Does Auditor Supply Chain Specialization Affect Audit Opinion?

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ABSTRACT

This study examines the association between auditor supply chain specialization and audit opinion. Collecting and analyzing data from annual reports of Taiwanese public firms for the fourteen-year period from 2000-2013, this research find that the audit opinion is positively associated with auditor supply chain specialization, indicating if companies and their suppliers or buyers hiring the same audit firms have a higher probability of receiving a clean opinion. Auditors accumulate multiple industry knowledge of the supply chain relationship, which has a positive impact on audit opinions. The results remain the same when authors extend tests to audit partner level. Additional tests further reveal that this association is stronger for the supplier-related than the buyer-related supply chain specialization. The results have practical and policy implications.

Keywords: Auditor Supply Chain Specialization, Audit Opinion, supply chain management, audit firm level, size of the auditor firm

INTRODUCTION

Financial statements are highly valued by investors, creditors and other external users as crucial sources guiding their decisions. However, these financial statements are prepared by the management of an enterprise. It is necessary for an independent auditor to provide financial statements users with an opinion on whether the financial statement is prepared in according with generally acceptance accounting principles. A financial statement audit enhances the degree of confidence that intended users can place on the management assertions in the financial statements.

In the era of rapid development of information technology, supply chain management has become a new trend. The supply chain works together for a group of interrelated organizations and competes with other supply chains in order to create valuable products for sale to the end consumer. By sharing resources, information, and reducing redundancy, the supply chain enables each organization's information to be transmitted quickly to the other, making product circulation more stable (Agrawal & Pak, 2001). Companies in the same supply chain tend to be interdependent, so it is easy to form alliances or partnerships, and this relationship can create a competitive advantage for the company. As a result, the supply chain relationship between suppliers and their main customers is very important in today's economy. Chang et al., (2009) believe that when companies actively collaborate with their suppliers, they can improve the smoothness of transactions, in such areas as bargaining, processes, methods, etc., thereby increasing the efficiency of their work.

Although many management studies explore supply chain relationships and its economic impacts, they rarely discuss the links between supply chains and certain elements impacting the capital markets, such as audit opinion. A good supply chain relationship enables companies in the same supply chain faster information transfer, more accurate inventory management, and better operational efficiency. Thus, auditors who audit a client, its suppliers or its major customers may be able to develop auditor supply chain specialization. Through knowledge spillover and transferability of expertise, auditor supply chain specialization results in an improvement in audit efficiency and reduced audit fees (Chang et al., 2009; Johnston et al., 2012).

This study explores how auditor supply chain specialization affects audit opinion on companies in the same supply chain. Empirical results indicate a positively association between auditor supply chain specialization and audit opinion, at both audit firm level and audit partner level. Additionally, the positive association is substantially stronger on upstream than downstream supply chain relationships. This paper makes incremental contributions to the literature and practice. First, prior literature studied industry specialization extensively, but literature studying supply chain specialization is very limited. Our study provides evidences on how multiple industry specialization affects audit opinion. Second, this research uses a sample from a dual-attest system requiring audit reports signed by both audit firms and audit partner. The authors are able to observe directly at individual partner's level. This is especially important when the Security Exchange Commission just approved PCAOB rules requiring the names of audit partners filed to PCAOB website. Lastly, the results of this study fit in the emerging literature how auditors respond to supply chain relationships from the perspectives of audit opinion.

The remainder of this study proceeds as follows. The second section discuss literature and develops hypotheses. The third section describes sample and research method, followed by results presentation, sensitivity analyses and additional tests. The last section presents our conclusions, limitations and recommendations for future studies.

LITERATURE REVIEW

According to the Supply Chain Council (SCC), a supply chain is a network all activities involving associated organizations from the production of goods or services to the delivery of the final product to the customer. Hertzel et al. (2008) pointed out that there is a rich information transfer system among members of the supply chain, which forms a close interdependence among supply chain members. The source of value in the supply chain may be generated from suppliers, companies and customers (Kaplan & Norton, 2004). That is, while the value of the company itself comes from the cost of the product minus the cost of the employees and the supply price, the total value that the three parties can obtain depends on their interdependence, relative power and negotiating power. Firms engage in activities to internalize or externalize integration to create value in the supply chain (Culot, Orzes & Sartor, 2019). A good supply chain relationship can increase information spillover effects, share common risks, reduce costs, and manage inventory well, thereby improving each party's financial or operational performance (Maloni & Benton, 1997). Overall, a good supply chain relationship can provide customers with higher value-added products to enhance the competitive advantage of supply chain companies.

Auditors may develop specific knowledge about a company and its industry when they conduct an audit on clients' inventory, production process, accounts receivable and other aspects of their operations management. Past studies examined auditor industry specialization and its effects. For example, Krishnan & Yang (2003) confirmed that industry specialization is positively related to audit quality and earnings quality. Krishnan (2003) uses the clients of the big-six accounting firms as a sample to explore the relationship between the auditor's industry specialization and the absolute value of accruals to measure the level of earnings management. The results of the study indicate that the company audited by non-industry expert accountants had a significantly higher absolute value of accruals than those audited by the industry experts, indicating that the auditor's industry expertise helps limit a company's earnings management behaviors. Chen et al. (2003) use a questionnaire survey method to explore the correlation between industry specialization, customer satisfaction and audit fees in Taiwan. The research results show that audit quality and customer satisfaction are higher from CPA firms with industry specialization. The above literature indicates that auditors with industry specialization can limit the earnings management of the companies under audit and improve the accuracy of financial statements.

Auditors sometimes provide audit services for member companies in the same supply chain. Overtime, they gain a thorough understanding of multiple industries in the supply chain through information spillover and expertise transfer. That is, auditors may develop special auditor-client relationships when they also provide audit services to the suppliers or major customers of the company (Levinthal & Fichman, 1998). Such auditor supply chain specialization is likely to affect the efficiency of audit planning, the extent of substantive testing and risk assessment. Two recent studies explore how auditor supply chain specialization affects audit quality and audit pricing. Johnstone et al., (2014) assert that auditors with supply chain specialization make more effective audit decisions, which will in turn improve audit quality.

Additionally, familiarity with the supply chain enables auditors to reduce information redundancy and cost during an audit. Such cost savings allow auditors discount their audit fees. The effects are even stronger for partner firms that derive a high proportion of revenue from their major customers. Chen et al. (2014) report similar findings that the audit fee is significantly lower for downstream supply chain relationships (i. e. a firm and its client), but not upstream supply chain relationships (i. e. a firm and its supplier).

Publicly listed companies pay a considerable amount of audit fees every year for the economic benefits brought by the auditing report. An independent auditor plans, conducts, and reports the results of an audit in accordance with generally accepted auditing standards (GAAS). Auditors then issue an audit report to provide their opinion on the reasonable assurance that financial statements are free from material misstatement. The audit opinion on the financial statements is considered the final product of the audit work. According to auditing standards, auditors issue the following types of audit opinions: unqualified and unqualified with explanatory paragraphs commonly referred to as clean, qualified, disclaimer, and adverse. When an auditor issues a report other than an unqualified one, the trading price of the listed company's stock will be affected (Czerney, Schmidt & Thompson, 2019). Wu and Huang (2009) provide evidences that auditors are hesitant to issue opinion reports other than unqualified opinions. However, auditors hold considerable discretion on their decisions when the auditor faces doubt that a company has a going concern. They can issue a qualified or a standard unqualified opinion (or an unqualified with an explanatory paragraph), or a disclaimer audit opinion according to his or her professional judgment given the circumstances.

Past studies explored factors affecting types of audit opinions issued by an auditor. John et al., (2007) finds that firms are more likely to receive qualified opinions if earnings management is not constrained and they are audited by the Big Four. Using data from Australia, Carey and Simnett (2006) report that long tenure auditors have a lower propensity to issue a going-concern opinion where there is some evidence of just beating (or missing) earnings benchmarks. When auditors develop special knowledge on various industries in a supply chain, such supply chain specialization is likely to affect the efficiency of audit planning, the extent of substantive testing and risk assessment. Johnstone et al., (2014) assert Auditors with supply chain specialization make more effective audit decisions, resulting in higher audit quality and lower audit fees (Chen et al., 2014; Johnstone et al., 2014). Thus, audit firms that audit an entire supply chain will have deeper expertise, thus may be more likely to catch an error and issue a modified opinion.

But the so-called professional judgment has no objective criteria and relies entirely on the subjective judgment of the auditor (Carcello, Hermanson & Huss, 2000; Carcello & Neal, 2000; Defond, Raghunandan & Subramanyam, 2002; Mutchler, Hopwood & McKeown, 1997; Reynolds & Francis, 2001). DeAngelo (1981a, 1981b) believes that “economic over-reliance on customers” is one of the main causes of damaging auditor independence. The larger the size of the client being audited, the higher the CPA firm's dependence on its economy, and the more likely the auditor will issue the opinion report in favor of the customer to retain the customer. Firth (2002) finds firms with high non-audit service fees are more likely to receive a clean audit opinion. This could be the non–audit consulting work clearing up problematic areas at the firm or high consultancy fees impairing auditor independence. If the supply chain specialization auditor issues an unfavorable opinion, it may lose not just one, but all clients in the same supply chain. From this point of view, auditors with supply chain specialization may carefully consider their own economic survival by issuing a more favorable audit opinion.

In view of the previous research findings, there are many factors that can affect the auditor's judgment. However, these factors are mostly based on the individual situation of the company. It is rarely discussed whether the CPA firm or auditor's relationship with the company's suppliers and customers will affect the audit opinion.
Considering the advantages and disadvantages from supply chain knowledge, auditor supply chain specialization may be a factor influencing audit opinion. While past literature mainly explored auditor industry specialization and its effects, the relevant literature on industry specialization can serve as the basis for the development of a hypothesis on the effect of auditor supply chain specialization on audit opinions. The above discussions lead to our first hypothesis:

Hypothesis 1 (H1): Audit opinions are influenced by supply chain specialization at the audit firm level.

Auditors accumulate personal and professional contacts which enable them to build up networks in the business community (Borgatti & Cross, 2003) and as a result, the likelihood of working on multiple engagements in the same supply chain increases (Johnstone et al., 2014). Sivakumary and Roy (2004) indicate that supply chain knowledge redundancy at personal level is the key to audit efficiency (Sivakumar & Roy, 2004). The audit report in Taiwan adopts a dual-attest system. That is, audit reports must be audited and signed by a lead partner and a concurring partner, as well as by an audit firm. The Taiwanese sample presents a unique opportunity where an individual partner can be identified in the audit report. Using Taiwanese listed firms as samples, Chi and Chin (2010) provide evidences that differential discretionary accruals from auditor industry expertise are driven by a combination of firm and partner expertise. Due to this unique feature in the Taiwanese audit market, the authors are able to test directly if supply chain specialty at the partners level is associated with the type of audit opinion, leading to our second hypothesis:

Hypothesis 2 (H2): Audit opinions are influenced by supply chain specialization at the audit partner level.

DATA AND METHODOLOGY

SAMPLE

This paper uses the years 2000-2013 as the research period. The researchers secure 2013 company annual reports available in Market Observation Post System (MOPS), an official website for listed firms updating public information required by the Security and Exchange Commission of Taiwan. Companies in the financial and insurance industries were excluded from our sample due to their unique characteristics.

The researchers use a content analysis method to read through the operational profile in the audited financial statements to establish a supply chain member company database, resulting in a total of 74,065 supply chain partner companies. This total includes, names of companies identified as suppliers or customers. Based on this information, researchers then compare this list to our sample firms and build a database with firm names in a supply chain. The researchers delete private firms from this database because their financial information is unavailable. The final supply chain partner firm database is 10,621.

Since the Certified Public Accountant Act of Taiwan requires audit reports signed by both the CPA firm and partner's name, the researchers are able to establish the names of audit firms and audit partners of these supply chain partner firms, further deleting 2,412 firms with insufficient financial information. Our final sample is 7,849. Table 1 presents our sample selection results.

VARIABLE DEFINITION AND MEASUREMENT

1. Test variables:

Audit Firm Supply Chain Specialization: When a company is audited by an audit firm with supply chain specialization, it is 1, otherwise it is 0.

Audit Partner Supply Chain Specialization: When a company is audited by an audit partner with supply chain specialization, it is 1, otherwise it is 0.

2. Dependent variables:

AO: auditor's opinion

Following Wu and Huang (2009), when the audit opinion is unqualified or unqualified with an explanatory paragraph report not leading to significant doubt about the ongoing assumptions of the audited company (also considered to be a favorable opinion), it is 1, otherwise it is 0.

3. Control variables:

Size (size of the company)

According to Reynolds & Francis (2000), when financial difficulties occur, the larger companies have more sources of funding available to avoid bankruptcy. Therefore, the size of the company will affect the type of audit opinion issued by the auditor. It is expected that the larger the company, the lower the probability of being issued an unfavorable audit opinion. This research expects the company size to be positively correlated with the audit opinion.

LEV (debt ratio)

According to Raghunandan & Rama (1995), the debt ratio of a company affects the auditor's opinion. This variable can determine the company's long-term repayment ability. The higher the ratio, the higher the probability that the company will be issued with a poorer audit opinion type. The debt ratio is expected to be inversely related to the audit opinion.

Zscore (Financial crisis)

According to Zmijewski (1984), when the score is higher than 3.0, the company will not go bankrupt; when the score is lower than 1.8, the company is easy to close down. Therefore, the lower the score, the higher the probability of company failure. This article expects the Zscore to be positively related to the audit opinion. (Zscore=Working Capital/Total Assets*1.2+Retained Earnings/Total Assets*1.4+ (Pre-tax Net Profit (Loss))/Total Assets*3.3+ Net Sales/Total Assets*0.99+Shareholders Market Value/Total Liabilities)

Big 4 (audited by Big 4 Accounting Firms)

According to Craswell et. al., (2002), because large firms need to consider their reputations, and the investment in the audit is larger than that of small firms, a big firm audit is more likely to detect errors and illegal matters. If a company is audited by a Big 4 accounting firm, it risks a higher probability of being issued an unfavorable audit opinion. DeAngelo (1981) believes that the size of the accounting firm is positively related to the audit opinion

Loss (Continuous loss)

The existence of continuous losses represents financial deterioration and is highly likely to create doubt about ongoing operations. (Mutchler, 1985; McKeown et al., 1991; Mutchler et al., 1997), the higher the loss situation, the higher the probability that the client will be issued an unfavorable audit opinion. This research anticipates that continuous losses are negatively correlated with the audit opinion.

Age (age of the company)

Mutchler (1985); Dopuch et al., (1987) argue that companies with short-term lives are more likely to experience financial crisis and are less likely to survive. Dopuch et al., (1987); Monroe & Teh (1993) found that companies with fewer years of income received a high frequency of bankrupcy. This research anticipates that the company's seniority is positively related with the audit opinion.

PreAO (Previous audit opinion)

Receiving an audit opinion that the company continues to operate with going concern is usually an ongoing situation. In other words, if the company creates any doubts about continuing operations in the previous year, the chances of receiving the same opinion in the current period are greater. (Carcello & Neal, 2000 ; Nogler, 1995 ; Reynolds & Francis, 2000). This paper expects that the previous audit opinion is positively related to the audit opinion.

Models:

Based on the model by Wu & Huang (2009), Wu & Zeng (2008); Johl, Jubb & Houghton (2007), the researchers develop our regression models using binary logistic regression to test whether auditor supply chain specialization will affect audit opinions.

Model 1 for H1:

$$AO = \beta_0 + \beta_1 SameAuditFirm + \beta_2 SIZE + \beta_3 LEV + \beta_4 Zscore + \beta_5 Big4 + \beta_6 LOSS + \beta_7 AGE + \beta_8 PreAO + \sum_{j=2013}^{i=2000} \beta_{9-21} Year + \varepsilon$$

Model 2 for H2:

$$AO = \beta_0 + \beta_1 SameAuditor + \beta_2 SIZE + \beta_3 LEV + \beta_4 Zscore + \beta_5 Big4 + \beta_6 LOSS + \beta_7 AGE + \beta_8 PreAO + \sum_{j=2013}^{i=2000} \beta_{9-21} Year + \varepsilon$$

EMPIRICAL RESULTS

Descriptive Statistics

Table 2 presents descriptive statistics in the regression models. The mean value for AO is 0.98, meaning the majority of our sample firms receive clean opinions. About 46% of our samples hire the same audit firm, and 26% of them use the same lead partner. As to control variables, the average firm size is 9.860 with SD at 0.581; the mean LEV is 0.449 with SD at 0.170 and 10% are loss firms. The average Zscore is about 3.174 (SD 3.206). About 78% of our sample firms are audited by Big Four accounting firms. The average age of firms is 1.339 and 98% of firms received favorable audit opinions in the previous year.

Table 3 is the t-test results comparing firms hiring or not hiring the same audit firms. This research finds significant differences in AO, meaning firms audited by audit firms with supply chain specialization are more likely to receive favorable audit opinion. There are also significant differences in Size, Zscore, Big4, LOSS AGE and PreAO among these two groups.

Table 4 is the t-test results comparing firms hiring or not hiring the same audit partner. This research finds significantly differences in AO, meaning firms audited by the same audit partner are more likely to receive favorable audit opinions. There are also significant differences in Size, Zscore, Big4, LOSS, AGE and PreAO among these two groups.

Correlation Analysis

Table 5 is the correlation analysis. The researchers find that AO is significantly related to SameAudit Firm and SameAuditor, providing initial support for H1 and H2.

Regression Results

Table 6 is the regression results for Model 1. This study finds that SameAuditFirm is significantly and positively related with AO (0.545, P=0.097), supporting H1. The results indicate that firms are more likely to receive clean opinions if audited by audit firms with supply chain specialization.

As for the control variables, SIZE (0.550, P=0.037) is significantly positively related to AO. The larger the company size, the higher the possibility of obtaining favorable audit opinions, which is in line with expectations. LEV (-10.496, P=0.000) is significantly and negatively related with AO, meaning that the higher the company's liabilities, the lower the probability of obtaining favorable audit opinions. Zscore (0.944, P=0.000) was significantly positively correlated with AO. The higher the Zscore, the lower the company's failure rate, and the higher the probability of receiving favorable audit opinions, which is in line with expectations. Big4 (-1.218, P=0.001) was significantly negatively correlated with AO. It can be seen that when audited by the four major firms, it is less common to receive favorable audit opinions. PreAO (3.480, P=0.000) was significantly positively related with AO. It indicates that when the company received favorable audit opinions in previous years, the company can expect to receive a favorable audit opinion in the current period. LOSS and AGE are not significant.

Table 7 is the regression results for Model 2, showing that SameAuditor is significantly and positively related to AO (0.834, P=0.070), supporting Hypothesis 2. Firms are more likely to receive clean opinions if audited by audit partners with supply chain specialization.
The results of the control variables are all similar to Hypothesis 1.

Sensitivity Analysis

For robustness, this study uses other variables to measure the probability of company failure. DeFond, Raghunandan and Subramanyam (2002) indicate liquidity is an important factor in determining a firm's ability to raise cash for its maturing liabilities. The researchers replace Zscore by CR (current ratio) and INVESTMENT (ratio of cash and investment to total asset) in the regression. The results are similar to our main tests. In Table 8, this study finds that SameAuditFirm is significantly and positively related with AO (0.639, P=0.048), supporting H1. In Table 9, SameAuditor is also significantly and positively related with AO (1.056, p=0.025), supporting H2. The results indicate that firms are more likely to receive clean opinions if audited by audit firms or audit partners with supply chain specialization.

Additional Analysis: The auditor supply chain specialization effects on buyer-related vs. client-related relationships

A supplier generates most its revenue from its major customers (Baiman & Rajan, 2002a ; Baiman & Rajan, 2002b ; Kulp & Ofek, 2004 ; Hertzel et al., 2008). In a down-stream supply chain relationship, a company is more likely to perform well if the demand for products or services increases from its major customers. On the other hand, a financial downturn impacting major customers may affect financial performance of a company due to the decreased demand for goods or services, delay in payment, or even cease of contractual relationship (Hertzel et al. 2008).

Similarly, a company may be affected by the performance of its suppliers. A company and its supplier, in the form of information sharing, synchronized replenishment, and collaborative product design and development, develop ways to improve supply chain performance (Hertzel et al. 2008). Information integration efforts between a company and its supplier may benefit the company in inventory management and operational efficiency, which in turn result in cost reduction and profit improvement. Of course, this up-stream supply chain relationship may hurt a company from the poor financial performance of suppliers, or just inferior supply chain management (Gavirneni, Kapusicniski & Tayur, 1999 ; Lee, So & Tnag, 2000 ; Fee & Thomas, 2004).

This study further tests if the auditor supply chain specialization effects on audit opinion differs between these two groups. The authors first delete 4,247 sample firms not using the same auditors leaving a 3,602 firm sample size, then identify using the same auditor as their supplier as an upstream relationship referred to by 1. The authors identify companies using the same auditors as their customer as a downstream relationship referred to by 0. The authors replace SameAuditFirm and SameAuditor with the Upstream and Downstream ("UD") variable in the regression model.

Results in Table 10 indicate significant differences in these two groups. Chen et al. (2014) report similar findings that auditor supply chain knowledge spillover effects on audit fees are significantly different for downstream and upstream supply chain relationship. This study finds that the auditor supply chain specialization effects on audit opinions are stronger on upstream relationships (1.405, p=0.089). This may be due to the fact that when companies are actively engaging in collaborative planning on replenishment, such as in the form of vendor-managed inventory, this collaboration can be directly and positively related to margins and other performance measures. Thus, auditors with supply chain specialization are more likely to issue clean opinion as they fully understand how these supply chain partners collaborate in their operations and financial reporting.

CONCLUDING COMMENTS

A single company cannot face the impermanence of market changes alone. By the establishment of supply chain partnerships, firms and suppliers/customers share a common vision. Through information sharing and effective interaction, companies can be more efficient in production, manufacturing and distribution.

Another benefit of supply chain relationship is operation improvement in the financial statement audit. Auditors accumulate multiple multiple-industry knowledge of the supply chain relationship when they audit multiple companies in the same supply chain. Using Taiwanese listed firms as a sample, this research investigates the impact of auditor supply chain specialization on audit opinions. The results show that when supply chain companies hire the same CPA firm or same audit partner, the likelihood that the companies will receive favorable audit opinions increases. The results are robust using different measures of control variables.

Additionally, the auditor supply chain specialization effects on audit opinion are stronger on upstream relationships. That is, firms hiring the same auditor as their suppliers are more likely to receive favorable audit opinions. The present study uses a content analysis method to identify companies and their suppliers or major customers, where the same auditor was hired by members of the supply chain. The authors also expand our analysis to the audit partner's level due to the unique sample in Taiwan where audit partners are identifiable. The results of this study provide policy and practical implications to academics and practitioners. The researchers only collected publicly listed companies' data. Non-listed companies' data was excluded due to lack of data availability. Therefore, the database of supply chain partnerships could be expanded in the future to make the results more accurate.

When the supply chain specialization auditor has the supply chain industry knowledge of the supply chain partners, overall auditing efficiency is improved and the error rate is reduced. Therefore, future research can explore the supply chain specialization auditor's impact on earnings quality such as earnings stabilization, earnings management, small positive earnings or audit quality as evidenced by restatement of financial statements, analyst expectations, or discretionary accruals.

REFERENCES

Agrawal, M. K. and Pak, M. H. 2001. Getting smart about supply chain management.

The McKinsey Quarterly, 2, 22-25.
Balsam, S.,J. Krishnan, and Yang, J. S. 2003. Auditor industry specialization and earnings quality. *Auditing: A Journal of Practice and Theory*, 22, 71-97.
Baiman, S., M. Rajan. 2002a. The role of information and opportunism in the choice of buyer-supplier relationships. *Journal of Accounting Research,* 40, 247-278.
Bainman, s., M. Rajan. 2002b. Incentive issues in inter-firm relationships. *Accounting, Organizations and society,* 27, 213-238.
Beamon, B. M. (1998), "Supply Chain Design and Analysis: Models and Methods,." *International Journal of Production Economics*, 55, No. 3, 281-294.
Chang, H., J. Chen, G. Fernando and T. Lin. 2009. Judgmental effects of supply chain Information: Empirical evidence from analysts forecast revisions working paper. University of Southern California.
Carey, Peter and Roger Simnett. 2006. Audit partner tenure and audit quality. *The Accounting Review*, 81, 653-676.
Craswell, A. T., Stokes, D. J., Laughton, J. 2002. Auditor independence and fee dependence. *Journal of Accounting and Economics,* 33, 253-275.
Carcello, J. V., D. R. Hermanson, and H. F. Huss. 2000. Going-concern opinions: the Effects of partner compensation plans and client size. *Auditing: A Journal of Practice & Theory,* 19, 67-77.
Carcello, J. V. and T. Neal. 2000.Audit committee composition and auditor reporting. *The Accounting Review,* 75, 4, 453-467.
Chen, J., H. Chang., H. C. Chen, & S. Kim. 2014. The effect of supply chain knowledge spillovers on audit pricing. *Journal of Management Accounting Research*, 26, 1, 83-100.
Culot, G, Orzes, G. and M. Sartor (2019). Integration and scale in the context of industry 4.0: The evolving shapes of manufacturing value chains. *IEEE Engineering Management Review,* 47, 1, 41-45.
Czerney, K., Schmidt, J.J. and Thompson, A.M. (2019). Do investors respond to explanatory language included in unqualified audit reports? *Contemporary Accounting Review*, 36,1,198-229.
DeAngelo, L., 1981. Auditor size and audit quality. *Journal of Accounting and Economics,* 3, 183-199.
Dopuch, N., Holthausen, R. W. and Leftwich, R. w. 1987. Predicting audit Qualifications with financial and market variables. *The Accounting Review*, 62, 3, 431-454.
DeFond, M. L., K Raghunandan, and K. R. Subramanyam. 2002. Do non-audit service fees impair auditor independence? Evidence from going concern audit opinions. *Journal of Accounting Research,* 40, 1247-1274.
Francis and Krishnan. 1999. Accounting accruals and auditor reporting conservatism. *Contemporary Accounting Research,* 16, 135-165.
Firth, M. 2002. Auditors-provided consultancy Services and their association with audit fees and audit opinions. *Journal of Business & Accounting,* 29 (5) & (6).
Firth, M. 1980. A note on the impact of audit qualifications on lending and credit decisions. *Journal of Banking and Finance,* 4, 137-164
Fee, C. E. and S. Thomas. 2004. Sources of gains in horizontal mergers: Evidence from customer, supplier and rival firms. *Journal of Accounting Research,* 50, 685-727.

Gavirneni, S., R. Kapuscinski, and S. Tayur. 1999. Value of information in capacitated supply chains. *Management Science,* 45, 16-24.

Hertzel, M. G., Z. Li, M.S. officer, and K. J. Rodgers. 2008. Inter-firm linkages and the wealth effects of financial distress along the supply chain. *Journal of Financial Economics*, 87, 374-387.

Johnstone, K. M., Li, C. and Luo, S. 2014. Client-Auditor Supply Chain Relations, Audit Quality, and Audit Pricing. *AUDITING: A Journal of Practice & Theory*, 33, 4, 119-166.

Johl, Shireenjit., Jubb, Christine A., and Houghton, Keith A., 2007. Earnings management and the audit opinion: evidence from Malaysia. *Managerial Auditing Journal*, 22, 7, 688-715.

Jones, F. L. 1999. The information content of the auditor's going concern evaluation. *Journal of Accounting and Public Policy,* 15, 1-27.

Kulp, S., H. Lee, and E. Ofek. 2004. Manufacturer benefits from information integration with retail customers. *Management Science*, 50, 431-444.

Krishnan, Gopal V. 2003. Does big 6 auditor industry expertise constrain earnings management? *Accounting Horizons,* 17, 1-16.

Lee, H., K. So, C. Tnag. 2000. The value of information sharing in a two-level supply chain. *Management Science,* 46, 626-643.

Levintal, D. A. and M. Fichman.1988. Dynamics of interorganizational attachments: Auditor-client relationship. *Administrative Science Quarterly,* 33, 345-369.

Monroe, G. S. and The, S.T. 1993. Predicting uncertainty audit qualifications in Australia using publicly available information. *Accounting and Finance*, 32, 79-106.

McKeown, J. C., Mutchler, J. F., & Hopwood, W. 1991. Towards an explanation of auditor failure to modify the audit opinions of bankrupt companies. Auditing: *A Journal of Practice & Theory*, 10, 1-13.

Mutchler, J. F. 1985. A multivariate analysis of the auditor's going-concern opinion decision. *Journal of Accounting Research,* 23(2), 668-682.

Mutchler, J. F., Hopwood, W., & McKeown, J. M. 1997. The influence of contrary information and mitigating factors on audit opinion decisions on bankrupt companies. *Journal of Accounting Research,* 35(2), 295-310.

Nogler, G. E. 1995. The resolution of auditor going concern opinions. Auditing: *A Journal of Practice & Theory,* 14, 54-73.

New, S. J. (1996), "A Framework for Analyzing Supply Chain Improvement." *International Journal of Operations and Production Management*, 16, 4, 19-34.

Peter and Roger. 2006. Audit partner tenure and audit quality. *The Accounting review,* 81, 3, 653-676.

Reynolds, J. K., and J. Francis. 2000. Does size matter? The influence of large clients on office-level auditor reporting decisions. *Journal of Accounting and Economics,* 30, 375-400.

Raghunandan, K. and D. V. Rama. 1995. Audit reports for companies in financial distress: Before and After SAS No.59. Auditing: *A Journal of Practice & Theory*, 14, 1, 50-63.

Zmijewski, M. E. 1984. Methodological issues related to the estimation of financial

distress prediction models. *Journal of Accounting Research, 22,* 50-82.

APPENDIX

Table 1 Sample Selection Results

Supply chain partner firms identified in 2013 annual reports (excluding insurance industry)	74,065
Deduct non-listed firms	-63,804
Supply chain partner firms	10,261
Insufficient financial information	-2,412
Final sample size	7,849

Table 2: Descriptive Statistics

n=7,849	Mean	Standard deviation	Median	Minimum	Maximum
AO	0.980	0.132	1	0	1
SameAuditFirm	0.460	0.498	0	0	1
SameAuditor	0.260	0.438	1	0	1
SIZE	9.860	0.581	9.755	7.829	11.980
LEV	0.449	0.17	0.464	0.017	0.981
Zscore	3.174	3.206	2.532	-24.01	77.012
Big4	0.780	0.415	1	0	1
LOSS	0.100	0.302	0	0	1
AGE	1.339	0.259	1.380	0	1.8195
PreAO	0.980	0.122	1	0	1

AO: favorable opinion=1, otherwise it is 0. SameAuditFirm: Supply chain companies audited by same CPA firm =1, otherwise it is 0. SameAuditor: Supply chain companies audited by the same auditor=1, otherwise it is 0. SIZE: size of the company. LEV: debt ratio. Zscore: Financial crisis. Big4: Audited by Big4=1, otherwise it is 0. LOSS: Prior and current operation income less than 0 is 1, otherwise it is 0. AGE: age of the company. PreAO: Previous favorable audit opinion is 1, otherwise it is 0.

Table 3: T-test Results on Differences in Means-Hiring the Same Audit Firm

	Hiring Same Audit Firm		Hiring different Audit Firm		Variance	t-test
Variables	Mean	Standard deviation	Mean	Standard deviation	In Mean	(p value)
AO	0.99	0.089	0.97	0.159	0.02	6.249 (.000)***
SIZE	9.946	0.59	9.787	0.563	0.159	12.167 (.000)***
LEV	0.435	0.168	0.461	0.171	-0.026	-6.821 (.000)***
Zscore	3.515	3.589	2.884	2.81	0.631	8.568 (.000)***
Big4	0.87	0.341	0.7	0.457	0.413	17.914 (.000)***
LOSS	0.08	0.275	0.12	0.322	-0.242	-5.231 (.000)***
AGE	1.318	0.261	1.357	0.257	1.061	-6.695 (.000)***
PreAO	0.99	0.076	0.98	0.15	0.01	6.556 (.000)***
n	3602		4247			

Table 4: T-test Results on Differences in Means-If Hiring the Same Audit Partner

	Same Audit Partner		Different Audit Partner		Variance in Mean	t-test (p value)
Variables	Mean	Standard deviation	Mean	Standard deviation		
AO	0.990	0.077	0.980	0.146	0.010	4.280 (.000)***
SIZE	9.994	0.602	9.813	0.566	0.181	-1.565 (.000)***
LEV	0.444	0.165	0.451	0.172	-0.007	-4.875 (.118)
Zscore	3.435	3.678	3.082	3.019	0.353	11.845 (.000)***
Big4	0.840	0.371	0.760	0.428	0.008	6.227 (.000)***
LOSS	0.080	0.265	0.110	0.314	-0.030	7.754 (.000)***
AGE	1.328	0.259	1.343	0.259	-0.015	5.478 (.023)**
PreAO	0.990	0.073	0.980	0.135	0.010	-2.270 (.000)***
n	2035		5814			

Table 5 Correlation Analysis

n=7849	AO	Same Audit Firm	Same Auditor	Zscore	LEV	LOSS	SIZE	Big4	PreAO	AGE
AO	1	0.067**	0.053**	0.154**	-0.236**	-0.224**	0.071**	0.52**	0.624**	-0.021
SameAudit Firm		1	0.642**	0.098**	-0.077**	-0.058**	0.137**	0.194**	0.070**	-0.075**
SameAuditor			1	0.048**	-0.017	-0.051**	0.137**	0.081**	0.047**	-0.026*
Zscore				1	-0.570**	-0.211**	-0.127**	0.119**	0.139**	-0.253**
LEV					1	0.160**	0.210**	-0.057**	-0.220**	0.070**
LOSS						1	-0.095**	-0.076**	-0.210**	0.069**
SIZE							1	0.065**	0.061**	0.118**
Big4								1	0.102**	-0.165**
PreAO									1	-0.037**
AGE										1

*** significant level 1%；**significant 5%；*significant 10%

Variable definitions are the same as in Table 2.

Table 6: Regression Results of the Audit Firm Supply Chain Specialization Effects on Audit Opinion

$$AO = \beta_0 + \beta_1 SameAuditFirm + \beta_2 SIZE + \beta_3 LEV + \beta_4 Zscore + \beta_5 Big4 + \beta_6 LOSS + \beta_7 AGE + \beta_8 PreAO + \sum_{j=2013}^{i=2000} \beta_{9-21} Year + \varepsilon$$

(n=7,849)	Expected direction	Coefficient value	P-value
CONST	?	3.085	0.323
SameAuditFirm	?	0.545*	0.097
SIZE	+	0.550**	0.037
LEV	-	-10.496***	0.000
Zscore	+	0.944***	0.000
Big4	+/-	-1.218***	0.001
LOSS	-	-0.552	0.101
AGE	+	0.098	0.873
PreAO	+	3.480***	0.000
YEARD	Yes	Yes	Yes
Cox & Snell R^2		11.4%	

*** significant level 1%；**significant 5%；*significant 10%
Variable definitions are same as in Table 2.

Table 7: Regression Results of the Audit Partner Supply Chain Specialization Effects on Audit Opinion

$$AO = \beta_0 + \beta_1 SameAuditor + \beta_2 SIZE + \beta_3 LEV + \beta_4 Zscore + \beta_5 Big4 + \beta_6 LOSS + \beta_7 AGE + \beta_8 PreAO + \sum_{j=2013}^{i=2000} \beta_{9-21} Year + \varepsilon$$

(n=7,849)	Expected direction	Coefficient value	P-value
CONST	?	2.794	0.369
SameAuditor	+	0.834*	0.070
SIZE	+	0.571**	0.029
LEV	-	-10.520***	0.000
Zscore	+	0.948***	0.000
Big4	+/-	-1.151***	0.001
LOSS	-	-0.561*	0.095
AGE	+	0.112	0.855
PreAO	+	3.484***	0.000
YEARD	Yes	Yes	Yes
Cox & Snell R^2		11.4%	

*** significant level 1%；**significant 5%；*significant 10%
Variable definitions are same as in Table 2.

Table 8 Sensitivity Analysis at Audit Firm Level

(n=7,783)	Coefficient value	P value
CONST	0.075	0.982
SameAuditFirm	0.639**	0.048
SIZE	0.695**	0.012
LEV	-11.460***	0.000
Big4	-1.338***	0.000
LOSS	-0.713**	0.025
AGE	0.783	0.188
PreAO	3.789***	0.000
CR	2.103***	0.000
INVESTMENT	-0.676	0.439
YEARD	Yes	Yes
Cox & Snell R^2	11.30%	

*** significant level 1%；**significant 5%；*significant 10%
CR: current ratio；INVESTMENT: cash and investment to total assets at year end.
The rest of variable definitions are same as in Table 2.

Table 9 Sensitivity Analysis at Audit Partner Level

(n=7,783)	Coefficient value	P value
CONST	0.267	0.938
SameAuditor	1.056**	0.025
SIZE	0.698**	0.012
LEV	-11.804***	0.000
Big4	-1.290***	0.000
LOSS	-0.728**	0.022
AGE	0.828	0.162
PreAO	3.804***	0.000
CR	2.073***	0.000
INVESTMENT	-0.966	0.278
YEARD	Yes	Yes
Cox & Snell R^2	11.30%	

*** significant level 1%；**significant 5%；*significant 10%

CR: current ratio；INVESTMENT: cash and investment to total assets at year end. The rest of variable definitions are same as in Table 2.

Table 10: The auditor supply chain specialization effects on buyer-related vs. client-related relationshi

(n=3,602)	Coefficient value	P-value
CONST	-19.640**	0.017
UD	1.405*	0.089
Zscore	3.368***	0.000
SIZE	1.847***	0.008
LEV	-6.080*	0.073
Big4	-1.153	0.253
LOSS	-1.128	0.259
AGE	1.363	0.446
PreAO	4.111***	0.000
YEARD	Yes	Yes
Cox & Snell R^2	7.10%	

*** significant level 1% ; **significant 5% ; *significant 10%

UD: Firms using the same auditor as their supplier at 1 and using the same auditors as their customer at 0. The rest of variable definitions are same as in Table 2.