Effect of C-Suite Members' Social Network Capital on Tail Risk

Amy Fairfield*

Abstract

The purpose of this research is to analyze the impact of the CEO's and CFO's social network capital on tail risk. The CEO and CFO are the most dominant members of the top management team. Relationships between the CEO, CFO, and a firm's stakeholder groups (shareholders, employees, customers and suppliers, society, the environment, and government) form to create a social network that can evolve into social capital. I tested whether the CEO and CFO, with high social capital, can reduce the probability of their company stock persistently landing in the bottom 10% of yearly returns. Various stakeholders in the hierarchy of a social capital network can contribute to this prevention. I found the CFO total connections variable significant in the base model, the full model, and several subsample models. The interesting result was that CFO and CEO total connections were significant with market risk but not idiosyncratic risk.

Keywords: tail risk, CEO, CFO, top management team, C-suite, social capital, social network

I Introduction

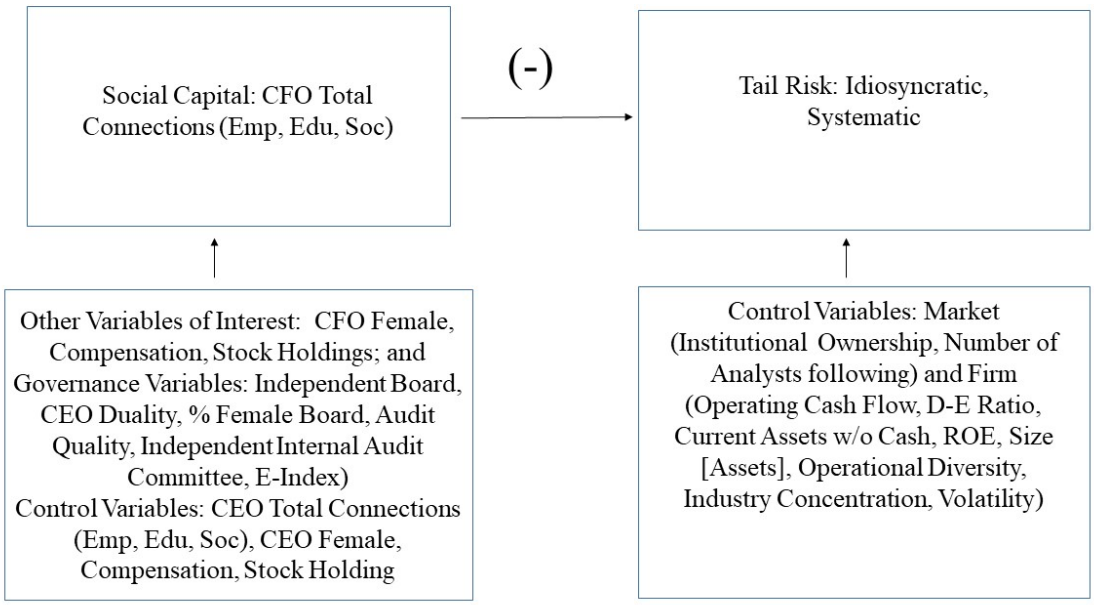
The chief executive officer (CEO) and chief financial officer (CFO), as members of the top management team, are responsible for key corporate strategic initiatives, including financial responsibilities that could impact the company's stock price (Amoozegar, Pukthuanthong, & Walker, 2017). If the market perceives bad news, it reacts accordingly, potentially resulting in extreme negative returns known as tail risk. The stock return of any publicly traded company has the potential to land in the bottom 10% of returns on any given day; it is the persistence of the stock returns landing in the bottom 10% that brings an unfortunate circumstance against which greater social capital may guard. Uncertainty in the market will always exist; strategic managers will be key resources and in times of trouble, social capital may be essential as well.

The purpose of this research is to analyze the relationship between social network capital of both the CEO and CFO and tail risk (defined here as market risk—the average return below the 10th percentile of the yearly distribution of the predicted returns from the market model—and idiosyncratic risk—the average return below the 10th percentile of the yearly distribution of the residuals from the market model; Srivastav, Keasey, Mollah, & Vallascas, 2017), as shown in Figure 1.

The CEO and CFO are members of the top management team and hold the top two positions in the C-suite. These two members of the C-suite have connections with many individuals, throughout their organization, their industry, and the business world at large as well as in their social circles (Bhandari, Mammadov, Shelton, & Thevenot, 2018). Cao, Simsek, and Jansen (2015) referred to the internal relationships as intrafirm and external relationships as interfirm. All these connections make up a member's social network and offer the potential for creation of social capital (Fracassi, 2017; Kanihan, Hansen, Blair, Shore, & Myers, 2013; Pappas, Ongena, Izzeldin, & Fuertes, 2017). The value of social capital is rising, taking its place right next to financial capital (Agarwal, Bersin, Lahiri, Schwartz, & Volini, 2018).

* Amy Fairfield (afairfield@bellarmine.edu), Bellarmine University, USA

Figure 1: Conceptual framework of the model.



This model delineates the conceptual framework of the model I used in the study. Tail risk is the dependent variable, operationalized by idiosyncratic and systematic risk. Social capital is the independent variable operationalized by CFO and CEO total connections. Several variables of interest and control variables are used interchangeably to test various models. The companies' yearly stock return is multiplied by -1 such that higher values indicate a higher exposure to extreme negative returns. Control variables (that affect financial measurements) were added as were market and governance variables. See Appendix A for variable definitions.

In this study, I tested the relationship between tail risk and social network capital. I also included myriad financial variables as control variables and to explore as variables of interest. I used profitability, leverage, and market value ratios; included variables for volatility; and incorporated governance variables. In addition, I controlled for industry and year fixed effects.

The valuation process is becoming more sophisticated. It is not easy for the price of a security to be determined by the intersection of the demand and supply curves or for the market to value a company based on its earnings (Miller, 1977). Ex post investment results cannot be used to measure ex ante investor expectations (Miller, 1977). The type of distribution with the best indication of stock returns has been a debate since the early 1960s, when *fat tails* were first analyzed (Fama, 1963). Tail risk often occurs in systematic macro crises when liquidity is an issue, and not until the global financial crisis of 2007 did tail risk emerge as a serious concern for practitioners and as a topic of interest to academics as well (Andersen, Fusari, & Todorov, 2019; Bollerslev, Todorov, & Xu, 2015; Kaya, Lee, & Pornrojnangkool, 2011). Hedging, as a form of insurance against tail risk, has also gained in popularity as a financial tool (Kaya et al., 2011). The need for further research into variables that impact tail risk is the motivation for this study.

According to upper echelons theory, the firm is a representation of its leaders (Hambrick & Mason, 1984). Similar background characteristics provide a backdrop for leaders on the top management team to have crossed paths with many individuals who ultimately make up their social network (Hambrick & Mason, 1984; Bowen & Bowen, 2016; Liu, 2014; Nahapiet &

Ghoshal, 1998). I relied on upper echelons theory to support the positions of CEO and CFO having the power to use their social capital for the benefit of their company (Khanna, Kim, & Lu, 2015). Social capital theory supports the connectedness of the CEO, CFO, and their social network. Fisher-Tippett extreme value theory addresses the area of the distribution wherein tail risk occurs (Basrak, 2011). Bringing these theories together forms the foundation for my analysis.

I utilized ordinary least squares regression with panel data and tested the impact of CEO and CFO social capital on tail risk. I analyzed the results to determine a reliable conclusion about the impact of CEO and CFO connectedness on tail risk.

Previous literature has explored the relationship between the C-suite and social capital. There is a small body of literature that has shown a relationship between the C-suite and tail risk and an even smaller body of literature that has shown a relationship between social capital and tail risk. However, there is a gap in the literature void of these three variables being examined together. Analyzing the relationship between CEO and CFO social networks and tail risk is important because extreme negative returns have a negative effect on market capitalization and valuations. The market often overreacts to various noisy signals that may be somewhat misguided. Having a social network to assist in the prevention (or management) of situations causing extreme negative events represents strategic effectiveness on the part of the CEO and CFO (Khanna et al., 2015). Analyzing the relationship between the CEO and CFO social network and tail risk provides an indication of the network's persuasive ability, for example, to obtain additional financing (Fracassi, 2017; Javakhadze, Ferris, & French, 2016).

This topic is also important from a regulatory perspective (Van Bekkum, 2016) as well as for finance professionals. Although the concept of tail risk has been studied for several decades, after the global financial crisis of 2007, practitioners began to show an increase in the level of interest for managing tail risk and academics began to show an increase in the level of examination of how tail risk might explain a particular phenomenon (Andersen et al., 2019; Bollerslev et al., 2015; Kaya et al., 2011). As an example, research on securitization agents (vice presidents who work at major investment houses) having prior knowledge of the housing bubble (and the impending crisis) did not produce any systematic evidence; however, Cheng, Raina, and Xiong (2014) suggested future research is needed. They suggest the entire financial system would benefit from greater transparency of tail risk (Cheng et al., 2014). Providing greater understanding of increased tail risk disclosures could assist regulatory bodies in enacting appropriate laws to prevent such a crisis from happening again. Providing an avenue for more transparency will enable better financial decision-making (Hutton, Marcus, & Tehranian, 2009). It is likely that many CFOs work at banks or deal with bankers; CFOs may have a trader working for them or have an investment firm that manages their company's trades. All of these connections are part of the network in which the CEO and CFO might belong that can help them effectively manage their tail risk.

II Literature Review and Hypothesis Development

Upper echelons theory states that the firm is a representation of those who lead it, that is, the top management team (Hambrick & Mason, 1984). Social capital theory describes the process by which capital is captured and reproduced for returns (Lin, Burt, & Cook, 2001). Using upper echelons theory, Ullah, Ur Rehman, Hameed, and Kayani (2017) found social capital to be a mediator between ethical leadership and corporate social responsibility. LeCounte, Prieto, and Phipps (2017) drew on social capital with regards to CEO succession planning; oftentimes the heir apparent is the CFO. For the purpose of this research, I specifically refer to the CEO and CFO.

The CEO and CFO are the top two positions in the C-suite—a circle of power consisting of seven members whose titles begin with chief—executive officer, financial officer, operations officer, human resources officer, general counsel, marketing officer, and information officer (Groysberg, Kelly, & MacDonald, 2011; LeCounte et al., 2017). Collectively, this group makes up the top management team. The top management team is a dominant coalition of the organization (Hambrick & Mason, 1984), driving organization outcomes by way of its strategic initiatives. Hambrick and Mason (1984) relied on background characteristics, such as functional background, education, and socioeconomic roots, to develop their (upper echelons) theory; these characteristics provide a backdrop for members of the top management team to have crossed paths with many individuals who ultimately make up their social networks. For this analysis, the focus is on the top two positions in the C-suite: CEO and CFO. Relationships are formed between the CEO and CFO and their firm's stakeholder groups (shareholders, employees, customers and suppliers, society, the environment, and government; Cao et al., 2015; Fracassi, 2017; Rezaee, 2016). As these relationships develop, trust is built, and the social network evolves into social capital (Bowen & Bowen, 2016; Liu, 2014; Nahapiet & Ghoshal, 1998). CEOs and CFOs are responsible to these stakeholder groups for the strategic direction of their organization, and they must work effectively and efficiently to manage their firm's status as an ongoing entity. As leaders, CEOs and CFOs need to develop interpersonal relationships to build social capital. The connections will be necessary to enable leaders to influence, work well with others, and make a difference in their organizations (Elkington, Pearse, Moss, Van, & Martin, 2017).

Social capital is "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (Nahapiet & Ghoshal, 1998, p. 243). In a business sense, social capital is an investment in social relations with expected returns (Lin, 1999).

Social connections do not, however, come without a cost; developing social ties takes an investment of time and energy on the part of executives (Cao et al., 2015). Cao et al. (2015) describe a CEO's bonding social capital as the social connections with organizational members from various functional units within the firm. The other type of connection Cao et al. (2015) describe is a CEO's bridging social capital; this refers to social connections with individuals from a diverse set of external organizational stakeholder groups, such as customers, suppliers, competitors, partners, financial agencies, industrial authorities, and government agencies. Bridging social capital provides an executive with an avenue to access new, valuable, and strategic information for their firm.

Market noise, agency concerns, and especially information asymmetry can impede seamless decision-making processes. Javakhadze et al. (2016) argued that social capital is a mechanism that potentially alleviates the forces that keep a CFO from becoming successful in today's modern corporate financial environment. Frazzini, Malloy, and Cohen (2008) also studied the impact of social networks on executives' ability to gather superior information about firms. They tested whether analysts gain comparative information advantages through their social networks by way of educational ties with executives and board members of firms they cover (Frazzini et al., 2008). Their findings suggested that the most likely mechanism driving the superior performance of analysts on their school-tied recommendations is direct information transfer (Frazzini et al., 2008).

Cai and Sevilir (2012) examined merger and acquisition transactions between firms with current board connections. They studied two types of board connections: the first type is where the two firms share a common director before the deal announcement; this is referred to as a first-

degree connection (Cai & Sevilir, 2012). The second type is where one director from the acquiring firm and one director from the target firm have been serving on the board of a third firm before the deal announcement; this is referred to as a second-degree connection (Cai & Sevilir, 2012). Their results provided new evidence that board connectedness enhances knowledge and improves information flow (Cai & Sevilir, 2012).

With a constantly changing business environment and a noticeable increase in the power of millennials, the importance of social capital is on the rise (Agarwal et al., 2018). The rise in social capital will bode well for members of the C-suite as they strategically lead their company to be an ongoing entity while avoiding tail risk (i.e., avoiding a perpetuating spot in the bottom 10% of the yearly stock return distribution). Social capital can play an integral part in the financial space by maintaining stock price (Engelberg, Gao, & Parsons, 2012) and market capitalization.

The CEOs and CFOs play an instrumental role in controlling risk for their companies. Research has shown that when the person responsible for risk management participates in the corporate governance process and has sufficient power to maintain Securities and Exchange Commission (SEC) regulations, the firm's potential for litigation is reduced and stock price performance improves (Amoozegar et al., 2017). Since the enactment of the Sarbanes-Oxley Act (SOX), CEOs and CFOs have increased accountability and thus are in a position to manage their organizations' risk by properly controlling tail risk (Alkhafaji, 2007; Schminke, Arnaud, & Keunzi, 2007).

Tail risk is extreme negative equity returns defined in this research as the average return below the 10th percentile of the yearly distribution of returns. A key assumption of the capital asset pricing model is that all investors are expected to have the same distribution of returns. Fama (1963) suggested that Mandelbrot's stable Paretian hypothesis will challenge the Gaussian hypothesis (which states the distribution of price changes in a speculative series are approximately normal). The extreme tails of distributions are higher (containing more of the probability), indicating higher yields but also greater losses (Fama, 1963). An investigation into the shape of tails, that is, fat tail behavior, ensued (Akgiray & Booth, 1988; Blattberg & Gonedes, 1974; Hill, 1975; Hols & de Vries, 1991; Jansen & de Vries, 1991). The Fisher-Tippett theorem is the foundation for extreme value theory, an identification of all extreme value distributions (Basrak, 2011). Bali (2003); Gencay and Selcuk (2004); Marimoutou, Raggad, and Trabelsi (2009) have used extreme value theory to investigate share price distributions and the behavior of tails.

Subsequently, value-at-risk (VAR) became a popular risk management tool (Beder, 1995; Duffie & Pan, 1997; Simons, 1996), but there was not a consistent approach for calculating VAR and researchers continued to look for a better way to measure risk. Later, Rockafellar and Uryasev (2000) introduced conditional value-at-risk (CVAR), also known as mean (expected) shortfall (ES; Acerbi, 2002; Acerbi, Nordio, & Sirtori, 2001). The CVAR, or ES, has much better properties than VAR and is considered a more consistent measure of risk (Rockafellar & Uryasev, 2000).

Ellul and Yerramilli (2013) analyzed tail risk as the main risk measure of interest for banks. They acknowledged that banks are in the risk-taking business, and they developed a risk management index to measure the strength of the bank risk management function (Ellul & Yerramilli, 2013). In this context, tail risk is based on the ES measure that is used within financial firms to capture the anticipated loss depending on returns; Ellul & Yerramilli (2013) used tail risk as the dependent variable in their research.

Van Bekkum (2016) used a sample of CEOs and CFOs from small and large U.S. banks, describing stockholder and debtholder risk using tail risk. The study used ES rather than VAR as it provides a better indication of the worst $100\alpha\%$ of cases by indicating average loss suffered in

the lower tail of the return distribution; ES was used as a DV in a cross-sectional regression model (Van Bekkum, 2016).

Srivastav et al. (2017), the research on which I based my definition of tail risk, used ES. Srivastav et al. (2017) showed that there is a relationship between tail risk and the CEO; they indicated in their findings that the possibility of a forced CEO turnover in large banks is positively associated with idiosyncratic tail risk. Interestingly, member(s) of the board of directors (one of the characters in the social capital network) were not supportive of the CEO in this bank research; the board was not supportive because the CEO takes undue risk, putting their organization in jeopardy by not managing the downside of bank risk (i.e., extreme negative stock returns; Srivastav et al., 2017). Srivastav et al. (2017) used ES to measure the bank's tail risk exposure. For this analysis, I used ES to measure the market component of tail risk, looking at firms' stock returns landing in the bottom 10% of the yearly return distribution, and the residuals from a market model to measure idiosyncratic risk.

For this study, I examined whether social capital could help ensure that stock returns avoid persistently landing in the bottom 10% of the yearly stock return distribution. I combined upper echelons theory, social capital theory, and extreme value theory to predict that the CEO and CFO, with high social capital, will work diligently with members of their social network to prevent extreme negative returns. Formally stated, my hypothesis is:

> H_1: The CEO and CFO will use their social network capital to keep their firm's stock price return from persistently landing in the bottom 10% of the yearly stock return distribution.

Led by the CEO and CFO, the top management team will work strategically to maintain the company stock price and stock returns. They are motivated to do this for various reasons: for the financial health of the company, especially in the eyes of creditors, if the need would arise for additional financing; for their own financial gain; to decrease the likelihood of a takeover; and to be viewed positively in the media, with the perception that they are acting in the best interest of all stakeholders. Both the media and stakeholders keep a watchful eye on stock prices, as stock prices serve as an indicator of how well companies are performing. Collecting stock price returns is the first step toward discovering the relationship between the CEO and CFO social network capital and tail risk. In the next section, the development of that relationship is discussed.

III Methodology

In this section, I will present my research design. First, I discuss how I captured the key construct in my study, that is, tail risk. Second, I discuss how I proxied for CEO and CFO social capital. Then I present the model used to test my hypothesis on tail risk.

Measures

Tail risk

The concept of tail risk has been evolving for many decades as a risk management tool. The CVAR, also known as ES, is considered a consistent measure of risk (Acerbi, 2002; Acerbi et al., 2001). After the global financial crisis in 2007, tail risk became a more prominent financial metric to help companies in their risk management function (Andersen et al., 2019; Bollerslev et al., 2015;

Kaya et al., 2011). Research into banks' mismanagement of risk, and their ultimate failure, led to the use of ES to measure tail risk (Cheng et al., 2014; Srivastav et al. 2017).

Tail risk has two components: market and idiosyncratic risk. Following Srivastav et al. (2017), I captured the market component using ES to determine the average yearly return below the 10th percentile of the yearly return distribution:

$$ES_i^{\alpha} = -E[R_{i,t} \mid R_{i,t} < R_{i,t}^{\alpha}] \quad (1)$$

where $R_{i,t}$ is the yearly stock return for company *i* at day *t*, and $R_{i,t}^{\alpha}$ is a company's yearly stock return equal to α percentile of the year *t* distribution (multiplied by -1 such that higher values indicate a higher exposure to extreme negative returns).

The idiosyncratic component of a company's yearly stock returns, computed by way of the residuals from a market model (regressed on market returns and industry returns), is shown as:

$$R_{i,t} = \beta_1 + \beta_2 R_{m,t} + \beta_3 R_{b,t} + \varepsilon_{j,t} \quad (2)$$

where $R_{i,t}$ is the return for stock *i* at time t, $R_{m,t}$ is the yearly return of the market index, $R_{b,t}$ is the yearly return of the industry index. The error term captures the residuals, which is the idiosyncratic component of tail risk. The directions for calculating tail risk, along with the Stata code, can be provided upon request.

Since tail risk is influenced by many other factors, I included several additional variables in my model. For operating cash flow, current assets without cash, and acquisitions, I used the natural log to eliminate outliers. Several company characteristics may affect tail risk; thus, it was necessary to include two groups of control variables. The first group controlled for financial and market-based variables, for example, firm size and return on assets (Ayers, Ramalingegowda, & Yeung, 2011; Zhao & Chen, 2008). The second group included market controls: institutional holdings and the number of analysts following a company. All control variables were lagged one year. Another group of variables were added as variables of interest; this group consisted of corporate governance characteristics, for example Big 4 auditors (Chang, Dasgupta, & Hilary, 2009); CEO age and CEO duality (as Chair) on the board (Ayers et al., 2011; Fairfield, 2021); and entrenchment (Morck, Shleifer, & Vishny, 1988). All models were checked with winsorized data, with supporting results. To minimize the impact of time-invariant year and industry characteristics, year- and industry-fixed effects were also included. See Appendix A for variable definitions.

Social capital

Social capital emerges when someone you know well can be trusted when seeking advice or who you may be assured will accomplish things efficiently and effectively (Smith, 2009). Social capital is measured by the number of interactions and relationships between executives and other executives (Nahapiet & Ghoshal, 1998). I followed Bhandari et al. (2018) to proxy social network. The variables used to determine social network were CEO and CFO connections with other CEOs and CFOs and board of director members, CEO and CFO prior year employment connections, CEO and CFO education connections, and CEO and CFO social connections. See Appendix A for variable definitions.

Data analysis

Empirical model

Ordinary least squares regression with panel data was used to examine the impact of CEO and CFO social network on tail risk, (both market and idiosyncratic components). I included profitability, leverage, and market value ratios. I also included variables for volatility and incorporated governance variables as well. In addition, I controlled for industry and year fixed effects. The following variables were utilized: industry Concentration (Herfindahl-Hirschman index), operational diversity (segments), total assets, acquisitions, operating cash flows, debt-to-equity ratio, current assets without cash, ROE, volatility (standard deviation of ROE), institutional ownership (percentage), analysts following, independent board (percentage), CEO duality (as Chair of the Board), female board (percentage), independent internal audit committee, audit quality, entrenchment index, female CFO, female CEO, CFO compensation, CEO compensation, CFO stock holdings, and CEO stock holdings (Morck et al., 1988). These variables of interest were used interchangeably as control variables to test various models. The following regression equation was tested to determine if there was any statistical significance to explain the relationship between social network (and other variables of interest) and tail risk.

$$\begin{aligned}\text{Tail Risk} = {} & \text{Intercept} + \text{Beta} * \text{Total Connections} + \text{Beta} * \text{Other Variables of} \\ & \text{Interest} + \text{Beta} * \text{Governance Variables} + \text{Beta} * \text{Firm Control Variables} + \\ & \text{Beta} * \text{Market Control Variables} + \text{error}\end{aligned} \quad (3)$$

Based on my hypothesis, I expected a negative sign for the beta coefficient on Total Connections.

$$\begin{aligned}\text{Tail Risk} = {} & \beta_0 + \beta_1 * \text{CFOtotcon} + \beta_2 * \text{CEOtotcon} + \beta_3 * \text{fCFO} + \beta_4 * \\ & \text{CFOtotcomp} + \beta_5 * \text{CFOstock} + \beta_6 * \text{fCEO} + \beta_7 * \text{CEOtotcomp} + \beta_8 * \\ & \text{CEOstock} + \beta_9 * \text{indbrd} + \beta_{10} * \text{CEOchair} + \beta_{11} * \text{femdirs} + \beta_{12} * \text{auditq} + \\ & \beta_{13} * \text{indaudcom} + \beta_{14} * \text{eindex} + \beta_{15} * \text{ocf} + \beta_{16} * \text{deratio} + \beta_{17} * \\ & \text{cawocash} + \beta_{18} * \text{roe} + \beta_{19} * \text{lnat} + \beta_{20} * \text{segments} + \beta_{21} * \text{indusconc} + \beta_{22} \\ & * \text{volatil} + \beta_{23} * \text{acq} + \beta_{24} * \text{insthold} + \beta_{25} * \text{numanalst} + \varepsilon_{j,t}\end{aligned} \quad (4)$$

where Tail Risk is measured by idiosyncratic risk and market risk. CFO total connections and CEO total connections are the variables of interest; other variables of interest are whether the CFO and CEO are female, CFO and CEO total compensation, and stock holdings of both CFO and CEO. Additional variables of interest include several governance variables: the percentage of independent board members, whether the CEO is also the Board Chair, the percentage of female board members, audit quality, if there is an independent internal audit committee, and the entrenchment index. Firm controls are as follows: operating cash flow, debt-to-equity ratio, current assets without cash, ROE, the natural log of total assets, the number of company segments, industry concentration, a volatility measure, and acquisitions. Market control variables include institutional holding percentage and the number of analysts following a company.

Sample

The sample began post-SOX, covering thirteen years from 2003 through 2016, and consisted of all U.S. firms with available data. I obtained firms' financial data from the annual Compustat database, return data from CRSP database, governance data from BoardEx database, and salaries data from the Execucomp database. The final sample size for the primary analysis was 88,694 observations. Firm-year observations with missing information were deleted. I ran the models with raw data; I also winsorized all continuous variables at the top and bottom one percentile of their distributions to normalize the data and confirm the results. The following section discusses the results.

IV Results

Descriptive statistics

Table 1 presents the descriptive statistics for all the variables I used in this analysis. There are two dependent variables used to measure tail risk: market risk and idiosyncratic risk, representing the lowest 10% decile.

As a robustness test, I also ran models for 5% and 20%. The results for 5% were inconsistent, leaving a very small number of firms to merge with the CFO and CEO social network and other variables of interest. In addition, to keep more data, I scaled up the database since it is in percentage format. The results held for both raw and winsorized data.

Table 1: Descriptive Statistics

Variable	Observations	M	SD	Q1	Median	Q3
idiorisk	54,894	-0.603	1.617	-1.648	-0.855	0.129
mktrisk	54,894	5.059	0.863	4.526	4.866	5.385
CFOtotcon	3,539	103.412	321.858	0.000	0.000	22.000
CEOtotcon	4,332	293.608	506.994	0.000	81.000	342.000
CFOgender	3,506	0.095	0.293	0.000	0.000	0.000
CEOgender	4,313	0.034	0.181	0.000	0.000	0.000
CFOtotcomp	3,539	7.120	1.082	6.573	7.195	7.772
CEOtotcomp	2,563	8.261	0.964	7.636	8.344	8.922
CFOstock	3,539	4.178	1.792	3.387	4.473	5.348
CEOstock	2,563	1.665	4.257	0.000	0.247	1.400
Governance						
indbrd	3,365	0.776	0.121	0.714	0.800	0.875
CEOchair	3,365	0.203	0.402	0.000	0.000	0.000
femdirs	3,365	0.121	0.106	0.000	0.111	0.182
auditq	41,570	0.611	0.487	0.000	1.000	1.000
indaudcom	20,111	0.977	0.149	1.000	1.000	1.000
eindex	31,818	2.468	1.562	1.000	3.000	4.000
Market Controls						
insthold	38,546	0.238	0.295	0.012	0.120	0.190
numanalst	38,256	15.973	16.715	2.000	5.000	41.000
Firm Controls						
ocf	58,789	4.270	2.528	2.567	4.459	6.062

Variable	Observations	M	SD	Q1	Median	Q3
deratio	63,272	3.613	391.114	0.000	0.125	0.659
cawocash	82,274	4.091	2.541	2.070	4.190	5.924
roe	64,205	-0.229	56.255	-0.100	0.075	0.184
lnat	88,694	5.542	2.784	3.539	5.635	7.552
segments	88,694	12.061	10.256	5.000	9.000	17.000
indusconc	88,694	1.37E+27	4.07E+29	0.108	0.156	0.224
volatil	49,182	2.120	36.932	0.032	0.093	0.354
acq	83,090	0.982	1.897	0.000	0.000	0.974

Table 1 provides descriptive statistics for the variables of interest. *mktrisk* represents market risk, the average return below the 10th percentile of the yearly distribution of the predicted returns from the market model; *idiorisk* represents idiosyncratic risk, the average return below the 10th percentile of the yearly distribution of the residuals from the market model; *CFOtotcon* is the number of total CFO connections; *CEOtotcon* is the number of total CEO connections; *fCFO* indicates whether the CFO is female (1) or not (0); *fCEO* indicates whether the CEO is female (1) or not (0); *CFOtotcomp* represents the CFO total compensation; *CEOtotcomp* represents the CEO total compensation; *CFOstock* represents the total value of restricted stock granted to the CFO plus the total value of stock options granted to the CFO; *CEOstock* represents the total value of restricted stock granted to the CEO plus the total value of stock options granted to the CEO; *indbrd* represents the percentage of independent board members; *CEOchair* indicates whether the CEO is also Chair of the Board (1) or not (0); *femdirs* stands for female directors, the percentage of female board members; *auditq* represents audit quality, 1 if a Big Four, 0 otherwise; *indaudcom* represents independent audit committee, 1 if audit committee is independent, 0 otherwise; *eindex* represents entrenchment index, as developed by Bebchuk, Cohen, and Ferrell (2009); *ocf* represents the natural log of operating cash flows, the net change in cash from all items classified in the operating activities section on a Statement of Cash Flows; *deratio* represent the debt-to-equity ratio; *cawocash* represents the natural log of current assets without cash; *roe* represents return on equity; *volatil* represents volatility, measured by the standard deviation of ROE; *lnat* is the natural log of total assets, used to measure firm size; *segments* represents the product or service segments of a company; *indusconc* represents industry concentration, measured by the Herfindahl-Hirschman index ; *acq* represents the natural log of acquisitions; *insthold* represents the percentage of holdings by institutional investors; *numanalst* represents the number of analysts following a company; Q1 represents the first quarter; Q3 represents the third quarter.

Since the global financial crisis of 2007, tail risk has been a topic of greater interest to researchers and a growing concern for financial executives (Andersen et al., 2019; Bollerslev et al., 2015; Kaya et al., 2011). Social capital and the network of connections play an important role for executives to gain helpful information.

In addition to the social network variables, I included three more variables of interest for both the CFO and CEO: gender, total compensation, and holdings (restricted stock and stock options granted). I also included nine firm performance control variables, two market control variables, and six governance variables. The firm performance variables are as follows: operating cash flows, debt-to-equity ratio, current assets without cash, ROE, natural log of total assets, operational diversity (segments), industry concentration (HHI), volatility (standard deviation of ROE), and acquisitions. The market control variables are percentage of institutional ownership and number of analysts following a company. The governance variables are as follows: percentage of independent board, CEO duality (as Chair of the Board), percentage of female board members, audit quality, independent audit committee, and entrenchment index.

Table 2 presents the correlation among all the variables included in this analysis. The natural log of current assets without cash was highly correlated with the natural log of operating cash flow and the natural log of total assets. Likewise, the natural log of total assets was highly correlated with the natural log of operating cash flow.

Table 2: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
(1) *idiorisk*	1																										
(2) *mktrisk*	-0.22[a]	1																									
(3) *CFOtotcon*	0.04[b]	-0.05[a]	1																								
(4) *CEOtotcon*	0.00	-0.03[c]	0.2[a]	1																							
(5) *fCFO*	0.03	0.00	0.03[c]	0.05	1																						
(6) *fCEO*	-0.01	-0.01	0.03	0.05[a]	0.01	1																					
(7) *CFOtotcomp*	-0.17[a]	-0.02	0.21[a]	0.21[a]	-0.01	0.05	1																				
(8) *CEOtotcomp*	-0.19[a]	-0.02	0.23[a]	0.28[a]	0.08	0.02	0.72[a]	1																			
(9) *CFOstock*	0.02	0.01	0.09[a]	0.03	-0.03	-0.06[c]	0.25[a]	0.30[a]	1																		
(10) *CEOstock*	0.05[a]	0.03	-0.05	-0.09[a]	0.13[a]	-0.02	-0.11[b]	-0.18[a]	-0.02	1																	
(11) *indbrd*	-0.09[a]	-0.06[a]	0.01	0.21[a]	-0.02	-0.00	0.19[a]	0.25[a]	0.06	-0.13[a]	1																
(12) *CEOchair*	0.08[a]	0.08[a]	0.02	-0.08[b]	-0.01	-0.07[c]	-0.13[a]	-0.05	0.04	-0.08[b]	-0.08[a]	1															
(13) *femdirs*	-0.11[a]	-0.05[a]	0.16[a]	0.18[a]	-0.04	0.22[a]	0.22[a]	0.22[a]	0.05	-0.15[a]	0.29[a]	-0.03[c]	1														
(14) *auditq*	-0.19[a]	0.06[a]	0.09[a]	0.11[a]	-0.01	0.06[b]	0.30[a]	0.21[a]	0.01	-0.10[b]	0.13[a]	0.03[b]	0.14[a]	1													
(15) *indaudcom*	0.01	0.03[a]	-0.16[a]	-0.01	-0.02	0.02	0.01	0.01	0.01	-0.31[a]	0.03	0.01	0.02	0.03[a]	1												
(16) *eindex*	0.28[a]	0.13[a]	0.04	-0.02	0.02	-0.05[c]	-0.08[a]	-0.07	0.09[a]	0.03	0.04[c]	0.22[a]	-0.00	-0.02[a]	0.01	1											
(17) *insthold*	0.10[a]	0.08[a]	0.01	-0.02	-0.01	-0.02	-0.02	-0.01	-0.06[c]	-0.00	0.02	0.09[a]	-0.03[c]	-0.01	0.02[a]	-0.03[a]	1										
(18) *numanalst*	0.14[a]	0.03[a]	-0.01	0.03	0.03	-0.01	0.01	0.07[c]	-0.00	0.05	0.09[a]	-0.24[a]	0.06[a]	-0.00	-0.00	0.16[a]	0.11[a]	1									
(19) *ocf*	-0.30[a]	0.10[a]	0.23[a]	0.26[a]	-0.00	-0.01	0.62[a]	0.67[a]	0.15[a]	-0.18[a]	0.22[a]	0.01	0.31[a]	0.62[a]	0.00	0.00	0.00	0.04[a]	1								
(20) *deratio*	-0.00	0.01	0.01	0.01	-0.01	-0.01	-0.02	0.04[c]	0.04[b]	-0.01	0.03	-0.01	0.02	0.01[c]	0.00	-0.00	-0.00	0.00	0.01[c]	1							
(21) *cawocash*	-0.36[a]	0.15[a]	0.24[a]	0.27[a]	0.00	-0.00	0.61[a]	0.64[a]	0.13[a]	-0.19[a]	0.20[a]	0.01	0.31[a]	0.61[a]	0.03[a]	0.02[a]	0.00	0.01[c]	0.90[a]	-0.00	1						
(22) *roe*	-0.01	-0.01	0.00	0.02	-0.01	-0.02	0.02	0.05[b]	-0.05[a]	-0.01	0.02	0.01	0.00	0.00	-0.00	0.00	0.00	0.00	0.01[b]	-0.01[b]	0.01[c]	1					
(23) *lnat*	-0.36[a]	0.14[a]	0.23[a]	0.26[a]	-0.00	0.00	0.60[a]	0.66[a]	0.13[a]	-0.19[a]	0.22[a]	0.01	0.32[a]	0.64[a]	0.03[a]	0.02[a]	-0.00	0.02[a]	0.95[a]	-0.00	0.94[a]	0.01[c]	1				
(24) *segments*	-0.18[a]	0.11[a]	0.06[a]	0.14[a]	-0.01	-0.05[a]	0.25[a]	0.25[a]	0.08[a]	-0.09[a]	0.13[a]	-0.02	0.07[a]	0.31[a]	0.02[a]	0.00	0.00	0.02[a]	0.42[a]	-0.01[c]	0.55[a]	0.00	0.50[a]	1			
(25) *indusconc*	0.00	-0.00	-0.05[a]	-0.09[a]	0.03[b]	0.03[b]	-0.14[a]	-0.12[a]	-0.04[b]	0.04[c]	-0.03[b]	0.01	-0.04[b]	0.00	0.00	0.00	-0.00	0.01[c]	-0.00	0.00	-0.00	0.00	-0.00	-0.00	1		
(26) *volatil*	0.02[a]	-0.01[c]	-0.00	-0.01	0.01	-0.00	-0.10[a]	-0.01	-0.02	-0.02	-0.02	-0.02	0.01	-0.02[a]	0.00	-0.00	-0.01	0.00	-0.06[a]	-0.00	-0.05[a]	-0.40[a]	-0.06[a]	-0.03[a]	-0.00	1	
(27) *acq*	-0.18[a]	0.04[a]	0.15[a]	0.17[a]	-0.02	-0.02	0.30[a]	0.29[a]	0.10[a]	-0.08[a]	0.07[a]	-0.01	0.09[a]	0.28[a]	0.00	0.03[a]	-0.00	-0.01[a]	0.42[a]	-0.00	0.48[a]	0.00	0.47[a]	0.34[a]	-0.00	-0.03[a]	1

Note. Table 2 presents Pearson correlation coefficients for variables which have been defined in Appendix A.
a=***significance at the 1% level. b=**significance at the 5% level. c=*significance at the 10% level.

After checking the variance inflation factor (VIF) for each model, and running collinearity diagnostics, there was no evidence of multicollinearity in the base model. In the full model, the variables with high VIFs were control variables and they were not collinear with variables of interest; these VIFs can be safely ignored.

Regression analysis

Table 3 reports the base model regression results for CFO and CEO total connections and tail risk, including both idiosyncratic risk and market risk. Table 4 reports the full model regression results for the CFO and CEO total connections and tail risk, including both idiosyncratic risk and market risk. In this section, I report the regression results and in the next section, I discuss the results of the relationship between CFO and CEO total connections and tail risk, including both idiosyncratic risk and market risk.

Table 3: Tail Risk Base Model (Idiosyncratic and Market)

	Tail Risk	
Variables	Idiosyncratic	Market
CFOtotcon	-0.00013	-0.00020*
	(0.000)	(0.000)
CEOtotcon	0.00004	-0.00008
	(0.000)	(0.000)
Constant	-1.42519***	5.26353***
	(0.120)	(0.080)
Industry Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	582	582
Adjusted R^2	0.259	0.149

This table reports estimation from ordinary least squares regression of the relationship between CFO and CEO total connections and market risk. I used both industry and year fixed effects. Also, I clustered standard errors by firm identification number (Gvkey). Robust standard errors were computed using the Huber-White sandwich estimator of variance by clustering on the firm level (Wolter, 2007). Variables are defined in Appendix A.
*$p < .1$. **$p < .05$. ***$p < .01$.

Tail risk: market risk and idiosyncratic risk

My hypothesis is that the CEO and CFO will use their social network capital to keep their firm's stock price return from persistently landing in the bottom 10% of the yearly stock return distribution. In the base model (Table 3), only the CFO total connections variable was significant at the 10% level for market risk. In the full model, (Table 4), audit quality was negative and significant at the 10% level for idiosyncratic risk. For market risk, both CFO total connections and CEO total connections were significant, at the 1% and 5% level, respectively. These results were surprising because it is unusual for CEOs and CFOs to have influence over long-term market effects (French, 2003). There is a much greater possibility for them to have control over something micro (firm-level) within their power, which would be measured by idiosyncratic risk. In addition, e-index, operating cash flows, and acquisitions were all negative and significant at the 5% level.

Table 4*:* Tail Risk Full Model (Idiosyncratic and Market)

	Tail Risk	
Variables	Idiosyncratic	Market
CFOtotcon	0.002*	-0.002***
	(0.001)	(0.001)
CEOtotcon	0.001	-0.001**
	(0.000)	(0.000)
auditq	-2.757*	2.346**
	(1.616)	(1.128)
eindex	0.823	-1.077**
	(0.645)	(0.437)
ocf	1.552*	-1.135**
	(0.774)	(0.517)
acq	0.182	-0.176**
	(0.122)	(0.072)
Constant	4.904	1.717
	(6.116)	(4.371)
Observations	40	40
Adjusted R^2	0.602	0.619

This table reports estimation from ordinary least squares regression of the relationship between CFO / CEO total connections and market risk. I used both industry and year fixed effects. Also, I clustered standard errors by firm identification number (Gvkey). Robust standard errors were computed using the Huber-White sandwich estimator of variance by clustering on the firm level (Wolter, 2007). Variables are defined in Appendix A.
*$p < .1$. **$p < .05$. ***$p < .01$.

Next, I discuss the results of the findings between the relationship of CFO and CEO total connections and tail risk, including both market risk and idiosyncratic risk.

V Robustness Checks

The purpose of this study was to investigate the relationship between CFO and CEO social network and tail risk (both market risk and idiosyncratic risk) to determine whether the CFO's and CEO's connectedness could keep the company's stock return from persistently landing in the bottom 10% of the yearly stock return distribution.

I used the model from Srivastav et al. (2017) to measure tail risk. I captured both components of tail risk: market risk and idiosyncratic risk. I included the same social network variables (and other variables of interest) for the CEO, as control variables, to test whether the CFO or CEO contribute more to the power of social networking. My research showed that both CFO and CEO total connections were associated with tail risk. The results produced were not what I expected. In fact, the results were the complete opposite of what I expected. Next, I discuss potential explanations.

Market risk, or systematic risk, such as inflation risk, interest rate risk, exchange rate risk, and political risk can be monitored and acted on, by savvy CFOs who pay attention to, not only the business of their own firm, but macro issues as well, for example, government regulations and the global economy (Corporate Finance Institute, 2021). Mishra, Talukdar, and Upadhyay (2019) analyzed CFO appointments and firm's debt-equity choice. They found that internal CFOs

markedly reduce information asymmetry, which may decrease market risk and the cost of financing through equity issues (Mishra et al., 2019). Cai, Dhaliwal, Kim, and Pan (2014) found evidence that interlocked board of director members wield power to discontinue quarterly earnings guidance. In addition, Cai et al. (2014) pointed out that closely tied to social networks is the overlapping of auditors, (institutional) investors, or analysts. Further, Jung (2013) found that a firm's decision to follow the industry first mover in providing more market-risk disclosures is positively associated with an increase in the institutional investor overlap between the two firms.

Hasan and Habib (2019) found that firm-specific variables do not explain all of a firm's idiosyncratic return volatility; regional social capital also plays a role. There is a great deal of impact a large company can make in a region. Also, social capital is on the rise, and it just may be blurring the line as to whether its presence explains idiosyncratic risk or market risk.

In other untabulated results, I ran myriad models to determine the explanatory power of several variables of interest and control variables. In addition to the network variables (connections made through education, employment, and social organizations and the total of these connections), there are three additional categories: firm performance control variables, market control variables, and governance variables, all described previously.

Table 5: Tail Risk

	Tail Risk	
Variables	Idiosyncratic	Market
CFOtotcon	-0.001	-0.001***
	(0.001)	(0.000)
insthold	-0.081	-0.943*
	(0.991)	(0.502)
deratio	0.004	0.023**
	(0.012)	(0.011)
Roe	-0.126	-0.275***
	(0.242)	(0.060)
Segments	-0.014	0.029***
	(0.023)	(0.009)
Volatile	-0.075	-0.055**
	(0.057)	(0.025)
Constant	-4.221	4.990***
	(3.383)	(0.662)
Observations	103	103
Adjusted R^2	0.181	0.236

Note. This table reports estimation from ordinary least squares regression of the relationship between the CFO and CEO total connections and market risk. The model excludes other CFO and CEO variables of interest and governance variables. I used both industry and year fixed effects. Also, I clustered standard errors by firm identification number (Gvkey). Robust standard errors were computed using the Huber-White sandwich estimator of variance by clustering on the firm level (Wolter, 2007). Variables are defined in Appendix A.
*$p < .1$. **$p < .05$. ***$p < .01$.

The regression results for Table 5 are from a model including CFO and CEO total connections, firm performance control variables, and market control variables, but excluding other variables of interest for CFO and CEO and governance variables. The CFO total connections remained negative and significant at the 1% level for market risk. The variable for ROE was

negative and significant at the 1% level for market risk; volatility, the standard deviation of ROE, was negative and significant at the 5% level. The variable for institutional holdings, the percentage of market capitalization owned by institutional investors, was significant at the 10% level. The debt-to-equity ratio and operational diversity (segments) were significant, but the coefficients had an unexpected sign. There were no significant results for idiosyncratic risk.

Next, I ran models with all CFO and CEO variables of interest (including network variables) and some combination of control variables. These were all small data sets as well. The untabulated results indicated the CFO total connections variable continued to be significant but the same was not true for CEO total connections; it was not consistent. Gender, compensation, and holdings appeared in three separate models, but the coefficients had an unexpected sign. Operational diversity and current assets without cash were both significant but with an unexpected sign.

Table 6: Tail Risk

	Tail Risk	
Variables	Idiosyncratic	Market
CFOtotcon	0.002**	-0.002***
	(0.001)	(0.001)
CEOtotcon	0.001**	-0.001*
	(0.000)	(0.000)
CEOgender	2.931*	-0.425
	(1.509)	(1.578)
CFOtotcomp	1.087*	-0.784
	(0.575)	(0.532)
CEOtotcomp	-0.971**	0.815**
	(0.427)	(0.332)
auditq	-1.753*	0.978
	(0.873)	(0.971)
indaudcom	-3.440	3.773**
	(2.913)	(1.860)
ocf	1.362**	-0.936**
	(0.623)	(0.442)
roe	-2.276**	-0.565
	(0.999)	(0.921)
acq	0.165**	-0.117**
	(0.075)	(0.057)
Constant	5.304	-2.351
	(5.464)	(4.405)
Observations	45	45
Adjusted R^2	0.746	0.405

Note. This table reports estimation from ordinary least squares regression of the relationship between the CFO and CEO total connection and market risk, including all CFO and CEO variables, governance, and firm controls, but excluding market variables. I used both industry and year fixed effects. Also, I clustered standard errors by firm identification number (Gvkey). Robust standard errors were computed using the Huber-White sandwich estimator of variance by clustering on the firm level (Wolter, 2007). Variables are defined in Appendix A.
*$p < .1$. **$p < .05$. ***$p < .01$.

The small data set with the combination of all CFO and CEO variables of interest, governance variables, and firm control variables, with market controls excluded, produced significant results for idiosyncratic risk; CEO total compensation, audit quality, and ROE were negative and significant. Both CFO and CEO connections were significant, as was CEO gender, CFO total compensation, operating cash flows, and acquisitions, but with an unexpected sign. Both CFO and CEO total connections continued to be negative and significant for market risk, as were operating cash flows and acquisitions. CEO total compensation and independent internal audit committee were also significant but with an unexpected sign. These regression results can be found in Table 6.

In Table 7, I report the regression results from CFO and CEO total connections and market variables, wherein institutional ownership was significant. I was interested in this result because of the literature cited in the Discussion section, that is, Cai et al. (2014) referring to institutional investors. Also, Jung (2013) referred to market-risk disclosure and institutional investor overlap between firms.

Table 7: Tail Risk

	Tail Risk	
Variables	Idiosyncratic	Market
CFOtotcon	-0.00031	-0.00034*
	(0.000)	(0.000)
insthold	-0.76124	-0.47969*
	(0.484)	(0.274)
Observations	167	167
Adjusted R^2	0.269	0.150

This table reports estimation from ordinary least squares regression of the relationship between the CFO and CEO total connections and market risk, including only CFO and CEO network variables and market variables. I used both industry and year fixed effects. Also, I clustered standard errors by firm identification number (Gvkey). Robust standard errors were computed using the Huber-White sandwich estimator of variance by clustering on the firm level (Wolter, 2007). Variables are defined in Appendix A.
*$p < .1$. **$p < .05$. ***$p < .01$.

Limitations of this study.

The full model for tail risk had a very small number of observations. In addition, I only had 13 years of data; a larger sample size was not readily available but could be created using another method to connect C-suite executives, board members, and other constituents in a network. Although we do research in the area of finance, the CEO (not the CFO) continues to be the primary position for study. The literature on CFOs is still growing; hence, there does not seem to be an ample supply of prior work. SOX has changed this phenomenon, but it will be important to continue to build the stream of literature on CFOs.

Suggestions for future research.

The results for this study were somewhat surprising. I anticipated there would be more significant results for idiosyncratic risk. Given the results, additional research is needed to determine the impetus for the influence CFOs and CEOs have in the marketplace.

In addition, as mentioned previously, gathering a larger data set to create a new model using a different method would be an avenue for future research. One such idea is to use an Eulerian path (in graph theory). Hochberg, Ljungqvist, and Lu (2007) utilized graph theory in their network analysis of centrality, to measure the degree and quality of relationships. It is interesting to see this as cross-sectional data, but it would also be interesting to see CFOs' careers in a longitudinal research project.

V Conclusion

In this study, I sought to discover if the CFO and CEO have enough social capital in their social networks to keep their company's stock return from consistently falling into the bottom 10% of the yearly stock return distribution. Interestingly, the component of risk over which I assume CFOs and CEOs have more control did not support that. In the base model, only the CFO total connections variable was significant, at the 10% level, for market risk. In the full model, audit quality was negative and significant at the 10% level for idiosyncratic risk. For market risk, both CFO total connections and CEO total connections were significant, at the 1% and 5% level, respectively. This result was surprising because it is unusual for CEOs and CFOs to have influence over long-term market effects (French, 2003). There is a much greater possibility for them to have control over something micro (firm-level) within their power, which would be measured by idiosyncratic risk. In addition, under market risk, e-index, operating cash flows, and acquisitions were all negative and significant at the 5% level. For robustness checks, I ran several models with various combinations of CFO and CEO total connections, other CFO and CEO variables of interest, governance variables, firm control variables, and market control variables. Fairly consistent results indicated there was not very much explanatory power for idiosyncratic risk. The CFO total connections variable consistently provided explanatory power for market risk. When the market controls were included in the model, the institutional investors variable was consistently negative and significant. Although the results did not turn out as expected, the results provide an interesting avenue for future research.

References

Acerbi, C. (2002). Spectral measures of risk: A coherent representation of subjective risk aversion. *Journal of Banking & Finance*, *26*(7), 1505-1518. https://doi.org/10.1016/S0378-4266(02)00281-9

Acerbi, C., Nordio, C., & Sirtori, C. (2001). Expected shortfall as a tool for financial risk management. Retrieved from https://arxiv.org/abs/cond-mat/0102304

Agarwal, D., Bersin, J., Lahiri, G., Schwartz, J., & Volini, E. (2018). *Introduction: The rise of the social enterprise: 2018 Deloitte global human capital trends*. Retrieved from https://www2.deloitte.com/insights/us/en/focus/human-capital-trends/2018/introduction.html

Akgiray, V., & Booth, G. G. (1988). The stable-law model of stock returns. *Journal of Business & Economic Statistics*, *6*(1), 51-57. https://doi.org/10.2307/1391417

Amoozegar, A., Pukthuanthong, K., & Walker, T. J. (2017). On the role of the chief risk officer and the risk committee in insuring financial institutions against litigation. *Managerial Finance, 43*(1), 19-43. https://doi.org/10.1108/MF-05-2016-0127

Andersen, T. G., Fusari, N., & Todorov, V. (2019). The pricing of tail risk and the equity premium: Evidence from international option markets. *Journal of Business & Economic Statistics, 38*(3), 662-678. https://doi-org/10.1080/07350015.2018.1564318

Ayers, B., Ramalingegowda, S., & Yeung, P. (2011). Hometown advantage: The effects of monitoring institution location on financial reporting discretion. *Journal of Accounting and Economics, 52*(1), 41-61. https://doi.org/10.1016/j.jacceco.2011.03.003

Bali, T. (2003). An extreme value approach to estimating volatility and value at risk. *Journal of Business*, 76(1), 83–107. https://doi.org/10.1086/344669

Basrak, B. (2011). Fisher-Tippett theorem. *International Encyclopedia of Statistical Science*. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-04898-2_254

Bebchuk, L., Cohen, A., & Ferrell, A. (2009). What matters in corporate governance? *The Review of Financial Studies, 22*(2), 783-827. https://doi.org/10.1093/rfs/hhn099

Beder, T. S. (1995). VaR: Seductive but dangerous." *Financial Analysts Journal,* 51(5), 12-24. https://doi.org/10.2469/faj.v51.n5.1932

Bhandari, A., Mammadov, B., Shelton, A., & Thevenot, M. (2018). It is not only what you know, it is also who you know: CEO network connections and financial reporting quality. *Auditing, 37*(2), 27-50. https://doi.org/10.2308/ajpt-51821

Blattberg, R., & Gonedes, N. (1974). A comparison of the stable and student distributions as statistical models for stock prices. *The Journal of Business, 47*(2), 244-280. https://doi.org/10.1086/295634

Bollerslev, T., Todorov, V., & Xu, L. (2015). Tail risk premia and return predictability. *Journal of Financial Economics, 118*(1), 113-134. https://doi.org/10.1016/j.jfineco.2015.02.010

Bowen, G., & Bowen, D. (2016). Social media: A strategic decision-making tool. *Journal of Global Business and Technology, 12*(1), 48-59. https://gbata.org/journal-of-global-business-and-technology-jgbat/

Cai, Y., Dhaliwal, D. S., Kim, Y., & Pan, C. (2014). Board interlocks and the diffusion of disclosure policy. *Review of Accounting Studies, 19*(3), 1086-1119. https://doi.org/10.1007/s11142-014-9280-0

Cai, Y., & Sevilir, M. (2012). Board connections and M&A transactions. *Journal of Financial Economics*, *103*(2), 327-349. https://doi.org/10.1016/j.jfineco.2011.05.017

Cao, Q., Simsek, Z., & Jansen, J. J. (2015). CEO social capital and entrepreneurial orientation of the firm: Bonding and bridging effects. *Journal of Management*, *41*(7), 1957-1981. https://doi.org/10.1177/0149206312469666

Chang, X., Dasgupta, S., & Hilary, G. (2009). The effect of auditor quality on financing decisions. *The Accounting Review*, *84*(4), 1085-1117. https://doi.org/10.2308/accr.2009.84.4.1085

Cheng, I., Raina, S., & Xiong, W. (2014). Wall street and the housing bubble. *The American Economic Review, 104*(9), 2797-2829. https://doi.org/10.1257/aer.104.9.2797

Corporate Finance Institute. (2021). *What is market risk?* Retrieved from https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/market-risk/

Duffie, D. & Pan, J. (1997). An overview of value-at-risk. *Journal of Derivatives*, *4*(3), 7-49. https://doi.org/10.3905/jod.1997.407971

Elkington, R., Pearse, N. J., Moss, J., Van, d. S., & Martin, S. (2017). Global leaders' perceptions of elements required for effective leadership development in the twenty-first century. *Leadership & Organization Development Journal, 38*(8), 1038-1056. https://doi.org/10.1108/LODJ-06-2016-0145

Ellul, A., & Yerramilli, V. (2013). Stronger risk controls, lower risk: Evidence from US bank holding companies. *The Journal of Finance*, *68*(5), 1757-1803. https://doi.org/10.1111/jofi.12057

Engelberg, J., Gao, P., & Parsons, C. A. (2012). Friends with money. *Journal of Financial Economics*, *103*(1), 169-188. https://doi.org/10.1016/j.jfineco.2011.08.003

Fairfield, A. (2021). A study of CFO and CEO attributes: Cash and operating cycles as determinant measures of success. *Journal of Accounting and Finance, 21*(4), 96-116. https://doi.org/10.33423/jaf.v21i4.4528

Fama, E. F. (1963). Mandelbrot and the stable Paretian hypothesis. *The Journal of Business*, *36*(4), 420-429. https://doi.org/10.1086/294633

Fracassi, C. (2017). Corporate finance policies and social networks. *Management Science, 63*(8), 2420-2438. https://doi.org/10.1287/mnsc.2016.2433

Frazzini, A., Malloy, C., & Cohen, L. (2008). *Sell side school ties* (AFA 2009 San Francisco Meetings Paper). https://doi.org/10.2139/ssrn.1107230

French, C. W. (2003). The Treynor capital asset pricing model. *Journal of Investment Management*, *1*(2), 60-72. https://www.joim.com/

Gencay, R., & Selcuk, F. (2004). Extreme value theory and value-at-risk: Relative performance in emerging markets. *International Journal of Forecasting,* 20(2), 287-303. https://doi.org/10.1016/j.ijforecast.2003.09.005

Groysberg, B., Kelly, L., & MacDonald, B. (2011). The new path to the C-Suite. *Harvard Business Review*. Retrieved from https://hbr.org/2011/03/the-new-path-to-the-c-suite

Hambrick, D., & Mason, P. (1984). Upper echelons: The organization as a reflection of its top managers. *The Academy of Management Review, 9*(2), 193-206. https://doi.org/10.5465/amr.1984.4277628

Hasan, M. & Habib, A. (2019). Social capital and idiosyncratic return volatility. *Australian Journal of Management, 44*(1), 3-31. https://doi.org/10.1177/0312896217717573

Hill, B. (1975). A simple general approach to inference about the tail of a distribution. *The Annals of Statistics, 3*(5), 1163-1174. https://doi.org/10.1214/aos/1176343247

Hochberg, Y., Ljungqvist, A., & Lu, Y. (2007). Whom you know matters: Venture capital networks and investment performance. *The Journal of Finance*, *62*(1), 251-301. https://doi.org/10.1111/j.1540-6261.2007.01207.x

Hols, M., & de Vries, C. (1991). The limiting distribution of extremal exchange rate returns. *Journal of Applied Econometrics, 6*(3), 287-302. https://doi.org/10.1002/jae.3950060306

Hutton, A., Marcus, A., & Tehranian, H. (2009). Opaque financial reports, R^2, and crash risk. *Journal of Financial Economics,94*(1), 67-86. https://doi.org/10.1016/j.jfineco.2008.10.003

Jansen, D.W. & de Vries C.G. (1991). On the frequency of large stock returns: Putting booms and busts into perspective. *The Review of Economics and Statistics*, *73*(1), 18–24. https://doi.org/10.2307/2109682

Javakhadze, D., Ferris, S. P., & French, D. W. (2016). Social capital, investments, and external financing. *Journal of Corporate Finance*, *37*, 38-55. https://doi.org/10.1016/j.jcorpfin.2015.12.001

Jung, M. J. (2013). Investor overlap and diffusion of disclosure practices. Review of Accounting Studies, 18, 167–206. https://doi.org/10.1007/s11142-012-9209-4

Kanihan, S. F., Hansen, K. A., Blair, S., Shore, M., & Myers, J. (2013). Communication managers in the dominant coalition. *Journal of Communication Management, 17*(2), 140-156. https://doi.org/10.1108/13632541311318747

Kaya, H., Lee, W. & Pornrojnangkool, B. (2011). Implementable tail risk management: An empirical analysis of CVaR-optimized carry trade portfolios. *Journal of Derivatives & Hedge Funds*, 17(4), 341-356. https://doi.org/10.1057/jdhf.2011.15

Khanna, V., Kim, E., & Lu, Y. (2015). CEO connectedness and corporate fraud. *The Journal of Finance*, *70*(3), 1203-1252. https://doi.org/10.1111/jofi.12243

LeCounte, J., Prieto, L., & Phipps, S. (2017). CEO succession planning and organizational performance: A human capital theory approach. *Journal of Leadership, Accountability and Ethics, 14*(1), 46-57. https://articlegateway.com/index.php/JLAE/index

Lin, N. (1999). Building a network theory of social capital. *Connections*, *22*(1), 28-51. https://www.exeley.com/journal/connections

Lin, N., Burt, R. & Cook, K. (2001). *Social capital: Theory and research.* https://doi.org/10.1017/CBO9780511815447

Liu, Y. (2014). Outside options and CEO turnover: The network effect. *Journal of Corporate Finance, 28*, 201-217. https://doi.org/10.1016/j.jcorpfin.2014.03.004

Marimoutou, V., Raggad, B., & Trabelsi, A. (2009). Extreme value theory and value at risk: Application to oil market. *Energy Economics*, *31*(4), 519-530. https://doi.org/10.1016/j.eneco.2009.02.005

Miller, E. M. (1977). Risk, uncertainty, and divergence of opinion. *The Journal of finance*, *32*(4), 1151-1168. https://doi.org/10.1111/j.1540-6261.1977.tb03317.x

Mishra, S., Talukdar, B., & Upadhyay, A. (2019). CFO appointment and debt-equity choice. *Managerial Finance., 46(2)*, 179-196. https://doi.org/10.1108/MF-10-2018-0484

Morck, R., Shleifer, A., & Vishny, R. (1988). Management ownership and market valuation: An empirical analysis. *Journal of Financial Economics*, *20*, 293-315. https://doi.org/10.1016/0304-405X(88)90048-7

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *The Academy of Management Review. 23(2)*, 242-266. https://doi.org/10.5465/amr.1998.533225

Pappas, V., Ongena, S., Izzeldin, M., & Fuertes, A. (2017). A survival analysis of Islamic and conventional banks. *Journal of Financial Services Research, 51*(2), 221-256. https://doi.org/10.1007/s10693-016-0239-0

Rezaee, Z. (2016). Business sustainability research: A theoretical and integrated perspective. *Journal of Accounting Literature, 36*, 48-64. https://doi.org/10.1016/j.acclit.2016.05.003

Rockafellar, R.T. & Uryasev, S. (2000). Optimization of conditional value-at-risk. *Journal of Risk*, 2(3), 21–41. https://doi.org/10.21314/JOR.2000.038

Simons, K. (1996, September/October). Value at risk - New approaches to risk Management. *New England Economic Review,* 3-13. https://www.bostonfed.org/publications/new-england-economic-review.aspx

Smith, J. (2009). Solidarity networks: What are they? And why should we care? *Learning Organization, 16*(6), 460-468. https://doi.org/10.1108/09696470910993936

Srivastav, A., Keasey, K., Mollah, S., & Vallascas, F. (2017). CEO turnover in large banks: Does tail risk matter? *Journal of Accounting and Economics, 64*(1), 37-55. https://doi.org/10.1016/j.jacceco.2017.05.001

Ullah, I., Ur Rehman, K., Hameed, R. M., & Kayani, N. Z. (2017). Development of CSR through ethical leadership: Constructive role of ethical culture and intellectual capital. *Pakistan Journal of Commerce and Social Sciences, 11*(3), 977-1004. http://www.jespk.net/

Van Bekkum, S. (2016). Inside debt and bank risk. *Journal of Financial and Quantitative Analysis*, *51*(2), 359-385. https://doi.org/10.1017/S0022109016000168

Wolter, K. M. (2007). *Introduction to variance estimation*. New York, NY: Springer.

Zhao, Y., & Chen, K. (2008). Staggered boards and earnings management. *The AccountingReview, 83*(5), 1347-1381. https://doi.org/10.2308/accr.2008.83.5.1347

Appendix A

Variable Definitions

Variable	Definition
Tail Risk	
idiorisk	Idiosyncratic Risk, the average return below the 10th percentile of the yearly distribution of the residuals from the market model (scaled up, multiplied by a factor of 100, i.e., 10x100, because it is in percentage form);
mktrisk	Market Risk, the average return below the 10th percentile of the yearly distribution of the predicted returns from the market model (scaled up, multiplied by a factor of 100, i.e., 10x100, because it is in percentage form);
Social Network	
CEOtotcon	CEO Total Connections, the number of total CEO connections from the summation of employment, education, and social connections in this study;
CEOemp	CEO Employment Connections, current or past coworkers who are executives or directors;
CEOedu	CEO Education Connections, education connections exist when two executives or directors went to the same school and graduated with similar degrees;
CEOsoc	CEO Social Connections, social connections formed when two executives or directors have an advanced role in the same non-profit organizations;
CFOtotcon	CFO Total Connections, the number of total CEO connections from the summation of employment, education, and social connections in this study;
CFOemp	CFO Employment Connections, current or past coworkers who are executives or directors;
CFOedu	CFO Education Connections, education connections exist when two executives or directors went to the same school and graduated with similar degrees;
CFOsoc	CFO Social Connections, social connections formed when two executives or directors have an advanced role in the same non-profit organizations;
Other Variables of Interest	
fCEO	Female CEO, 1 if the CEO is female, 0 otherwise;
fCFO	Female CFO, 1 if the CFO is female, 0 otherwise;
CEOtotcomp	CEO Total Compensation, comprised of salary and bonus;
CEOstock	CEO Stock, total value of restricted stock granted to CEO plus total value of stock options granted (using Black-Scholes);
CFOstock	CFO Stock, total value of restricted stock granted to CFO plus total value of stock options granted (using Black-Scholes);

Variable	Definition
Governance Variables	
indbrd	Independent Board, the percentage of independent board members;
CEOchair	CEO Chair, 1 if CEO is also the Chair, 0 otherwise;
femdirs	Female Directors, the percentage of female board members;
auditq	Audit Quality, number associated with auditing firm that audited the financial statements of a company; 1 if a Big Four, 0 otherwise;
indaudcom	Independent Audit Committee, 1 if audit committee is independent, 0 otherwise;
eindex	Entrenchment Index, as developed by Bebchuk, Cohen, and Ferrell (2009);
Firm Control Variables	
ocf	Operating Cash Flows, the net change in cash from all items classified in the operating activities section on a Statement of Cash Flows;
deratio	Debt-to-Equity Ratio, total debt divided total stockholders' equity;
cawocash	Current Assets without Cash, total current assets minus cash;
roe	Return on Equity, net income divided by shareholders' equity;
volatil	Volatility, measures as the standard deviation of ROE;
lnat	Natural Log of Total Assets, natural log of assets used to measure firm size;
segments	Segments, product / service segments of a company;
indusconc	Industry Concentration, the level of concentration in a company's industry, measured by the Herfindahl-Hirschman index (HHI);
acq	Acquisition, cash outflow of funds used for and/or the costs relating to acquisition of a company in the current year or effects of an acquisition in a prior year carried over to the current year;
Market Control Variables	
insthold	Institutional Holdings, percentage of market capitalization owned by institutional investors;
numanalst	Number Analysts, number of analysts following a company.