Supplier-Major Customer Relationship: The Effect of Common Auditor on the Cost of Equity Capital and Cost of Bank Debt.

by

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Abstract

This thesis consists of two main empirical chapters that investigate the effect of common auditors within a capital market context. Specifically, it examines whether capital market participants perceive that a common auditor between supplier firms and their major customers contributes to the information and estimation risk they are facing and, as a result, whether such a relationship contributes to economically significant implications on the cost of capital of the supplier firms.

Extant research within the customer concentration literature suggests that supplier firms that rely on a considerable portion of their revenues from a few major customers face increased liquidity problems and cash flow risks, if their major customers become bankrupt, decide to develop products internally or switch to another supplier. Prior literature also shows that this risk is priced into the supplier's cost of equity and debt capital. Consequently, any factor that could either mitigate or exacerbate such concerns/risks should be important for investors and creditors' information and estimation risks. This thesis posits that common auditors constitute such a factor. However, there is conflicting evidence regarding the role of common auditors on the quality of audits of interrelated firms, and thus the impact of the common auditor on supplier's external financing is not clear *ex ante*.

On the one hand, audit firms can develop enhanced supply chain knowledge and better understanding of a supplier's business inherent risks when they also audit its major customer. In that sense, supplier's risks due to customer concentration should be better integrated into estimates when producing supplier's financial statements. Therefore, investors and creditors should be faced with lower information and estimation risk. On the other hand, audit firms have higher motives to act opportunistically and decrease their standards of auditing when operating within common audit settings. Lower audit quality can result in less accurate and credible estimates on suppliers' financial statements. Therefore, investors and creditors should be faced with higher information and estimation risks.

The first empirical chapter focuses on the equity market context and investigates investors' perceptions on suppliers' cost of equity for firms sharing a common auditor with their major customers. Using a sample of 7,773 U.S. supplier-year observations over the period 1983-2016, this study finds that the existence of a common auditor is priced into the supplier's implied cost of equity capital. These findings indicate that supplier firms having

a common auditor with their major customers experience higher equity-financing compared to those firms that do not have a common auditor with their major business partners, thus supporting the notion that investors negatively perceive the existence of common auditors among such relationships. Importantly, the findings are robust in a series of sensitivity tests that control for the noise of analyst forecasts, omitted variable bias, alternative measures of the implied cost of equity and common auditor variables, propensity score matching and common auditor switch status analysis. Additional tests indicate that these results are more pronounced for supplier firms with higher customer concentration base and supplier firms with a greater number of major customers.

The second empirical chapter focuses on the private debt market context and explores the effect of a common auditor on the cost of bank debt and other bank loan contracting features of the supplier firms. Employing a sample of 5,382 U.S. supplier-year-loan observations over the period 1988-2016, the study documents evidence that supplier firms that have at least one common auditor with their major customers are facing a higher cost of bank debt and more restrictive non-price loan terms. This evidence is, generally, supported by a series of robustness tests (e.g., alternative measures to capture the common auditor presence, firm-level analysis, propensity score matching, control for financial reporting effect and common auditor switch status analysis). With respect to the cost of bank debt, additional tests suggest that the results are more pronounced for supplier firms with higher customer concentration and supplier firms with a greater number of major customers. In terms of non-price terms, the results, mainly, hold irrespective of whether firms belong to any of these two sub-samples.

In summary, the main findings of this thesis suggest that the existence of a common auditor between the supplier firm and its major customers has an adverse impact on supplier's equity- and debt-financing. These findings make important contributions as they extend and advance at least three strands of the literature. First, the thesis adds to the growing literature that examines the common-audit effects. Second, with the focus being within the supply chain setting, the thesis contributes to the emerging literature which explores the economic consequences of characteristics among supply chain partners within a capital market context. Third, it complements the broader literature around capital market effects, by adding a new parameter that affects the equity- and debt-financing of the firms. Beyond the academic contributions, the findings of the current thesis could provide useful insights for regulators and accounting standard setters since they document evidence for two of the most important groups of users of audited financial statements. Further, the

findings of this thesis could also have corporate policy implications. Given the importance of raising external capital, supplier firms might need to consider the trade-offs between having a common auditor with their major customers and the cost of equity and debt capital.

Table of Contents

List of Tables

List of Appendices

List of Abbreviations

AEG	Abnormal Earnings Growth
AICPA	American Institute of Certified Public Accountants
APT	Arbitrage Pricing Theory
BPS	Basis Points
CAPM	Capital Asset Pricing Model
CEO	Chief Executive Officer
COE	Cost of Equity
CPA	Certified Public Accountants
CRSP	Center for Research in Security Prices
CSRC	China Securities Regulatory Commission
CUSIP	Committee on Uniform Securities Identification Procedures
DID	Difference in Difference
E&Y	Ernst & Young
EPS	Earnings Per Share
ERC	Earnings Response Coefficient
FASB	Financial Accounting Standard Board
FRC	Financial Reporting Council
FT	Financial Times
FTC	Federal Trade Commission
GAAP	Generally Accepted Accounting Principles
GAAS	Generally Accepted Auditing Standards
GAO	Government Accountability Office
GM	General Motors
HBJ	Houston Business Journal
IBES	Institutional Brokers Earnings Services
ICAEW	Institute of Chartered Accountants in England and Wales
IESBA	International Ethics Standards Board for Accountants
IIA	Institute of Internal Auditors
IOSCO	International Organization of Securities Commissions
IPO	Initial Public Offering
ISIN	International Securities Identification Number
JIT	Just-in-Time
JSC	Joint Stock Companies
KPMG	Klynveld Peat Marwick Goerdeler
LBH	Lehman Brothers Holding
LIBOR	London Inter-Bank Offered Rate
LPC	Loan Pricing Corporation
M&A	Merger and Acquisition
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares
PCAOB	Public Company Accounting Oversight Board
PSM	Propensity Score Matching

PWC	PriceWaterhouseCoopers
R&D	Research and Development
RIV	Residual Income Valuation
RSI	Relationship-Specific Investments
S&P	Standard and Poors
SAS	Statement of Accounting Standard
SEC	Securities Exchange Commission
SFAS	Statement of Financial Accounting Standards
SIC	Standard Industry Classification
SOX	Sarbanes-Oxley Act
SPE	Special Purpose Entities
TARP	Troubled Asset Relief Program
U.K.	United Kingdom
U.S.	United States
VIF	Variance Inflation Factor
WSJ	Wall Street Journal

Dedication

This thesis is dedicated to my parents, Mary and Aristeidis.

“When everything seems to be going against you, remember that the airplane takes off against the wind, not with it.” (Henry Ford)

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Researcher's Declaration

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution

Printed Name: Sotirios Kokkinos
Signature:

Chapter 1: Motivation, Objectives and Overview of the Thesis

1.1 Motivation of the Thesis

The current thesis examines whether the existence of common auditors (common audit firms) between supplier firms and their major customers results in equity and debt capital market consequences for the former. This aim is motivated by the following reasons.

Over the last decades, traditional accounting and auditing literature follows a unilateral approach when examining the role that external auditors play in providing independent verification over the credibility and accuracy of the information included in the published financial statements. Under this approach, the effect of the auditor is examined on a one-to-one basis (i.e., auditor A and client A). However, auditors provide services to multiple clients at the same time. It naturally follows that there would be many cases where the same audit firm would provide auditing services on - either explicitly or implicitly- economically interrelated firms. Recently, a growing body of literature has started exploring the role of common auditors among such firms (e.g., Cai et al., 2016; Dhaliwal et al., 2016b; Chang et al., 2019; Sun et al., 2020; Chen et al., 2020; Hope et al., 2022). In contrast to the traditional unilateral approach, this stream of literature applies a multilateral approach, thus adding another dimension. Under this approach, the effect of the auditor is examined on a one-to-many basis (i.e., auditor A and client A; client B and so on). In that sense, the role of the (common) auditor on client A is examined by taking into consideration that the same auditor provides services at the same time to other clients that are economically interrelated to client A. While the importance of the informational intermediary role of auditors for capital markets is well documented within a unilateral context (e.g., Mansi et al., 2004; Khurana and Raman, 2004; Pittman and Fortin, 2004; Knechel et al., 2007; Dhaliwal et al., 2008; Kim et al., 2013; Krishnan et al., 2013; Azizkhani et al., 2013; Francis et al., 2017), evidence within a multilateral context is rather limited. As discussed in more detail in chapter 4 (section 4.4), extant common auditor literature focuses mostly on corporate efficiency advantages (e.g., Cai et al., 2016), audit quality implications (e.g., Chang et al., 2019; Krishnan et al., 2019; Sun et al., 2020) or confidentiality violation issues (e.g., Dhaliwal et al., 2016b; Chen et al., 2020; Hope et al.,

2022)[1]. Therefore, the current thesis is motivated by the lack of evidence in the existing literature as to how such a relationship is perceived by capital market participants.

Another important reason that motivates this thesis lies in the continuous concern of accounting regulators and standard setters about auditor independence issues as well as how such issues are perceived by capital market participants.

"I believe investors should be concerned about the emerging threats to auditor independence from the evolving firm business model.... Over the past two years firms have settled enforcement actions related to independence violations. The Board also continues to identify independence issues. Regulators around the world are raising similar concerns." (Extract from the speech of Steven B. Harris, a Board Member of the PCAOB, during the international corporate governance network annual conference in 2016).

"The accounting profession must be like Caesar's wife. To be suspected is almost as bad as to be convicted. It is not enough for the auditor on an engagement to be independent; rather, the (investing) public must perceive the accountant as independent…Independence is a covenant between auditor and investor, and no one else; a covenant that says the auditor works in the interests of shareholders, not on behalf of management; a covenant that says the auditor must steer clear of having financial interests in the companies he or she audits; and a covenant that says the auditor's work stands separate and apart from their clients' business. These are the basic principles that have established the foundation of independence for more than six decades." (Extract from the speech of Arthur Levitt, former SEC chairman, in his keynote speech in 2000).

[1] It should be noted that a recent study examine the role of common auditors in private debt contracting (e.g., Francis and Wang, 2021). Specifically, Francis and Wang (2021) find that when borrowers and banks appoint the same audit firm, informationally opaque borrowers tend to receive lower interest rates. The current thesis departs from this study in several important ways. First, Francis and Wang (2021) focus on a setting where a common auditor might exist between a borrowing firm and its lender. In contrast, the current thesis focuses on a supply chain setting where the commonality of auditor might exist between supplier firms and their major customers. Second, the main argument in Francis and Wang (2021) lies in the "soft talk information" between the (common) auditor of the bank and the bank. Instead, the current thesis argues that it is the potential opportunistic behaviour of the audit firm that might drive the adverse bank's reaction on price and non-price terms. Third, the difference in the two settings, inevitably lead to different samples and periods under examination. Finally, the borrower-bank setting of Francis and Wang (2021) is, by nature, restricted only to private debt contracting and does not allow for further extensions to other capital markets. On the contrary, the current thesis's setting (i.e., supply chain) expands the evidence within an equity market as well.

Among the growing body of literature that examines the role of common auditors using different contexts in which common audits might exist (e.g., between supplier and customer firms, acquirer and target firms, mutual funds and invested firms, parent-subsidiary firms), several studies bring to light the opportunistic and self-interest behaviour of auditors which is underpinned by their inherent utility maximisation nature when they operate within such environments. One strand of this literature, for instance, highlights the potential of biased or leaked information by common auditors (e.g., Aobdia 2015; Dhaliwal et al., 2016b; Chen et al., 2020; Hope et al., 2022), thus confirming the view that audit firms might put their interests ahead of and consequently overlook their *raison d'etre* (i.e., provision of independent and unbiased services)[2]. A second strand, also, documents evidence of lower quality of audits when the same audit firm is appointed by two economically interrelated firms, thus highlighting the fact that such environments can facilitate an increased risk of impairment of auditor's independence (e.g., Chen et al., 2014; Chang et al., 2019; Dhaliwal et al., 2020; Sun et al., 2020). In sum, such evidence in liaison with the ongoing concern of regulators and standard setters about auditor independence issues as well as how such issues are perceived by capital market participants constitutes the second motivation of the current thesis.

1.1.1 Motivation to Focus on Equity Markets

Contextually, two main reasons motivate a focus on the equity market. First, U.S. equity market constitutes one of the most important capital markets. According to the SIFMA (2019) report, over 221 billion dollars of equity was issued in the U.S. in 2018, while the volume of initial public offering (IPO) nearly touched the amount of 50 billion dollars. Hence, evidence within the equity context is expected to be economically significant.

Second, equity holders, as residual claimants, are among the last individuals to receive any amount of their investment back in case of bankruptcy or liquidation of the firm. As such, to mitigate the increased risk they bear, equity investors rely and place significant emphasis on auditing services and audit-specific characteristics when they define the minimum rate of return to compensate them for the risk of financing a firm (Krishnan et al., 2013). As mentioned later in Chapter 4 (section 4.2.2), the supply chain context

[2] While this notion might be relatively new within the academic research, it appears to be evident among the corporate world for some time. For instance, Chrysler's Treasurer in the late 1980s, Frederick Zuckerman, raised similar concerns in the anticipation of Chrysler's audit firm being merged with another audit firm that audited a main competitor of the automotive producer: *"It'd be very awkward to have the same auditor for two large companies…. Clients may feel uncomfortable knowing that their corporate secrets are lying just a few files away from papers of their arch-rivals"* (Tierney, 1989).

facilitates an increased risk for supplier firms to become bankrupt or financially distressed in case they lose a major customer. Therefore, within such a setting, it is reasonable to expect that equity investors would place significant emphasis not only on the auditor appointed by the supplier firm, but also on the auditor of the supplier's major customer.

1.1.2 Motivation to Focus on Debt Markets

While the first empirical chapter (Chapter 5) documents significant evidence within an equity market context, an investigation from a debt market perspective is also necessitated for several reasons.

First, firms raise capital much more frequently from debt rather than from equity markets (Armstrong et al., 2010; Dhaliwal et al., 2011; Florou and Kosi, 2015). For instance, the total amount of U.S. outstanding corporate debt (including both loans and bonds) was three-time higher than the total stock market capitalization (323% vs 126%) over the period 2000-2011 (World Bank, Global Financial Database, 2017)[3]. More recently, SIFMA's (2019) report confirms the preference of debt over equity capital markets as the foremost external financing source for U.S. firms[4]. According to the report, the U.S. corporate debt issuance totalled $2.2 trillion, whereas equity issuance was $221 billion in 2018. Academic research also confirms the tendency of firms to prefer to raise capital through debt rather than the equity market. For example, Elliot et al. (2010) document that 91% of the external capital raised by U.S. firms, in 2002, was through the issuance of debt. Similarly, Armstrong et al. (2010) report that nearly 95% of funds raised

[3] The magnitude of the difference between the two capital markets is similar for European firms, as well. According to Florou and Kosi (2015), the total amount of EU outstanding corporate debt (including both loans and bonds) was 193% while the total stock market capitalization was just 59%, over the period 2000-2011. In other words, the average size of corporate debt market, in Europe, was three times higher than the corresponding equity market size.

[4] It should be noted that the preference of firms to raise capital through debt markets more frequently than equity markets can be justified by the following four viewpoints. First, the interest paid on debt is tax deductible, thus making debt a less expensive source of capital than equity. Second, according to the static trade-off theory, the tax benefit that arise from raising capital through the debt market results in firms borrowing until the point where the loss, that arise from the agency cost of debt and the probability of financial distress/default, counterbalances that tax benefit (Myers, 1977; Ross, 1977; Myers, 1993; Hart, 2001). The third reason lies on the so-called pecking order theory. This theory posits that firms would opt to raise internal over external and debt over equity capital (Myers, 1984; Myers and Majluf, 1984). The rationale behind this proposition lies on the fact that equity issuance might indicate a potential overvaluation on the firm's shares, and thus, could result in a negative price impact. On the contrary, when firms issue debt they are able to reduce the information advantage of management over the price of shares, and hence, it would have either a no-price impact or a positive price impact (Krasker, 1986; Smith, 1986; Korajczyk et al., 1992; Myers, 1993). Forth, according to organisational theory of capital structure, debt markets facilitate firms' wealth maximisation, through signalling management's commitment to better performance, investing in less risky projects with positive net present value (NPV) and disciplining to meet debt obligation on time (Harris and Raviv, 1991). As a result, firms opt to raise debt over equity capital.

by U.S. firms were attributed to the debt market. Considering that debt constitutes the most important source of capital for firms, it is therefore important to examine the potential effect of cross-audits within a debt-financing context as well.

Second, debtholders, compared to equity investors, bear the risk of an asymmetric payoff structure (Dewatripont and Tirole, 1994). Put it simply, both market participant groups are exposed to unlimited downside risk. However, the upside prospect of the former is confined to a fixed contractual payment (i.e., interest and principal payments), whereas equity investors also benefit from unlimited upside potential (Easton et al., 2009; Elliot et al., 2010; Lok and Richardson, 2011; Defond and Zhang, 2014). Inevitably, such differences in the payoff structure lead also to differences in the information needs between the two groups. In that sense, debtholders are expected to be more concerned and sensitive about negative news, information risks and uncertainties since these could, increase their downside risk (Holthausen & Watts, 2001; Ball et al., 2008; Easton et al., 2009; Armstrong et al., 2010; Florou and Kosi, 2015; Kress et al., 2019)[5]. As discussed in chapter 4, the existence of common auditors between interrelated business partners/firms could lead to higher information and uncertainty risks. Thus, evidence within a debt market context is expected to be more predominant and relevant compared to equity markets.

Lastly, an examination within a debt market context allows for more clear inferences than within the equity market context. As discussed in Chapter 5 (section 5.2.3), the implied cost of equity estimates might be "vulnerable" to several assumptions that could potentially lead to spurious inferences (Easton, 2006; 2007). For instance, an often assumption when the cost of equity is estimated is that long-term growth rates are held constant across all firms. In practice, however, this is unlikely to happen. In contrast, the calculations around the cost of debt are more direct and straightforward (Florou and Kosi, 2015; Leuz and Wysocki, 2016). In that sense, focusing within a debt financing context would allow for clearer and safer conclusions to be drawn.

[5] The difference regarding the information needs between equity investors and creditors have, also, been highlighted by Givoly et al. (2017). The authors examine the change, over time, in the information content of accounting numbers to both debt- and equity-holders. Using over 13,000 corporate debt-issues and returns and valuation models for a large sample over the period 1975-2013, Givoly et al. (2017) find that the value relevance of financial accounting information has been decreased (increased) for equity(debt) holders over the last decades.

1.1.3 Motivation to Focus on Private over Public Debt Markets

While examining the economic consequences within a public debt market context might provide useful insights on the effect of shared auditors, the current study chooses to focus on the private over public debt market for the following reasons. First, private debt constitutes the most predominant source of firms' external financing over the last decades, accounting consistently for more than half of the total debt raised in the U.S. (Graham et al., 2008; Chava et al., 2009; Khang et al., 2016). For instance, the total debt capital issued in the form of syndicated loans in the U.S. was $1.5 trillion in 2005, while corporate bond issuance totalled $700 billion (Bharath et al., 2008). The same trend continues in more recent years, with the volume of syndicated loans outstanding as of 2018 is approximately $2 trillion and exceeding that of corporate bonds (Federal Reserve Bank of St. Louis, 2019). In that sense, even a slight difference in the cost of bank debt between supplier firms that share a common auditor with their major customers and those firms that do not share could probably be economically significant.

Second, firms that choose to raise capital through private debt markets are usually characterised by considerable cross-sectional differences in relation to their information environment and credit quality (Sufi, 2007; Dennis and Mullineaux, 2000). Consequently, focusing on the private debt market could potentially lead to a more heterogeneous sample of firms compared to the public debt market, in which firms are, generally, larger and characterised by less heterogenous information environments. In turn, a higher variation in the characteristics of the sample firms that can be found in the private debt market could allow for safer conclusions and inferences to be drawn.

Finally, bank loan contracts relative to corporate bonds provide the opportunity for a multi-dimensional examination of debt. That is, the response of banks to shared auditors could be observed not only directly, through the interest rate charged, but also indirectly through a number of non-price loan terms such as loan maturity, collateral and financial covenants attached to the loan agreement. In that sense, a focus on the private debt market would allow for a more holistic and comprehensive investigation of the effect of shared auditors in capital markets.

1.2 Research Questions

Following the previous discussion, the current thesis aims to understand whether and how capital market participants perceive the presence of common auditors between economically interrelated firms. Specifically, the main research questions related to the first empirical chapter (Chapter 5) are as follows:

RQ1: Do equity market investors negatively perceive the existence of common auditors between supplier firm and its major customers and as a result require a higher equity premium to compensate for their risk?

RQ2: Do supplier firms that rely on their major customers for a larger portion of sales or that have a greater number of major customers experience a higher equity premium as a result of the increased risk associated with them?

Similarly, the main research questions related to the second empirical chapter (Chapter 6) are as follows:

RQ3: Do banks negatively perceive the existence of common auditors between supplier firm and its major customers and as a result require higher interest rates to compensate for their risk?

RQ4: Do banks negatively perceive the existence of common auditors between supplier firm and its major customers and as a result require stricter non-price loan terms to compensate for their risk?

RQ5: Do supplier firms that rely on their major customers for a larger portion of sales or that have a greater number of major customers experience higher loan interest rates and more stringent non-price terms as a result of the increased risk associated with them?

1.3 Contribution and Policy Implications of the Thesis

By providing answers to the aforementioned research questions, this thesis makes important academic contributions to several strands of the literature. First, it adds to the growing body of literature that examines the common audit effects. In particular, extant common auditor literature, thus far, focuses mostly on corporate efficiency advantages (e.g., Cai et al., 2016), audit quality implications (e.g., Chang et al., 2019; Krishnan et al.,

2019; Sun et al., 2020) or confidentiality violation issues (e.g., Dhaliwal et al., 2016b; Chen et al., 2020; Hope et al., 2022). While the importance of the informational intermediary role of auditors for capital markets is well documented within a unilateral auditor context (Mansi et al., 2004; Khurana and Raman, 2004; Pittman and Fortin, 2004; Knechel et al., 2007; Dhaliwal et al., 2008; Kim et al., 2013; Krishnan et al., 2013; Azizkhani et al., 2013; Francis et al., 2017), evidence within a multilateral auditor context is rather limited. Thus, this thesis contributes directly to this stream of literature by providing evidence about the economic consequences of common audits for two of the most important groups of capital market participants, equity investors and banks.

Second, this thesis responds to Aobdia's (2015, p. 1533) call for future research on *"assessing the capital market implication of the reluctance of rival firms to share auditors"*. While in the first instance, this call seems to be addressed in the context of industry rival firms, it should be noted that supplier firms and their major customers are potentially future competitors/rivals. As explained in Chapter 4 (section 4.2.2), supplier firms bear the risk that their major customers would start developing products in-house, rather than buying directly from them in order to: (i) develop a more direct and structured source of supplies; (ii) improve control and time management over the supplies; and (iii) protect proprietary information leakages. As such, major customers that decide to develop in-house products most probably would terminate their relationship with their existing suppliers as they would have automatically become rivals in the same market. In addition, the findings of the current thesis show that only 30 percent of the supplier firms have a common auditor with their major customers. While the current thesis does not examine auditor-choice decisions due to research design difficulties, the findings are consistent with the evidence of reluctance documented by Aobdia (2015). Thus, this thesis contributes to the broader call of Aobdia (2015) for capital market implications of firms that share auditors.

Third, this thesis also contributes to the emerging literature within the supply chain setting which highlights the important role that the information contained in the published financial reports play in capital market participants' investing and lending decisions. For example, Dhaliwal et al. (2016a) and Campello and Gao (2017) show that both equity investors and creditors price and place significant emphasis on the degree of reliance of the supplier firm as expressed by the percentage of sales over its few large customers. More closely related to the notion of this thesis, Kim et al. (2015) provide evidence that capital

market participants are not confined only in the information contained in the financial reports of the supplier firms. Rather, Kim et al. (2015) show that the close economic dependence of the supplier on its major customers necessitates capital market participants, and more specifically banks, to take into account the earnings performance of the supplier's major customers contained in the financial reports of each of the major customer when they set out the price and non-price loan terms of the supplier firm. The thesis contributes to this stream of literature by showing that equity investors and banks also consider whether the supplier firms share a common audit firm with their major customers when they set out the equity premium and the loan interest rate, respectively.

Beyond its academic contribution, the findings of the current thesis could also be of great interest to accounting regulators and standard setters. Specifically, this thesis finds that supplier firms that have at least one common auditor with their major customers experience higher equity- and debt-financing charges. These findings are consistent with the notion that the existence of common auditors is adversely perceived by both equity investors and banks. While capital market perceptions might not necessarily reflect an *actual or in fact* audit quality and auditor's independence issue, they definitely represent another important feature recognised by regulators and standard setters, *independence in appearance.* As Dopuch et al. (2003; p. 84) highlight: *"a violation of independence in appearance is prima facie evidence of impaired independence, even if the auditor is independent in fact".* Similarly, Arthur Levitt, a former SEC chairman, highlighted in his keynote speech in 2000 that *"The accounting profession must be like Caesar's wife. To be suspected is almost as bad as to be convicted. It is not enough for the auditor on an engagement to be independent; rather, the (investing) public must perceive the accountant as independent.* Hence, the findings of this thesis could assist in improvements in current regulation that would fortify the credibility and reliability of the audit profession and thus preserve and enhance the systemic trust and confidence over the information included in companies' financial reports. A series of accounting scandals that have seen the light of publicity over the last two decades (e.g., Enron, WoldCom, BHS, Carillion) have raised many questions regarding auditor's independence and consequently the overall value of auditing (Ye et al., 2011).

Finally, the findings of the current thesis suggest that the effect of common auditor on both cost of equity and cost of debt capital are economically important as well. Specifically, in terms of the equity market, this study shows that supplier firms sharing

common auditors with their major customers pay an excess annual cost of nearly $200,000 to obtain equity financing compared to those that do not have a common auditor with major customers. Similarly, in terms of debt markets, the study finds that firms that have a shared auditor with their major customers are charged $2.2m more compared to those with no common auditor. In that sense, the findings of this thesis could also have direct capital structure firm and auditor-choice decision implications. That is, given the importance of raising external capital, supplier firms might need to (re)-consider the trade-offs between having a common auditor with their major customers and the cost of equity and debt capital.

1.4 Overview of the Chapters and Structure of the Thesis

The remainder of the thesis is structured as follows. Chapter 2 provides a detailed overview of the historical evolution of the audit profession, highlights major corporate financial scandals that damaged the perception of the audit profession and discusses critical accounting and auditing regulations. Further, the chapter illustrates the conditions that create the demand for external auditing while it also provides definitions about audit quality and auditor's independence concepts.

Chapter 3 presents the two conflicting theoretical views (i.e., the classic agency theory and the alternative agency theory) that could explain the contradictory impact that the existence of a common auditor could have on the cost of equity and debt capital. In sum, both Chapters 2 and 3 set out the institutional and theoretical background, thus serving as forerunners of the main empirical chapters of the thesis.

Chapter 4 provides a comprehensive review that attempts to synthesise three different streams of literature. While, practically, the two empirical chapters investigate capital market consequences under a different realm, they do share similar foundations. Therefore, this chapter develops a common literature review for both empirical chapters. In addition, Chapter 4 presents the hypotheses development and sets out the research questions.

Chapters 5 and 6 present the two main empirical chapters of this thesis. The former examines the effect of common auditor by adopting an equity market perspective, while the latter puts emphasis on a debt-financing context, and more specifically the private debt market. Each of these chapters provides a thorough discussion of the empirical research

design applied, an extensive presentation and analysis of the empirical results, a series of sensitivity as well as additional tests.

Finally, Chapter 7 presents the concluding remarks of the thesis. Particularly, it summarises the main findings of the two empirical chapters, discusses their potential caveats and limitations associated with the research design and provides suggestions for future research avenues.

Chapter 2: The Fundamentals of the External Financial Auditing

2.1 Introduction

This chapter discusses the fundamentals of external financial auditing. The first section provides a detailed analysis of the historical evolution of the audit profession. Specifically, it traces the evidence of external audit back to its origins, explains the shift of its focus towards managerial responsibilities, highlights major corporate financial scandals that damaged the perception of the audit profession and discusses critical accounting and auditing regulations. The following sections provide the definition of external auditing as proposed by accounting professional bodies, regulators and academics, present the four main conditions that create the demand for such services and document thorough definitions about audit quality and auditor's independence concepts. Finally, the last section sets out the concluding marks of this chapter.

2.2 The Historical Development of the Auditing Profession

While the early historical evolution of auditing is not well documented (Lee, 1994), there is evidence suggesting that the concept of external auditing can be traced back thousands of years. For instance, checking activities similar to the contemporary auditing practices have been found in the ancient civilizations of Greece, Roman, Egypt and China (Brown, 1905; Curry et al., 1920; Lee, 1986; Porter et al., 2014). Like present-day, citizens who were serving as public officers and officials, were assigned to collect and manage public funds. Yet, due to concerns related to incompetency or even corruption, those citizens were required to provide a detailed oral explanation with respect to their handling of those funds in front of a large audience among which there was a checking clerk (i.e., the then auditor)[6]. The procedure was conducted orally for two main reasons. First, most of the audience, at that time, was not capable of reading and second an oral account was considered to further facilitate transparency among the public. The method of the above-

[6] As Alexander (2002) states, such public officers were members of the Athenian Council that were legislating on financial matters and controlling public monies under the supervision of 10 state accountants, chosen by the public. As the Greek Philosopher Aristotle describes (as cited in McMickle, 1978, p. 11): "*Ten [logistae]….and ten [euthuni]…. are chosen by lot. Every single public officer must account to them. They have sole control over those subject to [examination]…. they place their findings before the courts."*

mentioned process gave birth to the contemporary term "audit" which is derived from the Latin verb "*audire"*, meaning *"to hear"* or "*a hearing"*[7].

Similar kind of checking activities have later been documented in the U.K., during the reign of King William the Conqueror (circa 1035-1087). Specifically, a special unit of Commissioners (i.e., the then auditors) - whose identity was only known by the King - were sent across the Kingdom to check and verify whether revenues and expenditures were accurately reported[8]. Such checking practices were further intensified during the reign of Henry I (1100-1135), when the Exchequer was introduced in the UK (Gul et al., 1994). Likewise, evidence of early auditing practices has been documented in the major Italian City-States (e.g., Venice, Florence, Pisa and Genoa) during the late Middle Ages. Owning to the rise and the expansion of trading activities, prosperous Italian merchants used to employ auditors to assist them in the verification and checking process of the merchandised goods sold. As was the case in earlier times, such checking activities aimed to prevent and determine whether any fraudulent acts (e.g., embezzlement) had taken place (Brown, 1962).

Industrial Revolution in the UK, (i.e., during the late eighteenth and early nineteenth centuries) marked the initiation of a gradual change in the objectives and applications of auditing, thus advancing its role and shifting its focus within a corporate environment. The reason behind this change lies in two socio-economic developments that started taking place during this period. First, numerous commercial and industrial corporations were established and second, more and more people started investing small amounts of funds in those corporations. The rapid business expansion and the emergence of the so-called "middle-class investors" led to the development of the separation between business's ownership and control. Yet, business's financial failures were pervasive, while investors were heavily exposed and unprotected against any business's mismanagement. To address this issue, UK regulators passed the Joint Stock Companies (JSC) Act of 1844. Under this

[7] While it is practically infeasible to identify the exact origin of auditing, Brown (1905) and Anderson (1977) summarize its theoretical foundation as follows: *"The origin of auditing goes back to times scarcely less remote than that of accounting…Whenever the advance of civilization brought about the necessity of one man being entrusted to some extent with the property of another, the advisability of some kind of check upon the fidelity of the former would become apparent." (Brown,1905; p.74). "The practice of auditing commenced on the day that one individual assumed stewardship over another's property. In reporting on his stewardship, the accuracy and reliability of that information would have been subjected to some sort of critical review." (Anderson, 1977; p.6).*

[8] *"The King [William the Conqueror] …sent men all over England to each shire [or county] …to find out…what or how much each landowner held and what it was worth. William was thorough…[He] also sent a second set of Commissioners to shires, where they themselves were unknown, to check their predecessors' survey, and report culprits to the King" (Morris, 1977; p.1).*

Act, joint-stock companies were required to distribute to their shareholders the annual balance sheet accounts of the company. More importantly, the Act required the appointment of the auditor to be performed by the company's shareholders. The main responsibilities of the auditor were: (i) the thorough investigation of the company's balance sheet; and (ii) the report of the outcome to the shareholders (i.e., whether the company's records represent an accurate picture of the company's current state). JSC Act of 1844, however, required the auditor neither to be independent of the company's management nor a certified accountant. It was a common practice that a shareholder was selected as an auditor by the other shareholders (Porter et al., 2014; p. 28). Twelve years after the establishment of JSC Act of 1844, the requirement for companies' balance sheets to be audited was revoked. According to Brown (1905; p. 325), over sixty percent of the registered companies between 1862-1904 ceased their operations. Inevitably, the requirement of audited balance sheets was re-established in the UK with the Companies Act of 1900. While this Act still did not require the auditor to be a qualified professional, most of the companies were audited by chartered accountants (Watts and Zimmerman, 1983). More importantly, the Act stipulated that the auditor must be independent of the company's management. Therefore, the Companies Act of 1900, was a prominent milestone in the history of corporate auditing not only because a requirement for companies' balance sheets to be audited was re-introduced, but also because the auditor's independence concept was recognised for the first time.

After a prolonged period of British dominance, the UK started losing the helm in the development of the auditing profession. The rapid growth of the U.S. economy during the late nineteenth and early twentieth centuries, inevitably, shifted the epicentre of the economic and auditing development from the UK to the US. This period was, generally, characterized by the establishment of larger in size business entities (e.g., United States Steel, General Motors and International Harvester Company and International Business Machines Corporation), the development of more sophisticated securities markets as well as the introduction of credit rating agencies. Within such an economic environment, businesses developed the need for further financial capital while investors sought further investment opportunities. According to Hawkins (1963, p.256) public ownership in the US skyrocketed from almost half a million to over ten million stockholders between the period 1900-1930. The rapidly increased separation of management and ownership generated an "unofficial" demand for audited financial statements, thus putting the auditing profession at the forefront. As Jeff (2003) states, over ninety percent of the publicly listed firms in the

New York Stock Exchange (NYSE) provided audited financial statements by 1926, although there was no legal requirement to mandate the provision of audited financial statements at that point.

While the audit profession started gaining reputation and popularity, it was not before the mid-1930s that it was legally entrenched in the corporate world. In the wake of the stock market crash of 1929 and the subsequent Great Depression, the US Congress established the Securities Exchange Commission (SEC) and passed two prominent federal legislation reforms, namely the Securities Act of 1933 and the Securities Exchange Act of 1934. Under these two Acts, the SEC required that the financial statements of all existing and new registered firms to be audited by independent Certified Public Accountants (CPAs). That was the first time that external independent auditing was legally mandated by regulators, a fact that highlighted and recognised the importance of the audit profession and created further demand for audit services (Jeff, 2003). The main objective of those two Acts, however, was to establish a regulatory framework that would protect shareholders or any financial statements user by assigning auditors liability and holding them accountable for any misdoings. Specifically, Section 11 of the Securities Act of 1933 provides users of the audited financial statements with the right to sue auditors for any financial damages that may be incurred as a result of inadequate audit work or misleading financial reports. In a similar vein, under Section 10 (Rule 10b-5) of the Securities Exchange Act of 1934, auditors may be charged with fraud for any material misstatements or omissions regarding information which is deemed necessary for the understanding of the financial reports.

In the following two decades (i.e., 1940-1960) the audit profession in the US continued to expand rapidly, reaching its peak in the early 1960s (Jeff, 2003). During this period, the SEC relied heavily on the American Institute of Certified Public Accountants (AICPA) for the development of the Generally Accepted Accounting Principles (GAAP) and auditing processes used by auditing firms. This period, also, marked the business model expansion of auditing services to include non-audit management advisory services as well as the gradual transition of auditing firms into a more information-based environment. Finally, the increased corporate merger activities that took place in the early 1960s led to further demand for auditing and non-auditing services[9].

[9] This was the period that the term “Big Eight” used for the first time, referring to the eight biggest auditing firms, namely Arthur Andersen, Arthur Young, Deloitte Haskins & Sells, Ernst & Whitney, Peat Marwick Mitchell, Price Waterhouse, Touche Ross and Coopers & Lybrand (Jeff, 2003).

The demand for auditing services continued to increase in the ensuing decades. The rapid technological and regulatory advancements led to several important auditing technique developments[10]. Also, the continuation of the increased M&A activity resulted in a higher level of competition among the existing auditing firms (Jeff, 2003). Yet, the reputation of the audit profession was under attack and pressure throughout this period. A series of corporate financial scandals burst out, thus triggering a plethora of litigation actions against auditing firms[11]. Auditors' performance was heavily criticized with investors, business press and regulators casting doubts and raising questions regarding auditor's independence issues. As a result, the AICPA – the Committees of which consisted of audit partners and professionals – lost its influence and role in the standard setting process and was replaced by an independent organization, the Financial Accounting Standard Board (FASB) in 1973. By the mid-1980s, most of the big auditing firms were excluded from any public dialogue with the FASB regarding either the improvement of existing or the development of new standards and accounting principles. Further, the numerous financial scandals initiated a broader attack on the audit profession from the U.S. Congress. Specifically, the two Congressional Committees which launched a detailed investigation concluded that such scandals came as a result of a longstanding lack of auditor's independence from their clients. Similarly, the Department of Justice and the Federal Trade Commission (FTC) imposed a series of amendments in the Code of Professional Ethics based on which audit firms were conducting their affairs[12].

Notwithstanding the severe criticism, auditors' credibility did not improve in the following years[13]. In fact, a series of major accounting scandals in the late 1990s and early 2000s were brought to light (Johnstone et al., 2013; Diamond and Diamond, 2019)[14]. Indisputably, the most notable case was the collapse of the US energy giant, Enron Corporation. Exploiting accounting loopholes, providing poor and ambiguous financial

[10] As Porter et al. (2014, p.38) describes, the following constitute examples of auditing development techniques: (i) the emergence of computers and the continuation of computerization techniques; (ii) the adoption of a broader audit aspect which included both internal and external sources; (iii) the introduction of "sophisticated" statistical sampling techniques; and (iv) the adoption of a business risk-based auditing approach.

[11] Some of the most prominent cases were the following: (i) Westec Corp; (ii) National Student Marketing Corp; (iii) Penn Central Transportation Co; (iv) Four Seasons Nursing Centers of America Inc.; (v) Stirling Homex Corp.; (vi) Continental Vending Machine Corp; (vii) Yale Express System Inc.; and (viii) Equity Funding Corporation of America.

[12] For a detailed analysis on the banned rules imposed by the Department of Justice and the FTC, please refer to Bialkin (1987) and Chenok (2000).

[13] For example, the number of accounting restatements by U.S. firms quintupled over the period 1992-2002 (GAO, 2002; Moriarty and Livingston, 2001).

[14] Some notable corporate financial scandals include the following: Waste Management Inc.; Enron Corporation.; WorldCom; Tyco International; Adelphia Communication Corporation and Peregrine Systems Inc (Coates, 2007).

reporting disclosures and abusing special purpose entities (SPE), Enron concealed billions of debt and failed deals and projects (Schwarcz, 2001). The Enron case resulted in the demise of one of the largest US auditing firms at that time, Arthur Andersen, which was serving as Enron's auditor since 1986. More importantly, Enron's scandal led to severe economic consequences for capital market participants. Specifically, shareholders' estimated losses exceeded seventy billion dollars after Enron's bankruptcy, while its employees also lost billions of their accrued pension benefits.

In the wake of those high-profile corporate financial scandals, the US Congress passed the Sarbanes-Oxley Act (SOX) on July 30th, 2002[15]. Essentially, the enactment of SOX was a major legislative action that would restore the public confidence of capital market participants in financial reports, reinforce both corporate accountability and professional responsibility and revive the credibility of the auditing profession (Jain and Rezaee, 2006; Chan et al. 2008). It is considered the most significant securities legislation since the Securities Act of 1933 and the Securities Exchange Act of 1934 (Zhang, 2007). The SOX consists of eleven Titles, each of which includes several Sections[16]. The main contribution of the introduction of SOX lies in the following four aspects. First, the Public Company Accounting Oversight Board (PCAOB) is established. Under Section 101 of Title I, PCAOB - an independent non-profit organization- is empowered with the authority to oversee the audits of publicly traded firms and conduct annual inspections for registered auditing firms. Second, Title II introduced a series of reforms to amend pre-existing auditor-client relationship situations that could potentially hinder a threat to an audit firm's independence. For example, Section 201 dictates that nine non-audit services are banned[17]. Also, Section 202 requires firms to make full disclosures of any services paid to the

[15] The Act was named after its two co-sponsors, the U.S. Senator Paul Spyros Sarbanes and the U.S. Representative Michael Garver Oxley. It is also referred to as the Public Company Accounting Reform and Investor Protection Act (in the Senate) or Corporate and Auditing Accountability and Responsibility Act (in the House of Representatives). It should be noted that SOX bill received an almost unanimous in favor vote in both the Senate (99-0) and the House of Representatives (423-3).

[16] The titles under SOX are the following: Title I- Public Company Accounting Oversight Board; Title II- Auditor Independence; Title III- Corporate Responsibility; Title IV- Enhanced Financial Disclosures- Title V- Analyst Conflicts of Interest; Title VI- Commission Resources and Authority; Title VII- Studies and Reports; Title VIII- Corporate and Criminal Fraud Accountability; Title IX- White-Collar Crime Penalty Enhancements; Title X- Corporate Tax Returns; Title XI- Corporate Fraud and Accountability. A detailed analysis of the SOX sections can be found at: https://pcaobus.org/About/History/Documents/PDFs/Sarbanes_Oxley_Act_of_2002.pdf.

[17] The non-audit services prohibited under Section 201 of Title II are the following: (i) Bookkeeping or other services related to the accounting records or financial statements of the audit client; (ii) Financial information systems design and implementation; (iii) Appraisal or valuation services, fairness opinions, or contribution-in-kind reports; (iv) Actuarial services; (v) Internal audit outsourcing services; (vi) Management functions or human resources; (vii) Broker or dealer, investment adviser, or investment banking services; (viii) Legal services; (ix) Expert services unrelated to the audit. A comprehensive discussion of the non-audit services banned can be found at: https://www.sec.gov/news/press/2003-9.htm.

appointed auditors, while Section 203 specifies that audit engagement teams and partners need to be rotated after five consecutive years. Third, Title III increased firm's management responsibility regarding the reliability of the disclosed financial information. Specifically, under Section 302, firm's management is required to acknowledge and certify the reliability of financial statements as well as the adequacy of internal control processes over the financial reports. Finally, Section 404 of Title IV mandates the assessment and attestation for both firm management and external auditor regarding the effectiveness of firm's internal controls that are in place. Collectively, the enactment of SOX legislation aimed at improving the reliability and accuracy of corporate financial disclosures, thus restoring investors' confidence about the financial reporting process and information disclosed in the financial reports of the U.S. public firms (Hamilton and Trautmann, 2002; Wang, 2010).

Overall, the introduction of SOX had significant advantages[18]. However, a series of major corporate cases that followed the implementation of SOX raised further concerns since they revealed that poor auditing services and improper accounting practices continued to be in place. The bankruptcy and subsequent collapse of Lehman Brothers Holding Inc (LBH) constitutes the most renowned case in the post-SOX era. While LBH's collapse has been linked mostly to the U.S. financial crisis of 2008, both the SEC and the U.S. Bankruptcy Court questioned the role of the auditor, Ernst and Young, for not reporting improper accounting practices adopted in the bank's financial statements[19]. According to the testimony of the chairman of the SEC, Mary Schapiro in 2010, one of the main factors that resulted in the failure of the LBH was related to the misreporting of Repo 105 transactions. Specifically, LBH incorporated such transactions as sales, rather than debt. By doing so, the firm managed to remove and conceal almost fifty billion dollars that could be disclosed as liabilities, thus decreasing the risk reported in its financial reports. Similarly, SEC investigations have also revealed several other significant cases during the post-SOX era that have led to charges for committing securities fraud. For example, the American International Group, Inc. admitted the falsification of financial statements over the period 2000-2005, while the Koss Corporation was found to report materially inaccurate financial information and have inadequate internal control procedures during the

[18] For example, existing literature that examines the effect of SOX documents that in the post-SOX era there is higher propensity of going-concern opinions (Geiger et al., 2005; Li, 2009); and decreased initial year audit fee discount (Huang et al., 2009).

[19] Please refer to the corresponding report of the Lehman's examiner, Anton Valukas, available at: https://web.stanford.edu/~jbulow/Lehmandocs/VOLUME%201.pdf and the SEC's press release, available at: https://www.sec.gov/news/testimony/2010/ts042010mls.htm

period 2005-2009. Finally, recent PCAOB inspection reports have brought to light numerous cases of audit deficiencies related to both auditors' independence and competence issues.

2.3 The Definition of External Auditing

As noted in the prior section, while the core of the external audit notion remained unchanged, its objective has been developed throughout the years. For example, Littleton (1933) notes that during the early stages of the audit profession, the main objective of an audit was to provide verification about the honesty of officials with fiscal responsibilities. Following the rapid business expansion, however, the objective of the external audit shifted its focus towards managerial responsibilities. In this regard, several professional accounting bodies and academics have proposed definitions which reflect more accurately the objectives of contemporary external financial auditing and provide a better understanding regarding its meaning and function. For instance, the American Auditing Concepts Committee defines external auditing as:

"The systematic process of objectively obtaining and evaluating evidence regarding assertions about economic actions and events to ascertain the degree of correspondence between those assertions and established criteria and communicating the results to interested users". (Committee on Basic Auditing Concepts, 1973, p.8)

Also, AU-C Section 200 in the Statement on Auditing Standards (SAS) 122, states that:

"*The purpose of an audit is to provide financial statement users with an opinion on whether the financial statements are presented fairly, in all material respects, in accordance with an applicable financial reporting framework, which enhances the degree of confidence that intended users can place in the financial statements.*" AICPA (2021, p.82)

Similar definitions are provided by several academic textbooks. For instance, Spicer and Pegler (1969, p.2) state that *"the objective of a modern audit has its ultimate aim the verification of the financial position disclosed by the balance sheet and the profit and loss account of the undertaking"*.

In line with the aforementioned, Gray and Manson (2008, p.21) define an audit as *"an investigation or a search for evidence to enable an opinion to be formed on the truth and fairness of financial and other information by person or persons independent of the preparer and persons likely to gain directly from the use of the information, and the issue of a report on that information with the intention of increasing its credibility and therefore its usefulness".*

2.4 The Need for External Auditing

Four main conditions necessitate the demand for external financial auditing: (i) conflict of interests; (ii) consequences of error; (iii) practicality and remoteness; and (iv) complexity (Silvoso, 1972). The first condition lies in the so-called agency theory[20]. To elaborate further, the firm's management is legally responsible for the preparation of the financial reports. Considering that management is essentially reporting on its own performance, however, the financial information included in the reports might be biased in order to present a more favourable picture of the firm. In that sense, the users of the financial reports might perceive a potential or actual conflict of interest between themselves and the management.

The second condition relates to the direct consequences of the financial information provided to the users of the financial reports. Such information is extensively utilised to assist several types of users such as stockholders, debtholders, equity or credit analysts, banks and pension funds in their decision-making. Hence, if financial statements provide incomplete, misleading or biased information, it could result in incorrect decision-making. This, in turn, could lead to harmful financial consequences for the users of the financial reports.

The third condition refers to the explicit difficulties that arise and apply to each financial statement user to verify in person the reliability of the information provided. Such difficulties could be attributed to the following reasons either independently or as a combination. First, it is the physical separation between financial statement users and management. Considering, for example, that publicly traded firms have hundreds of thousands of stockholders, it is not practically feasible for individual verification of the financial statements. The second reason relates to legal and institutional barriers. For instance, access to any firms' records is limited only to firm's management or authorized

[20] A detailed discussion about the agency theory can be found in Chapter 3.

personnel, and thus stockholders have no legal right to access them. Third, cost and time constraints prevent users from a direct access and assessment of the financial statements. For example, stockholders usually do not live in the same country or even the same city where the headquarters of the firm is located, and hence might not be able to afford neither the expenses nor the time to travel and assess individually.

The final condition relates to the increased number of economic transactions as well as the continuous development of the accounting rules and standards which govern both the measurement and the disclosure of financial information. Put it simply, financial statements have become more complex and difficult to comprehend, and therefore financial statement users are less able and competent to assess the quality of the information provided.

Inevitably, the interaction of the above-mentioned four conditions (i.e., conflict of interests, consequences of error, practicality and remoteness and complexity) increase the difficulty of financial statement users to verify the quality of the information provided without the existence of external assistance. Therefore, an independent, knowledgeable and competent third party (i.e., an external auditor) is required.

2.5 Audit Quality: A Function of Auditor's Competence and Independence

External financial auditing constitutes an important function that assists financial statement users in the assessment and verification of the credibility and accuracy of the information disclosed in the financial reports. Yet, such a function has little or even no value at all if the audit performed is of low quality.

Audit quality has been a major subject of accounting and auditing research over the last decades (DeFond and Zhang, 2014; Tepalagul and Lin, 2015). Due to its complex and subjective nature, however, there is neither consensus as to what audit quality consists of nor a unified definition (FRC, 2006; IOSCO, 2009; Francis, 2011). As a result, different academics and professional accounting bodies provide varying views regarding audit

quality[21]. The most prominent definition is the one proposed by DeAngelo (1981, p. 186) who defines audit quality as *"the market-assessed joint probability that an auditor would: (i) detect a breach in the client's accounting system; and (ii) report that discovered breach"*[22]. Based on this definition, audit quality could be considered as a function of two elements: (i) the likelihood that the auditor would discover material misstatements in the auditee's financial statements; and (ii) the likelihood that the auditor would eventually report the identified misstatements. In short, the former relates to auditor's competence, whereas the latter links to the auditor's independence (Knechel et al., 2013).

Competence generally refers to the ability of an auditor to act with due diligence and in line with professional standards. According to the International Ethics Standards Board for Accountants (IESBA), an auditor is considered to be competent when "*maintains professional knowledge and skill at the level required to ensure that a client or employer receives competent professional services based on current developments in practice, legislation and techniques and acts diligently and in accordance with applicable technical and professional standards"* (Code of Ethics for Professional Accountants, IESBA, 2009, p. 4)[23].

Independence constitutes the cornerstone of the audit profession (Mautz and Sharaf, 1961; Farmer et al. 1987). Yet, auditor's independence is a more complex concept (compared to auditor's competence), and thus more difficult to provide an absolute and precise definition (Antle, 1984; Flint; 1988). For instance, auditor's independence has a

[21] For example, a large body of literature suggest that higher audit quality should be linked to enhanced error detection and prevent irregularities and misstatements in the information provided within the financial statements (e.g., Palmrose, 1988; Chan and Wong, 2002; Gul et al., 2002; Behn et al., 2008; Chang et al., 2009). Others express the view that higher audit quality could be defined by the audit work provided (e.g., Carcello et al., 2002). Further, DeFond and Zhang (2014) attempt to define audit quality within a broader spectrum. That is, they highlight that it should not be defined as a binary variable; rather, it should also incorporate a function as to whether and how faithfully the accounting statements do represent the underlying economic environment of the auditee. From a regulator's point of view, the Government Accountability Office (GAO, 2003, pp.13) determines audit quality as the one provided *''in compliance with Generally Accepted Auditing Standards (GAAS) to provide reasonable assurance that the audited financial statements and related disclosures: (i) are presented in accordance with Generally Accepted Accounting Principles (GAAP), and (ii) are not materially misstated due to errors or fraud.''.* While not a formal definition of audit quality is provided by the Institute of Chartered Accountants in England and Wales (ICAEW, 2002, pp.8), it is highlighted that the core objective of audit quality is to provide *"a professional opinion supported by the necessary evidence and objective judgements."*

[22] While the definition of audit quality as proposed by DeAngelo (1981) constitutes an important attempt which has motivated a considerable body of accounting research over the last decades, more recent studies have criticized its narrow dichotomous view and propose a more holistic framework under which audit quality can be defined (see for example Francis, 2011; Knechel et al., 2013).

[23] A similar, but shorter, definition is also provided by the Institute of Internal Auditors (IIA). According to IIA, auditor's competence is defined as "*the auditor's ability to perform a job or task properly, being a set of defined knowledge, skills and behavior"* (IIA, 2013, p. 1).

twofold aspect: (i) the independence *of mind (or in fact),* which generally refers to the actual ability of auditor to perform audit tasks impartially and provide unbiased audit opinions; and (ii) the independence *in appearance,* which refers to the perceptions of financial statement users regarding the ability of the auditor to perform audit tasks impartially and provide unbiased audit opinions. In this regard, professional accounting bodies, regulators and academics recognise both types and propose distinct definitions. For example, the AICPA (2020, p.1) defines auditor independence as follows[24]:

(i) *"Independence of mind is the state of mind that permits a member to perform an attest service without being affected by influences that compromise professional judgment, thereby allowing an individual to act with integrity and exercise objectivity and professional skepticism."*

(ii) *"Independence in appearance is the avoidance of circumstances that would cause a reasonable and informed third party, who has knowledge of all relevant information, including safeguards applied, to reasonably conclude that the integrity, objectivity, or professional skepticism of a firm or member of the attest engagement team is compromised."*

Following the inherent complexity to define audit quality in absolute and precise terms, there is also a long-standing debate over its measurement. Considering that the nature of audit quality -which can be largely unobservable from the financial statement users- existing accounting and auditing research employs several proxies and interactions of them in an attempt to capture differentiations in the quality of audits (Francis, 2004; Knechel et al., 2013; DeFond and Zhang, 2014; Tran et al., 2019). Prior literature categorizes those proxies into two distinct groups, based on when they occur within the audit process cycle. The first group refers to the observable outcome/output of the audit process *(ex post)* and includes proxies such as going-concern opinions, restatements, financial reporting quality and capital market reactions. The second group relates to the unobservable input of the

[24] Higgins (1962, p.699) defines independence as follows: *"There are actually two kinds of independence which a CPA must have independence in fact and independence in appearance. The former refers to a CPA's objectivity, to the quality of not being influenced by regard to personal advantage. The latter means, his freedom from potential conflicts of interest which might tend to shake public confidence in his independence in fact "*. Similarly, Arens et al. (2003, p.83) state that *"Not only is it essential for auditors to maintain an independent attitude in fulfilling their responsibilities but it is also important that the users of financial statements have confidence in that independence. These two objectives are often identified as independence in fact and independence in appearance. Independence in fact exists when the auditor is actually able to maintain an unbiased attitude throughout the audit, whereas independence in appearance is the result of others' interpretations of this independence".*

audit process *(ex ante)* and incorporates proxies such as auditor's size, auditor's industry specialization, client-audit relationship duration (tenure) and the magnitude of non-audit service fees. Arguably, the set of proxies that fall into the first group are considered retroactive measures since they can only assess audit quality *ex post.* As such, they are relatively more direct with less measurement error, and therefore they have been widely used as validation instruments over the proposed *ex ante* audit quality proxies.

2.6 Conclusion

This chapter reviews the fundamentals of external financial auditing. The review of the historical development of the auditing profession emphasizes that while a series of major corporate financial scandals have resulted in stricter accounting and auditing rules and regulations, evidence of impaired auditor's independence and audit quality continues to exist. Auditor independence and consequently audit quality are of paramount importance for financial statement users since they increase the credibility and accuracy of the information disclosed in the financial reports. As noted, auditor's independence and audit quality are extremely complex concepts and while several definitions have been proposed, they should not be considered in absolute terms. In this regard, the measurement of those concepts is, in turn, controversial and has resulted in numerous proxies that should be interpreted with caution.

Chapter 3: Theoretical Background

3.1 Introduction

This chapter discusses and provides insights on the theoretical views underpinning the development of the hypotheses examined in this thesis. The focal point of the theoretical foundations of the two empirical chapters lies in the conflicting theoretical arguments that attempt to explain the role of external auditors in contemporary corporations. On the one hand, the classic agency theory suggests that auditors act as independent third parties that resolve any information asymmetries at the expense of shareholders and creditors by enhancing the credibility of the information contained in the published financial reports. On the other hand, Antle's (1982; 1984) theoretical proposition argues that auditors are no different than any other economic agents, and therefore they are expected to be utility maximisers as well as to serve their own interests and economic incentives. As such, the information included in the published financial reports of the auditee firms could be perceived as being of lower accuracy and credibility.

3.2 The Origins of Agency Theory

The seminal work of Ross (1973) and Jensen and Meckling (1976) signaled the intellectual development of agency theory as it is observed in the context of contemporary organizational economics (Shankman, 1999). The notion of agency theory, however, has its fundamental roots in theoretical work regarding private property rights (e.g., Coase, 1937) as well as the risk-sharing literature in economic studies (e.g., Wilson, 1968; Arrow, 1971). Specifically, Coase (1937) in his seminal paper *The Nature of the Firm* explores the constituents of a firm in practice, by examining the legal relationship that arises between the so-called "master and servant" or "employer and employee". Within such a relationship, the "master" or the "employer" has both the ability and the right to oversee and control the work delivered by the "servant" or the "employee", respectively. According to Coase (1937), however, there might be cases where the latter parties have to make decisions that are difficult for the former parties to oversee or/and control. In that sense, there is a potential for agency problems being arisen. Further, economic studies in the risk-sharing literature such as Wilson (1968) and Arrow (1971) examine the notion of risk-sharing between individuals or groups. In sum, these studies document evidence that the different cooperating parties do not share the same attitude towards risk, thus creating the so-called risk-sharing problem. According to Eisenhardt (1989), agency theory

constitutes an extension of the risk-sharing problem. Evidence of agency relationships has also been documented in the English Common Law as well as the Tort Law since the 14th century (Bowie and Freeman, 1992). In that sense, while the theoretical development and application of agency theory within the academic cycles could be considered as being a relatively new concept, its notion and practical application have been prevalent for a long time before (Eisenhardt, 1989; Shankman, 1999)[25].

3.3 Agency Theory, Information Asymmetry, and the Agency Problem

The agency relationship lies at the core of agency theory. Agency theory examines the relationship between two interrelated parties, namely the principal and the agent. The former party (i.e., the principal) delegates power to the latter party (i.e., the agent) to act on behalf of and take decisions in the best interest of the former party. A contract between these two parties constitutes the underpinning mechanism through which such a relationship is articulated. In addition, agency theory has been developed along two streams, namely the positivist and the principal-agent (Jensen, 1983). The positivist stream focuses on the identification of scenarios under which the principal and the agent might have conflicting interests and the examination of monitoring mechanisms that could detain the agent's self-interest behavior, while the principal-agent stream focuses on the generalizability and applicability of the agency theory and involves different assumptions and mathematical proofs (Eisenhardt, 1989).

More specifically, agency theory is concerned with addressing two potential issues which could arise within such an agency relationship (Eisenhardt, 1989). The first issue is derived from the economic utilitarianism context that governs the agency relationship, under which each individual/party is considered to be a utility maximiser (Ross, 1973). In other words, agents might not always act in the best interest of the principal, as originally appointed; rather they might seek to maximise their own utility, at the expense of the principal (Jensen and Meckling, 1976; Shleifer and Vishny, 1997; Miller, 2002). The differing interests of agents could be motivated by several factors such as compensation rewards, labour market opportunities and development of relationships with other parties other than the principal (ICAEW, 2005). The second issue is related to the principal's

[25] Agency theory has been utilised as theoretical framework in many academic fields such as accounting (e.g., Demski and Feltham, 1978; Watts and Zimmerman, 1983; Ronen and Balachandran, 1995); finance (e.g., Fama, 1980; Fama and Jensen, 1983) , marketing (e.g., Basu et al., 1985; Bergen et al., 1992); sociology (e.g., Adams, 1996), political science (e.g., Weingast and Moran, 1983; Hammond and Knott, 1996); and organizational behavior (e.g., Eisenhardt, 1985;1988; Kosnik and Bittenhausen, 1992).

inherent remoteness from the agent's actual actions. In that sense, the principal might not always be in the position to verify and control agent's actions and decisions, thus resulting in asymmetric information possession between the two parties (Elbadry et al., 2015). These two conditions, namely the potential conflicting interests and the asymmetry of information among the two interrelated parties, are known as the agency issue/problem (Shankman, 1999; ICAEW, 2005; Wagenhofer, 2015).

The most common example of the afore-mentioned agency relationship can be observed, within a corporate context, between the shareholders (principal) and the management (agent) of the firm (principal-agent)[26]. Management's appointment by shareholders is based on the grounds that the former will act in the best interest of the latter. That is, management as an agent is expected to make decisions and act towards the maximization of firm's wealth, which is considered to be shareholders' main goal (Quinn and Jones, 1995). Yet, management may not share the same motives with the firm's owners (ICAEW, 2005), thus acting towards its own utility maximization. Manipulation, misrepresentation and obfuscation of firm's financial reports, deliberate avoidance of optimal investment choices or even embezzlement of firm's resources constitute a few examples of the "self-interest" and opportunistic managerial activities that can take place within a corporate organization (Dye, 2008). Such opportunistic behaviors can be further exaggerated due to the different levels of information possessed by the two parties (i.e., asymmetric information). To elaborate further, the fact that management (i.e., insiders) is placed within the firm provides it with the opportunity to hold a continuous flow of information (e.g., firm's future economic performance, business-related risks, and overall outlook). On the contrary, remoted shareholders (i.e., outsiders) obtain information only periodically (e.g., annual general meetings, financial statement releases etc.). In that sense, management has a direct information advantage which could potentially be used at the expense of the remoted shareholders[27]. According to prior literature (e.g., Barth et al., 1998; Tasker, 1998; Aboody and Lev, 2000), the issue of asymmetric information is reported to be more prevalent on firms with higher research and development (R&D) intensity due to the inherent difficulty of measuring and identifying the value and productivity of the R&D. Moreover, information asymmetry problems are reported to be

[26] While the scope of the current study lies within the principal-agent relationship/problem, there are other forms of agency relationships/problems that might exist within a corporate context. For instance, an agency relationship/problem could occur among major (controlling) and minor (non-controlling) shareholders (Shleifer and Vishny, 1997; Gilson and Gordon, 2003) or between shareholders and creditors (Peek et al., 2010).

[27] The asymmetric information problem between two parties is known as the "lemons" problem (see Akerlof, 1970).

more evident for non-public and smaller firms since they are not required to disclose firm-related information publicly (Butler et al., 2007).

3.3 The Agency Costs to Mitigate the Agency Problem

Management is responsible for the preparation and presentation of firm's financial statement reports. As mentioned earlier, however, the conflicting interests and information asymmetries between shareholders and management might result in concerns regarding the reliability of the information included in the financial statement reports. Hence, shareholders may employ several issues. The sum of all the expenditures incurred for addressing an agency problem (i.e., monitoring/bonding costs) along with any reduction in firm's wealth due to that agency problem (i.e., residual loss) are known as agency costs (Jensen and Meckling, 1976; Williamson, 1988; Hill and Jones, 1992).

3.3.1 The Classic Agency Theory Model

As discussed above, the classic agency theory model focuses exclusively on the agency relationship that arises between the owner(s) of the firm and its management. In addition, it acknowledges that the agency problem is mainly initiated by and attributed to the opportunistic incentives of the management. Under the classic agency theory model, the engagement of an external auditor constitutes an important agency cost towards preventing the inherent opportunistic behaviour of management and alleviating information asymmetries between the two parties[28]. The main assumption which drives such an expectation lies in the premise that the external auditor is considered to be independent of and free from conflicts of interest with firm's management and ownership (Culpan and Trussel, 2005). In that sense, it is the proposition that auditor's independence -the *raison d'etre* of the auditing profession- remains uncompromisable that makes the existence of auditors valuable to the business community (Lavin, 1977). Under this rationale, the engagement of an external auditor could reduce firm's agency costs (Watts and

[28] There are several other important monitoring/bonding mechanisms that principals could employ to address the agency problem. For example, managerial stock ownership increases management's affiliation to the firm, and therefore the interests between the two parties could be in a better alignment (Jensen and Meckling, 1976). Another important agency cost is related to management's compensation incentives. As noted by Core et al. (1999), performance-based executive compensation could stimulate management to focus on firm's better performance, thus maximizing owner's wealth. According to Frierman and Viswanath (1994), a higher level of debt financing could also serve as a discipling mechanism over management's opportunistic behavior. Furthermore, the appointment of outside and independent directors in the boardroom could enhance the monitoring of management's actions, hence reducing any potential interests' diversion (Crutchley and Hansen, 1989; Rosenstein and Wyatt, 1990). In addition, dividend payout policies could help alleviate agency conflicts between management and owners (Park, 2009). Finally, a more concentrated ownership could also serve as a monitoring mechanism over management's actions and decisions (Burkart et al., 1997).

Zimmerman, 1983) and enhance the credibility and accuracy of the information included in firm's financial reports (Skerratt, 1982). In turn, the external auditing services and choices could yield positive capital market reactions since audited financial information is perceived to be more credible by capital market participants. With respect to the context of the current thesis, few studies within the common audit literature provide evidence that the existence of common auditors could detain the opportunistic behaviour of management as well as decrease the asymmetry of information (e.g., Johnstone et al., 2014; Cai et al., 2016; Chircop et al., 2018).

3.3.2 An Alternative to the Classic Agency Theory Model

As mentioned earlier, one of the main assumptions that governs the classic agency theory model dictates that the external auditor is considered to be an independent monitoring mechanism with no "self-interest" behavior. In practice, however, such an assumption is rather limited, and therefore several academics have criticized the classic agency theory for being too narrow (Wright et al., 2001). The focal point of this critique lies in the fact that the classic agency theory model does not recognise the external auditor as another economic agent within the agency equation. The seminal work of Antle (1982, 1984) provides the first theoretical framework (auditor-management-owner agency model) within which the external auditor is viewed as an economic agent of the principal. Under the modified agency model proposed by Antle (1982, 1984), auditors, like other agents, are expected to be utility maximisers as well as to have their own interests and incentives.

Drawing upon this agency model perception, Ballwieser (1987) argue that the fact that auditors are appointed to monitor the actions of those people who are hiring them (i.e., management) provides the latter party with economic power over the monitor process which potentially could result in impairment of auditor's independence. For example, Ballwieser (1987, p.329) states: *"Though an auditor may be very valuable to an owner, it would be rather myopic not to be aware of the problems which the auditor can also create. Why should it be obvious that he should act on behalf of the owner if the interests of both are not identical?".* Following the same argument, Beattie et al. (2004, pp.3) point out the fact that audited financial reports are the product of the interactions among auditors and firm's management and highlight that such interactions *"may lead to negotiation and bargaining".*

Accounting bodies have also recognised the implicit contradiction that emerges within an agency relationship between external auditors (monitor agents) and management (agents) which prevents the former from being, totally, independent. Specifically, the ICAEW report (2005, p.8) states *"the appointment of expert auditors generates a further agency relationship which in turn impacts on trust and creates new issues relating to their independence."* As regards the context of the current thesis, there are several studies within the common audit literature that provide evidence that the existence of common auditors could facilitate the opportunistic behaviour of auditors by accommodating the needs of clients when serving both interrelated parties (e.g., Dhaliwal et al., 2016b; Chang et al., 2019; Sun et al., 2020; Chen et al., 2020; Hope et al., 2022).

3.4 Conclusion

Drawing upon the two competing theoretical views regarding the role of external auditors, this chapter provides the theoretical foundations that underpin the hypotheses development of the two empirical studies of the current thesis. Under the classic agency theory model, external auditors are viewed as monitoring mechanisms that are appointed to protect the interests of the firm's shareholders/creditors and other stakeholders against potential opportunistic behaviour of management. As such, audited financial information are viewed by capital market participants as more accurate and credible, and therefore a lower cost of equity and debt capital is required. Alternatively, external auditors are expected to be utility maximisers as well as to serve their own interests and economic incentives. As such, the information included in the published financial reports of the auditee firms could be perceived as being of lower accuracy and credibility, and therefore a higher cost of equity and debt capital might be required. Thus far, the evidence documented in the common auditor literature, supports both arguments regarding the role of common auditors in different settings. The next chapter provides a thorough literature review that explains the setting of supply chain and the risks/benefits associated with the supplier firm. Further, it continues with the emphasis that capital market participants place on such a setting while also document empirical evidence of the broader impact that auditors and auditing services have for capital markets. Lastly, it provides an extensive literature review of the existing common auditor literature which identifies the gap that the current thesis attempts to address.

Chapter 4: Literature Review and Hypotheses Development

4.1 Introduction

This chapter provides a comprehensive review of academic research related to the topic of the current thesis. The review is organised around three main streams of literature, namely customer concentration within the supply chain, the capital market effects of auditor-specific characteristics and client-auditor contracting features and the role of the common auditor. In brief, customer concentration studies highlight a series of business and operational risks that supplier firms face due to their increased exposure to few large customers. Also, common auditor literature provides evidence of two diametrically opposite views of common auditors' corporate behaviours. The last section of the literature review highlights the direct effect of auditing services and auditor-specific characteristics/relationships on capital markets' perceptions. Collectively, the synthesis of the aforementioned identifies a research gap within the existing literature which the current thesis aims to fill. Finally, the last section sets out the research questions and presents the hypotheses development.

4.2 Customer Concentration

Supply chain management practices such as cooperative relationships and partnerships of strategic importance or lengthier contractual agreements and supply chain optimization have been widely established within the modern economy over the last decades (e.g., Spekman, 1988; O'Neal 1989; Anderson and Jap, 2005; Choi and Krause, 2006; Ogden, 2006; Kim, 2017; Krishnan et al., 2019). As a result, firms have limited their corporate exposure to numerous exchange partners by establishing supply chain relationships with a select few[29]. Traditionally, supplier firms that seek to ensure and strengthen the status of such preferred partnerships often exhibit higher customer concentration bases. Specifically, customer concentration is defined as the degree of reliance of a supplier firm's sales on a small set of customer firms, known as major or principal customers. Indisputably, customer concentration figures have increased rapidly over the past decades. For example, Gosman and Kelly (1999) report an increase of approximately 60 percent for U.S. supplier firms within the retail industry between 1989 and 1997. Extant literature, also, report that

[29] Within the supply chain nexus, firms can either take the role of the supplier (seller) or the customer (buyer). In that sense, supply chain relationships are conceptualized as a form of a linear dyadic relationship between supply chain partners.

nearly 45 percent of U.S. public firms rely at least on one major customer, and approximately 33 percent of U.S. manufacturing firms report a considerable portion of sales on a few major customers only (Ellis, et al., 2012; Campello and Gao, 2017).

Considering that supply chain relationships hold a prominent role in the modern economy, a large body of literature investigates the effect of customer concentration among supply chain partners (i.e., supplier firms and their major customers)[30]. Extant accounting, finance and operational management literature adopts different perspectives or settings, and while most of the studies highlight different negative effects that customer concentration could incur on supplier firms, some other studies suggest that it could also provide supplier firms with several benefits. The following sections (4.2.1 and 4.2.2) provide a thorough discussion of extant literature that examines such benefits and costs for the supplier firms.

4.2.1 Customer Concentration: Benefits for the Supplier Firms

Many studies have argued in favour of supplier firms serving a few large customers. This stream of research documents evidence that the establishment of a concentrated customer base yields significant benefits for such firms. First, supplier firms with major customers can exploit their supply chain partners as a means of "acknowledgment" of their high-standard services provided. In that sense, prestigious major customers can provide a signalling effect in the market for the quality of the services provided by the attached suppliers. Jackson (1985) and Weitz et al. (1992), for example, argue that supplier firms might be able to benefit from the reputation and brand name associated with their major customers by using them as showcase accounts to attract new customers. Consistent with the view of the signalling effect, more recent studies argue that the suppliers might benefit from the existence of major customers since the latter can act as certifying entities for external stakeholders. For example, Johnson et al. (2010), using a sample of 1,429 firms with Initial Public Offerings (IPOs) over the period 1975-2005, find that supplier firms with major customers enjoy higher IPO valuations. Similarly, Albuquerque et al. (2014) employing 12,771 firm-year observations during the period 1992-2006, they show that supplier firms with a more concentrated customer base tend to rely less on equity-based incentive compensation. Albuquerque et al. (2014) attribute their findings to the fact that

[30] Given that customer concentration refers to the supplier's reliance on the few big customers, prior literature examines its effect from the supplier's perspective.

major customers- that act as certifying entities - engage in better monitoring of the supplier's CEO.

Second, supplier firms with high customer concentration could enjoy significantly reduced operating costs such as marketing and administrative expenses and achieve more efficient product distribution. Specifically, Cowley (1988) uses a sample of 828 business units over the period 1973-1976 and finds that supplier firms which serve a few major customers exhibit, on average, lower advertising and selling expenditures compared to supplier firms with no major customers. Similarly, Kalwani and Narayandas (1995) employ a sample of 114 U.S. manufacturing supplier firms during the period 1986-1991 and find that supplier firms that involve in long-term relationships with their major customers achieve several operational benefits such as decreased service costs, better cross-selling opportunities, higher levels of repeated transactions and increased effectiveness of selling expenditures which, in turn, result in lower selling, general and administrative costs.

Third, supplier firms with higher concentrated customer bases are more likely to attain improvements in their working capital management, since supply chain relationships can foster greater information sharing flow and enhanced product coordination among the supply chain partners. Inevitably, a higher level of product coordination could lead to less product distribution distortions that are common along the supply chain (e.g., bullwhip effect), lower redesign costs and mitigation of delays in the product development[31]. Along these lines, prior literature document evidence of enhanced inventory management. Kalwani and Narayandas (1995) find that supplier firms that involve in long-term relationships with their major customers exhibit lower inventory holding and control costs. Using a small sample of 201 U.S. manufacturing firms over the period 1982-1993, Kinney and Wempe (2002) document inventory benefits such as reduced coordination costs in ordering, production, scheduling and delivery for supplier firms that adopted a just-in-time (JIT) approach with their major customers. According to Balakrishnan et al. (1996), such JIT-related benefits derive from major customers' incentives. That is, major customers

[31] The bullwhip effect constitutes a distribution channel phenomenon which generates inefficiencies along the supply chain. Put it simply, the bullwhip effect occurs when customer's orders to supplier are disproportionally higher compared to their sales (Lee et al., 1997).

usually urge for the engagement in JIT manufacturing which would help their dependent suppliers to reduce their inventory levels[32].

More recently, Patatoukas (2012), also, documents evidence consistent with the inventory efficiency notion. Employing a large sample of 25,389 U.S. firm-year observations over the period 1977-2006, the author finds that suppliers with a more concentrated customer base not only tend to maintain a lower amount of assets in their inventories, but also, they experience inventory efficiencies in the form of higher turnover rates of current and non-current assets and shorter cash conversion cycles. Additionally, Patatoukas (2012) documents evidence of increased profitability for supplier firms with a more concentrated customer base, due to such efficiency and asset utilization gains[33]. Consistent with the aforementioned contention, Ak and Patatoukas (2016) document a positive association between customer concentration and inventory efficiencies for a sample of 15,084 U.S. firm-year observations between 1977 and 2006[34]. Particularly, they find that firms with higher customer concentration levels enjoy inventory benefits in the form of reduced amount of inventory assets and shorter periods that those assets are held. Further, Ak and Patatoukas (2016) observe that such firms tend to exhibit a lower likelihood of inventory reversals or write-downs (i.e., lower likelihood of excess inventories).

Fourth, supplier firms with major customers could also enjoy benefits that arise from the inherent incentives of their direct supply chain partners to mitigate distortions and interruptions in the supply chain process. For instance, major customers might agree to higher prices, establish longer relationships or provide financial support for supplier firms that are deemed important to them (Swinney and Netessine, 2009; White, 2005). Fee et al. (2006) document evidence consistent with this line of reasoning. Using a sample of 10,000 supplier-customer pairs over the period 1988-2001, they find that major customers can take actions such as committing to equity investments and forming strategic alliances to "safeguard" their supply chain when the supplier firm is financially constrained.

[32] Under JIT manufacturing approach, supplier firms minimize the risk of excessive inventories by producing only a small number of orders and only after those orders have been confirmed by the corresponding customers. In that sense, JIT manufacturing approach provides an advantage over the traditional push approach where inventories are piled up if they are not used or products not been sold. Thus, JIT manufacturing approach reduces the unnecessary inventory levels and enhances inventory turns (Huson and Nanda, 1995; Fullerton et al. 2003).

[33] According to Irvine et al. (2016), the association between customer concentration levels and return on assets is non-linear. The positive association can only be observed for firms with longer supplier-customer relationships.

[34] The sample in Ak and Patatoukas (2016) is based on the sample employed by Patatoukas (2012), with the focus being on the manufacturing sector.

4.2.2 Customer Concentration: Risks and Costs for the Supplier Firms

While customer concentration might be associated with several operational and inter-organizational benefits, relying heavily on a small set of major customers for a sizable portion of revenues, arguably, involves a high degree of business risk for the supplier firms. This contention has been long recognised by regulators and accounting standard setters. That is, supplier firms are required to disclose information about their major customers since such an exposure constitutes a significant business risk.

Disclosure requirements about the reliance of supplier firms on their major customers were initially introduced by the FASB in 1976, under the Statement of Financial Accounting Standards No. 14 (SFAS 14), *Financial Reporting for Segments of a Business Enterprise*. More specifically, paragraph 39 of SFAS 14 (*Information about Major Customers*) states that "*if 10 percent or more of the revenue of an enterprise is derived from sales to any single customer, that fact and the amount of revenue from each such customer shall be disclosed*." (FASB, 1976; p. 15). SFAS 14 was superseded by SFAS 30 in 1979, however that supersedure did not affect the disclosure requirement for enterprise major customers; rather it was related to amendments about governmental customers as stipulated in the second part of paragraph 39 of SFAS 14 (FASB, 1979)[35]. In 1997, SFAS 30, eventually, was superseded by SFAS 131, *Disclosures about Segments of an Enterprise and Related Information*. As previously, the supersedure did not affect the core notion of disclosure requirement for enterprise major customers; rather it was related to wording amendments. Specifically, paragraph 39 of SFAS 131 reiterates that *"if revenues from transactions with a single external customer amount to 10 percent or more of an enterprise's revenues, the enterprise shall disclose that fact, the total amount of revenues from each such customer, and the identity of the segment or segments reporting the revenues"* (FASB, 1997; p. 15). Other than the FASB, similar disclosure requirements are set by the SEC under Regulation S-K. Particularly, paragraph (c, vii) of Item 101 requires that *"the name of any customer and its relationship, if any, with the registrant or its subsidiaries shall be disclosed if sales to the customer by one or more segments are made*

[35] As per SFAS 30 summary (FASB, 1979; pp. 4), *"Paragraph 39 of FASB Statement No. 14, "Financial Reporting for Segments of a Business Enterprise," requires disclosure of the amount of revenue derived from sales to domestic governmental agencies in the aggregate or to foreign governments in the aggregate when those revenues are 10 percent or more of the enterprise's revenues. The Board was requested to consider the usefulness of disclosing aggregate amounts and concluded that such disclosure has limited general usefulness and should not be required. Therefore, this Statement amends that paragraph to require disclosure of the amount of sales to an individual domestic government or foreign government when those revenues are 10 percent or more of the enterprise's revenues. Consequently, disclosure of sales to a governmental customer is now the same as disclosure of sales to any other customer."*

in an aggregate amount equal to 10 percent or more of the registrant's consolidated revenues and the loss of such customer would have a material adverse effect on the registrant and its subsidiaries as a whole"[36]. To illustrate such disclosures, consider the following example:

> "*Our customer base is concentrated, with our top ten customers accounting for 45.8%, 45.5% and 45.4% of our net sales in fiscal 2010, 2009 and 2008, respectively. In fiscal 2010, 2009 and 2008, AT&T accounted for approximately 25.9%, 20.5%, and 18.3% of our net sales, respectively. Verizon accounted for 12.6%, 17.8% and 17.9% of our net sales in fiscal 2010, 2009 and 2008, respectively. If a significant customer slows-down, delays, or completes a large project or if we lose a significant customer for any reason, including consolidation among our major customers, our sales and operating results will be impacted negatively. Also, in the case of products for which we believe potential revenue growth is the greatest, our sales remain highly concentrated with the major communications service providers. The loss of sales due to a decrease in orders from a key customer could require us to exit a particular business or product line or record related impairment or restructuring charges*." (*Extract from the 2010 Annual report of the ADC Telecommunications, Inc*).

While regulatory bodies and accounting standard setters recognise the existence of significant business risks associated with higher customer concentrated bases, they do not delve into the mechanisms through which such risks can arise across the supply chain relationship. On the contrary, a large body of academic literature along with several anecdotal evidence shed some light on this matter. By and large, suppliers' risks associated with customer concentration can be distinguished into four main categories.

First, supplier firms are generally smaller in size and younger in age than their major customers (Gosman and Kohlbeck, 2009; Chen et al., 2014; Cen et al., 2017). Inevitably, such a relationship provides major customers with an advantageous bargaining power over the terms of the trade, thus positioning supplier firms in a situation of inferiority[37]. For

[36] Similar regulatory disclosures have been required in China as well. Specifically, China Securities Regulatory Commission (CSRC) requires, since 2007, publicly traded firms to disclose the name and the percentage of sales for the top five customers (Song and Wang, 2019).

[37] The notion of relative bargaining power of major customers over suppliers has long been established in the field of economics. For example, Galbraith (1952) claims that an important strategy for major customers, in the game of bargaining power, is to keep their suppliers in a state of uncertainty as regards to their intentions. Scherer (1970), also, argues that suppliers with high customer concentrations are vulnerable to major losses, and therefore the threat or even the fear that would lose a major customer provides major customers with a powerful bargaining power over the terms of trade and transaction prices. In a similar spirit, Porter (1974) suggests that seller's (i.e., supplier's) rate of return is always expected to be bargained down, whenever buyer's (i.e., customer's) power is high.

example, major customers typically demand products to be manufactured under specific requirements (e.g., customization or upgrade of the standard manufacturing procedures, unique assets or design specifications, extending workforce training). To fulfil such specific standards and requirements, the supplier firm is often compelled to commit extensively in relationship-specific investments (RSI) (Cannon and Homburg, 2001; Kang et al., 2009; Zhang et al., 2020). RSI are non-recoverable investments that a firm undertakes in order to facilitate and enhance a specific business interrelated relationship with another firm (Williamson, 1985). However, such types of investments have limited, or most of the times no usage outside of that relationship since they cannot be redeployed (and if a firm is able to redeploy, then it comes at a high productivity discount) to alternative projects with other business partners once the specific relationship comes to an end (Klein et al., 1978). In addition, major customers' bargaining power advantage could also lead supplier firms to accept delays in the predetermined payback period on the agreed trade credit (Klapper et al., 2012; Murfin and Njoroge 2014; Peng et al., 2019). The following extract from the 2002 annual report of the Universal Forest Products Inc. (supplier firm) indicates the bargaining power of Home Depot (major customer) on the extension of the payment period:

> *"In recent sales negotiations with The Home Depot, we agreed to extend our payment terms by an additional 15 days. We expect this will increase our average accounts receivables by $20 million in 2002 ($35 million increase at our seasonal peak and $10 million increase at the low point). Our intention is to compensate for most of this increase through a combination of consigned inventory programs with vendors and other strategies for reducing working capital".*

Further, the advantageous position of major customers is, also, reflected through the extensive use of borrowing via trade credit. For example, Wal-Mart that serves as a major customer for many supplier firms tend to borrow more extensively via trade credit than raising capital in the private or public debt markets (Murfin and Njoroge, 2014). Inevitably, such trade credit compromises can exacerbate the cash flow risks of the supplier firm (Gosman and Kohlbeck, 2009; Murfin and Njoroge 2014; Kim and Henderson, 2015). Another important effect that is related with the higher bargaining power is that major customers could also force supplier firms to accept lower than the agreed transaction prices (i.e., price concessions) for the manufactured products provided,

thus leaving the latter party with significantly diminished gross margins[38]. Kelly and Gosman (2000), for example, documents a negative and significant association between customer concentration and the gross profit margin for 218 supplier firms between 1993 and 1997. Similar findings are also documented by Kim's et al. (2017) study that utilises return on assets as a measurement of supplier's profitability. Examining 717 supplier-major customers pairs over the period 2011-2012, Kim et al. (2017) finds that higher customer concentration is negatively associated with supplier's return on assets. More recently, Hui et al. (2019) utilising a large sample of 73, 856 supplier-major customer firm level observations over the period 1977-2013, they document evidence consistent with the aforementioned line of studies. Specifically, they show that supplier firms with higher level of reliance on few major customers exhibit on average lower profitability, while major customers within such relationships enjoy higher profitability[39,40]. Empirical findings are consistent with anecdotal evidence as well.

Effectively, the asymmetric bargaining power of major customers over their suppliers that results in squeezed supplier profits, could, in turn, lead to termination of the supply chain relationship, and drive the supplier into financial distress and bankruptcy. A case in point is the termination of the relationship between the battery maker Exide Technologies (supplier firm) and Wal-Mart Stores Incorporation (major customer firm). Specifically, the battery producer lost Wal-Mart from its major customer due to the fact that the former could not afford the significant pricing pressures exerted by the latter, thus leading Wal-Mart to switch into another supplier firm. Wal-Mart's loss from major customer cost $160 million in annual income for the battery maker and led Exide Technologies to file for Chapter 11 bankruptcy in 2013 (Reuters, 2013).

[38] Early empirical research within the industrial organisation literature document evidence of a negative association between industry level customer concentration and supplier profits (e.g., Lustgarten 1975; McGuckin and Chen 1976; Clevenger and Campbell 1977; Schumacher 1991; Snyder, 1996).

[39] As can be noticed, the evidence documented within this stream of literature contradicts the evidence reported by Patatoukas (2012). According to Hui et al. (2012), the positive association between supplier profitability and customer concentration in Patatoukas (2012) is driven by research design bias. That is, Patatoukas (2012) excludes from the sample selection firms with negative operating margins following the study of Fairfield and Yohn (2001). However, profitability is an independent variable in the Fairfield and Yohn's (2001), while it is a dependent variable in Patatoukas (2012). Therefore, Hui et al. (2019) conclude that by removing non-profitable firms from the sample, Patatoukas (2012) introduces sample truncation bias.

[40] Anecdotal evidence, also, supports the empirical findings that the asymmetric bargaining power of major customers over their suppliers that results in squeezed supplier profits. Gene Munster, a supply-chain analyst at Loup Ventures parallelize the state of being Apple's supplier as players in a "*Russian roulette*". *"It's the classic deal with the devil. You know that you are going to pay a price for it, whether it is getting left behind completely or squeezed on your profits."* (FT, 2017). For similar anecdotal evidence see also: "Apple squeeze parts suppliers to protect margins" (WSJ, 2016), "Big manufacturers tighten supply chain as low growth forecasts spread" (WSJ, 2015), and "UnitedHealth, Anthem seek to buy smaller rivals" (WSJ, 2015).

Second, supplier firms face the risk of losing a major customer if the latter decides to switch to a different supplier. Arguably, losing a major customer could incur significant losses in terms of future cash flows and sales. Anecdotal evidence supports this notion as well. For instance, Wal-Mart which was serving as a major customer for Lovable Garments, terminated the supply chain relationship with the then leading women's innerwear producer, in the 1990s, because Wal-Mart decided to switch to another supplier. This business interruption resulted in significant losses for Lovable Garments which ended up filing for Chapter 11 bankruptcy (ABC, 1998). Similarly, PortalPlayer, a manufacturer of audio technology for Apple, lost half of its value overnight and eventually was acquired by Nvidia in 2006. This was the result of Apple (its major customer) switching to another supplier few months earlier (FT, 2017)[41]. Investment and accounting-related practices of supplier firms with a high customer concentration base might also reflect the concern of supplier firms losing major customers. For example, Zhang et al. (2020) using a large sample of 33,121 firm-year observations over the period 1980-2018 find that suppliers with higher reliance over their major customers tend to over-invest and exceed the optimal investment level. Furthermore, Raman and Shahrur (2008) employing a sample of 96,302 firm-year observations during the period 1984-2003, find that firms within a supply chain relationship are associated with higher levels of discretionary accruals. The authors attribute their findings in the inherent need of such firms to present a more favourable picture in order to influence the perceptions of their corresponding partners and continue to enjoy the benefits arising from such business relationships. In a similar spirit, Cen et al. (2018) documents evidence of strategic disclosure patterns for supplier firms with high level of reliance on major customers. Focusing on 630 material litigation cases and 1,567 immaterial litigation cases over the period 1994-2012, they find that dependent suppliers tend to delay (accelerate) bad (good) news related to litigation outcomes. Consistent with Raman and Shahrur (2008), Cen et al. (2018) also claim that such strategic disclosure practices are driven by the potential negative effect of bad news disclosure which could arguably lead to the termination of the supply chain relationship.

Third, supplier firms bear the risk that their major customers might decide to intensify their research and development (R&D) and start developing products in-house, rather than

[41] To an extent, supplier firms can mitigate the risk that a major customer might switch to a different supplier by signing explicit contracts which bind a number of specific sales and the duration of the relationship with that major customer. In practice, however, prior research shows that supplier firms rarely write such contracts (e.g., Costello, 2013). This is consistent with the fact that writing explicit contracts which cover all possible contingencies incur significantly high costs for supplier firms (Bowen et al., 1995; Shleifer and Summers, 1988).

buying directly from them. The reasons behind a "make rather than buy" decision lies in the fact that the major customers might seek to: (i) develop a more direct and structured source of supplies; (ii) improve control and time management over the supplies; and (iii) protect proprietary information leakages. In that sense, major customers that opt to develop in-house products usually terminate their relationship with their existing suppliers since they have automatically become competitors in the same market. For instance, prior literature provides evidence that major customers that intensify their R&D activities are more likely to end the relationship with their suppliers (e.g., Fee et al., 2006; Raman and Shahrur 2008). The case of Brothers Gourmet Coffees Incorporation, a leading wholesale distributor of coffee products constitutes a practice anecdote of such an effect. In 2000, Procter & Gamble which was serving as the largest customer for the Brothers Gourmet Coffees Inc., decided to develop products in-house and consequently terminated its contract with Brothers Gourmet Coffees Inc. This decision resulted in a rapid decrease in the production of the firm, from 9 million pounds of coffee to just 300,000 pounds of coffee a year, and essentially signalled the economic calamity for the wholesale coffee distributor (HBJ, 2000).

Lastly, supplier firms are exposed to significant business risk in the case where their major customers become either financially distressed, default or file for bankruptcy. Anecdotal evidence provides support to this notion as well. For instance, Super Shops, an auto performance retailer, was one of the largest customers of a big manufacturer of vehicle wheels and wheel accessories, Cragar Industries. As per Cragar Industries' financial statements, Super Shops accounted for 28% of Cragar Industries' sales in 1996. During the next year, Super Shops went into financial distress and eventually filed for Chapter 11 bankruptcy. This had dramatic economic consequences for the dependent supplier. Specifically, Cragar Industries' gross profit and net sales were 35% down within one year. That is, a net profit of over $300,000 in 1997 turned into a significant loss of approximately $1 million in 1998 for the Phoenix-based wheel manufacturer (Gosman and Kelly, 1999). Another case in point is when General Motors (GM) and Chrysler declared bankruptcy in 2009. After the demise of the two U.S. leading carmakers, over forty auto-part suppliers whose sales were heavily dependent upon GM and Chrysler filed for bankruptcy as well. The U.S. Treasury Department provided them with the financial

support of $5 billion through the Troubled Asset Relief Program (TARP) in order to avoid financial collapse (TM, 2008)[42].

4.2.3 Precautionary Measures by the Supplier Firms

Considering the aforementioned risks, supplier firms become concerned about losing important customers, and therefore they establish "precautionary measures" which shape the firm's behaviour (Wang and Mao 2021). For example, Banerjee et al. (2008) investigate whether a higher degree of reliance on large customers could affect supplier's capital structure choices. Using a sample of over 20,000 supplier-year observations during the period 1979-1997, they find that supplier firms with high dependence on few large customers tend to maintain lower financial leverage. According to Banerjee et al. (2008), a possible explanation that drives such an association lies in the fact that supplier firms try to hedge themselves against considerable financial losses that could arise from losing major customers[43]. Focusing on another aspect of a supplier's financial policy, Itzkowitz (2013) examines whether customer concentration affects the supplier's cash holding policy. Using a large sample of 62,463 U.S. manufacturing firms over the period 1976-2006, they find that supplier firms with higher customer concentration base tend to hold, on average, more cash. Itzkowitz (2013) concludes that supplier firms are motivated to hold additional cash as a precautionary measure against the risk of future uncertainty by being exposed in few large customers. Bae and Wang (2015) also examine the effect of customer concentration on supplier's cash holding. Employing an alternative measure to capture customer concentration and using all U.S. non-financial public firms (rather than focusing only on firms within the manufacturing sector), they document evidence consistent with that of Itzkowitz (2013), thus confirming the positive relationship between customer concentration and cash holdings. Collectively, the findings from these two studies suggest that

[42] It should be noted that the abovementioned risks apply to supplier firms with major corporate customers. Extant literature suggest that such supplier's risks are mitigated when government serves as a major customer. For instance, government customers are less likely to declare bankruptcy or default their payment obligations (Dhaliwal et al., 2016a). In addition, government customers are less likely to switch to another supplier or dramatically decrease the magnitude of their future orders since government purchases are usually regulated by the existence of legal contracts that bind them within such a relationship for a long-term horizon (Goldman et al., 2013; Samuels, 2018). Also, governments, unlike corporations, are less driven by profit-maximization incentives (Mills et al., 2013). Consistent with this line of argument, Cohen and Li (2020) find that supplier firms contracting with government as major customers experience, on average, higher profitability and lower demand uncertainty than those contracting with corporate customers.

[43] Similar evidence is reported by Kale and Shahrur (2007). However, Kale and Shahrur (2007) provide an alternative explanation which is based on the theoretical work of Titman (1984) and Maksimovic and Titman (1991). That is, supplier firms might decide to remain low levered in order to induce their supply chain partners to commit further within the supply chain relationship (e.g., undertake more RSI).

maintaining more cash serves as a precautionary financial firm policy to offset potential risks that might arise within the supply chain relationship.

Further, Wang (2012) examines whether supplier's dividend pay-out policy is affected by customer concentration. Using a sample of 94,651 firm-year observations for non-financial U.S. firms over the period 1981-2006, Wang (2012) finds that shareholders of supplier firms with higher dependence on major customers tend to receive significantly lower dividend payments. Moreover, Huang et al. (2016) focus on supplier's tax behaviour. Using a sample of 48,386 firm-year observations for non-financial U.S. firms over the period 1988-2011, they show that supplier firms with higher reliance on their major customers tend to engage in more tax avoidance strategies. Extending the study of Huang et al. (2016) within a Chinese context, Wang and Mao (2021) provide similar evidence on the effect of customer concentration over the supplier's tax behaviour. Employing a sample of 9,428 firm-year observations for the period 2003-2015, Wang and Mao (2021) find that suppliers with more concentrated customer base tend to engage in more aggressive tax policies. Another study within this stream of literature focus on the effect of customer concentration on corporate decision-making. Specifically, Cao et al. (2021) using a sample of 4,842 Chinese firm-year observations over the period 2009-2015, document evidence of a negative association between supplier's risk-taking decisions and customer concentration level. Taken together, the engagement in lower dividend distribution policies, tax avoidance strategies and less risky investment decisions arguably constitute "precautionary measures" that supplier firms decide to adopt in order to counterbalance operational and financial risks associated with a higher concentration base.

4.2.4 Customer Concentration Risks and Capital Markets Effects

Besides supplier firms that operate within a supply chain relationship, capital market participants also recognise the operational and financial risks associated with suppliers' higher reliance on few major customers. Extant literature provides evidence that capital market participants protect themselves against those risks by adjusting their valuation and financing costs accordingly. The first strand of this literature focuses on the adverse spill-over capital market effects which are transmitted to supplier firms from their corresponding major customers that experience negative events. Specifically, using a sample of 378 U.S. supplier firms whose major customers filed for Chapter 11 bankruptcy between 1980-2009, Kolay et al. (2016) show that those firms experience considerable losses in their market value. In a similar spirit, Files and Gurun (2018) explore whether the

interest rate of borrowing firms is affected by the financial misreporting of their corresponding economically interrelated firms. Employing a sample of 5,421 U.S. firms over the period 1998-2012, they find that the average loan spread that banks charge supplier firms whose major customers restated their financial statements is 11 basis points higher compared to those with major customers without restated financial statements. Consistent with the aforementioned findings, Agca et al. (2021) document evidence of spill over effects within the Credit Default Swaps (CDS) market. Using a sample of 3,222 U.S. supplier firms, during the period 2003-2014, they show that the cumulative abnormal CDS spread of supplier firms whose major customers experienced an adverse credit event is 63 basis points higher.

The second strand of this literature focuses on the direct effect of supplier's customer concentration within capital markets. Specifically, Dhaliwal et al. (2016a) examine whether supplier firms with a more concentrated customer base experience higher equity and debt financing costs. With respect to equity financing, Dhaliwal et al. (2016a) utilising a sample of 12,652 U.S. supplier firm-year observations over the period 1981-2011 document evidence of a positive association between customer concentration and supplier's cost of equity capital. Similar evidence is reported within the debt-financing context as well. Using a sample 14,789 (7,016) U.S. supplier loan-year (bond-year) observations initiated during 1987-2011 (1981-2011), they report a positive and significant association between customer concentration and the cost of private (public) debt. In a similar spirit, a concurrent study by Campello and Gao (2017) explore the customer concentration effect on bank loan contracting terms. Focusing only on the manufacturing sector and employing a sample of 3,055 supplier loan-year observations over the period 1985-2010, they document evidence consistent with Dhaliwal et al. (2016a). Particularly, Campello and Gao (2017) find that banks tend to charge higher interest rates, impose more restrictive covenants and provide shorter maturity loans on supplier firms with higher customer concentrated base. More recently, Ma et al. (2020) examine the association between customer concentration and supplier's stock price crash risk. Using a large sample of 97,793 U.S. firm-year observations over the period 1984-2017, they show that customer concentration is positively associated with supplier's future stock price crash

risk[44]. Collectively, this evidence supports the notion that capital market participants recognise the significant risk exposure of supplier firms and therefore adjust their valuation and financing costs to capture that risk.

4.3 The Role of Auditor and Auditing Services for Capital Markets

The role of external auditors is to lend credibility and assurance by providing independent verification of the information contained in the financial statements of the auditee firms (e.g., Simunic and Stein, 1987; Slovin et al., 1990; Datar et al., 1991). Arguably, capital market participants, especially investors and creditors, constitute two of the most important groups of recipients and users of audited financial statements. Considering that these two groups rely heavily on the information included in the financial reports for informed investing and lending decisions, their perceptions about auditor's objectivity and fairness are of paramount interest to accounting body regulators and standard setters. For example, Arthur Levitt, a former SEC chairman, highlighted in his keynote speech in 2000: "*The accounting profession must be like Caesar's wife. To be suspected is almost as bad as to be convicted. It is not enough for the auditor on an engagement to be independent; rather, the (investing) public must perceive the accountant as independent…Independence is a covenant between auditor and investor, and no one else; a covenant that says the auditor works in the interests of shareholders, not on behalf of management; a covenant that says the auditor must steer clear of having financial interests in the companies he or she audits; and a covenant that says the auditor's work stands separate and apart from their clients' business. These are the basic principles that have established the foundation of independence for more than six decades."*[45]

From an academic perspective, capital market participants' perceptions have also attracted considerable attention. Unlike studies that adopt a preparer's perspective and

[44] In a concurrent study, Lee et al. (2020), also, examine the impact of customer concentration on supplier's stock price crash risk and document similar findings. It should be noted that when the major customer is a governmental customer, the negative effect of concentration is eliminated (Dhaliwal et al., 2016a; Ma et al., 2020; Lee et al., 2020). This is consistent with the notion that governments, unlike corporate major customers, less driven by profit-maximisation incentives (Mills et al., 2013) and they are less likely to default their payment obligations, switch to another supplier or dramatically decrease the magnitude of their future orders (Dhaliwal et al., 2016a).

[45] In a similar spirit, the U.S. Supreme Court (as cited in the SEC, 2000, p.5) notes that: *"It is not enough that financial statements be accurate; the public must also perceive them as being accurate. Public faith in the reliability of a corporation's financial statements depends upon the public perception of the outside auditor as an independent professional".* The dependence and importance of independent audits for capital markets is also highlighted in the SEC concept release paper about International Accounting Standards states: *"Trustworthy and effective audits are essential to the efficient allocation of resources in a capital market environment, where investors are dependent on reliable information."* (SEC, 2000, p.4).

focus on measures of the so-called "actual output" of the audit process audit, perception-based studies investigate the impact of auditor-specific characteristics and client-auditor contracting features by employing measures such as stock market reaction to unexpected earnings, abnormal returns, cost of equity and cost of debt capital (Boone et al., 2008; DeFond and Zhang, 2014).

4.3.1 Auditor-specific Characteristics

An important strand within this body of literature examines how auditor's size is perceived by capital markets. The underpinning rationale that drives this stream of literature is motivated, mainly, by two closely interrelated theoretical arguments (e.g., DeAngelo, 1981; Dye, 1993). First, larger audit firms (i.e., Big N) have, a larger clientele portfolio, by default. In that sense, such firms are exposed to greater reputation risk costs if they succumb to the demands of an individual client. Second, larger audit firms have more wealth ("deep pockets") at stake[46]. Consequently, audit firms with "deeper pockets" are exposed to higher costs related to litigations and regulatory sanctions if they capitulate to the client's management pressures. Under both arguments, larger audit firms have more to lose, and therefore they are expected to be more independent and provide higher quality of audits.

The seminal work of Teoh and Wong (1993) constitutes the first academic endeavour that examines the effect of auditor size on equity markets. Under the proposition that Big N auditors are associated with higher audit quality, the authors conjecture that investors would respond more strongly to non-anticipated earnings for firms appointing a Big N auditor compared to those hiring a non-Big N auditor since the reported earnings of the former would be perceived as more credible and accurate. To proxy for the perceived credibility of reported earnings, Teoh and Wong (1993) use the stock market's reaction to unexpected earnings (i.e., earnings response coefficient (ERC)). Using a sample of 2,564 U.S firm-year observations over the period 1980-1989, they document a positive and significant association between the auditor size and the magnitude of ERC, thus confirming that investors perceive positively the existence of larger auditors. A more recent study by Khurana and Raman (2004) lends support to the findings of Teoh and Wong (1993) that auditor's reputation could signal more credible financial statements for investors. To capture investors' perceptions, Khurana and Raman (2004) utilise the *ex ante*

[46] Dye (1993) proposes the so called "deep pocket" hypothesis. The author defines the depth of pocket for each audit firm, by measuring the amount of wealth that each audit firm has at the start of the year.

cost of equity capital. Using a large sample of 19,517 non-financial firm-year observations from the U.S, Canada, Australia and the U.K (i.e., Anglo-American countries) over the period 1990-1999, they document a negative and significant association between the brand name and *ex ante* cost of equity capital for the U.S-based firms. However, they fail to identify any significant association with the other Anglo-American countries[47,48]. Evidence beyond the U.S. context also supports the notion of the equity market participants associate Big N auditors with higher perceived audit quality. More specifically, Fan and Wong (2005) employing a broad sample of firms in eight different Asian countries over the period 1994-1996 find that firms appointing a Big N auditor enjoy, on average, smaller reductions in their share prices[49].

Similar to equity market participants, prior literature shows that creditors also perceive auditor's size positively. Mansi et al. (2004) investigate the relationship between auditor size and the cost of debt financing with the focus being on public debt markets. Utilising a large sample of U.S firms over the period 1974-1998, the authors provide evidence of a negative association between Big N auditors and public cost of debt. In a similar spirit, a concurrent study by Pittman and Fortin (2004) reports evidence consistent with that of Mansi et al. (2004). Specifically, the authors obtain debt-related data for 371 non-financial U.S. firms during their early public years (i.e., first 9 years) over the period 1977-1997 and find that firms hiring Big 4 auditors benefit from lower interest rates. Although these two studies differ in their sample and sample period, the main difference lies in the dependent variable employed. That is, Mansi et al. (2004) use market bond prices to approximate debt financing, while Pittman and Fortin (2004) employ the aggregating annual interest rate. In addition to public debt markets, prior literature documents evidence for publicly held firms within the private debt-financing context as well. Utilizing a sample of over 12,000 U.S. bank loan data during the period 1996-2008, Kim et al. (2013) report a significant and negative association between the cost of private debt and auditor size. In particular, the authors find that firms appointing a Big N auditor receive, on average, 23 bps lower interest rates than those employing a non- Big N auditor. Evidence beyond the U.S. context provide consistent findings as well. For example, Karjalainen (2011) employing a sample

[47] Given that the U.S is considered to be more litigious environment relative to that of Canada, Australia and the U.K, Khurana and Raman (2004) conclude that investors' perceptions are driven, mainly, by the litigation risk environment and less by the audit firm's reputation.

[48]In contrast to Khurana and Raman (2004), Azizkhani et al. (2010) report evidence of a negative and significant association between auditor's size and cost of equity capital for the same period within the Australian setting. According to Azizkhani et al. (2010), the conflicting evidence could lie on differences in the sample selection process as well as on the inclusion of further control variables.

[49] The eight East Asian countries employed by Fan and Wang (2005) are: Singapore, Malaysia, Philippines, Hong Kong, South Korea, Indonesia, Thailand and Taiwan.

of 3,890 Finnish private firms with available debt data during the period 1999-2006, they find that firms audited by Big N auditors enjoy significantly lower interest rates compared to those audited by non-Big N auditors. Similarly, Gul et al. (2013) utilising a broader sample of countries provide confirmation of the aforementioned studies. Specifically, using data from 30 countries over the period 1994-2006, they find that firms employing Big 4 auditors are compensated with lower cost of debt capital, with the effect being more prominent in countries with stronger investor protection.

A second important strand within this body of literature examines how auditor's industry specialization is perceived by capital markets. The underpinning rationale that drives this stream of literature lies in the premise that auditors with industry-specific knowledge are more likely to possess a comprehensive understanding of clients' firm characteristics. For example, Gramling and Stone (2001) suggest that industry specialist auditors develop and accumulate industry-specific knowledge as a result of economies-of-knowledge. This expertise-related knowledge, in turn, would limit the opportunistic behaviour of management and eventually result in higher financial reporting quality of the auditee firm. Under this proposition, prior literature investigates whether industry specialization constitutes an audit quality differentiation factor for capital markets.

Evidence within equity markets support the notion that industry specialist auditors are positively perceived by investors. Knechel et al. (2007) examine whether switches from non-specialist to specialist auditors (from specialist to non-specialist auditors) lead to positive (negative) market reactions. Using a sample of U.S firms that switched auditors over the period 2000-2003, they find that firms switching to (from) industry specialist auditors experience positive (negative) abnormal returns. Similar evidence is also reported by the study of Krishnan et al. (2013) that employed the *ex ante* cost of equity capital to proxy for investors' perceptions. Utilising a sample of 12,005 U.S. firm-year observations over the period 2000-2008, Krishnan et al. (2013) document evidence of a significant negative association between industry specialization and cost of equity capital.

Findings within a debt-financing context are in line with evidence documented in equity markets. Focusing on the public debt market, Li et al. (2010) explore the association between industry specialization and the cost of debt capital. Employing a sample of 351 U.S. firm-year observations over the period 2001-2006, they find that firms audited by industry specialist auditors enjoy a significantly lower cost of debt financing, as measured

by bond spreads. Focusing on private debt markets, Zhang et al. (2017) extends the evidence of the impact of auditors' industry specialization within a debt financing context. Using a sample of 25,463 U.S. firm-loan-year observations for the period 2000-2010, they show that firms appointing industry specialist auditors tend to enjoy, on average, lower price loan terms (i.e., loan interest rates) and less stringent non-price loan terms (i.e., fewer covenants and collateral requirements).

In sum, extant literature provides conclusive evidence regarding the effect of auditor-specific characteristics on capital markets. As discussed above, both auditor's size and auditor's industry specialisation are positively perceived by capital market participants within both equity- and debt-financing contexts[50].

4.3.2 Client-Auditor Contracting Features

An important strand within this stream of literature investigates how auditor's remuneration from audit and non-audit services are perceived by capital markets. Conventional wisdom suggests that when the same auditor provides both non-audit and audit services to its client or when auditor's remuneration is excessively large, the economic dependence and bonding of the audit firm over its client increases. This, in turn, could result in an implicit threat of auditor's independence, and consequently of the quality of audits (SEC, 1979; 2000; 2001)[51].

One of the first academic endeavours to investigate the association between non-audit fees and capital market reactions is the study conducted by Frankel et al. (2002). Using a sample of 3,074 non-financial U.S firms and employing abnormal stock returns to proxy for capital market reaction, they document evidence of a significant negative association between abnormal stock returns and non-audit fees[52]. Such findings suggest that investors perceive that auditor's independence is compromised when the auditor provide non-audit

[50] Perception-based evidence is largely consistent with the evidence documented from a preparer's perspective. For auditor's size see for example, Becker et al., 1998; Francis et al., 1999; Kim et al., 2003; Farber, 2005; Geiger and Rama, 2006; Lennox and Pittman, 2010; Boone et al., 2010; Zang, 2012. For auditor's industry specialisation see for example, Owhoso et al., 2002; Balsam et al., 2003; Carcello and Nagy, 2004a; Krishnan, 2005.

[51] For example, Arthur Levitt (2000) noted that *"The audit function is simply being used as a springboard to more lucrative consulting services".* As discussed in Chapter 2, the numerous accounting scandals in the early 2000s led to U.S. regulators to pass the SOX Act under which the joint provision of certain non-audit services is banned.

[52] It should be noted that the economic significance of the association between non-audit fees and abnormal stock returns, is small in economic terms. In addition, when the authors extend the time period over longer event windows, the association becomes insignificant.

along with audit services to its client[53]. Further, employing ERC as a surrogate for perceived earning quality, several studies investigate whether the joint provision of non-audit and audit service fees is perceived -by equity market participants- as a potential factor of impairment of auditor's independence. Using a sample of U.S firms that filed proxy statements in 2001, Krishnan et al. (2005) report a negative association between both the non-audit fee ratio and the magnitude of non-audit fees and ERCs. In a related study, Higgs and Skantz (2006) utilise ERC as a surrogate for earnings quality and test the association between ERC and engagement profitability. To proxy for engagement profitability, the authors employ both audit and non-audit fees simultaneously. Utilising a sample of 1,313 non-financial U.S firms which disclosed audit fee information in 2001, Higgs and Skantz (2006) document evidence of a negative association between ERCs and abnormally high non-audit fees, and a positive association between ERCs and abnormally high total and audit fees. In a concurrent study, Francis and Ke (2006), also, examine the effect of non-audit fees on investors' perceptions regarding auditor independence, and effectively earnings quality. Employing a sample of 3,133 U.S firms over the period 1999-2002, the authors find that the ERC on quarterly earnings surprises tend to be smaller for firms with higher levels of non-audit fees compared to those firms which disclose lower non-audit fees. In other words, the findings are consistent with the argument that investors perceive -the high levels of fees attributable to non-audit services- as an impairing factor for auditor independence, hence corroborating the existing evidence on the impact of non-audit fees over equity market participants' perceptions[54]. Due to the fact that ERC can be a noisy measure to proxy for investors' perceptions, Khurana and Raman (2006) employ *ex ante* cost of equity capital. Specifically, for a sample of 2,163 U.S. firm-year observations over the period 2000-2001, they also document evidence of a positive association between both non-audit and total (audit and non-audit) fees and ex ante cost of equity capital. In a

[53] Several subsequent studies, however, document evidence of no association between abnormal stock returns and the magnitude of non-audit fees, therefore questioning the conclusion drawn by Frankel et al. (2002) (e.g., Ashbaugh et al., 2003; Chung and Kallapur 2003; Mitra, 2007). The contradictory findings between Frankel et al. (2002) and the other studies may be driven by two major considerations. First, the results reported by Frankel et al. (2002) are sensitive to research design choices regarding the fee construction and the measurement of abnormal accruals (Ashbaugh et al., 2003); and second, Frankel et al. (2002) do not account for industry-specific effects (Chung and Kallapur 2003; Mitra, 2007).

[54] In contrast to the aforementioned studies, Ghosh et al. (2009) fail to document any association between ERCs and non-audit service fees. Using a large sample of U.S firms during the period 2001-2006, the authors find that non-audit fees are not associated with negative investor perceptions. According to Ghosh et al. (2009), the contradictory findings might lie on two main reasons. First, compared to prior studies, the authors use a larger sample of firms for a longer sample period. Second, contrary to extant literature, the authors employ a different measure for non-audit fees. In particular, Ghosh et al. (2009) use the non-audit fee ratio which is calculated as the ratio of non-audit to total audit fees. They argue that employing the non-audit fee ratio, it allows for more clear inferences regarding the effect of non-audit services, since any effect related to the client importance can be disentangled. In that sense, their results could better reflect the net effect of non-audit services.

similar vein, Hope et al. (2009), investigate investors' perceptions on auditor's remuneration for a broader sample of countries[55]. Specifically, using a sample of 9,008 firm-year observations, they also document a positive and significant relationship between the cost of equity and auditor's remuneration.

Evidence from debt markets is largely consistent with equity markets' findings. Brandon et al. (2004) investigate the impact of non-audit service fees on bond ratings. Utilizing all active U.S non-financial firms with bond issues during the period 2001-2002 (corresponding to 333 bond issues), they report a negative association between the levels of non-audit fees paid to the incumbent auditor and the firm's bond rating. This evidence indicates that a higher magnitude of non-audit service fees is perceived negatively by bond rating analysts, therefore suggesting an association with impaired auditor independence and audit quality. In a related study, Dhaliwal et al. (2008) examine the relationship between non-audit, audit and the aggregated (non-audit and audit) fees and a firm's cost of public debt. Employing a sample of 560 new debt issues over the period 2001 and 2003, Dhaliwal et al. (2008) document a positive association between the level of non-audit and audit fees and the cost of debt capital. While this positive association is only evidenced for investment-grade firms, the findings reported by Dhaliwal et al. (2008) are generally consistent with those documented by Brandon et al. (2004), hence suggesting that debt markets participants perceive higher service fees as an impairment factor for auditor independence and quality of audit.

A second important strand within this body of literature focuses on auditor's tenure. A longer client-auditor relationship could lead to erosion of auditor's independence, and consequently to lower quality of audits. The underpinning notion under this argument lies in the fact that the client's firm influence power over the incumbent auditor increases, as the client-auditor relationship lengthens. That is, longer tenure could facilitate a closer bonding between the incumbent auditor and its client, therefore resulting in the former succumbing to management pressures. On the other hand, advocates of longer audit tenure claim that that a longer client-auditor relationship improves auditor's independence and audit quality. The rationale of this argument lies in the fact that longer tenure could help auditors to develop an accumulated specific knowledge regarding business risks, operations and accounting choices of their clients. Eventually, such a knowledge could lead to better detection of misstatements and material errors, thus resulting in more

[55] Hope et al. (2009), other than the U.S., incorporate in their sample Australia, Denmark, China, India, Malaysia, Netherlands, Norway, Singapore, South Africa, Spain, Sweden, Switzerland and the U.K.

accurate audit reports. Under these conflicting arguments, a number of studies examine how auditor's tenure is perceived by capital markets.

The first archival study to document evidence as to whether equity market investors perceive auditor's tenure as affecting auditor's independence and audit quality is the study conducted by Ghosh and Moon (2005). Utilizing ERCs for 38,794 U.S firm-year observations over the period 1990-2000, the authors find that the levels of ERCs increase as auditor's tenure lengthens. In other words, the positive association between ERCs and auditor-client relationship suggests that investors perceive longer tenure as an improvement factor for auditor's independence, and eventually for the quality of audit. Boone et al. (2008) investigate the effect of audit firm tenure on investors' perception as well. To do so, the authors employ the *ex-ante* equity risk premium as their research metric for perceived audit quality; and they hypothesize a nonlinear relationship between audit firm tenure and perceived audit quality. Using a sample of 3,264 firm-year observations of non-financial U.S firms between 1993 and 2001, they provide evidence which is consistent with that reported by Ghosh and Moon (2005). That is, audit firm tenure and cost of equity capital are negatively associated. However, when the authors allow for nonlinearity, the evidence suggests that firms' cost of equity capital start to increase when the audit-client relationship exceeds a period of thirteen consecutive years. Rather than focusing on audit firm tenure, Azizkhani et al. (2013) examine the influence of audit partner tenure on the cost of equity capital. Considering that audit reports in Australia must include both audit firm's and auditor's partner's names, they exploit the Australian setting for their research purposes. Over the period 1995-2005, they obtain a sample of 2,346 firm-year observations. Consistent with the findings documented in an audit firm level, Azizkhani et al. (2013) provide evidence of a negative association between audit-engagement partner tenure and the cost of equity capital.

Existing literature documents evidence on the effect of the audit firm tenure within a debt-financing context as well. Specifically, Mansi et al. (2004) focus on the public debt market and utilise 8,529 firm-year observations of non-financial U.S firms that issued bonds over the period 1974-1998. The authors report a negative and statistically significant association between audit firm tenure and cost of debt capital, thus suggesting that longer audit-client relationship is positively perceived by bondholders. In a similar vein, Fortin and Pittman (2007) also explore whether longer auditor tenure is associated with debt market participants' perceptions. Rather than examining publicly listed firms, they focus

on private U.S firms that issued 144A bonds over the period 1996-2005. Utilizing a sample of 428 firm-year observations, Fortin and Pittman (2007) fail to document any association between audit firm tenure and yield spread, thus suggesting that creditors do not take into consideration auditor tenure in the debt contracting process for non-publicly listed firms. Finally, Kim et al. (2013) place the focus within a private debt-financing context. They employ a sample of over 12,000 bank loans issued by non-financial listed U.S firms over the period 1996-2008. In line with the evidence documented by Mansi et al. (2004), Kim et al. (2013) find that audit firm tenure is negatively related to private debt as well. Closely related, Francis et al. (2017) examines the effect of disruptions in the client-auditor relationship (i.e., auditor changes) on bank loan contracting. Using a sample of 3,224 loan-year observations over the period 1998-2014, they show that firms with auditor changes receive, on average, 22 percent higher interest rate and more stringent non-price loan terms.

Collectively, client-auditor contracting features such as non-audit/audit fees and duration of the client-auditor relationship have attracted considerable attention. While consensus has not been reached yet, the majority of studies seems to provide evidence that auditor's remuneration from audit and non-audit services are perceived negatively by capital market participants, both in equity and debt markets. Similarly, extant perception-based literature strongly supports the notion that longer client-auditor relationships are positively perceived by capital markets[56].

4.4 The Role of Common Auditor

Auditors provide services to multiple clients at the same time. In many cases, however, audit firms are involved in auditing services for either explicitly or implicitly interrelated firms (e.g., acquirer and target firms, mutual funds and invested firms, supplier and customer firms, parent-subsidiary firms). Prior literature refers to such audits as common-, cross-, or shared-audits. Using different corporate contexts in which common audits exist, a growing body of literature examines the role of common auditor as well as the corporate consequences for the interrelated firms.

[56] Perception-based evidence is largely consistent with the evidence documented from a preparer's perspective. For audit/non-audit fees see for example, Firth, 2002; Geiger and Rama, 2003; Kinney et al., 2004; Ferguson et al., 2004; Srinidhi and Gul, 2007; Basioudis et al., 2008. For tenure see, Johnson et al., 2002; Myers et al., 2003; Carcello and Nagy, 2004b; Carey and Simnett, 2006; Chen et al., 2008).

On the one hand, some studies support the notion that a common auditor among interrelated parties develops a better understanding of the business environment and inherent risks of both parties. For example, Cai et al. (2016) examine the role of common auditors and the consequences for the involved firms within the Merger and Acquisition (M&A) context. They conjecture that when both the acquirer and the target firms share the same audit firm, the inherent uncertainty that is embodied in M&A transactions is mitigated due to the existence of a common auditor. Using a sample of 1,971 U.S. firms that involved in M&A transactions over the period 1988-2010, they find that deals for firms sharing the same auditor result in higher acquisition announcement returns (i.e., higher M&A quality). In their supplementary analysis, Cai et al. (2016) show that common auditors are able to reduce the uncertainty and information asymmetry among the merging firms through three mechanisms: (i) direct communication with both M&A parties; (ii) higher comparability of financial statements; and (iii) less earnings management. With regards to the first mechanism, they find that the impact of shared auditor is higher in cases where both the acquirer and the target firms appoint the same audit firm from the same local office. The rationale behind this finding lies in the fact that the auditor could more easily facilitate communications among the interrelated parties when they are all located in close proximity. With respect to the second mechanism, the authors show that when acquirer and target firms which share the same auditor tend to have more comparable financial statements compared to those with non-common auditors. According to Cai et al. (2016), the underpinning explanation of this finding lies in two interrelated reasons. First, each audit firm sets and follows its own unique style of accounting choices and assumptions (Kothari et al., 2010; Francis et al., 2014). Second, auditees often seek advice from their audit firms regarding the preparation of their financial statements. Taken together, the existence of common auditor, implicitly, allows for the merging firms to understand and decode better the economics of each other. Finally, Cai et al. (2016) provide evidence of less misreporting incidents when both the acquirer and target firms share the same auditor. They attribute this finding on the fact that common auditors might be exposed on higher reputational and litigation risk, and therefore are incentivised to provide higher quality of audits. Rather than confining within the U.S. context, Chircop et al. (2018) use an international sample to examine the common auditor effect. Employing a sample of 351 deals for firms involved in M&A transactions over the period 2000-2014, they find that that when both the acquirer and the target share the same audit firm there is a higher M&A transaction efficiency[57].

[57] M&A transaction efficiency is measured as: (i) market reaction at the M&A announcement; (ii) deal

Consistent with these findings, evidence from the supply chain context also supports the notion that the existence of common auditors between interrelated firms allows for a better understanding of the supply chain partners' risks. Drawing upon the auditor industry specialist literature, Johnstone et al. (2014) argue that when the same audit firm is appointed by both the supplier firm and its major customer (i.e., supply chain auditors), both the individual auditor and the audit firm are able to develop better knowledge related to the supply chain partners (i.e., supplier firm and its major customer)[58]. Such an accumulated knowledge gained by the corresponding audit firm, in turn, results in improvements over the quality of audits. In that sense, Johnstone et al. (2014) hypothesize that supplier firms appointing a supply chain auditor (i.e., an audit firm that provides auditing services to supplier's main customer during the same period as well) should receive higher audit quality than supplier firms appointing a non-supply chain auditor. Employing a sample of 4,569 U.S. firm-year observations over the period 2003-2010, they find that supplier firms audited by a supply chain auditor have, on average, higher quality of audits as measured by discretionary accruals, the propensity of financial statements being restated and meeting or beating earnings forecasts[59,60].

Beyond the accumulated supply chain knowledge, prior literature provides evidence that common auditors develop audit synergies that allow for the reduction of the audit effort when providing auditing services to both sides. Chen et al. (2014) show that supplier firms having common auditors with their major customers enjoy lower audit pricing compared to those not having common auditors[61].Similar findings are documented by Krishnan, et al. (2019). While the focus of the study is not on investigating the impact of a common

premiums after the M&A transaction; (iii) change in profitability ratios after the M&A transaction.

[58] Such knowledge could be partially attributed to the fact that engagement audit teams share information regarding supply chain partners in cases were both are audited by their firm. As Johnstone et al. (2014; p.124) note, "*It is routine practice for engagement teams to discuss information about clients both audited by their firm. One partner that we contacted told us that individual auditors generally do not to talk with other teams about specific client matters that would not otherwise be publicly known. That said, he noted that situations do arise when it is appropriate to share knowledge that could benefit the individual office or the audit firm…. He noted that such communications are usually informal and verbal, which is due to the need to delicately address a potential issue without compromising confidentiality"*

[59] It should be noted that this evidence holds only within the office/city-level analysis. Johnstone et al. (2014) failed to document a significant association on a national level analysis.

[60] While studies within the M&As context use an indicator variable to capture the effect of common auditor, Johnstone et al. (2014) use a measure that captures the level/percentage of audit firms appointed by both the supplier firms and their major customer(s). Although the two measures are distinct, the notion remains the same

[61] Chen et al. (2014) fail to document evidence for the reverse association. That is, they find no differential audit fee for the major customers when they share the same auditor with their suppliers. According to Chen et al. (2014), the rationale behind this finding lies on the fact that major customers are generally larger than their suppliers since the latter typically produce a limited number of products. In that sense, "there is less knowledge to transfer to the client audit engagement from the supplier than from the major buyer audit engagement" (Chen et al., 2014, 97).

auditor on the audit fees paid by the supplier firm per se, when the authors conduct supplementary tests -in which an indicator variable that captures the existence of a common auditor between the supplier firm and its major customer is included- they find that supplier firms having common auditors with their major customers benefit from audit fee discounts.

On the other hand, several studies provide evidence that common auditors have higher incentives to accommodate the needs of clients when serving both interrelated parties. For example, Dhaliwal et al. (2016b) employing a sample of 3,294 deals for U.S. firms that were involved in M&A transactions over the period 1985-2010, they find that M&A deals with shared auditors lead to lower, overall, deal premiums and lower (higher) target (acquirer) event returns[62]. According to Dhaliwal et al. (2016b) these findings suggest that common auditors serve as a means for the acquirer firm to reap greater benefits from the deals at the expense of the target firm, thus highlighting the opportunistic behaviour of the common auditor to favour the acquirer in order to facilitate an ongoing relationship with the surviving client after the acquisition.

Evidence within the context of mutual funds also confirm the notion that the existence of common auditor can lead to impairment of auditor's independence and quality. For example, Hope et al. (2022) argue that common auditors between mutual funds and their investing firms are incentivised to share critical information about the latter since it can facilitate the former's investment decision-making. Such an incentive is, arguably, driven by the implicit threat of losing the mutual fund along with its associated fees from the clientele portfolio. Using a sample of over 10,000 Chinese fund-year observations during the period 2004-2016, they find that not only do mutual funds tend to invest more extensively in firms which share the same auditor as them, but they also earn higher profits when trading in those firms. The findings of a concurrent study corroborate the evidence documented by Hope et al. (2022). Employing a sample of 20,315 Chinese firm-year observations over the period 2004-2016, Chen et al. (2020) investigate whether firms, in which mutual funds invest in, are more likely to receive favourable audit opinions (unqualified) when they do appoint the same auditor as their mutual funds. The main argument underpinning this hypothesis lies in the potential erosion of auditor's independence and quality which is, mainly, driven by the "auditor's personal interest

[62] The main difference of the final examined samples between Cai et al. (2016) and Dhaliwal et al. (2016b) lies in the sample selection criteria applied. That is, the former considers M&A transactions with a 100% change in control, while the latter requires to be over 50%.

incentive". That is, considering that the outcome of the audit report of the firms in which mutual funds invest in has direct consequences on mutual funds' performance, mutual funds could exert pressure on the common auditor for a clean report of their invested firms. In turn, common auditor is, also, strongly incentivised to succumb over this pressure in order to retain both clients in its clientele portfolio. Consistent with their argument, Chen et al. (2020) find that firms are more likely to receive favourable audit opinions (unqualified) when they do appoint the same auditor as their mutual fund blockholders.

The adverse effect of common auditors is also documented within the supply chain context. Chang et al. (2019) show that the presence of common auditors among supplier firms and their major customers is negatively associated with supplier's quality of audit, as proxied by positive-signed discretionary revenues. Utilising a sample of 2,421 U.S. firm-year observations over the period 2003-2012, they find that supplier firms with common office-level auditors with their major customers tend to manipulate their earnings more frequently (i.e., more aggressive revenue management) compared to those with no common office-level auditors. According to Chang et al. (2019), the underpinning rationale behind this finding lies on the auditor's economic dependence over the clientele portfolio. That is, when both supply chain partners are audited by the same audit firm, they are potentially viewed as one large client. In addition, supply chain partners are economically related to each other. Under this premise, if the common auditor does not succumb to supply chain partners' demands, then there is an implicit threat of losing not just one client (either the supplier or its major customer) but both. Effectively, such an inherent threat results in compromises over the quality of audits. In line with the above-mentioned evidence, Dhaliwal et al. (2020) report a negative and significant association between common auditor's existence and propensity of issuance of going concern opinion. Specifically, using a sample of 1,400 U.S. firm-year observations over the period 2002-2010, they find that supplier firms having a common auditor with their major customers are 56 percent less likely to obtain a going concern opinion than those without sharing an auditor with their major customer.

Finally, evidence that the existence of a common auditor among interrelated parties leads to impairment of audit quality is, also, supported within the context of group affiliated firms. Utilising a sample of 9,260 Chinese firm-year observations during the period 2003-2012, Sun et al. (2020) investigate whether the existence of a common auditor among parent firms and their subsidiaries is associated with audit quality. Employing

several measurements to proxy for audit quality such as discretionary accruals, propensity of issuing modified report and likelihood of restatements, they find that parent firms sharing the same auditor with their subsidiaries have a lower quality of audits compared to those not having such a relationship. Consistent with the aforementioned stream of literature, Sun et al. (2020) attribute their findings to auditor's economic dependence and opportunistic interest.

4.5 Hypotheses Development

4.5.1 Common Auditors and Cost of Capital (H1a & H1b)

As explained earlier, relying heavily on a small set of major customers for a sizeable portion of revenues, involves a high degree of operational and financial risks for the supplier firm. Specifically, the supplier firm faces the risk of losing significant future sales in case that its major customer becomes financially distressed, default or file for bankruptcy, decides to switch onto a different supplier, or opt to develop products in-house. Arguably, these risks could increase the likelihood of supplier on defaulting on its debt obligations (Dhaliwal et al., 2016a; Campello and Gao, 2017). Thus, any factor that could either alleviate or exacerbate such risks should be important for investors' and creditors' information and estimation risks. The evidence about the important informational role of common auditors could serve as such a factor. Yet, the conflicting evidence regarding the role of common auditors on the quality of audits of interrelated firms, does not allow to infer clearly *ex ante* the impact of common auditor on supplier's cost of equity and bank debt, and, as such remains an empirical issue.

When the supplier and its major customers employ the same audit firm, such risks should be better integrated into the supplier's estimates when producing financial statements, for at least two reasons. First, the common auditor develops supply chain knowledge that enhances the efficiency of audit planning, substantive testing, and risk assessment of the supplier firm due to a better understanding of their client's business environment (Johnstone et al., 2014; Chen et al., 2014). Second, having engaged the clients' supply chain partners (i.e., major customers), the audit firm has enhanced capabilities to gauge the clients' business models, including operational processes and practices. Considering that the spill-over effect of the economic situation and viability for firms engaged in a customer-supplier relationship could be bi-directional, major customer(s) which share the same auditor with their supplier(s) have incentives to facilitate

potential supplier-related queries and provide full access to any interrelated documents (e.g., receipts for goods delivered, delays in products purchased). Thus, the existence of a common auditor should lead to more reliable financial statements which in turn should result in lower information and estimation risks in relation to the supplier firm.

However, such a setting provides the common auditor with a strong incentive to act opportunistically, impair its independence, and subsequently lower the quality of audits (Dhaliwal et al. 2016b; Chang et al. 2019; Chen et al. 2020; Sun et al., 2020; Hope et al. 2022). The rationale behind such an incentive is driven by the implicit threat that the common auditor could lose both the customer and supplier from its clientele portfolio, thus resulting in major financial losses for the audit firm. Specifically, an audit firm could be more inclined to lower its standards when evaluating and discussing with supplier's management the risks that could arise from its major customer if that major customer belongs to the clientele portfolio of the same audit firm. The reason is that the major customer could lose important supply chain interfirm gains that have been established at the expense of the supplier (e.g., higher credit allowance, relationship specific investments, faster deliveries, and lower prices). Consequently, this could lead to the major customer departing from that audit firm. As mentioned earlier, however, when both the supplier and its major customer appoint the same audit firm, the former enjoys the benefit of reduced audit pricing (Chen et al., 2014; Krishnan et al., 2019). It follows that if the major customer disrupts its relationship with that auditor, the supplier firm will effectively lose the audit fee discount that arise from audit synergies and efficiency gains when sharing the same auditor. Therefore, it is conceivable that the supplier might also depart. In that sense, the audit firm would lose not only one client (i.e., major customer), but both. Thus, when supply chain parties employ the same audit firm, supplier's business risks arising from its high degree of dependency to its major customer(s) might not be accurately reflected and highlighted in supplier's estimates when producing financial statements. This, in turn, should result in higher information and estimation risks for the supplier firm.

As discussed earlier, extant auditing research suggests that auditor-specific characteristics and client-auditor relationships affect investors' and creditors' perceived information risk (e.g., Boone et al., 2008; Hope et al., 2009; Kim et al., 2013; Francis et al., 2017). In that sense, if capital market participants perceive that the existence of a common auditor facilitate a better understanding of the supplier's business environment, the credibility of financial information will increase, thus resulting in lower information and

estimation risks for the supplier firm. However, to the extent that they perceive the existence of common auditor to be "deficient" (i.e., lacking auditor independence), the credibility of financial information will decrease, thus resulting in higher information and estimation risks for the supplier firm. Considering the aforementioned competing views on the role of common auditors between interrelated firms, it is not clear *ex ante* whether capital market participants perceive common auditors as a mitigating or an exacerbating factor for the information environment of the supplier firm. These two competing arguments are theoretically supported by the two conflicting propositions (i.e., agency theory and Antle's utility maximization theory) about the role of external auditors as discussed in Chapter 3 (please refer to section 3.3.1 and 3.3.2). Thus, the first set of hypotheses are stated in a non-directional form:

H1a: There is a significant association between the existence of a common auditor and the cost of equity of the supplier firm.

H1b: There is a significant association between the existence of a common auditor and the cost of private debt of the supplier firm.

4.5.2 Common Auditors and Non-Price Loan Terms (H2- H4)

An important characteristic of bank loan contracting research is the fact that, it provides the opportunity to investigate several directly observable contractual terms, other than the cost of debt capital. In addition, extant literature suggests that non-price loan terms are used as an alternative to price loan terms in the debt contracting context (e.g., Melnik and Plaut 1986; Bharath et al. 2008). In that sense, the information risk and information environment -due to the existence of a common audit firm- could also be reflected in non-price contract terms. The current thesis focuses on three key non-price loan features, namely loan securitization, loan maturity and the number of financial covenants attached to the loan agreement.

Extant literature argues that loan securitization is used by lenders as an alternative mechanism to reduce lending risk and mitigate borrowers' information risk (e.g., Boot et al., 1991; Rajan and Winston, 1995). Consequently, it is more likely that banks would require collaterals from firms with higher information risk (Berger and Udell 1990). Another major non-price term that might be utilised by lenders as a substitute for price terms is the maturity of the loan issued. According to Diamond (1991), a shorter loan

maturity could serve as a monitoring mechanism for lenders, since borrowing firms would be required to obtain financing more frequently. This theoretical argument is in line with the credit quality hypothesis which posits that creditors would offer debt with shorter maturities to riskier borrowers in order to limit their financial exposure. Finally, financial covenants constitute another important non-price contractual feature which could be used to substitute for price terms in debt contracting, since they allow lenders for more efficient monitoring of the borrowing firm (e.g., Rajan and Winston, 1995; Asquith et al., 2005). Typically, borrowers with higher uncertainty, ambiguous environment, information asymmetry risks and poorer performance are associated with higher number of covenant restrictions attached to the loan agreement (Dichev and Skinner, 2002; Nikolaev, 2010; Demerjian, 2017). Extant literature within the bank loan contracting provides evidence consistent with the above-mentioned arguments within different contexts such as restated financial statements, financial statement comparability, social capital, auditor changes and auditor's industry specialization (Graham et al. 2008; Fang et al. 2016; Hasan et al., 2017; Francis et al., 2017; Zhang et al., 2017).

To the extent that creditors perceive that common auditors between suppliers and their major customer(s) can either mitigate or exacerbate the information and estimation risks related to the former party, it is conceivable to expect that this will also be reflected into the non-price terms of the loan issued by the supplier firm. As explained earlier, however, the direction of the impact is not clear *ex ante*. The two competing arguments are theoretically supported by the two conflicting propositions (i.e., agency theory and Antle's utility maximization theory) about the role of external auditors, as discussed in Chapter 3 (please refer to section 3.3.1 and 3.3.2). Thus, the hypotheses related to non-price bank loan terms are stated as follows:

H2: There is a significant association between the existence of a common auditor and the collaterals pledged by the supplier firm.

H3: There is a significant association between the existence of a common auditor and the loan maturity of the supplier firm.

H4: There is a significant association between the existence of a common auditor and the inclusion of financial covenants attached in the loan contracts of the supplier firm.

4.6 Conclusion

This chapter provides an extensive literature review around three main streams of literature, namely customer concentration within the supply chain, the capital market effects of auditor-specific characteristics and client-auditor contracting features and the role of the common auditor. Combining these three separate streams of literature, the current thesis identifies an empirical question that remains unexplored thus far. That is, whether and how supplier firms' equity- and debt-financing is affected if they appoint the same audit firm as their major customers. As discussed, the conflicting evidence of prior common audit literature does not allow for a unidirectional association (for the theoretical justification of those two arguments please refer to sections 3.3.1 and 3.3.2). Therefore, the hypotheses are expressed in a non-directional form.

Chapter 5: Supplier-Major Customer Relationship: The Effect of Common Auditor on the Cost of Equity

5.1 Introduction

This chapter investigates empirically the effect of common auditors within an equity-financing context. Specifically, it examines whether investors perceive that a common auditor between supplier firms and their major customers contributes to the information and estimation risk they are facing and, as a result, whether such a relationship contributes to economically significant implications on the cost of equity capital of the supplier firms.

Numerous studies within the customer concentration literature suggest that supplier firms that rely upon a considerable portion of their revenues over a few major customers face increased liquidity problems and cash flow risks if their major customers become bankrupt, decide to develop products internally or switch to another supplier (e.g., Dhaliwal et al. 2016a; Campello and Gao, 2017; Dhaliwal et al. 2020) (see section 4.2.4). Prior literature also shows that this risk is priced into supplier's cost of equity (Dhaliwal et al. 2016a). Arguably, any factor that could either mitigate or exacerbate such concerns/risks should be important for investors' information and estimation risks. This chapter posits that common auditors could constitute such a factor. The underpinning rationale behind this proposition lies on the following. Investors' beliefs are heavily influenced by audit-specific characteristics, client-auditor contracting features and audit-related events. Regardless of the actual effect of those characteristics on the quality of the audits and the independent state of the incumbent auditor, to the extent that investors perceive them as detrimental (enhancing) factors, the perceived credibility of the financial statements would be weakened (increased), thus increasing (reducing) further the information risk that investors face (Boone et al., 2008; Hope et al., 2009; Krishnan et al., 2013). The competing evidence regarding the role of common auditors on the quality of audits of interrelated firms does not allow for clear inferences on the impact that the presence of a common auditor could have on supplier's equity financing. Therefore, whether and how common auditors affect supplier's cost of equity is an open empirical question.

To test the relevant hypothesis (see section 4.5.1), the supply chain context for a sample of 7,773 U.S. supplier firm-year observations over the period 1983-2016 is used. In line

with expectations, this study finds that the existence of common auditor is priced into the supplier's cost of equity capital. Specifically, the findings indicate that supplier firms having a common auditor with their major customers experience higher equity-financing compared to those firms that do not have a common auditor with their major business partners. This evidence supports the notion that investors negatively perceive the existence of common auditors among interrelated firms. From a theoretical perspective, such evidence supports Antle's (1982;1984) proposition. That is, investors recognise that auditors within such a setting (i.e., providing auditing services at the same time to economically interrelated firms) have also economic benefits that might facilitate a utility maximisation and opportunistic behaviour from their side (refer to section 3.3.2), and therefore such a behaviour is priced into supplier's cost of equity capital. Further, the magnitude of the effect of common auditor is not only statistically significant, but also economically important. Supplier firms with at least one common auditor with their major customers incur 0.42 percent higher cost of equity compared to those firms not sharing a common auditor with their major customers. Effectively, this translates into an excess annual cost of approximately $200,000 for the mean supplier firm to obtain equity-financing. The main findings are robust in a series of sensitivity tests that control for the noise of analyst forecasts, omitted variable bias, alternative measures of the implied cost of equity and common auditor variables, propensity score matching and common auditor switch status analysis. Finally, the evidence from the additional test suggests that the result documented in the main regression are more pronounced for supplier firms with a higher customer concentration base and supplier firms with a greater number of major customers.

The remainder of this chapter is organised as follows. Section 5.2 highlights the debate around the different methods regarding the estimation of the cost of equity. Section 5.3 describes the research design, including the data and the sample collection processes. Section 5.4 tests the relevant hypothesis and presents the results and discussion of the main analysis. Section 5.5 documents the results of the analysis from the sensitivity tests and the additional tests. Finally, Section 5.6 discusses the summary and conclusion of the chapter.

5.2 The Debate Around the Estimation of the Cost of Equity

The current chapter examines the effect of common auditors within an equity market context. Prior to the analysis and discussion of the results, however, it is important to acknowledge and reflect on the ongoing debate around the estimation of the cost of equity. Theoretically, the cost of equity is defined as the minimum rate of return that equity

investors require to be compensated for financing a firm (Botosan, 2006). In practice, however, its measurement has triggered a long-standing debate, and even to date consensus has yet to be reached as to what should be the most appropriate way for calculating it accurately (Echterling et al., 2015; Aghazadeh et al., 2018). Broadly, prior literature proposes two main approaches for the empirical estimation of cost of equity, namely the backward-looking (*ex post* estimations) and the forward-looking (*ex ante* estimations) approaches. Within the former approach, the empirical estimations of the cost of equity are derived from historically observable data (i.e., realised stock returns), while within the latter they are derived from forward looking forecasted data (i.e., analyst forecasts). The below sections (5.2.1 and 5.2.2) discuss the advantages and shortcomings associated with the implementation of those approaches and conclude with the most appropriate estimation method for the current study[63].

5.2.1 The Use of Ex Post Cost of Equity Estimations

Earlier academic attempts use historically observable data (i.e., realised returns) to estimate the cost of equity capital. These estimates are, mainly, derived by the empirical implementation of different asset pricing models. Generally, asset pricing models have their origin to the seminal work of Markowitz (1952;1959) which suggests that the investment decision of individuals is based on two statistical measures, the mean and variance (mean-variance analysis). Under this proposition, rational investors choose investment portfolios that on the one hand maximise their expected returns and on the other hand minimise the variance of returns. Drawing upon the aforementioned notion, the Capital Asset Pricing Model (hereafter, the CAPM) as developed by (Sharpe, 1964; Lintner, 1965; Mossin, 1966) constitutes the most prominent method for the estimation of the *ex post* cost of equity capital. Under the assumptions that investors have homogenous expectations as regards the distribution of asset's expected returns, similar investing horizons and unlimited ability to lend or borrow with the risk-free interest rate, CAPM expresses the expected rate of return of a security, $E(R_i)$, as a function of the risk-free rate, r_f, plus the market risk premium, $[E(R_m) - r_f]$, multiplied by the security's beta, β_i.

$$E(R_i) = r_f + \beta_i[E(R_m) - r_f] \quad (5.1)$$

[63] The current section intends to provide a constructive analysis and discussion of the main cost of equity calculation methods. A comprehensive review and analysis of all the models/methods is out of the scope of the current thesis/chapter. For an extensive review please refer to Echterling et al. (2015).

where, $\beta_i = \frac{Cov(R_i,R_m)}{Var(R_m)}$

Other popular methods for the estimation of the *ex post* cost of equity capital are the so-called multifactorial asset pricing models, i.e., the Arbitrage Pricing Theory (APT) model (Ross, 1976), the Three-Factor model (Fama and French, 1993; 1996) and the Four-Factor model (Carhart, 1997). In contrast to CAPM which includes only one factor/beta, the multifactorial models estimate the expected rate of return of a security by taking into consideration further factors/betas. Essentially, the multifactorial asset pricing models can be regarded as a multivariate extension of the CAPM in the sense that the historical returns are explained by firm or economy specific factors other than just the systematic risk. Specifically, the APT model defines the expected return of a security, $E(R_i)$, as a linear function of the risk-free rate, r_f , and a theoretically unlimited and undetermined number of other factors (equation 5.2).

$$E(R_i) = r_f + \beta_{i,1}\delta_1 + \beta_{i,2}\delta_2 + \cdots + \beta_{i,k}\delta_k (5.2)$$

Where δ_k represents the risk premium of the k[th] factor.

Alternatively, the Three-Factor model defines the expected rate of return as follows:

$$E(R_{i,t}) = r_{f,t} + \beta_{i,m}[E(R_{m,t}) - r_{f,t}] + \beta_{i,s}E(SMB_t) + \beta_{i,h}E(HML_t) (5.3)$$

Where $E(R_{i,t})$ is the security's expected return, $r_{f,t}$ is the risk-free interest rate, $E(R_{m,t}) - r_{f,t}$ is the difference between the market portfolio and the risk-free rate, (SMB_t) captures the difference among returns on diversified portfolios of small and big stocks, and (HML_t) expresses the difference among returns on diversified portfolios of high and low book to market stocks.

Similarly, the Four-Factor model defines the expected rate of return as follows:

$$E(R_{i,t}) = r_{f,t} + \beta_{i,m}[E(R_{m,t}) - r_{f,t}] + \beta_{i,s}E(SMB_t) + \beta_{i,h}E(HML_t) + \beta_{i,p}E(PR1YR_t) (5.4)$$

Where the $E(PR1YR_t)$, is the one-year momentum effect in returns, while all the rest variables remain the same as defined in (5.3).

Subsequent studies, however, have identified several shortcomings associated with those models, and therefore they have questioned their applications for the measurement of the cost of equity. Specifically, the CAPM's theoretical foundation has been criticized being based on quite simplistic or even unrealistic assumptions (e.g., Fama and French, 1997; 2004; Markowitz, 2005; Dawson, 2015). For instance, the CAPM stipulates that the risk of a security should be measured in relation to the market portfolio. In principle, the market portfolio could consist of consumer durables, human capital and real estate, other than traded financial securities. As noted by Roll (1977), however, the market portfolio composition is not observable, and therefore any empirical implementations are based on market-proxy portfolios, such as S&P 500. In other words, by utilising a market-proxy portfolio, one cannot infer anything about the true unobservable market portfolio. On these grounds, Roll (1977; p. 130) concludes that the CAPM is practically untestable, "*unless the exact composition of the actual market portfolio is known"*[64]. Other notable assumptions, under CAPM, postulate that all investors: (i) are able to lend and borrow (unlimited) by utilizing the risk-free interest rate; (ii) have homogenous expectations as regards the expected returns, correlations and volatilities of the securities; (iii) have the same investment time horizon which is focused on a single period; and (iv) incur no transaction costs and taxes[65]. Yet, those assumptions have been criticized for their applicability in the real-world as well. Beyond its theoretical caveats, there is also empirical evidence disputing the applicability of CAPM, in practice. For instance, early tests on risk premiums find that estimates of empirical beta for individual securities are not precise, thus resulting in measurement error issues when utilised to explain average returns[66]. Another empirical evidence against the CAPM lies on the findings of several studies which show that other factors, besides beta, could incrementally explain average returns. For example, earnings to price ratio (Basu, 1977; 1983), market capitalization (Banz, 1981), book value of equity (Rosenberg et al., 1985), debt to equity ratio (Bhandari, 1988), book to market ratio (Chan et al., 1991) constitute factors that are not taken into consideration in the CAPM, yet they do explain average returns in the cross-section.

[64] The aforementioned criticism is known as the Roll's Critique due to the author's critical examination on the CAPM assumptions in his paper "A Critique of the Asset Pricing Theory's Tests Part I: On Past and Potential Testability of the Theory.

[65] For a more detailed analysis on the assumptions, see for instance, Levy, 2012, Berk and DeMarzo, 2014.

[66] To address this issue, prior literature employs portfolio-based betas, rather than using betas of individual securities (e.g., Blume, 1970; Friend and Blume, 1970; Black et al., 1972). While such a process could lead to more accurate beta estimates, grouping individual securities in portfolios generates another problem. That is, it reduces the range of betas estimates used, therefore decreasing the statistical power of the results (Fama and French, 2004).

With regards to APT, while it is considered as more advantageous cost of equity capital metric compared to CAPM, there are, still, several shortcomings associated with it. First, it does not provide a theoretical guidance and an identification framework as to which factors should be incorporated in the model, what is the number of relevant factors as well as how these factors can be measured reliably (Groenewold and Fraser, 1997; Morel, 2001; Azeez and Yonezawa, 2006)[67]. Second, Gilles and LeRoy (1991) argue that APT lacks "clear" assumed restrictions, and therefore conclude that the APT model might not contain useful information about securities' prices. Finally, researchers are skeptical regarding the reliability of existing APT's testing approaches. For instance, Cheng (1996) criticizes the testing method used in prior literature (e.g., Chen et al., 1986). More specifically, the author claims that the regression results using Chen's et al. (1986) approach are quite sensitive to the number of factors incorporated in the model[68].

With respect to Three-Factor model, while it partially addresses a major deficiency of the CAPM and provides a more accurate description of the returns on average, it does not serve as a panacea either (Gregory and Michou, 2009). The most important shortcoming is related to the theoretical underpinnings of the model. That is, the method employed to incorporate both the size (SMB) and the book to market (HML) factors is empirically driven and ad hoc in nature. In that sense, several academics argue that the three-factor model lacks a solid theoretical foundation to provide guidance of the underlying asset pricing process (Barberis and Thaler, 2003; Bornholt, 2007; Walkshausl and Lobe, 2014). Another important limitation of the three-factor model is associated with the momentum effect of stocks. The seminal work of Jegadeesh and Titman (1993) documents evidence that stocks with relatively good (poor) performance over the last 3 to 12 months continue to perform well (poor) over the following months. As noted by Fama and French (2004), however, the three-factor model cannot explain this momentum effect. Finally, several researchers criticize the inability of the Three-factor model to capture information about expected profitability (e.g., Frankel and Lee, 1998; Dechow et al., 1999; Piotroski, 2000). Specifically, they find that when portfolios are formed based on book to market or other

[67] According to Dhrymes et al. (1984), the relevant factors to be included are not constant. The authors provide evidence that the number of factors to be included in the APT model increases as the number of securities increases. Specifically, they show that when a group of 15, 30, 60, 90 securities are used, then the number of factors is two, three, six and nine, respectively.

[68] For example, Cheng (1996, p. 288) states: "*A particular factor may appear to be significant in one multivariate analysis, but not when other independent variables have been changed or when analysed alone in a univariate model, and vice versa."*

price ratios, stocks with higher expected cash flows tend to have higher average returns which are neglected by the Three-factor model.

Finally, while the Four-Factor model addresses the inability of its predecessor to capture the momentum effect, the incorporation of the additional factor is, still, empirically driven, rather than theoretically driven. Considering that the four-factor model merely adds an extra factor in the pre-existing three-factor model, it is also characterized by a lack of a solid theoretical framework that could provide guidance of the underlying asset pricing process. In addition, Fama and French (2004) claim that the momentum effect has a short-term duration and therefore, the addition of such a factor should not be relevant for estimates on the cost of equity capital.

Collectively, the *ex post* methods using asset pricing models are characterized by quite simplistic assumptions while they, also, lack a solid theoretical basis that guide of the underlying asset pricing process. In addition, the fact that average realized returns are utilised to infer the cost of equity is, also, problematic, since realised returns are considered to be a poor surrogate for expected returns (Elton, 1999; Fama and French, 2002; Subrahmanyam, 2010; Botosan et al., 2011; Easton and Monahan, 2016). In that sense, only limited inferences can be drawn by using such estimates. In this regard, Fama and French (1997, p.153; 2004, p.25) argue that estimates based on the CAPM are "*unavoidably imprecise",* and that the model is "*poor enough to invalidate the way it is used in applications"*[69]. In addition, Hail and Leuz (2006) further stress that *ex post* returns are noisy proxies as they are likely to capture external shocks to the firms' growth opportunities. Therefore, due to the aforementioned theoretical and practical issues associated with the *ex post* estimation models, the current study focuses on the more recently proposed approach which derives its estimations from forward-looking data. Section 5.2.2 below discusses in more detail.

5.2.2 The Use of Ex Ante Cost of Equity Estimations

To overcome the issues related to the theoretical and practical implementation of the *ex post* models, a substantial body of literature has introduced alternative estimations,

[69] Notwithstanding the theoretical and empirical criticism, CAPM still remains the standard for many practitioners in the private sector, while it also holds a pivotal place in the curriculum of contemporary investment programs (Fama and French, 2004; Damodaran, 2012; Berk and DeMarzo, 2014). In addition, CAPM has also been used, as a point of reference, in the validation process of different *ex-ante* cost of equity capital models (e.g., Botosan and Plumlee, 2005; Botosan et al., 2011).

commonly referred to as implied (*ex ante*) cost of equity capital. The main advantage of such approaches is that they do not rely on historically observable data (i.e., realised returns), rather they use forward-looking forecasted data for the estimation of cost of equity (Hou et al., 2012). The general idea lies in the fact that the cost of equity capital is calculated as the internal rate of return using a business valuation model, hence equating the firm's current market price with its present value of future earnings (Botosan, 2006). Extant equity market literature document evidence that implied cost of equity estimations, generally, outperform the traditional valuation measures in terms of predicting future returns or cross-sectional and time-series measurement-error variance (e.g., Pástor et al., 2008; Li et al., 2013; Lee et al., 2021). The most widely used implied cost of equity capital models are the ones constructed by Claus and Thomas (2001), Gebhardt et al. (2001), Easton (2004) and Ohlson and Juettner-Nauroth (2005) as implemented by Gode and Mohanram (2003). The former two are based on the Residual Income Valuation (RIV) model, which emphasises the firm's book value of equity and its corresponding book value growth, while the latter two are based on the Abnormal Earnings Growth (AEG) model, which focuses on firm's earnings and its subsequent growth in earnings. While they share several similarities, each of the four estimation models makes different assumptions and has implementations. The following sections discuss these in more detail.

5.2.2.1 Claus and Thomas (2001) model

The Claus and Thomas (2001) model constitutes one of the most prominent specifications with an extensive application within the accounting and finance research. To estimate the implied cost of equity, Claus and Thomas (2001) draw upon the residual income model and expresses the value of the firm as a function of its current book value and the discounted present value of its abnormal earnings (equation 5.5).

$$P_0 = B_0 + \sum_{t=1}^{5} \frac{AE_t}{(1+R_{CT})^t} + \frac{AE_5 * (1 + g_{AE})}{(1+R_{CT})^5 (R_{CT} - g_{AE})} \quad (5.5)$$

where P_0 represents the current market price of the firm's common stock, B_0 is the book value of equity, AE_t denotes the abnormal earnings in year *t* and are calculated as $AE_t = FEPS_t - R_{CT} * B_{t-1}$ where $FEPS_t$ correspond to the forecasted earnings per share, g_{AE} is the long-term growth beyond the fifth year and R_{CT} is the implied cost of equity.

As can be noticed from equation (5.5), Claus and Thomas (2001) model assumes a five-year detailed plan horizon for the calculation of the forecasted abnormal earnings. Also, to estimate the terminal value beyond the explicit five-year period, the model assumes that the forecasted abnormal earnings grow in line with the forecasted inflation which is proxied by the risk free interest rate (i.e., ten-year U.S. Treasury bond yield) minus 3%. Further the model assumes a dividend payout ratio of 50% while the future book value of equity is estimated in line with the notion of the clean-surplus (i.e., $B_t = B_{t-1} + FEPS_t - DPS_t$). Considering that the cost of equity, R_{CT}, appears in both numerators and denominators, it follows that equation (5.5) is a polynomial with multiple solutions. Thus, Claus and Thomas (2001) slightly transform it to equation (5.6) where the current price of the firm, P_0, is shifted to the right hand side and through an iterative process they solve for the unknown R_{CT} that reasonably satisfies the relationship.

$$0 = -P_0 + B_0 + \sum_{t=1}^{5} \frac{[FEPS_{t+1} - R_{CT} * B_{t-1}]}{(1+R_{CT})^t} + \frac{[FEPS_5 - R_{CT} * B_4] * (1 + g_{LT})}{(1+R_{CT})^5 (R_{CT} - g_{GLT})} \quad (5.6)$$

5.2.2.2 Gebhardt et al. (2001) model

The model proposed by Gebhardt et al. (2001) constitutes another important specification within the equity market literature. Similar to Claus and Thomas (2001), the Gebhardt et al. (2001) model apply a residual income model to estimate the implied cost of equity capital (equation 5.7).

$$P_0 = B_0 + \sum_{t=1}^{11} \frac{[FROE_t - R_{GLS}] * B_{t-1}}{(1+R_{GLS})^t} + \frac{[FROE_{12} - R_{GLS}] * B_{11}]}{(1+R_{GLS})^{11} * R_{GLS}} \quad (5.7)$$

As can be noticed from (5.7), this model also assumes clean surplus relation, thus allowing the share price to be expressed as a function of the forecasted returns on equity and book values. The Gebhardt et al. (2001) model assumes an explicit forecast period of three years. For the period beyond the third year and up to the twelfth year, it assumes that the forecasted return on equity gradually decays to the median industry return on equity, while it remains constant thereafter. For the calculation of the industry median, the industries are defined according to the Fama and French (1997) classification and the median is calculated over the last ten years. Also, the model assumes zero growth in its terminal value. Similar to Claus and Thomas (2001), Gebhardt et al. (2001) model's does

not provide a straightforward solution for the cost of equity, R_{GLS}. Thus, equation (5.7) is slightly transformed to equation (5.8) where the current price of the firm, P_0, is shifted to the right hand side and through an iterative process it is solved for the unknown R_{GLS} that reasonably satisfies the relationship.

$$0 = -P_0 + B_0 + \sum_{t=1}^{11} \frac{[FROE_t - R_{GLS}] * B_{t-1}}{(1+R_{GLS})^t} + \frac{[FROE_{12} - R_{GLS}] * B_{11}]}{(1+R_{GLS})^{11} * R_{GLS}} \quad (5.8)$$

5.2.2.3 Ohlson and Juettner (2005) model

Another prominent model within the equity market literature is the Ohlson and Juettner (2005) as implemented by Gode and Mohanram (2003). Unlike the previous two models, this model is based on the Abnormal Earnings Growth (AEG) model which focuses on firm's earnings and its subsequent growth in earnings. Specifically, it does not require the consideration of book values or the forecasted earnings beyond the second year. Equation (5.9) below describes the model.

$$R_{OJN} = \mathrm{A} + \sqrt{A^2 + \left(\frac{FEPS_1}{P_0}\right) * (g_2 - g_{LT})}\,, (5.9)$$

$$with\ \mathrm{A} = 1/2\left[(g_{LT}) + \frac{FDPS_1}{P_0}\right]$$

Where P_0 represents the current market price of the firm's common stock, g_2 represents the short-term growth on earnings calculated as the average percentage change in the forecasted analyst earnings, g_{LT} denotes the long-term growth rate calculated as the risk free interest rate (i.e., ten-year U.S. Treasury bond yield) minus 3% and R_{OJN} is the implied cost of equity.

5.2.2.4 Easton (2004) model

Similar to Ohlson and Juettner (2005) model, the Easton (2004) model does not require the consideration of book values or the forecasted earnings beyond the second year. It allows the share price to be expressed as a function of expected dividend and one-year-ahead and two-year-ahead earnings forecasts. Easton (2004) model assumes an explicit forecast

horizon of two years, while beyond this period the abnormal earnings grow at a constant rate. Equation (5.10) below describes the model.

$$R_{MPEG} = \mathrm{A} + \sqrt{A^2 + \left(\frac{FEPS_2 - FEPS_1}{P_0}\right)} \quad (5.10)$$

$$with\ \mathrm{A} = \left[\frac{FDPS_1}{2P_0}\right]$$

where P_0 represents the current market price of the firm's common stock, $FEPS_2$ and $FEPS_1$ correspond to the forecasted earnings for year two and one respectively, $FDPS_1$ represents the forecasted dividend and R_{MPEG} is the implied cost of equity.

5.2.3 Limitations of Individual Implied Cost of Equity Metrics and Alternative Suggestions

While cost of equity estimates relying on forward-looking data (i.e., analyst forecasts) overcome issues associated with estimates based on realised stock returns or theoretically "insufficient" asset pricing models such as CAPM, subsequent studies suggest that such estimates are not without shortcomings, either. One major concern relates to the assumptions underpinning each of the widely used *ex ante* cost of equity models. That is, each model is sensitive to alternative underlying assumptions or implementation approaches which inevitably can lead to spurious inferences and measurement errors about the cost of equity. For example, they are highly sensitive to assumptions regarding the growth rate in perpetuity. Considering that analysts typically provide short-term earnings forecasts and long-term growth forecasts up to five years, assumptions about the perpetual growth of earnings beyond analysts' forecast horizon are relatively arbitrary, simplified and, inevitably, prone to measurement error and bias (Easton and Monahan, 2005; Chen et al., 2011). Another main concern is associated with the relatively mixed evidence regarding the variation in the level of associations among the *ex ante* cost of equity estimates of the individual models and several common risk-related proxies such as beta, leverage, size or book-to-market ratio. For instance, Dhaliwal et al. (2006) find that long term growth rate forecasts are negatively associated with the cost of equity when the estimate is based on Gebhardt et al. (2001), while they document a positive association when the estimate is based on Easton (2004) and Ohlson and Juettner-Nauroth (2005). In a similar vein, prior equity market research documents controversial results with regards to the estimate derived from the Gebhardt et al. (2001) model. Specifically, while Guay et al.

(2005) find that it constitutes the optimal predictor of expected returns, the analysis of Botosan and Plumlee (2005) indicates that the estimate derived from the Gebhardt et al. (2001) model is not consistently associated with several risk proxies.

Apparently, there is little consensus to date as to which individual model constitutes the best option as well as how these models could be evaluated (Chen et al., 2011; Lamoreaux et al., 2020). To alleviate limitations associated with the use of only one specific model, prior research within the equity market context adopts different alternative approaches for capturing a less imprecise cost of equity estimate. The use of the firm-level arithmetic average estimate constitutes the most prominent approach (see for example, Hail and Leuz, 2006; Dhaliwal et al., 2006; Dhaliwal et al., 2007; Chen et al., 2011; Boubakri et al., 2010; Hou et al., 2012; Boubakri et al., 2012; Dhaliwal et al., 2016a; Imhof et al., 2017; Fu et al., 2020; Lamoreaux et al., 2020). Specifically, this approach calculates the individual implied cost of equity estimates that derive from the Claus and Thomas (2001), Gebhardt et al. (2001), Easton (2004), and Ohlson and Juettner-Nauroth (2005) models and then calculates the mean from the various results obtained.

Another alternative proposed by Hou et al. (2012) suggests the use of mechanical forecasts. This approach uses cross-sectional models to generate mechanical earnings forecasts based on historically observable accounting data. The main advantage of mechanical forecasts lies in the fact that it generates earnings forecasts even for firms that are smaller and younger, and they are not covered by analysts, thus increasing the number of potential firm-year observations. While its intuitive appeal, this approach has been criticized from both an empirical and a conceptual perspective. Empirically, Li and Mohanram (2014; p. 1152) state that "*forecasts from the HVZ [Hou et al. 2012] model perform worse than those from a naïve random walk model and the ICCs show anomalous correlations with risk factors*". Further, on a conceptual level, mechanical earnings forecasts are based on historically observable accounting data rather than forward-looking data, thus abandoning the main proposition that underpins the *ex ante* cost of equity models.

A third alternative proposed by two concurrent studies (Larocque, 2013; Mohanram and Gode, 2013) suggests the adjustment/removal of predictable errors from analysts' forecasts. Under this approach, analyst forecast errors are regressed on a number of variables that are argued to be predictors of those errors (e.g., prior's year accruals, long-

term growth rate, stock returns, equity market value, to name a few) and then by using the estimated coefficients from the regression, the errors for one-year ahead and two-year-ahead earnings are predicted and adjusted. On a conceptual level, this approach addresses a major limitation in the calculation of cost of equity estimates by removing the noise in analyst forecasts and thus correcting for any associated bias and measurement errors. In practice, however, this approach is not without flaws. As noted by Easton and Monahan (2016), while such an approach is effective in removing forecast errors for models based on forecasts of earnings level such as Claus and Thomas (2001) and Gebhardt et al. (2001) models, it is less effective in removing errors for models based on forecasts of earnings changes such as Easton (2004) and Ohlson and Juettner-Nauroth (2005) models. In contrast to the aforementioned alternatives that are based on a firm-level analysis, another approach proposed by equity market literature involves the portfolio-level analysis (e.g., Nekrasov and Ogneva, 2011). The main advantage of the portfolio-level approach lies in the fact that the implied cost of equity and growth rate are estimated simultaneously, thus not requiring any arbitrary or sensitive assumptions about them. In practice, however, firm-specific implied cost of equity estimates are required. In that sense, additional assumptions regarding both risk and growth rates are prerequisite for the estimation of individual cost of equities through the portfolio-based estimates.

In summary, several alternative approaches attempt to address estimation issues and limitations associated with the use of individual implied cost of equity models. As discussed earlier, however, none of these approaches are flawless, and therefore there is no explicit agreement as to which approach should be followed. Arguably, most of the studies calculate the individual implied cost of equity estimates that derive from the Claus and Thomas (2001), Gebhardt et al. (2001), Easton (2004), and Ohlson and Juettner-Nauroth (2005) models and then employ their arithmetic average. In that sense, this method can be considered as an implicit consensus within the relevant literature. Thus, the current study, also, employs the average estimate derived from the four main cost of equity capital models.

5.3 Research Design

5.3.1 Sample and Data Selection Process

The sample used in this study is drawn from the intersection of four databases: WRDS Supply Chain with IDs (Compustat Segment), Compustat Annual Fundamentals, Center

for Research in Security Prices (CRSP) and Institutional Brokers Earnings Services (IBES). First, considering that the focus of the current thesis lies within the supplier-customer setting, firms with an established supplier-customer relationship are identified[70]. This information is compiled in the WRDS Supply Chain with IDs (Compustat Segment) database[71], through which the initial supplier-customer-year observations population is obtained. This provides 96,547 observations for the period 1983-2016[72]. Next, 20,630 and 21,378 supplier-customer-year observations for which supplier firms do not document any sales to their corresponding customers (i.e., information is missing) and for which supplier firms voluntary incorporate information about customers with purchases less than the regulatory threshold of 10% are removed. This exclusion leaves the sample with 54,539 supplier-customer-year observations. Then, the aforementioned sample is matched with the Compustat Annual Fundamentals to obtain the auditor appointed for the supplier firms and its corresponding major customers. Due to missing or unidentified auditor data, 10,469 observations are removed, thus leaving a sample of 44,070 supplier-major customer-year observations. At this point, it should be noted that the format of data in the WRDS Supply Chain with IDs (Compustat Segment) database corresponds to supplier-major customer-year observations (i.e., the same supplier is reported as many times as its corresponding major customer within the same year). In line with prior literature (e.g., Kim et al., 2015; Dhaliwal et al., 2016a), these data are transformed into unique supplier-major customer-year observations with common auditor (see Appendix A for the transformation details). This process results in 31,532 supplier-year observations.

Further, firms outside of the U.S., even if they are not required to disclose such information and abide by the U.S. regulations, they might provide information about their major business partners as a form of voluntary disclosure. Thus, 1,900 supplier-year

[70] As discussed in section 4.2.2, U.S. regulators and standard setters (i.e., FASB and SEC) mandate that public firms must disclose information about their major customers in order to enhance the decision-usefulness of financial reporting.

[71] Cen et al. (2017) provide an updated version of Compustat Segment database. Prior to the modification/addition in WRDS by Cen et al. (2017), the information for suppliers' major customer(s) was limited. For instance, major customer's name was reported without any unique identifiers and/or there were many cases where customer's name was listed in an abbreviated format (i.e., "WMRT" instead of Walmart). Hence, the data could not be used without significant processing and data cleaning following the algorithm matching as per Fee and Thomas (2004) and Luo and Nagarajan (2015).

[72] While data in the WRDS Supply Chain with IDs (Compustat Segment) starts from 1977, coverage prior to 1983 is rather limited compared to the following years. Therefore, the starting point of the current sample selection commences in 1983. Also, during the time of collection of the current sample (i.e., 2019), data availability after 2016 was relatively imbalanced compared to prior years. That is, while, on average, each year has 2,875 number of observations between 1983-2016 in the WRDS Supply Chain with IDs (Compustat Segment), the available data for the year of 2017 was only 558. Therefore, the ending point of the current sample selection is set at 2016 (i.e., the last year with fully available data at the time of collection).

observations that correspond to non-U.S. supplier firms which provide information about their major customers are excluded. This elimination drops the sample to 29,632 supplier-year observations. Next, 1,733 supplier-year observations from the financial and the utility sectors (SIC code 6000-6999 and SIC code 4900-4999) are removed, as these are subject to different credit decisions and regulation requirements that makes them not directly comparable to the rest of the firms (e.g., Pittman and Fortin 2004). This leaves the sample at 27,899 supplier-year observations.

To obtain the relevant data required for the calculations of the implied cost of equity, CRSP and IBES databases are used as well. First, the above remaining dataset is merged with CRSP (stock price data) using the CRSP/Compustat Merged-Fundamentals Annual module in WRDS which provides linking identifiers between CRSP and Compustat (i.e., LPERMNO and GVKEY, respectively). During this process, 4,520 observations are not matched. In addition, 2,749 observations are removed due to missing and negative stock pricing data, thus collectively leaving a sample of 20,630 supplier-year observations. Next, analysts' earnings forecasts are obtained from IBES as provided by Datastream Thomson Reuters and they are measured with the consensus (median) annual EPS forecast. Since a readily available link between IBES and one of the above databases does not exist, the merging process is conducted through CUSIP and ISIN identifiers. By doing so, 2,607 observations for which the supplier firm could not be identified in the IBES database are dropped. Further, 4,259 observations with missing one-year and two-year ahead EPS consensus forecasts are excluded as such data is necessary for the estimation of the implied cost of equity across all metrics. Similarly, 3,290 observations with negative missing one-year and two-year ahead EPS consensus forecasts are dropped. Finally, 2,701 observations with missing key data items for the calculation of control variables are also removed, thus leaving a final sample of 7,773 supplier-year observations for which at least one cost of equity capital measure can be estimated. Table 5.1 summarizes the sample selection process.

Table 5.1 Sample Selection Process

Initial data from CS from 1983 - 2016 (Compustat - Segment database)	96,547
Less:	
Customers with zero sales	20,630
Customers with less than 10% purchases	21,378
Observations with missing/unidentified auditor data	10,469
Customer/Supplier/year observations	44,070
Convert to unique supplier/year observations*	31,532
Less:	
Non-US suppliers	1,900
Financial (SIC 6000 - 6999) and Utilities (4900-4999) firms	1,733
Missing identifiers (linkage) in CRSP database	4,520
Missing and negative price data from CRSP database	2,749
Missing identifiers (linkage) in I/B/E/S database	2,607
Missing EPS1 and EPS2 consensus forecasts	4,259
Negative EPS1 and EPS2 consensus forecasts	3,290
Missing key data estimates for control variables	2,701
Final Sample	**7,773**

*See example of conversion in Appendix A

5.3.2 Model Specification

The hypothesis related to this chapter, (H1a), predicts an association between the presence of a common auditor among a supplier and its major customers and the supplier's implied cost of equity capital (see also section 4.5.1). To test this hypothesis, the following regression model is estimated as appropriate:

$$COE = CA + Firm\_Specific\_Characteristics + Supply\_Chain\_Specific\_Characteristics + Auditor\_Specific\_Characteristics + Equity\_Specific\_Characteristics + (Industry, Year)\_Fixed\_Effects + \varepsilon \quad (5.11)$$

5.3.2.1 Dependent Variable

The dependent variable, *COE*, is the implied cost of equity. While several models for the estimation of the implied cost of equity have been proposed, each of them is subject to

various assumptions and they are highly sensitive to measurement error and bias. Following the discussion in Section 5.2.2.5, the current study starts with the estimation of the individual implied cost of equity measures that derive from the four main accounting-based valuation models developed by Claus and Thomas (2001), Gebhardt et al. (2001), Easton (2004) and Ohlson and Juettner-Nauroth (2005). Next, in line with extant literature (e.g., Attig et al., 2013; Ferris et al., 2017; Gupta et al., 2018; Attig and Ghoul, 2018; Rijba et al., 2021), the implied equity risk premium is calculated by subtracting the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds) from each of the aforementioned cost of equity estimates, denoted as *ICC_CT*, *ICC_GLS*, *ICC_MPEG* and *ICC_OJN*, respectively[73]. Finally, the arithmetic average of those four estimates as the main estimated cost of equity, denoted as *ICC_AVG* (e.g., Attig et al., 2013; Ferris et al., 2017; Gupta et al., 2018; Attig and Ghoul, 2018; Rijba et al., 2021).

5.3.2.2 Main Independent and Control Variables

Drawing upon the wider literature that examines common auditor effects among related firms (e.g., Cai et al. 2016; Dhaliwal et al. 2016b; Sun et al. 2020), the independent variable of primary interest, *CA*, is defined as an indicator variable that equals to 1 if the supplier firm shares the same audit firm with at least one of its major customers, and 0 otherwise[74].

Further, a series of firm-related variables that have been found to be associated with firms' cost of equity are included in the model in equation (5.1) as control variables. First, to control for firm's size, *LN_MV* variable is employed, respectively. *LN_MV* is defined as the natural logarithm of the total market value of equity. Given that larger firms are more diversified and are characterised by lower information asymmetry, a negative association between firm's size and the cost of equity is expected (e.g., Dhaliwal et al., 2016a; Aghazadeh et al., 2018; Gupta et al., 2018). Second, to control for the firm's level of leverage and probability of default, *LEV* and *MOD_Z* variables are included, respectively.

[73] As discussed in section 5.2.2, for some of the models the calculation of the implied cost of equity is not straightforward, as they are polynomial equations. The current study adopts the "moremata" function in Stata as described in Veenman (2019, p.83-84) which applies the matrix programming language mata to solve for the implied cost of equity.

[74] In section 5.5.2.4 two alternative definitions are utilised to capture the common auditor presence: *NUM_CA* and *PERC_CA*. The first proxy is an integer variable that counts the total number of common auditors between a supplier firm and all of its major customer(s) in a given year. The second proxy constitutes a continuous variable that measures the percentage of common auditors between the supplier firm and its major customer(s). Specifically, it is defined as the total number of common auditors between the supplier firm and its major customer(s) divided by total number of supplier's major customers for each year.

LEV is estimated as the ratio of firm's long-term debt to total assets while *MOD_Z* is the adjusted Altman's Z-score, excluding the ratio of market value of equity to book value of total debt. Higher financial leverage is associated with increased costs of financial distress, and therefore a positive relationship between leverage and cost of equity is anticipated. Also, firms with higher Z-score are associated with better financial health, which, in turns, translates into lower default risk, and thus a negative relationship between firm's adjusted Altman's Z-score and cost of equity capital is expected (e.g., Amin et al., 2014; Aghazadeh et al., 2018).

Furthermore, the current study controls for firm's financial performance (*PROF*) and book to market ratio (*LN_BTM*). *PROF* is calculated as the earnings before interest, taxes, depreciation, and amortization divided by lagged total assets. Firms with better financial and stock performance are associated with lower cost of equity, and therefore a negative association between the two variables is expected (Fu et al., 2020). In turn, *LN_BTM,* is calculated as the natural logarithm of the ratio of book value of equity over market value of equity. As shown in Gebhardt et al. (2001), firms with higher book to market ratio earn abnormally higher ex post returns. Thus, a positive association is predicted. The current study, also, controls for the ratio of book value of cash and marketable securities to the book value of total assets (*CASH*). In line with Quang (2020), a negative association with the cost of equity is expected.

In addition, considering that the focus of the current study lies within the context of supply chain, an important aspect to control for is the degree of reliance of supplier firms over their major customers. Following prior literature (e.g., Patatoukas, 2012; Dhaliwal et al., 2016a), an application of the Herfindahl-Hirschman Index is constructed to capture the customer concentration for each supplier firm (*CC*). In line with Dhaliwal et al. (2016a), a positive relationship between the customer concentration and cost of equity capital is anticipated.

Next, a set of auditor-specific characteristics are included. Particularly, *TENURE*, *SPECIAL* and *BIG* variables are incorporated to control for auditor's independence and competency. *TENURE* captures the auditor-client relationship, measured in number of years, *SPECIAL* is an indicator variable that equals to 1 if the supplier firm is audited by an industry specialist auditor, and 0 otherwise and BIG is an indicator variable that equals to 1

if the supplier firm appoints a Big-N audit firm, and 0 otherwise[75]. Boone et al. (2008) report a positive association between auditor's tenure and cost of equity capital. Similarly, prior literature (e.g., Khurana and Raman, 2004; Knechel et al., 2007; Krishnan et al., 2013) shows that when an industry specialist or a Big N audit firm is appointed, the rate of return required by investors decreases. Thus, a negative relationship between those three auditor-specific variables and the cost of equity capital is expected.

In addition, the current study controls for three properties of analyst forecasts, namely forecast dispersion (*DISP*), long-term growth in earnings forecasts (*LTG*) and forecast bias (*F_BIAS*) as they can explain cross-sectional variations in the equity risk premium (Gebhardt et al., 2001; Dhaliwal et al., 2006). *DISP* is calculated as the standard deviation of one-year-ahead earnings forecasts, *LTG* represents the mean long-term growth forecast and *F_BIAS* is measured as the difference between the one-year-ahead mean earnings forecast and realised earnings deflated by the June-end stock price. In line with prior equity market literature, a positive association between the three analyst-specific variables and the cost of equity capital is anticipated (e.g., Boubakri et al., 2010; Ghoul et al., 2012).

Further, consistent with prior research (e.g., Krishnan et al., 2013; Imhof et al., 2017; Lamoreaux et al., 2020), the current study controls for the stock market beta calculated over the 36 months preceding the measurement of the average cost of equity (*BETA*), the idiosyncratic risk measured as standard deviation of the residuals of the market model using monthly returns over the 36 months preceding the measurement of the average cost of equity (*IDIOS*) and the twelve-month buy-and-hold stock return (*S_RET*). Market beta (*BETA)* and idiosyncratic risk *(IDIOS)* are expected to yield a positive association with the cost of equity, while stock returns (*S_RET*) are expected to load a negative relationship with the cost of equity (e.g., Krishnan et al., 2013; Imhof et al., 2017; Lamoreaux et al., 2020).

Finally, industry (one digit SIC codes) and year dummy variables are included to control for potential differences across industries and years, respectively. Additionally, all continuous variables are winsorised at the 1st and 99th percentiles to reduce the effect of outliers. Also, all models are estimated using heteroskedasticity robust standard errors, adjusted to account for correlations within firms' clusters (White, 1980; Petersen, 2009). A

[75] Considering that the sample period spans from the late-1980s, as Big- N audit firms are considered the following: Arthur Andersen; Arthur Young; Coopers & Lybrand; Ernst & Young; Deloitte & Touche; KPMG Peat Marwick; PriceWaterhouseCoopers; Touche Ross and merged entities between them.

summary of all variable definitions and measurements used in the current study can be found in Appendix B.

5.4 Univariate Analysis

5.4.1 Summary Statistics and Correlations of the Implied Cost of Equity

Table 5.2 documents the descriptive statistics for the average and the four individual implied cost of equity metrics employed. Panel A reports the summary statistics of the implied cost of equity metrics. In general, the summary results are consistent with the prior literature. Specifically, the mean (median) value of the *ICC_AVG* is 5.23% (4.43%) which is similar to the mean (median) of 5.1% (4.7%) reported in Gupta et al. (2018). The mean (median) values of the excess cost of equity for the four different measures *ICC_CT*, *ICC_GLS*, *ICC_OJN* and *ICC_MPEG* are 6.05% (4.88%), 0.81% (0.28%), 7.06% (6.14%) and 7.08% (5.99%), respectively[76,77]. Likewise, these figures are in line with the results reported by Chen et al. (2011), Dhaliwal et al. (2016a) and Gupta et al. (2018). Panel B of Table 5.2 reports the pairwise Pearson (below diagonal) and Spearman (above diagonal) correlations between the four individual and the average implied cost of equity metrics. The lowest correlation coefficients are observed among *ICC_GLS* and *ICC_CT* metrics (0.557) and between *ICC_GLS* and *ICC_MPEG* metrics (0.543) for Pearson and Spearman tests, respectively. Further, the *ICC_CT* and *ICC_GLS* exhibit lower correlation coefficients with the *ICC_AVG* compared to *ICC_OJN* and *ICC_MPEG* which is also comparable to the findings documented by prior studies (e.g., Dhaliwal et al., 2006; Ghoul et al., 2011; Chen et al., 2011; Dhaliwal et al., 2016a; Gupta et al., 2018). More importantly, all metrics are positively correlated with each other, and they are statistically significant at the 1% level. These results suggest that the information captured by the four individual implied cost of equity metrics is similar, thus providing further confirmation regarding the internal validity of the different metrics and the robustness of the average metric employed.

[76] Consistent with prior literature (e.g., Botosan and Plumlee, 2005; Hail and Leuz, 2006; Dhaliwal et al., 2006; Ghoul et al., 2011; Dhaliwal et al., 2016a; Gupta et al., 2018), the models that are based on Claus and Thomas (2001) and Gebhardt et al. (2001) specifications generate, on average, lower cost of equity premiums compared to the ones based on Easton (2004) and Ohlson and Juettner-Nauroth (2005).

[77] Ferris et al. (2017) and Gupta et al. (2018) also report a negative value in the 25th percentile of the *ICC_GLS*. This is not surprising given that the cost of equity metrics are estimated as the implied cost of equity minus the risk-free rate.

Table 5.2 Descriptive Statistics for Implied Cost of Equity Measures

Panel A: Summary statistics for implied cost of equity measures

	Mean	25th Perc	Median	75th Perc	SD
ICC_AVG	0,0523	0,0218	0,0443	0,0685	0,0528
ICC_CT	0,0605	0,0197	0,0488	0,0788	0,0660
ICC_GLS	0,0081	-0,0191	0,0028	0,0276	0,0401
ICC_OJN	0,0706	0,0353	0,0614	0,0893	0,0653
ICC_MPEG	0,0708	0,0292	0,0599	0,0969	0,0706

Panel B: Pairwise correlation matrix for implied cost of equity measures

	ICC_AVG	*ICC_CT*	*ICC_GLS*	*ICC_OJN*	*ICC_MPEG*
ICC_AVG	1	0.825***	0.726***	0.934***	0.902***
ICC_CT	0.808***	1	0.546***	0.669***	0.576***
ICC_GLS	0.786***	0.557***	1	0.573***	0.543***
ICC_OJN	0.945***	0.645***	0.703***	1	0.960***
ICC_MPEG	0.905***	0.565***	0.606***	0.890***	1

Table 5.2 reports the descriptive statistics for the implied cost of equity measures. Panel A reports the summary statistics for the average and the four individual implied cost of equity measurements. Panel B reports the pairwise Spearman (top) and Pearson (bottom) correlations among the four individual and the average implied cost of equity measurements employed. *ICC_AVG*, is calculated as the mean of *ICC_CT* (Claus and Thomas, 2001), *ICC_GLS* (Gebhardt et al., 2001), *ICC_MPEG* (Easton, 2004) and *ICC_OJN* (Ohlson and Juettner-Nauroth (2005). For all implied cost of equity measures, the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds) is deducted. Variables are winsorized at the top and bottom 1 percent. Detailed definitions for the variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.4.2 Validation of the Implied Cost of Equity

An important aspect of research conducted within the equity market context lies on the assessment of the validity of the implied cost of equity metrics employed (Echterling et al., 2015). As shown in Table 5.2, the univariate analysis provides a good indication that the metrics employed are reliable and consistent with prior literature. While this is a standard practice in contemporary accounting and finance literature, it might serve as an implicit validation. For an explicit validation, earlier studies suggest the examination of the associations between the cost of equity metric employed and commonly assumed risk factors such as firm's size, financial leverage, book to market ratio, beta, idiosyncratic risk, analyst forecast bias and dispersion (e.g., Botosan and Plumlee, 2005; Hail and Leuz, 2006; Hope et al., 2009). Following this stream of literature, the current study, also, evaluates explicitly the validity of the main cost of equity metric *(ICC_AVG)* by regressing it against those risk proxies. Table 5.3 reports the regression results.

In line with Hail and Leuz (2006), the different risk factors are successively incorporated across three different models (Columns (I)-(III)). As shown in Table 5.3, the

associations of risk proxies reported across all specifications are generally consistent with prior research (e.g., Botosan and Plumlee, 2005; Hail and Leuz, 2006; Hope et al., 2009). Specifically, firm size loads a negative and significant association while all the rest variables report a positive and significant association with cost of equity capital. Notably, the magnitude of the adjusted R-squared increases from 0.145 to 0.267 with the inclusion of the additional risk proxies, thus suggesting that the model explains better the variation in the implied cost of equity capital. Collectively, the evidence documented in Table 5.3 suggests that the *ICC_AVG* relates to risk factors in a predictable manner, thus providing a reasonable validation that the employed cost of equity metric in the current study constitutes a reliable proxy for the unobservable *ex ante* cost of equity.

Table 5.3 Validation of Average Implied Cost of Equity Metric Against Risk Proxies

Variables	(I)	(II)	(III)
LN_MV	-0.0070***	-0.0036***	-0.0027***
	(-10.54)	(-5.10)	(-4.19)
LEV	0.0383***	0.0409***	0.0314***
	(5.27)	(5.81)	(4.97)
LN_BTM	0.0103***	0.0168***	0.0154***
	(5.40)	(8.71)	(9.04)
BETA		0.0033***	0.0028***
		(3.37)	(3.11)
IDIOS		0.1819***	0.1446***
		(7.82)	(6.93)
DISP			0.0030**
			(2.40)
F_BIAS			0.2345***
			(11.53)
Constant	0.0696***	0.0414***	0.0345***
	(9.49)	(4.54)	(4.04)
Observations	7,773	7,773	7,773
Adjusted R-squared	0.145	0.178	0.267
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes

Table 5.3 reports the association between the employed implied cost of equity metric *ICC_AVG* and several risk proxies. *ICC_AVG*, is calculated as the mean of *ICC_CT* (Claus and Thomas, 2001), *ICC_GLS* (Gebhardt et al., 2001), *ICC_MPEG* (Easton, 2004) and *ICC_OJN* (Ohlson and Juettner-Nauroth (2005). For all implied cost of equity measures, the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds) is deducted. Variables are winsorised at the top and bottom 1 percent. Detailed definitions for the variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.4.3 Summary Statistics of Common Auditor and Control Variables

Next, Table 5.4 provides the descriptive statistics for the control variables used in the main regression models. As can be noticed, around 28 percent of the supplier firms in the full sample have at least one common auditor with their major customers *(CA)*. This is consistent with the proportions reported by Dhaliwal et al. (2016b). With regards to firm-specific characteristics, the mean and median of suppliers' firm size *(MV)* are 4.5 billion and 643 million U.S. dollars, respectively. On average, the sample firms have a book-to-market (*BTM*) and long-term debt *(LEV)* to total asset ratios of 59% and 18.6%, correspondingly. In addition, the descriptive statistics for profitability *(PROF)* measurement show that for the sample firms, slightly over 7% of total assets are, EBITDA. Further, the ratio of cash/marketable securities (*CASH*) over total assets for the sample firms is, on average, 20%. Moreover, the mean (median) values of the default probability *(MOD_Z)* and customer base concentration *(CC)* for the sample firms are 2.01 (2.05) and 7.8% (4.0%). Further, the average period of audit tenure (*TENURE*) is approximately 9 years, while around 26 and 94 percent of the sample firms appoint an industry specialist auditor (*SPECIAL*) and a Big N auditor *(BIG)*, respectively.

Turning the focus on the market- and analyst-specific characteristics, summary statistics are descriptively similar to prior literature within the U.S. equity market context (e.g., Dhaliwal et al., 2006; Ghoul et al., 2011; Dhaliwal et al., 2016a; Aghazadeh et al., 2018; Gupta et al., 2018; Imhof et al., 2017; Fu et al., 2020). Specifically, the mean and median values of the long-term growth rate *(LTG)* are 17.8% and 15%, respectively. Further, the average systematic market risk *(BETA)* and idiosyncratic risk *(IDIOS)* are, 1.35 and 0.12, correspondingly. Moreover, the mean values of analyst forecast dispersion *(DISP)* and bias (*F_BIAS*) are around 12% and 2%, respectively. Finally, the mean and median values of stock returns (*S_RET*) are 13.9% and 16.7%, respectively.

Table 5.4 Descriptive Statistics for Common Auditor and Control Variables

Variables	N	Mean	25th Perc	Median	75th Perc	SD
CA	7,773	0.2838	0.0000	0.0000	1.0000	0.4509
MV	7,773	4577,8818	206.3075	643.3279	2,327.8257	17,003.8440
LEV	7,773	0.1867	0.0162	0.1641	0.3071	0.1695
MOD_Z	7,773	2.0160	1.2914	2.0505	2.7396	1.1930
PROF	7,773	0.0769	0.0276	0.0684	0.1215	0.1129
BTM	7,773	0.5913	0.3927	0.5853	0.7713	0.2575
CASH	7,773	0.1985	0.0305	0.1264	0.3146	0.2020
CC	7,773	0.0788	0.0196	0.0400	0.0870	0.1094
TENURE	7,773	8.7212	4.0000	7.0000	12.0000	6.7780
BIG	7,773	0.9379	1.0000	1.0000	1.0000	0.2414
SPECIAL	7,773	0.2639	0.0000	0.0000	1.0000	0.4408
LTG	7,773	17.8024	11.5000	15.0000	21.5000	9.0726
DISP	7,773	0.1250	0.0187	0.0420	0.1028	0.9233
F_BIAS	7,773	0.0178	0.0006	0.0060	0.0165	0.0681
BETA	7,773	1.3508	0.7213	1.2084	1.8266	0.9764
IDIOS	7,773	0.1202	0.0780	0.1074	0.1500	0.0583
S_RET	7,773	0.1391	-0.0291	0.1679	0.2523	0.2224

Table 5.4 reports the descriptive statistics on the main variables employed. Continuous variables are winsorised at 1% and 99%. Detailed definitions for the variables can be found in Appendix B.

5.4.4 Summary Statistics of the Partitioned Sample

Considering that the sample consists of supplier firms with and without common auditor with their major customers, in Table 5.5, the full sample is partitioned into the two sub-samples to allow for a first stage comparison of the data. In particular, Panel A illustrates the summary statistics for firms that have at least one common auditor with their major customers, while Panel B depicts the summary statistics for those firms that do not have a common auditor with their major customers. Further, Panel C, reports the results of tests for the mean (T-test) and median (Mann-Whitney test) differences between the two sub-samples.

As shown in Panels A and B, the mean value of the average implied cost of equity metric *(ICC_AVG)* for the sub-sample with common auditor is higher compared to the corresponding mean for the sub-sample without common auditor (5.50% vs 5.13%). Similar results are also reported within the median values between the two sub-samples (4.57% vs 4.39%). More importantly, both parametric (T-test) and non-parametric (Mann-Whitney test) comparison tests, in Panel C, indicate that the mean and median differences are statistically significant at 5% and 1% level of confidence, respectively. Hence, the results from the univariate comparison provide preliminary support of the validity of H1a,

and more specifically they are consistent with the notion that equity market participants (i.e., investors) negatively perceive the presence of common auditors between supplier firms and their major customers. In addition, the preliminary findings are in line with the evidence documented within the debt-financing context (Chapter 6).

With respect to the control variables, Table 5.5 shows that the sub-sample with common auditor consists of larger (6.8881 vs 6.5266), less leveraged (0.1828 vs 0.1883) and relatively less profitable (0.0746 vs 0.0779) firms compared to the non-common auditor sub-sample. In addition, firms with at least one common auditor tend to hold more cash cash/marketable securities (0.2185 vs 0.1905), have higher probability of being default (1.9008 vs 2.0616), higher level of dependency over their major customers (0.0874 vs 0.0753), lower book to market ratio (-0.6715 vs -0.6338)[78], longer audit firm tenure (8.7375 vs 8.7147) and appoint more frequently larger (0.9982 vs 0.9140) and industry specialist auditors (0.3939 vs 0.2123) compared to those that do not share a common auditor with their major customers. Finally, the firms within the common auditor sub-sample are shown to have higher forecast bias (0.0185 vs 0.0176), systematic and idiosyncratic risk (1.3839 vs 1.3376 and 0.1217 vs 0.1196), stock returns (0.1467 vs 0.1361), and lower long-term growth forecast rate (17.5854 vs 17.8883) and analyst forecast dispersion (0.1186 vs 0.1275).

[78] The negative figures are due to the fact that they are expressed as the natural logarithm of book to market ratio and that the actual value of the book to market ratio stands below the value of one (for similar results see Ferris et al., 2017).

Table 5.5 Descriptive Statistics: Partitioning the Sample and Differences

	Panel A Common Auditor (N=2,206)					Panel B Non-Common Auditor (N=5,567)					Panel C Differences	
Variables	Mean	25th Perc	Median	75th Perc	SD	Mean	25th Perc	Median	75th Perc	SD	Mean	Median
ICC_AVG	0.0550	0.0240	0.0457	0.0705	0.0543	0.0513	0.0210	0.0439	0.0678	0.0522	0.0037**	2.739***
LN_MV	6.8881	5.6602	6.7633	7.9252	1.7177	6.5266	5.2056	6.3335	7.6883	1.7459	0.3615***	8.543***
LEV	0.1828	0.0097	0.1549	0.3077	0.1697	0.1883	0.0181	0.1679	0.3064	0.1694	-0.0055	-1.543
MOD_Z	1.9008	1.1479	1.8729	2.6318	1.2009	2.0616	1.3598	2.0981	2.7862	1.1869	-0.1608***	-6.346***
PROF	0.0746	0.0221	0.0654	0.1226	0.1191	0.0779	0.0300	0.0696	0.1213	0.1104	-0.0033	-1.964**
LN_BTM	-0.6715	-0.9761	-0.5497	-0.2638	0.5488	-0.6338	-0.9125	-0.5294	-0.2578	0.5265	-0.0037**	-2.379**
CASH	0.2185	0.0354	0.1561	0.3533	0.2094	0.1905	0.0289	0.1158	0.2950	0.1984	0.0279***	5.041***
CC	0.0874	0.0229	0.0477	0.1004	0.1104	0.0753	0.0193	0.0361	0.0829	0.1089	0.0121***	7.629***
TENURE	8.7375	4.0000	7.0000	12.0000	6.8607	8.7147	4.0000	7.0000	12.0000	6.7455	0.0228	-0.264
BIG	0.9982	1.0000	1.0000	1.0000	0.0426	0.9140	1.0000	1.0000	1.0000	0.2805	0.0842***	13.868***
SPECIAL	0.3939	0.0000	0.0000	1.0000	0.4887	0.2123	0.0000	0.0000	0.0000	0.4090	0.1816***	16.377***
LTG	17.5854	11.0000	15.0000	21.2500	8.9431	17.8883	11.6000	15.0000	21.5000	9.1228	-0.3029	-0.877
DISP	0.1186	0.0196	0.0437	0.1133	1.0849	0.1275	0.0185	0.0412	0.0988	0.8509	-0.0089	2.287**
F_BIAS	0.0185	0.0003	0.0059	0.0164	0.0735	0.0176	0.0008	0.0061	0.0166	0.0658	0.0009	-0.663
BETA	1.3839	0.7029	1.2315	1.9106	0.9903	1.3376	0.7279	1.2034	1.7909	0.9706	0.0463	1.725*
IDIOS	0.1217	0.0774	0.1094	0.1534	0.0594	0.1196	0.0782	0.1066	0.1482	0.0579	0.0021	1.342
S_RET	0.1467	-0.0291	0.1679	0.2523	0.2339	0.1361	-0.0291	0.1669	0.2523	0.2176	0.0106	1.079

Table 5.5 presents the summary statistics for the two sub-samples. Panel A reports the summary statistics for firms that have at least one common auditor with their major customers. Panel B reports the summary statistics for firms that do not have common auditor with their major customers. Panel C presents the mean (T-test) and median (Mann-Whitney test) differences for the two sub-samples. Continuous variables are winsorized at 1% and 99%. Detailed definitions for the variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

5.4.5 Correlation Matrices

The pairwise correlations among all variables are reported in Table 5.6. Panel A presents the Pearson correlation coefficients (parametric test), and Panel B documents the Spearman correlation coefficients (non-parametric test). Both tests provide consistent correlations and show that the variables employed are, generally, not highly correlated with each other. Specifically, the highest values reported in Panel A and Panel B are between financial leverage *(LEV)* and cash ratio *(CASH)* (i.e., -0.514 and -0.605, respectively). The correlation coefficients among those variables stand below the critical value of 0.8 that could indicate potential multicollinearity issues (Gujarati, 2003, p.359). Nonetheless, to eliminate the potential of multicollinearity between the variables used, a Variance Inflation Factor (VIF) test is performed as well. The VIF values for all variables lie within the range of 1 and 4, which is well below the critical point of 10 (Wooldridge, 2016, p.86), thus suggesting no multicollinearity issues.

As shown in Panel A, the variable of interest, *CA*, is positively correlated with the implied cost of equity metric (*ICC_AVG*) and the coefficient estimate is statistically significant at the 1% confidence level (r=0.032). Similarly, Panel B reports a positive and statistically significant correlation at the 1% confidence level between *CA* and *ICC_AVG* (r=0.031). These findings are consistent with the evidence documented in Table 5.5, thus providing further preliminary support that investors require higher rates of return on equity capital for supplier firms that have a common auditor with their main customers. With respect to the other control variables, *CA* reports positive and statistically significant correlations with firm size (*LN_MV*), cash ratio (*CASH*), appointment of large auditor *(BIG)*, appointment of industry specialist auditor (*SPECIAL*), level of reliance on major customers (*CC*), systematic risk *(BETA)*, stock returns (*S_RET*) and analyst forecast dispersion (*DISP*). On the other hand, *CA* reports negative and statistically significant correlations with the firm's probability of default *(MOD_Z*), profitability (*PROF*) and book to market ratio (*LN_BTM*).

With regards to the dependent variable, *ICC_AVG*, Panels A and B show that the implied cost of equity is positively and significantly correlated with leverage (*LEV*), book to market ratio (*LN_BTM*), level of dependence on major customers (*CC*), years of audit tenure *(TENURE)*, long-term growth forecast (*LTG*), analyst forecast dispersion (*DISP*), analyst forecast bias (*F_BIAS*), systematic market risk (*BETA*) and idiosyncratic risk

(IDIOS). On the contrary, the implied cost of equity (*ICC_AVG)* is shown to be negatively and significantly correlated with firm size *(LN_MV)*, profitability (*PROF*), default probability (*MOD_Z*), cash ratio (*CASH*), appointment of large auditors *(BIG)* and stock returns (*S_RET*). Overall, both Pearson and Spearman correlations related to the implied cost of equity are in line with the extant equity market literature (e.g., Dhaliwal et al., 2006; Ghoul et al., 2012; Krishnan et al., 2013; Aghazadeh et al., 2018; Imhof et al., 2017; Fu et al. 2020; Lamoreaux et al., 2020).

Table 5.6 Pairwise Correlation Matrices

Panel A. Pearson Correlation Matrix

Variables	*ICC_AVG*	*CA*	*LN_MV*	*LEV*	*MOD_Z*	*PROF*	*LN_BTM*	*CASH*	*CC*	*TENURE*
ICC_AVG	1									
CA	0.032***	1								
LN_MV	-0.111***	0.093***	1							
LEV	0.141***	-0.015	0.090***	1						
MOD_Z	-0.176***	-0.061***	-0.065***	-0.225***	1					
PROF	-0.169***	-0.013	0.077***	-0.255***	0.463***	1				
LN_BTM	0.191***	-0.032***	-0.274***	0.355***	-0.104***	-0.450***	1			
CASH	-0.057***	0.062***	-0.019*	-0.514***	-0.072***	0.198***	-0.460***	1		
CC	0.054***	0.050***	-0.116***	-0.039***	-0.022**	0.062***	-0.054***	0.110***	1	
TENURE	0.004	0.002	0.457***	0.084***	0.022*	-0.041***	0.010	-0.052***	-0.090***	1
BIG	-0.026**	0.157***	0.084***	0.063***	-0.023**	-0.040***	0.029**	-0.004	-0.025**	0.098***
SPECIAL	-0.005	0.186***	0.070***	-0.021*	-0.059***	-0.020*	-0.014	0.068***	0.020*	0.029**
LTG	0.025**	-0.015	-0.227***	-0.289***	-0.119***	0.126***	-0.478***	0.388***	0.104***	-0.271***
DISP	0.077***	-0.004	-0.064***	0.005	-0.067***	-0.068***	0.042***	0.005	0.002	-0.030***
F_BIAS	0.344***	0.006	-0.167***	0.068***	-0.183***	-0.271***	0.083***	-0.019	0.012	-0.058***
BETA	0.104***	0.021*	-0.092***	-0.147***	-0.157***	-0.039***	-0.109***	0.251***	-0.000	-0.103***
IDIOS	0.156***	0.016	-0.388***	-0.220***	-0.169***	-0.003	-0.204***	0.334***	0.132***	-0.283***
S_RET	-0.014	0.022*	0.025**	-0.037***	-0.019*	0.004	-0.101***	0.033***	-0.004	-0.007

Panel A. Pearson Correlation Matrix (continued)

Variables	*BIG*	*SPECIAL*	*LTG*	*DISP*	*F_BIAS*	*BETA*	*IDIOS*	*S_RET*
BIG	1							
SPECIAL	0.154***	1						
LTG	-0.033***	0.023**	1					
DISP	-0.001	-0.009	0.015	1				
F_BIAS	0.004	-0.010	0.059***	0.039***	1			
BETA	-0.009	0.023**	0.250***	0.017	0.080***	1		
IDIOS	-0.029**	-0.010	0.463***	0.049***	0.138***	0.379***	1	
S_RET	0.016	-0.014	0.020*	-0.012	0.052***	0.034***	0.071***	1

Table 5.6 (Panel A) reports the Pearson correlation coefficients among the employed variables. Continuous variables are winsorized at the at 1% and 99%. Detailed definitions for the variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel B. Spearman Correlation Matrix

Variables	*ICC_AVG*	*CA*	*LN_MV*	*LEV*	*MOD_Z*	*PROF*	*LN_BTM*	*CASH*	*CC*	*TENURE*
ICC_AVG	1	0.031***	-0.072***	0.147***	-0.164***	-0.228***	0.243***	-0.070***	0.079***	0.054***
CA		1	0.097***	-0.018	-0.072***	-0.022**	-0.027**	0.057***	0.087***	-0.003
LN_MV			1	0.116***	-0.115***	0.083***	-0.280***	0.015	-0.120***	0.416***
LEV				1	-0.243***	-0.304***	0.384***	-0.605***	-0.053***	0.088***
MOD_Z					1	0.506***	-0.151***	0.005	-0.027**	-0.006
PROF						1	-0.529***	0.216***	0.022*	-0.066***
LN_BTM							1	-0.440***	-0.026**	0.007
CASH								1	0.093***	-0.028**
CC									1	-0.087***
TENURE										1

Panel B. Spearman Correlation Matrix (continued)

Variables	*BIG*	*SPECIAL*	*LTG*	*DISP*	*F_BIAS*	*BETA*	*IDIOS*	*S_RET*
ICC_AVG	-0.053***	0.015	0.039***	0.217***	0.133***	0.088***	0.105***	-0.042***
CA	0.157***	0.186***	-0.010	0.026**	-0.008	0.020*	0.015	0.012
LN_MV	0.082***	0.072***	-0.276***	-0.271***	-0.196***	-0.085***	-0.448***	0.013
LEV	0.062***	-0.023**	-0.348***	-0.004	0.064***	-0.167***	-0.255***	-0.036***
MOD_Z	-0.040***	-0.061***	-0.048***	-0.292***	-0.152***	-0.112***	-0.131***	-0.004
PROF	-0.047***	-0.027**	0.160***	-0.292***	-0.267***	-0.050***	-0.024**	0.004
LN_BTM	0.035***	-0.010	-0.435***	0.218***	0.075***	-0.077***	-0.124***	-0.109***
CASH	-0.005	0.072***	0.377***	0.047***	-0.033***	0.271***	0.304***	0.021*
CC	-0.075***	0.010	0.095***	0.070***	0.023**	0.031***	0.141***	-0.010
TENURE	0.097***	0.023**	-0.274***	-0.145***	-0.081***	-0.095***	-0.279***	0.023**
BIG	1	0.154***	-0.034***	-0.039***	-0.006	-0.014	-0.036***	0.017
SPECIAL		1	0.031***	-0.005	-0.009	0.029***	-0.004	-0.014
LTG			1	0.115***	0.161***	0.273***	0.509***	0.033***
DISP				1	0.020*	0.182***	0.278***	-0.011
F_BIAS					1	0.081***	0.153***	0.084***
BETA						1	0.369***	0.017
IDIOS							1	0.068***
S_RET								1

Table 5.6 (Panel B) reports the Spearman correlation coefficients among the employed variables. Continuous variables are winsorized at the at 1% and 99%. Detailed definitions for the variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.5 Multivariate Analysis

5.5.1 The Effect of Common Auditor on Implied Cost of Equity

Thus far, the evidence from the univariate analysis suggests that supplier firms sharing the same audit firm with at least one of their major customers exhibit higher cost of equity capital than supplier firms that do not have a common auditor. Such evidence lends support towards the notion that investors negatively perceive the existence of common auditors, and as a result they require higher equity premium to compensate for the risk associated with those firms. Yet, such an evidence can only provide indications as it is based on a univariate level, and hence no associations can be inferred. To examine the association between common auditor and the implied cost of equity a multivariate analysis is performed.

Particularly, Table 5.7 reports the ordinary least squares (OLS) regression results using eq. (5.11). Across all specifications, the average implied cost of equity measure, *ICC_AVG* is the dependent variable and *CA* is the main variable of interest. The first model reports a basic specification which regresses the implied cost of equity on the dummy common auditor variable, excluding any other control variables or fixed effects. As shown in Column (I), the coefficient estimate of *CA* is positive and statistically significant at the 10% confidence level (0.0037 with t= 1.65). The second model incorporates a set of control variables that prior equity market research shows to be associated with the cost of equity capital but excludes any fixed effects. As shown in Column (II), the coefficient estimate of *CA* remains positive and statistically significant at the 5% confidence level (0.0043 with t= 2.08). Finally, the third model includes the set of control variables employed in the second specification, while it also accounts for both industry and year fixed effects. As shown in Column (III), the coefficient estimate of *CA* continues to be positive and statistically significant at the 5% confidence level (0.0042 with t= 2.14). Collectively, the regression results, reported in Table 5.7, document significant evidence that supplier firms which have at least one common auditor with their major customer(s) exhibit, on average, higher cost of equity capital compared to supplier firms that do not appoint the same audit firm with their major customers. Effectively, such evidence supports the argument that investors might view the existence of common auditor as a potential threat over the impairment of the quality of audits (for the theoretical justification please refer to section 3.3.2) for the supplier firm which, in turn, could amplify their

information and estimation risks that arise from the high reliance on its major customers and therefore, they require higher equity premium to compensate for the risks associated with those firms.

Beyond its statistical significance, the magnitude of the coefficient estimate of the variable of interest, *CA*, suggests that the effect of common auditor on the implied cost of equity is economically important as well. Specifically, the coefficient of *CA* (in Column (III)) indicates that supplier firms with at least one common auditor with their major customers incur 0.42 percent higher cost of equity than those that do not have common auditor with their main customers. Considering that the mean supplier firm has a market value of equity of $4,578 million, a 0.42 percent increase in the supplier's firm cost of equity translates into an excess annual cost of nearly $200,000 for the mean supplier firm to obtain equity financing.

In terms of the control variables, the results reported are in line with expectations[79]. As shown in Column (III) of Table 5.7, firm size (*LN_MV)* and ratio of cash/marketable securities over total assets *(CASH)* are negatively and statistically significant associated with the implied cost of equity at 1% and 5% level of confidence, respectively (-0.0019 with *t*= -2.75; -0.0118 with *t*= -2.23). Firm's financial leverage *(LEV)*, profitability *(PROF)* and book to market ratio *(LN_BTM)*, long-term growth earnings forecast *(LTG)*, analyst forecast bias *(F_BIAS)*, systematic market risk *(BETA)* and idiosyncratic risk *(IDIOS)* exhibit a positive and statistically significant relation with the implied cost of equity, at the 1% level of confidence (0.0300 with *t*= 4.52; 0.0364 with *t*= 4.39; 0.0220 with *t*= 9.88; 0.0005 with *t*= 4.59; 0.2457 with *t*= 11.80; 0.0028 with *t*= 3.17; 0.1297 with *t*= 6.09). Also, supplier firms with greater reliance on a few major customers *(CC)* and analyst forecast dispersion *(DISP)* are positively and statistically associated with the cost of equity capital, at the 5% significance level (0.0161, with *t*= 2.36; 0.0033, with *t*= 2.52). Finally, the coefficient estimates of the remaining variables report a non-significant association with the implied cost of equity capital *ICC_AVG*. Overall, the direction and magnitude of associations reported are in line with prior literature in equity market context (e.g., Dhaliwal et al., 2006; Hope et al., 2009; Ghoul et al., 2011; Ghoul et al., 2012; Krishnan et al., 2013; Dhaliwal et al., 2016a; Gupta et al., 2018; Aghazadeh et al., 2018; Imhof et al., 2017; Ferris et al., 2017; Fu et al. 2020; Lamoreaux et al., 2020).

[79] Given the fact that the Column (III) of Table 5.6 includes all the control variables and fixed effects, the regression results of Column (III) are selected to be discussed, as more comprehensive and indicative.

Table 5.7 The Effect of Common Auditor on the Implied Cost of Equity

Variables	(I)	(II)	(III)
CA	0.0037*	0.0043**	0.0042**
	(1.65)	(2.08)	(2.14)
LN_MV		0.0014**	-0.0019***
		(1.97)	(-2.75)
LEV		0.0288***	0.0300***
		(4.08)	(4.52)
MOD_Z		-0.0024**	-0.0005
		(-2.31)	(-0.45)
PROF		0.0281***	0.0364***
		(3.34)	(4.39)
LN_BTM		0.0237***	0.0220***
		(10.52)	(9.88)
CASH		-0.0012	-0.0118**
		(-0.23)	(-2.23)
CC		0.0205***	0.0161**
		(2.62)	(2.36)
TENURE		0.0000***	-0.0000
		(5.01)	(-0.80)
BIG		-0.0099***	0.0020
		(-3.47)	(0.80)
SPECIAL		-0.0006	-0.0027
		(-0.36)	(-1.61)
LTG		0.0004***	0.0005***
		(3.84)	(4.59)
DISP		0.0029**	0.0033**
		(2.24)	(2.52)
F_BIAS		0.2362***	0.2457***
		(11.33)	(11.80)
BETA		0.0026***	0.0028***
		(2.82)	(3.17)
IDIOS		0.1366***	0.1297***
		(7.28)	(6.09)
S_RET		-0.0036*	-0.0003
		(-1.79)	(-0.09)
Constant	0.0512***	0.0279***	0.0167*
	(38.91)	(4.03)	(1.68)
Observations	7,773	7,773	7,773
Adjusted R-squared	0.001	0.198	0.278
Year Fixed Effects	No	No	Yes
Industry Fixed Effects	No	No	Yes

Table 5.7 reports the association between the existence of common auditor and the implied COE capital. The variable of interest *(CA)* is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. The dependent variable, implied COE capital *(ICC_AVG)*, across all specifications is calculated as the mean of *ICC_CT* (Claus and Thomas, 2001), *ICC_GLS* (Gebhardt et al., 2001), *ICC_MPEG* (Easton, 2004) and *ICC_OJN* (Ohlson and Juettner-Nauroth (2005) minus the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds). Continuous variables are winsorised at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.5.2 Sensitivity Analysis

To ensure the robustness of the main findings documented in the prior section, a series of sensitivity tests are performed. These tests address issues identified in prior equity market research such as the noise of analyst forecasts, omitted variable bias, alternative measures of the implied cost of equity and potential endogeneity issues, while also control for alternative proxies to capture common auditor.

5.5.2.1 The Noise of Analyst Forecasts

While the implied cost of equity capital is recognised as the most widely used and accepted approach within the equity market literature, some studies criticize its accuracy and credibility due to analyst earnings forecasts. This stream of literature argues that analyst forecasts serve as poor proxies to capture market expectations (future earnings), which inevitably leads to biased cost of equity estimates (Easton and Monahan, 2005). On that note, Botosan and Plumlee (2005) and Easton and Sommers (2007) suggest that the upward noise, arising from overly optimistic analyst forecasts, needs to be addressed in order to avoid inflated cost of equity estimates.

In a similar spirit to prior literature (e.g., Ghoul et al., 2011 and Ghoul et al., 2012), the current study addresses such distortions in the equity pricing in two ways. First, the top 10%, 15%, 20% and 25% of the firm-year observations in the forecast optimism bias *(F_BIAS)* distribution (i.e., the most optimistic analyst forecasts) are successively excluded. As shown in Panel A of Table 5.8 (Columns I-IV), the coefficient estimates of common auditor variable (*CA)* remain positive and statistically significant (at 1% and 5% level of significance) across all specifications. Second, the top 10%, 15%, 20% and 25% of the firm-year observations in the long-term growth forecast *(LTG)* distribution are successively removed. As shown in Panel B of Table 5.8 (Columns I-IV), the regression results obtained are consistent with the prior test. Specifically, the coefficient estimates of common auditor variable *(CA)* yield a positive and statistically significant association with the implied cost of equity capital at 5% level across all specifications. In addition to the aforementioned tests, the forecast bias optimism *(F_BIAS)* and long-term growth forecast *(LTG)* are explicitly controlled in the main regression (Table 5.8, Column III). Collectively, the regression results document evidence of a positive and significant association between *CA* and *ICC_AVG,* even after controlling for the implicit noise

associated with overly optimistic analyst earnings forecasts, thus corroborating the main findings documented earlier.

Table 5.8 The Effect of Common Auditor on Implied Cost of Equity after Controlling for Analyst's Optimism

Panel A. Forecast optimism bias lower than kth percentile

Variables	k=90% (I)	k=85% (II)	k=80% (III)	k=75% (IV)
CA	0.0035**	0.0040***	0.0038***	0.0034**
	(2.27)	(2.74)	(2.80)	(2.49)
Controls	Yes	Yes	Yes	Yes
Constant	0.0265***	0.0164**	0.0136**	0.0128*
	(2.79)	(2.10)	(1.84)	(1.72)
Observations	7,174	6,831	6,481	6,106
Adjusted R-squared	0.274	0.328	0.358	0.384
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes

Panel B. Long-term growth forecast lower than kth percentile

Variables	k=90% (I)	k=85% (II)	k=80% (III)	k=75% (IV)
CA	0.0050**	0.0051**	0.0049**	0.0048**
	(2.39)	(2.35)	(2.23)	(2.10)
Controls	Yes	Yes	Yes	Yes
Constant	0.0227**	0.0178*	0.0138	0.0148
	(2.30)	(1.80)	(1.36)	(1.41)
Observations	7,035	6,651	6,260	5,855
Adjusted R-squared	0.277	0.278	0.284	0.280
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes

Table 5.8 reports the association between the existence of common auditor and the implied COE capital after controlling for analyst forecast optimism. The variable of interest *(CA)* is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. The dependent variable that captures the implied COE capital *(ICC_AVG)*, is calculated as the mean of *ICC_CT* (Claus and Thomas, 2001), *ICC_GLS* (Gebhardt et al., 2001), *ICC_MPEG* (Easton, 2004) and *ICC_OJN* (Ohlson and Juettner-Nauroth (2005) minus the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds). Columns I-IV in Panel A remove the top 10%, 15%, 20%, 25% of the *F_BIAS* distribution, respectively. Columns I-IV in Panel B, remove the top 10%, 15%, 20%, 25% of the *LTG* distribution, respectively Continuous variables are winsorized at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.5.2.2 Omitted Variables Bias

Evidence, thus far, suggests that supplier firms sharing at least one common auditor with their major customer(s) experience higher cost of equity capital than those not having such a relationship. While a comprehensive set of control variables are included in the main analysis, an important concern related to the main findings is the potential bias due to omitted variables. Omitted variables bias could obscure the interpretation of the effect of common auditor on the cost of equity, thus resulting in inconclusive inferences with regards to the association between those two variables. For instance, the results obtained earlier might be driven by omitted variables that are associated with both equity pricing and common auditor. In this regard, as shown in Table 5.9, the common auditor variable, *CA*, is positively and significantly associated with lower financial reporting quality[80,81]. Prior studies within the equity market context find that lower financial reporting quality is positively associated with the cost of equity capital (e.g., Krishnan et al., 2013; Imhof et al., 2017; Fu et al., 2020). In that sense, the evidence documented in the main analysis might not be attributable to the existence of common auditor *per se*. Instead, it might be due to the fact that supplier firms have, on average, lower financial reporting quality which is influenced by having a common auditor with their major customers. To mitigate the concern related to potential omitted variables bias, the two alternative measures of discretionary accruals, *ABS_JONES* and *MOD_JONES_ABS* are included.

Further, extant equity market research suggests that the magnitude of firm's analyst following *(LN_ANA)*, and the precision of analyst forecasts *(AFE_ABS)* can be significantly associated with the cost of equity capital[82]. In order to improve the accuracy of the estimates reported in the current study, those two analyst-related variables are also incorporated. The results are reported in Table 5.10. As shown in columns I and II, the

[80] In line with prior literature (e.g., Krishnan et al., 2013; Anagnostopoulou and Tsekrekos, 2015; Imhof et al., 2017; Sun et al., 2020), the current study uses discretionary accruals to proxy for financial reporting quality. The higher the level of abnormal accruals, the higher the managerial discretion over the reported earnings, and thus the lower the quality of financial reporting quality. Two alternative measures for discretionary accruals are employed. More specifically, the *ABS _JONES* variable is the absolute value of discretionary accruals estimated using the Jones model (Jones, 1991), whereas *MOD_JONES_ABS* is the absolute value of discretionary accruals estimated using the modified Jones model (Dechow et al., 1995). Also, the positive relationship between supplier's lower financial reporting quality and common auditor presence within the supply chain context is consistent with Raman and Shahrur (2008) who argue that firms which serve as supply chain partners might be more prone to use earnings management as they might be indulged to present a more favorable picture for their corresponding partners.

[81] The number of observations is reduced (from 7,773 to 7,034) due to missing necessary items for the calculation of both discretionary accruals measures.

[82] Following prior equity market literature (Ghoul et al., 2011; Ghoul et al., 2012) analyst following *(LN_ANA)* is calculated as the natural logarithm of one plus the number of analysts covering the firm and analyst forecast error (*AFE_ABS)* is calculated as the difference between actual earnings per share minus the mean one-year earnings forecast, deflated by June stock price.

association between common auditor and the implied cost of equity remains positive and statistically significant at 5% level of confidence, after controlling for analyst following and analyst forecast errors. Also, analyst following variable *(LN_ANA)* is negatively and significantly associated with implied cost of equity (-0.0060 with t= -2.68) while analyst forecast error variable *(AFE_ABS)* is positively and significantly associated with implied cost of equity (0.0021 with t= 8.96), which is consistent with prior literature (e.g., Imhof et al., 2017; Lamoreaux et al., 2020). In addition, the coefficient estimates of common auditor, *CA*, continue to be positive and statistically significant at 5% level of confidence, after controlling for discretionary accruals (see Columns (III) and (IV)). Further, in line with prior research (e.g., Francis et al., 2008; Krishnan et al., 2013) both *ABS_JONES* and *MOD_JONES_ABS* variables report a positive and statistically significant association with the implied cost of equity at 1% level of confidence (0.0207 with t= 3.21; 0.0184 with t= 2.87, respectively). More importantly, the variable of interest, *CA*, continues to be positively and significantly associated with the cost of equity even when all the additional variables are included simultaneously, although the level of significance drops from 5% to 10% (see Columns (V) and (VI)). Collectively, these findings provide further support and validity of hypothesis (H1b), thus mitigating the concern that the main results are subject to omitted variable bias.

Table 5.9 The Effect of Common Auditor on Financial Reporting Quality

Variables	(I)	(II)
CA	0.0082**	0.0080**
	(2.05)	(1.98)
LN_MV	-0.0082***	-0.0082***
	(-5.60)	(-5.49)
LEV	-0.0024	-0.0006
	(-0.21)	(-0.05)
MOD_Z	-0.0086***	-0.0083***
	(-4.45)	(-4.35)
PROF	0.1779***	0.1869***
	(5.22)	(5.50)
LN_BTM	-0.0365***	-0.0353***
	(-6.81)	(-6.56)
CC	0.0360**	0.0350**
	(2.15)	(2.10)
MA	0.0044	0.0036
	(0.75)	(0.62)
LOSS	0.0359***	0.0367***
	(6.89)	(7.02)
TENURE	-0.0000**	-0.0000**
	(-2.19)	(-2.19)
BIG	-0.0065	-0.0033
	(-0.74)	(-0.38)
SPECIAL	-0.0056	-0.0057
	(-1.33)	(-1.35)
Constant	0.1352***	0.1344***
	(5.05)	(4.86)
Observations	7,034	7,034
Adjusted R-squared	0.133	0.132
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes

Table 5.9 reports the regression results on the association between common auditor and financial reporting quality. In the regression shown in Column (I), the dependent variable is *ABS_JONES (*discretionary accruals using the Jones (1991)), whereas in the regression shown in Column (II) the dependent variable is *MOD_JONES_ABS*, based on the modified Jones model (Dechow et al., 1995). Continuous variables are winsorized at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix B. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 5.10 The Effect of Common Auditor on the Implied Cost of Equity after Controlling for Omitted Variables Bias

Variables	(I)	(II)	(III)	(IV)	(V)	(VI)
CA	0.0041**	0.0036**	0.0045**	0.0046**	0.0038*	0.0039*
	(2.08)	(1.98)	(2.12)	(2.13)	(1.90)	(1.91)
LN_ANA	-0.0060***				-0.0050**	-0.051**
	(-2.68)				(-2.15)	(-2.17)
AFE_ABS		0.0021***			0.0021***	0.0021***
		(8.96)			(8.43)	(8.43)
ABS_JONES			0.0207***		0.0205***	
			(3.21)		(3.21)	
MOD_JONES_ABS				0.0184***		0.0186***
				(2.87)		(2.95)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.0192*	0.0162*	0.0018	0.0020	0.0034	0.0035
	(1.94)	(1.72)	(0.09)	(0.10)	(0.18)	(0.19)
Observations	7,773	7,773	7,034	7,034	7,034	7,034
Adjusted R-squared	0.281	0.320	0.271	0.270	0.313	0.313
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 5.10 reports the association between the existence of common auditor and the implied COE capital after controlling for omitted variable bias. The variable of interest *(CA)* is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. The dependent variable, implied COE capital *(ICC_AVG)*, is calculated as the mean of *ICC_CT* (Claus and Thomas, 2001), *ICC_GLS* (Gebhardt et al., 2001), *ICC_MPEG* (Easton, 2004) and *ICC_OJN* (Ohlson and Juettner-Nauroth (2005) minus the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds). Regression models in columns I-IV include the *LN_ANA*, *AFE_ABS*, *ABS_JONES* and *MOD_JONES_ABS*, respectively. Columns V and VI, regress *ABS_JONES and MOD_JONES_ABS* with all control variables included, respectively. Continuous variables are winsorised at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.5.2.3 Alternative Measures for Implied Cost of Equity

In line with prior research within the equity market context (e.g., Hail and Leuz, 2006; Dhaliwal et al., 2006; Dhaliwal et al., 2007; Chen et al., 2011; Boubakri et al., 2010; Hou et al., 2012; Boubakri et al., 2012; Dhaliwal et al., 2016a; Ferris et al., 2017; Imhof et al., 2017; Fu et al., 2020; Lamoreaux et al., 2020, the current study also calculates the implied cost of equity as the average of the four main cost of equity measures (i.e., Claus and Thomas, 2001; Gebhardt et al., 2001; Easton, 2004 and Ohlson and Juettner-Nauroth, 2005, as implemented by Gode and Mohanram, 2003). While this method constitutes the most widely accepted approach to capture the *ex ante* cost of equity capital, there is still an ongoing debate regarding its applicability (e.g., Botosan and Plumlee, 2005; Easton and Monahan, 2005; Botosan et al., 2011; Echterling et al., 2015). Thus, to mitigate concerns related to the controversy surrounding the accuracy of the calculation of the implied cost

of equity estimates, a series of alternative measures are examined as well. Table 5.11 reports the regression results across the different specifications.

First, following prior equity market literature (e.g., Muino and Trombetta, 2009; Li, 2010; Kim et al., 2012; Mazzi et al., 2017), the average implied cost of equity is calculated only for those observations with non-missing cost of equity estimates, across all four measurements. Considering the above condition, the sample drops slightly from 7,773 to 7,390 firm-year observations but regression results remain unchanged. As shown in Table 5.11, (Column (I)), the coefficient estimate of the *CA* variable continues to be positively and significantly associated with the implied cost of equity, at the 5% confidence level (0.0044 with t= 2.23). Second, the average implied cost of equity is calculated without deducting the risk-free interest rate (i.e., the yield on the 10-year U.S. Treasury bonds). The results, which are reported in Column (II), show that the coefficient estimate of the *CA* variable continues to be positive and significant, at the 5% confidence level (0.0063 with t= 1.96).

Third, the average implied cost of equity capital *(ICC_AVG)* measurement is successively replaced by the four individual risk premiums from which is being composed. Columns (III) to (VI) report the regression results for *ICC_CT* (Claus and Thomas, 2001), *ICC_GLS* (Gebhardt et al., 2001), *ICC_MPEG* (Easton, 2004) and *ICC_OJN* (Ohlson and Juettner-Nauroth, 2005, as implemented by Gode and Mohanram, 2003), respectively. As can be noticed, the coefficient estimate of the *CA* variable remains positive across all four specifications but documents a significant association only under the Claus and Thomas' (2001) and Easton's (2004) measures, at 5% level of confidence. These findings are, generally, in line with prior literature. For example, Ghoul et al. (2011), also, fail to find a significant association under the Gebhardt's et al. (2001) specification. More importantly, while results under all four specifications are of great importance, the main focus lies on the modified version of Easton (2004) (*ICC_MPEG)* metric since it constitutes the best individual measurement employing analyst forecasts (Clarkson et al., 2013). Hence, the fact that the coefficient estimate of *CA* under the Easton's (2004) specification is significant and in line with the results reported in Table 5.7, it provides further assurance on the main findings. Finally, to mitigate the concern the results are not subject to the assumptions associated with the four main measures, two alternative cost of equity estimates are calculated. Following Ghoul et al. (2011), the alternative cost of equity calculations are based on: (i) the finite horizon expected return model, as proposed by

Gordon and Gordon (1997) (Column (VII)); and (ii) the Price Earning Growth (PEG) model for short-term earnings forecasts a described in Easton (2004) (Column (VIII)). As shown in Columns (VII) and (VIII), the coefficient estimates of *CA* continue to be positive and statistically significant, although at the 10% level of confidence, when the alternative specifications are employed. Collectively, the evidence documented in Table 5.11 shows that the implied cost of equity estimates remain, largely, unchanged under different alternative specifications, thus reinforcing the results of the main analysis.

Table 5.11 The Effect of Common Auditor on Alternative and Individual Cost of Equity Estimates

	Estimates for four measures	Including risk-free	Regressing with individual cost of equity estimates				Regressing with alternative cost of equity estimates	
	ICC_AVG	ICC_RF	CT	GLS	MPEG	OJN	GGM	PEG
Variables	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
CA	0.0044**	0.0063**	0.0056**	0.0013	0.0053**	0.0037	0.0051*	0.0055*
	(2.23)	(1.96)	(2.18)	(0.81)	(2.01)	(1.49)	(1.75)	(1.80)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.0134	0.1543***	0.0036**	0.0157**	0.0355**	0.0114	0.0674***	0.0311*
	(1.36)	(9.14)	(2.52)	(2.08)	(2.44)	(0.95)	(5.19)	(1.78)
Observations	7,390	7,773	7,743	7,743	7,424	7,544	7,743	7,488
Adjusted R-squared	0.291	0.253	0.172	0.322	0.276	0.323	0.309	0.313
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 5.11 reports the results under different alternative specifications of the implied cost of equity capital estimates. In column I, COE is calculated only for those observations with non-missing cost of equity estimates, across all four measurements. In column II, COE is calculated including the risk-free interest rate (i.e., the yield on the 10-year U.S. Treasury bonds). In columns III-VIII, COE is estimated based on: (i) Claus and Thomas (2001); (ii) Gebhardt et al. (2001); (iii) Easton (2004); (iv) Ohlson and Juettner-Nauroth (2005) as implemented by Gode and Mohanram (2003); (v) the finite horizon model of Gordon and Gordon (1997); and (vi) the price earnings growth model of Easton (2004) minus the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds).The variable of interest *(CA)* is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customer(s), and 0 otherwise. Continuous variables are winsorized at t1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.5.2.4 Alternative Measures to Proxy for Common Auditor

The variable of interest, *CA*, which captures the existence of common auditor between the supplier firm and its major customers in the main and preceding regressions, is described by an indicator variable that takes the value of one if there is at least one common auditor between the supplier firm and its major customers, and zero otherwise. In order to ensure that the prior findings are not influenced by the construction of this specific variable, two alternative measures that proxy for common auditor between the two parties are employed as well. The first, *NUM_CA*, constitutes an integer variable that represents the total number of instances a supplier firm has a common auditor with its major customers for each year. The second, *PERC_CA*, constitutes a continuous variable that captures the percentage of cases where a supplier firm has a common auditor with its major customers for each year. Specifically, it is defined as the total number of common auditors between the supplier firm and its major customer(s) divided by total number of supplier's major customers for each year. Appendix A provides an illustrative example on how these two alternative measurements are constructed.

Columns (I) and (II) of Table 5.12 report the regression results when the *NUM_CA* and *PERC_CA* are the key independent variables, respectively. As shown in Column (I), when *NUM_CA* is used as an alternative proxy for common auditor, the coefficient estimate reports a positive and statistically significant association with the cost of equity capital (0.0047 with t= 2.79), which is higher in magnitude than the coefficient estimate reported under *CA*. Similarly, when *CA* is replaced by *PERC_CA* variable, the relationship between common auditor and cost of equity still remains positive and statistically significant. However, significance level drops from 5% to 10% level of confidence (0.0040 with t= 1.73). Considering that both alternative common auditor variables suggest a positive association, with the first being statistically significant at 1% confidence level and the second at the 10% threshold, evidence documented in Table 5.12 corroborate and provide further assurance over the validity of the main findings.

Table 5.12 Alternative Measures of Common Auditor on the Implied Cost of Equity

Variables	(I)	(II)
NUM_CA	0.0047***	
	(2.79)	
PERC_CA		0.0040*
		(1.73)
Controls	Yes	Yes
Constant	0.0175*	0.0167*
	(1.76)	(1.68)
Observations	7,773	7,773
Adjusted R-squared	0.279	0.278
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes

Table 5.12 reports the association between alternative common auditor variables and the implied COE capital. *NUM_CA* represents the total number of instances a supplier firm has a common auditor with its major customers and *PERC_CA* is a continuous variable that captures the percentage of cases where a supplier firm has a common auditor with its major customers. The dependent variable, implied COE capital (*ICC_AVG*), is calculated as the mean of *ICC_CT* (Claus and Thomas, 2001), *ICC_GLS* (Gebhardt et al., 2001), *ICC_MPEG* (Easton, 2004) and *ICC_OJN* (Ohlson and Juettner-Nauroth (2005) minus the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds). Continuous variables are winsorized at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.5.2.5 Propensity Score Matching Analysis

Thus far, the results of the main analysis are robust in a series of sensitivity tests. Yet, an important issue that might lead to wrong inferences is that the main results might be subject to endogeneity bias due to the fact that the control variables employed in prior analyses may not capture differences between firms with common and non-common auditors. In a similar spirit to Truong et al. (2020), to address and mitigate the concern associated with endogeneity from unobservable variables that might drive the main results, Propensity Score Matching (PSM) analysis is conducted[83]. The application of a PSM approach leads to the construction of an optimal control sample, since it allows for the moderation of differences between the treatment group (i.e., firms sharing at least one

[83] While there are several statistical techniques that help to alleviate endogeneity issues, a complete elimination of endogeneity issues might not be practically feasible (Houston et al., 2014). The propensity score matching analysis was, initially, developed by Rosenbaum and Rubin (1985), while further extended by Heckman et al. (1997; 1998). According to Houston et al. (2014), the main advantage of the propensity score matching over the conventional regression lies in the fact that the former does not require the specification of linear or actual relationship among spreads and the other characteristics which could impact loan pricing, Thus, the application of propensity score matching techniques leads to a more accurate analysis (Conniffe et al., 2000).

common auditor with their major customers) and the control group (i.e., firms not sharing a common auditor with their major customers). In that sense, the firms identified among the two groups are similar across the different dimensions of firm-, auditor- and equity market-specific characteristics, but they differ on their common auditor status.

To obtain the propensity score for each firm among the two groups, a probit model is employed[84]. The dependent variable is a dummy variable that equals to one if the supplier firms share at least one common auditor with their major customers (treatment group), and zero otherwise (control group). The probit model regresses the *CA_PSM* over the firm-, auditor-, equity market-specific characteristic variables, as well as industry and year fixed effects. Having obtained the propensity scores, firms from the treatment group are then matched with firms from the control group using a nearest- neighbor matching approach without replacement (e.g., Caliendo and Kopeinig, 2008; Lawrence et al., 2011; Francis et al., 2017). In addition, the treatment group firms are matched with the control group firms using different caliper distances (0.05, 0.1 and 0.2)[85]. The matching process yields a sample of 3,478, 3,604 and 3,718 evenly matched observations (i.e., 1,739, 1,802 and 1,859 for the treatment and the control groups, respectively) when the caliper distance is 0.05, 0.1 and 0.2, respectively.

An important step in the PSM analysis is the assessment of matching among the two groups. To evaluate the quality of matching, the differences in the means for each covariate variables of both groups are examined[86]. As shown in Table 5.13, there are no statistically significant mean differences among the two groups, which according to Shipman et al. (2017) provides a confirmation of correct matching. Further, the standardized differences, for each variable, do not exceed the critical threshold of |20|, which according to prior research (e.g., Rosenbaum and Rubin, 1985; Ferri and Maber, 2013; Hooghiemstra et al., 2015; Chantziaras et al., 2020) provides an indication of a good match. Taken together, the evidence reported in Table 5.13 suggests that the matching process is successful. Following the successful matching process, a second stage regression using the PSM sample of treatment and control groups is conducted. The results are reported in Table 5.14. As shown in Columns (I) to (III), the coefficient estimate of the key variable of

[84] According to Shipman et al. (2017), both probit and logit methods generate similar results, and therefore it is at the researcher's discretion which method to follow.
[85] While there is no consensus over the optimal caliper distance choice, prior research recommends that caliper width should be lower or equal to 0.2 (Rosenbaum and Rubin, 1985; Austin, 2011).
[86] For the sake of brevity, only the covariate test for caliper distance of 0.05 is documented in Table 10. The covariate tests for caliper distance of 0.1 and 0.2 present quantitively similar results.

interest, *CA*, preserves the positive and statistical significance across all three specifications (0.0040 with *t*= 1.81; 0.0042 with *t*= 1.87; 0.0043 with *t*= 1.96). Overall, the evidence reported in Table 5.14 is consistent with the findings documented in the prior analyses, therefore providing further assurance that the main results are robust.

Table 5.13 Covariate Balance Tests Subsequent to PSM

	Mean differences		Std Difference	t-test	
VARIABLES	Treated	Control	% of bias	t	p>|t|
LN_MV	6.6809	6.7526	-4.4	-1.29	0.199
LEV	0.1850	0.1818	1.9	0.57	0.569
MOD_Z	1.9696	1.9493	1.7	0.50	0.618
PROF	0.0741	0.0752	-1.0	-0.28	0.777
LN_BTM	-0.6425	-0.6447	0.4	0.12	0.902
CASH	0.2029	0.2137	-5.3	-1.57	0.117
CC	0.0785	0.0771	1.3	0.39	0.699
TENURE	11.1570	11.1485	0.1	0.03	0.976
BIG	0.9977	0.9977	0.0	0.0	1.000
SPECIAL	0.3116	0.3226	-2.3	-0.69	0.489
LTG	17.796	17.501	3.3	0.98	0.325
DISP	0.1187	0.1319	-5.0	-1.46	0.144
F_BIAS	0.0170	0.0162	1.2	0.34	0.734
BETA	1.4093	1.3919	1.7	0.51	0.612
IDIOS	0.1230	0.1229	0.1	0.02	0.984
S_RET	0.1432	0.1466	-1.5	-0.44	0.660

Table 5.13 reports the mean differences and standardized differences on the covariates between the treatment and control groups, based on the *CA* variable. The standardized difference in percent is: $100(\bar{x}_{gr1} - \bar{x}_{gr0}/\sqrt{(s^2_{gr1} - s^2_{gr0})/2}$ where $\bar{x}_{gr1}$ and $\bar{x}_{gr0}$ $(s^2_{gr1} - s^2_{gr0})$ are the sample mean (variance) in the *CA* =1 and *CA* =0 groups. The last two columns report the t- and p- values. Continuous variables are winsorised at 1% and 99%. All variables are defined in Appendix B.

Table 5.14 The Effect of Common Auditor on the Implied Cost of Equity (PSM sample)

Variables	c=0.05 (I)	c=0.1 (II)	c=0.2 (III)
CA	0.0040*	0.0042*	0.0043*
	(1.81)	(1.87)	(1.96)
Controls	Yes	Yes	Yes
Constant	0.0020	0.0040	0.0015
	(0.13)	(0.24)	(0.09)
Observations	3,478	3,604	3,718
Adjusted R-squared	0.256	0.250	0.258
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes

Table 5.14 reports the association between common auditor and the implied COE capital for the PSM sample. Columns I to III regress the variables under 5%, 10% and 20% calliper distances, respectively. The variable of interest *(CA*) is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. The dependent variable, implied COE capital *(ICC_AVG)*, is calculated as the mean of *ICC_CT* (Claus and Thomas, 2001), *ICC_GLS* (Gebhardt et al., 2001), *ICC_MPEG* (Easton, 2004) and *ICC_OJN* (Ohlson and Juettner-Nauroth (2005) minus the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds). Continuous variables are winsorized at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.5.2.6 Common Auditor Status Switch Analysis

In addition to the PSM analysis and in an effort to further address potential endogeneity issues associated with unobservable control variables, a common auditor status change (switch) analysis using a difference-in-differences (DID) research design is performed. The rationale is to compare equity financing differences before and after the status change for supplier firms that: (i) change from having a non-common auditor to sharing a common auditor with at least one of their major customer(s) (treatment group A) versus those that have never shared a common auditor with at least one of their major customer(s) (control group A); and (ii) change from sharing to not sharing a common auditor with at least one of their major customer(s) (treatment group B) versus those that have always shared a common auditor with at least one of their major customer(s) (control group B).

The matching process yields a sample of 2,258 evenly matched firm-year observations (i.e., 1,129 for the treatment group A and 1,129 for the control group A) and 992 evenly matched firm-year observations (i.e., 496 for the treatment group B and 496 for the control

group B). Following the matching process, a DID analysis is conducted by estimating the following model for sample A:

$$COE = \beta_0 + \beta_1 SWITCH\_SAME + \beta_2 POST\_SAME + \beta_3 SWITCH\_SAME * POST\_SAME + CONTROLS + (INDUSTRY, YEAR)\_FE + \varepsilon$$

and the following model for sample B, respectively:

$$COE = \beta_0 + \beta_1 SWITCH\_DIFFERENT + \beta_2 POST\_DIFFERENT + \beta_3 SWITCH\_DIFFERENT * POST\_DIFFERENT + CONTROLS + (INDUSTRY, YEAR)\_FE + \varepsilon$$

Particularly, *SWITCH_SAME* is an indicator variable that takes the value of 1 for firms that switch from having a non-common auditor to sharing a common auditor (treatment group A), and the value of 0 for firms that never shared a common auditor (control group A). *POST_SAME* is an indicator variable that equals to 1 for firm's cost of equity after the common auditor status change, and 0 before the change[87]. The interaction term, *SWITCH_SAME * POST_SAME*, is the independent variable of interest and captures the net effect of switching from a non-common to a common auditor on cost of equity in the post-switch era for the treatment firms compared to their matched controlled firms. Similarly, *SWITCH_DIFFERENT* is an indicator variable that takes the value of 1 for firms that switch from sharing to not sharing a common auditor (treatment group B), and the value of 0 for firms that have always shared a common auditor (control group B). *POST_DIFFERENT* is an indicator variable that equals to 1 for firm's cost of equity after the common auditor status change, and 0 before the change.[88] The interaction term, *SWITCH_DIFFERENT * POST_DIFFERENT,* is the independent variable of interest and captures the net effect of switching from a having common to a non-common auditor on the cost of equity in the post-switch era for the treatment firms compared to their matched controlled firms.

Columns (I) and (II) of Table 5.15 report the results of the common auditor status change analysis for samples A and B, respectively. Regarding sample A, the interaction term (*SWITCH_SAME * POST_SAME)* is positive and statistically significant at 1% level of confidence (0.0097 with *t*= 2.92). In other words, this association suggests that for those

[87] Consistent with Francis et al. (2017), since the control firms do not experience any status change, the current study uses the change of status year of the matched treatment firm as a pseudo-change year of the corresponding control firm.
[88] See footnote 87.

firms that change from having no common auditor to sharing a common auditor with at least one of their major customers, investors require higher interest rate. With respect to sample B, the interaction term (*SWITCH_DIFFERENT * POST_DIFFERENT)* is negative and statistically significant at 10% level of confidence (-0.0115 with *t*= -1.65). In turns, such an association suggests that for those firms that switch from having a common auditor to a non-common auditor with at least one of their major customers, investor lower the required interest rate. Effectively, the evidence from the common auditor status switch analysis suggests that moving from a non-common auditor (common auditor) to a common auditor (non-common auditor) incur negative (positive) capital market consequences. Importantly, these results are consistent with the evidence presented earlier, thus providing further assurance that the core findings are robust.

Table 5.15 Common Auditor Status Change Analysis

Variables	Non-Common to Common (I)	Common to Non-common (II)
SWITCH_SAME	-0.0040	
	(-1.50)	
POST_SAME	-0.0063***	
	(-2.73)	
SWITCH_SAME*POST_SAME	0.0097***	
	(2.92)	
SWITCH_DIFFERENT		-0.0021
		(-0.50)
POST_DIFFERENT		0.0066
		(1.42)
SWITCH_DIFFERENT*POST_DIFFERENT		-0.0115*
		(-1.65)
Controls	Yes	Yes
Constant	0.0296*	0.0280
	(1.87)	(0.92)
Observations	2,258	992
Adjusted R-squared	0.343	0.289
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes

Table 5.15 reports the regression results from the common auditor status change analysis. Column (I) examines the effect when supplier firms moving from non-common to common auditor status. Column (II) examines the effect when supplier firms moving from common to non-common auditor status. The dependent variable, implied COE capital *(ICC_AVG)*, is calculated as the mean of *ICC_CT* (Claus and Thomas, 2001), *ICC_GLS* (Gebhardt et al., 2001), *ICC_MPEG* (Easton, 2004) and *ICC_OJN* (Ohlson and Juettner-Nauroth (2005) minus the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds). Continuous variables are winsorized at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.5.3 Additional Analysis: The Effect of Concentration and Number of Customers

Following the results documented in the prior sections, it is important to identify environments where the main results are more (less) pronounced. In this regard, two additional tests are conducted. Table 5.16 reports the regression results.

First, the full sample is partitioned into two sub-samples: higher and lower customer concentrated firms. The partition is based on the median value of the customer sales-based Herfindahl-Hirschman Index (*CC*) which captures the magnitude of reliance of supplier firms over the major customers. Considering that a higher (lower) degree of reliance on a few large customers could arguably lead to higher (lower) likelihood for the supplier firm to default its debt obligations (Dhaliwal et al., 2016a; Campello and Gao, 2017), it would be expected that the effect of common auditors between supply chain partners on cost of equity to be more (less) pronounced for the higher (lower) customer concentrated suppliers. Consistent with expectations, results in Columns (I) and (II), show that the coefficient estimate of *CA* is positive and statistically significant at the 1% level of confidence (0.0065 with t= 3.73) for the sub-sample of firms with more concentrated customer base. In contrast, the coefficient estimate of *CA* is not significant for the firms with less concentrated customer base. More importantly, the difference between the coefficients of the two sub-samples is significant at the 5% level of confidence, thus indicating that such a difference is non-trivial. In sum, this evidence suggests that the result documented in the main regression is driven by firms with higher customer concentration.

Second, the full sample is partitioned into supplier firms with higher and lower number of major customers. The former sub-sample consists of those supplier firms that report over one major customers, while the latter sub-sample consists of firms that have exactly one major customer. Conventional wisdom suggests that supplier firms with more than one major customer face higher risks associated with their major business partner (see section 4.2.2). Instead, supplier firms with only one major customer should be less exposed on such risks. Considering that investors are concerned about supplier's exposure risks that arise from their major business partners (i.e., require higher cost of equity) (Dhaliwal et al., 2016a), it would be reasonable to expect that the effect of common auditors between supply chain partners on cost of equity to be more (less) pronounced for firms with higher (lower) number of major customers. In line with expectations, results in Columns (III) and (IV), show the coefficient estimate of *CA* is positive and statistically significant at the 1% level of confidence (0.0064 with t= 2.96) for the sub-sample of firms that report more than

one major customers. In contrast, the association between *CA* and cost of equity is not significant for the sub-sample of firms that report exactly one major customer. Furthermore, the difference between the coefficients of the two sub-samples is significant at the 10% level of confidence, thus indicating that such a difference is also significant. Overall, these findings suggest that the result documented in the main regression are driven, mainly, by firms with a higher number of major customers.

Table 5.16 Additional Tests: Customer Concentration and Number of Customers

	Higher Concentration	Lower Concentration	More Customers	Less Customers
Variables	(I)	(II)	(III)	(IV)
CA	0.0065***	0.0012	0.0064***	0.0018
	(3.73)	(0.74)	(2.96)	(1.21)
Controls	Yes	Yes	Yes	Yes
Constant	0.0035***	0.0168**	0.0451***	0.0205***
	(5.50)	(2.50)	(5.32)	(3.76)
F-test difference between subsamples	0.0053**		0.0046*	
	(2.08)		(1.71)	
Observations	3,838	3,935	2,500	5,273
Adjusted R-squared	0.214	0.177	0.208	0.1849
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes

Table 5.16 reports the results under different subsamples. In columns I and II, the partition is based on the median value of the customer sales-based Herfindahl-Hirschman Index (*CC*), while in columns III and IV, the partition is based on the number of supplier's major customers. The variable of interest (*CA*) is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. The dependent variable, implied COE capital (*ICC_AVG*), is calculated as the mean of *ICC_CT* (Claus and Thomas, 2001), *ICC_GLS* (Gebhardt et al., 2001), *ICC_MPEG* (Easton, 2004) and *ICC_OJN* (Ohlson and Juettner-Nauroth (2005) minus the risk-free rate (i.e., the yield on the 10-year U.S. Treasury bonds). Continuous variables are winsorized at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix B. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.6 Conclusion

This chapter explores investors' perceptions about common audits. Drawing upon a growing body of literature which shows that the existence of common auditors between interrelated business parties has actual audit quality consequences, the current study posits that common audits should yield direct capital market implications as well. Particularly, it is conjectured that when supplier firms appoint the same audit firm as their major customers, the information and estimation risks associated with the former should be amplified (alleviated), thus resulting in higher (lower) cost of equity-financing.

Exploiting the supply chain environment and using a sample of 7,773 supplier-year observations during the period 1983-2016, the current study finds that investors require, on average, a higher equity premium for supplier firms that appoint the same audit firm with at least one of the major customers. The evidence of higher equity-financing among those firms is consistent with the notion that investors perceive negatively to the existence of common auditors, and therefore require a higher premium to compensate for the risk associated with those firms. These findings can be explained by the theoretical argument proposed by Antle (1982; 1984), stating that auditors have incentives to act on their economic benefit since they are utility maximisers (see section 3.3.2). As such, investors tend to require higher equity premium to compensate for such a potential. Importantly, the results are robust in a series of sensitivity tests including controls for the noise of analyst forecasts, omitted variable bias, alternative measures of the implied cost of equity and common auditor variables, propensity score matching and common auditor switch status analysis. Also, a set of additional tests reveals that the result documented in the main regression are more pronounced for suppliers with a higher customer concentration base and suppliers that are more exposed on a greater number of major customers.

The findings of this study have several contributions. From an academic perspective, the evidence of this study advances the perception-based auditing literature that examines the effect of audits and auditing-related characteristics within an equity market context (e.g., Boone et al., 2008; Hope et al., 2009; Krishnan et al., 2013). In addition, it extends the emerging literature which explores the capital market consequences of characteristics among supply chain partners (e.g., Kim et al., 2015; Dhaliwal et al. 2016a). Further, this study contributes to the growing body of literature that examines the cross-audit effects (e.g., Cai et al. 2016; Dhaliwal et al. 2016b; Chang et al. 2019; Chen et al. 2020; Sun et al. 2020; Hope et al. 2022). Beyond the academic contribution, the findings of the current

study could be of interest for accounting body regulators and standard setters. According to Levitt (2000), investors' beliefs about the quality of audits is of high importance for maintaining systemic confidence in the integrity of financial reporting (refer to section 2.3 and 2.4 for a more detailed discussion about the role of external auditors as gatekeepers of the systematic confidence and integrity within the financial markets and corporate world. Finally, the results of this study could also have direct capital structure firm implications. To put it simply, given the paramount importance of firms for raising external capital, supplier firms might need to consider the trade-offs between having common auditor with their major customers and the cost of equity capital.

Chapter 6: Supplier-Major Customer Relationship: The Effect of Common Auditor on the Cost of Private Debt

6.1 Introduction

This chapter investigates empirically the effect of common auditors within a debt-financing context. Specifically, it examines whether lenders perceive that a common auditor between supplier firms and their major customers contributes to the information and estimation risk they are facing and, as a result, whether such a relationship contributes to economically significant implications on the cost of bank debt and other bank loan contracting features of the supplier firms.

As discussed in chapter 4 (section 4.2.4), extant literature suggests that supplier firms that rely for a considerable portion of their revenues on a few major customers face increased liquidity problems and cash flow risks if their major customers become bankrupt, decide to develop products internally or switch to another supplier (Dhaliwal et al. 2020). In turn, creditors are concerned that those risks could increase the likelihood of supplier's default risk (Dhaliwal et al., 2016a; Campello and Gao 2017). Consequently, any factor that could either mitigate or exacerbate such concerns/risks should be important for creditors' information and estimation risks. Given the importance of the role of auditing services for capital markets and its direct effect over creditors' perceptions about borrower's information risk, the current chapter posits that common auditors constitute such a factor. However, there is conflicting evidence regarding the role of common auditors on the quality of audits of interrelated firms, and thus the impact of common auditor on bank contracting is not clear *ex ante*.

While the preceding empirical chapter provides evidence within an equity market context, an investigation from a private debt market perspective is, also, necessitated for several reasons [89]. First, private debt constitutes the predominant source of firms' external financing over the last decades, accounting consistently for more than half of the total debt raised in the U.S. (Graham et al., 2008; Chava et al., 2009). For instance, the total debt capital issued in the form of syndicated loans in the U.S. was $1.5 trillion in 2005, while corporate bond issuance totalled $700 billion (Bharath et al., 2008). The same trend continues in more recent years, with the volume of syndicated loan issuances exceeding that of corporate bonds, totalling approximately $2 trillion as of 2018 (Federal Reserve

[89] please refer to sections 1.1.2 and 1.1.3 for a more detailed discussion.

Bank of St. Louis 2019). Second, the cost of bank debt allows for more clear inferences relative to examining either the cost of equity or the cost of public debt. Cost of equity estimates is "vulnerable" to several assumptions that potentially could lead to spurious inferences (Easton, 2006; 2007) and the public debt market is mainly accessed by firms with more homogenous characteristics relative to private debt market which traditionally consists of more heterogenous sample of firms (Francis et al., 2017).

To test the relevant hypotheses (please see sections 4.5.1 and 4.5.2), the supply chain context for a sample of 5,382 U.S. supplier firm-year-loan observations over the period 1988-2016 is utilised. With respect to the price loan terms, the current chapter documents evidence of a positive and statistically significant association between the existence of common auditor and the cost of bank loans for the supplier firm. Specifically, supplier firms with common auditor pay, on average, higher loan interest rates compared to those not having the same audit firm with their major customers. From a theoretical stance, such evidence supports Antle's (1982;1984) proposition. That is, creditors recognise that auditors within such a setting (i.e., providing auditing services at the same time to economically interrelated firms) have also economic benefits that might facilitate a utility maximisation and opportunistic behaviour from their side (refer to section 3.3.2), and therefore such a behaviour is priced into supplier's cost of bank debt and non-price loan terms. Moreover, the magnitude of the effect of common auditor is not only statistically significant, but also economically important: the loan spread for supplier firms sharing at least one common auditor with their major customer(s) is, on average, 8.73 percent higher compared to those firms not sharing a common auditor with their major customer(s). This translates into a $2.2m loan interest overcharge for supplier firms that have a shared auditor with their major customers. With respect to the non-price loan terms, banks impose more restrictive terms to supplier firms that share at least one common auditor with their major customer(s). On average, loans obtained by supplier firms with common auditors have significantly higher likelihood of being secured and more financial covenants attached in the loan agreement. Collectively, the evidence documented is consistent with the notion that creditors perceive negatively to the existence of common auditor between interrelated firms. Following the main regressions, a set of additional analysis tests are conducted to identify environments where the associations may be more pronounced. In terms of cost of debt, the main result is driven by the sub-sample of firms which have high customer concentration levels and longer auditor tenure. In terms of non-price terms, the results hold irrespective of whether firms belong to any of these two sub-samples. Finally,

the main findings are robust after a series of sensitivity tests (e.g., alternative measures to capture the common auditor presence, analysis of firm-level than issuance-level, tests to address endogeneity issues and control for supplier firms' financial reporting quality).

The remainder of this chapter is structured as follows. Section 6.2 describes the research design, including the data and the sample collection processes. Section 6.3 tests the relevant hypotheses and presents the results and discussion of the main analysis. Section 6.4 and 6.5 document the results of the analysis from the additional tests and sensitivity tests, respectively. Finally, Section 6.6 discusses the summary and conclusion of the chapter.

6.2 Research Design

6.2.1 Sample and Data Selection Process

For the execution of the empirical analysis, it is necessary to draw on data available in several databases. First, considering that the focus of the current thesis lies within the supplier-customer setting, firms with an established supplier-customer relationship are identified[90]. This information is compiled in the WRDS Supply Chain with IDs (Compustat Segment) database[91], through which the initial supplier-customer-year observations population is obtained. This provides 86,656 observations for the period 1988-2016[92]. Next, 17,998 and 19,398 supplier-customer-year observations for which supplier firms do not document any sales to their corresponding customers (i.e., information is missing) and for which supplier firms voluntary incorporate information about customers with purchases less than the regulatory threshold of 10% are removed. This exclusion leaves the sample with 49,260 supplier-customer-year observations. Then,

[90] As discussed in section 4.2.2, U.S. regulators and standard setters (i.e., FASB and SEC) mandate that public firms must disclose information about their major customers in order to enhance the decision-usefulness of financial reporting.

[91] Cen et al. (2017) provide an updated version of Compustat Segment database. Prior to the modification/addition in WRDS by Cen et al. (2017), the information for suppliers' major customer(s) was limited. For instance, major customer's name was reported without any unique identifiers and/or there were many cases where customer's name was listed in an abbreviated format (i.e., "WMRT" instead of Walmart). Hence, the data could not be used without significant processing and data cleaning following the algorithm matching as per Fee and Thomas (2004) and Luo and Nagarajan (2015).

[92] The starting year of the sample period is 1988. The reason behind this selection lies in the limited availability of loan data in the DealScan-Compustat link file that contains loan data prior to 1988. This starting point is in line prior bank loan contracting literature (e.g., Graham et al., 2008; Dhaliwal et al., 2016a). Further, during the time of data collection of the current thesis, loan data for 2017 and onwards was very limited or unavailable (Cohen et al., 2018 also cites limited availability after 2016). Hence, the sample period ends in 2016.

the afore-mentioned sample is matched with the Compustat Annual Fundamentals to obtain the auditor appointed for the supplier firms and its corresponding major customers. Due to missing or unidentified auditor data 9,071 observations are removed, thus leaving a sample of 40,189 supplier-major customer-year observations. At this point, it should be noted that the format of data in the WRDS Supply Chain with IDs (Compustat Segment) database corresponds to supplier-major customer-year observations (i.e., the same supplier is reported as many times as its corresponding major customer within the same year). In line with prior literature (e.g., Kim et al., 2015; Dhaliwal et al., 2016a), those data are transformed into unique supplier-major customer-year observations with common auditor (see Appendix A for the transformation details). This process results in 28,598 supplier-year observations.

Further, firms outside of the U.S., even if they are not required to disclose such information and abide by the U.S. regulations, they might provide information about their major business partners as a form of voluntary disclosure. Thus, 1,770 supplier-year observations that correspond to non-U.S. supplier firms which provide information about their major customers are excluded. This elimination drops the sample to 26,828 supplier-year observations. Next, 1,539 supplier-year observations from the financial and the utility sectors (SIC code 6000-6999 and SIC code 4900-4999) are removed, as these are subject to different credit decisions and regulation requirements that makes them not directly comparable to the rest of the firms (e.g., Pittman and Fortin 2004). This leaves the sample at 25,289 supplier-year observations.

With respect to loan-related data, the Loan Pricing Corporation (LPC) DealScan database is utilised. The data on DealScan are organised either by facility or by package (deal). Each loan is referred to as a facility, while a deal of grouped loans constitutes the packages. Effectively, each facility corresponds to a unique borrower, while each package contains several facilities for the same borrower. In line with prior literature (Bharath et al., 2008; Graham et al., 2008, Florou and Kosi, 2015), each facility is considered as a separate observation since loan characteristics could vary across facilities. Data on DealScan are not in an immediate usable format, due to the fact that they are contained in several distinguished sub-databases. For instance, data are categorized in four major sub-databases: (1) Company; (2) Facility; (3) Package; and (4) Current Facility Pricing. In addition, data regarding covenants and performance pricing are contained in separate files. Utilizing unique identifiers (e.g., Borrower ID, Facility ID etc.) the different sub-databases

are merged to form a combined dataset of bank loan data. In turn, this bank loan dataset is then merged with the unique supplier-major customer dataset (25,289 observations) using the linking table originally created by Chava and Roberts (2008) which contains the linking identifiers between Compustat and DealScan. This matching process leaves 8,167 supplier-loan-year observations[93]. In addition, following prior bank loan contracting literature (e.g., Graham et al., 2008; Kim et al., 2017; Chan et al., 2020) only revolvers, loan terms and 364-day loan types are included in order to facilitate a homogenous comparison between loan facilities. This process further reduces the loan sample to 7,197 supplier-loan-year observations. Finally, 1,815 observations with missing necessary data items for tests are removed, thus leaving a final sample of 5,382 supplier-loan-year observations. Table 6.1 summarizes the sample selection process while Table 6.2 reports the loan-category distribution across the sample period.

Table 6.1 Sample Selection Process

Initial data from CS from 1988 - 2016 (Compustat - Segment database)	86,656
Less:	
Customers with zero sales	17,998
Customers with less than 10% purchases	19,398
Observations with missing/unidentified auditor data	9,071
Customer/supplier/year observations	40,189
Convert to unique supplier/year observations*	28,598
Less:	
Non-US suppliers	1,770
Financial (SIC 6000-6999) and utilities (SIC 4900-4999) firms	1,539
Missing loan data from DealScan	17,122
Loan type other than revolvers, terms and 364-facilities	970
Missing key data estimates for control variables	1,815
Final Sample	**5,382**

*See example of conversion in Appendix A

[93] Consistent with prior bank loan contracting literature (e.g., Kim et al., 2015; Hasan et al., 2017), the bank loan data are merged with the supplier data for the fiscal year before loans are initiated.

Table 6.2 Sample Distribution by Year and Type

Year	364-Day	Revolvers	Terms	All Loans
1988	1	46	39	86
1989	0	47	37	84
1990	0	42	30	72
1991	2	56	29	87
1992	4	67	28	99
1993	8	67	32	107
1994	14	103	56	173
1995	10	106	45	161
1996	9	123	42	174
1997	17	198	83	298
1998	29	163	96	288
1999	33	115	59	207
2000	24	77	26	127
2001	44	112	41	197
2002	62	137	70	269
2003	46	121	73	240
2004	24	183	90	297
2005	8	155	90	253
2006	6	152	66	224
2007	12	149	91	252
2008	5	87	31	123
2009	7	75	30	112
2010	3	123	57	183
2011	3	173	58	234
2012	6	139	61	206
2013	3	131	74	208
2014	5	161	70	236
2015	4	107	75	186
2016	1	121	77	199
Total	390	3336	1656	5382
Percent (%)	7,2%	62,0%	30,8%	100%

Table 6.2 reports the loan sample distribution by categorising into type (i.e., 364-day facility, revolver, or term loan) and year.

6.2.2 Model Specification (H1b-H4)

The hypotheses related to this chapter (H1b-H4) predict an association between the presence of a common auditor among a supplier and its major customers and the supplier's cost of private debt and loan-related characteristics (see also sections 4.5.1 and 4.5.2). Hence, the regression models employed are consistent with those used by prior studies within the bank loan contracting literature (e.g., Graham et al. 2008; Goss and Roberts

2011; Houston, et al., 2014; Francis et al. 2017; Lin et al., 2018). Specifically, the following models are estimated as appropriate:

$$LN\_SPREAD_{i,t} \; or \; NON\_PRICE\_TERMS_{i,t} = CA_{i,t-1} + Firm\_Specific\_Characteristics_{i,t-1} + Auditor\_Specific\_Characteristics_{i,t-1} + Supply\_Chain\_Specific\_Characteristics_{i,t-1} + Loan\_Specific\_Characteristics_{i,t} + (Industry, Year, Loan\ purpose)\_Fixed\ Effects + \varepsilon_{i,t}$$ (Equation 6.1)

For the first hypothesis (H1b), the dependent variable, *LN_SPRD,* is a direct measure of the cost of private debt. It is defined as the natural logarithm of the amount of loan interest payments charged by banks, over the benchmark rate (e.g., LIBOR or LIBOR equivalent) for each loan dollar drawn for each facility *i* in year *t* (Kim et al., 2017; Francis et al., 2017; Hasan et al., 2017). The loan interest payments are expressed in basis points (bps) and incorporate any annual and upfront fees[94]. *NON_PRICE_TERMS* represents the corresponding dependent variable for hypotheses H2, H3 and H4, respectively. Particularly, *SEC*, is defined as a dummy variable which equals to one if the loan contract is backed up by collateral, and zero otherwise (Fang et al., 2016; Ertugul et al., 2017). *LN_MAT* captures the number of months a loan matures, and it is expressed as a natural logarithm (Francis et al., 2017; Lin et al., 2018). Finally, *NUM_COV* measures the total number of financial covenants that are attached in the loan agreement (Fang et al., 2016; Francis et al., 2017).

Drawing upon the wider literature that examines common auditor effects among related firms (e.g., Cai et al. 2016; Dhaliwal et al. 2016b; Sun et al. 2020), the independent variable of primary interest, *CA,* is defined as an indicator variable that equals to 1 if the supplier firm shares the same audit firm with at least one of its major customers, and 0 otherwise[95].

[94] The rationale behind measuring the cost of bank loans utilizing the spread over the LIBOR or LIBOR equivalent lies in the fact that the majority of bank loans are priced with respect to the floating rate.

[95] In section 6.5.5.1 two alternative definitions are utilised to capture the common auditor presence: *NUM_CA* and *PERC_CA*. The first proxy is an integer variable that counts the total number of common auditors between a supplier firm and all of its major customer(s) in a given year. The second proxy constitutes a continuous variable that measures the percentage of common auditors between the supplier firm and its major customer(s). Specifically, it is defined as the total number of common auditors between the supplier firm and its major customer(s) divided by total number of supplier's major customers for each year.

Following prior literature (e.g., Graham et al., 2008; Bharath et al., 2011; Costello and Wittenberg-Moerman, 2011; Chuluun et al., 2014; Ge and Liu, 2015; Brown, 2016; Fang et al., 2016; Dhaliwal et. al., 2016a; Anagnostopoulou, 2017; Francis et al., 2017), a series of firm-related variables that have been found to be associated with the yield spread or the non-price terms are included in the models in equation 6.1 as control variables.

First, to control for firm's size, *LN_TA* variable is employed. *LN_TA* is defined as the natural logarithm of the firm's total assets. Considering that larger firms are more diversified, have less information asymmetry and incur lower monitoring costs, a negative association between firm's size and the cost of bank loan, collateral requirements and number of financial covenants attached to the loan agreement is anticipated[96]. In contrast, a positive association between firm's size and loan maturity is expected (e.g., Graham et al., 2008; Liu and Magnan, 2016; Francis et al., 2017; Fang et al., 2016).

Second, to control for firm's growth opportunity, *MTB* variable is used. *MTB* is defined as the ratio of the market value to book value of assets. On the one hand, a higher ratio (i.e., higher growth potential) could indicate higher future cash flows, and therefore a lower cost of debt and less restrictive non-price terms would be expected (e.g., Brown, 2016; Fang et al., 2016). On the other hand, firms characterised with higher growth potential might be subject to higher information asymmetry or financial distress, and thus a higher cost of debt and more stringent non-price terms would be anticipated (e.g., Graham et al., 2008; Chuluun et al., 2014). Given the two-sided interpretation of this variable, no predictions are made regarding its direction.

Third, to control for firm's profitability, *PROF* variable is employed. *PROF* is calculated as the earnings before interest, taxes, depreciation, and amortization divided by lagged total assets. Considering that more profitable firms are associated with a lower risk of default and repayment, a negative association between profitability and cost of private debt, collateral requirements and the number of financial covenants attached to the loan agreement is anticipated. In turn, a positive association between firm's profitability and loan maturity is expected (e.g., Fang et al., 2016; Francis et al., 2017).

Fourth, to control for firm's tangibility, *LN_FA* variable is used. *LN_FA* is calculated as the natural logarithm of the ratio of the book value of property, plant and equipment to

[96] It should be noted, however, that while theoretically larger firms are viewed by creditors as less risky, some studies document evidence of a positive association with the cost of debt (e.g., Shaw, 2012).

book value of assets. In case of firm's default, creditors could recover tangible assets, or they could be used as collateral. Hence, firms with higher tangibility ratios are expected to be able to borrow at lower interest rates and have less stringent non-price terms in place (e.g., Graham et al., 2008; Costello and Wittenberg-Moerman, 2011; Francis et al., 2017).

Fifth, to control for firm's level of leverage, *LEV* variable is utilised. *LEV* is estimated as the ratio of firm's long-term debt to total assets. Considering that firms with higher leverage ratio are associated with higher probability of default, a positive relationship between leverage and cost of bank loans, collateral requirements and the number of financial covenants attached to the loan agreement is anticipated while a negative association between leverage and loan maturity is expected (e.g., Ge and Liu, 2015; Anagnostopoulou, 2017; Francis et al., 2017).

Finally, to control for probability of default, *MOD_Z* variable is used. *MOD_Z* is the adjusted Altman's Z-score, excluding the ratio of market value of equity to book value of total debt. Generally, firms with higher Z-score are associated with better financial health, which, in turns, translates into lower default risk. It follows that a negative relationship between firm's adjusted Altman's Z-score and cost of private debt, collateral requirements and number of financial covenants attached to the loan contract is expected while a positive association between *MOD_Z* and loan maturity is anticipated (e.g., Fang et al., 2016; Francis et al., 2017).

Further, considering that the current study lies within the context of supply chain, supply chain characteristics that have been found to be associated with the cost of bank debt and non-price terms are included. Following Dhaliwal et al. (2016a) and Campello and Gao (2017) an application of the Herfindahl-Hirschman Index is constructed to capture the customer concentration for each supplier firm. Given that firms with higher customer base concentration (i.e., higher degree of reliance over their customers) are associated with higher default risk, banks are expected to charge those firms with higher interest payments and demand more stringent non-price terms. In addition, Kim et al. (2015) find that price and non-price terms are more favourable for supplier firms whose major customers have higher earnings performance. To control for the cumulative earnings performance of suppliers' major customers, *CROA* variable is constructed. In line with Kim et al. (2015), *CROA* is calculated as the weighted-average ROA of major customers, with the weight

being the major customer's purchases from the supplier divided by the supplier's total sales.

Next, in line with prior literature, the following auditor-specific characteristics are included. Particularly, *TENURE*, *SPECIAL* and *BIG* variables are incorporated to control for auditor's independence and competency. *TENURE* captures the auditor-client relationship, measured in number of years. On the one hand, longer auditor-client relationship allows for the auditor to develop an "accumulated" client-specific knowledge, which eventually would lead to improvements in the audit process (e.g., detecting material errors and misstatements) (e.g., Johnson et al., 2002). On the other hand, a longer auditor-client relationship might facilitate "closeness" in terms of interests between the auditor and the auditee. This, in turn, would lead to less independent and rigorous audit procedures. Thus, the quality of audits would decrease with such long-lasting relationships (Arruranda and Paz-Ares 1997; Cahan and Zhang 2006; Carey and Simnett 2006; Davis et al., 2009; Azizkhani et al., 2013). Given the conflicting theoretical and empirical evidence, no predictions are made regarding this variable.

SPECIAL is an indicator variable that equals to 1 if the supplier firm is audited by an industry specialist auditor, and 0 otherwise. Extant auditing literature suggests that industry specialist auditors provide higher quality of audit services due to the accumulated industry-specific knowledge that acquire through industry-concentrated audits (e.g., Owhoso et al., 2002; Balsam et al., 2003; Dunn and Mayhew, 2004; Carcello and Nagy, 2004a; Krishnan, 2005; Romanus et al., 2008)[97]. Considering that higher quality of audits reduce information and uncertainty risks, supplier firms with industry specialist auditors are expected to enjoy a lower cost of bank debt and less stringent non price terms (e.g., Li et al., 2010; Zhang et al., 2017).

Finally, *BIG* is an indicator variable that equals to 1 if the supplier firm appoints a Big-N audit firm, and 0 otherwise[98]. Prior theoretical and empirical studies suggest that Big-N auditors are associated with more independent and higher quality of audits (e.g.,

[97] The rationale underpinning this notion lies in the premise that auditors with industry-specific knowledge are more likely to possess a comprehensive understanding of clients' firm characteristics. For example, Gramling and Stone (2001) suggest that industry specialist auditors develop and accumulate industry-specific knowledge as a result of economies-of-knowledge. This expertise-related knowledge, in turn, would limit the opportunistic behaviour of management and eventually result in higher financial reporting quality of the auditee firm.

[98] Considering that the sample period spans from the late-1980s, as Big- N audit firms are considered the following: Arthur Andersen; Arthur Young; Coopers & Lybrand; Ernst & Young; Deloitte & Touche; KPMG Peat Marwick; PriceWaterhouseCoopers; Touche Ross and merged entities between them.

DeAngelo, 1981; Dye, 1993; Palmrose, 1988; Becker et al., 1998; Francis et al., 1999; Kim et al., 2003; Farber, 2005; Lennox and Pittman, 2010; Zang, 2012)[99]. This, in turn, implies lower information and uncertainty risks for capital market participants. Hence, supplier firms appointing bigger auditors are expected to have lower cost of bank debt and less stringent non-price terms (e.g., Mansi et al., 2004; Pittman and Fortin, 2004; Kim et al., 2013; Gul et al., 2013).

Moreover, a set of loan-specific characteristics that are systematically associated with private debt pricing and/or non-price terms are included. These controls consist of the *LN_LS, LN_MAT, SEC, NUM_COV, PP, REV, CREDIT* and *TERM* as controls for the total amount of loan, the maturity of loan, the existence of collaterals attached to the loan agreement, the number of performance pricing provisions, the number of financial covenant restrictions, the type of loan issued and the macroeconomic conditions during the loan issuance respectively.

More specifically, *LN_LS* is the natural logarithm of the size of the loan facility measured in million U.S. dollars. Considering that more credible borrowers (e.g., borrowers with lower default risk) could obtain larger loan amounts at lower interest rates, a negative association between loan size and the cost of bank debt, collateral requirement and number of financial covenants attached in the loan is anticipated, while a positive association between loan size and loan maturity is expected contracting (e.g., Graham et. al, 2008; Kim et al., 2011; Fang et al., 2016; Francis et al., 2017; Lin et al., 2018).

LN_MAT is the natural logarithm of the duration of the loan, measured in number of months. As regards to the association between the second loan-specific control variable and cost of private debt, existing theories and literature provide mixed evidence. Under the "trade-off" hypothesis, maturity is positively associated with the cost of private debt (Gottesman and Roberts, 2004; Wang et al., 2020). Following the "credit quality" hypothesis, however, a negative association between loan maturity and cost of private debt

[99] This rationale lies in the following two interrelated arguments. First, larger audit firms have, a larger clientele portfolio, by default. In that sense, such firms are exposed to greater reputation risk costs if they succumb to the demands of an individual client. Second, larger audit firms have more wealth ("deep pockets") at stake. Consequently, audit firms with "deeper pockets" are exposed to higher costs related to litigations and regulatory sanctions if they capitulate to the client's management pressures. Under both arguments, larger audit firms have more to lose, and therefore they are expected to be more independent and provide higher audit quality

is expected (Berger and Udell, 1990; Strahan, 1999; Dennis and Mullineaux, 2000)[100]. Given the two competing arguments, no prediction is made regarding the association between maturity and loan pricing.

SEC is an indicator variable which equals to 1 if the loan is secured by collateral, and 0 otherwise. Previous empirical research documents evidence that the existence of collateral is related with riskier borrowers, and therefore higher interest rates (Berger and Udell, 1990; Carey et al., 1998; Booth and Booth, 2006). Therefore, a positive (negative) relationship between the presence of collateral and cost of bank loan (loan maturity) is anticipated (e.g., Kim et al., 2011; Fang et al., 2016; Lin et al., 2018).

NUM_COV, measures the number of financial covenants attached on the loan agreement. According to Spiceland et al. (2016), banks tend to impose stricter covenant restrictions (e.g., increased number of covenants) for borrowers with low financial reporting quality. Thus, supplier firms with a greater number of covenants are expected to pay higher interest rates and have more strict non-price terms ((e.g., Graham et. al, 2008; Kim et al., 2011; Fang et al., 2016).

PP is an indicator variable that takes the value 1 if the loan includes performance pricing clauses, and 0 otherwise. The inclusion of this variable serves as a means to control for the fact that banks could charge different interest rates if loans contain performance pricing provisions (Asquith et al., 2005; Graham et al., 2008)[101]. In line with prior literature, a negative association among performance pricing provisions and cost of private debt, collateral requirements and number of financial covenants is expected. On the contrary, performance pricing provisions are expected to be positively associated with loan maturity (e.g., Fang et al., 2016; Francis et al., 2017; Lin et al., 2018).

REV is an indicator variable that takes the value 1 if the loan type is categorised as revolver, and 0 otherwise. Generally, non-term loans (e.g., revolving loans) considered to

[100] The rationale behind the trade-off hypothesis lies in the following. Creditors, generally, prefer to issue loans with shorter maturity in order to mitigate agency problems, such as asset substitution. Borrowers, in turn, are generally motivated to obtain loans with longer duration due to high liquidation costs at maturity. Thus, to hedge against the risk of lending riskier borrowers over a longer period, banks would demand higher compensation for loans with longer maturity. An alternative to trade-off hypothesis is the credit quality hypothesis. Based on the credit quality hypothesis, banks would offer loans with shorter maturities to riskier borrowers in order to limit their financial exposure.

[101] Performance pricing provisions are measured through the use of financial ratios or credit ratings. Such provisions help to determine, *ex ante*, the effect of credit quality changes on interest rates. They are classified into two distinct categories, namely interest-increasing and interest-decreasing performance pricing provisions (see Asquith et al., 2005 for a detailed analysis)

be less risky compared to other types of loans. Thus, supplier firms with revolver loans are expected to pay lower interest rate and have less strict non-price terms (e.g., Kim et al., 2013; Fang et al., 2016).

In addition, two economy-wide variables, *CREDIT* and *TERM*, are included to control for the potential effects of macroeconomic conditions on loan contract terms. *CREDIT* is the difference in yield between the BAA- and AAA-rated corporate bonds, and *TERM* is the difference in yield between the 10-year and two-year U.S. Treasury bonds. Higher values for *CREDIT* and *TERM* indicate higher economic uncertainty. As such, they are expected to be positively (negatively) associated with cost of debt, collateral requirements and number of financial covenants (loan maturity).

Further, industry (one digit SIC codes), year and loan purpose dummy variables are included to control for potential differences across industries, years and purpose of loans, respectively (Fang et al. 2016; Lin et al. 2018). Additionally, to alleviate potential concern over reverse causality between the dependent and independent variables, all firm-specific variables are measured in the year preceding the debt issuance date, while all issue-specific variables are measured at the debt issuance date (Dhaliwal et al., 2011; Florou and Kosi 2015; Kreß et al. 2019; Almaghrabi et al., 2021). All continuous variables are winsorised at the 1st and 99th percentiles to reduce the effect of outliers. Finally, all models are estimated using heteroskedasticity robust standard errors, adjusted to account for correlations within firms' clusters (White, 1980; Petersen, 2009). A summary of all the variable definitions and measurements used in the current chapter can be found in Appendix C.

6.3 Univariate Analysis

6.3.1 Summary Statistics of Common Auditor and Control Variables

Table 6.3 reports the descriptive statistics for the variables used in the main regression models. With respect to the variable of interest, *CA*, approximately 29 percent of the supplier firms in the full sample employ at least one common auditor with their major customers. This is consistent with the proportions reported by Dhaliwal et al. (2016b).

The summary statistics for the loan-specific characteristics are, generally, in line with prior literature in bank loan contracting (e.g., Kim et al. 2013; Kim et al. 2015; Fang et al. 2016; Hasan et al. 2017). Specifically, the mean and median of the interest rate over the LIBOR are 212 and 200 basis point spread (bps), respectively, with a standard deviation of

about 139 bps. The mean (median) of the total facility amount is $302 million ($110 million), with a standard deviation of $489 million. The average period before the loan is matured is about 48 months, with the median being at 59 months. About 58 percent of the loan facilities in the full sample are secured by collaterals, while almost two thirds of the loan facilities in the full sample are issued as revolver type loans. Also, the mean (median) number of financial covenants contained in the loan contracts is 1.3 (1.0), while 40 percent of the loan facilities in the full sample have performance pricing provisions.

Turning the focus on the firm-specific characteristics, the mean and median of suppliers' firm size are 3.3 billion and 760 million, respectively. On average, the sample firms have a market to book and long-term debt to total asset ratios of 1.78 and 27.8, correspondingly. In addition, the descriptive statistics for profitability and tangibility measurements show that for the sample firms, 3% and 29% of total assets are related to earnings before interest, taxes, depreciation and amortization (EBITDA) and tangible assets (i.e., PPE), respectively. Further, the mean (median) of the default probability for the sample firms is 1.72 (1.82).

As regards the supply chain and audit-related characteristics, firms have, on average, a customer base concentration of 7.5%, while the mean of weighted average ROA for supplier's major customers is 1.5%. Nearly 17 (94) percent of the supplier firms are audited by an industry specialist (Big-N) auditor, while the average period of audit tenure in the sample firms is about 10 years. Finally, the mean (median) differences in yield between the BAA- and AAA-rated corporate bonds and the 10-year and two-year U.S. Treasury bonds are 0.93 (0.88) and 1.18 (1.23), respectively.

Table 6.3 Descriptive Statistics for Full Sample

Variables	N	Mean	25th Perc	Median	75th Perc	SD
SPREAD	5,382	212.579	112.500	200.000	275.000	139.253
CA	5,382	0.293	0.000	0.000	1.000	0.455
TA	5,382	3264.221	180.081	759.967	2570.000	7851.398
MTB	5,382	1.785	1.172	1.508	2.061	0.964
PROF	5,382	0.035	0.009	0.049	0.092	0.132
FA	5,382	0.294	0.117	0.218	0.398	0.235
LEV	5,382	0.278	0.118	0.255	0.395	0.207
MOD_Z	5,382	1.728	1.034	1.823	2.508	1.399
TENURE	5,382	10.170	4.000	8.000	14.000	8.248
SPECIAL	5,382	0.167	0.090	0.178	0.233	0.091
BIG	5,382	0.940	1.000	1.000	1.000	0.237
CC	5,382	0.075	0.020	0.040	0.083	0.100
CROA	5,382	0.015	0.005	0.013	0.023	0.022
LOAN_SIZE	5,382	302.888	30.000	110.000	350.000	489.444
MATURITY	5,382	48.180	35.000	59.000	60.000	22.577
SECURITY	5,382	0.583	0.000	1.000	1.000	0.493
NUM_COV	5,382	1.308	0.000	1.000	2.000	1.388
PP	5,382	0.400	0.000	0.000	1.000	0.490
REVOLVER	5,382	0.642	0.000	1.000	1.000	0.479
CREDIT	5,382	0.929	0.700	0.880	1.040	0.322
TERM	5,382	1.183	0.320	1.230	1.960	0.904

Table 6.3 presents the descriptive statistics of the full sample firms. Note that variables that are transformed into a logarithmic form in later analysis (e.g., *SPREAD, TA, LOAN_SIZE* etc.), they are expressed in their initial form in Table 6.3 so as to depict their actual descriptive statistics (i.e., free from any transformations).

6.3.2 Summary Statistics of the Partitioned Sample

In Table 6.4, the full sample is partitioned into two sub-samples to allow for a first stage comparison of the data. Panel A illustrates the summary statistics for firms that have at least one common auditor with their major customers, while Panel B depicts the summary statistics for those firms that do not have common auditor with their major customers. Further, in Panel C of Table 6.4, the results of the tests for the mean (T-test) and median (Mann-Whitney test) differences between the two samples are reported.

As shown in Panels A and B, the mean and median values of the natural logarithm of the interest rate for the sample with common auditor are higher compared to the corresponding the corresponding values for the sample with non-common auditor (5.196 bps vs 5.073 bps and 5.298 bps vs 5.164 bps). In addition, the mean of the probability that the loan issued would be secured by collaterals is higher for supplier firms sharing at least one common auditors with their major customer compared to those not sharing (e.g., 0.63

vs 0.56). Similarly, supplier firms with common auditors have, on average, a higher number of financial covenants attached to their loan agreement (e.g., 1.46 vs 1.24). More importantly, both parametric and non-parametric tests indicate that these differences are statistically significant at 1% level of confidence [see Panel C][102]. Collectively, the results suggest that banks tend to apply higher interest rates and stricter non-price bank loan terms for those firms that share an auditor with their major customers, hence providing preliminary support of H1b, H2 and H4.

With respect to the remaining loan-specific variables, Table 6.4 shows that supplier firms with common auditors receive loans of higher amount (mean: 4.63 vs 4.53; median: 4.82 vs 4.60) with the median differences being statistically significant at the 5% confidence level. Further, supplier firms with common auditors have more performance pricing provisions (0.40 vs 0.39), while they obtain revolvers on a higher frequency compared to supplier firms with non-common auditors (0.65 vs 0.63). However, both mean and median tests suggest not statistically significant differences.

As regards the rest of the variables, Table 6.4 shows that the common auditor sub-sample is comprised of larger firms (6.57 vs 6.54), with lower probability of being default (1.59 vs 1.78). In addition, firms with at least one common auditor have, on average, lower market to book ratio (1.77 vs 1.79) than those with no common auditor. Further, they are less profitable (0.02 vs 0.04), less leveraged (0.275 vs 0.278) while they hold more tangible assets (-1.47 vs -1.62) than firms that do not have a common auditor with their major customers[103]. Finally, firms within the common auditor sub-sample are shown to have higher dependency over their major customers (0.09 vs 0.07), higher credit spreads (0.93 vs 0.92), lower term spreads (1.16 vs 1.19), less profitable major customers (0.0156 vs 0.0152), shorter audit firm tenure (9.6 vs 10.3), appoint less frequently industry specialist auditors (0.159 vs 0.169) and they are audited more often by Big-N auditors (0.98 vs 0.92).

[102] Parametric and non-parametric tests indicate not statistically significant differences in loan maturities.
[103] Please note that the negative values reported under *LN_FA* variable are consistent with the value of the actual mean of *FA* variable. That is, the logarithmic transformation of any value below zero yields negative values.

Table 6.4 Descriptive Statistics: Partitioning the Sample and Differences

	Panel A Common Auditor (N=1,579)					Panel B Non-Common Auditor (N=3,803)					Panel C Differences	
Variables	Mean	25th Perc	Median	75th Perc	SD	Mean	25th Perc	Median	75th Perc	SD	Mean	Median
LN_SPRD	5.1960	4.8283	5.2983	5.7038	0.7373	5.0731	4.6052	5.1648	5.6168	0.7929	0.1229***	4.596***
LN_TA	6.5739	5.2863	6.6545	7.7981	1.7905	6.5489	5.1607	6.6161	7.8928	1.8712	0.0249	0.478
MTB	1.7706	1.1181	1.4420	2.0500	1.0170	1.7907	1.1991	1.5383	2.0612	0.9417	-0.0201	-3.606***
PROF	0.0240	-0.0141	0.0394	0.0870	0.1406	0.0396	0.0177	0.0528	0.0934	0.1285	-0.0155***	-6.017***
LN_FA	-1.4746	-2.0742	-1.3721	-0.8172	0.9083	-1.6231	-2.1779	-1.5699	-0.9724	0.9238	0.1485***	5.552***
LEV	0.2750	0.1070	0.2523	0.3944	0.2101	0.2787	0.1213	0.2560	0.3953	0.2050	-0.0037	-0.762
MOD_Z	1.5918	0.8627	1.6540	2.4905	1.4336	1.7850	1.0996	1.8995	2.5221	1.3800	-0.1932***	-5.477***
TENURE	9.6244	4.0000	7.0000	13.0000	7.9026	10.3968	4.0000	8.0000	15.0000	8.3777	-0.7723**	-2.743***
SPECIAL	0.1592	0.0670	0.1787	0.2231	0.0834	0.1699	0.0964	0.1782	0.2383	0.0943	-0.0107***	-2.971***
BIG	0.9848	1.0000	1.0000	1.0000	0.1224	0.9219	1.0000	1.0000	1.0000	0.2684	0.0628***	8.870***
CC	0.0908	0.0242	0.0529	0.1076	0.1093	0.0680	0.0193	0.0361	0.0750	0.0955	0.0227***	10.004***
CROA	0.0156	0.0051	0.0125	0.0243	0.0236	0.0152	0.0054	0.0125	0.0221	0.0212	0.0004	0.423
LN_LS	4.6322	3.4012	4.8283	5.9269	1.7181	4.5327	3.4012	4.6052	5.7526	1.7355	0.0995	2.098**
LN_MAT	3.7314	3.5835	4.0775	4.0943	0.6494	3.7035	3.5553	4.0775	4.0943	0.6563	0.0278	1.093
SEC	0.6314	0.0000	1.0000	1.0000	0.4826	0.5630	0.0000	1.0000	1.0000	0.4961	0.0684***	4.636***
NUM_COV	1.4623	0.0000	1.0000	2.0000	1.4645	1.2438	0.0000	1.0000	2.0000	1.3498	0.2185***	4.652***
PP	0.4091	0.0000	0.0000	1.0000	0.4918	0.3968	0.0000	0.0000	1.0000	0.4893	0.0123	0.840
REV	0.6580	0.0000	1.0000	1.0000	0.4745	0.6353	0.0000	1.0000	1.0000	0.4814	0.0227	1.583
CREDIT	0.9310	0.7200	0.8800	1.0400	0.3215	0.9282	0.7000	0.8800	1.0400	0.3217	0.0027	0.314
TERM	1.1617	0.2600	1.2100	1.9500	0.9134	1.1915	0.3400	1.2300	1.9700	0.8998	-0.0298	-1.277

Table 6.4 presents the summary statistics for the two sub-samples. Panel A reports the summary statistics for firms that have at least one common auditor with their major customers. Panel B reports the summary statistics for firms that do not have common auditor with their major customers. Panel C presents the mean (T-test) and median (Mann-Whitney test) differences for the two sub-samples. Continuous variables are winsorized at 1% and 99%. Detailed definitions for the variables can be found in Appendix C. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

6.3.3 Correlation Matrices

The pairwise correlations among all variables are reported in Table 6.5. Panel A presents the Pearson correlation coefficients (parametric test), and Panel B documents the Spearman correlation coefficients (non-parametric test). Both tests provide consistent correlations and show that the variables employed are, generally, not highly correlated with each other. The only exception is the correlation between firm's size (*LN_TA*) and loan amount (*LN_LS*). Nonetheless, the correlation coefficient among these two variables stands below the critical value of 0.8 that could indicate potential multicollinearity issues (Gujarati 2003, p. 359)[104]. In addition, it should be noted that such a correlation is similar to prior related studies. For instance, Kim et al. (2015) document correlation of 0.84 and Francis et al. (2017) report correlation of 0.79.

As shown in Panel A, the variable of interest, *CA*, is positively correlated with the cost of bank debt (*LN_SPRD*), loan securitization *(SEC)* and the number of financial covenants attached in the loan contract *(NUM_COV)*, with the coefficient estimate being statistically significant at the 1% confidence level for all variables (r= 0.072; r= 0.063; r= 0.072). Similarly, Panel B reports a positive and statistically significant correlation at the 1% confidence level between the *CA* and *LN_SPRD*, *SEC* and *NUM_COV*. As can be noticed, however, the correlation coefficients between the variable of interest, *CA*, and loan maturity *(LN_MAT)* are insignificant in both panels (r= 0.019; r= 0.015). This is consistent with the evidence reported in Table 6.4. More importantly, this evidence provides a preliminary support of hypotheses H1b, H2 and H4. That is, supplier firms with common auditors pay higher interest rates and have more stringent non-price bank loan terms in place than firms with no such relationships.

Turning the focus on the other variables, *CA* is positively and statistically significant correlated at 1% level of confidence with *LN_FA*, *BIG* and *CC* (r= 0.073; r= 0.121; r= 0.103) and at 10% level of confidence with *LN_LS* (r= 0.026). On the contrary, *CA* is negatively and statistically significant correlated with *PROF* (r=- 0.053), *MOD_Z* (r=- 0.063), *TENURE* (r=- 0.043) *SPECIAL* (r=- 0.054) at 1% level of confidence. In other words, supplier firms with common auditors hold more tangible assets, are audited by Big-N auditors, have a higher degree of dependency over their major customers, obtain loan of

[104] To eliminate the potential of multicollinearity among the two variables, a Variance Inflation Factor (VIF) test is performed as well (unreported). The VIF values for all variables lie within the range of 1-4. That is, values stand below the critical point of 10 (Wooldridge, 2016, p. 86), suggesting no multicollinearity issues.

larger size, are less profitable, have lower probability of default, employ less frequently industry specialist auditors and retain the same audit firm for shorter period. Finally, the variable of interest, *CA*, is positively (negatively) but not significantly correlated with *LN_TA*, *CROA*, *PP*, *REV* and *CREDIT* (*MTB*, *LEV* and *TERM*).

Table 6.5 Pairwise Correlation Matrices

Panel A. Pearson Correlation Matrix

Variables	*LN_SPRD*	*CA*	*LN_TA*	*MTB*	*PROF*	*LN_FA*	*LEV*	*MOD_Z*	*TENURE*	*SPECIAL*
LN_SPRD	1									
CA	0.072***	1								
LN_TA	-0.325***	0,006	1							
MTB	-0.184***	-0.010	-0.055***	1						
PROF	-0.259***	-0.053***	0.095***	0.220***	1					
LN_FA	-0.135***	0.073***	0.019	-0.126***	-0.009	1				
LEV	0.193***	-0.008	0.120***	-0.193***	-0.216***	0.151***	1			
MOD_Z	-0.260***	-0.063***	0.062***	0.041***	0.559***	-0.119***	-0.290***	1		
TENURE	-0.215***	-0.043***	0.384***	-0.031**	0.068***	-0.042***	-0.023*	0.137***	1	
SPECIAL	-0.073***	-0.054***	0.001	0.020	0.068***	-0.041***	0.067***	0.174***	0.045***	1
BIG	-0.098***	0.121***	0.147***	-0.022	-0.029**	0.033**	0.051***	-0.035***	0.120***	0.025*
CC	0.116***	0.103***	-0.160***	0.034**	-0.043***	0.046***	-0.064***	-0.090***	-0.152***	-0.046***
CROA	0.004	0.009	-0.057***	0.059***	0.112***	-0.034**	-0.074***	0.078***	-0.048***	0.037***
LN_LS	-0.349***	0.026*	0.790***	-0.015	0.156***	0.097***	0.106***	0.109***	0.288***	-0.037***
LN_MAT	0.104***	0.019	0.138***	-0.068***	0.099***	0.016	0.103***	0.048***	0.032**	-0.029**
SEC	0.530***	0.063***	-0.288***	-0.114***	-0.187***	-0.051***	0.138***	-0.209***	-0.174***	-0.051***
NUM_COV	0.128***	0.072***	-0.123***	-0.029**	0.023*	0.017	-0.020	-0.013	-0.074***	-0.073***
PP	-0.163***	0.011	0.094***	-0.020	0.098***	0.058***	-0.050***	0.087***	0.036***	-0.030**
REV	-0.151***	0.022	-0.064***	-0.011	0.030**	0.064***	-0.111***	0.051***	-0.004	-0.061***
CREDIT	0.162***	0.004	0.155***	-0.079***	-0.075***	-0.079***	-0.006	-0.033**	0.072***	-0.038***
TERM	0.205***	-0.015	0.191***	-0.106***	-0.073***	-0.079***	0.026*	-0.065***	0.102***	-0.038***

(Table 6.5 continues in the next page)

Panel A. Pearson Correlation Matrix (continued)

Variables	*BIG*	*CC*	*CROA*	*LN_LS*	*LN_MAT*	*SEC*	*NUM_COV*	*PP*	*REV*	*CREDIT*	*TERM*
BIG	1										
CC	-0.047***	1									
CROA	-0.058***	0.303***	1								
LN_LS	0.091***	-0.127***	-0.022	1							
LN_MAT	0.004	-0.013	0.036***	0.254***	1						
SEC	-0.047***	0.060***	0.006	-0.238***	0.132***	1					
NUM_COV	-0.029**	-0.027**	0.011	-0.015	0.089***	0.297***	1				
PP	0.001	-0.057***	0.028**	0.217***	0.121***	0.051***	0.462***	1			
REV	-0.031**	0.014	0.017	0.026*	0.033**	-0.085***	-0.003	0.133***	1		
CREDIT	-0.060***	-0.019	-0.021	0.092***	-0.043***	0.036***	0.043***	0.041***	-0.033**	1	
TERM	-0.050***	-0.033**	-0.060***	0.100***	-0.012	0.015	-0.036***	-0.067***	-0.015	0.335***	1

Table 6.5 (Panel A) reports the Pearson correlation coefficients among the employed variables. Continuous variables are winsorised at the at 1% and 99%. Detailed definitions for the variables can be found in Appendix C. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

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Panel B. Spearman Correlation Matrix

Variables	*LN_SPRD*	*CA*	*LN_TA*	*MTB*	*PROF*	*LN_FA*	*LEV*	*MOD_Z*	*TENURE*	*SPECIAL*
LN_SPRD	1	0.063***	-0.295***	-0.219***	-0.318***	-0.121***	0.175***	-0.285***	-0.173***	-0.065***
CA		1	0.007	-0.049***	-0.082***	0.076***	-0.01	-0.075***	-0.037***	-0.041***
LN_TA			1	0.031**	0.038***	0.008	0.166***	-0.054***	0.372***	0.002
MTB				1	0.464***	-0.131***	-0.211***	0.125***	-0.015	0.007
PROF					1	-0.053***	-0.278***	0.521***	0.02	0.068***
LN_FA						1	0.206***	-0.169***	-0.048***	-0.062***
LEV							1	-0.320***	0.013	0.074***
MOD_Z								1	0.111***	0.190***
TENURE									1	0.034**
SPECIAL										1

(Table continues in the next page)

Panel B. Spearman Correlation Matrix (continued)

Variables	*BIG*	*CC*	*CROA*	*LN_LS*	*LN_MAT*	*SEC*	*NUM_COV*	*PP*	*REV*	*CREDIT*	*TERM*
LN_SPRD	-0.088***	0.137***	-0.001	-0.352***	0.071***	0.528***	0.055***	-0.212***	-0.198***	0.163***	0.194***
CA	0.121***	0.136***	0.006	0.029**	0.015	0.063***	0.063***	0.011	0.022	0.004	-0.017
LN_TA	0.149***	-0.170***	-0.057***	0.788***	0.175***	-0.279***	-0.097***	0.088***	-0.069***	0.206***	0.184***
MTB	-0.008	-0.045***	0.077***	0.080***	-0.001	-0.158***	-0.029**	0.013	-0.029**	-0.105***	-0.108***
PROF	-0.045***	-0.046***	0.112***	0.113***	0.062***	-0.225***	0	0.087***	0.034**	-0.087***	-0.108***
LN_FA	0.026*	0.013	-0.075***	0.094***	0.018	-0.038***	0.016	0.049***	0.058***	-0.107***	-0.073***
LEV	0.045***	-0.063***	-0.049***	0.142***	0.116***	0.119***	-0.053***	-0.047***	-0.103***	0.016	0.025*
MOD_Z	-0.045***	-0.053***	0.101***	0.009	0.017	-0.202***	-0.015	0.075***	0.054***	-0.045***	-0.074***
TENURE	0.119***	-0.148***	-0.030**	0.277***	0.064***	-0.159***	-0.062***	0.027*	-0.004	0.096***	0.096***
SPECIAL	0.071***	-0.054***	0.054***	-0.041***	-0.011	-0.053***	-0.082***	-0.034**	-0.062***	-0.073***	-0.043***
BIG	1	-0.101***	-0.058***	0.091***	0.017	-0.047***	-0.029**	0.001	-0.031**	-0.046***	-0.046***
CC		1	0.430***	-0.140***	-0.022	0.089***	0.027*	-0.036***	0.017	0.011	0.004
CROA			1	-0.031**	0.028**	0.009	0.001	0.012	0.01	0.012	-0.047***
LN_LS				1	0.285***	-0.237***	0.009	0.200***	0.005	0.127***	0.095***
LN_MAT					1	0.120***	0.043***	0.075***	-0.080***	-0.004	-0.050***
SEC						1	0.284***	0.051***	-0.085***	0.027**	0.015
NUM_COV							1	0.507***	0.017	0.018	-0.035**
PP								1	0.133***	0.009	-0.064***
REV									1	-0.054***	-0.013
CREDIT										1	0.333***
TERM											1

Table 6.5 (Panel B) reports the Spearman correlation coefficients among the employed variables. Continuous variables are winsorized at the at 1% and 99%. Detailed definitions for the variables can be found in Appendix C. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

6.4 Multivariate Analysis

6.4.1 The Effect of Common Auditor on Loan Pricing (H1b)

Hypothesis H1b conjectures that there is a significant association between the existence of common auditor among supplier-major customers and the supplier's cost of bank debt. Due to the conflicting arguments, however, it is not clear *ex ante* how the existence of common auditor could affect loan costs. The findings from the univariate analysis supports the view that creditors negatively perceive the presence of common auditor, and therefore higher loan interest payments are charged to supplier firms sharing at least one common auditor with their major customers. However, a univariate approach involves the analysis of a single variable at a time, and therefore a multivariate analysis is required. Table 6.6 reports the regression results of H1b.

Column I, II, III and IV, in Table 6.6, report the results of Eq. (6.1) using an ordinary least squares (OLS) model, with the cost of bank loan being the dependent variable. Column I of Table 6.6 regresses *LN_SPRD* with the variable *CA* being the only independent variable. The coefficient estimate is positive and statistically significant at 1% confidence level (0.1229 with t = 2.75). In Columns II and III, firm-, audit-, supply chain- and loan- specific control variables are successively included. While there is a slight change in the estimated coefficient of the *CA* variable, the association remains positive and significant at 1% level (Column II: 0.1242 with t = 3.39; Column III: 0.0846 with t = 3.18). In Column IV, the model regresses cost of bank debt on *CA* after including all firm-, audit-, supply chain-, loan- specific characteristics and firm, year and loan purpose fixed effects. As shown, the coefficient estimate of *CA* is positive and statistically significant at 1% confidence level (0.0837 with t = 3.71). Collectively, the regression results reported in Table 6.6 suggest that banks, on average, charge higher interest rates for those supplier firms which share at least one common auditor with their major customers. The findings support the view that the existence of common auditor is priced negatively by creditors (for the theoretical justification of the findings please refer to section 3.3.2). Importantly, the evidence is in line with that documented in the univariate analysis earlier, while also provide confirmation of H1b.

Moreover, the magnitude of the effect of common auditor is not only statistically significant, but also economically important. Specifically, from the coefficient estimate on the variable of interest, *CA*, the loan spreads for supplier firms that sharing at least one common auditor with their major customers are, on average, 8.73 percent higher compared to those firms not sharing a common auditor with their major customers[105]. Given that the mean loan spread of the sample is 212 bps, this translates to 18.56 bps difference in the

[105] Considering that the dependent variable is expressed in the form of natural logarithm, the coefficient estimate in percentage is estimated as: 100 x ($e^{0.0837}$-1) = 8.73%.

cost of bank debt paid by firms with common auditor and those with no common auditor[106]. Since the mean loan size that the sample firms receive is approximately $303m and the average maturity of the loans is about 4 years, this corresponds to a payment of over $2.2m loan interest over the average loan's life[107]. In other words, firms that have a shared auditor with their major customer(s) are charged $2.2m more compared to those with no common auditor.

With respect to control variables, the associations reported across all specifications are, largely, in line with those documented in prior bank loan contracting literature (e.g., Graham et al., 2008; Bharath et al., 2008; Kim et al., 2013; Fang et al., 2016; Francis et al., 2017; Kim et al., 2017; Lin et al., 2018). For the sake of brevity only the estimated coefficients of the results documented in Column IV are discussed[108].

Particularly, the cost of bank loan is negatively and significantly associated with firm's size (*LN_TA*) (-0.0802 with *t* = -5.68). Generally, larger firms are more diversified and face fewer information asymmetry issues. This, in turn, leads to lower monitoring costs by creditors, and therefore the negative association between these two variables is loaded as expected. Cost of bank debt is also negatively and significantly associated with market-to-book ratio (*MTB*) (-0.0660 with *t* = -5.62). Again, results are in line with expectations, as firms with higher growth potential could indicate higher future cash flows, and therefore a lower cost of debt. Table 6.6 reports a negative and significant association between cost of bank loans and earnings performance (*PROF*) (-0.3266 with *t* = -3.51), default probability (*MOD_Z*) (-0.0192 with *t* = -2.00) and asset tangibility (*LN_FA)* (-0.0482 with *t* = -3.54). Firms with higher profitability ratio and modified Altman's Z-score are generally associated with a lower risk of default and repayment. Also, firms with higher tangibility ratio have more assets to pledge in case of being default. Taken together, firms with such characteristics are viewed as being less risky by creditors, and thus the negative association is consistent with expectations. Furthermore, regression documents a negative and statistically significant relationship between cost of bank loan and auditor's tenure (*TENURE*) (-0.0073 with *t* = -4.98). This result is in line with the argument that longer auditor-client relationship allows for the development of "accumulated" client-specific knowledge. In addition, cost of bank debt is negatively and significantly associated with loan facility amount (*LN_LS*) (-0.1035 with *t* = -8.25), performance pricing provisions (*PP*) (-0.1530 with *t* = -6.67) and loan type being revolver (*REV*) (-0.1507 with *t* = -9.53). Given that non-term loans (e.g., revolvers) are considered to be less risky than other loan categories, the negative association is loaded as expected. Also, more credible borrowers are usually eligible to obtain higher amount of credit and have less performance pricing

[106] 212.6 (average loan spread) x 8.73% = 18.56 bps.
[107] 302.88 (average loan size) x 4 years (average maturity) x 18.56 bps (increase in loan spreads) = $2.24m.
[108] Given the fact that the column IV of Table 6.6 includes all the control variables, the regression results of Column IV are selected to be discussed, as more comprehensive and indicative.

provisions attached to the loan. Hence, the negative relationship between those two variables and the cost of private debt is justified.

On the contrary, Table 6.6 documents a positive and statistically significant association between cost of bank loan and firm's financial leverage (*LEV*) (0.5605 with t = 10.25). Considering that firms with higher leverage ratio are associated with higher probability of default, the reported association is in line with expectations. Also, cost of bank loan is positively and significantly associated with customer base concentration (*CC*) (0.3083 with t = 2.11). Firms with higher degree of reliance over their customers are associated with higher default risk, and therefore the positive association is loaded as expected. With respect to the loan-specific characteristics, cost of bank loan is positively and significantly associated with the loan securitization (*SEC*) (0.3972 with t = 16.04) and the number of financial covenants attached to the loan contract (*NUM_COV*) (0.307 with t = 3.50). Loans with more collateral and covenant requirements are associated with higher risk and thus the reported association is consistent with expectations. A positive and significant relationship is, also, documented among the cost of private bank debt and the two macro-economic variables (*CREDIT*) (0.0860 with t = 1.82) and *(TERM)* (0.0509 with t = 1.70). Given that those two variables capture economy-wide uncertainty, the positive association is along expectations. Finally, the coefficient estimates on firm's loan maturity (*LN_MAT*), industry specialist auditor *(SPECIAL)*, cumulative earnings performance of major customers *(CROA)* and auditor size *(BIG)* are not statistically significant[109].

6.4.2 The Effect of Common Auditor on Loan Securitization (H2)

Loan securitization constitutes one of the most prominent non-price loan contract features (Bharath et al., 2011). Hypothesis H2 conjectures that there is a significant association between the existence of common auditor among supplier-major customers and the collaterals pledged by the supplier firm. Due to the conflicting arguments, however, it is not clear *ex ante* how the existence of common auditor could affect loan securitization. To investigate the association between common auditor and the likelihood of a loan being secured with collateral, eq. (1) is employed, with the dependent variable being the indicator variable *SEC*[110]. Considering that *SEC* is a dummy variable with a binary outcome, eq. (1) is estimated using a probit regression[111]. The results are reported in Column I of Table 6.7.

[109] It should be noted that, the results on loan maturity are not surprising, as they are consistent with prior literature which also documents insignificant association (e.g., Graham et al. 2008; Kim et al., 2013; Francis et al., 2017).

[110] In line with Francis et al. (2017), the control variables employed in the model are the same as the ones included in the cost of bank debt model (Column IV, Table 6.6).

[111] Given that the dependent variable is binary, either a probit or logit regression could be used. Following prior bank loan contracting literature (Graham et al. 2008; Francis et al. 2017; Ertugrul et al.2017), the current study employs a Probit regression. Nevertheless, both regression models should yield similar results (Hahn et al., 2005).

The evidence suggests that the likelihood of banks requiring collateral requirements is positively and significantly associated with the existence of common auditors between supplier firms and their major customer(s). Specifically, the coefficient estimate of the key independent variable, *CA*, is positive (0.1506 with z= 2.32) and significant at 5% level of confidence. This is consistent with the evidence documented in the analysis related to H1, that is, the existence of common auditors among interrelated firms is negatively perceived by creditors[112]. More importantly, the regression results provide confirmation of hypothesis H2.

As regards the impact of control variables on loan securitization, directions and magnitudes of the coefficients are in line with prior bank loan contracting literature (e.g., Graham et al. 2008; Fang et al., 2016; Ertugrul et al., 2017).

As shown in Column I of Table 6.7, loan securitization *(SEC)* is negatively and significantly associated with firm's size *(LN_TA)* (-0.2447 with *t* = -7.53), growth opportunities *(MTB)*, (-0.1127 with *t* = -3.50), profitability *(PROF)* (-0.7217 with *t* = -2.48) and probability to default *(MOD_Z)* (-0.1235 with *t* = -4.10). Collectively, such an association could probably be justified by the fact that firms with those characteristics are, generally, related with lower default risk. A negative and statistically significant relationship is also documented between collateral requirements *(SEC)* and auditor's tenure *(TENURE)* (-0.0083 with *t* = -1.73). The evidence is consistent with the argument that longer auditor-client relationship allows for the development of "accumulated" client-specific knowledge. As such, higher tenure is positively perceived by creditors, and thus banks are willing to reduce their monitoring mechanisms over borrowers (i.e., collateral requirements). Further, Table 6.7 documents a negative and statistically significant association between loan collaterals and both loan size (*LN_LS*) (-0.1058 with *t* = -3.54) and type of loan *(REV)* (-0.1642 with *t* = -3.75). The negative relationship between loan size and collateral requirements can be explained by the fact that the former is positively associated with credit quality, whereas credit quality is negatively associated with the demand of collateral requirements. The negative association among the type of loan and collateralization is, also, along expectations. Specifically, when banks lend term loans, the full amount of loan is provided upfront, and borrowers can pay off the loan over a longer horizon. Instead, when banks issue non-term loans (e.g., revolving loans), borrowers are required to pay off the loan in a relatively short period, while they are usually related to smaller amounts. In that sense, non-term loans could be considered by lenders as less risky compared to other types of loans, and therefore the demand of collateral requirements is lower.

[112] According to Chan and Thakor (1987) and Berger et al. (2011), the imposition of collaterals - by banks - on loan contracts serves as a means to reduce concerns related to information risk issues.

On the other hand, Table 6.7 documents a positive and statistically significant association between collateral requirement *(SEC)* and firm's financial leverage (*LEV*) (1.0561 with t = 5.06). Considering that firms with higher leverage ratio are associated with higher probability of default, the reported association is consistent with expectations. Moreover, *(SEC)* is positively and significantly associated with loan's maturity (*LN_MAT*) (0.2444 with t = 5.96) and the number of financial covenants attached in the loan agreement *(NUM_COV)* (0.3053 with t = 10.59). The positive association among the intensity of covenant restrictions and collateral requirements is anticipated as well. To elaborate further, debt covenants serve as a monitoring mechanism that allow lenders to closely evaluate the performance of borrowers (Dichev and Skinner, 2002; Graham et al., 2008). In that sense, a higher intensity of such restrictions over a firm's loan could possibly indicate deterioration in firm's credit risk (Dichev et al., 2002). Consequently, banks would be expected to demand higher collateral requirements. Also, the positive relationship between the loan maturity and the demand for collateral requirements is in line with the trade-off hypothesis. As mentioned earlier, shorter maturities do not always indicate riskier borrowers. Under the trade-off hypothesis, risky borrowers could obtain loans over longer periods as well[113]. Therefore, the positive association documented is, also, along expectations. Finally, the coefficient estimates on firm's customer concentration level *(CC)*, industry specialist auditor *(SPECIAL)*, cumulative earnings performance of major customers *(CROA)*, auditor size *(BIG)*, performance pricing provisions *(PP)*, and the two macro-economic variables *(CREDIT)* and *(TERM)* are not statistically significant.

6.4.3 The Effect of Common Auditor on Financial Covenants (H3)

Financial covenants hold a significant role in the private debt contracting (Nikolaev, 2010). Consequently, the effect that common auditor has over the use of financial covenants is examined as well. To explore the association between common auditor and the number of financial covenants, eq. (6.1) is employed, with the dependent variable being a count data variable which measures the number of financial covenants attached to the loan agreement *(NUM_COV)*. Considering that the number of financial covenants included in a loan is countable data, the Poisson regression constitutes a sensible method of analysis (Lin et al., 2018). Also, such a methodology has been extensively utilised by prior bank loan contracting literature (Graham et al., 2008; Hasan et al., 2014; Hasan et al., 2017; Lin et al., 2018). The results are documented in Column II of Table 6.7.

As shown in Table 6.7, the coefficient estimate of the main variable of interest, *CA*, is positive (0.0763 with z= 1.80) and significant at 10% level of confidence. This finding is consistent with the evidence documented throughout the prior analyses (i.e., lenders react negatively to the existence of shared auditors. As a result, they expand/enhance their monitoring mechanisms (i.e., imposition of more financial covenants) against borrowers

[113] For further analysis of the trade-off hypothesis, see section 6.4.2.

having a common auditor with their major customers. Importantly, the positive and significant association lends support to hypothesis (H3).

Additionally, the regression results regarding the coefficient estimates for the control variables are, generally, in line with the extant literature (e.g., Kahan and Yermack, 1998; Nash et al., 2003; Graham et al., 2008; Hasan et al., 2014; Fang et al., 2016; Hasan et al., 2017; Lin et al., 2018). More specifically, firm's size *(LN_TA)* is negatively and significantly associated with the number of financial covenants linked to the loan contract *(NUM_COV)* (-0.1344 with *z*= -6.49). Generally, larger firms are more diversified and face less information asymmetry problems. This, in turn, would lead to lower demand for further monitoring, which could explain the negative association between the two variables. The results, also, indicate that the loan agreements of firms with higher growth potential *(MTB)* carry, on average, fewer number of financial covenants *(NUM_COV)* (-0.0716 with *z*= -3.38). The rationale behind the negative relationship could lie on the fact that firms with higher growth potential might aim to have more flexibility in their financial contracts, by including fewer financial covenants (Kahan and Yermack, 1998; Nash et al., 2003; Graham et al., 2008). The regression results, also, document a negative and significant association between the number of financial covenants attached in the loan agreement *(NUM_COV)* and the type of the loan issued *(REV)* (-0.1229 with *z*= -5.04). Such an association is along expectations as well. Specifically, when banks lend term loans, the full amount of loan is provided upfront, and borrowers can pay off the loan over a longer horizon. Instead, when banks issue non-term loans such as revolving loans, borrowers are required to pay off the loan in a relatively short period, while they are usually related to smaller amounts. In that sense, non-term loans (i.e., revolvers) could be considered by lenders as less risky compared to other types of loans. Therefore, lenders are expected to impose fewer covenant restrictions on such type of loans.

On the contrary, firm's earnings performance *(PROF)* is positively and significantly associated with the intensity of financial covenants required *(NUM_COV)* (0.4313 with *z* = -2.23). A possible explanation behind the positive relationship between profitability and the number of financial covenants. could be that leverage increases with profitability. Consequently, lenders might seek to enhance their monitoring mechanisms by applying more restrictions on loans. With respect to loan-related characteristics, the findings indicate that the number of financial covenants increases significantly as regards the loan maturity *(LN_MAT)* (0.1290 with *z* = 3.96) and the presence of performance pricing provisions *(PP)* (0.6529 with *z* = 15.09). The positive relationship between loan maturity and number of financial covenants could possibly be explained by the fact that more covenants and collateral are required to address potential agency problems that might arise due to longer term debt (Graham et al., 2008). Further, the positive association among financial covenants and performance pricing provisions could lie on the fact that firms with high credit risk are more likely to issue loans that are priced conditionally to their credit

improvement, and therefore banks would be expected to impose more debt covenants on such firms. Finally, the coefficient estimates on firm's tangibility *(LN_FA)*, leverage exposure *(LEV)*, probability of default *(MOD_Z)*, customer concentration level *(CC)*, auditor's tenure *(TENURE)*, industry specialist auditor *(SPECIAL)*, cumulative earnings performance of major customers *(CROA)*, auditor size *(BIG)*, and the two macro-economic variable *(CREDIT)* and *(TERM)* are not statistically significant.

6.4.4 The Effect of Common Auditor on Loan Maturity (H4)

Loan maturity constitutes another key non-price loan contract feature (Bharath et al., 2011). As such, the effect of common auditor on the duration of debt contract is investigated as well. To examine the relationship between common auditor and loan maturity, eq. (6.1) is utilised, with the dependent variable expressed as the natural logarithm of the number of months a loan matures *(LN_MAT)*. Given that loan maturity is a continuous variable, eq. (6.1) is estimated using an OLS regression[114]. The results are reported in Column III of Table 6.7.

As shown in Table 6.7, the coefficient estimate of the key independent variable, *CA*, is positive but not significant (0.0247 with t= 1.18). This evidence fails to provide support of hypothesis (H4). Yet, two important notes should be made at this point. First, as Francis et al. (2017) highlight, there is a potential trade-off among price and non-price loan terms. That is, if banks suspect borrower's credibility, this would be mainly reflected on the interest payments charged while the reliance on non-price loan terms might be lower. As it can be noticed not only from loan maturity *(LN_MAT)* but also from the other two non-price loan features, the magnitude of the coefficient estimates is well below compared to the coefficient of interest rate payment *(LN_SPRD)*[115]. Second, loan maturity's interpretation of direction cannot be taken as an absolute[116]. On the one hand, considering that the existence of common auditor is perceived negatively by creditors - one could expect that *CA* should be negatively associated to the loan maturity. Such an expectation would lie under the credit quality hypothesis which states that creditors would offer loans with shorter maturities to riskier borrowers in order to limit their financial exposure. However, an alternative to credit quality hypothesis is the so-called trade-off hypothesis (Gottesman and Roberts, 2004). As mentioned earlier, under the trade-off hypothesis creditors are willing to offer loans with longer maturities to riskier borrowers as well. Therefore, the positive (although insignificant) association between those two variables is also consistent with the evidence documented thus far.

[114] In line with prior literature a number of variables that have been found to be associated are included. All variable definitions can be found in Appendix C.
[115] Francis et al. (2017), also, report insignificant coefficient estimate as regards the loan maturity.
[116] Such a difficulty in the interpretation of loan maturity might explains the fact that several prior bank loan contracting research does not examine the specific non-price term (e.g., Kim et al., 2017; Hasan et al., 2017)

With respect to the control variables, the associations reported in Column III are, mainly, in line with those documented in prior bank loan contracting literature (e.g., Barclay and Smith, 1995; Stohs and Mauer, 1996; Johnson, 2003; Graham et al., 2008; Fang et al., 2016; Ertugrul et al., 2017).

As shown in Column III of Table 6.7, loan maturity *(LN_MAT)* is negatively and significantly associated with firm's size *(LN_TA)* (-0.0343 with *t* = -2.95). While a positive association would normally be expected – since larger firms are more diversified, have less information asymmetry and incur lower monitoring costs– the finding is still not surprising. According to Barclay and Smith (1995), there is a non-monotonic association among firm size and debt maturity. That is, if firms' size, on average, is lower than $1 billion market value, then a positive relationship is expected. However, *"after that point, there appears to be a negative relation between size and maturity"* (Barclay and Smith, 1995; p. 625). As can be noticed from Table 6.3, the sample's average firm size exceeds the cut-off point of $1 billion, and therefore the coefficient's direction and significance are along with expectations. In addition, such an association is consistent with the evidence reported by Fang et al. (2016). Similarly, loan maturity *(LN_MAT)* is negatively and significantly associated with firm's growth potential indicator *(MTB)* (-0.0241 with *t* = -2.22). The negative relationship among those two variables could probably be explained by the fact that firms with higher growth potential -although they might expect higher future cash flows- they might, also, be associated with higher uncertainty regarding expected future profits. In addition, firms with higher growth potential are more likely to face agency problems (e.g., risk shifting, underinvestment etc.) (Barclay and Smith, 1995). This, in turn, could lead to greater monitoring efforts by creditors (i.e., loans with shorter maturity). A negative association is also reported between loan maturity *(LN_MAT)* and macro-economic variable *(CREDIT)* (-0.1041 with *t* = -2.31). Higher economic uncertainty results in creditors being more reluctant to provide loans with longer maturities in order to counterbalance the economy-wide negative effect. Thus, the reported association is along with expectations.

On the other hand, loan maturity *(LN_MAT)* is positively and significantly associated with firm's earning performance *(PROF)* (0.1980 with *t* = 2.02) and tangibility ratio *(LN_FA)* (0.0394 with *t* = 2.58). Given that firms with higher profitability and more tangible assets are considered to be less risky, the positive association between those two control variables and loan maturity is therefore justified. A positive and statistically significant relationship is also reported for both leverage *(LEV)* (0.2856 with *t*= 4.85) and the probability of default *(MOD_Z)* (0.0195 with *t* = 1.94). The positive association between firm's leverage and debt maturity could be explained by the theoretical work of Diamond (1991) who argues that liquidity risk increases with leverage, and therefore high leveraged firms are expected to seek for more long-term debt so as to secure longer time for debt repayment. Also, Flannery (1986) finds that highly leveraged firms could mitigate

their refinancing risk by obtaining longer term debt. The direction and magnitude of *MOD_Z* is also anticipated since firms with higher score are less possible to default payments to creditors and therefore banks are more willing to borrow loans with longer maturities.

With respect to the loan-related characteristics, the regression results are consistent with prior literature in bank loan contracting as well (Graham et al., 2008; Fang et al., 2016; Lin et al., 2018). Specifically, loan maturity is positively and significantly associated with loan size *(LN_LS)* (0.0969 with *t*= 8.91), the demand for collateral requirements *(SEC)* (0.1221 with *t*= 5.77), the presence of performance pricing provisions *(PP)* (0.0792 with *t*= 3.66) and the number of financial covenants attached to the loan agreement *(NUM_COV)* (0.0312 with *t*= 3.51). Larger loans, generally, are granted to borrowers with better credit quality (Wang et al., 2020). Considering that loan maturity is positively related to firm's credit quality, the positive association between loan size and maturity is justified. The positive relationship between loan maturity and both collateral requirements and intensity of financial covenants could possibly be explained by the fact that more covenants and collateral are required to address potential agency problems that might arise due to longer term debt (Graham et al., 2008). Further, the regression shows that loans which do not include performance pricing provisions have shorter maturities. This result could possibly be explained by the fact that banks utilise short maturity to re-assess loan terms, rather than linking the firm performance with the loan pricing directly. Finally, the coefficient estimates on firm's customer concentration level *(CC)*, auditor's tenure *(TENURE)*, industry specialist auditor *(SPECIAL)*, cumulative earnings performance of major customers *(CROA)*, auditor size *(BIG)*, loan type *(REV)*, and the macro-economic variable *(TERM)* are not statistically significant.

Table 6.6 The Effect of Common Auditor on the Cost of Bank Debt

Variables	(I)	(II)	(III)	(IV)
CA	0.1229***	0.1242***	0.0846***	0.0837***
	(2.75)	(3.39)	(3.18)	(3.71)
LN_TA		-0.1238***	-0.0554***	-0.0802***
		(-11.47)	(-3.30)	(-5.68)
MTB		-0.1427***	-0.0851***	-0.0660***
		(-7.67)	(-5.75)	(-5.62)
PROF		-0.3491***	-0.2115**	-0.3266***
		(-2.77)	(-2.04)	(-3.51)
LN_FA		-0.1754***	-0.0964***	-0.0482***
		(-9.30)	(-7.05)	(-3.54)
LEV		0.6736***	0.4655***	0.5605***
		(8.04)	(7.17)	(10.25)
MOD_Z		-0.0833***	-0.0400***	-0.0192**
		(-5.71)	(-3.43)	(-2.00)
TENURE		-0.0063**	-0.0055***	-0.0073***
		(-2.54)	(-3.24)	(-4.98)
SPECIAL		-0.4158**	-0.2548	0.2389
		(-2.33)	(-1.48)	(1.33)
BIG		-0.2118***	-0.1430***	-0.0099
		(-4.42)	(-3.49)	(-0.25)
CC		0.4412***	0.3700***	0.3083**
		(3.16)	(2.82)	(2.11)
CROA		-0.0290	0.2073	-0.2801
		(-0.05)	(0.41)	(-0.59)
LN_LS			-0.0736***	-0.1035***
			(-4.03)	(-8.25)
LN_MAT			0.1512***	0.0296
			(6.91)	(1.57)
SEC			0.5331***	0.3972***
			(17.44)	(16.04)
NUM_COV			0.0276***	0.0307***
			(3.37)	(3.50)
PP			-0.2050***	-0.1530***
			(-8.20)	(-6.67)
REV			-0.1436***	-0.1507***
			(-7.91)	(-9.53)
CREDIT			0.2722***	0.0860*
			(8.28)	(1.82)
TERM			0.1459***	0.0509*
			(12.19)	(1.70)
Constant	5.0730***	6.1307***	4.8028***	5.6743***
	(164.03)	(67.37)	(42.84)	(49.03)
Observations	5,382	5,382	5,382	5,382
Adjusted R-squared	0.005	0.281	0.501	0.615
Year Fixed Effects	No	No	No	Yes
Industry Fixed Effects	No	No	No	Yes
Loan Purpose Fixed Effects	No	No	No	Yes

Table 6.6 reports the regression results on the effect of common auditor on the cost of bank debt. The dependent variable across all specifications is the interest rate payment expressed as the natural logarithm of the all-in-drawn spread *(LN_SPREAD)*. The variable of interest *(CA)* is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. Columns I-III regress by successively including different control variables that have been found to be associated with cost of debt and excluding any year, industry, and loan fixed effects. Column IV regression results contain all control variables including year, industry, and loan fixed effects. Continuous variables are winsorized at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix C. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6.7 The Effect of Common Auditor on Non-Price Terms

Variables	(I)	(II)	(III)
CA	0.1506**	0.0763*	0.0247
	(2.32)	(1.80)	(1.18)
LN_TA	-0.2447***	-0.1344***	-0.0343***
	(-7.53)	(-6.49)	(-2.95)
MTB	-0.1127***	-0.0716***	-0.0241**
	(-3.50)	(-3.38)	(-2.22)
PROF	-0.7217**	0.4313**	0.1980**
	(-2.48)	(2.23)	(2.02)
LN_FA	-0.0725*	0.0244	0.0394**
	(-1.65)	(0.91)	(2.58)
LEV	1.0561***	0.0976	0.2856***
	(5.06)	(0.89)	(4.85)
MOD_Z	-0.1235***	-0.0134	0.0195*
	(-4.10)	(-0.74)	(1.94)
TENURE	-0.0083*	-0.0011	-0.0009
	(-1.73)	(-0.37)	(-0.62)
SPECIAL	0.7825	-0.0274	-0.2178
	(1.57)	(-0.08)	(-1.32)
BIG	0.1052	0.0703	0.0374
	(0.79)	(0.93)	(0.93)
CC	0.0976	-0.2217	0.0853
	(0.32)	(-1.11)	(0.91)
CROA	-0.0270	-0.0922	-0.1766
	(-0.02)	(-0.11)	(-0.40)
LN_LS	-0.1058***	0.0123	0.0969***
	(-3.54)	(0.65)	(8.91)
LN_MAT	0.2444***	0.1290***	
	(5.96)	(3.96)	
SEC			0.1221***
			(5.77)
NUM_COV	0.3053***		0.0312***
	(10.59)		(3.51)
PP	-0.0632	0.6529***	0.0792***
	(-1.03)	(15.09)	(3.66)
REV	-0.1642***	-0.1229***	0.0382
	(-3.75)	(-5.04)	(1.43)
CREDIT	-0.0122	0.0589	-0.1041**
	(-0.09)	(0.69)	(-2.31)
TERM	0.1100	0.0426	-0.0441
	(1.15)	(0.71)	(-1.37)
Constant	0.5748	0.4859**	3.4595***
	(1.47)	(2.27)	(35.71)
Observations	5,382	5,382	5,382
Adjusted/Pseudo R-squared	0.289	0.171	0.312
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes

Table 6.7 reports the regression results on the effect of common auditor on the non-price terms. Column (I) represents a probit regression with *SEC* being the dependent variable. Column (II) is a Poisson regression with *NUM_COV* as the dependent variable. Column (III) represents an OLS regression with *LN_MAT* being the dependent variable. The variable of interest *(CA)* is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. Continuous variables are winsorized at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix C. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

6.4.5 Sensitivity Analysis

To ensure the robustness of the main findings, a series of sensitivity tests are conducted as well. These tests include: (i) the construction of alternative measures to capture the common auditor presence; (ii) a firm-level rather than issuance-level analysis; (iii) Propensity Score Matching to control for endogeneity; (iv) switch status analysis using Difference-in-Differences approach; and (v) control for financial reporting quality. The analyses and results are discussed in the following sections.

6.4.5.1 Alternative Measures to Capture Common Auditor

Main regressions utilise an indicator variable (binary) to capture the existence of common auditor between the supplier firms and their major customers. To ensure that the main findings are not influenced by the construction of this variable, two alternative measures that proxy for common auditor between the two parties are developed. The first, *NUM_CA*, constitutes an integer variable that represents the total number of instances a supplier firm has a common auditor with its major customers for each year. The second, *PERC_CA*, constitutes a continuous variable that captures the percentage of cases where a supplier firm has a common auditor with its major customers for each year. Specifically, *NUM_ CA* is divided by total number of supplier's major customers in each year[117]. Columns I-VIII of Table 6.8 report the regression results for both price and non-price terms with *NUM_CA* and *PERC_CA* being the key dependent variable, respectively. Additionally, all models are estimated with the same control variables as reported in Table 6.6 and Table 6.7.

As shown in Panels A and B, both alternative variables yield evidence consistent with the results documented in Table 6.6 earlier. Particularly, the coefficient estimates of *NUM_CA* and *PERC_CA* report a positive and statistically significant association with the cost of bank debt at 1% and 5% level of confidence, respectively. Considering that both the direction and magnitude of those two alternative measures remain in line with the initial findings corroborates and provides further support for H1. With respect to the non-price loan terms, results are, also, consistent with the evidence reported in Table 6.7. Specifically, *NUM_CA* is positively and significantly associated with loan securitization *(SEC)* and number of financial covenants *(NUM_COV)* at 5% confidence level. Similarly, *PERC_CA*, reports a positive and significant association when the dependent variable is *SEC* (0.1566 with t= 2.09). However, when the dependent variable is the number of financial covenants *(NUM_COV),* the coefficient estimate of *PERC_CA* fails to load a significant association. Finally, in line with the findings reported in Table 6.7 regarding loan maturity, both alternative common auditor variables yield insignificant associations. Collectively, the regression results based on the employment of alternative proxies for

[117] Appendix A provides an illustrative example on how these two alternative measurements are constructed.

common auditor are consistent with the findings documented in the main regressions, thus providing further confirmation that the evidence is robust.

Table 6.8 The Effect of Common Auditor on Price and Non-Price Terms (Alternative Measures of Common Auditor)

Panel A. Number of common auditors				
Variables	(I)	(II)	(III)	(IV)
NUM_CA	0.0680***	0.1227**	0.0835**	0.0195
	(3.48)	(2.12)	(2.12)	(1.12)
Controls	Yes	Yes	Yes	Yes
Constant	5.6750***	0.5754	0.4840**	3.4599***
	(48.90)	(1.47)	(2.25)	(35.70)
Observations	5382	5382	5382	5382
Adjusted/Pseudo R-squared	0.609	0.289	0.171	0.312
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes

Panel B. The percent of common auditors relative to major customers				
Variables	(I)	(II)	(III)	(IV)
PERC_CA	0.0675**	0.1566**	0.0465	0.0334
	(2.50)	(2.09)	(0.96)	(1.38)
Controls	Yes	Yes	Yes	Yes
Constant	5.6713***	0.5647	0.4847**	3.4579***
	(48.82)	(1.45)	(2.26)	(35.70)
Observations	5382	5382	5382	5382
Adjusted/Pseudo R-squared	0.614	0.289	0.170	0.302
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes

Table 6.8 reports the regression results on the effect of common auditor on the cost of debt and the three major non-price loan contract terms, utilising alternative measures to capture the main variable of interest. In Panel A, the variable of interest is defined as the total number of common auditors between the supplier firm and its major customers (*NUM_CA*). In Panel B, the variable of interest is defined as the percentage of common auditors between the two parties divided by the number of customers that supplier firm has over the year (*PERC_CA*). Column I represents an OLS regression with *LN_SPRD* being the dependent variable. Column II represents a Probit regression with *SEC* being the dependent variable. Column III is a Poisson regression with *NUM_COV* as the dependent variable. Column IV represents an OLS regression with *LN_MAT* being the dependent variable. *SEC* is an indicator variable that equals to 1 if the loan requires collateral, and 0 otherwise. *NUM_COV* is the total number of financial covenants included in the loan agreement. *LN_MAT* is the natural logarithm of maturity expressed in months. All models are estimated with the same control variables as reported in Table 6.6 and 6.7. Heteroskedasticity-robust t-statistics for OLS regressions and heteroskedasticity-robust z-statistics for Probit and Poisson are reported in the parentheses. Continuous variables are winsorized at the 1% and 99%. Detailed definitions for all other variables can be found in Appendix C. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

6.4.5.2 Deal-level Analysis

Main tests, thus far, are based on an issuance-level analysis. In other words, every observation in the baseline models corresponds to a single loan. It is important to note, however, that firms tend to issue more than one loans within the same year that are structured in a package/deal level. As such, each loan facility might not be negotiated independently, rather they might be negotiated on a package/deal level (Hertzel and Officer, 2012). In that sense, there is an inherent risk of inflating the statistical significance of the main findings if any potential dependency among loan facilities is ignored. Hence, to eliminate the concern that core findings are driven by this design choice, as an alternative, a deal-level analysis is performed. Following prior bank loan contracting literature (e.g., Houston et al., 2014; Kim et al., 2015; Zhang et al., 2017), when a firm has multiple loans within a year, only the largest loan facility that issued within this specific year is utilised. Given that several firms have more than one loan issuance within a year, this leads to a reduction in the number of observations used in this robustness test (from 5,382 to 3,546 loan-year observations). The regression results are documented in Table 6.9.

As shown in Column (I), the existence of common auditor results in an increase in the loan interest rates by 7.4% (which translates into 16.32 bps)[118]. The coefficient remains statistically significant at the 1% level (0.074, *t*= 3.24), which is relatively close to the 8.37% coefficient that reported when the full sample is utilised. This evidence is consistent with the core findings, thus confirming the negative effect of common auditor on the cost of bank debt for the supplier firms with major customers (H1b).

Similarly, the regression results for the non-price loan terms are, also, in line with the evidence reported in the initial analysis (i.e., Table 6.7). As regards hypothesis (H2), the results suggest that the likelihood of banks requiring collateral requirements is positively and significantly associated with the existence of common auditors between supplier firms and their major customers. As shown in Column (II), the coefficient estimate of *CA* remains positive (0.1131 with *t*= 1.75), but the significance level of confidence drops to 10%. This evidence is consistent with the core analysis and provide confirmation on negative effect of common auditor on the loan securitization for the supplier firms with major customers (H2). With respect to hypothesis (H3), the regression results in Column (III) indicate that the intensity of financial covenants attached to the loan agreement is positively and significantly associated with the existence of common auditors between supplier firms and their major customers. The coefficient estimate on the key independent variable, *CA*, remains positive (0.0637 with *z*= 1.68) and significant at 10% level of

[118] Considering that the dependent variable is expressed in the form of natural logarithm, the coefficient estimate in percentage is estimated as: 100 x ($e^{0.0740}$-1) = 7.68%. Also, given that the average loan spread is 212.6, that translates into16.32 bps (212.6 x 7.68%).

confidence. This result confirms the relationship documented in the main analysis and therefore provides support for hypothesis (H3). Finally, the coefficient estimate of *CA* reports a positive but insignificant association when the dependent variable is the loan maturity *(LN_MAT)*. Again, this result is in line with the evidence documented in the initial regression analysis, thus failing to lend support for hypothesis (H4). Taken together, the results from the deal-level analysis provide confidence and confirmation that the evidence documented on the issuance-level is robust.

Table 6.9 The Effect of Common Auditor on Price and Non-Price Terms (Deal-level Analysis)

Variables	(I)	(II)	(III)	(IV)
CA	0.0740***	0.1131*	0.0637*	0.0434
	(3.24)	(1.75)	(1.68)	(1.28)
Controls	Yes	Yes	Yes	Yes
Constant	5.8583***	1.0835***	0.4054*	3.5683***
	(51.19)	(2.66)	(1.92)	(35.30)
Observations	3,546	3,546	3,546	3,546
Adjusted/Pseudo R-squared	0.609	0.281	0.164	0.315
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes

Table 6.9 presents the regression results on the effect of common auditor over price and non-price loan terms on a deal-level analysis. Specifically, Column I represents an OLS regression with *LN_SPRD* being the dependent variable. Column II represents a Probit regression with *SEC* being the dependent variable. Column III is a Poisson regression with *NUM_COV* as the dependent variable. Column IV represents an OLS regression with *LN_MAT* being the dependent variable. The variable of interest, *CA*, is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. *SEC* is an indicator variable that equals to 1 if the loan requires collateral, and 0 otherwise. *NUM_COV* is the total number of financial covenants included in the loan agreement. *LN_MAT* is the natural logarithm of maturity expressed in months. All models are estimated with the same control variables as reported in Table 6.6 and 6.7. Heteroskedasticity-robust t-statistics for OLS regression and heteroskedasticity-robust z-statistics for Probit and Poisson are reported in the parentheses. Continuous variables are winsorized at the 1% and 99%. Detailed definitions for all other variables can be found in Appendix C. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

6.4.5.3 Propensity Score Matching Analysis

In line with Truong et al. (2020), to address any concern that the findings reported earlier may be driven by endogeneity bias associated to unobservable control variables that might drive the main results, a Propensity Score Matching (PSM) analysis is conducted[119]. The application of a PSM approach leads to the construction of an optimal control sample, since it allows for the moderation of differences between the treatment group (i.e., firms sharing a common auditor with at least one of their major customers) and the control group (i.e., firms not sharing a common auditor with any of their major customers). In that sense, the firms identified among the two groups are similar across the different dimensions of firm-, auditor-, supplier chain- and loan-specific characteristics, but they differ on their common auditor status. To obtain the propensity score for each firm among the two groups, a probit model is first employed[120]. In a similar spirit to Houston et al. (2014), the dependent variable *(CA_PSM)* is a dummy variable that equals to 1 if the supplier firms share a common auditor with at least one of their major customers (treatment group), and 0 otherwise (control group). The probit model regresses the *CA_PSM* over the firm-, auditor-, supplier chain- and loan-specific characteristic variables, as well as industry and year fixed effects. Having obtained the propensity scores, firms from the treatment group are matched with firms from the control group using a nearest- neighbor matching approach without replacement (Caliendo and Kopeinig 2008; Lawrence et al., 2011; Francis et al. 2017; Almaghrabi et al. 2021). In addition, the treatment group firms are matched with a caliper distance of 0.01 from the control group firms[121]. The matching process yields a sample of 2,038 evenly matched loans (i.e., 1,019 for the treatment and 1,019 for the control group) when the dependent variable is the *LN_SPRD*. In turn, the matching procedure yields a sample of 2,178, 2,164 and 2,122 evenly matched loans, when the dependent variable is the *SEC, NUM_COV and LN_MAT*, respectively.

An important step in the PSM analysis is the assessment of matching among the two groups. In order to evaluate the quality of matching, the differences in the means for each covariate variables of both groups are examined. As shown in Table 6.10 (Panels A-D), there are no statistically significant mean differences among the two groups for the vast majority of the variables, which according to Shipman et al. (2017) provides a confirmation of correct matching. Further, the standardized differences, for each variable,

[119] While there are several statistical techniques that help to alleviate endogeneity issues, a complete elimination of endogeneity issues might not be practically feasible (Houston et al., 2014). The propensity score matching analysis was, initially, developed by Rosenbaum and Rubin (1985), while further extended by Heckman et al. (1997, 1998). According to Houston et al. (2014), the main advantage of the propensity score matching over the conventional regression lies in the fact that the former does not require the specification of linear or actual relationship among spreads and the other characteristics which could impact loan pricing, Thus, the application of propensity score matching techniques leads to a more accurate analysis (Conniffe et al. 2000).

[120] According to Shipman et al. (2017), both probit and logit methods generate similar results.

[121] While there is no consensus over the optimal caliper distance choice, prior research recommends that caliper width should be lower or equal to 0.2 (Rosenbaum and Rubin, 1985; Austin, 2011).

do not exceed the threshold of |20|, which according to prior research (Rosenbaum and Rubin, 1985; Ferri and Maber, 2013; Hooghiemstra et al. 2015; Chantziaras et al., 2020) is an indication of a good match. Taken together, the evidence reported in Table 6.10 suggests that the matching is successful.

After the matching has been performed, a second stage regression using the PSM sample of treatment and control groups is conducted. The results are reported in Table 6.11 (Columns I-IV). Consistent with the evidence documented in the main regression analysis, Column I of Table 6.11 reports that the coefficient of the key variable of interest, *CA*, remains positive (0.0496) and statistically significant at 10% confidence level when the dependent variable is the cost of bank debt. The evidence presented regarding the non-price loan terms is, also, in line with the results reported in the main regression analysis (Table 6.7). Specifically, Columns II-IV of Table 6.11 show that the coefficient of *CA*, remains positive and statistically significant at 10% confidence level when the dependent variable is the loan securitization *(SEC)* and the number of financial covenants attached in the loan agreement *(NUM_COV)*. Finally, the impact of the existence of common auditor when the dependent variable is the loan maturity, is not statistically significant. Collectively, the evidence reported in Table 6.11 is consistent with the findings documented in the prior analyses. More importantly, they lend further assurance that the results are robust, thus confirming the validity of hypotheses H1b, H2 and H3, respectively.

Table 6.10 Covariate Balance Tests Subsequent to Propensity Score Matching

Panel A. *LN_SPRD*	Mean			T-test	
Variables	Treated	Control	% Bias	t	p>|t|
LN_TA	6.587	6.569	1.000	0.230	0.819
MTB	1.785	1.772	1.300	0.300	0.763
PROF	0.039	0.036	2.400	0.550	0.583
LN_FA	-1.556	-1.530	-3.000	-0.680	0.495
LEV	0.266	0.279	-6.300	-1.430	0.153
MOD_Z	1.769	1.690	5.800	1.310	0.189
TENURE	10.461	9.784	8.400	1.890	0.059
SPECIAL	0.176	0.177	-0.700	-0.150	0.882
CC	0.062	0.058	6.000	1.350	0.176
CROA	0.015	0.015	-1.600	-0.360	0.718
LN_LOAN_SIZE	4.571	4.616	-2.600	-0.590	0.554
LN_MATURITY	3.726	3.751	-4.000	-0.910	0.364
SECURITY	0.574	0.584	-2.000	-0.450	0.654
NUM_COV	1.388	1.454	-4.800	-1.080	0.279
PP	0.420	0.424	-0.800	-0.180	0.858
REVOLVER	0.662	0.660	0.400	0.090	0.925
CREDIT	0.909	0.911	-0.600	-0.140	0.886
TERM	1.151	1.158	-0.800	-0.180	0.858

Panel B. *SEC*	Mean			T-test	
Variables	Treated	Control	% Bias	t	p>|t|
LN_TA	6.543	6.537	0.400	0.080	0.934
MTB	1.785	1.748	4.000	0.920	0.356
PROF	0.039	0.034	4.500	1.050	0.292
LN_FA	-1.533	-1.541	0.900	0.210	0.836
LEV	0.271	0.274	-1.900	-0.450	0.653
MOD_Z	1.745	1.700	3.300	0.770	0.444
TENURE	10.366	9.945	5.100	1.200	0.231
SPECIAL	0.173	0.178	-5.700	-1.320	0.187
CC	0.066	0.060	9.700	2.270	0.024
CROA	0.015	0.015	2.700	0.630	0.532
LN_LOAN_SIZE	4.560	4.634	-4.300	-1.010	0.314
LN_MATURITY	3.731	3.756	-3.900	-0.910	0.362
NUM_COV	1.372	1.430	-4.200	-0.970	0.332
PP	0.415	0.422	-1.500	-0.350	0.728
REVOLVER	0.661	0.691	-6.300	-1.460	0.143
CREDIT	0.916	0.908	2.600	0.600	0.546
TERM	1.130	1.132	-0.200	-0.060	0.955

Table 6.10 (continued)

Panel C. *LN_MAT*	Mean			T-test	
Variables	Treated	Control	% Bias	t	p>|t|
LN_TA	6.529	6.526	0.200	0.040	0.965
MTB	1.786	1.816	-3.000	-0.690	0.488
PROF	0.037	0.036	0.900	0.210	0.838
LN_FA	-1.536	-1.531	-0.600	-0.130	0.895
LEV	0.268	0.270	-1.100	-0.250	0.803
MOD_Z	1.751	1.682	5.200	1.200	0.232
TENURE	10.362	9.712	8.000	1.840	0.066
SPECIAL	0.174	0.178	-5.400	-1.240	0.214
CC	0.065	0.061	5.100	1.180	0.238
CROA	0.015	0.015	-1.200	-0.260	0.791
LN_LOAN_SIZE	4.555	4.568	-0.800	-0.180	0.857
SECURITY	0.588	0.598	-2.100	-0.490	0.627
NUM_COV	1.365	1.418	-3.800	-0.880	0.382
PP	0.418	0.422	-0.800	-0.180	0.860
REVOLVER	0.651	0.662	-2.200	-0.500	0.615
CREDIT	0.909	0.911	-0.500	-0.110	0.911
TERM	1.127	1.144	-1.900	-0.440	0.660
Panel D. *NUM_COV*	Mean			T-test	
Variables	Treated	Control	% Bias	t	p>|t|
LN_TA	6.559	6.608	-2.700	-0.630	0.530
MTB	1.803	1.818	-1.400	-0.340	0.737
PROF	0.039	0.039	-0.500	-0.110	0.911
LN_FA	-1.549	-1.516	-3.900	-0.900	0.369
LEV	0.270	0.278	-3.800	-0.890	0.373
MOD_Z	1.734	1.767	-2.400	-0.570	0.571
TENURE	10.394	10.319	0.900	0.210	0.836
SPECIAL	0.174	0.176	-1.600	-0.370	0.708
CC	0.062	0.060	2.700	0.620	0.537
CROA	0.015	0.015	-0.200	-0.040	0.970
LN_LOAN_SIZE	4.592	4.681	-5.200	-1.220	0.222
MATURITY	3.723	3.724	-0.200	-0.060	0.955
PP	0.412	0.431	-3.700	-0.870	0.384
REVOLVER	0.648	0.686	-8.000	-1.870	0.062
CREDIT	0.923	0.918	1.700	0.410	0.684
TERM	1.135	1.129	0.700	0.170	0.863

Table 6.10 reports the mean and standardized differences on the covariates between the treatment and control groups, based on the *CA* variable Panel A, B, C and D document the covariates when the dependent variable is *LN_SPRD, SEC, LN_MAT and NUM_COV*, respectively. The standardized difference in percent is: $100(\bar{x}_{gr1} - \bar{x}_{gr0}/\sqrt{(s^2_{gr1} - s^2_{gr0})/2}$ where $\bar{x}_{gr1}$ and $\bar{x}_{gr0}$ $(s^2_{gr1} - s^2_{gr0})$ are the sample mean (variance) in the *CA* =1 and *CA* =0 groups. The last two columns report the t- and p- values. Continuous variables are winsorized at 1% and 99%. All variables are defined in Appendix C.

Table 6.11 The Effect of Common Auditor on Price and Non-Price Terms (PSM Analysis)

Variables	(I)	(II)	(III)	(IIIV)
CA	0.0496*	0.1443*	0.0802*	-0.0037
	(1.89)	(1.77)	(1.66)	(-0.14)
Controls	Yes	Yes	Yes	Yes
Constant	5.8743***	0.7918	0.6929**	3.4366***
	(22.92)	(1.20)	(2.24)	(23.27)
Observations	2,038	2,178	2,164	2,122
Adjusted/Pseudo R-squared	0.595	0.326	0.157	0.345
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes

Table 6.11 reports the regression results on the effect of common auditor, subsequent to propensity score matching. Column I represents an OLS regression with *LN_SPRD* being the dependent variable. Column II represents a Probit regression with *SEC* being the dependent variable. Column III is a Poisson regression with *NUM_COV* as the dependent variable. Column IV represents an OLS regression with *LN_MAT* being the dependent variable. The variable of interest, *CA*, is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. *SEC* is an indicator variable that equals to 1 if the loan requires collateral, and 0 otherwise. *NUM_COV* is the total number of financial covenants included in the loan agreement. *LN_MAT* is the natural logarithm of maturity expressed in months. All models are estimated with the same control variables as reported in Table 5 and Table 6. Heteroskedasticity-robust t-statistics for OLS regression and heteroskedasticity-robust z-statistics for Probit and Poisson are reported in the parentheses. Continuous variables are winsorized at the 1% and 99%. Detailed definitions for all other variables can be found in Appendix C. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

6.4.5.4 Common Auditor Status Switch Analysis

To further address potential endogeneity issue related to unobservable variables, a common auditor status change (switch) analysis is conducted by using a difference-in-differences (DID) research design. The rationale is to compare both price and non-price terms differences before and after the status change between borrowers that: (i) change from having a non-common auditor to sharing a common auditor with at least one of their major customer(s) (treatment group A) versus those that have never shared a common auditor with at least one of their major customer(s) (control group A); and (ii) change from sharing to not sharing a common auditor with at least one of their major customer(s) (treatment group B) versus those that have always shared a common auditor with at least one of their major customer(s) (control group B).

In a similar spirit to Houston et al. (2014), for both treatment and control groups the following conditions are required to be met. First, borrowers that have a common auditor status change at year *t*, they need to maintain their status for the following years (e.g., *t*+1, *t*+2). Second, in cases where borrowers do not issue a loan in year *t*-1 (or *t*+1), year *t*-2 (or *t*+2) and so on are utilised. Finally, if a borrower has issued more than one loans in any given year, only the loan associated to the largest amount are kept.

The matching process yields a sample of 464 evenly matched loans (i.e., 232 for the treatment group A and 232 for the control group A) and 144 evenly matched loans (i.e., 72 for the treatment group B and 72 for the control group B) when the dependent variable is the *LN_SPRD*. In turn, the matching procedure results in 641 (146), 504 (266) and 808 (261) evenly matched loans for sample A (sample B), when the dependent variable is the *SEC*, *NUM_COV* and *LN_MAT*, respectively. Then, the DID analysis is performed by estimating the following model for sample A:

$$LN\_SPREAD_{i,j,t}\ or\ NONPRICETERMS_{i,j,t} = \beta_0 + \beta_1 SWITCH\_SAME_j + \beta_1 POST\_SAME_{i,t} + \beta_3 SWITCH\_SAME_j * POST\_SAME_{i,t} + CONTROLS + (INDUSTRY, YEAR, LOAN\_PURPOSE)\_FE + \varepsilon_{i,j,t}$$

and the following model for sample B, respectively:

$$LN\_SPREAD_{i,j,t}\ or\ NONPRICETERMS_{i,j,t} = \beta_0 + \beta_1 SWITCH\_DIFFERENT_j + \beta_1 POST\_DIFFERENT_{i,t} + \beta_3 SWITCH\_DIFFERENT_j * POST\_DIFFERENT_{i,t} + CONTROLS + (INDUSTRY, YEAR, LOAN\_PURPOSE)\_FE + \varepsilon_{i,j,t}$$

SWITCH_SAME is an indicator variable that takes the value of 1 for firms that switch from having a non-common auditor to sharing a common auditor (treatment group A), and the value of 0 for firms that never shared a common auditor (control group A). *POST_SAME* is an indicator variable that equals to 1 for loans issued after the common auditor status change, and 0 before the change[122]. The interaction term, *SWITCH_SAME * POST_SAME*, is the independent variable of interest and captures the net effect of switching from a non-common to a common auditor on price and non-price terms in the post-switch era for the treatment firms compared to their matched controlled firms. Similarly, *SWITCH_DIFFERENT* is an indicator variable that takes the value of 1 for firms that switch from sharing to not sharing a common auditor (treatment group B), and the value of 0 for firms that have always shared a common auditor (control group B). *POST_DIFFERENT* is an indicator variable that equals to 1 for loans issued after the common auditor status change, and 0 before the change[123]. The interaction term, *SWITCH_DIFFERENT * POST_DIFFERENT*, is the independent variable of interest and captures the net effect of switching from a having common to a non-common auditor on price and non-price terms in the post-switch era for the treatment firms compared to their matched controlled firms.

[122] Following Francis et al. (2017), for the control firms that do not experience any status change, the change of status year of the matched treatment firm as a pseudo-change year of the corresponding control firm is used.
[123] See footnote 121.

Panels A and B of Table 6.12 report the results of the common auditor status change analysis for samples A and B, respectively. Regarding sample A, the interaction term (*SWITCH_SAME * POST_SAME)* is positive and statistically significant at 10% level when the dependent variable is *LN_SPRD* (Columns I). However, the findings indicate not such an association when the dependent variable is either *SEC*, *NUM_COV* or *LN_MAT* (Columns II-IV). In other words, evidence suggests that for those firms change from having no common auditor to sharing a common auditor - with at least one of their major customers- banks charge higher interest rates. With respect to sample B, the interaction term (*SWITCH_DIFFERENT * POST_DIFFERENT)* is negative and statistically significant at 10% level when the dependent variable is *LN_SPRD, SEC* and *NUM_COV* (Columns I, II and III). However, regression results fail to document a significant association when the dependent variable is *LN_MAT* (Column IV). In short, Panel B suggest that for those firms that switch from having a common auditor to a non-common auditor -with at least one of their major customers- banks charge lower interest rates, demand fewer collateral requirements and impose a lower number of financial covenants. Overall, the results are in line with the evidence presented earlier, thus providing further assurance that the main findings are robust.

Table 6.12 The Effect of Common Auditor on Price and Non-Price Terms (Switch Analysis)

Panel A. (Status change from non-common to common: Sample A)				
Variables	(I)	(II)	(III)	(IV)
SWITCH_SAME	-0.1350*	-0.2195	-0.0043	0.0405
	(-1.75)	(-1.21)	(-0.04)	(0.57)
POST_SAME	-0.0499	-0.2485	-0.1543	0.0346
	(-0.68)	(-1.37)	(-1.30)	(0.57)
SWITCH_SAME*POST_SAME	0.1824*	0.1796	0.1565	-0.0516
	(1.69)	(0.77)	(1.05)	(-0.63)
Control Variables	Yes	Yes	Yes	Yes
Observations	464	641	504	808
Adjusted/Pseudo R-squared	0.685	0.288	0.197	0.302
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
Panel B. (Status change from common to non-common: Sample B)				
Variables	(I)	(II)	(III)	(IV)
SWITCH_DIFFERENT	0.1753	0.9923*	0.0666	-0.0074
	(1.23)	(1.69)	(0.50)	(-0.06)
POST_DIFFERENT	0.1607	-0.3212	0.1118	-0.0143
	(1.01)	(-0.58)	(0.85)	(-0.14)
SWITCH_DIFFERENT*POST_DIFFERENT	-0.3177*	-1.1953*	-0.3223*	-0.0994
	(-1.68)	(-1.86)	(-1.69)	(-0.71)
Control Variables	Yes	Yes	Yes	Yes
Observations	144	146	266	261
Adjusted/Pseudo R-squared	0.749	0.479	0.215	0.367
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes

Table 6.12 reports the regression results from the common auditor status change (switch) analysis by using a DID research design. Column I represents an OLS regression with *LN_SPRD* being the dependent variable. Column II represents a Probit regression with *SEC* being the dependent variable. Column III is a Poisson regression with *NUM_COV* as the dependent variable. Column IV represents an OLS regression with *LN_MAT* being the dependent variable. For Panel A, the variable of interest is, *SWITCH_SAME*POST_SAME while for Panel B is the SWITCH_DIFFERENT*POST_DIFFERENT*. *LN_SPRD* is defined as *SEC* is an indicator variable that equals to 1 if the loan requires collateral, and 0 otherwise. *NUM_COV* is the total number of financial covenants included in the loan agreement. *LN_MAT* is the natural logarithm of maturity expressed in months. All models are estimated with the same control variables as reported in Table 5 and Table 6. Heteroskedasticity-robust t-statistics for OLS regression and heteroskedasticity-robust z-statistics for Probit and Poisson are reported in the parentheses. Continuous variables are winsorized at the 1% and 99%. Detailed definitions for all other variables can be found in Appendix C. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

6.5.5.5 Controlling for Financial Reporting Quality

While findings, thus far, suggest that banks charge higher loan interest rates and set more stringent non-price terms for supplier firms sharing common auditors with at least one of their major customers, this evidence might not be attributable to the existence of common auditor per se. Instead, it might be due to the fact that supplier firms have, on average, lower financial reporting quality which is influence by having a common auditor with their major customers. In fact, supplier-customer relationship constitutes a "fertile" ground for lower financial reporting quality. Raman and Shahrur (2008), for instance, argue that firms that serve as supply chain partners might be more prone to use earnings management as they might be indulged to present a more favourable picture for their corresponding partners. In line with this, Sun et al. (2020) find that group affiliated firms (i.e., parent and subsidiaries) with common auditors, on average, have lower financial reporting quality than their counterparties with not such a relationship. In addition, prior studies have shown that financial reporting quality is positively associated with the cost of bank debt (Bharath et al. 2008; Francis et al. 2017). Taken together, it is possible that the sub-sample of firms with common auditor in the current thesis to have, on average, lower financial reporting quality, which, in turns, drives the positive association documented in the prior analyses.

First, the association between financial reporting quality and the existence of common auditor is examined. Following prior literature (Anagnostopoulou and Tsekrekos, 2015; Francis et al., 2017; Sun et al., 2020), the current study utilises discretionary accruals to proxy for financial reporting quality. Two alternative measures for discretionary accruals are employed[124]. More specifically, the *ABS_JONES* variable is the absolute value of discretionary accruals estimated using the Jones model (Jones, 1991), whereas *MOD_JONES_ABS* is the absolute value of discretionary accruals estimated using the modified Jones model (Dechow et al., 1995). Results are reported in Table 6.13. As shown in Column (I) and (II), *CA* is positively and statistically significant at 10% and 5% level of confidence when the dependent variable is *ABS_JONES and MOD_JONES_ABS*, respectively. These findings are consistent with prior literature (e.g., Raman and Shahrur, 2008; Sun et al., 2020), thus confirming that the supplier firms that have at least one common auditor with their major customers tend to have lower financial reporting quality (i.e., higher magnitude of discretionary accruals).

[124] The higher the level of abnormal accruals, the higher the managerial discretion over the reported earnings, and thus the lower the quality of financial reporting quality.

Table 6.13 The Effect of Common Auditor on Financial Reporting Quality

Variables	(I)	(II)
CA	0.0099*	0.0108**
	(1.79)	(1.97)
LN_TA	-0.0060***	-0.0059***
	(-3.22)	(-3.20)
MTB	0.0197***	0.0194***
	(6.20)	(6.33)
PROF	-0.0435	-0.0398
	(-0.88)	(-0.82)
LN_FA	-0.0067	-0.0058
	(-1.56)	(-1.40)
LEV	-0.0140	-0.0169
	(-0.92)	(-1.13)
MOD_Z	-0.0022	-0.0021
	(-0.76)	(-0.77)
CC	0.0411	0.0406
	(1.48)	(1.47)
MA	-0.0034	-0.0012
	(-0.36)	(-0.13)
LOSS	0.0057	0.0049
	(0.70)	(0.61)
TENURE	-0.0011***	-0.0010***
	(-3.26)	(-3.17)
BIG	-0.0116	-0.0121
	(-0.88)	(-0.89)
SPECIAL	-0.0409	-0.0361
	(-0.93)	(-0.83)
Constant	0.1416***	0.1430***
	(6.71)	(6.83)
Observations	3,280	3,280
Adjusted R-squared	0.115	0.116
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes

Table 6.13 reports the regression results on the association between common auditor and financial reporting quality. In the regression shown in Column (I), the dependent variable is *ABS_JONES (*discretionary accruals using the Jones (1991)), whereas in the regression shown in Column (II), the dependent variable is *MOD_JONES_ABS*, based on the modified Jones model (Dechow et al., 1995). The variable of interest, *CA*, is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise Continuous variables are winsorized at the 1% and 99%. Standard errors are corrected for heteroscedasticity and firm- level clustering, and t-values are reported in the parentheses. Detailed definitions for all other variables can be found in Appendix C. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Second, following Krishnan et al. (2013) and Francis et al. (2017), to eliminate the possibility of the results being driven by the effect of discretionary accruals, *ABS_JONES* and *MOD_JONES_ABS* variables are included in eq. (6.1) to control whether financial reporting quality influences/deteriorates the positive association between common auditor and cost of bank debt as well as the other loan characteristics reported earlier. The results for these estimations are documented in Table 6.14.

As shown in Column (I), both measures for discretionary accruals are positive and statistically associated with the cost of bank loan (0.2855, with *t*=3.49 and 0.3059, with *t*=3.72). This is consistent with extant literature within the private debt markets (e.g., Bharath et al., 2008; Francis et al., 2017). More importantly, the association between the key variable of interest, *CA* and the cost of bank debt remains positive and statistically significant at 1% confidence level after the inclusion of the two alternative discretionary accrual variables. These findings not only provide confirmation for the validity of hypothesis (H1b), but also lends support that the positive relationship documented in prior analyses is not driven by the potential effect of discretionary accruals on the cost of bank debt.

In line with prior literature (e.g., Francis et al., 2017), Column (II) shows that firms with lower financial reporting quality are more likely to incur more collateral requirements. Specifically, the coefficient estimates are positive and significant at 10% and 5% level of confidence for *ABS_JONES* and *MOD_JONES_ABS*, respectively. Also, the variable of interest, *CA*, continues to be positive and statistically significant at the 5% level of confidence, across both specifications. As shown in Column (III), when the dependent variable expresses the intensity of financial covenants (*NUM_COV*), the effect of common auditor on number of financial covenants remains positive and significant at 5%, under both specifications. However, the coefficient estimates of both discretionary accrual variables fail to report a significant association. Consistent with the evidence documented in prior sections, Column (IV) shows that the common auditor variable, *CA*, has no significant impact on loan maturity. Yet, the coefficient estimates for both discretionary accrual variables report a negative and statistically significant association at 1% level of confidence, thus indicating that supplier firms with lower financial reporting quality have shorter loan maturities. Overall, evidence remain largely unchanged and in line with prior analyses. More importantly, the results of Table 6.14 provide confidence that the main findings are not driven by the effect of discretionary accruals on the cost of bank loans and non-price terms.

Table 6.14 The Effect of Common Auditor on Price and Non-Price Terms after Controlling for Financial Reporting Quality

Variables	(I)		(II)		(III)		(IV)	
CA	0.0763***	0.0759***	0.1647**	0.1633**	0.1316**	0.1317**	0.0250	0.0253
	(3.29)	(3.27)	(2.45)	(2.43)	(2.53)	(2.54)	(1.16)	(1.17)
ABS_JONES	0.2855***		0.4664*		-0.1309		-0.2557***	
	(3.49)		(1.90)		(-0.77)		(-3.28)	
MOD_JONES_ABS		0.3059***		0.5798**		-0.1414		-0.2698***
		(3.72)		(2.34)		(-0.83)		(-3.46)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	5.6361***	5.6184***	0.5606**	0.5473*	0.4061*	0.4076*	3.5813***	3.5803***
	(14.45)	(14.37)	(1.84)	(1.79)	(1.89)	(1.90)	(12.49)	(12.54)
Observations	4,971	4,971	4,971	4,971	4,971	4,971	4,971	4,971
Adjusted/Pseudo R-squared	0.612	0.612	0.269	0.270	0.124	0.124	0.314	0.314
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6.14 presents the regression results on the effect of common auditor after controlling for financial reporting quality. For each column, the first sub-column reports the regression results controlling for discretionary accruals using the Jones (1991), while the second reports the regression results controlling for discretionary accruals using the modified Jones models (Dechow et al., 1995). Column I represents an OLS regression with *LN_SPRD* being the dependent variable. Column II represents a Probit regression with *SEC* being the dependent variable. Column III is a Poisson regression with *NUM_COV* as the dependent variable. Column IV represents an OLS regression with *LN_MAT* being the dependent variable. The variable of interest, *CA,* is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. *SEC* is an indicator variable that equals to 1 if the loan requires collateral, and 0 otherwise. *NUM_COV* is the total number of financial covenants included in the loan agreement. *LN_MAT* is the natural logarithm of maturity expressed in months. All models are estimated with the same control variables as reported in Table 6.6 and 6.7. Heteroskedasticity-robust t-statistics for OLS regression and heteroskedasticity-robust z-statistics for Probit and Poisson are reported in the parentheses. Continuous variables are winsorized at the 1% and 99%. Detailed definitions for all other variables can be found in Appendix C. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

6.4.6 Additional Analysis: The Effect of Concentration and Number of Customers

In addition to the main regressions, the following series of additional tests are performed to identify environments where the main results are more/less pronounced.

First, the full sample is partitioned into two sub-samples: higher and lower customer concentrated firms (Panel A in Table 6.15). The partition is based on the median value of the customer sales-based Herfindahl-Hirschman Index (*CC*). Considering that a higher reliance on a few large customers could arguably lead to a higher likelihood for the supplier firm to default its debt obligations (Dhaliwal et al. 2016a; Campello and Gao 2017), the effect of common auditors between supply chain partners on both price and non-price terms is expected to be more pronounced for the higher customer concentrated suppliers. As shown in Columns I and II, the coefficient of *CA* is 0.111 and significant at the 1% level for the sub-sample of more concentrated firms, while it is marginally significant (0.045 with t= 1.85) for the less concentrated sub-sample. More importantly, the difference between the two coefficients is significant at the 5% level (see Panel A in Table 6.15).

When the dependent variable is either *SEC* or *NUM_COV*, the results fail to document a statistically significant difference between the two subsamples (i.e., differences between columns III and IV and differences between V and VI, respectively), even though the coefficients on *CA* are positive and statistically significant at the conventional level (0.144 vs 0.186 and 0.092 vs 0.175, respectively). In other words, the impact of common auditor on both collaterals and number of financial covenants holds irrespective of suppliers' customer concentration. Further, in line with the findings from the main results (Table 6.7), Table 6.15 shows that the effect of common auditor is not significantly associated with suppliers' loan maturity, irrespective of the degree of reliance on major customer (columns VII and VIII). Collectively, the findings suggest that the main result is driven by the sub-sample of firms which have higher degree of reliance on few major customers when cost of bank debt is the dependent variable. In terms of non-price terms, however, the results, generally, hold across both sub-samples regardless.

Second, the full sample is partitioned into supplier firms with higher and lower number of major customers. The former sub-sample consists of those supplier firms that report over one major customers, while the latter sub-sample consists of firms that have exactly one major customer. Conventional wisdom suggests that supplier firms with more than one major customer face higher risks associated with their major business partner (see section 4.2.2). Instead, supplier firms with only one major customer should be less exposed on such risks. Considering that investors are concerned about supplier's exposure risks that arise from their major business partners (i.e., require higher cost of private debt) (Dhaliwal

et al., 2016a), it would be reasonable to expect that the effect of common auditors between supply chain partners on price and non-price loan terms to be more (less) pronounced for firms with higher (lower) number of major customers. As shown in Panel B of Table 6.15, when the dependent variable is either the *LN_SPRD* or the *SEC*, the results fail to document a statistically significant difference between the two subsamples (i.e., differences between columns I and II and differences between III and IV, respectively), even though the coefficients on *CA* are positive and statistically significant at the conventional level (0.085 vs 0.054 and 0.159 vs 0.181, respectively). In other words, the impact of common auditor on both interest rates and collaterals holds irrespective of suppliers' number of customers. However, when the dependent variable is the number of financial covenants attached in the loan agreement *(NUM_COV)* (Columns IV and V), the coefficient of *CA* is 0.203 and statistically significant at the 1% level for the sub-sample of firms that have more customers, while it is insignificant for the sub-sample of supplier firms that have only one customer. More importantly, the difference between the two coefficients is significant at the 1% level of confidence. Further, in line with the findings from the main results (Table 6.7), the effect of the common auditor is not significantly associated with suppliers' loan maturity, irrespective of the number of major customers (columns VII and VIII). Overall, the findings provide only weak evidence that the effect of the common auditor is more pronounced for supplier firms with a higher number of major customers.

Table 6.15 Additional Test Analysis: Customer Concentration and Number of Customers

Panel A. Partition based on customer concentration	(I) Higher Concentration	(II) Lower Concentration	(III) Higher Concentration	(IV) Lower Concentration	(V) Higher Concentration	(VI) Lower Concentration	(VII) Higher Concentration	(VIII) Lower Concentration
CA	0.111***	0.045*	0.144**	0.186***	0.092***	0.175***	0.002	0.037
	(5.25)	(1.85)	(2.35)	(2.67)	(2.60)	(4.36)	(0.12)	(1.39)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-test difference between subsamples	0.066**		-0.042		-0.082		-0.034	
	(2.07)		(-0.47)		(-1.48)		(-1.00)	
Observations	2,683	2,699	2,683	2,699	2,683	2,699	2,683	2,699
Adjusted/Pseudo R-squared	0.522	0.586	0.231	0.300	0.124	0.159	0.262	0.252
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B. Partition based on number of customers	(I) More Customers	(II) Less Customers	(III) More Customers	(IV) Less Customers	(V) More Customers	(VI) Less Customers	(VII) More Customers	(VIII) Less Customers
CA	0.085***	0.054**	0.159**	0.181***	0.203***	0.043	-0.017	0.029
	(3.54)	(2.59)	(2.19)	(3.25)	(4.71)	(1.16)	(-0.58)	(1.21)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-test difference between subsamples	0.031		-0.021		0.160***		-0.046	
	(0.96)		(-0.24)		(2.82)		(1.20)	
Observations	1,729	3,653	1,729	3,653	1,729	3,653	1,729	3,653
Adjusted/Pseudo R-squared	0.555	0.571	0.197	0.234	0.122	0.151	0.132	0.144
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6.15 reports the results under different subsamples. Panel A partition is based on the median value of the customer sales-based Herfindahl-Hirschman Index *(CC)*, while in Panel B partition is based on the number of major customers. In Columns I -II, III-IV, V-VI and VII-VIII the dependent variable are *LN_SPRD*, *SEC*, *NUM_COV* and *LN_MAT*, respectively. The variable of interest, *CA*, is an indicator variable that equals to 1 if the supplier firm shares a common audit firm with at least one of its major customers, and 0 otherwise. *LN_SPREAD* is the natural logarithm of the all-in-drawn spread. *SEC* is an indicator variable that equals to 1 if the loan requires collateral, and 0 otherwise. *NUM_COV* is the total number of financial covenants included in the loan agreement. *LN_MAT* is the natural logarithm of maturity expressed in months. All models are estimated with the same control variables as reported in Table 6.6 and 6.7. Heteroskedasticity-robust t-statistics for OLS regression and heteroskedasticity-robust z-statistics for Probit and Poisson are reported in the parentheses. Continuous variables are winsorized at the 1% and 99%. Detailed definitions for all other variables can be found in Appendix C. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

6.5 Conclusion

This chapter explores whether and how common audits affect the perceptions of one of the most important groups of capital market participants, namely banks. Drawing upon an emerging body of literature which shows that the existence of common auditors between interrelated business parties has actual audit quality consequences, the current study posits that common audits should have direct capital market implications as well. Specifically, it is hypothesised that when supplier firms appoint the same audit firm with their major customers, the information and estimation risks associated with the former should be amplified (alleviated), thus resulting in higher (lower) cost of bank loans and more (less) stringent non-price loan terms.

Using a sample of a sample of 5,382 loans issued by U.S. non-financial firms over the period 1988-2016, the current study finds that banks charge higher interest loans and more tight non-price loan terms for supplier firms appointing a common audit firm with at least one of their major customers. These findings are in line with and can be explained by the theoretical argument proposed by Antle (1982; 1984), stating that auditors have incentives to act on their economic benefit since they are utility maximisers (see section 3.3.2). As such, investors tend to require higher cost of debt and more stringent non-price loan terms to compensate for such a potential. Importantly, the results remain after a series of sensitivity tests that include alternative measures to capture the common auditor presence, a firm-level than issuance-level analysis and controls for endogeneity and supplier firms' financial reporting quality. Collectively, the evidence documented is in line with the notion that private debt market participants perceive the existence of common auditors negatively.

The findings of this study contribute along several dimensions. From an academic point of view, this study extends the emerging literature that examines the cross-audit effects (e.g., Cai et al. 2016; Dhaliwal et al. 2016b; Chang et al. 2019; Chen et al. 2020; Sun et al. 2020; Hope et al. 2022). In addition, it contributes to the emerging literature which explores the economic consequences of characteristics among supply chain partners within a debt-financing context (e.g., Kim et al., 2015; Dhaliwal et al. 2016a; Campello and Gao 2017). Further, these findings could provide useful insights for regulators and standard setters by documenting evidence for of one of the most important group recipients of the financial statements. According to Levitt (2000), capital market's perception of audit quality is critical in maintaining systemic confidence in the integrity of financial reporting

(refer to section 2.3 and 2.4 for a more detailed discussion about the role of external auditors as gatekeepers of the systematic confidence and integrity within the financial markets and corporate world). Finally, the results of this study could also have direct capital structure firm implications. That is, given the importance of raising external capital, supplier firms might need to consider the trade-offs between having common auditor with their major customers and the cost of debt capital.

Chapter 7: Concluding Remarks, Limitations and Future Research Avenues

7.1 Summary of the Thesis

This thesis consists of two empirical chapters that investigate the effect of common auditors within a capital market context. In particular, it examines whether equity investors and banks perceive that a common auditor between supplier firms and their major customers contributes to the information and estimation risk they are facing and, as a result, whether such a relationship contributes to economically significant implications on the cost of capital of the supplier firms. To do so, this thesis combines three different streams of literature: (i) the supply chain literature that focuses on the supplier-major customer relationship; (ii) the capital market-based auditing literature and (iii) the growing body of literature that explores the role of common auditors between economically interrelated firms.

With respect to the first stream of literature, prior studies within the supply chain context argue that supplier firms that rely - for a considerable portion of their revenues- on a few major customers face increased liquidity problems and cash flow risks since their major customers might bankrupt, decide to develop products internally or switch to another supplier (Dhaliwal et al., 2020). In addition, they also find that this risk is captured into the supplier's cost of equity and debt capital (Dhaliwal et al., 2016a; Campello and Gao, 2017). Arguably, any factor that could either mitigate or exacerbate such concerns/risks should be important for investors' and creditors' information and estimation risks. The current thesis posits that common auditors constitute such a factor. The rationale behind such a conjecture lies in the well-developed capital market-based auditing literature which documents conclusive evidence that auditor-specific characteristics or auditing services can directly affect capital market participants' perceptions and, in turn, their investing and lending decisions (e.g., Mansi et al., 2004; Khurana and Raman, 2004; Pittman and Fortin, 2004; Knechel et al., 2007; Dhaliwal et al., 2008; Kim et al., 2013; Krishnan et al., 2013; Azizkhani et al., 2013; Francis et al., 2017). However, there is conflicting evidence regarding the role of common auditors on the quality of audits of interrelated firms, and thus the impact of the common auditor on supplier's external financing is not clear *ex ante*.

One strand within the common auditor literature suggests that audit firms which are appointed simultaneously by both the supplier firm and its major customer are able to

develop enhanced supply chain knowledge and a better understanding of the supplier's business inherent risks (e.g., Johnstone et al., 2014; Chen et al., 2014). In that sense, supplier's risks due to customer concentration should be better integrated into estimates when producing supplier's financial statements. Therefore, it is reasonable to expect that investors and creditors should be faced with lower information and estimation risk. On the contrary, another strand within this body of literature suggests that environments within which common auditors exist could facilitate an increase in the likelihood of (common) auditors acting opportunistically and impairing their independence (e.g., Dhaliwal et al., 2016b; Chang et al., 2019; Sun et al., 2020; Chen et al., 2020; Hope et al., 2022). Inevitably, lower audit quality as a result of impaired auditor independence can, in turn, result in less accurate and credible estimates on suppliers' financial statements. Therefore, investors and creditors should be faced with higher information and estimation risks.

Considering that information and estimation risks are priced by equity investors, the first empirical chapter focuses on the equity market context. Specifically, it investigates whether investors perceive that a common auditor between supplier firms and their major customers contributes to the information and estimation risk they are facing and, as a result, whether such a relationship contributes to economically significant implications on the cost of equity capital of the supplier firms. The findings indicate that supplier firms having a common auditor with their major customers experience higher equity-financing compared to those firms that do not have a common auditor with their major business partners, thus supporting the notion that investors negatively perceive the existence of common auditors among such relationships. Importantly, the findings are robust in a series of sensitivity tests that control for the noise of analyst forecasts, omitted variable bias, alternative measures of the implied cost of equity and common auditor variables, propensity score matching and common auditor switch status analysis, while additional tests indicate that these results are more pronounced for supplier firms with higher customer concentration base and supplier firms with a greater number of major customers.

In a similar vein, the second empirical chapter focuses on the private debt market context and explores the effect of a common auditor on the cost of bank debt and other bank loan contracting features of the supplier firms. Consistent with the findings within the equity market context, the second empirical chapter also documents evidence that supplier firms that have at least one common auditor with their major customers are facing a higher cost of bank debt and more restrictive non-price loan terms. This evidence is, generally,

supported by a series of robustness tests (e.g., alternative measures to capture the common auditor presence, firm-level analysis, propensity score matching, control for financial reporting effect and common auditor switch status analysis). With respect to the cost of bank debt, additional tests suggest that the results are more pronounced for supplier firms with higher customer concentration and supplier firms with a greater number of major customers. In terms of non-price terms, the results, mainly, hold irrespective of whether firms belong to any of these two sub-samples.

In summary, the main findings of this thesis suggest that the existence of a common auditor between the supplier firm and its major customers has an adverse impact on the supplier's equity- and debt-financing.

7.2 Academic and Practical Implications of the Thesis

This thesis contributes in several ways. From an academic point of view, it makes important contributions to at least two strands of literature. First, this thesis fills the gap in the emerging body of literature that investigates the role that common auditors play between economically interrelated firms. Thus far, evidence is mainly concentrated on corporate efficiency advantages (e.g., Cai et al., 2016), audit quality implications (e.g., Chang et al., 2019; Krishnan et al., 2019; Sun et al., 2020) or confidentiality violation issues (e.g., Dhaliwal et al., 2016b; Chen et al., 2020; Hope et al., 2022). However, although extant accounting and auditing literature has long recognised and highlighted the significant role that auditor-specific characteristics and auditing services hold for capital market decisions (e.g., Mansi et al., 2004; Khurana and Raman, 2004; Pittman and Fortin, 2004; Knechel et al., 2007; Dhaliwal et al., 2008; Kim et al., 2013; Krishnan et al., 2013; Azizkhani et al., 2013; Francis et al., 2017), evidence regarding the perceived role of common auditors by capital market participants is rather sparse. Combining these two streams of literature, the current thesis contributes to and extends the growing body of studies that explore the role of common auditors by adopting a capital market perspective.

In addition to filling the void in the existing literature, focusing on the capital market perceptions regarding the role of common auditors partially addresses Aobdia's (2015, p. 1533) recent call for future research on *"assessing the capital market implication of the reluctance of rival firms to share auditors"*. Although the focus on Aobdia's (2015) suggestion might lie in the context of rival/competitor firms, the main idea remains the same. That is, whether and how capital market participants perceive the existence of

common auditors. In that sense, the current thesis contributes to the broader call of Aobdia (2015) for capital market implications of firms that share auditors.

Furthermore, the findings of the current thesis add to the growing stream of literature within the supply chain setting which documents evidence of the direct capital market consequences of the information included in the published financial reports between the supplier firms and their corresponding major customers (e.g., Kim et al., 2015; Dhaliwal et al., 2016a; Campello and Gao, 2017). Specifically, this thesis contributes to this stream of literature by showing that equity investors and banks also consider whether the supplier firms share a common audit firm with their major customers when they set out the equity premium and the loan interest rate, respectively.

Apart from the academic contributions, the findings of this thesis could also inform and provide useful insights to accounting body regulators and standard setters. Particularly, the evidence suggests that equity investors and banks charge higher equity premiums and loan interest rates to supplier firms that have at least one common auditor with their major customers. Such findings indicate that two important groups of capital market participants negatively perceive the role of common auditor within such a relationship. While capital market perceptions might not necessarily reflect an *actual or in fact* audit quality and auditor's independence issue, they definitely represent another important feature recognised by regulators and standard setters, *independence in appearance.* As Dopuch et al. (2003; p. 84) highlight: *"a violation of independence in appearance is prima facie evidence of impaired independence, even if the auditor is independent in fact".* Similarly, Arthur Levitt, a former SEC chairman, highlighted in his keynote speech in 2000 that *"The accounting profession must be like Caesar's wife. To be suspected is almost as bad as to be convicted. It is not enough for the auditor on an engagement to be independent; rather, the (investing) public must perceive the accountant as independent.* Therefore, the findings of this thesis could assist in improvements in current regulation that would fortify the credibility and reliability of the audit profession and thus preserve and enhance the systemic trust and confidence over the information included in firms' financial reports.

Finally, the findings of the current thesis suggest that the effect of common auditor on both cost of equity and cost of debt capital are economically important as well. Specifically, in terms of the equity market, this study shows that supplier firms sharing common auditors with their major customers pay an excess annual cost of nearly $200,000

to obtain equity financing compared to those that do not have a common auditor with major customers. Similarly, in terms of debt markets, the study finds that firms that have a shared auditor with their major customers are charged $2.2m more compared to those with no common auditor. In that sense, the findings of this thesis could also have direct capital structure firm and auditor-choice decision implications, and therefore could be of great interest for firms within such a relationship. That is, given the importance of raising external capital, supplier firms might need to (re)-consider the trade-offs between having a common auditor with their major customers and the cost of equity and debt capital.

7.3 Limitations of the Thesis

As is the case for all accounting and finance studies, the two empirical studies presented in this thesis are also subject to several caveats.

First, the two studies may be subject to potential endogeneity bias due to unobservable or omitted factors and, in turn, could drive the documented associations. However, it should be acknowledged the fact that a complete elimination of such issues in accounting and finance studies is not practically feasible (Houston et al. 2014). Nonetheless, several tests are conducted to address such issues in both studies, including PSM analysis, switch auditor analysis and incorporating in the model additional variables that might be associated.

Second, the two studies are subject to research design issues related to the supply chain context. Specifically, they examine the effect of common auditor existence on capital markets by focusing on an audit firm-level perspective. Arguably, the results reported within an audit firm-level approach might be more pronounced and informative if an audit office-level approach is adopted as well. However, while it might be interesting to examine the effect of common auditor existence from an audit office-level perspective as well, such results would be rather limited, thus obscuring the validity of the inferences that can be drawn. That is, adopting an audit office-level approach would significantly reduce the available sample for analysis. The reason behind this lies in the fact that supplier firms and their major customers are, in most of the cases, not located in the same counties or states (or even in a relatively close proximity to each other). As a result, supplier firms and their major customers are more often audited in different offices by the same audit firm (Johnstone et al., 2014; Chang et al., 2019). Therefore, while this thesis acknowledges the

potential advantages that an audit office-level approach could offer, it does not perform such an analysis due to significant sub-sample restrictions[125].

Third, the current thesis is subject to data availability limitations. Specifically, audit output and input-related variables such as restatements, going concern opinions, audit and non-audit fees are not utilised in the empirical models due to access restriction in the corresponding database, Audit Analytics. In addition, even if access to Audit Analytics was granted, the data becomes available only after 2001. Thus, a significant number of years (i.e., prior to 2001) would have to be ignored. While the current thesis acknowledges and appreciates the importance of such variables, it should be noted that several other available audit-related variables are used in the empirical models, including auditor size, auditor industry specialization as well as audit tenure. Similar data availability limitations occur for corporate governance-related data. The reasons behind this lies in the fact that corporate governance data availability and full coverage commence not earlier than the mid-2000s. Thus, if such data are to be used then a considerable number of years (i.e., prior to 2005) would have to be ignored. This, effectively, would result in a significantly reduced sample, which in turn could lead in a lower validity and generalizability of the reported results. Nonetheless, to account for the corporate governance data limitation, the current thesis performs a pre- and post- SOX analysis (untabulated). The coefficient estimates in both pre- and post- periods remain positive and significant for both equity and debt contexts, thus indicating that the introduction of SOX Act did not have any significant differential effect for both investors and creditors within this setting. Such results are not surprising considering the numerous accounting/auditing scandals that brought into light after the enactment of SOX (e.g., Lehman Brothers, AIG, Carillion etc.).

7.4 Avenues for Future Research

The findings of the current thesis provide a unique opportunity for the development of future studies. First, this thesis examines the effect of capital market implications on common auditors by employing the supplier-major customer relationship. Indisputably, such a setting is economically important for the U.S. economy due to the considerable high number of firms that tend to operate within such a relationship (refer to section 4.2). Yet, there are several other settings within which common auditors might exist. Arguably, an interesting avenue for future research would be to investigate capital market implications

[125] Specifically, untabulated descriptive statistics confirm the aforementioned argument, as only the 2% of the sample is audited by the same audit office.

within such settings. For example, similar to the supplier-major customer, extant literature identifies a number of different settings where economically interrelated business parties might share a common auditor (e.g., parent and their subsidiary firms, acquirer and target firms, mutual funds and invested firms). In that sense, future research could provide further insights into the capital markets by adopting a different common auditor setting.

Second, another potential avenue would be to extend the current research beyond the U.S. context. While the U.S. market constitutes one of the most important economies globally with a high volume of supplier-customer relationships in place, another equally important economy with a large number of manufacturing firms (firms in which most of the supplier-customer relationships are identified) is China. Since 2007, the China Securities Regulatory Commission (CSRC) has published the *Guidelines for the Content and Format of Information Disclosures of Companies that Offer Securities to the Public No. 2 – Contents and Formats of Annual Reports*. Similar to the U.S. regulatory requirements, the Chinese regulator requires that all A-share listed firms in the Shanghai and Shenzhen Stock Exchanges to disclose information about their major customers and the proportion of their total sales for the top five major customers. Considering that the findings of the current thesis hint at a potential trust issue of capital market participants due to potential malpractices and opportunistic behaviour of auditors, China as a country of interest, is expected to provide a fertile ground of work. The rationale behind this suggestion lies in the following two reasons. First, China is characterised by a relatively less concentrated audit market (Chen et al., 2010; Wang et al., 2015; Gul et al., 2019). Such an environment, in turn, naturally leads to additional pressure of (common) auditors to both obtain and more importantly to retain their clientele portfolio (Hope et al., 2022). Second, China's audit market is characterized by low litigation risk, weak regime to protect investors and a less-developed institutional environment (Chan et al., 2006; Wang et al., 2015). Such audit market features, in turn, could facilitate more opportunistic behaviour of auditors within the context of commonality. Thus, an extension study within the Chinese setting is expected to yield significant capital market implications and would arguably shed more light on and provide further insights from a regulatory perspective.

Finally, while the current thesis document some evidence that supplier firms that have common auditors with their major customers tend to have lower audit quality, it should be acknowledged the fact that discretionary accruals constitute relatively less direct proxies of audit quality (DeFond and Zhang, 2014), and thus the results need to be interpreted with

caution. To allow for more clear inferences, future research could employ more direct proxies of audit quality such as the likelihood of restatements or propensity of going concern opinions. In addition, future research could also explore the potential impact that corporate governance might have on the reported results and associations (i.e., the moderating role of corporate governance data). In that sense, several corporate governance variables could be incorporated in the models, including, board's size and independence, CEO duality, firm ownership structure, ties between board of directors and auditors appointed.

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Appendices

Appendix A. Example of Transformation from Supplier-Customer-Year to Supplier-Year Observations

This is an actual example from data as drawn by WRDS Supply Chain with IDs (Compustat Segment). As shown in Panel A, Ducommun Inc. (supplier firm) is audited by PWC and reports three major customers (Raytheon Co., United Technologies Corp. and Boeing Co.) in 2010. Raytheon Co. and United Technologies Corp. are also audited by PWC, while Boeing Co. is audited by Deloitte & Touche in the same year. Consequently, the same supplier firm appears three times. To facilitate the analysis in the current study supplier-customer-year observations (multiple lines) are converted into supplier-year format (unique line) in Panel B. Panel B, also, illustrates the construction of the three common auditor variables employed in the study.

Panel A. Supplier-Customer-Year (multiple lines format)

Year	Supplier Firm	Supplier's Auditor	Major Customers	Major Customer's Auditor
2010	Ducommun Inc.	PWC	Raytheon Co.	PWC
			United Technologies Corp.	PWC
			Boeing Co.	Deloitte & Touche

Panel B. Supplier-Year (unique line format)

Year	Supplier Firm	# Major Customers	*CA*	*NUM_CA*	*PERC_CA*
2010	Ducommun Inc	3	(Yes=1)	2	66.7%

Appendix B. Variables Definition (Chapter 5)

Variable	Definition	Source
Dependent Variables		
ICC_AVG	Average cost of equity capital from four different accounting-based valuation models: CT, GLS, OJN, and MPEG.	I/B/E/S, CRSP, Compustat
ICC_CT	Implied cost of equity capital, derived from the accounting-based valuation model in Claus and Thomas (2001), minus the rate on 10-year treasury note.	I/B/E/S, CRSP, Compustat
ICC_GLS	Implied cost of equity capital, derived from the accounting-based valuation model in Gebhardt et al. (2001), minus the rate on 10-year treasury note.	I/B/E/S, CRSP, Compustat
ICC_MPEG	Implied cost of equity capital, derived from the accounting-based valuation model in Easton (2004), minus the rate on 10-year treasury note.	I/B/E/S, CRSP, Compustat
ICC_OJN	Implied cost of equity capital, derived from the accounting-based valuation model in Ohlson and Juettner-Nauroth (2005) as implemented by Gode and Mohanram (2003), minus the rate on 10-year treasury note.	I/B/E/S, CRSP, Compustat
ICC_GGM	Implied cost of equity capital, derived from the finite horizon expected return model as proposed by Gordon and Gordon (1997), minus the rate on 10-year treasury note.	I/B/E/S, CRSP, Compustat
ICC_PEG	Implied cost of equity capital, derived from the Price Earning Growth (PEG) model for short-term earnings forecasts a described in Easton (2004), minus the rate on 10-year treasury note	I/B/E/S, CRSP, Compustat
Common Auditor Variables		
CA	Indicator variable equals to 1 if the supplier firm and at least one of its major customer(s) are audited by the same audit firm, and 0 otherwise	CSSC & Compustat

NUM_CA	Integer variable that counts the total number of common auditors between a supplier firm and all of its major customer(s) for each year.	As above
PERC_CA	The total number of common auditors between the supplier firm and its major customer(s) divided by total number of supplier's major customers for each year.	As above
Control Variables		
MV	The total market value of equity	Compustat
LN_MV	The natural logarithm of the total market value of equity	As above
LEV	The book value of long-term debt plus book value of debt in current liabilities divided by book value of assets	As above
MOD_Z	The modified Z-Score. The modified version does not include the ratio of market value of equity to book value of total debt, because a similar term, Market to Book, enters the regression as a separate control variable. It is computed as: 1.2*(wcap/at) +1.4*(re/at) +3.3*(ebit/at) + 0.999*(sale/at).	As above
PROF	The net income (before extraordinary items) divided by lagged total assets	As above
BTM	The ratio of book value of equity over market value of equity	As above
LN_BTM	The natural logarithm of the ratio of book value of equity over market value of equity	As above
CASH	The ratio of book value of cash and marketable securities to the book value of total assets	As above

CC	The customer sales-based Herfindahl-Hirschman Index. Following Patatoukas (2012), it is computed as: $\sum_{j=1}^{j}\left(\frac{Sales_{ijt}}{Sales_{ij}}\right)^2$, where $Salesij$t is firm i's sales to major customer j in year t and $Salesij$ represents firm i's total sales in year t.	CSSC & Compustat
TENURE	The number of years of the auditor-client relationship.	Compustat
BIG	Indicator variable equals to 1 if the supplier firm is audited by a Big N firm, and 0 otherwise. Big N audit firms include Arthur Andersen Arthur Young, Coopers & Lybrand, Ernst & Young, Deloitte & Touche, KPMG, PricewaterhouseCoopers, Touche Ross and merged entities between them (Compustat).	As above
SPECIAL	The auditor's portfolio share by number of clients, which equals to the total number of the auditor's clients in the Fama-French industry divided by total number of all clients for that auditor.	As above
LTG	The median analysts' forecast of the long-term earnings growth rate	IBES
DISP	The analysts' forecast dispersion calculated as the standard deviation of the analysts' forecasts, deflated by the mean analysts' forecasts	IBES
F_BIAS	Forecast optimism bias defined as the difference between the one-year-ahead consensus earnings forecast and realised earnings, deflated by stock price	IBES &CRSP
BETA	The stock beta calculated over 36 months preceding the measurement of the average cost of equity	CRSP

IDIOS	standard deviation of the residuals of the market model regression using monthly returns over the 36 months preceding the measurement of the average cost of equity	CRSP
S_RET	The twelve month buy-and-hold stock return over the firm's fiscal year	CRSP
AFE_ABS	Unsigned analyst forecast error defined as the absolute value of the difference between actual earnings per share and one-year-ahead consensus earnings forecast, deflated by actual earnings	IBES
LN_ANA	The natural logarithm of one plus the number of analysts following the firm	IBES
ABS_JONES	The absolute value of discretionary accruals estimated using the Jones model (Jones, 1991).	Compustat
MOD_JONES_ABS	The absolute value of discretionary accruals estimated using the modified Jones model (Dechow et al., 1995).	Compustat

Appendix C. Variables Definition (Chapter 6)

Dependent Variables		
SPREAD	The "all-in" spread drawn	DealScan
LN_SPREAD	The natural logarithm of the all-in spread drawn	As above
MAT	Loan maturity measured in number of months.	As above
LN_MAT	The natural logarithm of loan maturity.	As above
SEC	An indicator variable that equals to 1 if the loan is secured by collateral, and 0 otherwise.	As above
NUM_COV	The number of financial covenants contained in a loan contract.	As above
Common Auditor Variables		
CA	Indicator variable equals to 1 if the supplier firm and at least one of its major customer(s) are audited by the same audit firm, and 0 otherwise	CSSC & Compustat
NUM_CA	Integer variable that counts the total number of common auditors between a supplier firm and all of its major customer(s) for each year.	As above
PERC_CA	The total number of common auditors between the supplier firm and its major customer(s) divided by total number of supplier's major customers for each year.	As above
Control Variables		
TA	Total assets in millions of dollars (Compustat).	Compustat
LN_TA	The natural logarithm of total assets.	As above
MTB	Market value of assets minus book value of equity divided by book value of assets.	As above

PROF	The net income (before extraordinary items) divided by lagged total assets	As above
FA	The ratio of the book value of property, plant, and equipment to book value of assets.	As above
LN_FA	The natural logarithm of fixed assets.	As above
LEV	The book value of long-term debt plus book value of debt in current liabilities divided by book value of assets	As above
MOD_Z	The modified Z-Score. The modified version does not include the ratio of market value of equity to book value of total debt, because a similar term, Market to Book, enters the regression as a separate control variable. It is computed as: 1.2*(wcap/at) +1.4*(re/at)+3.3*(ebit/at)+0.999*(sale/at).	As above
TENURE	The number of years of the auditor-client relationship	As above
BIG	Indicator variable equals to 1 if the supplier firm is audited by a Big N firm, and 0 otherwise. Big N audit firms include Arthur Andersen Arthur Young, Coopers & Lybrand, Ernst & Young, Deloitte & Touche, KPMG, PricewaterhouseCoopers, Touche Ross and merged entities between them (Compustat).	As above
SPECIAL	The auditor's portfolio share by number of clients, which equals to the total number of the auditor's clients in the Fama-French industry divided by total number of all clients for that auditor.	As above
LOSS	Indicator variable equals to 1 if the firm reports negative net income before extraordinary items, and 0 otherwise.	As above
MA	Indicator variable equals to 1 if the firm has involved in a merger or acquisition, and 0 otherwise	As above

CC	The customer sales-based Herfindahl-Hirschman Index. Following Patatoukas (2012), it is computed as: $\sum_{j=1}^{j}\left(\frac{Sales_{ijt}}{Sales_{ij}}\right)^2$, where $Salesij$t is firm i's sales to major customer j in year t and $Salesij$ represents firm i's total sales in year t.	CSSC & Compustat
CROA	The weighted-average ROA of major customers, with the weight being the major customer's purchases from the supplier divided by the supplier's total sales	As above
MAT	Loan maturity measured in number of months.	DealScan
LN_MAT	The natural logarithm of loan maturity.	As above
SEC	An indicator variable that equals to 1 if the loan is secured by collateral, and 0 otherwise.	As above
LS	The loan facility amount measured in millions of dollars.	As above
LN_LS	The natural logarithm of the loan facility size.	As above
NUM_COV	The number of financial covenants contained in a loan contract.	As above
PP	An indicator variable that equals to 1 if the loan uses performance pricing, and 0 otherwise.	As above
REV	Indicator variables that equals to 1 if the loan is revolvers and 0 otherwise.	As above
CREDIT	The difference between AAA and BAA corporate bond yields	Federal Reserve Board of Governors
TERM	The difference between the 10-year and 2-year treasury yields.	Federal Reserve Board of Governors
ABS_JONES	The absolute value of discretionary accruals estimated using the Jones model (Jones, 1991).	Compustat
MOD_JONES_ABS	The absolute value of discretionary accruals estimated using the modified Jones model (Dechow et al., 1995).	Compustat