).

4.3 Main regression results

Table 4 presents the OLS regression results of the relationship between organization capital and future firm-level risks. In Panel A, we examine how the organization capital of year *t* is

	Mean	Std. Dev	p25	Median	p75
Dependent variable					
IVOL_FF4 (%)	3.491	2.313	1.889	2.828	4.339
IVOL_FF3 (%)	3.508	2.318	1.903	2.843	4.360
BETA_FF4	0.905	0.634	0.513	0.909	1.279
BETA_FF3	0.915	0.622	0.521	0.909	1.285
TVOL_RET (%)	3.738	2.307	2.133	3.102	4.601
Independent and control variables					
OC/TA	0.321	0.332	0.095	0.226	0.430
SIZE	5.335	2.277	3.662	5.205	6.910
LEV	0.182	0.192	0.008	0.132	0.288
MTB	1.911	1.502	1.065	1.413	2.122
ROA	0.066	0.201	0.034	0.108	0.167
AGE	2.400	0.87	1.720	2.432	3.047
δ(CF)	0.088	0.126	0.021	0.043	0.097
IND_CON	0.095	0.093	0.040	0.065	0.105
RET	0.131	0.656	−0.272	0.032	0.365
DIV	0.345	0.475	0.000	0.000	1.000
R&D	0.045	0.089	0.000	0.000	0.051
INTAN	0.109	0.165	0.000	0.025	0.155
MA_SCORE	0.000	0.120	−0.070	−0.017	0.040
PPE	0.292	0.235	0.103	0.226	0.426
ΔSALE	0.189	0.555	−0.030	0.083	0.239
CEO_AGE	4.031	0.130	3.951	4.043	4.111
CEO_FEMALE	0.028	0.165	0.000	0.000	0.000
CEO_OVRCON	4.707	2.493	3.807	5.436	6.438
DELTA	5.179	1.629	4.178	5.202	6.254
VEGA	3.372	1.889	2.207	3.633	4.747
TOTAL_CURR	6.685	0.926	6.331	6.737	7.094
CEO_TENURE	1.759	0.879	1.099	1.792	2.398
Variables used in the robustness and additional analysis					
IVOL_FF4_MNT (%)	13.265	7.123	8.129	11.575	16.520
BETA_FF4_MNT	1.025	0.692	0.599	0.988	1.403
TVOL_RET_MNT (%)	15.357	7.787	9.784	13.554	18.836
OC/TA_EP	1.469	1.535	0.436	1.045	1.943
OC/TA_ EPW	0.326	0.365	0.086	0.214	0.426
δ(ROA)	0.028	0.053	0.005	0.010	0.026
δ(ROE)	0.179	0.632	0.009	0.022	0.067
δ(CF)	0.039	0.042	0.014	0.026	0.047
CREDIT_RATING	17.832	3.708	15.000	18.000	20.000
ΔCREDIT_RATING	−0.057	0.708	0.000	0.000	0.000
PVIOL	0.381	0.412	0.019	0.138	0.905
PVIOL_PCOV	0.314	0.401	0.000	0.058	0.787
PVIOL_CCOV	0.112	0.263	0.000	0.000	0.057
ANALYST	0.909	1.049	0.000	0.693	1.792
BOG	83.598	8.141	78.000	84.000	89.000
COM	−3.457	2.597	−3.970	−2.760	−2.040
KEY HUMAN CAPITAL	0.198	0.398	0.000	0.000	0.000
INST	0.408	0.311	0.119	0.360	0.67
FIRM EFFICIENCY	0.302	0.161	0.214	0.262	0.342
δ(IND_CF)	0.031	0.019	0.017	0.027	0.040
δ(IND_SALE)	0.189	0.555	−0.030	0.083	0.239
OIL PRICE SHOCK	0.108	0.359	−0.171	0.113	0.362

Note(s): This table reports descriptive statistics of the variables used in the regression models. Variable definitions are provided in the Appendix

Table 2.
Summary statistics

Table 3. Correlations

Variables	VIF	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) IVOL_FF4	–	1.00																	
(2) BETA_FF4	–	−0.03*	1.00																
(3) TVOL_FF4	–	0.99*	0.02*	1.00															
(4) OC/TA	1.69	0.19*	−0.11*	0.17*	1.00														
(5) SIZE	2.52	−0.53*	0.19*	−0.48*	−0.35*	1.00													
(6) LEV	1.41	−0.06*	0.06*	−0.05*	−0.17*	0.26*	1.00												
(7) MTB	1.40	0.02*	0.14*	0.04*	0.05*	−0.12*	−0.14*	1.00											
(8) ROA	1.88	−0.44*	0.03*	−0.43*	−0.21*	0.37*	0.08*	−0.18*	1.00										
(9) AGE	1.41	−0.32*	−0.02*	−0.31*	0.08*	0.36*	0.03*	−0.15*	0.21*	1.00									
(10) σ(CF)	1.44	0.33*	−0.01	0.33*	0.22*	−0.33*	−0.08*	0.25*	−0.43*	−0.17*	1.00								
(11) IND_CON	2.87	−0.01*	−0.03*	−0.02*	0.01*	−0.03*	0.06*	−0.10*	0.06*	−0.01	−0.08*	1.00							
(12) RET	1.20	−0.15*	0.11*	−0.15*	−0.01*	0.03*	−0.03*	0.22*	0.17*	0.04*	−0.01	0.00	1.00						
(13) DIV	1.61	−0.43*	−0.01*	−0.43*	−0.09*	0.44*	0.05*	−0.10*	0.30*	0.39*	−0.30*	0.04*	0.02*	1.00					
(14) R&D	2.02	0.21*	0.08*	0.22*	0.12*	−0.23*	−0.20*	0.36*	−0.52*	−0.14*	0.34*	−0.20*	−0.03*	−0.23*	1.00				
(15) INTAN	1.69	−0.11*	0.00	−0.10*	−0.08*	0.27*	0.17*	−0.02*	0.06*	0.04*	−0.01*	−0.08*	−0.02*	0.00	−0.07*	1.00			
(16) MA_SCORE	1.40	−0.09*	0.04*	−0.08*	0.16*	0.09*	−0.16*	0.19*	0.19*	0.03*	0.00	−0.04*	0.06*	0.06*	0.15*	−0.06*	1.00		
(17) PPE	2.58	−0.08*	−0.02*	−0.08*	−0.25*	0.16*	0.32*	−0.18*	0.17*	0.03*	−0.16*	0.10*	−0.04*	0.18*	−0.29*	−0.31*	−0.21*	1.00	
(18) ΔSALE	1.16	0.07*	0.07*	0.07*	−0.17*	−0.08*	−0.01	0.21*	−0.06*	−0.21*	0.13*	−0.01*	0.07*	−0.12*	0.09*	0.03*	0.07*	−0.03*	1.00

Note(s): This table reports pair-wise Pearson correlations between the variables used in the main analysis. * shows significance at the 0.01 level. Variable definitions are provided in the Appendix

Table 4.
Organization capital and risks

Variables	(1) IVOL_FF4	(2) IVOL_FF3	(3) IVOL_FF4	(4) IVOL_FF3	(5) BETA_FF4	(6) BETA_FF3	(7) BETA_FF4	(8) BETA_FF3	(9) TVOL_RET	(10) TVOL_RET
	Panel A: Idiosyncratic risk				Panel B: Systematic risk				Panel C: Total risk	
OC/TA	*0.414****	*0.416****	*0.285****	*0.283****	*−0.039****	*−0.047****	*−0.123****	*−0.127****	*0.393****	*0.207****
	[9.59]	*[9.60]*	*[5.36]*	*[5.31]*	*[−3.45]*	*[−4.23]*	*[−5.52]*	*[−5.74]*	*[9.02]*	*[3.84]*
SIZE	−0.368***	−0.366***	−0.131***	−0.127***	0.114***	0.117***	0.029***	0.041***	−0.317***	−0.103***
	[−53.27]	[−52.85]	[−12.99]	[−12.52]	[50.65]	[51.83]	[6.57]	[8.77]	[−45.57]	[−9.47]
LEV	0.760***	0.767***	0.613***	0.614***	0.080***	0.074***	0.085***	0.097***	0.749***	0.589***
	[13.55]	[13.62]	[8.70]	[8.62]	[4.68]	[4.41]	[3.25]	[3.56]	[13.14]	[7.74]
MTB	−0.138***	−0.138***	0.045***	0.047***	0.057***	0.055***	0.008**	0.015***	−0.106***	0.079***
	[−20.31]	[−20.13]	[4.18]	[4.31]	[26.72]	[26.55]	[2.21]	[3.78]	[−14.95]	[6.22]
ROA	−3.037***	−3.047***	−2.764***	−2.794***	0.027	−0.006	−0.223***	−0.336***	−3.014***	−3.050***
	[−45.89]	[−45.89]	[−17.61]	[−17.59]	[1.40]	[−0.30]	[−4.66]	[−6.59]	[−44.73]	[−17.34]
AGE	−0.229***	−0.232***	−0.127***	−0.130***	−0.039***	−0.047***	−0.022***	−0.033***	−0.235***	−0.130***
	[−17.24]	[−17.35]	[−8.70]	[−8.80]	[−9.16]	[−11.00]	[−3.36]	[−4.75]	[−17.37]	[−8.25]
σ(CF)	1.655***	1.663***	1.111***	1.116***	0.194***	0.187***	0.157***	0.180***	1.691***	1.158***
	[19.36]	[19.39]	[7.88]	[7.85]	[7.64]	[7.64]	[3.00]	[3.36]	[19.50]	[7.80]
IND_CON	0.082	0.085	0.796***	0.797***	0.038	0.042	−0.093	0.004	0.140	0.885***
	[0.54]	[0.55]	[3.74]	[3.70]	[0.76]	[0.85]	[−1.03]	[0.05]	[0.90]	[3.95]
RET	−0.272***	−0.275***	−0.134***	−0.143***	0.074***	0.082***	0.061***	0.052***	−0.251***	−0.126***
	[−28.45]	[−28.71]	[−8.56]	[−9.03]	[22.96]	[26.18]	[10.33]	[8.68]	[−25.88]	[−7.54]
DIV	−0.635***	−0.639***	−0.381***	−0.385***	−0.156***	−0.165***	−0.069***	−0.085***	−0.687***	−0.409***
	[−30.18]	[−30.24]	[−16.14]	[−16.12]	[−22.05]	[−23.37]	[−7.38]	[−8.66]	[−32.08]	[−15.91]
R&D	−1.016***	−1.015***	0.191	0.177	0.599***	0.639***	0.251***	0.285***	−0.885***	0.006
	[−6.67]	[−6.64]	[0.81]	[0.75]	[13.51]	[14.57]	[2.74]	[3.00]	[−5.71]	[0.02]
INTAN	−0.032	−0.041	−0.435***	−0.442***	−0.106***	−0.143***	−0.161***	−0.214***	−0.083	−0.534***
	[−0.50]	[−0.64]	[−6.31]	[−6.36]	[−5.44]	[−7.33]	[−6.21]	[−7.75]	[−1.29]	[−7.40]
MA_SCORE	0.764***	0.777***	0.265***	0.275***	−0.254***	−0.228***	−0.132***	−0.129***	0.706***	0.181**
	[12.00]	[12.15]	[4.11]	[4.22]	[−10.31]	[−9.00]	[−4.60]	[−4.26]	[10.97]	[2.57]
PPE	0.495***	0.502***	0.199**	0.218***	−0.109***	−0.111***	0.039	0.024	0.479***	0.260***
	[7.39]	[7.47]	[2.40]	[2.59]	[−5.60]	[−5.74]	[1.27]	[0.72]	[7.08]	[2.95]
ΔSALE	−0.039***	−0.037***	0.156***	0.159***	0.032***	0.039***	0.052***	0.065***	−0.027**	0.189***
	[−2.86]	[−2.76]	[5.41]	[5.47]	[7.04]	[8.62]	[4.35]	[5.54]	[−2.00]	[5.85]

(*continued*)

Table 4.

Variables	(1) IVOL_FF4	(2) Panel A: Idiosyncratic risk IVOL_FF3	(3) IVOL_FF4	(4) IVOL_FF3	(5) BETA_FF4	(6) Panel B: Systematic risk BETA_FF3	(7) BETA_FF4	(8) BETA_FF3	(9) Panel C: Total risk TVOL_RET	(10) TVOL_RET
CEO_AGE			−0.351***	−0.357***			−0.070**	−0.088***		−0.402***
			[−4.43]	[−4.45]			[−2.26]	[−2.73]		[−4.71]
CEO_FEMALE			−0.010	−0.011			−0.010	−0.015		−0.027
			[−0.18]	[−0.18]			[−0.41]	[−0.59]		[−0.45]
CEO_OVRCON			0.049***	0.049***			0.003	0.005**		0.049***
			[9.38]	[9.32]			[1.27]	[2.35]		[8.81]
DELTA			−0.075***	−0.076***			0.005	0.004		−0.071***
			[−8.52]	[−8.52]			[1.58]	[1.12]		[−7.65]
VEGA			−0.081***	−0.082***			−0.010***	−0.015***		−0.090***
			[−11.39]	[−11.41]			[−3.31]	[−4.80]		[−11.74]
TOTAL_CURR			−0.014	−0.014			0.002	0.001		−0.008
			[−1.43]	[−1.40]			[0.50]	[0.22]		[−0.70]
CEO_TENURE			0.031**	0.032***			0.005	0.006		0.038***
			[2.57]	[2.62]			[1.14]	[1.34]		[2.98]
Constant	5.195***	5.201***	5.389***	5.411***	0.390***	0.406***	0.887***	0.958***	5.087***	5.305***
	[22.51]	[22.46]	[13.98]	[13.83]	[7.83]	[8.11]	[5.54]	[5.68]	[22.09]	[12.87]
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	119,309	119,309	27,170	27,170	119,309	119,309	27,170	27,170	119,309	27,170
Adj. R-squared	0.51	0.51	0.53	0.53	0.16	0.17	0.13	0.19	0.49	0.54

Note(s): This table reports regression results of the relation between organization capital and idiosyncratic risk (Panel A), organization capital and systematic risk (Panel B) and organization capital and total risk (Panel C). Robust t-statistics are included below the coefficient estimates in parentheses. *, **, *** Denote a two-tailed p-value of less than 0.10, 0.05 and 0.01, respectively. Variable definitions are provided in the Appendix related to the idiosyncratic volatility of year $t + 1$. In Columns (1) and (2), we find that the coefficient of OC/TA is positive and highly significant (coefficient = 0.414; $p < 0.01$ for IVOL_FF4 and coefficient = 0.416, $p < 0.01$ for IVOL_FF3), suggesting that organization capital is associated with a higher level of idiosyncratic risk. This finding supports our agency- and information asymmetry-based hypothesis rather than the resource-based argument. In terms of economic significance, the coefficient in column (1) suggests that a one standard deviation increase in organization capital (= 0.332) leads to an increase in idiosyncratic risk of 3.94% and 4.86% relative to the mean (i.e. (0.414 * 0.332)/3.491) and median (i.e. (0.414 * 0.332)/2.828), respectively. Our documented positive relationship between OC/TA and idiosyncratic volatility remains positive and significant ($p < 0.01$) when executive-specific controls are included in columns (3) and (4). With respect to the control variables, we find that idiosyncratic volatility is associated positively with LEV, cash flow volatility, and managerial ability, while it is associated negatively with size, profitability, age and dividends. Overall, the coefficients of the controls are in line with our expectation and the prior studies (Becchetti, Ciciretti, & Hasan, 2015; Dhaliwal *et al.*, 2016).

Panel B exhibits the results of the relationship between organization capital and future systematic risk (BETA) of the firm. In columns (5) and (6), we find that the coefficient of OC/TA is negative and statistically significant (coefficient = −0.039, $p < 0.01$ for BETA_FF4 and coefficient = −0.047, $p < 0.01$ for BETA_FF3, respectively), implying that organization capital is associated negatively with systematic risk. This finding supports the resource-based hypothesis rather than the agency- and information asymmetry-based argument. In terms of economic significance, the regression results in column (5) suggests that, controlling for other firm characteristics, a one standard deviation increase in the OC/TA of the average firm reduces systematic risk by 1.43% and 1.42% relative to the mean and median, respectively. We find qualitatively similar results when executive-specific controls are included in columns (7) and (8). With respect to the controls, we find that systematic risk is higher for large, leveraged and growth firms with high cash flow volatility, while it is lower for profitable, dividend-paying and mature firms. Thus, the coefficients of the controls are consistent with our expectation and the prior studies.

Finally, in Panel C, we document the regression results of the relationship between organization capital and total risk. Column (9) shows that the coefficient of OC/TA is positive and significant (coefficient = 0.393, $p < 0.01$). In terms of economic significance, the coefficient in column (9) suggests that a one standard deviation increase in OC/TA results in a 3.49% (4.21%) increase in the total risk of the firm relative to the mean (median). Thus, the findings from this analysis support our agency- and information asymmetry-based hypothesis. We find that the inference from our analysis remains qualitatively similar when we control for executive-level controls in the regression (column 10). With respect to the controls, we find that total risk is positively associated with LEV, cash flow volatility, PPE and managerial ability, while it is negatively associated with size, profitability, age and DIV. Thus, the coefficients of the controls are in line with our expectation and the prior studies [3].

Overall, we find robust evidence that organization capital is positively related to idiosyncratic risk and total risk, which is consistent with the agency and information asymmetry views of organization capital. We also find that organization capital is negatively related to systematic risk, and this supports the efficiency view of organization capital.

4.4 Cross-sectional tests

4.4.1 Organization capital and idiosyncratic risk: the role of information asymmetry. In developing our hypothesis, we argued that firms with more organization capital are exposed to information asymmetry, which in turn increases idiosyncratic risk. If this argument holds, the positive relationship between organization capital and idiosyncratic risk will be stronger for firms that are exposed to more information asymmetry. To test this conjecture empirically, we use three measures of information asymmetry: (i) the number of analysts following a firm (ANALYST); (ii) financial statement readability (BOG) and (iii) financial statement comparability (COM) (De Franco, Kothari, & Verdi, 2011). We split the sample into two subgroups based on the median value of the information asymmetry proxies: firms with more than median ANALYST and COM (BOG) are subject to less (more) information asymmetry.

We report the results from this analysis in panel A of Table 5. We find that the relationship between organization capital and idiosyncratic risk is significantly more pronounced ($p < 0.01$) for the subsample of firms with high information asymmetry (i.e. ANALYST < median; BOG > median and COM < median). Furthermore, the inference from our analysis remains qualitatively similar when we use idiosyncratic risk estimated using the Fama–French three-factor model (untabulated). This result thus supports our conjecture that greater information asymmetry arising from organization capital increases the idiosyncratic risk.

4.4.2 Organization capital and idiosyncratic risk: the role of human capital. Prior studies suggest that the key talents of firms with higher organization capital have better outside options, exposing such firms not only to the loss of key personnel but also to the threat of losing invaluable information to rival firms (Eisfeldt & Papanikolaou, 2013). Accordingly, the loss of key talents and business secrecy may expose the firms to adverse financial shocks, giving rise to idiosyncratic risk. If this is the case, we expect the positive relationship between organization capital and idiosyncratic risk to be stronger for firms in which human capital plays an important role. To test the above argument empirically, we follow Israelsen and Yonker (2017) and employ a dummy variable indicating whether the firm made disclosures of key human capital in Securities and Exchange Commission (SEC) filings (1) or not (0) [4].

Panel B of Table 5 shows that the coefficient of organization capital is positive and significant ($p < 0.01$) for both subsamples of firms. However, an F-test suggests that the difference in the coefficients of organization capital is significantly more pronounced for the subsample of firms that disclosed key human capital ($\chi^2 = 18.03$; $p = 0.000$). We find qualitatively similar results when idiosyncratic risk estimated from the Fama–French three-factor model is used in our analysis (untabulated). Overall, we confirm that exposure to key human capital risk explains the positive relationship between organization capital and idiosyncratic risk.

4.4.3 Organization capital and idiosyncratic risk: the role of the agency problem. Prior studies indicate that, while shareholders pay all the cost of investment in organization capital, they have a claim only to the residual cash flows (Eisfeldt & Papanikolaou, 2013). As a result, there is considerable uncertainty about the amount of the cash flows that shareholders are entitled to receive, which in turn increases the valuation uncertainty and idiosyncratic volatility. This argument thus suggests that the positive relationship between organization capital and idiosyncratic risk is more pronounced for the subsample of firms with more agency problems. To test this conjecture, we use institutional shareholdings (INST) and equity-based compensation – vega – as a proxy for agency problems [5]. We classify firms into a high (low) governance subsample if the institutional shareholdings and vega are above (below) the sample median.

We report the results from this analysis in panel C of Table 5. We find that the coefficient of organization capital is significantly more pronounced ($p < 0.01$) for the subsample of firms with high agency problems (INST < median and vega < median). Therefore, the results from this analysis provide evidence in favor of our agency-based argument.

4.4.4 Organization capital and systematic risk: the role of firm efficiency, acquisition, industry risk and macroeconomic shock. In this subsection, we investigate how the relationship between organization capital and systematic risk is moderated by firm-level, industry and macroeconomic variables. For all the specifications, we divide the sample into

Table 5. Cross-sectional analysis

Panel A: Organization capital and idiosyncratic risk: The role of information asymmetry

Dep. Var. =	(1) High information asymmetry ANALYST < Median IVOL_FF4	(2) Low information asymmetry ANALYST > Median IVOL_FF4	(3) High information asymmetry BOG > Median IVOL_FF4	(4) Low information asymmetry BOG < Median IVOL_FF4	(5) High information asymmetry COM<Median IVOL_FF4	(6) Low information asymmetry COM>Median IVOL_FF4
OC/TA	*0.464****	*0.238****	*0.589****	*0.389****	*0.559****	*0.156****
	[7.83]	*[5.61]*	*[9.28]*	*[6.07]*	*[8.36]*	*[2.30]*
Constant	5.635***	4.649***	5.146***	5.702***	5.534***	4.416***
	[16.64]	[27.57]	[9.68]	[7.61]	[11.02]	[6.93]
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	56,879	62,430	32,322	33,014	30,663	32,245
Adj. R-squared	0.47	0.53	0.58	0.57	0.50	0.53
Difference in sample coefficients						
OC/TA	$\chi^2 = 27.46$ ($p = 0.000$)		$\chi^2 = 10.92$ ($p = 0.001$)		$\chi^2 = 47.36$ ($p = 0.000$)	

Panel B: Organization capital and idiosyncratic risk: The role of human capital

Dep. Var. =	(1) Key human capital = Yes (1) IVOL_FF4	(2) Key human capital = No (0) IVOL_FF4
OC/TA	*0.898****	*0.464****
	[7.10]	*[7.14]*
Constant	5.433***	4.660***
	[8.77]	[13.03]
Firm-level controls	Yes	Yes
Industry effects	Yes	Yes
Year effects	Yes	Yes
Observations	7,013	29,282
Adj. R-squared	0.56	0.55
Difference in sample coefficients		
OC/TA	$\chi^2 = 18.03$ ($p = 0.000$)	

(*continued*)

Panel C: Organization capital and idiosyncratic risk: The role of agency problem

Dep. Var. =	(1) High agency problem INST < Median IVOL_FF4	(2) Low agency problem INST > Median IVOL_FF4	(3) High agency problem Vega < Median IVOL_FF4	(4) Low agency problem Vega > Median IVOL_FF4
OC/TA	*0.493****	*0.183****	*0.413****	*0.111**
	[7.44]	*[4.44]*	*[5.65]*	*[1.89]*
Constant	6.351***	4.013***	4.598***	3.242***
	[18.38]	[18.24]	[18.82]	[19.79]
Firm-level controls	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	37,404	43,611	13,312	17,198
Adj. R-squared	0.46	0.50	0.50	0.55
Difference in sample coefficients				
OC/TA	$\chi^2 = 42.18$ ($p = 0.000$)		$\chi^2 = 23.42$ ($p = 0.000$)	

Panel D: Organization capital and systematic risk: Potential explanations

Dep. Var. =	(1) Firm efficiency High BETA_FF4	(2) Firm efficiency Low BETA_FF4	(3) Acquisition High BETA_FF4	(4) Acquisition Low BETA_FF4	(5) Industry sales volatility (δIND_SALE) High BETA_FF4	(6) Industry sales volatility (δIND_SALE) Low BETA_FF4	(7) Industry cash flow volatility (δIND_CF) High BETA_FF4	(8) Industry cash flow volatility (δIND_CF) Low BETA_FF4	(9) Oil price shock High BETA_FF4	(10) Oil price shock Low BETA_FF4
OC/TA	*−0.075****	*−0.026**	*−0.092****	*−0.019*	*−0.055****	*−0.015*	*−0.049****	*−0.025**	*−0.059****	*−0.022*
	[−4.91]	*[−1.73]*	*[−4.47]*	*[−1.54]*	*[−3.55]*	*[−1.01]*	*[−3.41]*	*[−1.70]*	*[−3.99]*	*[−1.56]*
Constant	0.209***	−0.313***	0.239***	−0.179***	−0.019	−0.106*	−0.119	−0.055	−0.103	−0.065
	[3.79]	[−4.87]	[2.64]	[3.11]	[−0.25]	[1.88]	[−1.63]	[−0.98]	[−1.32]	[−0.96]
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	61,432	57,877	37,457	76,769	57,275	61,424	57,964	61,332	52,524	46,961
Adj. R-squared	0.13	0.17	0.13	0.17	0.15	0.18	0.16	0.18	0.17	0.17
Difference in sample coefficients										
OC/TA	$\chi^2 = 9.36$ ($p = 0.002$)		$\chi^2 = 16.52$ ($p = 0.000$)		$\chi^2 = 6.82$ ($p = 0.009$)		$\chi^2 = 2.52$ ($p = 0.112$)		$\chi^2 = 4.70$ ($p = 0.030$)	

Note(s): This table reports regression results that explore potential explanations of the relationship between organization capital and firm risk. We report results for information asymmetry-based explanation (Panel A), human capital-based explanation (Panel B) and agency-based explanation (Panel C) of the relationship between organization capital and idiosyncratic risk. We also explore firm efficiency, acquisition, industry risk and macro-economic shock-based explanation of the relationship between organization capital and systematic risk (Panel D). Robust *t*-statistics are included below the coefficient estimates in parentheses. *, **, *** Denote a two-tailed p-value of less than 0.10, 0.05 and 0.01, respectively. Variable definitions are provided in the Appendix

Table 5.

two groups based on their respective sample median. We report the results from this analysis in Panel D of Table 5.

In columns (1) and (2), we consider how firm-level efficiency moderates the relationship between organization capital and systematic risk [6]. Since organization capital improves firm efficiency, we expect the negative relationship between organization capital and systematic risk to be more pronounced for the subsample of firms with greater efficiency. The results in columns (1) and (2) support this conjecture. An F-test confirms that the difference in the coefficients of organization capital between the high- and the low-efficiency sub-sample is significant at the 1% level ($\chi^2 = 9.36$; $p = 0.002$).

Columns (3) and (4) exhibit how corporate acquisitions moderate the relationship between organization capital and systematic risk. As a proxy for acquisitions, we use acquisition expenses scaled by sales. Since organization capital is associated with a greater magnitude and efficiency of M&As, we expect the negative relationship between organization capital and systematic risk to be more pronounced for the subsample of firms with a higher level of acquisitions. We find support for this conjecture. An F-test confirms that the difference in the coefficients of organization capital between the high- and the low-efficiency subsamples is significant at the 1% level ($\chi^2 = 16.52$; $p = 0.000$).

In columns (5) to (8), we investigate how industry-level shock moderates the relationship between organization capital and systematic risk. In the spirit of Mishra (2014), we use industry-level sales volatility and cash flow volatility over the four quarters to measure industry-level risk. Given that organization capital enables firms to cope with industry-wide challenges more effectively, we expect the negative relationship between organization capital and systematic risk to be stronger when the industry-level risk is higher. An F-test confirms that the relationship between organization capital and systematic risk is significantly more pronounced for the high-industry-risk subsample.

Finally, we use oil price shock as a proxy for economy-wide shock. Recent studies suggest that oil is an important production factor of many firms and that oil price fluctuations significantly affect the firm-level outcome (Wong & Hasan, 2021). Columns (7) and (8) show that the negative relationship between organization capital and systematic risk is significantly stronger when firms are subject to a greater oil price shock, as reflected by the volatility of the Brent spot prices [7].

4.5 Sensitivity analysis

4.5.1 Alternative measures of risks. In this subsection, we measure the risks using a 60-month estimation window (minimum window of 36 months) (Huynh & Xia, 2021; Petkova & Zhang, 2005). The results in Panel A of Table 6 show that the coefficient of OC/TA remains positive and significant ($p < 0.01$), corroborating the findings from the main analysis.

4.5.2 Alternative measure of organization capital. We use alternative measures of organization capital. First, we use the organization capital measure of Eisfeldt and Papanikolaou (2013), which employs deflated values of SG&A expenses. Second, we use the organization capital measure of Ewens *et al.* (2020), which employs industry-level parameter estimates (fraction of SG&A and depreciation rates) in estimating organization capital (OC/TA_EPW). In Panel B (Table 6), we continue to find that organization capital is related positively and significantly ($p < 0.01$) to idiosyncratic risk and total risk, while it is related negatively and significantly ($p < 0.01$) to systematic risk.

4.5.3 Alternative regression model: firm fixed effect, high-dimensional fixed effect and dynamic panel regression. To test the sensitivity of our findings, we re-estimate our regression model in Eq. (6) using a firm fixed-effect regression and high-dimensional fixed effects (i.e. industry × year) models. In Panel C of Table 6, we find that the coefficients of OC/TA remain positive (negative) and significant ($p < 0.01$) for idiosyncratic risk and total risk (systematic risk), which corroborate our main analysis.

Dep. Var. =	(1) IVOL_FF4	(2) BETA_FF4	(3) TVOL_RET
Panel A: Alternative measures of risks using monthly data			
OC/TA	0.674***	−0.046***	0.635***
	[4.65]	[−2.81]	[3.99]
Panel B: Alternative measures of organization capital			
(B.1) Organization capital measure of Eisfeldt and Papanikolaou (2013)			
OC/TA_EP	0.094***	−0.012***	0.088***
	[9.99]	[−4.76]	[9.22]
(B.2) Organization capital measure of Ewens *et al.* (2020)			
OC/TA_EPW	0.454***	−0.030***	0.426***
	[11.16]	[−2.78]	[10.32]
Panel C: Alternative regression specifications			
(C.1) Firm fixed effect regression			
OC/TA	0.786***	−0.077***	0.784***
	[12.90]	[−3.97]	[12.54]
(C.2) High dimensional fixed effect (Firm effect and Year*Industry effects)			
OC/TA	0.765***	−0.071***	0.764***
	[12.59]	[−3.65]	[12.31]

Note(s): This table reports regression results of the relationship between organization capital and alternative measures of risks (Panel A), alternative measures of organization capital and firm risks (Panel B), and alternative regression specification (Panel C). For brevity, we only report the coefficients of organization capital. The constant term, controls and industry/firm fixed effects, and year fixed effects are included but not reported in all regressions. Robust *t*-statistics are included below the coefficient estimates in parentheses. *, **, *** Denote a two-tailed p-value of less than 0.10, 0.05 and 0.01, respectively. Variable definitions are provided in the Appendix

Table 6. Sensitivity analysis

We also repeat the analysis using both lagged firm risk and OC as additional explanatory variables in the regression. Untabulated results further confirm that our main findings remain qualitatively similar.

4.5.4 Other sensitivity tests. Our inference remains quantitatively similar when we employ the following tests (untabulated): (i) scaling organization capital by PPE; (ii) dropping the first 5 years of data for every firm to alleviate the effect of the initialization scheme in the perpetual inventory method; and (iii) measuring investment in organization capital as SG&A expenses minus advertising expenditures.

4.6 Endogeneity tests

4.6.1 Instrumental variable estimation. To alleviate any potential endogeneity problem arising from the omitted variable problem and/or unobserved heterogeneity and reverse causality, we employ an instrumental variable approach using heteroskedasticity-based instruments generated from the method by Lewbel (2012). This method does not rely on an external instrument but instead uses heterogeneity in the error term of the first-stage regression to generate instruments from within the existing model.

In Table 7, we find that the positive (negative) and significant ($p < 0.01$) relationship of organization capital with idiosyncratic and total risk (systematic risk) holds after addressing the endogeneity concern. We also note that our estimation does not suffer from the underidentification, weak instrument and overidentification problems. Thus, the relationship between organization capital and risks is not driven by the endogeneity problem.

4.6.2 Erickson–Whited linear errors-in-variables panel regression. To further use the errors-in-variables model of Erickson and Whited (2002) and Erickson, Jiang, and Whited (2014).

Dep. Var. =	(1) IVOL_FF4	(2) BETA_FF4	(3) TVOL_RET
OC/TA	*0.449****	*−0.208****	*0.455****
	[5.63]	*[−4.33]*	*[5.64]*
Constant	5.488***	0.332***	5.329***
	[25.17]	[6.64]	[24.52]
Other controls	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Observations	119,309	119,309	119,309
Adj. R-squared	0.49	0.12	0.46
Underidentification test			
Kleibergen-Paap rk LM statistic	662.123	146.082	662.126
p-value	0.00	0.00	0.00
Hansen J statistic	2.986	1.585	5.956
p-value	0.394	0.208	0.114
Andrews (2018)*'s weak instrument robust tests and confidence sets*			
Test	*Conf. Set*	*Conf. Set*	*Conf. Set*
LC_2sls (95% Conf. level)	[0.286, 0.591]	[−0.316, −0.121]	[0.298, 0.583]

Note(s): This table reports the two-stage least-squares regression results of the relationship between organization capital and firm of risk. We follow Lewbel (2012) in generating heterogeneity-based instruments and use them as instrumental variable in the 2SLS regression. Robust t-statistics are included below the coefficient estimates in parentheses. *, **, *** Denote a two-tailed p-value of less than 0.10, 0.05 and 0.01, respectively. Variable definitions are provided in the Appendix

Table 7.
Endogeneity tests: two-stage least squares (2SLS) regression model of Lewbel (2012)

The contemporary finance literature also uses this method to overcome measurement error (Javakhadze & Rajkovic, 2019; Lyandres, Marchica, Michaely, & Mura, 2019). Untabulated results show that organization capital is positively associated with idiosyncratic and total risk but negatively associated with systematic risk (all significant at $p < 0.01$), corroborating our main findings.

4.7 Additional analysis

4.7.1 Organization capital and other risks. We examine our hypotheses using three additional measures of risk including the standard deviation of cash flow (δ(CF)), the standard deviation of the ROA (δ(ROA)) and the standard deviation of the ROE (δ(ROE)) (Bakke *et al.*, 2016; Ferris *et al.*, 2017; Kim *et al.*, 2017). Panel A of Table 8 shows that the coefficients of OC/TA are positive and significant ($p < 0.01$) for all measures, implying that firms with higher organization capital are related to higher cash flow and operating risks.

4.7.2 Organization capital and debt holders' risk. To provide additional insights, we test the association of organization capital with the debt holders' risk. Following prior studies, we use rating changes, which captures the changes in a company's performance and creditworthiness (Amato & Furfine, 2004; Jones, Johnstone, & Wilson, 2015) [8]. The results in Column (1) of Panel B (Table 8) show that organization capital is negatively associated with changes in the credit rating, suggesting that organization capital increases debt holders' risk.

Next, following Demerjian and Owens (2016), we use three measures of covenant violations: (i) PVIOL – the aggregate probability of covenant violation from the total set of 15 covenant categories; (ii) PCOV – the aggregate probability of performance covenant violation and (iii) CCOV – the aggregate probability of a capital covenant [9]. Columns (2) to (4) of Panel B show that organization capital is positively associated with PVIOL ($p < 0.05$) and PCOV ($p < 0.01$), but it is marginally negatively associated with CCOV ($p < 0.10$).

Panel A: Organization capital and other risks

Dep. Var. =	(1) δ(CF)	(2) δ(ROA)	(3) δ(ROE)
OC/TA	*0.013****	*0.008****	*0.117****
	[13.33]	*[9.72]*	*[10.93]*
Constant	0.082***	0.038***	0.070*
	[12.80]	[7.50]	[1.79]
Firm-level controls	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Observations	127,878	126,834	125,928
Adj. *R*-squared	0.25	0.23	0.12

Panel B: Organization capital and debt holders' risks

Dep. Var. =	(1) OLS ΔCREDIT_RATING	(2) OLS PVIOL	(3) OLS PCOV	(4) OLS CCOV
OC/TA	*−0.263****	*0.057***	*0.078****	*−0.030**
	[−7.75]	*[2.09]*	*[2.77]*	*[−1.76]*
SIZE	−0.050***	−0.025***	−0.018***	−0.012***
	[−9.01]	[−4.36]	[−3.35]	[−3.55]
LEV	−0.286***	0.393***	0.376***	0.060**
	[−6.56]	[10.92]	[10.24]	[2.44]
MTB	0.032***	−0.050***	−0.051***	0.000
	[3.67]	[−6.67]	[−6.75]	[0.07]
ROA	0.631***	−0.547***	−0.495***	−0.203***
	[4.03]	[−5.83]	[−4.96]	[−2.79]
CF	1.121***	−0.097	−0.087	−0.018
	[7.54]	[−1.53]	[−1.28]	[−0.33]
σ(CF)	0.556***	0.159**	0.170**	0.070
	[5.95]	[2.19]	[2.26]	[1.61]
RET	0.117***	0.039***	0.039***	0.008
	[8.64]	[4.46]	[4.32]	[1.28]
DIV	−0.147***	−0.085***	−0.085***	−0.003
	[−9.83]	[−6.03]	[−6.31]	[−0.37]
R&D	−0.389*	−0.505***	−0.825***	0.119
	[−1.91]	[−3.24]	[−4.93]	[1.17]
INTAN	−0.020	−0.165***	−0.160***	−0.020
	[−0.45]	[−3.63]	[−3.44]	[−0.82]
MA_SCORE	0.052	−0.043	−0.075	0.039
	[1.24]	[−0.81]	[−1.47]	[1.16]
PPE	−0.175***	−0.179***	−0.209***	0.048
	[−3.89]	[−3.93]	[−4.53]	[1.64]
BETA	0.116***	0.011	0.005	0.008
	[7.58]	[0.98]	[0.47]	[1.09]
TVOL	−8.827***	2.078***	1.534***	1.222***
	[−10.27]	[4.46]	[3.10]	[3.52]
INT_COV	−0.000	−0.000***	−0.000***	−0.000***
	[−1.32]	[−4.89]	[−3.11]	[−2.71]
INST	0.015	−0.085***	−0.082***	−0.038**
	[0.62]	[−2.89]	[−2.84]	[−2.00]

(*continued*)

Table 8.
Organization capital and other risks

Table 8.

Panel B: Organization capital and debt holders' risks				
	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
Dep. Var. =	ΔCREDIT_RATING	PVIOL	PCOV	CCOV
Constant	0.407***	0.744***	0.539***	0.246**
	[4.17]	[3.79]	[2.74]	[2.25]
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Observations	15,769	7,008	7,008	7,008
Adj. R^2/Pseudo R^2	0.12	0.24	0.22	0.13

Note(s): This table reports regression results of the relation between organization capital and other risks. Panel A reports results for risks measures as standard deviation of cash flow risk (δ(CF)), standard deviation of return on assets (δ(ROA)) and standard deviation of return on equity (δ(ROE)). Panel B reports results for debtholders' risk. Robust *t*-statistics are included below the coefficient estimates in parentheses. *, **, *** Denote a two-tailed p-value of less than 0.10, 0.05 and 0.01 respectively. Variable definitions are provided in the Appendix

5. Conclusion

This paper examines the relationship between organization capital and idiosyncratic, systematic and total risk. Our empirical results show that organization capital is related positively to idiosyncratic and total risk but negatively to systematic risk. Thus, organization capital has different implications for different types of risk. We also find that organization capital is related positively to the firm's cash flow risk, operating risk and credit risk. We also show the robustness of our results by using different measures of organization capital and proxies for different types of risk. Furthermore, we provide evidence that our documented results are not driven by the endogeneity problem.

Overall, the empirical evidence contributes to the growing body of literature that focuses on organization capital as a major driver of firm (and national) growth and competitiveness. Our findings have important implications for investors and policymakers. For example, since organization capital increases idiosyncratic risk and total risk but reduces systematic risk, investors should take organization capital into account in portfolio formation and risk management. Moreover, our findings lend support to the argument on the recognition of intangible assets in financial statements. In particular, our study suggests that standard-setting bodies should consider corporate reporting frameworks to incorporate the disclosure of intangible assets into financial statements, particularly given the recent surge of corporate intangible assets and their critical impact on corporate risks.

Finally, our study uses US public firms as the sample, which may limit the generalizability of our findings. We encourage future research to explore whether the evidence from our study holds in cross-country settings. Future research could also examine the influence of organization capital on the cost of debt capital.

Notes

1. For the return type, we select regular returns (including dividends). Our analysis throughout the study remains qualitatively very similar when log returns are used in estimating risks.
2. We deliberately cover a long sample period to explore the relationship between organization capital and firm risks over the long horizon. We do not extend our sample beyond 2019 to avoid overlapping with the COVID-19 pandemic period because organization capital and firm risks might change significantly during this period.

3. To test the robustness of our findings, we correct the standard errors by clustering by both firm and year (Cameron, Gelbach, & Miller, 2011). Untabulated results show that the coefficient of OC/TA remains significant at the 1% level.
4. Data on key human capital are available at: https://sites.google.com/site/ryandisraelsen/
5. Prior studies use institutional shareholdings and vega as proxies for the agency problem (e.g. Callen & Fang, 2015; Jia, 2018).
6. Firm efficiency refers to Demerjian *et al.*'s (2012) measure of total firm efficiency. See Demerjian, Lev, & McVay (2012) for a detailed discussion of this topic. Data on firm efficiency are available at: http://faculty.washington.edu/pdemerj/data.html
7. The monthly data on oil prices are available on the website of the Energy Information Administration.
8. Following Becker and Milbourn (2011), the credit rating score ranges from 28 (AAA) to 1 (D). We follow prior studies in selecting the controls (Becker & Milbourn, 2011; Elyasiani, Jia, & Mao, 2010).
9. Data on the probability of debt covenant violation are available at: http://faculty.washington.edu/pdemerj/data.html. See Demerjian and Owens (2016) for a detailed discussion of three measures of covenant violations.

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(The Appendix follows overleaf)

Appendix

Variable	Definition and measurement
Dependent variables	
IVOL_FF4	Idiosyncratic volatility estimated from Fama–French (1993) three-factor model with an extension of momentum factor (Carhart, 1997) (Source: Beta Suite)
IVOL_FF3	Idiosyncratic volatility estimated from Fama–French (1993) three-factor model (Source: Beta Suite)
BETA_FF4	Systematic risk estimated from Fama–French (1993) three-factor model with an extension of momentum factor (Carhart, 1997) (Source: Beta Suite)
BETA_FF3	Systematic risk estimated from Fama–French (1993) three-factor model (Source: Beta Suite)
TVOL_RET	Total risk, estimated as standard deviation of firm-specific daily returns over the year (Source: Beta Suite)
Independent and control variables	
OC/TA	The stock of organization capital, constructed by capitalizing fraction of SG&A expenses using the perpetual inventory method. Following Peters and Taylor (2017), we use 30% of SG&A, and a depreciation rate of 20% in estimation. We scale the stock of organization capital by total assets (AT)
SIZE	Firm size, measured as the natural log of book value of total assets (AT)
LEV	Leverage, measured as the sum of short-term and long-term debt (DLC + DLTT) scaled by total assets (AT)
MTB	Market-to-book ratio, measured as the market value of assets (AT + (CSHO * PRCC_F) − CEQ) scaled by the book value of assets (AT)
ROA	Profitability, measured as operating income before depreciation (OIBDP) scaled by total assets (AT)
AGE	Firm age, measured as the number of years since the firm was first covered by the Center for Research in Securities Prices (CRSP). We measure AGE as the natural log of (1 + age of the firm)
δ(CF)	Rolling standard deviation of cash flow over the prior five years, where cash flow is defined as income before extraordinary items (IB) less common dividends (DVC) and scaled by total assets (AT)
IND_CON	Industry competition, measured as the sum of squared market share of firms operating in the same industry (2-digit) in each year
RET	Yearly holding period return
DIV	An indicator variable that takes a value of 1 if firms pay cash dividends, 0 otherwise
R&D	Research and development expenses, measured as R&D (XRD) divided by lagged total assets (AT). We replace missing XRD with zero
INTAN	Intangible assets (INTAN) divided by lagged total assets (AT)
MA_SCORE	Managerial ability measure following Demerjian *et al.* (2012)
PPE	Net property, plant and equipment (PPENT) divided by total assets (AT)
ΔSALE	Sales growth, measured as $(SALE_t - SALE_{t-1})/SALE_{t-1}$
CEO_AGE	Natural log of age of the CEO of firm i in year t
CEO_FEMALE	An indicator variable that takes a value of 1 if CEO is a female, 0 otherwise
CEO_OVRCON	CEO overconfidence, measured as ln(unexercised exercisable Options + 1) for a CEO in year t
DELTA	Delta is the dollar change in the executive's wealth for a 1% change in stock price
VEGA	Vega is the dollar change in the executive's wealth for a 0.01 change in standard deviation of returns
TOTAL_CURR	Natural log of total current compensation of CEO in year t
Variables used in the robustness and additional analysis	
IVOL_FF4_MNT	Idiosyncratic volatility estimated from Fama–French (1993) three-factor model with an extension of momentum factor (Carhart, 1997) using monthly data over a 60-month estimation window (Source: Beta Suite)

(*continued*)

Table A1.
Variable definition and measurement

Variable	Definition and measurement
BETA_FF4_MNT	Systematic risk estimated from Fama–French (1993) three-factor model with an extension of momentum factor (Carhart, 1997) using monthly data over a 60-month estimation window (Source: Beta Suite)
TVOL_RET_MNT	Total risk estimated using monthly data over a 60-month estimation window (Source: Beta Suite)
OC/TA_EP	Organization capital scaled by total assets (AT), where organization capital is measured following Eisfeldt and Papanikolaou (2013)
OC EWENS	Organization capital measure of Ewens *et al.* (2020) that employs industry-level parameter estimates (fraction of SG&A and depreciation rates)
δ(ROA)	Standard deviation of return on assets over the next four quarters
δ(ROE)	Standard deviation of return on assets over the next four quarters
δ(CF)	Cash flow volatility (standard deviation of quarterly cash flow deflated by assets) using data over the next four quarters
CREDIT_RATING	Credit rating score ranges from 28 (AAA) to1 (D) (Becker & Milbourn, 2011)
PVIOL	The aggregate probability of covenant violation from the total set of fifteen covenant categories developed by Demerjian and Owens (2016)
PVIOL_PCOV	The aggregate probability of performance covenant violation (Demerjian & Owens, 2016)
PVIOL_CCOV	The aggregate probability of capital covenant violation (Demerjian & Owens, 2016)
ANALYST	Number of analysts following a firm
BOG	The "Bog Index" reported by Editor Software's Stylewriter 4 provides a comprehensive measure of a document's plain English problems, including passive voice, redundant verbs, use of jargon and sentence complexity, among others (Bonsall *et al.*, 2017). Higher levels of the Bog Index reflect poorer document readability
COM	Firm-year level accounting comparability, which is the average of the largest four comparability combinations for firm i and other firms in the same industry in year t
KEY HUMAN CAPITAL	An indicator variable that takes a value of 1 if a firm discloses key human capital in SEC filings, 0 otherwise (Israelsen & Yonke, 2017)
INST	Percentage of common shares held by institutional investors
FIRM EFFICIENCY	Firm efficiency measure following Demerjian *et al.* (2012)

Table A1.

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