CEO Succession, Audit Pricing, and Firm Value: The Role of Supply Chain Knowledge

Abstract

This study examines several issues in the context of CEOs' supply chain knowledge. Organizational complexity, particularly the diversification of organizational structure, is essential to the growing trend of Supply Chain Management. Consistent with this notion, we find that CEOs with supply chain knowledge are more likely to be recruited by firms with higher organizational complexity. We also show that among outsider CEOs audit fees are greater when the CEO previously worked for a partner within the supply chain, and that insider CEOs demand more audit effort or greater audit scope and coverage. Appointing a new CEO who previously served for a partner within the supply chain or promoting a new CEO from inside an organization adds greater value to firms than that outside a supply chain, suggesting that new CEOs with supply chain knowledge is valued at a premium. These results are robust to alternative specifications and analyses designed to mitigate the concern that our findings are driven by factors leading to the CEO change.

Keywords: audit pricing; CEO succession; firm value; organizational complexity; supply chain knowledge

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1. Introduction

Incoming Chief Executive Officers (CEOs) often commence significant changes after succession.   Major changes to a firm's mission and strategy may significantly affect both operational decisions and financial policies (Bills, Lisic, and Sedel, 2017).   Even without the presence of strategic changes, an incoming CEO may bring a distinctive management style that affects firms' financial reporting decisions.   Extant research indicates that firms change financial policies after CEO turnover (Pan, Wang, and Weisbach, 2016), and that executives can exercise their influence over accounting quality (Ge, Matsumoto, and Zhang, 2011).

Risk sharing and the specialization of management are the major advantages of the corporate form of organization, and yet at the expense of "separation of ownership and control" (Fama and Jensen, 1983; Demsetz, 1983).   In assessing the risk of material misstatement, auditors evaluate the company's control environment (Public Company Accounting Oversight Board, 2010a, AS 1101, para. 6).   The risk increases with amount of evidence that the auditor should obtain (PCAOB, 2010b, AS 1105, para. 5), which may, in turn, affects audit pricing.

The CEO turnover process increases the risk of an audit litigation and therefore audit fees.   For instance, several studies explore the issues on CEOs subject to non-routine change versus routine change as well as forced turnover versus voluntary turnover (e.g., Huang et al., 2014; Pourciau, 1993; Wells, 2002).   They generally find that non-routine/forced CEO turnover negatively affects earnings or audit quality.   Specifically, a non-routine CEO change

creates uncertainty regarding both the company's future operating strategy and the new CEO's ability to effectively manage the organizational changes (Clayton, Hartzell, and Rosenberg, 2005).

Another line of research argue that stakeholder perceptions of risk associated with CEO turnover may be lower when a new CEO is promoted from inside a firm relative to external replacement (Bebchuk and Stole, 1993; Bills et al., 2017; Laux, 2012). However, external CEOs come with considerable upside may be also accompanied by significant downside – risk (Ranft et al., 2006). The positive relation between new CEOs and audit fees is further mitigated when the new CEO is promoted from within the firm relative to those hired from outside the firm, and that this mitigation effect is greater for heir apparent insiders than for non-heir apparent insiders (Bills et al., 2017).

A growing body of research finds that CEO characteristics affect audit risk. For instance, Johnson et al. (2012) and Judd, Olsen, and Stekelberg (2017) document that auditors charge higher fees when a client's CEO exhibits behavior and attitudes consistent with narcissism. Hribar et al. (2012) find that overconfident CEOs report more aggressively, and that auditors charge higher fees to compensate for aggressive reporting. Harjoto, Laksmana, and Lee (2015) provide evidence that firms with female and ethnic minority CEOs pay significantly higher audit fees than those with male Caucasian counterparts. Kim, Li, and Li (2015) document a positive relation between CEO portfolio vega equity and audit fees, suggesting that auditors consider higher earnings-management risk to be associated with equity compensation. Moreover, Kalelkar and Khan (2016) find that firms with a financial expert CEO pay lower audit fees. The findings of the above studies increase our understanding that auditors consider the CEO's characteristics to be a relevant factor in audit

pricing decisions.

We extend the relevant literature by investigating a relatively neglected aspect of CEO characteristics around turnover, namely, whether a new CEO previously worked for a company within/outside a supply chain influences audit pricing.   Outsider CEOs are commonly hired to formulate and implement strategic change or replace a poorly performing CEO (Elosge et al., 2018).   Audit committees responsible for setting and approving audit fees may demand greater assurance surrounding uncertainty associated with new CEOs who are less likely to adapt their strategies in response to environmental changes, which would lead to an increase in audit fees.   Moreover, auditors' strategic risk assessment is associated with the outcome of the audit process (Bruynseels and Willekens, 2012).   Accordingly, a company's strategic interactions with the incoming CEO's career experience can have important implications of audit pricing.

Prior studies provide evidence on the negative relation between auditors' supply chain knowledge and audit pricing (Chen et al., 2014; Johnstone, Li, and Luo, 2014).   They define supply chain knowledge from the accounting and auditing perspectives as comprehension of information and processes regarding accounting and auditing issues that relates to a supplier and its major customer, which is particularly beneficial for approaching the complexities associated with the revenue cycle (Johnstone et al., 2014).   Supply chain knowledge presents at both the individual auditor and the entity level through audit firm expertise, knowledge organizing mechanisms, and personal communication systems.   Accordingly, supply chain knowledge helps auditors to make more informed opinions and more accurate risk assessments, thus leading to higher audit quality (Chen et al., 2014; Johnstone et al., 2014). While the auditing literature explores the effect of audit firms' expertise and/or knowledge on

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audit fees, relevant research neglects the potential impact on the audit pricing of CEO's unique knowledge along the supply chain.

As CEOs gain further relationship- and transaction-specific experiences over time, they develop an understanding of commonalities and shared risks/opportunities among supply chain partners, which forms exclusive CEO-level supply chain knowledge. Supply chain knowledge is defined as the conglomeration of all the information resources and knowledge assets available for supply chain partners from a wide range of industries that would contribute the supply chain objectives' achievement (Taher, Bandarian, and Moghadam, 2016). Recognizing the importance of supply chain knowledge helps implement supply chain-related organizational activities (Lee and Nam, 2016; Richey, Tokeman, and Wheeler, 2006). Specifically, knowledge sharing with the supplier is a factor that leads to improved product and financial performance (Lakshman and Parente, 2008).

Additionally, extant research (e.g., Bozarth et al., 2009; Closs and Mollenkopf, 2004; Russell and Hoag, 2004) indicates that organizational complexity, particularly the diversification of organizational structure, is essential to the growing trend of supply chain management.[1] However, to date, it has received minimal coverage among prior studies. Berry et al. (2006) document that new CEOs in diversified firms are older, more educated, and are paid more when hired. Their results indicate that firm complexity and scope affect CEO succession. Coles, Daniel, and Naveen (2008) and Klein (1998) argue that the CEO's need

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[1] There appears to be little consensus on the definition of "supply chain management." (Kauffman, 2002; Burgess, Prakash, and Koroglu, 2006). Mentzer et al. (2001) propose a definition that is comprehensive and adequately reflecting the breadth of issues that are usually covered under this term. Specifically, the authors defined supply chain management as "*the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.*" Given that our issue of interest is "supply chain knowledge", we have not strictly adhered to all the nuances conveyed in this definition.

for advice will increase with the complexity of the organization. Furthermore, Zahavi and Lavie (2013) provide evidence that companies that engage in related diversification already have some relevant experience and knowledge about the industry, which in turn helps these companies learn and monitor their supply base. The importance of supply chains within today's economy therefore raises the question of whether the CEO's supply chain-relevant knowledge is associated with organizational complexity.[2]

We perform the two-sample *t*-test on the diversification measures to test the hypothesis of mean differences between CEO-firm-year observation with supply chain knowledge and those without supply chain knowledge. The results indicate that both mean number of business segment and Herfindahl-based measure for CEO-firm-year observations with supply chain knowledge is significantly higher than those without supply chain knowledge. Our findings are consistent with the notion that CEOs with supply chain knowledge are more likely to be recruited by firms with higher organizational complexity.[3,4]

Diversification may give rise to internal agency costs (Denis, Denis, and Sarin, 1997a, b). Firms facing higher levels of agency costs rely more on their external auditors to relieve such costs (Jensen and Payne, 2005). To the extent that firms with higher organizational complexity are more likely to appoint a new CEO from within the supply chain, the successor

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[2] It is reasonable to expect that industry knowledge overlaps with supply chain knowledge. Industry knowledge is defined as being able to maintain self-specialized knowledge, to follow the changes in industry and trends, and to build industry-based knowledge (Gulbahar and Kalelioglu, 2015) whereas supply chain knowledge is more generalized and defined as previously.

[3] In contrast with relevant studies (i.e., Chen et al., 2014; Johnstone et al., 2014), we include competitors in the supply chain partnership. That is, as the CEO gains further experience over time, he/she develops an understanding of commonalities and shared risks/opportunities among the firm itself and supply chain partners, which include major suppliers, customers, and competitors.

[4] Limiting the analysis to only observations of CEO turnover was common in earlier empirical studies in the economics and finance literature (Barron, Chulkov, and Waddell, 2011; Huson, Malatesta, and Parrino, 2004). Following relevant studies (Bills et al., 2007; Huang et al., 2014), we do not compare pre- and post-CEO succession observations because CEO turnover is endogenous and partially determined by the firm's financial performance (Murphy and Zimmerman, 1993).

has a higher propensity to demand more audit efforts in response to increased levels of agency costs. Accordingly, we also examine whether the association between CEO succession planning and audit pricing is moderated by supply chain management skills.

The results indicate that audit fees are higher for companies with a new CEO who previously worked for a company within a supply chain or is promoted from inside an organization than for those with a new CEO who previously served for a company outside the supply chain. We also find that among outsider CEOs audit fees are greater when the CEO previously worked for a company within the supply chain, and that insider CEOs demand more audit effort or greater audit scope and coverage, suggesting that both CEO succession plans (identifying a new outsider CEO with supply chain management skills and identifying a new insider CEO) demand more audit efforts to relieve agency costs.

Additional findings document that appointing a new CEO who previously served for a company within the supply chain enhances firm value. We also find that among outsider CEOs the value gains are more pronounced when the CEO previously worked for a company within the supply chain, and that insider CEOs add greater value to firms than those without supply chain knowledge. We believe that our results are consistent with the notion that successor CEOs with supply chain knowledge consider agency costs large enough to make external audits valuable.

We conduct two additional analyses. First, due to uneven sample size between the treatment (firm-years with CEO turnover) and control (firm-years without CEO change) groups, we employ the propensity score matching approach to test the robustness of our findings. The propensity score matching approach yields 1,136 firm-year observations, 568 for firms with CEO change and the other 568 without CEO change. Our results are still hold

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to this robustness check.   Secondly, to determine whether our results are driven by observations where the firm has a new auditor, we repeat the analysis using a sub-sample removing all observations where the auditor is within the first three years of tenure with the client.   Our inferences hold for this alternative sample.

Our results reveals that new CEOs who previously worked for a company within a supply chain demand more audit efforts in response to high agency problems.   Increase in agency costs results in an increase need for intensive auditing, which leads to higher audit quality.   Accordingly, new CEOs with supply chain knowledge is valued at a premium. Taken together, the combined evidence suggests that appointing a new CEO with supply change knowledge to reduce agency costs can be an effective way to enhance firm value.

This paper contributes to audit-planning literature by providing evidence on an unexplored implication.   Specifically, we include the adaptation of the knowledge distribution framework posited in Johnstone et al. (2014).   This study uses that foundation and adapts it to the CEO turnover context.   We extend the literature by exploring whether new CEOs with supply chain-relevant knowledge affect the auditor's fee-setting process. Specifically, this study presents the first attempt in accounting literature to investigate whether new CEOs' supply chain knowledge plays an essential role in the audit risk and firm value assessment of succession practices.   This paper provides evidence on a new dimension of CEOs' knowledge acquisition and transfer via supply chain specialization.

The remainder of this paper is organized as follows.   Section 2 contains a review of relevant research and development of the hypothesis.   Section 3 reports the sample distribution.   Section 4 presents our research design.   Section 5 reports empirical results.

Section 6 presents the findings of additional analyses.   Section 7 concludes and offers directions for future research.

2.   Literature review and research hypotheses

2.1. Tone at the top and transition of leadership

A CEO is an individual at the top of a firm whose personal reputation can have direct and long lasting impact upon the organization (Ranft et al., 2006).   A CEO has a strong influence on the firm's ''tone at the top,'' which is a fundamental way in which he/she proclaims leadership.   A firm's "tone at the top" reflects the CEO's personality and affects the auditor's assessments of the client's inherent and control risks, due to its prevalent impact on the client's financial reporting and organizational practices (Judd, Olsen, and Stekelberg, 2017; Patelli and Pedrini, 2015; Schmidt, 2014).

Transition of key leadership is a very important occasion for a firm because of the substantive and symbolic importance of the CEO position (Bills et al., 2017).   Firms generally engage in multiple options and related processes to choose a successor CEO, including a comprehensive search of internal and external candidates and selection of an "heir apparent" (Zhang and Rajagopalan, 2004).   Incoming CEOs often commence significant changes after succession.   Major changes to a firm's mission and strategy may significantly affect both operational decisions and accounting choices.   Even without the presence of strategic changes, a new CEO may bring a distinctive management style that affects firms' financial reporting decisions and thereby stakeholders' perceived risk of accounting errors or improprieties (Bills et al., 2017).

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2.2. CEO succession planning, supply chain knowledge, and organization complexity

CEO succession acts as a means by which firms can expedite adaptation to major changes in their environment (Custodio, Ferreira, and Matos, 2013; Tushman, Newman, and Romanelli, 1986). Prior studies have examined the factors that lead to CEO change. They generally find that firms with poor performance or wish to change strategy are more likely to hire new CEOs from outside the organizations (Cannella, Lubatkin, and Dapouch, 1991; Farrell and Whidbee, 2003; Friedman, 1991; Parrino, 1997).[5] This is consistent with the notion that well performing firms are more likely to choose insider CEOs because their abilities are suitable to continue current policies (Jalal and Prezas, 2012; Kesner and Sebora, 1994). Poor performance may denote that firms exhibit a poor ability to cope with environmental change, and that top management does not possess the required career specialization necessary to manage a successful strategic adjustment (Friedman and Singh, 1989; White, Smith, and Barnett, 1997).

There is evidence that the appointment of an outsider CEO benefits stockholders more than the appointment of an insider (Farrell and Whidbee, 2003; Huson, Parrino, and Starks, 2001). While insider CEOs bring firm-specific knowledge and skills from their prior experience within the firm, the dominant stream of this research is within the organizational demography tradition and argues that they lack the necessary skills to adapt their strategies in response to environmental changes (Murphy and Zabojnik, 2007). This avenue of research also suggests that an incoming CEO hired externally is more likely to signal ability or talent, resulting in some degree of competitive advantage, as compared to inside hires (Boeker, 1997;

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[5] Their findings are consistent with our untabulated evidence that, relative to firms with new CEOs promoted internally, those hired externally have poorer accounting-based performance. Specifically, a greater portion of the latter has experienced a loss in at least two of the prior three years,

Zhang and Rajagopalan, 2003, 2004). On the contrary, some researchers are critical of these studies and argue that the "meaningfulness of this (outsider) distinction is somewhat unclear" for its impact on the firm (Zajac and Westphal, 1996). They further indicate that firms will not choose outsider CEOs who are just marginally better than insider candidates, thus the formers are frequently handicapped in the CEO succession process (Agrawal, Knoeber, and Tsoulouhas, 2006). Accordingly, prior studies examining the effects of outsider succession versus insider succession have been mixed.

Although the extant literature provides valuable insights on several aspects of the internal vs. external replacement, questions remain on possible differences among distinct groups of incoming outsider CEOs. For instance, if firms choose a CEO successor, they have the option of hiring from a company within or outside a supply chain. To the extent that CEO turnovers present an opportunity of generating a new fit between internal factors and varying environmental requirements (Elosge et al., 2018), successors appointed from within the supply chain may better "fit" in selected strategies.

A supply chain is a network of affiliated firms that work together, in competition with other such networks, to produce value for its end-user customers (Chen et al., 2014). Lee (2004) finds that top-performing supply chains haves three distinct qualities. First, they are *agile* enough to react readily to sudden changes in supply or demand. Second, they *adopt* over time when market environment changes. Third, they *align* the interests of all supply chain partners in order to optimize the chains' performance. These attributes (i.e., ability, adaptability, and alignment) are feasible only when partners support knowledge flow in their supply chain network.

Through repeated personal and professional contacts in the business community, CEOs

establish networking across individuals and organizations, which may enhance the acquisition of supply chain-relevant knowledge.   New CEOs hired from within the industry possess industry knowledge and skills which can be easily transferred to any firm within the industry (Castanias and Helfat, 1991).   Although it is reasonable to expect that industry knowledge overlaps with supply chain knowledge, the latter in this context is more generalized and difficult to imitate and cannot be purchased in a market because it serves as an inter-firm network of knowledge flow (Aman and Aitken, 2011).

Organizational complexity, particularly the diversification of organizational structure, is essential to the growing trend of supply chain management but, to date, has received minimal coverage among prior research.   Rose and Shepard (1997) find that CEOs of diversified firms earn more than CEOs of focused firms, and that this wage premium is more consistent with an ability matching story than an entrenchment story.   They also document that incumbents who diversify their firms are paid less than incoming CEOs at already diversified firms.   Likewise, Berry et al. (2006) document that new CEOs in diversified firms are older, more educated, and are paid more when hired.   Their results indicate that firm complexity and scope affect CEO succession.   Coles, Daniel, and Naveen (2008) and Klein (1998) argue that the CEO's need for advice will increase with the complexity of the organization.   Moreover, Xu et al. (2016) indicate that organizational complexity is mainly influenced by supply chain structure, scale, and internal relationship.   This study is motivated by the importance of supply chains within today's economy and is therefore intended to resolve the gap by testing the association between successor CEOs' supply chain knowledge

and organizational complexity.[6]

2.3. *Successor CEOs' supply chain knowledge, audit pricing, and firm value*

Denis et al. (1997a, b) document that diversified firms tend to refocus following external pressure or poor performance, and perceive this as evidence of agency costs in diversified firms. Goetz, Laeven, and Levine (2013) also provide evidence that diversification intensifies agency problems. Their results reveal that the decrease in firm valuations is associated with an increase in the benefits to corporate insiders and a reduction in loan quality. Accordingly, diversification may give rise to internal agency costs.

Auditing serves as a bonding and monitoring mechanism to relieve agency costs caused by information asymmetry among interested parties (Jensen and Meckling, 1976; Watts and Zimmerman, 1983). Jensen and Payne (2005) document that municipal organizations that rely more on their auditors to relieve higher levels of agency costs are more likely to have better-developed audit-procurement practices. They also find that well-developed audit-procurement practices are associated with the hiring of auditors who have higher levels of industry experience, which in turn leads to higher audit quality. Griffin, Lont, and Sun (2010) conclude that the agency problems of companies with high free cash flow induce auditors of companies to raise audit fees to compensate for the additional risk and effort. Accordingly, to the extent that firms with higher organizational complexity are more likely to appoint a new CEO from within the supply chain, the successor has a higher propensity to demand more audit efforts in response to increased levels of agency costs.

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[6] In contrast with relevant studies (i.e., Chen et al., 2014; Johnstone, Li, and Luo, 2014), we include competitors in the supply chain partnership. That is, as the CEO gains further experience over time, he/she develops an understanding of commonalities and shared risks/opportunities among the firm itself and supply chain partners, which include upstream suppliers, downstream customers, and competitors.

Auditing literature provides evidence that CEO characteristics affect audit fees. For instance, Johnson et al. (2012) and Judd et al. (2017) document that auditors charge higher fees when a client's CEO exhibits behavior and attitudes consistent with narcissism. Hribar et al. (2012) find that overconfident CEOs report more aggressively, and that auditors charge higher fees to compensate for aggressive reporting. Harjoto, Laksmana, and Lee (2015) provide evidence that firms with female and ethnic minority CEOs pay significantly higher audit fees than those with male Caucasian counterparts. Kim, Li, and Li (2015) document a positive relation between CEO portfolio vega equity and audit fees, suggesting that auditors consider higher earnings-management risk to be associated with equity compensation. Moreover, Kalelkar and Khan (2016) find that firms with a financial expert CEO pay lower audit fees. We extend auditing literature by investigating a relatively neglected aspect of CEO characteristics around turnover, namely, successor CEOs' supply chain knowledge.

Prior auditing literature defines supply chain knowledge as comprehension of information and processes regarding accounting and auditing issues that relates to a supplier and its major customer, which is particularly beneficial for approaching the complexities associated with the revenue cycle (Johnstone et al., 2014). The upstream and downstream relationship among supply chain partners can improve the auditor's understanding of sales and purchases transactions between the group-affiliated firms, which, in turn, lead to higher audit quality.

Relevant studies indicate that supply chain knowledge presents at both the individual auditor and the entity level through audit firm expertise, knowledge organizing mechanisms, and personal communication systems. For instance, Johnstone et al. (2014) investigate the effects of upstream suppliers and downstream major customers along a supply chain engaging

the same auditor.   Their results reveal that the probability of engaging the same auditor with supply chain knowledge increases with the operational relationship between the upstream and downstream companies, which produces a higher-quality audit and results in lower audit fees. This suggests that auditors share the efficiency gain from their supply chain knowledge with their clients via a fee discount.

Chen et al. (2014) also examine whether an audit firm charges higher or reduced audit fees to a client when it possesses exclusive knowledge derived from simultaneously auditing a client and that client's significant partners in the same supply chain.   They find that audit firms' supply chain knowledge has a negative impact on audit fees.   Specifically, their results indicate that an auditor with more supply chain knowledge offers more audit fee discounts to its clients in the same supply chain when it also provides auditing services to its client's major customer.   However, Chen et al. (2014) further document that audit firms with only supplier-related supply chain knowledge have no differential audit fee.

While the auditing literature explores the effect of audit firms' expertise and/or knowledge on audit fees, relevant research neglects the potential impact on the audit pricing of CEOs' unique knowledge.   Instances of CEO turnover provide a good setting to observe the impact of incoming CEOs' unique knowledge along the supply chain on auditor's fee-setting process.   Extant research documents that audit fees are greater for companies with new CEOs (e.g., Bills et al., 2017).   To the extent that new CEOs have gained supply chain knowledge about the organization and the environment in which the firm operates, they are more likely to consider several alternatives, have a more external focus, and are more open to fresh ideas, change and experimentation than incumbent CEOs.   Agency costs may serve as a motivating force for organizations to increase their audit efforts and improve their audit

quality.   It may also be useful in maximizing value (Jensen and Payne, 2005).[7]   Because

the benefits of higher audit quality are likely to be greater for those firms facing higher levels

of agency costs, it seems reasonable that new CEOs with supply chain knowledge demand

more audit efforts in response to high agency problems.   Accordingly, new CEOs with

supply chain knowledge would be valued at a premium.   This leads to the following

hypotheses (stated in alternative form):

H$_{1a}$:   *Audit fees are greater for companies with a new CEO who previously*

worked for a partner within the supply chain than for those with a new CEO

who previously served for a company outside a supply chain.

H$_{1b}$:   *Audit fees are greater for companies with a new CEO promoted from inside*

the firm than for those with a new CEO who previously served for a

company outside a supply chain.

H$_{2a}$:   *The value of the firm are greater for companies with a new CEO who*

previously worked for a partner within the supply chain than for those with a

new CEO who previously served for a company outside a supply chain.

H$_{2b}$:   *The value of the firm are greater for companies with a new CEO promoted*

from inside the firm than for those with a new CEO who previously served

for a company outside a supply chain.

3. Sample selection

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[7] Agency Theory claims that when the total agency costs are minimized, firm value is maximized.   Prior studies (e.g., Classens et al., 2002, Lemmon and Lins, 2003, and Lins, 2003; Xiao and Zhao, 2009) examine the impact of agency costs on firm value.   They find that in general, the divergence between the ultimate owner's cash flow rights and control rights has an adverse impact on firm value.

Panel A of Table 1 summarizes the sample selection process.   To construct our sample, we begin with the ExecuComp database to identify the chief executive officer (CEO) of all U.S. listed companies from years from 2012 to 2016.   We assume that CEO is the top ranking position in the firm.   We remove CEOs of subsidiaries and divisions from the sample. When more than one person hold the position of CEO during a given year, ExecuComp reports the names of the individuals who held the position and entitle them "co-chief executive officer".   When a CEO is named, we exclude individuals holding the positions of president, vice president, chief operating officer, chairman of the board or executive committee, and director from the sample unless one or more of those positions is also held by the CEO.

Merging the dataset with Audit Analytics database, Compustat database, and Datastream database results in available 35,871 firm-years representing 8,618 firms.   We exclude observations in financial industries and missing information in the combined dataset because their characteristics are unique (Francis, Reichelt, and Wang, 2005; Reichelt and Wang, 2010).   We further exclude missing information in the combined dataset.   Our final sample consists of 5,367 firm-years representing 1,229 firms.

We use the Audit Analytics database and the Execucomp database to identify changes in the position of CEO.   The Audit Analytics database specifically provides categorized reasons for the CEO change.   We collect information on whether the new CEO was an outsider/insider and the new CEO's last position if promoted from within the firm from ExecuComp.   For CEOs appointed from outside the firm, we hand-collect their prior positions from firm disclosures and press releases.   Of the 5,367 firm-year observations, there are 568 cases with a CEO turnover (10.58 percent of total observations), including 432 observations with internal replacement and 136 observations with outside appointment.

To determine the identification of each party in a company's supply chain relationships, we hand-collect the names of a company's major suppliers, customers, and competitor(s) from Bloomberg Professional Service for each sample year.[8] We further identify whether a new CEO previously worked for his/her incumbent company's suppliers, customers, or competitor(s) if he/she is appointed from outside the firm. Of the 136 observations with outside appointment, there are 99 cases involved in a supply chain relationship. Panel B of Table 1 details our sample distribution.

[Insert Table 1 here]

4. Research design

4.1. Empirical tests: The relation between CEO's supply chain knowledge and organizational complexity

Following prior studies (e.g., Berry et al., 2006; Naveen, 2006), We use diversification to proxy for organizational complexity. The first measure of diversification is equal to the number of business segments reported by a firm. As a second measure of diversification, we use one minus the firm's segment sales based Herfindahl index, given by $1 - \sum_{i=1}^{numseg} \left[\frac{(segment\ sales_i)^2}{(company\ sales)^2} \right]$. This Herfindahl-based measure, which is equal to zero for single segment firms, places less weight on a firm's smaller segments. The Herfindahl-based measure is greater than zero for multi-segment firms. We classify the firm-year observations into two groups (CEOs' with supply chain knowledge and those without supply chain

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[8] We include all of the major suppliers, customers, and competitors along a supply chain engaging a sample firm of interest. In contrast with relevant studies (i.e., Chen et al., 2014; Johnstone et al., 2014), we do not limit parties in a sample firm's supply chain relationships to suppliers and customers because CEOs at competitor firms may also enhance the acquisition of supply chain-relevant knowledge through repeated personal and professional contacts in the business community.

knowledge), and we compare the two measures of diversification measures between the two groups.

4.2. Empirical tests: The relation between CEOs' supply chain knowledge and audit fees

To test H_{1a} and H_{1b}, we extend the audit fee literature (e.g., Abbott, Parker, and Peters, 2006; Abbott, et al., 2003; Bills et al., 2017; Huang et al., 2014) by including the proxy for CEO's supply chain knowledge as follows:

$$AUD\_FEE_{it} = \lambda_0 + \lambda_1 CEO\_PTNR_{it} + \lambda_2 CEO\_NOT\_PTNR_{it} + \lambda_3 CEO\_INT_{it} + \lambda_4 SIZE_{it}$$
$$+ \lambda_5 LOSS_{it} + \lambda_6 ROA_{it} + \lambda_7 INVREC_{it} + \lambda_8 LEV_{it} + \lambda_9 RET_{it} + \lambda_{10} GOCON_{it}$$
$$+ \lambda_{11} BIG_{it} + \lambda_{12} NEWAUD_{it} + \lambda_{13} MERGER_{it} + \lambda_{14} INSTOWN_{it}$$
$$+ \lambda_{15} INDSPEC_{it} + \lambda_{16} NONAUD\_FEE_{it} + \lambda_j INDUSTRY\_FE$$
$$+ \lambda_k YEAR\_FE + \varepsilon_{it} \tag{1}$$

The dependent variable is the natural logarithm of audit fees (*AUD_FEE*). The key independent variables involve CEO turnover. Three types of successor CEOs are investigated: those appointed from partners within the supply chain (*CEO_PTNR*), from companies outside the supply chain (*CEO_NOT_PTNR*), and from inside an organization (*CEO_INT*). Each type is represented by a separate variable, which is coded 1 if that type of turnover is applicable, and 0 otherwise. Specifically, *CEO_PTNR* is indicator variable equal to 1 if the CEO is within the first year of his/her tenure and he/she previously worked for one of his/her major supplier, customer, or competitor firms; *CEO_NOT_PTNR* is an indicator variable equal to 1 if the CEO is within the first year of his/her tenure and he/she previously worked for a company outside the supply chain; *CEO_INT* is an indicator variable equal to 1 if the CEO is within the first year of his/her tenure and he/she was promoted from inside the

firm.   Firm-year observations without CEO turnovers are set to 0 for each of these key independent variables, and i and t represent firm and year indicators.

H$_{1a}$ (H$_{1b}$) predicts that the coefficient on *CEO_PTNR* (*CEO_INT*) will be larger than the coefficient on *CEO_NOT_PTNR*, suggesting that more audit efforts would be demanded when the new CEO previously worked for a company within the supply chain (was promoted from inside the firm).[9]   To test H$_{1a}$ (H$_{1b}$), we test the equality of the coefficients on *CEO_PTNR* and *CEO_NOT_PTNR* (that on *CEO_INT* and *CEO_NOT_PTNR*).

The research on the determinants of audit fees is well developed, and explanatory models have adjusted R^2s in the 70–90 percent range (Abbott, Parker, and Peter, 2003, Abbott, et al., 2006; Bills et al., 2017; Craswell, Francis, and Taylor, 1995; Huang et al., 2014). Following the above studies, we include in equation (1) a vector of control variables that are likely to affect audit fees.   We control for firm size by including the natural logarithm of total assets (*SIZE*).   We use two measures to control for past and current financial performance, respectively: an indicator variable equal to 1 if the client has experienced a loss in at least two of the prior three years, and 0 otherwise (*LOSS*) and earnings before interest and taxes deflated by total assets (*ROA*).   We include the proportion of total assets in inventory and accounts receivable (*INVREC*) to control for fraud, which is more likely when this proportion is greater (Cao, Myers, and Omer, 2012; Summers and Sweeney, 1998).   We control for debt-to-asset ratio (*LEV*), a common proxy for business risk, related to the firm's financial structure and debt level.   We also control for stock returns in the current year (*RET*).   We include an indicator variable (*GOCON*) coded 1 if the client receives a going-concern opinion during a

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[9] Extant research (e.g., Bills et al., 2017) provides evidence that audit fees are higher for companies with new CEOs.   Accordingly, the coefficients on the *CEO_PTNR*, *CEO_NOT_PTNR*, and *CEO_INT* are predicted to be positive.

given year, and 0 otherwise.   We use two indicator variables (*BIG* and *NEWAUD*) to control

for auditor type and shorter tenure.   *BIG* is coded 1 if the firm is audited by a Big 4 auditor

(*Deloitte, Ernst & Young, KPMG, or PwC*), and 0 otherwise; *NEWAUD* is set to 1 if the

auditor is within the first three years of tenure with the client, and 0 otherwise.   We control

for merger and acquisition activity by including an indicator variable (*MERGER*) that equals 1

if the firm has engaged in a merger or acquisition in year *t*, and 0 otherwise.   We control for

the percentage of shares owned by institutional investors (*INSTOWN*).   We include audit

firm's industry market share based on total sales audited within 2-digit SIC code (*INDSPEC*)

to control for industry specialization.   We also include the natural logarithm of non-audit fees

(*NONAUD_FEE*) to control for non-audit services.   Finally, we control for potential

influence of industry and year: industry fixed effects by two-digit SIC code (*INDUSTRY_FE*);

and year fixed effects for the firm's fiscal year (*YEAR_FE*).

4.3. Empirical tests: The relation between CEOs' supply chain knowledge and firm value

To test H$_{2a}$ and H$_{2b}$, we model firm value as a function of CEOs' career experiences and other

firm characteristics:

$$IND\_Q_{it} = \pi_0 + \pi_1 CEO\_PTNR_{it} + \pi_2\ CEO\_NOT\_PTNR_{it} + \pi_3 CEO\_INT_{it} + \pi_4 TA_{it}$$

$$+ \pi_5 LEV_{it} + \pi_6 IA_{it} + \pi_7 SEG_{it} + \pi_8 CS_{it} + \pi_9 CAP_{it} + \pi_{10} INDROA_{it}$$

$$+ \pi_m YEAR\_FE + \varepsilon_{it} \tag{2}$$

H$_{2a}$ (H$_{2b}$) predicts that the coefficient on *CEO_PTNR* (*CEO_INT*) will be larger than

the coefficient on *CEO_NOT_PTNR*, suggesting that the value of the firm increases to a

greater extent for companies with a new CEO who previously worked for a partner within the

supply chain (promoted from inside the firm) than for those with a new CEO who previously

served for a company outside a supply chain.　　To test H$_{2a}$ (H$_{2b}$), we test the equality of the coefficients on *CEO_PTNR* and *CEO_NOT_PTNR* (that on *CEO_INT* and *CEO_NOT_PTNR*). We devote the remainder of this section to defining the variables of interest in equation (2) and describing their measurement.

4.3.1. Dependent variable

We use Tobin's *q* to proxy for firm value.　　Tobin's *q*, a forward-looking market-based measure, captures potential future performance and value associated with international diversification, which earnings-based accounting measures may not capture (Chari, Devaraj, and David, 2007).　　Tobin's *q* is linked theoretically to total economic ROI and reflects investor expectations of future returns (Landsman and Shapiro, 1995).　　Applying Tobin's *q* helps avoid some of the problems that beset earnings-based performance measures (Bharadwaj, Bharadwaj, and Konsynski, 1999), such as ignoring discrepancies in systematic risk, temporary disequilibrium effects, tax laws, and accounting manipulation (Smirlack et al., 1984; Wernerfelt and Montgomery, 1988).

Following prior studies (e.g., Huang et al., 2009; Villalonga and Amit, 2006), we measure firm performance using industry-adjusted Tobin's *q* (*IND_Q$_{it}$*), which is the log difference between *q* and the median *q* for each firm's primary two-digit SIC classification. Tobin's *q* is the ratio of market value of assets to the book value of assets, where the market value of assets is the book value of assets less the book value of equity plus the market value of equity.[10]

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[10] We also use the natural logarithm of Tobin's *q* as an alternative proxy for firm value. The univariate and multivariate results do not vary substantially with the proxy used. Thus, we only report results using industry-adjusted Tobin's *q*.

4.3.2. Independent variables

CEO_PTNR_{it}, $CEO\_NOT\_PTNR_{it}$, and CEO_INT_{it}, and $YEAR\_FE$ are as defined previously.

Equation (2) also controls for additional factors we expect to affect corporate valuation (see

Huang et al., 2009; Villalonga and Amit, 2006).   We use the logarithm of total assets (TA_{it}) to

control for firm size, and we use the ratio of total debt to total assets (LEV_{it}) to control for the

impact of leverage on future performance.   The investment-to-assets ratio (IA_{it}), defined as the

sum of the annual change in inventory and the annual change in gross property, plant, and

equipment scaled by lagged total assets, is a proxy for investment growth.   The number of

business segments (SEG_{it}) controls for industry diversification. Cash stocks (CS_{it}), defined as

net cash flows less cash dividends and capital expenditures scaled by lagged total assets, controls

for the free cash flow problem.   The ratio of capital expenditures to sales (CAP_{it}) controls for

differences in growth options, and industry-adjusted ROA (IND_ROA_{it}), defined as earnings

before interest and taxes divided by total assets less median industry ROA, controls for

profitability.

5.   Empirical results

5.1.1. Descriptive statistics

Table 2 presents the descriptive statistics for the model variables (n = 5,367).   We find that

approximately 10 percent of the sample hires a new CEO with supply chain knowledge (i.e., 2

percent from supply chain partners and 8 percent from inside the firm).   Only 1 percent of the

sample appoints a new CEO who previously worked for a company outside a supply chain.

The mean return on assets (ROA) is 9 percent, while 11.4 percent of observations report a

loss.   We find 19 percent of firms have engaged in a merger or acquisition in the year of

observations.   Regarding governance, the mean institutional holdings is 17.2 percent.   The

annual changes in property, plant, equipment, and inventories average nearly 4.4 percent of

lagged total assets.   The typical firm in our sample has multiple business segments.   The

mean and median industry-adjusted returns on assets are approximately -0.1 percent and 0,

respectively.   Distributions of other variables are consistent with findings in prior research.

[Insert Table 2 here]

Table 3 presents Pearson correlations among the variables.   Panel A reports univariate

correlations among the variables in tests of the association between audit fees and CEO

succession planning.   Regarding correlations between audit fees and new CEOs' career

experiences, the results reveals that *AUD_FEE* is positively associated with *CEO_INT* (p $<$

0.01).   As we observe from Table 3, the correlation coefficient between *AUD_FEE* and each

of the control variables is statistically significant.   The combined results suggest that audit

fees are significantly associated with almost all of the independent variables, including control

variables.

Panel B of Table 3 presents correlations among the variables in tests of the association

between firm value and CEO succession planning.   The results reveal that *IND_Q* is

positively correlated with *CEO_PTNR*, suggesting that firms with new CEO who previously

worked for a partner within the supply chain have different valuation implications.   We find

no significant correlation between firm value and other proxies for CEO successions.

We find significant correlations, but to a lesser degree, between various pairs of

variables.   Specifically, our choice of variable considers multicollinearity.   However,

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multicollinearity is not significant within our specification because the variance inflation

factors (VIFs) on our independent variables are all less than 2.

[Insert Table 3 here]

5.1.2. Univariate results

We perform the two-sample *t*-test on the diversification measures to test the hypothesis of

mean differences between CEO-firm-year observation with supply chain knowledge and those

without supply chain knowledge.   Untabulated results indicate that both mean number of

business segment and Herfindahl-based measure for CEO-firm-year observations with supply

chain knowledge is significantly higher than those without supply chain knowledge at better

than $p = 10\%$.   These results are consistent with the notion that CEOs with supply chain

knowledge are more likely to be recruited by firms with higher organizational complexity.

5.1.3. Multiple regression results

In Table 4, we examine whether the predicted positive relation between a new CEO and audit

fees is more pronounced when the new CEO previously served for a partner within a supply

chain or was promoted from inside the firm.   As predicted, the coefficient values for

CEO_PTNR and *CEO_INT* are positive and significant at the 0.01 and 0.05 levels,

respectively.   The coefficient on *CEO_NOT_PTNR* is insignificant (at the 0.10 level),

suggesting that stakeholders do not perceive incremental risk with external appointment from

outside the supply chain.   We use F-tests to compare the coefficients on *CEO_PTNR*,

CEO_NOT_PTNR, and *CEO_INT*.   We find that the coefficient on *CEO_PTNR* is

significantly larger (at less than the 0.01 level; $\lambda 1 - \lambda 2 = 0.265$) than the coefficient on

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CEO_NOT_PTNR.   This result is consistent with H_{1a}, indicating that among outsider CEOs audit fees are greater when the CEO previously worked for a partner within the supply chain. We also find that the coefficient on *CEO_INT* is significantly larger (at less than the 0.01 level; $\lambda 3 - \lambda 2 = 0.137$) than the coefficient on *CEO_ NOT_PTNR.*   This result is consistent with H_{1b}, suggesting that insider CEOs demand more audit effort or greater audit scope and coverage.   Our combined evidence suggests that hiring a CEO with supply chain knowledge may not have a decreasing effect on audit fees.

Results for the control variables are consistent with prior audit fee studies (Abbott et al., 2003; Abbott, et al., 2006; Bills et al. 2017; Huang et al., 2014).   Control variables that have statistically significant coefficients ($p < 0.01$) include: *SIZE*, *LOSS*, *ROA*, *INVREC*, *LEV*, *BIG*, *NEWAUD*, *INSTOWN*, *INDSPEC*, and *NONAUD_FEE.*

[Insert Table 4 here]

The regression results presented in Table 5 document that the coefficient values for *CEO_PTNR* is positive and significant at the 0.10 level, suggesting that appointing a new CEO who previously worked for a partner within the supply chain enhances firm value.   The coefficients on *CEO_NOT_PTNR* and *CEO_INT* are insignificant (at the 0.10 level). Moreover, we use F-tests to compare the coefficients on *CEO_PTNR*, *CEO_NOT_PTNR*, and *CEO_INT*.   We find that the coefficient on *CEO_ PTNR* is significantly greater (at less than the 0.05 level; $\pi 1 - \pi 2 = 0.895$) than the coefficient on *CEO_NOT_PTNR.*   This result is consistent with H_{2a}, indicating that among outsider CEOs the value gains are more pronounced when the CEO previously worked for a partner within the supply chain.   We also find that the coefficient on *CEO_INT* is significantly larger (at less than the 0.10 level; $\pi 3 - \pi 2 = 0.630$)

than the coefficient on *CEO_ NOT_PTNR*.   This result is consistent with H2b, suggesting that insider CEOs add greater value to firms than those who previously served for a company outside a supply chain.[11]

The results reveals that new CEOs who previously work for a partner within a supply chain demand more audit efforts in response to high agency problems.   Increase in agency costs results in an increase need for intensive auditing, which leads to higher audit quality. Accordingly, new CEOs with supply chain knowledge is valued at a premium.   We believe that the combined evidence is consistent with the notion that successor CEOs with supply chain knowledge consider agency costs large enough to make external audits valuable.

[Insert Table 5 here]

6.   Additional Analysis

6.1. Uneven sample size

6.1.1. Propensity score matching approach

Due to uneven sample size between the treatment (firm-years with CEO turnover) and control (firm-years without CEO change) groups, we employ the propensity score matching approach to test the robustness of our findings.   In a regular matched-pair research design, each observation in the group of CEO turnovers is paired with an observation in the counterpart group that is similar along each dimension X_i relevant to the decision to change the CEO. Accordingly, the propensity score matching approach allows us to find a control group that is similar to the treatment group except for CEO changes.

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[11] The number of firm-year observations (5,367) in Table 4 are smaller than those (4,536) in Table 5 due to differing data requirements for the analyses.   We re-estimate equations (1) using a reduced sample of 4,536 firm-year observations.   The inferences remained unchanged.

We examine the nature of the CEO turnover and use the following logit model to generate the propensity scores (see Farrell and Whidbee, 2003):

$$CEO_{it} = \delta_0 + \delta_1 AGE_{it} + \delta_2 EMPLOY_{it} + \delta_3 HOMOGENEITY_{it} + \delta_4 IND\_RET_{it}$$

$$+ \delta_5 ADJ\_ROA_{it} + \delta_6 IND\_FORECAST_{it} + \varepsilon_{it} \tag{3}$$

where *CEO* is an indicator variable equal to 1 if the CEO is within the first year of his/her tenure, and 0 otherwise; *AGE* is an indicator variable equal to 1 if CEO is older than 60, and 0 otherwise; *EMPLOY* is the log of the number of firm employees; *HOMOGENEITY* is measured using the approach described by Parrino (1997); *IND_RET* is industry-adjusted stock returns measured over the previous fiscal year; IND_ROA_{it} is industry-adjusted ROA (net income/assets) measured over the previous fiscal year, defined as ROA less its median industry ROA (classified by its two-digit SIC code); $IND\_FORECAST_{it}$ is industry-adjusted analyst forecast error (realized EPS for the previous year − forecasted EPS at the beginning of the previous year) divided by stock price at the beginning of the previous year.

We collect categorized reasons for the CEO change based on firm disclosures from the Audit Analytics Director and Officer Changes database.   However, firms may not report a precise reason for the turnover (e.g., Farrell and Whidbee, 2003; Goyal and Park, 2002; Weisbach, 1988) and rarely cite poor firm performance as an explanation of a CEO change (DeFond and Park, 1999).   As a result, there may be misclassification of forced and voluntary turnover.   To control for this potential error in our classification, we include a dummy variable to indicate whether a firm's CEO is older than 60 years of age in our model.[12]   We expect CEO age to positively affect the likelihood of CEO turnover.

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[12] Because reported reasons for CEO turnovers are often not reliable, prior studies (Farrell and Whidbee, 2003; Huang et al., 2014) generally assume that departure of CEOs around age 60 are more likely due to age-related retirements than to forced turnovers.

Several studies find a positive relation between the likelihood of CEO turnover and firm size (e.g., Farrell and Whidbee, 2003; Huson et al., 2001). Other studies document that larger firms are more likely to appoint an insider to replace an outgoing CEO (e.g., Fich, 2005; Parrino, 1997). Potential explanations for these findings are that smaller firms have a higher propensity to have fewer senior executives that are qualified for the CEO position, and that an outside candidate is more likely to be effective in a smaller, less complex organization. Following prior studies (e.g., Farrell and Whidbee, 2003), we use the natural log of the number of firm employees as a proxy for size.

Parrino (1997) finds evidence that CEO turnovers are more likely in homogeneous industries due to the increased availability of strong outside candidates. The appointment of an executive with such experience probably reduces the likelihood that the new CEO will make costly errors when the objective of the succession is to adapt organizational change. Following Parrino, we construct a proxy for industry homogeneity and include this variable in the analysis to control for the availability of an outside candidate on the CEO turnover decisions. First, we estimate an equally weighted return index for each industry using the firms for which monthly returns are reported on the CRSP database between July 2010 and June 2017. Second, the monthly return for each firm in each index is then regressed against an equally weighted market return index and the industry return index. Finally, we determine the average of the partial correlation coefficients for the industry return index in each individual-company regression, hereafter referred to as the mean partial correlation proxy. We use monthly returns for up to 50 randomly selected firms from each industry and calculate the industry return index. We place an upper bound on the number of firms in calculating the industry index because the partial correlation coefficient estimated from the two-factor market

model is negatively related to the number of firms used to calculate the industry index. For this same reason, we exclude those industries that do not have at least 35 firms with sufficient return data.

Prior studies use both stock returns and reported earnings as measures of firm performance in determining the likelihood of CEO turnover. Although prior studies (e.g., Farrell and Whidbee, 2003; Goyal and Park, 2002; Jensen and Murphy, 1990; Kaplan, 1994; Murphy and Zimmerman, 1993) find that top executive turnover is significantly related to stock returns and earnings, it is unclear whether stock returns are more informative than earnings in measuring CEO performance. Moreover, analyst forecast errors may capture CEO performance as well as the impact of unanticipated events on firm performance (Farrell and Whidbee, 2003). Accordingly, to ensure the robustness of our results, we use three different measures of firm performance: industry-adjusted stock returns, industry-relative earnings, and analysts' earnings forecast errors.

Our first measure of firm performance is the industry-adjusted stock returns estimated as the difference between the stock return for the firm in a fiscal year and the median return for all the firms with the same two-digit SIC code in that fiscal year. The second measure is industry-adjusted ROA (net income/assets) measured over the previous fiscal year, defined as ROA less its median industry ROA (classified by its two-digit SIC code). Our third measure of performance is industry-adjusted analyst forecast errors estimated as the difference between realized EPS for the previous year and forecasted EPS for the previous year divided by stock price at the beginning of the previous year, adjusted for the industry median. By using industry-adjusted forecast errors in our analysis, we attempt to control for industry-wide events that affect firm performance. We hypothesize that there will be a negative relation

between firm performance and CEO turnover.

In the case where a binary treatment is present (i.e., treatment or control), we form matched pairs by selecting an observation that received the treatment and selecting another observation with the closest propensity score that did not receive the treatment. The propensity score matching approach yields 1,136 firm-year observations, 568 for firms with CEO change and the other 568 without CEO change. Our results (unreported) are robust to the use of an alternative sample that is propensity score matched on CEO turnover.

6.1.2. Bootstrapping approach

To account for this uneven sample size, whilst still using the entire data set, we also apply the bootstrapping approach to the estimations of the regression models in Tables 4 and 5 (see Efron and Tibshirani, 1993). Specifically, we obtain the mean and variance based on 1,000 random parameter estimates to construct the confidence intervals. The results (unreported) reveal that the inferences from that analyses are qualitatively similar to those presented in Tables 4 and 5.

6.2. Auditor change

The auditor has less experience and familiarity with a new client. This could aggravate the perceived uncertainty surrounding a new CEO who is appointed from a company within the supply chain or promoted from inside the firm, leading to a greater audit fee increase. Accordingly, to determine whether the results are driven by observations where the firm has a new auditor, we perform an additional analysis where we drop from the sample all

observations where *NEWAUD* is equal to 1 and re-estimate equation (1).   Table 6 presents the results of this analysis.   Our inferences hold in this alternative sample.

[Insert Table 6 here]

7. Conclusion

Instances of CEO turnover provide a good setting to observe the impact of incoming CEOs' unique knowledge along the supply chain.   Organizational complexity, particularly the diversification of organizational structure, is essential to the growing trend of Supply Chain Management.   However, to date, it has received minimal coverage among prior studies. Our results document that CEOs with supply chain knowledge are more likely to be recruited by firms with higher organizational complexity.

To the extent that firms with higher organizational complexity are more likely to appoint a new CEO from within the supply chain, our results also provide evidence that the successor is likely to demand more audit efforts in response to increased levels of agency costs.   Specifically, we find that audit fees are higher for companies with a new CEO who previously worked for a company within a supply chain or is promoted from inside an organization.   Moreover, the results support our theoretical argument that audit fees increases to a lesser extent for companies with a new CEO who previously worked for a company outside a supply chain than for those with either of the two CEO succession plans, suggesting that both CEO succession plans (identifying a new outsider CEO with supply chain management skills and identifying a new insider CEO) demand more audit efforts to relieve agency costs.

Our results also provide evidence that appointing a new CEO who previously served for a partner within the supply chain enhances firm value. In addition, we find that among outsider CEOs the value gains are more pronounced when the CEO previously worked for a partner within the supply chain, and that insider CEOs add greater value to firms than those without supply chain knowledge.

Taken together, the combined evidence suggests that hiring a CEO with supply chain knowledge may not have a decreasing effect on audit fees. On the other hand, our findings are consistent with the notion that new CEOs who previously work for a partner within a supply chain demand more audit efforts in response to high agency problems. Increase in agency costs results in an increase need for intensive auditing, which leads to higher audit quality. Accordingly, new CEOs with supply chain knowledge is valued at a premium.

Our results have potential implications for future research. First, although our study has practical implications for companies by examining auditing pricing in the context of CEO succession, we do not collect evidence of risk assessments and audit hours directly from auditors. Future research could address this issue. Understanding the association between incoming CEOs with supply chain knowledge and direct measures of audit effort would be informative. Second, future research will need to develop and examine precise measures of agency costs before one can draw sharper inferences about the relation between successor CEO's supply chain knowledge and firm value. Third, we do not separately investigate the potential impact on the audit pricing of CEOs' unique knowledge regarding major suppliers, customers, and competitors because of data limitations. These limitations warrant interesting avenues for future research. Finally, pre-existing differences, changes around CEO turnover, or both could drive the differences documented between CEO-firm-year observation with

supply chain knowledge and those without supply chain knowledge.   Future research could

investigate the two explanations by comparing the two groups of firms before CEO turnovers

and also determining the differences in the pre-and post-CEO turnover periods.

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Table 1

Sample Selection

Panel A: Sample selection process

	Firm-Years	Firms
Available observations with Audit Analytics/Compustat/ Datastream/ExecuComp data over the period 2012-2016	35,871	8,618
Less: Financial sector (SIC 6000-6999)	(15,331)	(3,902)
Less: Missing financial data	(15,173)	(3,487)
Final sample	5,367	1,229

Panel B: Sample distribution

	Firms-Years	Percentage
CEO switches	568	10.58%
No CEO switches	4,799	89.42%
Number of observations from Panel A	5,367	100.00%
Internal replacement	432	76.06%
External replacement	136	23.94%
CEO switches	568	100.00%
Supply chain knowledge	99	72.79%
No supply chain knowledge	37	27.21%
CEO turnover with external replacement	136	100.00%

Table 2

Descriptive Statistics

	N	Mean	Median	Std Dev	Q1	Q3
Test variables						
AUD_FEE	5,367	14.642	1.035	13.933	14.570	15.328
CEO_PTNR	5,367	0.018	0.135	0.000	0.000	0.000
CEO_NOT_PTNR	5,367	0.007	0.082	0.000	0.000	0.000
CEO_INT	5,367	0.079	0.270	0.000	0.000	0.000
IND_Q	4,536	0.248	0.102	2.662	-0.485	0.915
Control variables						
SIZE	5,367	7.882	1.680	6.665	7.771	8.976
LOSS	5,367	0.114	0.317	0.000	0.000	0.000
ROA	5,367	0.090	0.125	0.054	0.088	0.134
INVREC	5,367	0.241	0.167	0.103	0.218	0.335
LEV	5,367	0.251	0.213	0.089	0.238	0.360
RET	5,367	0.130	0.680	-0.107	0.080	0.272
GOCON	5,367	0.003	0.058	0.000	0.000	0.000
BIG	5,367	0.901	0.298	1.000	1.000	1.000
NEWAUD	5,367	0.037	0.189	0.000	0.000	0.000
MERGER	5,367	0.190	0.393	0.000	0.000	0.000
INSTOWN	5,367	0.172	0.115	0.080	0.160	0.240
INDSPEC	5,367	0.288	0.206	0.129	0.288	0.408
NONAUD_FEE	5,367	11.848	3.543	11.225	12.630	13.788
TA	4,536	21.698	21.596	1.681	20.484	22.778
IA	4,536	0.044	0.027	0.124	0.003	0.069
SEG	4,536	2.471	2.000	1.680	1.000	3.000
CS	4,536	0.036	0.041	0.101	0.001	0.080
CAP	4,536	0.094	0.035	0.271	0.020	0.067
IND_ROA	4,536	-0.001	0.000	0.117	-0.031	0.037

The number of observations are unequal due to differing data requirements for the analyses.

Variable definitions:

AUD_FEE	=	the natural logarithm of audit fees;
CEO_PTNR	=	an indicator variable equal to 1 if the CEO is within the first year of his/her tenure and he/she previously worked for one of his/her major supplier, customer, or competitor firms;
CEO_NOT_PTNR	=	an indicator variable equal to 1 if the CEO is within the first year of his/her tenure and he/she previously worked for a company outside the supply chain;
CEO_INT	=	an indicator variable equal to 1 if the CEO is within the first year of his/her tenure and he/she was promoted from inside the firm;
IND_Q	=	the log difference between q and the median q for each firm's primary two-digit SIC classification. Tobin's q is the ratio of market value of assets to the book value of assets, where the market value of assets is the book value of assets less the book value of equity plus the market value of equity;
SIZE	=	the natural logarithm of total assets;
LOSS	=	an indicator variable equal to 1 if the client has experienced a loss in at least two of the

		prior three years, and 0 otherwise;
ROA	=	earnings before interest and taxes deflated by total assets;
INVREC	=	the proportion of total assets in inventory and accounts receivable;
LEV	=	total debt divided by total assets;
RET	=	stock returns in the current year;
GOCON	=	an indicator variable coded 1 if the client received a going-concern opinion in the sample year, and 0 otherwise;
BIG	=	an indicator variable that equals 1 if the firm is audited by a Big 4 auditor (*Deloitte, Ernst & Young, KPMG, or PwC*), and 0 otherwise;
NEWAUD	=	an indicator variable set to 1 if the auditor is within the first three years of tenure with the client, and 0 otherwise;
MERGER	=	an indicator variable that equals 1 if the firm has engaged in a merger or acquisition in year t, and 0 otherwise;
INSTOWN	=	the percentage of shares owned by institutional investors;
INDSPEC	=	audit firm's industry market share based on total sales audited within 2-digit SIC code;
NONAUD_FEE	=	the natural logarithm of non-audit fees;
TA	=	the logarithm of total assets;
IA	=	the sum of the annual change in inventory and the annual change in gross property, plant, and equipment scaled by lagged total assets;
SEG	=	the number of business segment;
CS	=	net cash flows less cash dividends and capital expenditures scaled by lagged total assets;
CAP	=	the ratio of capital expenditures to sales; and
IND_ROA	=	industry-adjusted ROA (earnings before interest and taxes divided by total assets), measure as ROA less its median industry ROA (classified by its two-digit SIC code).

Table 3
Pearson Correlation Matrix

Panel A: Variables Testing the Association between CEO Succession Planning and Audit Fee

Variable	AUD_FEE	CEO_PTNR	CEO_NOT_PTNR	CEO_INT	SIZE	LOSS	ROA	INVREC	LEV	RET	GOCON	BIG	NEWAUD	MERGER	INSTOWN	INDSPEC
CEO_PTNR	-0.013															
CEO_NOT_PTNR	-0.019	-0.011														
CEO_INT	0.064***	-0.040***	-0.024*													
SIZE	0.834***	-0.050***	-0.028**	0.055***												
LOSS	-0.115***	0.051***	0.028**	0.008	-0.216***											
ROA	0.043***	-0.030**	-0.002	-0.039***	0.079***	-0.316***										
INVREC	-0.071***	-0.004	0.038***	-0.004	-0.212***	0.005	0.115***									
LEV	0.276***	-0.023*	-0.019	0.030**	0.319***	0.072***	-0.068***	-0.158***								
RET	-0.073***	0.038***	-0.005	-0.031**	-0.074***	0.041***	0.048***	0.028**	-0.012							
GOCON	-0.023*	-0.008	-0.005	0.031**	-0.049***	0.111***	-0.161***	0.001	0.039***	-0.029**						
BIG	0.376***	-0.010	0.012	0.046***	0.373***	-0.106***	0.087***	-0.073***	0.189***	-0.072***	-0.035**					
NEWAUD	-0.113***	0.010	0.032**	-0.014	-0.084***	0.066***	-0.043***	0.036***	-0.024*	0.036***	0.023	-0.104***				
MERGER	0.051***	-0.010	-0.028**	-0.022	0.011	-0.044***	-0.013	-0.009	0.036***	0.045***	-0.004	-0.003	0.003			
INSTOWN	-0.148***	0.014	0.008	-0.017	-0.162***	0.014	0.001	0.034**	0.039***	-0.037***	0.018	0.019	0.005	0.010		
INDSPEC	0.291***	-0.030**	0.011	0.021	0.321***	-0.090***	0.065***	-0.060***	0.117***	-0.036***	-0.017	0.427***	-0.082***	-0.045***	-0.042***	
NONAUD_FEE	0.527***	-0.004	0.004	0.026*	0.467***	-0.114***	0.106***	-0.070***	0.151***	-0.032**	-0.036***	0.305***	-0.085***	0.056***	-0.069***	0.212***

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

All variables are defined in Table 2.

Table 3 (continued)
Pearson Correlation Matrix

Panel B: Variables Testing the Association between CEO Succession Planning and Firm Value

Variable	IND_Q	CEO_PTNR	CEO_NOT_PTNR	CEO_INT	TA	LEV	IA	SEG	CS	CAP
CEO_PTNR	0.025*									
CEO_NOT_PTNR	-0.021	-0.012								
CEO_INT	-0.007	-0.040***	-0.025*							
TA	-0.081***	-0.059***	-0.012	0.050***						
LEV	-0.045***	-0.029**	-0.021	0.029**	0.332***					
IA	0.032**	-0.033**	-0.039***	-0.021	0.007	0.023*				
SEG	-0.080***	-0.027*	0.008	0.028*	0.331***	0.098***	-0.055***			
CS	0.148***	-0.022	0.001	-0.037***	0.018	-0.131***	-0.195***	-0.005		
CAP	-0.037***	-0.017	-0.016	0.017	0.069***	0.064***	0.296***	-0.074***	-0.470***	
INDROA	0.181***	-0.040***	-0.012	-0.042***	0.116***	-0.027**	0.104***	0.014	0.484***	-0.188***

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

All variables are defined in Table 2.

Table 4
CEO Succession Planning and Audit Fees

Dependent Variables: *AUD_FEE*

Variables	Pred. Sign	Coefficient	p-value
Constant		9.966	<0.001***
CEO_PTNR (λ1)	+	0.174	<0.001***
CEO_NOT_PTNR (λ2)	+	-0.091	0.887
CEO_INT (λ3)	+	0.046	0.022**
SIZE	+	0.524	<0.001***
LOSS	+	0.215	<0.001***
ROA	−	-0.361	<0.001***
INVREC	+	0.904	<0.001***
LEV	+	0.199	<0.001***
RET	−	-0.013	0.084*
GOCON	+	0.195	0.036**
BIG	+	0.166	<0.001***
NEWAUD	−	-0.213	<0.001***
MERGER	+	0.024	0.068*
INSTOWN	?	-0.253	<0.001***
INDSPEC	+	0.096	0.005***
NONAUD_FEE	+	0.031	<0.001***
Year and Industry Fixed Effects		Included	
F-value: λ1=λ2		9.919***	
F-value: λ2=λ3		14.459***	
F-value of model		314.710	
Adj R-square		0.814	
N		5,367	

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

All variables are defined in Table 2.

Table 5

CEO Succession Planning and Firm Value

Dependent Variables: *IND_Q*			
Variables	Pred. Sign	Coefficient	p-value
Constant		3.881	<0.001***
CEO_PTNR ($\pi1$)	+	0.418	0.071*
CEO_NOT_PTNR ($\pi2$)	?	-0.477	0.149
CEO_INT ($\pi3$)	+	0.163	0.130
TA	?	-0.160	<0.001***
LEV	−	-0.112	0.301
IA	+	0.779	<0.001***
SEG	+	-0.070	<0.001***
CS	+	2.018	<0.001***
CAP	+	0.246	0.060*
INDROA	+	3.773	<0.001***
Year Fixed Effects		Included	
F-value: $\pi1=\pi2$		2.790**	
F-value: $\pi2=\pi3$		1.800*	
F-value of model		19.542	
Adj R-square		0.054	
N		4,536	

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

All variables are defined in Table 2.

Table 6

Additional Analysis to Address Auditor Change

Dependent Variables: *AUD_FEE*			
Variables	Pred. Sign	Coefficient	p-value
Constant		9.965	<0.001***
CEO_PTNR (λ1)	+	0.158	<0.001***
CEO_NOT_PTNR (λ2)	+	-0.022	0.612
CEO_INT (λ3)	+	0.037	0.051*
SIZE	+	0.526	<0.001***
LOSS	+	0.205	<0.001***
ROA	—	-0.396	<0.001***
INVREC	+	0.891	<0.001***
LEV	+	0.190	<0.001***
RET	—	-0.014	0.086*
GOCON	+	0.214	0.027**
BIG	+	0.177	<0.001***
MERGER	+	0.026	0.052*
INSTOWN	?	-0.234	<0.001***
INDSPEC	+	0.091	0.006***
NONAUD_FEE	+	0.029	<0.001***
Year and Industry Fixed Effects		Included	
F-value: λ1=λ2		4.103**	
F-value: λ2=λ3		12.178***	
F-value of model		326.981	
Adj R-square		0.824	
N		5,168	

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

All variables are defined in Table 2.