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Address for correspondence: Chia-Ling Chao, National Chung Cheng University, No.168, Sec. 1, University Rd., Min-Hsiung Township, Chia-Yi County, Taiwan. Tel: (05)272-0411 ext. 34503. Email: actact@ccu.edu.tw.
CEO Succession, Audit Pricing, and Firm Value: The Role of Supply Chain Knowledge

Abstract

This paper examines whether new CEOs with supply chain knowledge influence audit pricing and firm value. Through repeated personal and professional contacts in the business community, CEOs establish networking across individuals and organizations, which enhances the acquisition of supply chain knowledge. Relative to those without supply chain knowledge, firms with new outsider CEOs who previously served for a partner (i.e., supplier, customer, or competitor firm) within the supply chain or those with new insider CEOs demand more audit efforts, which leads to higher audit fees. We also find that agency costs (incurred by shareholders due to the separation of ownership and control) lead to an increase in audit fees to compensate for the additional audit effort, and that new CEOs appointed from a company within the supply chain (i.e., external recruitment or internal promotion) partially mediate the positive relationship between agency costs and audit fees. The combined evidence is consistent with agency theory’s argument that management will demand a high-quality audit when agency problems are high. We further document that appointing a new CEO who previously worked for a partner within the supply chain or promoting a new CEO from inside an organization adds greater value to firms than their counterparts outside the supply chain, suggesting that new CEOs with supply chain knowledge are valued at a premium. These results are robust to alternative samples and analyses.

Keywords: agency costs; audit fees; CEO succession; firm value; supply chain knowledge
CEO Succession, Audit Pricing, and Firm Value: The Role of Supply Chain Knowledge

INTRODUCTION

Incoming Chief Executive Officers (CEOs) often commence significant changes after succession. Significant changes to a firm’s mission and strategy may substantially affect both operational decisions and financial policies (Bills, Lasic, and Seidel 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).

Prior research documents that the CEO turnover process increases the risk of audit litigation and therefore audit fees (Bills et al. 2017). Specifically, promoting the new CEO from inside the firm mitigates the relation between new CEOs and higher audit fees, and this mitigation effect is greater for heir apparent insiders than for non-heir apparent insiders. Their combined evidence is consistent with the notion that stakeholder perceptions of risk associated with CEO turnover may be lower for an individual rising to CEO internally than for a CEO appointed externally (Bebchuk and Stole 1993; Laux 2012). These results also complement studies indicating that successor CEOs affect investors’ and creditors’ judgment about future firm performance (Pan et al. 2015, 2016).

Another line of research find that CEO characteristics affect audit fees. For instance, Johnson, Kuhn, Apostolou, and Hassell (2012) and Judd, Olsen, and Stekelberg (2017) document that auditors charge higher fees when a client’s CEO reveals behavior and attitudes consistent with narcissism. Hribar, Kim, Wilson, and Yang (2012) find that when a firm appoints an
overconfident CEO, auditors respond by charging higher fees. Harjoto, Laksmana, and Lee (2015) provide evidence that firms with ethnic minority female CEOs demand higher audit efforts and thereby pay higher audit fees than those with white male CEOs. 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 associated with managers’ equity holdings. 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, namely, CEOs’ supply chain knowledge. Johnstone, Li, and Luo (2014) examine the relation between auditors’ supply chain knowledge and audit pricing. They define supply chain knowledge from the accounting and auditing perspectives as “specialized understanding of information and processes regarding accounting and auditing issues that relates to both a supplier and its major customer, regardless of industry commonalities, that is particularly useful for understanding the complexities associated with the revenue cycle” (p. 123). 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 assessments of risk, thus leading to higher audit quality and lower audit fees (Chen, Chang, Chen, and Kim 2014; Johnstone et al., 2014). 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 along the supply chain.

As CEOs gain further relationship- and transaction-specific experiences over time, they
become knowledgeable about shared aims, risks, and opportunities among the firm itself and 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 to the supply chain objectives’ achievement (Taher, Bandarian, and Moghadam 2016).1

Despite the importance of supply chains within today’s economy, the effect of a new CEO with supply chain-relevant knowledge on the auditor’s fee-setting process remains unexplored.2 Knowledge development capacity, an unobservable phenomenon of how much knowledge is acquired, is embedded in the supply chain and is shown by the observable constructs of learning advancement and usage of existing knowledge (Craighead, Hult, and Ketchen 2009; Dickson 2003). Moreover, a corporate board recruits a new CEO of constant but unobservable ability (Jenter and Lewellen 2019). Instances of CEO turnover, therefore, provide a good setting to observe the impact of successor CEOs’ unique knowledge along the supply chain.

An auditor’s increased effort through expanded audit procedures may result in an increase in audit fees. On the other hand, an auditor may raise audit fees by charging a risk premium to the client (Bell, Doogar, and Solomon 2008; Judd et al. 2017; Simunic 1980).3

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1 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 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).

2 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 operational and financial performance (Lakshman and Parente 2008).

3 More audit efforts and/or more expected losses from litigation can increase audit fees. However, it is hard to differentiate between the two.
Outsider CEOs are commonly hired to formulate and implement strategic change or replace a poorly performing CEO (Elosge, Oesterle, Stein, and Hattula 2018). 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 the supply chain.

Prior research shows a positive association between career specialization and audit fees. For instance, O’Keefe, King, and Gaver (1994) document that violations of Generally Accepted Auditing Standards (GAAS) decrease as audit fee increases, and that industry specialization is associated with fewer violations of GAAS. Bhandari, Mammadov, Shelton, and Thevenot (2018) also provide evidence that firms recruiting CEOs with larger numbers of employment connections demand higher audit quality, which translates into higher audit fees. Accordingly, we predict that, among outsider CEOs, when the new CEO previously worked for a partner (i.e., supplier, customer, or competitor firm) within the supply chain, the firm will be more willing to invest in a high-quality audit and make sure that a higher reputation audit firm provides the service. Consistent with our prediction, the results document that among outsider CEOs audit fees are higher (to compensate for the additional audit effort) when the CEO previously worked for a partner within the supply chain.4

Audit pricing associated with CEO succession may vary with succession planning. It is therefore warranted to examine whether the association between CEO turnover and audit pricing

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4 In contrast with relevant studies (i.e., Chen et al., 2014; Johnstone et al., 2014), we include competitors in the supply chain partnership. An important element of supply integration is sharing information among the firm itself and supply chain partners, which include suppliers, customers, and competitors (see Appendix A for CEO classifications used in this study).
is moderated by different types of successor CEOs. Specifically, this paper identifies two types of successor CEOs with supply chain knowledge: those appointed from partners within the supply chain and those promoted from inside an organization. The findings support our theoretical argument that audit fees are higher (to compensate for the additional audit effort or greater audit scope and coverage) for both CEO succession plans (i.e., identifying a new outsider CEO with supply chain management skills and identifying an internal hire) relative to those successors from outside the supply chain.

Agency theory suggests that management will demand a high-quality audit when agency problems are high. Audit effort serves as a bonding and monitoring tool to relieve agency costs initiated by information asymmetry among stakeholders (Jensen and Meckling 1976; Watts and Zimmerman 1983). Moreover, leaders of firms may play an important role in curbing complex dynamics within organizations (Marion and Uhl-Bien, 2001). We therefore predict that agency costs lead to an increase in audit fees to compensate for the additional audit effort, and that firms with high agency costs are more likely to appoint CEOs possessing supply chain knowledge to benefit from their knowledge resources, which in turn demand better-developed audit services that lead to higher audit quality. Consistent with our prediction, our empirical results document that new CEOs with supply chain knowledge play a mediating role in the positive relationship between agency costs and audit fees.

Additional findings document that appointing a new outsider CEO who previously served

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5 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. 2017; Huang, Parker, Yan, and Lin 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).

6 Agency costs refer to the monitoring, bonding and residual loss that may be suffered by shareholders due to the separation of ownership and control (Jensen and Meckling 1976).
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.

Our results reveal that firms with a new CEO who previously worked for a company within a supply chain demand more audit efforts when agency problems are high. An increase in agency costs results in an increased 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.

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 still hold for this robustness check. Second, to account for this uneven sample size, we also apply the bootstrapping approach to the estimations of the regression models. The inferences from the analyses remained unchanged.

This paper contributes to audit-planning literature by providing evidence on an unexplored implication. 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. Specifically, we extend the literature by exploring whether new CEOs with
supply chain-relevant knowledge affect auditors’ fee-setting process. This study presents the first attempt in accounting literature to investigate whether new CEOs’ supply chain knowledge plays an essential role in audit demand 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. While Bills et al. (2017) document that audit fees will increase to a greater extent for companies with a new CEO hired externally than for companies with a new CEO promoted from inside the firm, we present further evidence of differential audit fee charged for clients with different groups of new outsider CEOs. We also find that new CEOs with supply chain knowledge partially mediate the positive relationship between agency costs and audit fees, which is consistent with agency theory’s argument that management will demand a high-quality audit when agency problems are high.

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.

**LITERATURE REVIEW AND RESEARCH HYPOTHESES**

**New CEOs’ Supply Chain Knowledge and Audit Fees**

An auditor’s increased effort through expanded audit procedures may result in an increase in audit fees. On the other hand, an auditor may raise audit fees by charging a risk premium to the client (Bell et al. 2008; Judd et al. 2017; Simunic 1980). Extant research documents that auditors incorporate CEO characteristics into their decision making when assessing risks associated with audit engagements. For instance, Johnson et al. (2012) and Judd et al. (2017)
document that auditors charge higher fees when a client’s CEO reveals behavior and attitudes consistent with narcissism. Hribar et al. (2012) find that when a firm appoints an overconfident CEO, auditors respond by charging higher fees. Harjoto et al. (2015) provide evidence that firms with ethnic minority female CEOs demand higher audit efforts and thereby pay higher audit fees than those with white male CEOs. Kim et al. (2015) document a positive relation between CEO portfolio vega equity and audit fees, suggesting that auditors consider higher earnings-management risk associated with managers’ equity holdings. 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.

A CEO is an individual at the top of a firm whose personal reputation can have a 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 risk assessments, due to its prevalent impact on the client’s financial reporting and organizational practices (Judd et al. 2017; Patelli and Pedrini 2015; Schmidt 2014).

Transition of key leadership is a very important occasion for a firm due to “the substantive and symbolic importance of the CEO position” (Zhang and Rajagopalan 2004, p. 483). 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. Significant changes to a firm’s mission and strategy may substantially 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.

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). 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 organization, the dominant stream of research 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

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7 Their findings are consistent with our untabulated evidence that, relative to firms with new CEOs promoted internally, those with new CEOs 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.
compared to inside hires (Boeker 1997; 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” (Zajac and Westphal 1996, p. 64). They further indicate that firms will not choose outsider CEOs who are just slightly better than insider candidates, thus the formers are often “handicapped in CEO successions” (Agrawal, Knoeber, and Tsoulouhas 2006, p. 619). 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 the supply chain. To the extent that CEO turnovers present an opportunity of generating a new fit between internal factors and varying environmental requirements (see Elosge et al., 2018), successors appointed from within the supply chain may better “fit” in selected strategies.

Extant research argues that knowledge is an essential strategic asset that would contribute to the development and achievement of a supply chain (Attia and Eldin, 2018; Samuel et al., 2011). Moreover, several researchers (e.g., Dalpati, Rangnekar, and Birasnav 2010; Granta and Preston 2019; Ofek and Sarvary 2001) indicate that sharing, incorporating, and applying knowledge among supply chain partners would lead to substantial benefits for organizations (e.g., reducing costs and increasing the quality of their products/services).

Prior auditing literature defines supply chain knowledge as “specialized understanding of information and processes regarding accounting and auditing issues that relates to both a supplier and its major customer, regardless of industry commonalities, that is particularly useful for
understanding the complexities associated with the revenue cycle” (Johnstone et al. 2014, p. 123). 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, leads to higher audit quality.

While the auditing literature (e.g., Chen et al. 2014; Johnstone et al. 2014) explores the effect of audit firms’ expertise and/or knowledge on audit fees, relevant research neglects the potential impact on audit pricing of CEOs’ unique knowledge. Instances of CEO turnover, therefore, provide a good setting to observe the impact of incoming CEOs’ unique knowledge along the supply chain on auditors’ fee-setting process. 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.

A supply chain is a network of affiliated firms that collaborate, in competition with other such networks, to create value for its end-user customers (Chen et al. 2014). Lee (2004) finds that top-performing supply chains have three distinct qualities. First, they are agile enough to react readily to sudden changes in supply or demand. Second, they adapt over time when the 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. CEOs appointed from within the industry possess industry
knowledge and skills which can be transmitted to other managers 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).

As discussed earlier, possible differences among distinct groups of incoming outsider CEOs remained unexplored. Prior research shows a positive association between career specialization and audit fees. For instance, O’Keefe et al. (1994) document that violations of Generally Accepted Auditing Standards (GAAS) decrease as audit fee increases, and that industry specialization increases as violations of GAAS decrease. Bhandari et al. (2018) also provide evidence that firms recruiting CEOs with larger numbers of employment connections demand higher audit quality, which translates into higher audit fees. We therefore hypothesize that, among outsider CEOs, when the new CEO previously worked for a partner within the supply chain, the firm will be more willing to invest in a high-quality audit and make sure that a higher reputation audit firm provides the service. We state this hypothesis in the alternative form as follows:

H1: Audit fees are higher for companies with a new outsider CEO who previously worked for a partner within the supply chain.

Audit pricing associated with CEO succession may vary with succession planning. It is therefore warranted to examine differential audit fee charged for clients with different groups of successor CEOs. This paper identifies two types of successor CEOs with supply chain knowledge: those promoted from inside an organization and those appointed from partners (i.e., supplier, customer, competitor firms) within the supply chain. To the extent that firms with new CEOs possessing supply chain knowledge are more likely to incrementally demand more
audit efforts to maximize the functional benefits of an audit, we propose that firms with either types of successor CEOs have a higher propensity to demand more audit efforts (proxied by audit fees), relative to those without supply chain knowledge. We state this hypothesis in the alternative form as follows:

H2a: Audit fees will increase to a greater extent for companies with a new outsider 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 the supply chain.

H2b: Audit fees will increase to a greater extent for companies with a new insider CEO than for those with a new CEO who previously served for a company outside the supply chain.

Agency Costs, Successor CEOs’ Supply Chain Knowledge, and Audit Fees

Agency theory suggests that management will demand a high-quality audit when agency problems are high. That is, audit effort serves as a bonding and monitoring tool to relieve agency costs initiated by information asymmetry among stakeholders (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 have a higher propensity to receive better-developed audit services. They find that the appointment of auditors with higher levels of industry experience is associated with better-developed audit services, which in turn lead to higher audit quality. Moreover, Griffin, Lont, and Sun (2010) conclude that agency costs reflected by high free cash flow and low growth opportunities lead to an increase in audit fees to compensate for the additional audit effort. Consistent with agency theory, several other studies (Adams, Nishikawa, and Rasmussen 2015; Guedhami, Pittman, and Saffar 2009; Lennox 2005) also suggest that firms with higher agency costs are more likely to recruit high quality auditors. Accordingly, we propose the following hypothesis (stated in alternative form):
H3a: There is a positive relationship between agency costs and audit fees.

CEOs with special managerial skills which are difficult to transfer across firms and industries may have incentives that are more aligned with those of the firm and its shareholders (Gounopoulos and Pham 2018). CEOs with supply chain knowledge can gain an in-depth understanding of the firm’s business operations because of his/her historical background. This facilitates the process of information gathering and reduces agency problems. Therefore, we predict that firms with higher agency costs are more likely to recruit a CEO with supply chain knowledge. We state this hypothesis in its alternative form as follows:

H3b: Companies with a new CEO who previously worked for a company within the supply chain have higher agency costs.

Relying on the discussion on the development of H2a and H2b, we argue 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 other two CEO succession plans: identifying a new outsider CEO who previously worked a partner within the supply chain and identifying a new CEO who were promoted from inside an organization. Accordingly, we further predict firms with new CEOs possessing supply chain knowledge to incrementally demand more audit efforts to maximize the functional benefits of an audit. We state this hypothesis in its alternative form as follows:

H3c: Audit fees are higher for companies with a new CEO who previously worked for a company within the supply chain.

Taken together, we hypothesize that firms with higher agency costs are more likely to recruit CEOs with supply chain-relevant knowledge to benefit from their knowledge resources, and that such firms are more willing to invest in a high-quality audit (proxied by audit fees). That is, H3a through H3c are intended to examine whether a new CEO who previously worked
for a company within the supply chain mediates the positive relationship between agency costs and audit fees.

**Successor CEOs’ Supply Chain Knowledge and Firm Value**

Agency costs may serve as a motivating force for organizations to increase their audit efforts and improve their audit quality, which appears to be a valued resource. That is, agency costs are high enough to “make external audits valuable” (Jensen and Payne 2005, p. 37). Because the benefits of higher audit quality may be greater for firms with higher levels of agency costs, it seems reasonable that firms with new CEOs possessing supply chain knowledge demand more audit efforts when agency problems are high. Moreover, knowledge is the major source of value, and a firm’s value creation relies on its ability to accumulate and apply knowledge (Wang, Wang, and Liang 2014; Zhou and Li 2012). Accordingly, new CEOs with supply chain knowledge would be valued at a premium. This reasoning leads to the following hypothesis (stated in alternative form):

H4a: The value of the firm will increase to a greater extent for companies with a new outsider 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 the supply chain.

H4b: The value of the firm will increase to a greater extent for companies with a new insider CEO than for those with a new CEO who previously served for a company outside the supply chain.

**SAMPLE SELECTION**

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. companies.

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8 Agency Theory argues that the minimization of agency costs leads to the maximization of firm value. Prior studies (e.g., Claessens, Djankov, Fan, and Lang 2002, Lemmon and Lins 2003; 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.
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 holds 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 firm-year observations in financial industries because their characteristics are unique (Francis, Reichelt, and Wang 2005; Reichelt and Wang 2010). We further delete observations with missing variables in the combined dataset. Our final sample consists of 5,352 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 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 5,352 firm-year observations, there are 562 cases with a CEO turnover (10.50 percent of total observations), including 423 observations with internal replacement and 139 observations with outside appointment.

To determine the identity of each party in a company’s supply chain relationships, we hand-collect the names of a company’s supplier(s), customer(s), and competitor(s) from
Bloomberg Professional Service for each sample year.⁹ We further identify whether a new CEO previously worked for his/her incumbent company’s supplier(s), customer(s), or competitor(s) if he/she is appointed from outside the firm. Of the 139 observations with outside appointment, there are 102 cases involved in a supply chain relationship. Panel B of Table 1 details our sample distribution.

[Insert Table 1 here]

RESEARCH DESIGN

Empirical Tests: The Relation between New CEOs’ Supply Chain Knowledge and Audit Fees

To test H1, we first identify whether the new outsider CEO previously worked for a partner within the supply chain and then estimate the following model:

\[
\text{LN}(\text{AUD\_FEE})_{it} = \mu_0 + \mu_1 \text{EXT\_SCK}_{it} + \mu_2 \text{SIZE}_{it} + \mu_3 \text{LOSS}_{it} + \mu_4 \text{ROA}_{it} + \mu_5 \text{INVREC}_{it} \\
+ \mu_6 \text{LEV}_{it} + \mu_7 \text{RET}_{it} + \mu_8 \text{GOCON}_{it} + \mu_9 \text{BIG}_{it} + \mu_{10} \text{NEWAUD}_{it} \\
+ \mu_{11} \text{MERGER}_{it} + \mu_{12} \text{INSTOWN}_{it} + \mu_{13} \text{INDSPEC}_{it} \\
+ \mu_{14} \text{LN}(\text{NONAUD\_FEE})_{it} + \mu_{15} \text{INDUSTRY\_FE} + \mu_{16} \text{YEAR\_FE} \\
+ \epsilon_{it}
\]  

(1)

where the dependent variable is the natural logarithm of audit fees (\text{LN}(\text{AUD\_FEE})). The key independent variable involves \text{EXT\_SCK}, which is an indicator variable equal to 1 if the CEO’s tenure is one year or less and the CEO previously worked for a partner (i.e., supplier, customer, or competitor firm) within the supply chain, and 0 if the CEO’s tenure is one year or less and the CEO previously worked for a company outside the supply chain. H1 predicts that the estimated coefficient on \text{EXT\_SCK} will be significantly positive, suggesting that among outsider CEOs audit fees are higher (to compensate for the additional audit effort) when the CEO previously worked for a partner within the supply chain.

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⁹ We include all of the 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.
worked for a partner within the supply chain. We control for the potential influence of industry and year in all models: industry fixed effects by two-digit SIC code (\textit{INDUSTRY\_FE}), and year fixed effects for the firm’s fiscal year (\textit{YEAR\_FE}); \textit{i} and \textit{t} represent firm and year indicators.

Extant literature provides valuable insights on the determinants of audit fees, and explanatory models have adjusted $R^2$s in the 70–90 percent range (Abbott, Parker, Peters, and Raghunandan 2003; Abbott, Parker, and Peters 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 (\textit{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 (\textit{LOSS}) and earnings before interest and taxes deflated by total assets (\textit{ROA}). We include the proportion of total assets in inventory and accounts receivable (\textit{INVREC}) to control for fraud, which is more likely when this proportion is greater (Cao et al. 2012; Summers and Sweeney 1998). We control for debt-to-asset ratio (\textit{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 (\textit{RET}). We include an indicator variable (\textit{GOCON}) coded 1 if the client receives a going-concern opinion during a given year, and 0 otherwise. We use two indicator variables (\textit{BIG} and \textit{NEWAUD}) to control for auditor type and shorter tenure. \textit{BIG} is coded 1 if the firm is audited by a Big 4 auditor (\textit{Deloitte, Ernst & Young, KPMG, or PwC}), and 0 otherwise; \textit{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 (\textit{MERGER}) that equals 1 if the firm has engaged in a merger or acquisition in year \textit{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 (LN(NONAUD_FEE)) to control for non-audit services.

To test H2a and H2b, we examine audit fees as a function of the type of CEO succession and a number of control variables as defined previously. Specifically, we estimate the following regression model:

$$\ln(\text{AUD\_FEE})_{it} = \lambda_0 + \lambda_1 \text{INS\_SCK}_{it} + \lambda_2 \text{OUT\_SCK}_{it} + \lambda_3 \text{NO\_SCK}_{it} + \lambda_4 \text{SIZE}_{it} + \lambda_5 \text{LOSS}_{it} + \lambda_6 \text{ROA}_{it} + \lambda_7 \text{INVREC}_{it} + \lambda_8 \text{LEV}_{it} + \lambda_9 \text{RET}_{it} + \lambda_{10} \text{GOCON}_{it} + \lambda_{11} \text{BIG}_{it} + \lambda_{12} \text{NEWAUD}_{it} + \lambda_{13} \text{MERGER}_{it} + \lambda_{14} \text{INSTOWN}_{it} + \lambda_{15} \text{INDSPEC}_{it} + \lambda_{16} \ln(\text{NONAUD\_FEE})_{it} + \lambda_{17} \text{INDUSTRY\_FE} + \lambda_{18} \text{YEAR\_FE} + \epsilon_{it}$$ (2)

Three types of successor CEOs are investigated: those appointed from inside an organization (INS_SCK), from partners within the supply chain (OUT_SCK), and from companies outside the supply chain (NO_SCK). Each type is represented by a separate variable, which is coded 1 if that type of turnover is applicable, and 0 otherwise. Specifically, INS_SCK is an indicator variable equal to 1 if the CEO’s tenure is one year or less and the CEO was promoted from inside the firm; OUT_SCK is an indicator variable equal to 1 if the CEO’s tenure is one year or less and the CEO previously worked for one of the supplier, customer, or competitor firms; NO_SCK is an indicator variable equal to 1 if the CEO’s tenure is one year or less and the CEO previously worked for a company outside the supply chain. All of the three indicator variables are set to 0 for firm-year observations without CEO turnovers (see Appendix for CEO classifications).

H2a predicts that the estimated coefficient on OUT_SCK (\(\lambda_2\)) will be larger than the coefficient on NO_SCK (\(\lambda_3\)), indicating that more audit efforts would be demanded when the new
outsider CEO previously worked for a company within a supply chain than when the CEO previously served for a company outside the supply chain. To examine H2a, we test the equality of the estimated coefficients on \( \text{OUT} \_\text{SCK} \) and \( \text{NO} \_\text{SCK} \). H2b predicts that the estimated coefficient on \( \text{INS} \_\text{SCK} \) (\( \lambda_1 \)) will be greater than the coefficient on \( \text{NO} \_\text{SCK} \) (\( \lambda_3 \)), suggesting that more audit efforts would be demanded when the new CEO was promoted from inside the firm than when the CEO previously served for a company outside the supply chain.

To test H2b, we test the equality of the estimated coefficients on \( \text{INS} \_\text{SCK} \) and \( \text{NO} \_\text{SCK} \).

**Empirical Tests: The Mediating Role of Successor CEOs’ Supply Chain Knowledge in the Relationship between Agency Costs and Audit Fees**

To test whether a new CEO who previously worked for a partner within the supply chain mediates the positive relationship between agency costs and audit fees (H3a through H3c), we estimate the following regression models:\(^{10}\)

\[
\ln(\text{AUD}_\text{FEE})_{it} = \phi_0 + \phi_1 \text{AGENCY}_{it} + \phi_2 \text{SIZE}_{it} + \phi_3 \text{LOSS}_{it} + \phi_4 \text{ROA}_{it} + \phi_5 \text{INVREC}_{it}
+ \phi_6 \text{LEV}_{it} + \phi_7 \text{RET}_{it} + \phi_8 \text{GOCON}_{it} + \phi_9 \text{BIG}_{it} + \phi_{10} \text{NEWAUD}_{it}
+ \phi_{11} \text{MERGER}_{it} + \phi_{12} \text{INSTOWN}_{it} + \phi_{13} \text{INDSPEC}_{it}
+ \phi_{14} \ln(\text{NONAUD}_\text{FEE})_{it} + \phi_{15} \text{INDUSTRY} \_\text{FE} + \phi_{16} \text{YEAR} \_\text{FE}
+ \epsilon_{it}
\]

\[
\text{NEW} \_\text{SCK}_{it} = \sigma_0 + \sigma_1 \text{AGENCY}_{it} + \sigma_2 \text{SIZE}_{it} + \sigma_3 \text{LOSS}_{it} + \sigma_4 \text{ROA}_{it} + \sigma_5 \text{INVREC}_{it}
+ \sigma_6 \text{LEV}_{it} + \sigma_7 \text{RET}_{it} + \sigma_8 \text{GOCON}_{it} + \sigma_9 \text{BIG}_{it} + \sigma_{10} \text{NEWAUD}_{it}
+ \sigma_{11} \text{MERGER}_{it} + \sigma_{12} \text{INSTOWN}_{it} + \sigma_{13} \text{INDSPEC}_{it}
+ \sigma_{14} \ln(\text{NONAUD}_\text{FEE})_{it} + \sigma_{15} \text{INDUSTRY} \_\text{FE} + \sigma_{16} \text{YEAR} \_\text{FE}
+ \epsilon_{it}
\]

\[
\ln(\text{AUD}_\text{FEE})_{it} = \zeta_0 + \zeta_1 \text{NEW} \_\text{SCK}_{it} + \zeta_2 \text{SIZE}_{it} + \zeta_3 \text{LOSS}_{it} + \zeta_4 \text{ROA}_{it} + \zeta_5 \text{INVREC}_{it}
+ \zeta_6 \text{LEV}_{it} + \zeta_7 \text{RET}_{it} + \zeta_8 \text{GOCON}_{it} + \zeta_9 \text{BIG}_{it} + \zeta_{10} \text{NEWAUD}_{it}
+ \zeta_{11} \text{MERGER}_{it} + \zeta_{12} \text{INSTOWN}_{it} + \zeta_{13} \text{INDSPEC}_{it}
+ \zeta_{14} \ln(\text{NONAUD}_\text{FEE})_{it} + \zeta_{15} \text{INDUSTRY} \_\text{FE} + \zeta_{16} \text{YEAR} \_\text{FE}
+ \epsilon_{it}
\]

---

\(^{10}\) Audit committee is responsible for appointing the auditor and setting audit fees. Board characteristics (e.g., board independence, board size, and number of meetings) measure corporate governance of the client company. Prior studies (e.g., Abbott et al. 2006; Bills et al. 2017; Huang et al. 2014) control the effects of audit committee and board of directors when they specify the audit fee model. However, our sample will drop by about 50% (from 5,352 to 2,680) if we incorporate these proxies for audit committee and board of directors as additional control variables. Accordingly, we exclude them from our models due to a significant number of missing data.
Following Doukas, McKnight, and Pantzalis (2005), we measure agency costs \( AGENCY \) as the interaction of the firm’s growth opportunities and its free cash flows. Specifically, we measure the growth opportunities of the firm using an indicator variable that takes the value of 1 if the operating expense ratio is greater than the sample median and the value of 0 otherwise. Operating expense ratio is defined as total expense less cost of goods sold, interest expense, and depreciation standardized by total annual sales. Following Lehn and Poulsen (1989), we measure free cash flows as operating income before depreciation minus the sum of income taxes plus interest expense and dividends paid, scaled by total assets. A high value for the interactive \( AGENCY \) variable denotes high agency costs arising from the existence of high free cash flows associated with poorly managed firms.

\( NEW\_SCK \) denotes new CEOs with supply chain knowledge. Accordingly, \( NEW\_SCK \) is an indicator variable equal to 1 if the CEO’s tenure is one year or less and the CEO was promoted from inside the firm or recruited from one of the supplier, customer, or competitor firms.

Equation (3) examines the hypothesized direct relationship between \( AGENCY \) and \( LN(AUD\_FEE) \) (direct effect). Mediator models (i.e., Equations (4) and (5)) test the hypothesis that \( AGENCY \) predicts \( NEW\_SCK \), which, in turn, predicts \( LN(AUD\_FEE) \) (indirect effect). The direct and indirect effects can exist simultaneously.\(^{11}\) However, it is likely that only one of the two effects exists or none. H3a through H3c predict that the coefficients \( \varphi_1 \), \( \sigma_1 \) and \( \xi_1 \) in Equations (3), (4), and (5), respectively, to be significantly positive, suggesting that new CEOs

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\(^{11}\) Spencer (2011) indicates that when an independent variable has a significant effect on a dependent variable and on a third variable (mediator), which also significantly affects the dependent variable, then the third variable is perceived as mediating the effect of the independent variable on the dependent variable. Mia (1988) also suggests that if there is a relationship between two variables at least partially through a third variable, then the latter is perceived as playing the mediating role in the relationship. Mediation can be full or partial.
with supply chain knowledge partially mediate the positive relationship between agency costs and audit fees.\textsuperscript{12}

**Empirical Tests: The Relation between Successor CEOs’ Supply Chain Knowledge and Firm Value**

To test H4a and H4b, we model firm value as a function of CEOs’ career experiences and other firm characteristics:

\[
FIRM\_VAL_{it} = \pi_0 + \pi_1 INS\_SCK_{it} + \pi_2 OUT\_SCK_{it} + \pi_3 NO\_SCK_{it} + \pi_4 SIZE_{it} \\
+ \pi_5 LEV_{it} + \pi_6 IA_{it} + \pi_7 SEG_{it} + \pi_8 CS_{it} + \pi_9 CAP_{it} + \pi_{10} NDROA_{it, FE} \\
+ \pi_m YEAR\_FE + \varepsilon_{it} \tag{6}
\]

H4a (H4b) predicts that the estimated coefficient on \(OUT\_SCK\) (\(INS\_SCK\)) will be larger than the coefficient on \(NO\_SCK\), suggesting that the value of the firm increases to a greater extent for companies with a new outsider CEO who previously worked for a partner within the supply chain (those with a new insider CEO) than for those with a new CEO who previously served for a company outside the supply chain. To test H4a (H4b), we test the equality of the estimated coefficients on \(OUT\_SCK\) and \(NO\_SCK\) (that on \(INS\_SCK\) and \(NO\_SCK\)). We devote the remainder of this section to defining the variables of interest in Equation (6) and describing their measurement.

**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

\textsuperscript{12} Prior studies indicate that firms with high agency costs demand more audit efforts (see Griffin et al. 2010; Jensen and Payne 2005). Therefore, we do not propose the hypothesis of a full mediation process (i.e., significantly positive coefficients \(\sigma_1\) and \(\xi_1\) as well as insignificant coefficient \(\phi_1\)).
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, Gilligan, and Marshall 1984; Wernerfelt and Montgomery 1988).

Following Bebchuk, Cremers, and Peyer (2011), we measure firm value using industry-adjusted Tobin’s $q$ ($FIRM\_VAL$), which is the difference between Tobin’s $q$ and the median Tobin’s $q$ for each firm’s primary two-digit SIC classification. Tobin’s $q$ is the ratio of the 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.

**Independent Variables**

$INS\_SCK$, $OUT\_SCK$, $NO\_SCK$, $INDUSTRY\_FE$, and $YEAR\_FE$ are as defined previously. Equation (6) also controls for additional factors we expect to affect corporate valuation (see Huang, Zhang, Deis, and Moffitt 2009; Villalonga and Amit 2006). We use the natural logarithm of total assets ($SIZE$) to control for firm size, and we use the ratio of total debt to total assets ($LEV$) to control for the impact of leverage on future performance. The investment-to-assets ratio ($IA$), 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 ($SEG$) controls for industry diversification. Cash stocks ($CS$), defined as the ratio of net cash flows (less cash dividends and capital expenditures) to lagged total assets, controls for the free cash flow problem. Lastly, the ratio of capital expenditures to sales ($CAP$) controls for differences in growth options, and industry-adjusted return on assets ($INDROA$), defined as the ratio of earnings before interest and taxes to total assets (ROA) less median industry ROA (classified by the two-digit SIC code), controls for profitability.
EMPIRICAL RESULTS

Descriptive Statistics

Table 2 presents the descriptive statistics for the model variables. We find that approximately 10 percent of the sample hires a new CEO with supply chain knowledge (i.e., 1.8 percent from supply chain partners and 7.9 percent from inside the firm). Only 0.7 percent of the sample appoints a new CEO who previously worked for a company outside the supply chain. The typical firm in our sample has multiple business segments with a median value of 2. 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 value for 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 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 included in Equations (2)-(6). Panel A reports univariate correlations among the variables in tests of the association among audit fees, CEO succession planning, and agency costs. Regarding correlations between audit fees and new CEOs’ career experiences, the results reveal that $\ln(AUD\_FEE)$ is positively associated with $INS\_SCK$ and $NEW\_SCK$ ($p < 0.01$). As we observe from Table 3, the correlation coefficient between $\ln(AUD\_FEE)$ 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 $FIRM_{VAL}$ is positively correlated with $OUT_{SCK}$, suggesting that firms with new outsider 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, 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]

**Multiple Regression Results**

We run the test of our first hypothesis using a matched sample design. Based on a sample of firms with new outsider CEOs, the propensity score is calculated using a first-stage model predicting $EXT_{SCK}$. The prediction model includes all of the control variables in Equation (1). We then match each firm-year observation with $EXT_{SCK}$ equal to 0 with a firm-year observation with $EXT_{SCK}$ equal to 1 by propensity score, using a nearest neighbor. We report the regression results for Equation (1) in Table 4. The results in the balanced matched sample indicate that the coefficient value for $EXT_{SCK}$ is positive and significant at less than the 0.01 level. This is consistent with H1, suggesting that among outsider CEOs audit fees are higher (to compensate for the additional audit effort) when the new CEO previously worked for a partner within the supply chain.

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13 To address concerns regarding the validity of the normal distribution assumption in small samples, we apply the bootstrapping approach, which is a resampling technique for assessing uncertainties, to the estimation of Table 4 (see Efron and Tibshirani 1993). The results (not reported) are qualitatively similar and the inferences are unchanged.
In Table 5, we examine whether audit fees will increase to a greater extent for companies with a new CEO who previously worked for a company within a supply than for those outside the supply chain. The high adjusted $\hat{R}^2$ of the regression (82.9% percent) suggests a good model fit. As predicted, the coefficient value for \textit{NO\_SCK} is negative and significant at the 0.10 level, suggesting that firms with CEOs possessing supply chain knowledge demand more audit efforts, which result in higher audit fees. The coefficients on \textit{INS\_SCK} and \textit{OUT\_SCK} are positive and significant at less than 0.05 level, revealing that new CEOs promoted internally or hired from a company within the supply chain are associated with higher audit fees. We use F-tests to compare the coefficients on \textit{INS\_SCK}, \textit{OUT\_SCK}, and \textit{NO\_SCK}. We find that the coefficient on \textit{OUT\_SCK} is significantly larger (at less than the 0.01 level; $\lambda 2 - \lambda 3 = 0.239$) than the coefficient on \textit{NO\_SCK}. This result is consistent with H2a, indicating that firms with a new outsider CEO who previously worked for a partner within the supply chain demand more audit efforts, which leads to higher audit fees, than those with a new CEO who previously served for a company outside the supply chain. We also find that the coefficient on \textit{INS\_SCK} is significantly larger (at less than the 0.05 level; $\lambda 1 - \lambda 3 = 0.144$) than the coefficient on \textit{NO\_SCK}. This result is consistent with H2b, suggesting that firms with insider CEOs demand more audit effort or greater audit scope and coverage than those without supply chain knowledge. 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 *LN(NONAUD_FEE)*.

To fully test the mediation of new CEOs’ supply chain knowledge on the relationship between agency costs and audit efforts, we first examine the direct effect of *AGENCY* on *LN(AUD_FEE)*. The results in Table 6 demonstrate that the coefficient value for *AGENCY* is positive and significant at less than the 0.01 level, suggesting that firms with high agency costs demand more audit efforts. We next examine the hypothesized indirect effect on *LN(AUD_FEE)*. The results in Tables 7 and 8 document that the coefficient values for *AGENCY* and *NEW_SCK* are all positive and significant at better than 0.10 level, revealing the indirect effect of agency costs on audit efforts through successor CEOs’ with supply chain knowledge. Taking this together, the combined evidence is consistent with H3a through H3c, indicating that a new CEO who previously worked for a company within the supply chain partially mediates the positive effect of agency costs on audit fees.

The regression results presented in Table 9 document that the coefficient values for *OUT_SCK* is positive and significant at the 0.10 level, suggesting that appointing a new outsider CEO who previously worked for a partner within the supply chain enhances firm value. The

14 It is possible that a firm evaluates the magnitude of agency problems as of the prior year or the first few months of the current year before designing a CEO succession plan. To ensure our findings are insensitive to this potential confounding factor, we estimate Equation (4) with *AGENCY* measured at the end of year $t-1$ and year $t$, and we present the results in Columns (1) and (2) of Table 7, respectively. Our inferences regarding the association between *AGENCY* and *NEW_SCK* for the year $t-1$ and $t$ specifications are qualitatively similar.
coefficients on \( NO_{SCK} \) and \( INS_{SCK} \) are insignificant (at the 0.10 level). Moreover, we use F-tests to compare the coefficients on \( INS_{SCK} \), \( OUT_{SCK} \), and \( NO_{SCK} \). We find that the coefficient on \( OUT_{SCK} \) is significantly greater (at less than the 0.05 level; \( \pi_2 - \pi_3 = 0.895 \)) than the coefficient on \( NO_{SCK} \). This result is consistent with H4a, 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 \( INS_{SCK} \) is significantly larger (at less than the 0.10 level; \( \pi_1 - \pi_3 = 0.640 \)) than the coefficient on \( NO_{SCK} \). This result is consistent with H4b, suggesting that insider CEOs add greater value to firms than those who previously served for a company outside the supply chain.\(^{15}\)

Taken together, the results reveal that firms with new CEOs with supply chain knowledge demand more audit efforts when agency problems are high. An increase in agency costs results in an increased 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 9 here]

**ADDITIONAL ANALYSES**

**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 regular matched-pair research design, each observation in

\(^{15}\) The number of firm-year observations (5,352) in Tables 5-8 are greater than those (4,536) in Table 9 due to differing data requirements for the analyses. We re-estimate Equations (2)-(5) using a reduced sample of 4,536 firm-year observations. The inferences remained unchanged.
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.

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

\[
CEO_{it} = \delta_0 + \delta_1 AGE_{it} + \delta_2 EMPLOY_{it} + \delta_3 HOMOGENEITY_{it} + \delta_4 IND_RET_{it} + \delta_5 IND_ROAT_{it} + \delta_6 IND_FORECAST_{it} + \epsilon_{it}
\]  

(7)

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 the 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; \( IND_ROAT \) is industry-adjusted ROAT (net income/assets) measured over the previous fiscal year, defined as ROAT less its median industry ROAT (classified by the two-digit SIC code); \( IND_FORECAST \) 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 (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.\footnote{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.} We expect CEO age to positively affect the likelihood of CEO turnover.

Several studies find a positive relationship 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 who are qualified for the CEO position, and that an outside candidate is more likely to be effective in a smaller, less complex organization. Accordingly, we use the natural log of the number of firm employees as a proxy for size.

Parrino (1997) finds evidence that CEO turnover is more likely to occur in homogeneous industries because of the increased availability of strong outside candidates. The appointment of a successor CEO from homogeneous industries reduces the probability 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 associated with 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, we regress the monthly return for each firm in each index 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., 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 industry-adjusted analyst forecast errors. 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 696 firm-year observations, 348 for firms with CEO change and the other 348 without CEO change. For brevity, we report only the results with this alternative sample for Equation (2). The findings in Table 10 suggest that our results are robust to the use of an alternative sample that is propensity score matched on CEO turnover.

[Insert Table 10 here]
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 5 to 9 (see Efron and Tibshirani, 1993). Specifically, we obtain the mean and variance based on 1,000 random parameter estimates to construct confidence intervals. The results (unreported) reveal that the inferences from this analysis are qualitatively similar to those presented in Tables 5 to 9.

CONCLUSION

We extend the relevant literature by investigating a relatively neglected aspect of CEO characteristics around turnover, namely, whether new CEOs with supply chain knowledge influence audit pricing. We find that among outsider CEOs audit fees are higher (to compensate for the additional audit effort) when the new CEO previously worked for a partner within the supply chain. Moreover, the findings support our theoretical argument that, relative to those without supply chain knowledge, firms with new outsider CEOs who previously served for a partner within the supply chain or those with new insider CEOs demand more audit efforts, which leads to higher audit fees.

We find a positive effect of agency costs on audit efforts. We also find that firms with higher agency costs are more likely to recruit CEOs with supply chain knowledge to benefit from their knowledge resources, and that such firms are more likely to demand more audit efforts to maximize the functional benefits of an audit. The combined evidence supports the hypothesis of a partial mediation process. That is, successor CEOs with supply chain knowledge play a mediating role in the positive relationship between agency costs and audit fees.

Our results provide evidence that appointing a new CEO who previously served for a company 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. Our findings are consistent with the notion that firms with a new CEO who previously worked for a company within the supply chain have a higher propensity to demand more audit efforts when agency problems are high. An increase in agency costs results in an increased need for intensive auditing, which leads to higher audit quality. Accordingly, new CEOs with supply chain knowledge is valued at a premium.

Like any empirical study, this study is subject to several limitations. First, although our study has practical implications for companies by examining audit 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 relation between new CEOs with supply chain knowledge and direct measures of audit efforts would be informative. Second, we do not separately investigate the potential impact on the audit pricing of CEOs’ unique knowledge regarding supplier, customer, and competitor firms 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 observations with supply chain knowledge and those without supply chain knowledge. Future research could investigate the two explanations by comparing the two groups of samples before CEO turnovers and also exploring the differences in the pre- and post-CEO turnover periods.
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Groups A, B, C and D are mutually exclusive and collectively exhaustive. The classification in Table A1 is understandable intuitively. Group A represents those firms without CEO change whereas groups B, C, and D are those firms with new CEOs. Specifically, group B represents the new CEOs promoted from within their firms, and group C (D) denotes outsider CEOs appointed from within (outside) the supply chain. To estimate our regression models, we use three dummy variables to distinguish four CEO groups as in Table A2.

**TABLE A1**
Intuitive classifications for four CEO groups

| Group A: No CEO turnover | Group B: New CEOs promoted from inside the firm | Group C: Outsider CEOs appointed from within the supply chain | Group D: Outsider CEOs appointed from outside the supply chain |
|--------------------------|-------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------|

**TABLE A2**
Variable definitions for the four CEO groups

| Variable | INS_SCK is set to 1 for insider CEOs, and 0 otherwise. | OUT_SCK is set to 1 for outsider CEOs appointed from within the supply chain, and 0 otherwise. | NO_SCK is set to 1 for outsider CEOs appointed from outside the supply chain, and 0 otherwise. |
|----------|-----------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|
| Group    |                                                    |                                                                 |                                                                |
| A        | 0                                                  | 0                                                               | 0                                                               |
| B        | 1                                                  | 0                                                               | 0                                                               |
| C        | 0                                                  | 1                                                               | 0                                                               |
| D        | 0                                                  | 0                                                               | 1                                                               |

Note: Group A is the reference line.
### 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 variables | (15,188)   | (3,487) |
| Final sample             | 5,352      | 1,229 |

**Panel B: Sample Distribution**

**Panel B1: Final sample**

|                          | Firms-Years | Percentage |
|--------------------------|-------------|------------|
| CEO switches             | 562         | 10.50%     |
| No CEO switches          | 4,790       | 89.50%     |
| Total                    | 5,352       | 100.00%    |

**Panel B2: Subsample of CEO switches**

|                          | Firms-Years | Percentage |
|--------------------------|-------------|------------|
| Internal replacement     | 423         | 75.27%     |
| External replacement     | 139         | 24.73%     |
| Total                    | 562         | 100.00%    |

**Panel B3: Subsample of CEO switches with external replacement**

|                          | Firms-Years | Percentage |
|--------------------------|-------------|------------|
| Within the supply chain  | 102         | 73.38%     |
| Outside the supply chain | 37          | 26.62%     |
| Total                    | 139         | 100.00%    |
|                             | N  | Mean    | Median  | Std Dev | Q1  | Q3   |
|-----------------------------|----|---------|---------|---------|-----|------|
| **Test variables**          |    |         |         |         |     |      |
| $LN(AUD\_FEE)$              | 5,352 | 14.642  | 14.570  | 1.035   | 13.933 | 15.328 |
| $INS\_SCK$                  | 5,352 | 0.079   | 0.000   | 0.270   | 0.000 | 0.000 |
| $OUT\_SCK$                  | 5,352 | 0.018   | 0.000   | 0.135   | 0.000 | 0.000 |
| $NO\_SCK$                   | 5,352 | 0.007   | 0.000   | 0.082   | 0.000 | 0.000 |
| $AGENCY$                    | 5,352 | 0.041   | 0.000   | 0.073   | 0.000 | 0.086 |
| $NEW\_SCK$                  | 5,352 | 0.097   | 0.000   | 0.295   | 0.000 | 0.000 |
| Tobin’s q                   | 4,536 | 2.033   | 1.617   | 1.421   | 1.221 | 2.325 |
| **Control variables**       |    |         |         |         |     |      |
| $SIZE$                      | 5,352 | 7.882   | 7.771   | 1.680   | 6.665 | 8.976 |
| $LOSS$                      | 5,352 | 0.114   | 0.000   | 0.317   | 0.000 | 0.000 |
| $ROA$                       | 5,352 | 0.090   | 0.088   | 0.125   | 0.054 | 0.134 |
| $INVREC$                    | 5,352 | 0.241   | 0.218   | 0.167   | 0.103 | 0.335 |
| $LEV$                       | 5,352 | 0.251   | 0.238   | 0.213   | 0.089 | 0.360 |
| $RET$                       | 5,352 | 0.130   | 0.080   | 0.680   | -0.107 | 0.272 |
| $GOCON$                     | 5,352 | 0.003   | 0.000   | 0.058   | 0.000 | 0.000 |
| $BIG$                       | 5,352 | 0.901   | 1.000   | 0.298   | 1.000 | 1.000 |
| $NEWAUD$                    | 5,352 | 0.037   | 0.000   | 0.189   | 0.000 | 0.000 |
| $MERGER$                    | 5,352 | 0.190   | 0.000   | 0.393   | 0.000 | 0.000 |
| $INSTOWN$                   | 5,352 | 0.172   | 0.160   | 0.115   | 0.080 | 0.240 |
| $INDSPEC$                   | 5,352 | 0.288   | 0.288   | 0.206   | 0.129 | 0.408 |
| $LN(NONAUD\_FEE)$          | 5,352 | 11.848  | 12.630  | 3.543   | 11.225 | 13.788 |
| $IA$                        | 4,536 | 0.044   | 0.027   | 0.124   | 0.003 | 0.069 |
| $SEG$                       | 4,536 | 2.487   | 2.000   | 1.700   | 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 |
| $INDROA$                    | 4,536 | -0.001  | 0.000   | 0.117   | -0.031 | 0.037 |

The number of observations are unequal due to differing data requirements for different regression estimations.

Variable definitions:

- $LN(AUD\_FEE)$ = the natural logarithm of audit fees;
- $INS\_SCK$ = an indicator variable equal to 1 if the CEO’s tenure is one year or less and the CEO was promoted from inside the firm, and 0 otherwise;
- $OUT\_SCK$ = an indicator variable equal to 1 if the CEO’s tenure is one year or less and the CEO previously worked for one of the supplier, customer, or competitor firms, and 0 otherwise;
- $NO\_SCK$ = an indicator variable equal to 1 if the CEO’s tenure is one year or less and the CEO previously worked for a company outside the supply chain, and 0 otherwise;
- $AGENCY$ = the interaction of a dummy variable that takes the value of 1 if the firm’s operating expense ratio is greater than the sample median (and the value of 0 otherwise) with free cash flow. Operating expense ratio is defined as total expense less cost of goods sold, interest expense, and depreciation standardized by total annual sales. Free cash
flow is measured as \[
\frac{\text{(Operating Income before Depreciation)} - (\text{Taxes} + \text{Interest Expense} + \text{Dividends paid})}{\text{Total Assets}};\]

\(NEW\_SCK\) = an indicator variable equal to 1 if the CEO’s tenure is one year or less and the CEO was promoted from inside the firm or recruited from one of the supplier, customer, or competitor firms, and 0 otherwise;

\(Tobin\text{'s } q\) = the ratio of market value of assets to the book value of assets, where the market value of assets is the book value of debt 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 equal to 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;

\(LN(\text{NONAUD_FEE})\) = the natural logarithm of non-audit fees;

\(IA\) = 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 segments;

\(CS\) = net cash flows less cash dividends and capital expenditures scaled by lagged total assets;

\(CAP\) = the ratio of capital expenditures to sales; and

\(INDROA\) = 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 Included in Equations (2)-(5)**

| Variable        | LN(AUD_FEE) | INS_SCK | OUT_SCK | NO_SCK | AGENCY | NEW_SCK | SIZE | LOSS | ROA | INVREC | LEV | RET | GOCON | BIG | NEWAUD | MERGER | INSTOWN | INDSPEC |
|-----------------|-------------|---------|---------|--------|--------|---------|------|------|-----|--------|-----|-----|-------|-----|--------|--------|---------|---------|
| INS_SCK         | 0.064***    |         |         |        |        |         |      |      |     |        |     |     |       |     |        |        |         |         |
| OUT_SCK         | -0.013      | -0.040*** |        |        |        |         |      |      |     |        |     |     |       |     |        |        |         |         |
| NO_SCK          | -0.019      | -0.024* | -0.011 |        |        |         |      |      |     |        |     |     |       |     |        |        |         |         |
| AGENCY          | 0.002       | -0.008  | 0.008   | 0.012  |        |         |      |      |     |        |     |     |       |     |        |        |         |         |
| NEW_SCK         | 0.045***    | 0.892*** | 0.416*** | -0.028** | -0.003 |         |      |      |     |        |     |     |       |     |        |        |         |         |
| SIZE            | 0.834***    | 0.055*** | -0.050*** | -0.028** | -0.040** | -0.032** |      |      |     |        |     |     |       |     |        |        |         |         |
| LOSS            | -0.115***   | 0.008   | 0.051*** | -0.028** | -0.167*** | 0.026* | -0.216*** |      |      |     |        |     |     |       |     |        |        |         |         |
| ROA             | 0.043***    | -0.039*** | -0.030** | -0.002 | 0.491*** | -0.042*** | 0.079*** | -0.316*** |      |      |     |        |     |     |       |     |        |        |         |         |
| INVREC          | -0.071***   | -0.004  | -0.004  | 0.038*** | 0.040*** | -0.005 | -0.212*** | 0.005  | 0.115*** |      |      |     |        |     |     |       |     |        |        |         |         |
| LEV             | 0.276***    | 0.030** | -0.023* | -0.19  | 0.319*** | 0.072*** | -0.068*** | -0.158*** |      |      |     |        |     |     |       |     |        |        |         |         |
| RET             | -0.073***   | -0.031** | 0.038*** | -0.005 | 0.063*** | -0.033** | -0.074*** | 0.041*** | 0.048*** | 0.028** | -0.012 |      |      |     |        |     |        |        |         |         |
| GOCON           | -0.023*     | 0.031** | -0.008  | -0.005 | -0.077*** | 0.017 | -0.049*** | 0.111*** | -0.161*** | 0.001 | 0.039*** | -0.029** |      |      |     |        |     |        |        |         |         |
| BIG             | 0.376***    | 0.046*** | -0.010  | 0.012  | 0.030* | 0.035*** | 0.373*** | -0.106*** | 0.087*** | -0.073*** | 0.189*** | -0.072*** | -0.035** |      |      |     |        |     |        |        |         |         |
| NEWAUD          | -0.113***   | -0.014  | 0.010   | 0.032** | -0.013 | -0.005 | -0.084*** | 0.066*** | -0.043*** | 0.036*** | -0.024*** | 0.036*** | 0.023 | -0.104*** |      |      |     |        |     |        |        |         |         |
| MERGER          | 0.051***    | -0.022  | -0.010  | -0.028** | 0.007 | -0.023  | 0.011 | -0.044*** | -0.013 | -0.009 | 0.036*** | 0.045*** | -0.004 | -0.003  | 0.003 |      |      |     |        |     |        |        |         |         |
| INSTOWN         | -0.148***   | -0.017  | 0.014   | 0.008  | 0.026  | 0.002 | -0.162*** | 0.014  | 0.001  | 0.034** | 0.039*** | -0.037*** | 0.018  | 0.019  | 0.005 | 0.010 |      |     |        |     |        |        |         |         |
| INDSPEC         | 0.294***    | 0.021   | -0.030** | 0.011  | -0.14  | 0.001  | 0.321*** | -0.090*** | 0.065*** | -0.060*** | 0.117*** | -0.036*** | -0.017  | 0.427*** | -0.082*** | -0.045*** | -0.042*** |      |     |        |     |        |        |         |         |
| LN(NONAUD_FEE)  | 0.527***    | 0.026* | -0.004  | 0.004  | 0.049** | 0.028** | 0.467*** | -0.114*** | 0.106*** | -0.070*** | 0.151*** | -0.032** | -0.036*** | 0.305*** | -0.085*** | 0.056*** | -0.069*** | 0.212*** |      |     |        |     |        |        |         |         |
### TABLE 3 (Continued)
#### Pearson Correlation Matrix

**Panel B: Variables Included in Equation (6)**

| Variable   | FIRM VAL | INS SCK | OUT SCK | NO SCK | SIZE  | LEV    | IA    | SEG   | CS    | CAP   |
|------------|----------|---------|---------|--------|-------|--------|-------|-------|-------|-------|
| INS SCK    | 0.007    |         |         |        |       |        |       |       |       |       |
| OUT SCK    | -0.025*  | -0.040***|         |        |       |        |       |       |       |       |
| NO SCK     | -0.021   | -0.025* | -0.012  |        |       |        |       |       |       |       |
| SIZE       | -0.081***| 0.050***| -0.059***| -0.012|       |        |       |       |       |       |
| LEV        | -0.045***| 0.029** | -0.029* | -0.021| 0.332***|       |       |       |       |       |
| IA         | 0.032**  | -0.021  | -0.033**| -0.039***| 0.007 | 0.023*|       |       |       |       |
| SEG        | -0.080***| 0.028*  | -0.027* | 0.008 | 0.331***| 0.098***| -0.055***|       |       |       |
| CS         | 0.148*** | -0.037***| -0.022 | 0.001 | 0.018 | -0.131***| -0.195***| -0.005|       |       |
| CAP        | -0.037***| 0.017   | -0.017 | -0.016| 0.069***| 0.064***| 0.296***| -0.074***| -0.470***|       |
| INDROA     | 0.181*** | -0.042***| -0.040***| -0.012| 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.

Variable definitions:

- **FIRM VAL**: the difference between Tobin’s $q$ related to each firm and the median of the ratio corresponding to the year and industry using two-digit SIC codes. 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 debt plus the market value of equity.

- All other variables are defined in Table 2.
**TABLE 4**

New Outsider CEOs and Audit Fees

| Dependent Variable: $LN(AUD\_FEE)$ | Pred. Sign | Coefficient | p-value |
|------------------------------------|------------|-------------|---------|
| Constant                           |            | 9.856       | $<0.001^{***}$ |
| $EXT\_SCK$ ($\mu 1$)               | +          | 0.344       | 0.003*** |
| SIZE                               | +          | 0.469       | $<0.001^{***}$ |
| LOSS                               | +          | -0.064      | 0.342    |
| $ROA$                              | -          | -1.540      | 0.034**  |
| $INVREC$                           | +          | 0.979       | 0.004*** |
| $LEV$                              | +          | 0.327       | 0.143    |
| $RET$                              | -          | 0.042       | 0.091*   |
| $BIG$                              | +          | 0.395       | 0.079*   |
| $NEWAUD$                           | -          | -0.816      | $<0.001^{***}$ |
| $MERGER$                           | +          | -0.135      | 0.216    |
| $INSTOWN$                          | ?          | 0.263       | 0.329    |
| $INDSPEC$                          | +          | -0.472      | 0.083*   |
| $LN(\text{NONAUD}\_FEE)$          | +          | 0.091       | 0.013**  |

Year and Industry Fixed Effects: Included

F statistic: 15.165 $<0.001^{***}$

Adj. R-squared: 0.801

N: 74

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively, based on one (two)-tailed tests when a prediction is (is not) made.

Table 4 presents OLS results of testing H1 using Equation (1). We run the test using a matched sample design. Based on a sample of firms with new outsider CEOs (see Panel B3 in Table 1), the propensity score is calculated using a first-stage model predicting $EXT\_CEO$. The prediction model includes all of the control variables in Equation (1). We then match each firm-year observation with $EXT\_CEO$ equal to 0 with a firm-year observation with $EXT\_CEO$ equal to 1 by propensity score, using a nearest neighbor. Data from the resulting matched sample ($n = 74$) are used in the analysis.

Variable definitions:

- $EXT\_SCK$ = an indicator variable equal to 1 if the CEO’s tenure is one year or less and the CEO previously worked for one of the supplier, customer, or competitor firms, and 0 otherwise.

All other variables are defined in Table 2. The regression model includes industry (based on two-digit SIC codes) and year fixed effects.
### Table 5
CEO Succession Planning and Audit Fees

| Variables            | Pred. Sign | Coefficient | p-value    |
|----------------------|------------|-------------|------------|
| Constant             |            | 9.966       | <0.001***  |
| INS_SCK (λ₁)         | +          | 0.041       | 0.029**    |
| OUT_SCK (λ₂)         | +          | 0.137       | <0.001***  |
| NO_SCK (λ₃)          | −          | -0.103      | 0.072*     |
| SIZE                 | +          | 0.528       | <0.001***  |
| LOSS                 | +          | 0.212       | <0.001***  |
| ROA                  | −          | -0.355      | <0.001***  |
| INVREC               | +          | 0.901       | <0.001***  |
| LEV                  | +          | 0.197       | <0.001***  |
| RET                  | −          | -0.014      | 0.058*     |
| GOCON                | +          | 0.139       | 0.083*     |
| BIG                  | +          | 0.184       | <0.001***  |
| NEWAUD               | −          | -0.100      | <0.001***  |
| MERGER               | +          | 0.026       | 0.053*     |
| INSTOWN              | ?          | -0.266      | <0.001***  |
| INDSPEC              | +          | 0.105       | <0.001***  |
| LN(NONAUD_FEE)       | +          | 0.026       | <0.001***  |

**Year and Industry Fixed Effects**

|                     | Included |
|---------------------|----------|
| H2a: λ₂-λ₃=0        | 0.239    | 0.002***  |
| H2b: λ₁-λ₃=0        | 0.144    | 0.024**   |
| F statistic         | 348.098  | <0.001*** |
| Adj. R-squared      | 0.829    |           |
| N                   | 5,352    |           |

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively, based on one (two)-tailed tests when a prediction is (is not) made.

Table 5 presents the results of testing H2a and H2b using Equation (2). Specifically, we test the equality of the estimated coefficients on OUT_SCK and NO_SCK (H2a) and INS_SCK and NO_SCK (H2b). All variables are defined in Table 2. The regression model includes industry (based on two-digit SIC codes) and year fixed effects.
| Variables          | Pred. Sign | Coefficient | p-value   |
|-------------------|------------|-------------|-----------|
| Constant          |            | 9.942       | <0.001*** |
| AGENCY (φ1)       | +          | 0.640       | <0.001*** |
| SIZE              | +          | 0.528       | <0.001*** |
| LOSS              | +          | 0.241       | <0.001*** |
| ROA               |            | -0.600      | <0.001*** |
| INVREC            | +          | 1.021       | <0.001*** |
| LEV               | +          | 0.120       | 0.012**   |
| RET               |            | -0.020      | 0.089*    |
| GOCON             | +          | 0.468       | 0.005***  |
| BIG               | +          | 0.208       | <0.001*** |
| NEWAUD            |            | -0.406      | <0.001*** |
| MERGER            | +          | 0.020       | 0.201     |
| INSTOWN           | ?          | -0.335      | <0.001*** |
| INDSPEC           | +          | 0.188       | <0.001*** |
| LN(NONAUD_FEE)    | +          | 0.029       | <0.001*** |

Year and Industry Fixed Effects: Included

F statistic: 147.308 <0.001***
Adj. R-squared: 0.680
N: 5,352

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively, based on one (two)-tailed tests when a prediction is (is not) made.

Table 6 presents OLS results of testing H3a using Equation (3). All variables are defined in Table 2. The regression model includes industry (based on two-digit SIC codes) and year fixed effects.
Table 7 presents logit regression results of testing H3b using Equation (4). Specifically, we estimate Equation (4) with AGENCY measured at the end of year \( t-1 \) and year \( t \), and we present the results in Columns (1) and (2), respectively. All variables are defined in Table 2. The regression model includes industry (based on two-digit SIC codes) and year fixed effects.

| Dependent Variable: NEW_SCK | (1) Coefficient | (2) Coefficient |
|-----------------------------|----------------|----------------|
| Constant                    | -2.984***      | -2.910***      |
| \( AGENCY_{t-1} \) (\( \sigma_1 \)) | + 0.050**      |                |
| \( AGENCY_t \) (\( \sigma_1 \)) | + 0.452*       |                |
| SIZE | + 0.043 | 0.064 |
| LOSS | + 0.241 | 0.227 |
| ROA | -1.206*** | -0.910* |
| INVREC | + 0.408 | 0.539 |
| LEV | + -0.033 | -0.020 |
| RET | - 0.024 | 0.024 |
| GOCON | + 0.939 | -2.560 |
| BIG | + 0.493** | 0.547** |
| NEWAUD | - -0.062 | -0.039 |
| MERGER | + -0.213 | -0.194 |
| INSTOWN | ? -0.290 | -0.159 |
| INDSPEC | + -0.275 | -0.241 |
| LN(NONAUD_FEE) | + 0.008 | 0.001 |
| Year and Industry Fixed Effects | Included | Included |
| Chi-squared statistic | 14.403* | 19.186** |

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively, based on one (two)-tailed tests when a prediction is (is not) made.
TABLE 8
Successor CEOs’ Supply Chain Knowledge and Audit Fees

| Variables          | Pred. Sign | Coefficient | p-value |
|--------------------|------------|-------------|---------|
| Constant           | +          | 9.945       | <0.001*** |
| NEW_SCK (ξ1)       | +          | 0.054       | 0.038**  |
| SIZE               | +          | 0.528       | <0.001*** |
| LOSS               | +          | 0.251       | <0.001*** |
| ROA                | -          | -0.370      | <0.001*** |
| INVREC             | +          | 0.988       | <0.001*** |
| LEV                | +          | 0.131       | 0.008***  |
| RET                | -          | -0.017      | 0.140    |
| GOCON              | +          | 0.311       | 0.032**  |
| BIG                | +          | 0.231       | <0.001*** |
| NEWAUD             | -          | -0.405      | <0.001*** |
| MERGER             | +          | 0.025       | 0.143    |
| INSTOWN            | ?          | -0.296      | <0.001*** |
| INDSPEC            | +          | 0.139       | <0.001*** |
| LN(NONAUD_FEE)     | +          | 0.028       | <0.001*** |

Year and Industry Fixed Effects Included

F statistic 155.618 <0.001***
Adj. R-squared 0.683
N 5,352

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively, based on one (two)-tailed tests when a prediction is (is not) made.
Table 8 presents OLS results of testing H3c using Equation (5). All variables are defined in Table 2. The regression model includes industry (based on two-digit SIC codes) and year fixed effects.
### Table 9

**CEO Succession Planning and Firm Value**

| Variables         | Pred. Sign | Coefficient | p-value |
|-------------------|------------|-------------|---------|
| Constant          |            | 3.881       | <0.001*** |
| $INS_{SCK}$ ($\pi_1$) | +          | 0.163       | 0.130   |
| $OUT_{SCK}$ ($\pi_2$) | +          | 0.418       | 0.071*  |
| $NO_{SCK}$ ($\pi_3$) | -          | -0.477      | 0.149   |
| $SIZE$            | ?          | -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

**Hypotheses**

- **H4a:** $\pi_2 - \pi_3 = 0$
  - 0.895  0.047**

- **H4b:** $\pi_1 - \pi_3 = 0$
  - 0.640  0.090*

**F statistic**

- 19.542  <0.001***

**Adj. R-squared**

- 0.054

**N**

- 4,536

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***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively, based on one (two)-tailed tests when a prediction is (is not) made.

Table 9 presents the results of testing H4a and H4b using Equation (6). We test the equality of the estimated coefficients on $OUT_{SCK}$ and $NO_{SCK}$ (H4a) and $INS_{SCK}$ and $NO_{SCK}$ (H4b). All variables are defined in Table 2. The regression model includes industry (based on two-digit SIC codes) and year fixed effects.
### TABLE 10

Alternative Analysis to Address Factors Leading to CEO Turnovers

| Variables                  | Pred. Sign | Coefficient | p-value      |
|---------------------------|------------|-------------|--------------|
| **Constant**              |            | 9.250       | <0.001***    |
| **INS_SCK (λ1)**          | +          | 0.026       | 0.298        |
| **OUT_SCK (λ2)**          | +          | 0.089       | 0.063*       |
| **NO_SCK (λ3)**           | -          | -0.228      | 0.008***     |
| **SIZE**                  | +          | 0.546       | <0.001***    |
| **LOSS**                  | +          | 0.221       | <0.001***    |
| **ROA**                   | -          | -0.599      | <0.001***    |
| **INVREC**                | +          | 1.273       | <0.001***    |
| **LEV**                   | +          | 0.111       | 0.128        |
| **RET**                   | -          | 0.005       | 0.798        |
| **GOCON**                 | +          | 0.178       | 0.183        |
| **BIG**                   | +          | 0.220       | <0.001***    |
| **NEWAUD**                | -          | -0.032      | 0.369        |
| **MERGER**                | +          | -0.062      | 0.160        |
| **INSTOWN**               | ?          | 0.299       | 0.054*       |
| **INDSPEC**               | +          | 0.464       | <0.001***    |
| **LN(NONAUD_FEE)**        | +          | 0.024       | <0.001***    |

**Year and Industry Fixed Effects**: Included

| H4a: λ2-λ3=0              | 0.317       | 0.002***    |
| H4b: λ1-λ3=0              | 0.254       | 0.004***    |
| F statistic               | 82.036      | <0.001***   |
| Adj. R-squared            | 0.828       |             |
| N                         | 696         |             |

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively, based on one (two)-tailed tests when a prediction is (is not) made.

Table 10 presents the results of testing H2a and H2b using Equation (2) with an alternative sample. We use the propensity score matching approach to find a control group that is similar to the treatment group except for CEO changes. The approach yields 696 firm-year observations, 348 for firms with CEO change and the other 348 without CEO change.