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A STUDY OF CFO AND CEO ATTRIBUTES: CASH AND OPERATING CYCLES AS DETERMINANT MEASURES OF SUCCESS AND EFFECT OF C-SUITE MEMBERS' SOCIAL NETWORK CAPITAL ON TAIL RISK

presented by Amy Fairfield

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A STUDY OF CFO AND CEO ATTRIBUTES: CASH AND OPERATING CYCLES AS DETERMINANT MEASURES OF SUCCESS AND EFFECT OF C-SUITE MEMBERS' SOCIAL NETWORK CAPITAL ON TAIL RISK

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A STUDY OF CFO AND CEO ATTRIBUTES: CASH AND OPERATING CYCLES AS DETERMINANT MEASURES OF SUCCESS AND EFFECT OF C-SUITE MEMBERS' SOCIAL NETWORK CAPITAL ON TAIL RISK

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ABSTRACT

The chief executive officer (CEO) is the face of an organization. Nonetheless, since the Sarbanes-Oxley Act of 2002, the importance of the chief financial officer (CFO) has increased (Alkhafaji, 2007; Schminke, Arnaud, & Keunzi, 2007). The CEO and CFO are the top two executive positions on the top management team (Hambrick & Mason, 1984). Essay 1 examines similar characteristics of the CFO and CEO against various firm performance metrics, with emphasis on cash cycle and operating cycle. The theory of cash management (Gitman, Moses, & White, 1979) emphasizes the importance of cash flow management as a means for a company to maintain its solvency. The responsibility to maintain solvency primarily belongs to the CFO.

The performance metrics have not been attributed to any particular characteristics of either the CFO or CEO. This analysis examined which attributes contribute to a CFO or CEO having more influence on firm performance. The characteristics showing significance are professional degree, certified public accountant (CPA) licensure, and industry experience. More

CFO characteristics showed significance than CEO characteristics, indicating more firm performance success contributed by the CFO.

There is a growing literature stream on CFOs, and with increased accountability being placed on the CFO, more will need to be known about this position and the characteristics that contribute to a successful CFO.

Essay 2 continues the study of CFOs and CEOs. I analyzed the impact of the CEO's and CFO's social network capital on 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). The CEO and CFO are the most dominant members of the top management team, driving organization outcomes by way of strategic initiatives (Amoozegar, Pukthuanthong, & Walker, 2017). Relationships between the CEO, CFO, and a firm's stakeholder groups form to create a social network that can evolve into social capital (Kanihan, Hansen, Blair, Shore, & Myers, 2013; Pappas, Ongena, Izzeldin, & Fuertes, 2017). I tested whether the CEO and CFO, with high social capital, can reduce the probability of the company stock persistently landing in the bottom 10% of yearly returns.

Top management team is supported by upper echelons theory (Hambrick & Mason, 1984). Social network is supported by social capital theory (Lin, Burt, & Cook, 2001). Tail risk is supported by the Fisher-Tipper theorem of extreme value theory (Basrak, 2011). There literature is 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 will have a negative effect on market capitalization and valuations. In addition,

analyzing the relationship between the C-suite members' social network and tail risk will provide an indication of the network's persuasive ability, for example, to obtain additional financing.

Both CFO total connections and CEO total connections were significant for market risk. This result was surprising because it is unusual for CEOs and CFOs to have influence over long-term market effects (French, 20003). Additional research will be needed to explore this phenomenon.

My research questions were as follows:

1. Which CFO and CEO attributes contribute to greater success as indicated by firm performance measurements?
2. Can the CFO and CEO parlay their social network capital to keep their company stock from perpetually landing in the bottom 10% of yearly stock price return distributions?

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ESSAY 1: CASH AND OPERATING CYCLES AS DETERMINANT MEASURES OF SUCCESS BETWEEN CEO AND CFO

ABSTRACT

I explore whether certain attributes are associated with chief financial officer (CFO) success and whether the CFO has more (or less) influence on firm financial performance than the chief executive officer (CEO). I included cash and operating cycles in the financial data. Cash cycle and operating cycle are often used to describe a company's success without directly being attributed to either the CFO or CEO. My study examined listed companies from the years 2003 through 2016. Annual financial data were obtained for the analysis. I employed ordinary least squares regression using panel data to test the relationship between CFO attributes and CFO success, controlling for the CEO (same attributes as CFO) and firm performance measures that affect financial data.

I found professional degree, certified public accountant (CPA) licensure, and industry experience are characteristics that show significance. In addition, I found that significant CFO attributes contribute more to firm performance than do significant CEO attributes.

Keywords: Cash cycle, operating cycle, chief financial officer, CFO, chief executive officer, CEO, firm performance

Essay 1: Cash and Operating Cycles as Determinant Measures of Success Between CEO and CFO

Since the Sarbanes-Oxley Act of 2002 (SOX), the importance of the chief financial officer (CFO) position has dramatically increased, as evidenced by the signatory requirement on Securities and Exchange Commission (SEC) quarterly and annual reports (Alkhafaji, 2007; Schminke et al., 2007). Nonetheless, CFOs have been receiving more attention (Barua, Davidson, Rama, & Thiruvadi, 2010; Datta & Iskandar-Datta, 2014; Geiger & North, 2006) and have come under greater scrutiny. The investing public expects the CFO to have knowledge of and control over the entire finance and accounting functions of the company and to uphold the fiduciary responsibility when reporting financial information to the SEC. It is imperative to understand how the CFO effectively and efficiently manages the finance functions on behalf of the company and to identify the attributes needed for success.

The purpose of this research is to analyze CFO attributes to determine whether there is some degree of success to be attained by the CFO, as measured by financial firm performance, including cash cycle (CC) and operating cycle (OC). A great deal of literature pertains to the role of the chief executive officer (CEO; Zhang & Wiersema, 2009), and although the CEO is ultimately responsible for an organization, the role of CFO has seen increasing relevance (Florackis & Sainani, 2018; Zorn, 2004). Often considered the number two position, behind the CEO (Buchheit, Reitenga, Ruch, & Street, 2019), a CFO is primarily responsible for financial reporting; has oversight of corporate treasury; and as a member of the top management team, must think strategically to make sound business decisions for the organization and its stakeholders.

In this study, I looked at the relationship between specific CFO attributes and financial information. The CFO attributes are age, gender, professional degree (e.g., Master of Business Administration), certified public accountant (CPA) designation, industry experience, total compensation, and tenure at current firm. The specific financial information explored are: profitability ratios (return on assets [ROA] and return on equity [ROE]), acquisitions, investments, cost of equity, and cycle measures (CC and OC).

For both CC and OC as well as acquisitions and investment, I used the natural log to eliminate outliers. All models were checked with winsorized data, with supporting results. In addition, I used only positive observations for acquisitions and cost of equity. Also, to ascertain whether the CFO performs better than the CEO, I included the same attributes (age, gender, professional degree, CPA designation, industry experience, total compensation, and tenure at current firm) for the CEO as control variables. I also included firm-specific control variables that impact financial performance.

CC and OC are used to assess company success (Groth, 1992). Previous research has utilized CC as the dependent variable (Jalal & Khaksari, 2020; Lai, 2006; Palombini & Nakamura, 2012; Rutgersson & Uddenberg, 2010), lauding the success of the company but there has been no direct measure for the efforts of the CFO or CEO and their contributions toward the success. With more attention being given to the role of CFOs and with the elevation of their accountability, there is an opportunity to fill a gap explaining the development of the CFO's role and the accompanying success that should follow, especially on behalf of the company's stakeholders.

All CFOs have a fiduciary responsibility to their companies' stakeholders. One of the most important functions of a CFO is to keep the company solvent. This is accomplished by

maintaining sufficient cash flow. The theory of cash management emphasizes the importance of cash flow management as a means for a company to maintain its solvency (Gitman, Moses, & White, 1979). Cash management has evolved from the study of cash collections and cash disbursements and the concept of maintaining the appropriate balance of cash. As the study of cash management gained practical acceptance, CC was developed as a performance measure. "Cash cycle is an additive measure of the number of days funds are committed to inventories and receivables less the number of days payments are deferred to suppliers." (Johnson & Soenen, 2003, p. 366). As a cash management tool, CC is instrumental in serving as an explanation for other financial ratios (Kpodoh, 2010; Rutgersson & Uddenberg, 2010).

I used a post-SOX time period, 2003 through 2016, for this study. The model parameters were estimated by ordinary least squares regression using panel data. I tested the impact of CFO and CEO attributes on company financial data. The results were analyzed to determine whether a reliable conclusion could be reached about the success of a CFO.

The implications of my study are three-fold. First, for the position of the CFO as well as board members; board members should be aware of a CFO's previous success as they add someone to the CFO position in the C-Suite. Second, for analysts as they determine firm value and disseminate their opinions to the investing public, who seek to do further analysis with the information found in financial statements and are looking for additional metrics to make more informed investment decisions (John, 2001). Third, regarding the abusive power, particularly by large firms, including manipulating CC or OC for their own benefit, especially in an economic downturn (Trent, 2019).

Grounded in the theory of finance, this research, supported by empirical findings, will contribute to the growing strand of literature focusing on the CFO. Specifically relying on the

theory of cash management (Gitman, Moses, & White, 1979), the analysis included how CFOs manage the acquisition and utilization of funds for their organizations, and the use of both CC and OC as measures for CFO success. Therefore, the research will also contribute to the use of CC and OC, especially as they relate to the success of a CFO. Prior research has indicated working capital improvement (Filbeck, Krueger, & Preece, 2007), success for companies (Jalal & Khaksari, 2020), and success for the supply chain (Duman & Sawathanon, 2009; Lopatta, Böttcher, & Jaeschke, 2018).

In addition, aspiring CFOs who are planning their careers, may begin during graduate or executive education. Accordingly, this study could contribute to academia, for the development of finance and accounting curriculum as well as career development. Extending graduate education to future CFOs, at the appropriate time in their career (given their age and experience) will benefit the CFO as well as their firm and its stakeholders.

Theory

The theory of finance is a theoretical framework of the subject matter (Fama & Miller, 1972). The theory of finance provides in-depth fundamental building blocks, encompassing many other economic theories. The theory of choice involves one's personal preferences, and in the field of finance, the problem arises as to how individuals' financial resources are allocated over time(Fama & Miller, 1972). The theory of finance addresses financial policy and investment decisions in the corporate world. Thus, in the context of an organization, decisions are not made by individuals; instead, the day-to-day operational decision-making is entrusted to professional managers—the agency relationship, supported by agency theory (Jensen & Meckling, 1976).

Fundamentally, managers are to operate such that they maximize profit in every unit of time and, subsequently, maximize net return to shareholders. Over the last several decades, the role of CFO has been elevated to managing shareholders and stock prices (Zorn, 2004) and since the enactment of SOX, a higher level of financial accountability. The CFOs must have the knowledge (and traits) to serve in their capacity as the manager who has primary responsibility for the accounting and finance functions of the firm (Baxter & Chua, 2008; Bourdieu, 1977; Büttner, Schäffer, Strauss, & Zander, 2013; Granlund & Lukka, 1998).

Hambrick and Mason (1984) proposed upper echelons theory to offer the foundation for further research into the link between managerial backgrounds and organizational outcomes. Their study suggested the emphasis should be on observable managerial characteristics (e.g., age, functional track, professional degree).

The purpose of this paper is to analyze the relationship between CFO attributes and CFO success, as shown in Figure 1.

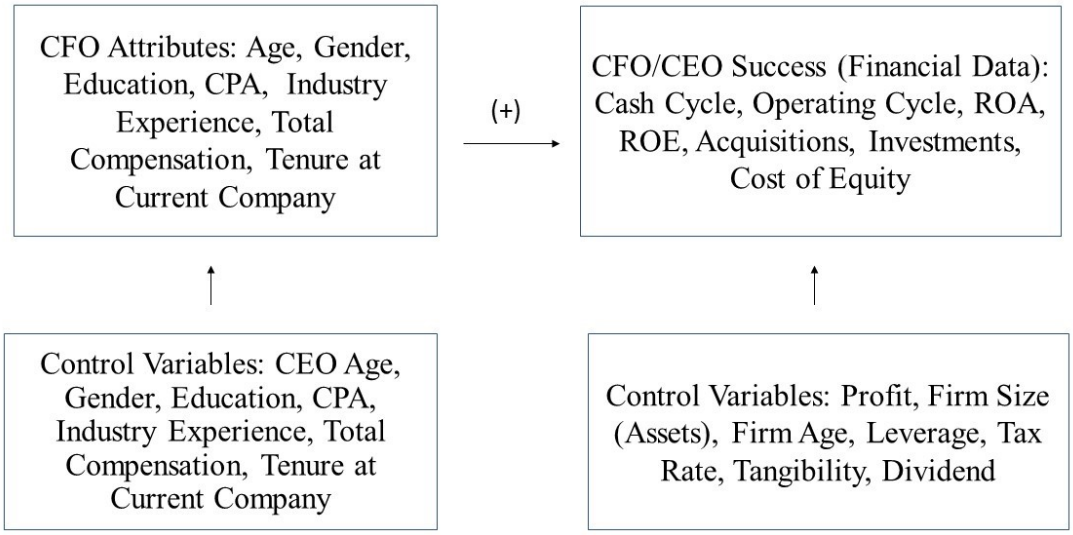

Figure 1. Essay 1 Conceptual framework of model.

This model delineates the conceptual framework of the model I used in the study. Chief Financial Officer (CFO) Success is the dependent variable, operationalized by numerous firm performance metrics. Control variables were added for the chief executive officer (CEO). CFO attributes are the independent variables. CFO attributes will positively impact CFO success. Control variables (that affect financial measurements) were also added. CPA represents certified public account; ROA represents return on assets; ROE represents return on equity.

Literature Review and Hypotheses Development

The operationalized variables used for CFO success are described in the following paragraphs, beginning with CC. The imbalance of outflows and inflows of cash to a firm causes liquidity issues. The concept of CC was introduced by Gitman (1974). Richards and Laughlin (1980) suggested that the concept of OC (the sum of inventory cycle and receivable cycle) became deficient due to ignoring the time dimension of current liability commitments which is useful for cash flow measurement and liquidity requirement of the firm. Thus, the cash conversion cycle (CC) was operationalized by Richards and Laughlin (1980) to show the amount of time between a company receiving payment from its customers and when the company must pay its suppliers. The purpose of this concept is to improve working capital management.

One factor critical to a company's success is its ability to effectively assess the health of its working capital cash flow generation (John, 2001). Previous research has shown that CC is better at diagnosing the health of a company's working capital cash flows. Although the current ratio seems to be a more popular financial tool in liquidity analysis, cash (conversion) cycle is a better predictor of cash flow (John, 2001). In addition, as a transactional measure that captures both the current assets and current liabilities of efficient management of working capital, it is better to use CC (Jalal & Khaksari, 2020). Maintaining a healthy cash rate is a treasury function, falling under the auspices of the CFO. A CFO would be more efficient, and more successful, if the CC were low. A shorter CC indicates better managerial efficiency, and as such, should serve as a proxy to indicate CFO success.

The market value rule applies when management makes investment and financing decisions based on the market and market prices. (Fama & Miller, 1972). Under the ordinary theory of production, once the production plan is in place, the objective is to maximize net

returns to shareholders. (Fama & Miller, 1972). In the ordinary theory of the firm, this is referred to as profit and profit maximization (Fama & Miller, 1972). Profitability can be measured by ROA and ROE.

Fundamental financial analysis is an essential step in the investment analysis process. Both ROA and ROE are strong profitability ratios, indicating how well a company utilizes its assets and shareholders' equity, respectively. These two commonly used ratios are utilized to measure a firm's strength.

It is often common practice to evaluate and measure the success of managers (CFOs and CEOs) based on financial metrics of a firm. These metrics often take the form of financial ratios. Financial ratio analysis is an integral part of financial analysis. There are five categories of financial ratios. For this analysis, I focused on one: profitability ratios, specifically, ROA and ROE. Both ROA and ROE have been used extensively in research (Banerjee & Kaya, 2016; Pettus, 2006) as they are indicative of a healthy company. Much like ROA and ROE indicate health and success of a firm, ROA and ROE will serve as proxies for CFO success.

Cash flows are the stream of earnings generated by a firm. Cash flow creation is in the context of cash earnings less accounting adjustments, for example, depreciation (Fama & Miller, 1972). The components of cash flow, sources and uses of funds, are generated by the firm's production and investment decisions, including acquisitions and capital expenditures (Fama & Miller, 1972). An increase in cash flow will provide additional funds. I predicted that additional funds would enable an increase in the number of acquisitions and/or an increase in the number of investments (capital expenditures). Value-added acquisitions and profitable investments will lead to greater success for a CFO.

The risk-return trade-off is a concept that beguiles (or worries) investors; it is a relative measure of one's portfolio, determined by one's parameters (Fama & Miller, 1972). The risk-return concept is also valid for the market as a whole. The pricing equation shows the market price per unit of expected value and the market price per unit of risk are the same for all shares (Fama & Miller, 1972).

Under the risk class model, based on a firm's operating (production-investment) decisions, the firm's total market value at any point in time is independent of its financing (Fama & Miller, 1972). The wealth of current shareholders is the same as the wealth of current bondholders (Fama & Miller, 1972). Thus, operating and financing decisions can be made independently (Fama & Miller, 1972). The weighted average cost of capital (WACC) is used to determine a company's cost of financing, either through borrowing or raising funds; WACC represents the effects of financing decisions on the firm's shareholders and bondholders. However, many companies do not (perhaps should not) use debt financing (Beneda, 2003; Elkhal, 2019; Hull, 2011; Pagano & Stout, 2004). In the absence of sufficient observations including debt, I used cost of equity in the model. A higher cost of equity means the cost of financing will be higher. Thus, I predicted a lower cost of equity will lead to great success for a CFO.

The CFO attributes chosen for this analysis are age, gender, professional degree, CPA designation, industry experience, total compensation, and tenure at current firm. These CFO attributes have been utilized in previous literature with supported empirical evidence of their efficacy (Barua et al., 2010; Datta & Iskandar-Datta, 2014; Geiger & North, 2006; Sellers, Fogarty, & Parker, 2016; Zhang & Wiersema, 2009). Many of these characteristics have roots in Spence's (1973) seminal signaling theory model. Education is the signal. Age and gender are

included as indices. The CFO attributes are explanatory variables for the response variables representing CFO success. The hypotheses that follow were developed to test and explain the relationships among these variables.

An older CFO will likely bring more experience to the office. The experience could come from outside the company, within the company, or perhaps even from an area other than accounting or finance. Regardless, an older CFO likely has the benefit of knowing the circumstances that precipitated the need for SOX.

Under the premise of SOX requiring CEOs and CFOs to certify their companies' financial statements, Huang, Rose-Green, and Lee (2012) examined the relationship between CEO age and the financial reporting quality of their firms. Relying on prior research, Huang et al. (2012) hypothesized that older individuals are more ethical and conservative than younger individuals and that they would less likely be involved in aggressive earnings management. Their results suggested that older CEOs are associated with higher-quality financial reporting (Huang et al., 2012). Similarly, in their research on the influence of individual executives on corporate financial reporting, Plöckinger, Aschauer, Hiebl, and Rohatschek (2016) noted that older CEOs are less often involved in fraudulent actions. Connecting age and experience with firm performance, Rambe and Mangara (2016) analyzed the impact of integrated reporting ratings (IRR), the CEO's age, and the individual's tenure as CEO on the company's share price. Their findings showed that share price of a company tends to increase with an increase in IRR, CEO age, and CEO years of experience (Rambe & Mangara, 2016). This leads to the argument that an older CFO will have more experience to manage the financial operations of a firm. Formally stated, my hypothesis is:

H_1: An older CFO will have more favorable firm performance outcomes.

By favorable outcomes, I mean lower CC and OC, higher ROA, higher ROE, more acquisitions, higher capital expenditures, and lower cost of equity.

A conservative financial decision made will not necessarily produce the best outcome. Making decisions requires risk assessment. In terms of risk taking, one can be more, or less, risk averse. There are noted gender differences in risk assessment abilities which may contribute to the understanding of a CFO's success.

Following Halpern's (1992) notion that studying gender differences can contribute to theoretical advances, Byrnes, Miller, and Schafer (1999) performed a meta-analysis to compare risk-taking tendencies between males and females; they discovered, in general terms, that males are more likely to take risks than females. Regarding financial decision-making by professionally trained investors, Olsen and Cox (2001) found that female investors weight risk attributes more heavily than male investors. In addition, they found that women will underscore risk reduction more than men when constructing portfolios (Olsen & Cox, 2001). In their research on the influence of individual executives on corporate financial reporting, Plöckinger et al. (2016) noted that female executives tend to report more conservatively and typically display more risk-averse accounting behavior than their male counterparts. Huang and Kisgen (2013) analyzed corporate financial and investment decisions made by both female and male executives. They found that male executives undertake more acquisitions and issue debt more often than female executives. They further report that acquisitions made by firms with male executives have announcement returns approximately 2% lower than those made by female executive firms. By comparison, Huang and Kisgen (2013) surmise that male executives demonstrate

overconfidence in their decision-making whereas female executives display more caution. This leads to the argument that a male CFO will be more aggressive in their decision-making. Formally stated, my hypothesis is:

H_2: A male CFO will have more favorable firm performance outcomes.

According to Spence's (1973) signaling theory, education is the signal to the employment market. Plöckinger et al. (2016) noted that more educated CEOs seem to be less often involved in fraudulent actions. Executives having a Master of Business Administration (MBA) degree tend to be more conservative in making their earnings forecasts, are more likely to disclose financial information, and report higher quality earnings (Plöckinger et al., 2016). In addition, CFOs with an MBA degree or CPA certification are less often involved in restatements than CFOs without such degrees (Plöckinger et al., 2016). Depending on their aspirations, CFOs can focus their expertise on the accounting field (CPA) or pursue a more extensive business degree (MBA). The business degree will assist a CFO with strategic decision-making. However, given the strict requirements imposed by SOX, it seems prudent for firms to seek CFOs with specialized accounting skills. In fact, O'Sullivan (2004) reported that after SOX in 2002, executive recruiters favored CFO candidates with a CPA. However, since then, Chahyadi and Abusalim (2011) found that CFOs in large firms have different education characteristics than CFOs in medium-sized firms. Their results showed that large firms rate CFOs with more general skills (MBA) more highly than CFOs with a Master of Accounting or CPA certification (Chahyadi & Abusalim, 2011). This leads to the argument that a CFO with a professional degree

will have the knowledge to utilize better financial tools, and a CFO holding a CPA license will have expertise in the accounting function. Formally stated, my hypotheses are:

H_3: A CFO with a professional degree (e.g., MBA) will have more favorable firm performance outcomes.

H_4: A CFO holding a CPA certification will have more favorable firm performance outcomes.

It was noted previously that with age comes experience, and that experience can be acquired in different places. Aier, Comprix, Gunlock, and Lee (2005) analyzed characteristics of CFOs associated with accounting restatements. One of their variables is experience at another firm; their results showed that companies having CFOs with this kind of experience are less likely to restate earnings Aier et al., 2005). Cohen and Dean (2005) operationalized top management team legitimacy by using two types of experience: top managers with industry experience and top managers with top management team experience; they reasoned that qualified and experienced top managers would have choices as to where they could work. Both types of experience, along with age, were significant, with prior industry experience and age having the greatest effect (Cohen & Dean, 2005). Another facet of experience is the extrinsic reward of compensation. Chahyadi and Abusalim (2011) analyzed education and experience of CFOs to ascertain if these variables affect CFO compensation. The findings indicated that a CFO's tenure at his or her current company and previous experience as a CFO at another company contribute to the CFO's compensation (Chahyadi & Abusalim, 2011). In addition, Chahyadi and Abusalim

(2011) found that older and more experienced CFOs are more highly compensated. This leads to the argument that having more experience in an industry will provide a CFO with more knowledge to manage the financial operations of their firm. Formally stated, my hypothesis is:

> H_5: A CFO with industry experience will have more favorable firm performance outcomes.

Extending from the last variable, I segue to a discussion on compensation. Holden (2005) analyzed the original incentive schemes developed by Du Pont and General Motors in the 1920s, connecting executive compensation to stock prices. In the 1990s, the use of stock options greatly increased; this was seen as a strategic move, to align the incentives of managers with those of stockholders (Holden, 2005). But by the early 2000s, these schemes were being criticized for encouraging excessive risk-taking, short-term orientation, and even tempting managers to commit fraud in order to ensure a high stock price at the time of exercise (Holden, 2005). Grossman and Hoskisson (1998) agreed that incentive plans expose executives to risk and imbue a short-term bias on their decision-making processes. They suggested developing an incentive plan that is based on the applicable performance metrics (be it accounting performance or stock price performance), that aligns with the firm's strategic plan, and considers the timing of rewards (Grossman & Hoskisson, 1998). To be more specific, Nourayi and Mintz (2008) tested the association between CEO tenure, compensation, and firm's performance. They used both cash compensation and total compensation as the dependent variables (Nourayi and Mintz, 2008). For performance measures, they utilize total one-year shareholder return on common stock and ROA (Nourayi and Mintz, 2008). Their findings revealed that compensation of less

experienced CEOs tends to be influenced by firm performance; they also found that performance measures are positively correlated with cash compensation and negatively with total compensation (Nourayi and Mintz, 2008). Feng, Ge, Luo, and Shevlin (2011) explored why CFOs become involved in material accounting manipulations. They discovered that while CFOs bear substantial legal costs when involved in accounting manipulations, these CFOs have similar equity incentives to the CFOs of matched non-manipulation firms (Feng et al., 2011). However, CEOs of manipulation firms have higher equity incentives and more power than CEOs of matched firms (Feng et al., 2011). Given that combination, they suggested their findings are consistent with the explanation that CFOs are involved in material accounting manipulations because they succumb to pressure from CEOs, rather than because they seek immediate personal financial benefit from their equity incentives (Feng et al., 2011). Balsam, Irani, and Yin (2012) analyzed the effect of job complexity, firm performance, and CFO-specific performance, on CFO compensation. Firm performance was proxied by accounting and stock market returns (Balsam et al., 2012). CFO-specific performance is measured on two dimensions: ability to meet or beat earnings targets and the use of earnings and/or expectations management in achieving that goal (Balsam et al., 2012). Their results suggested that overall firm performance affects both CFO salary and bonus, while CFO-specific performance affects CFO bonus (Balsam et al., 2012). More specifically, they found that CFOs are not only rewarded when their firms meet or beat earnings targets, but they receive incremental rewards for managing earnings and/or expectations to allow their firms to meet or just beat those targets (Balsam et al., 2012).

As members of the top management team, where strategic planning takes place, CFOs know the mission of the company, understand the detrimental ramifications of SOX, and would have access to provide pertinent information for establishing compensation plans for executives.

This leads to the argument that a CFO with higher total compensation will work not only to maintain their current position but to preserve the value of any restricted stock or stock options. Formally stated, my hypothesis is:

> H_6: A CFO with higher compensation will have more favorable firm performance outcomes.

Huang et al. (2012) used tenure to control for any confounding effects of experience on age and found the result for tenure to be insignificant. However, while examining the role of education and experience in CFO career and compensation, Chahyadi and Abusalim (2011) found that a CFO's tenure at his or her current company consistently dominated the measures of CFOs' education and experience to explain CFO compensation. In addition, Allgood and Farrell (2000) evaluated the effect of CEO tenure on the relationship between firm performance and forced turnover. Their findings indicated that performance-forced turnover is conditional on CEO tenure, noting the difference between an inside CEO, an outside CEO, and a founder (Allgood & Farrell, 2000). Dikolli, Mayew, and Nanda (2014) also found in their study of CEO turnover that CEO survival is associated with superior firm performance. This leads to the argument that a CFO who has been with his or her current firm for a longer period of time will have insight to manage the finance function more effectively. Formally stated, my hypothesis is:

> H_7: A CFO with longer tenure at his or her current firm will have more favorable firm performance outcomes.

Having hypothesized about each of the variables and the relationship between them, next is the methodology section to discuss design and the model. The CFO attributes will be regressed on each of the firm financial performance metrics. Also included in the model are control variables matched to the CFO attributes and control variables that affect the firm financial performance metrics.

Methodology

In this section, I present my research design. First, I discuss how I captured the key construct in my study, that is, CFO success. Second, I discuss how I proxied for CFO attributes. Then I present the model to test my hypothesis on CFO success.

Measures.

Chief financial officer success. There are seven dependent variables used as proxies for CFO success: CC, OC, ROA, ROE, acquisitions, investments, and cost of equity. For both CC and OC as well as acquisitions and investment, I used the natural log to eliminate outliers. All models were checked with winsorized data, with supporting results. In addition, I used only positive observations for acquisitions and cost of equity. Following Jalal and Khaksari (2020) and based on the effect they have on the dependent variables, the following control variables were included in the model: the natural log of total assets, firm age, leverage, firm tax rate, tangibility, and dividends. All control variables were lagged one year. Annual data was used. Thus, year-end fixed effects were included, as were industry-fixed effects. See Appendix A for variable definitions.

Chief financial officer attributes. The independent variables are the proxies used for CFO attributes: age, gender, professional degree, CPA designation, industry experience, total compensation, and tenure at current job. Many of these variables are included in Spence's (1972) signaling theory. To test whether a CFO has more (less) success than the CEO, similar variables are included in the model as controls. See Appendix A for variable definitions.

Data analysis.

Empirical model. Using panel data, ordinary least squares regression was used to examine the impact of CFO attributes on CFO success.

CFO Success = Intercept + Beta * CFO Attributes + CEO Attributes + Control Variables + error (1)

The following regression equation was tested to determine if there is any statistical significance to explain the relationship between CFO attributes and CFO success. In addition, I tested whether the CFO attributes contribute more to the success of the firm compared to the CEO attributes.

$$CFO\ Success = \lambda_0 + \lambda_1 * CFOage + \lambda_2 * CFOgender + \lambda_3 * CFOprofdeg$$

$$+ \lambda_4 * CFOcpa + \lambda_5 * CFOindusexp + \lambda_6 * CFOtotcomp + \lambda_7 * CFOtenure$$

$$+ \lambda_8 * CEOage + \lambda_9 * CEOgender + \lambda_{10} * CEOprofdeg + \lambda_{11} * CEOcpa$$

$$+ \lambda_{12} * CEOindusexp + \lambda_{13} * CEOtotcomp + \lambda_{14} * CEOtenure + \lambda_{15} * profit$$

$$+ \lambda_{16} * lnassets + \lambda_{17} * firmage + \lambda_{18} * lev + \lambda_{19} * taxrate + \lambda_{20} * tangib + \lambda_{21} * div$$

$$+ error \quad (2)$$

where CFO success is measured separately by CC, OC, ROA, ROE, acquisitions, investments, and cost of equity; and CFO attributes are measured by age, gender, professional degree, CPA designation, industry experience, total compensation, and tenure at current firm. I added CEO attributes, similar to the CFO attributes, as control variables to determine which officers' attributes contribute more to firm performance. Other control variables include profit, natural log of total assets, natural log of the firm's age, amount of leverage, tax rate of the firm, tangibility, and dividend.

Sample. My sample begins post-SOX, covering thirteen years from 2003 through 2016, and consists of all U.S. firms with available data. I obtained firms' financial data from the annual Compustat database, governance data from the BoardEx database, and salaries data from the Execucomp database. The final sample size for my main analysis was 88,694 observations. Firm-year observations with missing information was 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.

Results

Descriptive statistics. Table 1 presents the descriptive statistics for all the variables I used in this analysis. There are seven dependent variables used to measure firm performance, with the focus of the analysis being on both CC and OC. One of the most important functions of the CFO is cash management, but there are no direct connections linking successful firm performance by way of the CC or OC and specific characteristics directly attributable to the CFO. I included seven specific CFO characteristics; the same characteristics were included for the CEO as controls to determine which position contributes more to the success of the firm's performance. I also included seven firm performance control variables: profit, natural log of total assets, natural log of the firm's age, leverage, tax rate of the firm, tangibility, and dividend.

Table 2 presents the correlation among all the variables included in this analysis. The variables for CFO tenure and CFO industry experience were highly correlated as were total compensation for both CFO and CEO. However, after checking the variance inflation factor for each model and running collinearity diagnostics, there was no evidence of multicollinearity.

Table 1

Descriptive Statistics

Variable	Observations	M	SD	Q1	Median	Q3
CFOage	3,506	48.889	11.957	45.000	51.000	55.000
CFOgender	3,506	0.095	0.293	0.000	0.000	0.000
CFOprofdeg	3,539	0.009	0.096	0.000	0.000	0.000
CFOcpa	3,539	0.036	0.187	0.000	0.000	0.000
CFOindusexp	3,536	1.425	0.810	0.693	1.386	2.079
CFOtotcomp	3,539	7.120	1.082	6.573	7.195	7.772
CFOtenure	3,539	1.571	0.844	1.099	1.609	2.197
CEOage	4,313	55.014	9.493	51.000	55.000	60.000
CEOgender	4,313	0.034	0.181	0.000	0.000	0.000
CEOprofdeg	4,332	0.014	0.116	0.000	0.000	0.000
CEOcpa	4,332	0.007	0.084	0.000	0.000	0.000
CEOindusexp	4,332	1.925	0.780	1.386	2.079	2.565
CEOtotcomp	2,563	8.261	0.964	7.636	8.344	8.922
CEOtenure	4,106	1.764	0.857	1.099	1.792	2.398
cc	53,895	2.179	1.196	1.633	2.264	2.837
oc	68,098	2.633	0.989	2.156	2.653	3.139
roa	87,281	-5.257	472.698	-0.154	0.015	0.063
roe	64,205	-0.229	56.255	-0.100	0.075	0.184
acq	83,090	0.982	1.897	0.000	0.000	0.974
invest	86,240	0.050	0.085	0.010	0.027	0.060
costeqty	54,832	14.366	38.888	0.436	9.309	27.308

(continued)

(continued)

Control Variables

Variable	Observations	Mean	SD	Q1	Median	Q3
profit	88,694	-1.776	43.695	-0.063	0.078	0.140
lnassets	88,694	5.542	2.784	3.539	5.635	7.552
firmage	76,491	2.484	0.928	1.946	2.565	3.135
lev	88,512	4.929	130.100	0.314	0.538	0.761
taxrate	71,597	0.049	6.068	0.000	0.044	0.172
tangib	88,196	0.259	0.268	0.044	0.151	0.419
div	88,694	0.000	0.012	0.000	0.000	0.000

Note. Table 1 provides descriptive statistics for the variables of interest. CFOage represents the age of the CFO in each observation year; CFOgender indicates the gender of the CFO; CFOprofdeg indicates whether the CFO holds a professional degree (MBA, JD, MD, PhD); CFOindusexp represents the natural log of the CFO's industry experience; CFOtotcomp represents total compensation for the CFO; CFOtenure is the natural log of a CFO's tenure at his or her current firm; CEOage represents the age of the CEO in each observation year; CEOgender indicates the gender of the CEO; CEOprofdeg indicates whether the CEO holds a professional degree (MBA, JD, MD, PhD); CEOindusexp represents the natural log of the CEO's industry experience; CEOtotcomp represents total compensation for the CEO; CEOtenure is the natural log of a CEO's tenure at his or her current firm; cc represents the natural log of the cash cycle; oc represents the natural log of the operating cycle; roa represents return on assets; roe represents return on equity; acq represents the natural log of acquisitions; invest represents the natural log of investments; costeqty represents the cost of equity; profit represents profit; lnassets represents the natural log of total assets; firmage represents the natural log of the firm's age; lev represents leverage; taxrate represents the tax rate of firm; tangib represents tangibility; div represents dividend; Q1 represents the first quarter; Q3 represents the third quarter.

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)	(28)
(1)	*CFOage*	1																											
(2)	*CFOgender*	-0.03[b]	1																										
(3)	*CFOprofdeg*	0.03[c]	-0.01	1																									
(4)	*CFOcpa*	-0.02	0.05[a]	0.06[a]	1																								
(5)	*CFOindusexp*	0.22[a]	-0.02	0.00	0.00	1																							
(6)	*CFOtotcomp*	0.08[a]	-0.01	0.04[a]	-0.03[c]	0.17[a]	1																						
(7)	*CFOtenure*	0.27[a]	-0.03[c]	-0.00	0.00	0.85[a]	0.23[a]	1																					
(8)	*CEOage*	0.21[a]	0.05	0.01	-0.04	0.18[a]	0.07[c]	0.12[a]	1																				
(9)	*CEOgender*	-0.02	0.01	-0.02	-0.03	-0.07[c]	0.05	-0.05	-0.03[b]	1																			
(10)	*CEOprofdeg*	-0.01	-0.04	-0.01	0.04	-0.02	0.08[b]	-0.01	-0.00	-0.02	1																		
(11)	*CEOcpa*	0.02	-0.02	-0.01	0.20[a]	0.05	-0.04	0.06[c]	-0.01	-0.02	-0.01	1																	
(12)	*CEOindusexp*	0.13[a]	0.01	-0.01	-0.03	0.45[a]	0.27[a]	0.36[a]	0.24[a]	-0.03[b]	-0.02	0.04[b]	1																
(13)	*CEOtotcomp*	0.08	0.08	0.10[b]	-0.15[a]	-0.01	0.72[a]	0.07	0.10[a]	0.02	0.02	0.07[a]	0.14[a]	1															
(14)	*CEOtenure*	0.10[b]	0.00	-0.05	0.01	0.22[a]	-0.00	0.17[a]	0.31[a]	-0.04[b]	-0.01	-0.02	0.44[a]	-0.03[c]	1														
(15)	*cc*	0.04[b]	-0.03[c]	0.01	-0.02	0.03[c]	-0.07[a]	0.02	0.06[a]	-0.02	0.03[c]	-0.01	-0.01	-0.03	0.03	1													
(16)	*oc*	0.02	-0.05[a]	0.01	-0.01	0.01	0.01	0.00	0.07[a]	-0.01	0.03[b]	0.00	0.03[c]	0.07[a]	0.00	0.85[a]	1												
(17)	*roa*	-0.01	0.00	0.00	-0.00	-0.00	0.09[a]	-0.00	0.02	0.01	0.00	0.01	0.00	0.14[a]	-0.00	0.01[a]	0.01[b]	1											
(18)	*roe*	-0.02	-0.01	0.01	-0.00	0.02	0.02	0.01	0.02	-0.02	-0.00	-0.00	0.03[b]	0.05[b]	0.03	0.01	0.01[a]	0.14[a]	1										
(19)	*acq*	0.03[c]	-0.02	0.01	-0.05[a]	0.04[b]	0.30[a]	0.08[a]	0.03[c]	-0.02	0.02	-0.01	0.07[a]	0.29[a]	-0.00	-0.03[a]	0.01[a]	0.01[c]	0.00	1									
(20)	*invest*	-0.05[a]	-0.04[b]	-0.02	-0.03[c]	-0.02	0.01	-0.04[b]	-0.01	-0.02	-0.03[c]	0.02	0.01	-0.00	0.01	-0.20[a]	-0.14[a]	-0.01[a]	0.00	-0.05[a]	1								
(21)	*costeqty*	-0.02	0.01	-0.01	0.02	0.04[b]	0.04[b]	0.06[a]	-0.02	-0.01	0.01	-0.02	0.04[b]	-0.03[c]	-0.01	0.01b	0.02[a]	-0.00	-0.00	-0.04[a]	-0.05[a]	1							
(22)	*profit*	-0.00	0.02	0.00	-0.01	-0.01	0.16[a]	-0.00	0.01	0.01	0.00	-0.01	0.00	0.12[a]	0.00	-0.00	0.03[a]	0.43[a]	0.02[a]	0.02[a]	-0.11[a]	-0.00	1						
(23)	*lnassets*	0.04[b]	-0.00	0.02	-0.02	0.11[a]	0.60[a]	0.13[a]	0.11[a]	0.00	0.01	0.02	0.28[a]	0.66[a]	-0.06[a]	-0.07[a]	0.05[a]	0.02[a]	0.01[c]	0.47[a]	0.03[a]	-0.01[b]	0.08[a]	1					
(24)	*firmage*	0.05[a]	-0.02	0.03	-0.01	0.26[a]	0.24[a]	0.23[a]	0.16[a]	-0.03[c]	-0.03[b]	0.03	0.39[a]	0.24[a]	0.02	0.06[a]	0.10[a]	0.00	0.02[a]	0.15[a]	-0.08[a]	-0.02[a]	0.04[a]	0.33[a]	1					
(25)	*lev*	0.02	-0.01	-0.00	-0.00	0.02	-0.06[a]	0.01	0.00	-0.00	-0.00	-0.00	0.02[c]	0.25[a]	0.01	-0.01[a]	-0.02[a]	-0.40[a]	0.00	-0.02[a]	0.02[a]	-0.00	-0.31[a]	-0.07[a]	-0.01[a]	1			
(26)	*taxrate*	-0.01	-0.01	-0.00	-0.01	0.01	0.02	0.01	-0.03[b]	0.00	-0.00	-0.00	0.02	0.02	0.03[c]	0.00	0.00	0.00	0.00	0.01[b]	0.00	0.00	0.00	0.01[a]	0.00	-0.00	1		
(27)	*tangib*	-0.02	-0.03	-0.02	-0.04[b]	0.05[a]	0.03	0.02	0.04[a]	-0.02	-0.03[b]	0.02	0.11[a]	-0.01	-0.02	-0.29[a]	-0.23[a]	0.01	0.00	-0.03[a]	0.43[a]	-0.02[a]	0.01	0.24[a]	0.09[a]	-0.01[a]	-0.00	1	
(28)	*div*	-0.00	-0.02	-0.01	0.05[a]	-0.03[b]	-0.06[a]	-0.02	0.02	-0.01	0.00	0.02	0.02	-0.04[b]	0.02	-0.00	-0.01[a]	0.00	-0.00	-0.01[c]	N/A	-0.00	0.00	0.01[a]	-0.00	-0.00	0.00	-0.03[a]	1

Note. Table 2 presents Pearson correlation coefficients for all 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.

Table 3

The Relationship Between Chief Financial Officer and Chief Executive Officer Characteristics and Firm Performance Measurements.

Variables	cc	oc	roa	roe	acq	invest	costeqty
CEOage	0.006	0.003	0.000	0.007*	-0.009	0.000	0.064
	(0.005)	(0.003)	(0.001)	(0.004)	(0.012)	(0.000)	(0.126)
CFOprofdeg	0.105	0.130	0.008	0.296	1.156***	0.041***	-1.085
	(0.144)	(0.081)	(0.017)	(0.207)	(0.373)	(0.014)	(3.041)
CEOprofdeg	0.090	0.111	-0.059	-0.131	1.074	0.010*	-9.134
	(0.353)	(0.281)	(0.066)	(0.191)	(1.264)	(0.005)	(7.775)
CFOcpa	-0.124	-0.183	0.059***	0.366*	-0.362	-0.004	0.260
	(0.355)	(0.292)	(0.022)	(0.206)	(0.635)	(0.006)	(5.610)
CEOcpa	-0.024	0.246**	0.023	0.031	†	-0.018**	1.243
	(0.239)	(0.123)	(0.033)	(0.075)		(0.008)	(4.716)
CFOindusexp	-0.001	0.026	0.007	0.056	0.621***	-0.002	-5.262*
	(0.088)	(0.069)	(0.010)	(0.039)	(0.204)	(0.003)	(2.889)
CEOindusexp	0.169**	0.096**	-0.004	-0.046	-0.276*	0.003	0.784
	(0.075)	(0.042)	(0.009)	(0.049)	(0.159)	(0.003)	(1.676)
Control Variables							
profit	-0.314	-0.869***	0.389***	0.741***	2.150	0.016*	-28.146
	(0.489)	(0.284)	(0.047)	(0.056)	(1.318)	(0.010)	(21.747)
lnassets	-0.125***	0.007	0.011**	0.030**	0.675***	-0.003**	-0.540
	(0.035)	(0.021)	(0.004)	(0.014)	(0.086)	(0.001)	(0.836)
firmage	0.144*	0.057	-0.007	-0.017	-0.116	-0.002	-2.648
	(0.076)	(0.049)	(0.007)	(0.042)	(0.192)	(0.003)	(2.047)

(continued)

(continued)

Variables	cc	oc	roa	roe	acq	invest	costeqty
lev	-0.445***	-0.192**	-0.057*	-0.030	-0.377	-0.000	2.568
	(0.124)	(0.079)	(0.032)	(0.101)	(0.493)	(0.006)	(3.991)
taxrate	-0.070***	0.018	0.001	-0.003	0.023	0.001	-0.968***
	(0.023)	(0.064)	(0.006)	(0.012)	(0.016)	(0.001)	(0.229)
tangib	-1.209***	-0.928***	-0.069**	-0.314***	-0.978*	0.129***	-1.627
	(0.280)	(0.183)	(0.028)	(0.121)	(0.586)	(0.014)	(5.656)
div	-14.099	20.671	-1.693	77.171*	0.000	0.000	-235.294
	(16.128)	(13.459)	(1.238)	(42.834)	(0.000)	(0.000)	(204.888)
Constant	2.828***	2.577***	-0.081**	-0.390*	0.008	0.042**	29.079***
	(0.447)	(0.307)	(0.038)	(0.206)	(1.128)	(0.016)	(9.643)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	460	512	552	501	259	545	424
Adjusted R^2	0.206	0.173	0.486	0.284	0.306	0.570	0.344

Note. This table reports estimation from ordinary least squares regression. 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. † dropped by the model due to insufficient results.
*$p < .1$. **$p < .05$. ***$p < .01$.

Regression analysis. Table 3 reports the regression results for the CFO and CEO characteristics and firm performance analyses. In this section, I report the regression results and discuss the results of the relationship between CFO and CEO characteristics and the firm performance measures of success.

Chief financial officer age. The first hypothesis is that an older CFO will have both a lower CC and OC, a higher ROA and ROE, more acquisitions, higher capital expenditures, and lower cost of equity. There were no significant results for CFO age with any of the performance measurements. Therefore, the first hypothesis was not supported.

The average age of CFOs in my study was 48.9 years; the average age of CEOs was 55 years. Both of these average ages seem rather young so the results that an older CFO will have both a lower CC and OC, a higher ROA and ROE, more acquisitions, higher capital expenditures, and lower cost of equity is not a big surprise.

Post-SOX, the role of the CFO is on the rise; however, the literature has not necessarily followed the same trajectory. First, the CEO continues to be the primary position for study. In addition, the variables I used seem to appear in more research that is being done in the accounting area as opposed to the area of finance. For example, Huang et al. (2012) reported on age and financial reporting quality. The same argument applies to Plöckinger et al. (2016) wherein they noted that older CEOs are less often involved in fraudulent (financial reporting) actions. Although it stands to reason that an older CFO brings more knowledge to the table, being older, more ethical, and conservative does not necessarily deliver on any of the aforementioned firm performance measures.

In other untabulated results, both the univariate regression analysis and a subsample multivariate regression analysis for CC and age revealed CEO age was statistically significant, but positive, at the 10% level. This is not a surprise as the role of CEO requires a broader agenda that may necessitate a lower CC. Although none of the firm performance measures showed any significant results for CFO age, CEO age did have a positive and significant result for ROE.

Chief financial officer gender. The second hypothesis is that a male CFO will have both a lower CC and OC, a higher ROA and ROE, more acquisitions, higher capital expenditures, and lower cost of equity. There were no significant results for CFO gender with any of the performance measurements. Therefore, the second hypothesis was not supported.

The finding of no significant results for CFO gender was a surprise. All the firm performance variables used to measure success in this study require decision-making as well as some level of risk assessment. Byrnes et al. (1999), Olsen and Cox (2001), and Plöckinger et al. (2016) reported that males are more likely to take risks than females, but this appears to be irrelevant. Huang and Kisgen's (2013) results may help explain. They reported that acquisitions made by firms with male executives have announcement returns approximately 2% lower than those made by firms with female executives; they surmised that male executives demonstrate overconfidence in their decision-making whereas female executives display more caution (Huang & Kisgen, 2013). Laseter (2017) referred to overconfidence as hubris or dysfunctional confidence. That women display more caution may help to explain the results in untabulated results of subsample multivariate regression analyses, that is, CC was positive and significant for both CFO and CEO.

Chief financial officer professional degree. The third hypothesis is that a CFO with a professional degree will have both a lower CC and OC, a higher ROA and ROE, more acquisitions, higher capital expenditures, and lower cost of equity. Two of the firm performance measures (acquisitions and investments) were statistically significant at 1%. Investment was also positive and significant at 10% for CEO. Therefore, this hypothesis was partially supported.

As Plöckinger et al. (2016) noted, executives having an MBA degree tend to be more conservative in making their earnings forecasts, are more likely to disclose financial information, and report higher quality earnings. In addition, CFOs with an MBA degree or CPA certification are less often involved in restatements than CFOs without such degrees (Plöckinger et al., 2016). Once again, I will point out the expansive research on CEOs and (financial reporting) practices. Nonetheless, the business degree should prepare a CFO to make more strategic decisions with better results for these firm performance measures of success.

In untabulated results, the ROE univariate regression analysis, for both CFO and CEO, was positive and significant at the 10% level. On the other hand, both CC and OC subsample regression analyses for CFO were significant but positive.

There may be another explanation for this. Chahyadi and Abusalim (2011) found that CFOs in large firms have different education characteristics than CFOs in medium-sized firms. Their results showed that large firms prefer CFOs with more general skills (that is, having an MBA) than CFOs with an Masters of Accounting or CPA certification (Chahyadi and Abusalim, 2011). This makes sense as a larger firm will use the C-suite members for more strategic decision-making whereas a smaller firm will need the CFO to perform (or more closely oversee) many of the treasury functions. To continue with that thought, I turn to the next hypothesis.

Chief financial officer certified public accountant licensure. The fourth hypothesis is that a CFO with a CPA designation will have both a lower CC and OC, a higher ROA and ROE, more acquisitions, higher capital expenditures, and lower cost of equity. For this CFO characteristic, the results indicated 1% significance for ROA and 10% significance for ROE. Therefore, this hypothesis was partially supported. These two commonly used ratios are utilized to measure a firm's strength and it is no surprise that these two financial ratios indicated success for a CFO.

In other untabulated results, the univariate regression analysis for ROA was also significant for the CFO at 5%. In a subsample regression analysis for ROE, the results for CEO were statistically significant at 10%. In two subsample regression analyses for OC, both results for CFO were negative and significant; on the other hand, the results for CEO were significant but positive. For both CFO and CEO, the results from the subsample regression analysis for investment were significant but negative. Although both a CFO and CEO with a CPA designation would be skilled to make investment decisions, sometimes investment decisions are made with overconfidence by the CEO, and CFOs take their direction from the CEO.

Chief financial officer industry experience. The fifth hypothesis is that a CFO with more industry experience will have both a lower CC and OC, a higher ROA and ROE, more acquisitions, higher capital expenditures, and lower cost of equity. The results showed acquisitions significant at 1% and cost of equity significant at 10%. Therefore, this hypothesis was partially supported.

The untabulated results for the univariate regression analysis and other subsample regression analyses for acquisitions were also significant and positive for the CFO. The results for the CEO, however, were significant but negative.

In other untabulated results, the univariate regression analysis for ROE was significant and positive for CFO. The univariate regression analysis for cost of equity was significant and negative for the CFO. All CC and OC models for the CEO were significant and negative. Working capital management is a treasury function and although a CEO would be concerned about this, these metrics could get in the way of their decision-making; a more experienced CEO may well know exactly what kind of decisions can be made at the expense of CC and OC.

Chief financial officer total compensation. For the hypothesis pertaining to a CFO with higher total compensation, there were insufficient observations; the sample size was reduced by almost 40%. However, in untabulated results, both primary variables of interest (CC and OC) were statistically significant and negative for CFO. Similarly, OC was significant but negative for CEO.

Chief financial officer tenure at current position. The last hypothesis is that a CFO with a long tenure at his or her current firm will have both a lower CC and OC, a higher ROA and ROE, more acquisitions, higher capital expenditures, and lower cost of equity. There were no significant results for CFO tenure at current firm with any of the performance measurements. Therefore, this hypothesis was not supported. These results were surprising because it stands to reason that a CFO who has been in his or her position at a firm for a length of time would have success as measured by these firm performance metrics, but the surprise is tempered by the fact

that the average tenure for CFOs in my sample was 1.5 years. The average tenure for CEOs in my sample was 1.8 years. In untabulated results, there is one significant result for CEO: ROE was positive and significant at 10%.

Conclusion

The purpose of my study was to investigate the relationship between CFO attributes and determine whether there is some degree of firm success to be attained by the CFO. I used measures of financial firm performance, with a focus on CC and OC, to proxy for success. In addition, I included the same characteristics for the CEO as control variables to test whether the CFO or CEO contributes more to the firm performance measures. My research showed that some, but not all, of the characteristics are associated with firm performance measures of success. Looking at both CFO and CEO characteristics, some of the variables were positive, some were negative, and some showed no relationship. Table 4 provides a summary of the study findings.

Overall, there were more statistically significant results for the CFO than for the CEO. Thus, the attributes of the CFO contribute more success to firm performance than do the attributes of the CEO. There were more variables included that do not have significance than variables that do have significance. Therefore, the analysis is not without limitations, which I will now address.

Table 4

Summary of Essay 1 Study Findings

	Firm performance measurements						
	cc	oc	roa	roe	acq	invest	costeqty
CFO and CEO Characteristics							
CFOage	NS	NS	NS	NS	NS	NS	NS
CEOage	NS	NS	NS	positive*	NS	NS	NS
CFOgender	NS	NS	NS	NS	NS	NS	NS
CEOgender	NS	NS	NS	NS	NS	NS	NS
CFOprofdeg	NS	NS	NS	NS	positive***	positive***	NS
CEOprofdeg	NS	NS	NS	NS	NS	positive*	NS
CFOcpa	NS	NS	positive***	positive*	NS	NS	NS
CEOcpa	NS	positive**	NS	NS	NA	negative**	NS
CFOtotcomp	NA	NA	NA	NA	NA	NA	NA

(continued)

(continued)

	cc	oc	roa	roe	acq	invest	costeqty
CEOtotcomp	NA	NA	NA	NA	NA	NA	NA
CFOindusexp	NS	NS	NS	NS	positive***	NS	negative*
CEOindusexp	positive**	positive**	NS	NS	negative*	NS	NS
CFOtenure	NS	NS	NS	NS	NS	NS	NS
CEOtenure	NS	NS	NS	NS	NS	NS	NS

Note. NS = not statistically significant, NA = insufficient observations. Variables are defined in Appendix A. *$p < .1$. **$p < .05$. ***$p < .01$.

Limitations of this study. The time frame for this analysis is considered somewhat of a short time period, especially since most of the variables can be obtained for a 30-year data set. A longer time period would enable an event study, pre- and post- SOX (circa 2002). Also, the addition of quarterly data should be included for another robustness check. There are additional accounting variables that could be added to the model, for example, involuntary restatements and the timeliness of disclosures.

Suggestions for future research. The position of CEO is primarily the focus of attention for researchers but post-SOX, the role of CFO is on the rise to a more critical level of importance due to the accountability expected from the person in that position. In a sense, this is a new strand of research and when the topic of interest is accounting and/or finance related, it would add value to include the position of CFO. There are other areas of research in which to study CFOs; for example, research on personality traits (overconfidence, pessimism, cognitive dissonance) could be added to this model. It would also be interesting to create an index of CFO characteristics and personality traits; this could possibly lead to the creation of a CFO profile.

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Appendix A

Variable Definitions

Variable	Definition
CFO/CEO Success	
cc	Cash Cycle, days inventory outstanding plus days sales outstanding minus days payable outstanding;
oc	Operating Cycle, sum of inventory cycle and receivable cycle;
roa	Return on Assets, net income divided by assets;
roe	Return on Equity, net income divided by shareholders' equity;
acq	Acquisitions, 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;
invest	Investments, capital expenditures divided by total assets;
costeqty	Cost of Equity, capital asset pricing model (CAPM), the equity structure of the business;
CFO Attributes	
CFOage	CFO Age, current number of years old;
CFOgender	CFO Gender, 0 = Male, 1 = Female;
CFOprofdeg	CFO Professional Degree, 0 = no professional degree, 1 = professional degree (MBA, JD, MD, PhD);
CFOcpa	CFO CPA, 0 = does not have designation, 1 = has designation;
CFOindusexp	CFO Industry Experience, number of years working in current industry, based on SIC code;
CFOtotcomp	CFO Total Compensation, salary, bonus, restricted stock, stock options;
CFOtenure	CFO Tenure, number of years at current firm;
CEO Attributes	
CEOage	CEO Age, current number of years old;
CEOgender	CEO Gender, 0 = Male, 1 = Female:
CEOprofdeg	CEO Professional Degree, 0 = no professional degree, 1 = professional degree (MBA, JD, MD, PhD);
CEOcpa	CEO CPA, 0 = does not have designation, 1 = has designation;
CEOindusexp	CEO Industry Experience, number of years working in current industry, based on SIC code;
CEOtotcomp	CEO Total Compensation, salary, bonus, restricted stock, stock options;
CEOtenure	CEO Tenure, number of years at current firm;

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Variable	Definition
Control Variables	
profit	Profit, operating profit before taxes and depreciation divided by total assets;
lnassets	ln Assets, natural log of Total Assets;
firmage	Firm Age, from date of initial public offering;
lev	Leverage, total liabilities divided by total assets;
taxrate	Tax Rate, income tax expenses divided by the earnings before taxes;
tangib	Tangibility, net property, plant, and equipment divided by total assets;
div	Dividend, cash dividends divided by total assets.

ESSAY 2: EFFECT OF C-SUITE MEMBERS' SOCIAL NETWORK CAPITAL ON TAIL RISK

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, also known as the C-suite, driving organization outcomes by way of strategic initiatives. 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; many stakeholders will benefit. I found the CFO total connections variable significant in the base model, the overall 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

Essay 2: Effect of C-Suite Members' Social Network Capital on Tail Risk

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 ss 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 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 et al., 2017). 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).

In this study, I tested the relationship between tail risk and social network. I also included myriad financial variables as control variables and to explore as variables of interest. I used profitability, leverage, and market value ratios. I included variables for volatility and incorporated governance variables as well. 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 (circa 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 & Pornrojnangkool, 2011). Hedging, as a form of insurance against tail risk, has also gained in popularity as a financial tool (Kaya & Pornrojnangkool, 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 and 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, Fusari, & Todorov, 2019; Bollerslev, Todorov, & Xu, 2015; Kaya & Pornrojnangkool, 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 will 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.

Theory

Upper echelons theory states that the firm is a representation of those who lead it, that is, the top management team (Hambrick & Mason, 1984). For the purpose of this research, I specifically refer to the CEO and CFO. 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. Social capital theory describes the process by which capital is captured and reproduced for returns (Lin, Burt, & Cook, 2001). Using social capital theory,

LeCounte et al. (2017) drew on social capital with regards to CEO succession planning; oftentimes the heir apparent is the CFO.

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. In the context of this research, I looked at both components of tail risk: market risk and idiosyncratic risk.

The CEO and the CFO hold the top two positions on the top management team of organizations. They are responsible to many 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. Members of these stakeholder groups also make up the social network of the CEO and CFO. The connections between the CEO and CFO and their social network create social capital, and the importance of social capital is on the rise (Agarwal et al., 2018). Social capital can play an integral part in the financial space by maintaining stock price (Engelberg, Gao, & Parsons, 2012) and market capitalization.

The purpose of this paper is to analyze the relationship between the CEO and CFO social network capital and tail risk, as shown in Figure 1.

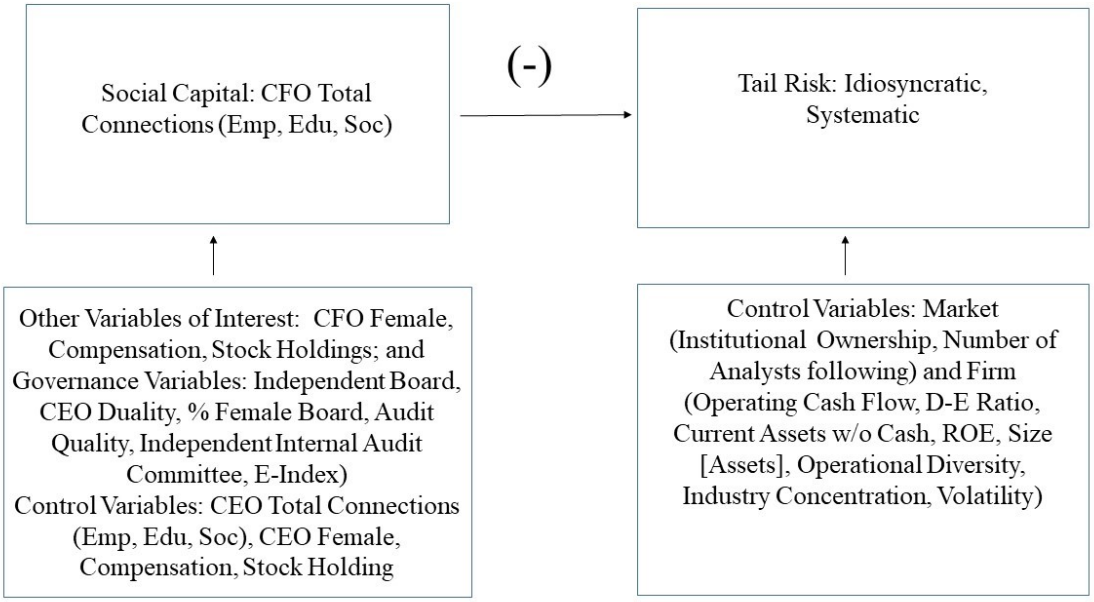

Figure 1. Essay 2 Conceptual framework of the model.

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.

Literature Review and Hypothesis Development

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, operation officer, human resources officer, general counsel, marketing officer and information officer (Groysberg, Kelly, & MacDonald, 2011; LeCounte, Prieto, & Phipps, 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). 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, 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).

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 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).

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 and 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 and 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 my 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.

Methodology

In this section, I 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 proxies for CEO and CFO social capital. Then I present the model I 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, Fusari, & Todorov, 2019; Bollerslev, Todorov, & Xu, 2015; Kaya & Pornrojnangkool, 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 the 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 found in Appendix B.

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 includes market controls: institutional holdings and the number of analysts following a company. All control variables were lagged one year. Another group of variables was 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); 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 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, 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.

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

Based on my hypothesis, I expected a negative sign for Beta.

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

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. Other 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. My 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 my main 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.

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 for me 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.

Since the global financial crisis (2007), tail risk is a topic of greater interest to researchers and a growing concern for financial executives (Andersen, Fusari, & Todorov, 2019; Bollerslev, Todorov, & Xu, 2015; Kaya & Pornrojnangkool, 2011). Social capital and the network of connections is playing 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 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
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

(continued)

(continued)

Variable	Observations	M	SD	Q1	Median	Q3
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

Note. 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, Ferrell, and Cohen (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.

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.

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.

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.

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)

Variables	Tail Risk: Idiosyncratic	Tail Risk: 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

Note. 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.

*$p < .1$. **$p < .05$. ***$p < .01$.

Table 4

Tail Risk Full Model (Idiosyncratic and Market)

Variables	Tail Risk: Idiosyncratic	Tail Risk: 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

Note. 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.
*$p < .1$. **$p < .05$. ***$p < .01$.

Tail risk: market risk and idiosyncratic risk. My hypothesis was 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% level. 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) in their power, that 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. A summary of the regression results can be found in Table 5.

Table 5

Summary of Essay 2 Study Findings (Full Model)

Variables	Tail Risk: Idiosyncratic	Tail Risk: Market
CFOtotcon	NS	negative***
CEOtotcon	NS	negative***
CFOgender	NS	NS
CEOgender	NS	NS
CFOtotcomp	NS	NS
CEOtotcomp	NS	NS
CFOstock	NS	NS
CEOstock	NS	NS

Note. NS = not statistically significant, ***$p < .01$. Variables are defined in Appendix A.

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.

Discussion

The purpose of my 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 an CEO's connectedness can 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. As a matter of 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 (2017) 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 6

Tail Risk

Variables	Tail Risk: Idiosyncratic	Tail Risk: 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)
volatil	-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 6 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 10% level for market risk; volatility, the standard deviation of ROE, was negative and significant at the 5% 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.

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 significance 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 7.

Table 7

Tail Risk

Variables	Tail Risk: idiosyncratic	Tail Risk: 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)

(continued)

(continued)

Variables	Tail Risk: Idiosyncratic	Tail Risk: Market
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.
*$p < .1$. **$p < .05$. ***$p < .01$.

Table 8

Tail Risk

Variables	Tail Risk: idiosyncratic	Tail Risk: 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

Note. 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.

*$p < .1$. **$p < .05$. ***$p < .01$.

In Table 8, 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 I cited in the Discussion section. Cai et al. (2014) referred to institutional investors. Also, Jung (2013) referred to market-risk disclosure and institutional investor overlap between firms.

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.

Conclusion

In Essay 1, I analyzed various attributes of the CFO. I was looking for evidence to suggest the attributes would contribute to more successful firm performance. In addition, I compared the same characteristics of the CEO to see if one position or the other shows a greater contribution to the success of the firm's financial performance. There were several significant results for various attributes and firm performance measurements. The variable for CEO age was positive and significant for ROE. The CEOs with a professional degree indicated a positive and significant result regarding investments; while a CEO with a CPA designation did have positive and significant results with operating cycle, there was negative significance with investments. Industry experience of CEOs showed positive significance for both cash and operating cycle, but negative significance for acquisitions. The CFOs with a professional degree indicated positive significance with both acquisitions and investments, and CFOs with a CPA designation had positive significance with both ROA and ROE. Industry experience of CFOs contributed positive significance to acquisitions and negative significance with cost of equity. Given the hypothesized expected sign, there were more significant results for the CFO; thus, the attributes for the CFO indicated that the CFO contributed more to the success of the firm's financial performance.

In Essay 2, 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 we 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% level. 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) in 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 significance. Although the results did not turn out as expected, the results provide an interesting avenue for future research. A summary of results from both studies can be found in Table 9.

Table 9

Summary of Study Findings

	Study 1							Study 2		
	cc	oc	roa	roe	acq	invest	costeqty	Tail Risk: idiosyncratic	Tail Risk: market	
CFOage	NS	NS	NS	NS	NS	NS	NS	NS	negative***	CFOtotcon
CEOage	NS	NS	NS	positive*	NS	NS	NS	NS	negative***	CEOtotcon
CFOgender	NS	NS	NS	NS	NS	NS	NS	NS	NS	fCFO
CEOgender	NS	NS	NS	NS	NS	NS	NS	NS	NS	fCEO
CFOprofdeg	NS	NS	NS	NS	positive***	positive***	NS	NS	NS	CFOtotcomp
CEOprofdeg	NS	NS	NS	NS	NS	positive*	NS	NS	NS	CEOtotcomp
CFOcpa	NS	NS	positive***	positive*	NS	NS	NS	NS	NS	CFOstock
CEOcpa	NS	positive**	NS	NS	NA	negative**	NS	NS	NS	CEOstock
CFOtotcomp	NA	NA	NA	NA	NA	NA	NA			
CEOtotcomp	NA	NA	NA	NA	NA	NA	NA			
CFOindusexp	NS	NS	NS	NS	positive***	NS	negative*			
CEOindusexp	positive**	positive**	NS	NS	negative*	NS	NS			
CFOtenure	NS	NS	NS	NS	NS	NS	NS			
CEOtenure	NS	NS	NS	NS	NS	NS	NS			

Note. Variables are defined in Appendix A of each essay.

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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;

(continued)

(continued)

Variable	Definition
CFOtotcomp	CFO 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);
Governance Variables	
indbrd	Independent Board, the percent of independent board members;
CEOchair	CEO Chair, 1 if CEO is also the Chair, 0 otherwise;
femdirs	Female Directors, the percent 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, Ferrell, and Cohen (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, percent of market capitalization owned by institutional investors;
numanalst	Number Analysts, number of analysts following a company.

Appendix B

Calculating Tail Risk

Directions for calculating tail risk:

From WRDS CRSP, download PERMNO, CUSIP, RET, SIC Code. Then use the following command to get lowest 5% return by DATE.

```
use "C:\YOUR_FILE_NAME.dta", clear
sort date
drop if ret==.
drop if ret==0
astile size20=ret, nq(20) by(date)
sort date ret
keep if size20==1
sort permno date
g es=ret*-1
```

Now run the following equation:

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

Ri,t is ES. For Rm,t use VWRETX from CRSP (Market index Daily Frequency) and save as a separate file. For Rb,t use the following command in your daily return (original) file.

```
egen indusret = mean(ret), by(siccd date)
```

After you calculate industry return save them as "industry return"

Merge all three files (Firm return, Market return and Industry return) by date. You will see many repeats of market and industry returns, as there are many firms that belong to the same industry. All industries belong to the same market.

Use STATA commands to run regression (previous equation) and then *predict* firm return (Ri,t) is systematic tail risk. Residuals calculated from the aforementioned model is idiosyncratic tail risk.

regress es vwretx indusret

predict eshat

predict double resid, residuals

save (click save as)

Stata code to calculate tail risk

```
*start here with daily return
use "YOUR_FILE_NAME.dta"
drop vwretx
sort date
drop if ret==.
drop if ret==0
astile size10=ret, nq(10) by(date)
sort date ret
keep if size10==1
sort permno date
g es=ret*-1
save as "YOUR_FILE_NAME_10.dta", replace
*use original data of daily return
use "YOUR_FILE_NAME.dta", clear
rename RET ret
egen indusret = mean(ret), by(siccd date)
rename SICCD siccd
rename PERMNO permno
egen indusret = mean(ret), by(siccd date)
save as "YOUR_FILE_NAME/industryret.dta"
*use original file of daily return
use "YOUR_FILE_NAME.dta"
```

```
rename PERMNO permno
drop TICKER
drop COMNAM
drop CUSIP
rename SICCD siccd
drop siccd
rename RET ret
drop ret
save as "YOUR_FILE_NAME/mktret.dta"
use "YOUR_FILE_NAME/industryret.dta"
sort siccd date
quietly by siccd date: gen dupe = cond(_N==1,0,_n)
drop if dupe>1
save "YOUR_FILE_NAME.dta", replace
*start here with nq10
use "YOUR_FILE_NAME/firmretnq10.dta", clear
merge m:1 date siccd using "YOUR_FILE_NAME/industryret.dta",
keepusing(indusret)
keep if _merge==3
sort date siccd
save "YOUR_FILE_NAME/firmretnq10.dta", replace
use "YOUR_FILE_NAME/mktret.dta"
quietly bys date: gen dupe = cond(_N==1,0,_n)
```

```
drop if dupe>1
save "YOUR_FILE_NAME/mktret.dta", replace
use "YOUR_FILE_NAME/firmretnq10.dta", clear
drop _merge
merge m:1 date using "YOUR_FILE_NAME/mktret.dta", keepusing(vwretx)
save as "YOUR_FILE_NAME/firmretnq10.dta", replace
regress es vwretx indusret
predict eshat
predict double resid, residuals
save "YOUR_FILE_NAME/firmretnq10.dta", replace
g year=year(date)
bys permno year: egen tailrisk10 = mean(resid)
bys permno year: egen systemes10 = mean(eshat)
sort permno year tailrisk
quietly by permno year tailrisk:gen dup = cond(_N==1,0,_n)
sum dup
drop if dup>1
save "YOUR_FILE_NAME/firmretnq10.dta", replace
```

VITA

Amy Fairfield received both her bachelor's and MBA degrees from Bradley University. Upon graduation, she worked as a General Securities Representative (Series 7 and 63 exams) as well as a General Securities Principal (Series 24 exam) to develop a new securities exchange. Amy subsequently returned to Bradley and has been an instructor in the Department of Finance and Quantitative Methods since 1999. In 2012, Amy accepted a new assignment as Undergraduate Recruiting Coordinator for the Foster College of Business. As such, she serves as liaison to the university admissions and recruitment staff as well as actively promotes the College's undergraduate opportunities to prospective students and parents to effectuate the Foster College of Business's enrollment plan.

Prior to her recruiting position, Amy served as Director of both the Project Springboard Business Plan Competition and the Assurance of Learning program in the Foster College of Business. Assurance of Learning responsibilities included planning and oversight toward the maintenance of the college's Association to Advance Collegiate Schools of Business (AACSB) accreditation. The AACSB is the premiere business education accrediting body in the world, assuring quality and promoting excellence and continuous improvement in undergraduate and

graduate education for business and accounting. Amy was instrumental in achieving a successful reaccreditation at the review in 2011.

Amy is very active at all levels of service within the university: to the department, the college, and the university as a whole. She is also an active volunteer in her community.