THE NEW LEASE ACCOUNTING STANDARDS (TOPIC 842): AN EMPIRICAL ANALYSIS OF ITS IMPACTS ON KEY FINANCIAL PERFORMANCE METRICS

by

Yan S. Gibson

Dissertation

Submitted in Partial Fulfillment

of the Requirements of the Degree of

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Abstract

The accounting treatment for operating leases has attracted attention from both business and academic communities. The progression of the operating lease from short-term low-risk rental activity to an extensive financing vehicle to hide liabilities posed a challenge to the accounting profession. The new lease accounting standards were launched with a background full of controversies. This study provided evidential support for the material changes in reported financial data after implementing the new lease accounting standards. The hypotheses testings utilized the paired *t*-test and its non-parametric alternative, Wilcoxon, to investigate the significance of the year-over-year differences in financial performance metrics measuring firms' asset efficiency, profitability, financial leverage, liquidity, and credit risk. The research results revealed significant changes in every category of financial performance. Firms with operating leases demonstrated more volatility in financial performance than firms not engaged in operating leases. Asset efficiency and profitability decreased while financial leverage increased. Other than expected higher assets and liabilities, most firms in the Standard & Poor's (S&P) Industrial Sector ended up with higher equity and cash holding positions. The significance of the changes in financial ratio reflects the magnitude of the differences in reported financial data pre and post the implementation of the new lease accounting standards.

Keywords: Topic 842, lease accounting standards, financial ratios, constructive capitalization

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Dedication

To my husband, Al, and my children, Leah and William.

Acknowledgments

Sincere gratitude goes to my dissertation chair, Dr. Carle Hunt, for his dedicated support, generous encouragement, prayers, and trust throughout the process of this research. Many thanks to Dr. Kuhn, who offered challenging feedback and insightful observations, which motivated me to investigate the subject further. Deep respect and appreciation to Dr. Nicole Lowes and Dr. Edward M. Moore for their consistent efforts to ensure the smooth flow of the process.

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Section 1: The Foundation of the Study

The main controversy of lease accounting evolves around the lessees' financial reporting framework (Spencer & Webb, 2015). The underlying issue is whether lessee firms' increasing use of operating leases as an off-balance-sheet (OBS) financing tool impedes financial reporting quality. Lease accounting has been a work-in-progress for years to accounting standard-setters in the United States (U.S.) and international accounting standard bodies. There have been extensive researches on the lease accounting standards from the investors, financial statements preparers, auditors, and accounting standard researchers' perspectives before the new lease accounting standards (Topic 842) took effect. This empirical study utilized the causal-comparative method to compare the differences in S&P Industrial Sector's financial performance indicators immediately before and after Topic 842's implementation. The differences at the sector level were attributed to Topic 842-impacted and non-impacted firms within the sector through hypotheses testings. The researcher also developed sub-hypotheses to trace the changes of financial ratios to the financial data input of the ratio calculation.

Background of the Problem

The U.S. Financial Accounting Standard Board (FASB) and International Accounting Standard Board (IASB), the two most globally authoritative accounting standards bodies, worked jointly for over eight years to update the lease accounting standards. IASB launched International Financial Reporting Standards (IFRS)16 the same year as FASB issued its new Accounting Standards Update (ASU) 2016-02 (Topic 842) on leases. Although FASB and IASB ended up issuing two different lease accounting standards, they did reach a fundamental agreement on the lessee's capitalization of any leases of 12 months or longer (Fajardo, 2016).

Topic 842 was issued in 2016 to replace the prior lease accounting standard (i.e., Statement of Financial Standard [SFAS] No. 13; (FASB, 2016). Topic 842 requires lessees to capitalize all non-cancellable operating leases of one year or more with right-of-use (ROU) asset and its corresponding liability calculated using the present value of the committed future cash payments (FASB, 2016). According to SFAS No. 13, lessees were only required to disclose operating leases in the footnotes and were able to keep related obligations off-balance-sheet (Sliwoski, 2017). Topic 842 is intended to improve the relevance and comparability of financial statements (Arimany-Serrat et al., 2015; Barone et al., 2014). The adoption of Topic 842 for public corporations starts for fiscal years beginning December 15, 2018 (FASB, 2016). Because the U.S. Generally Accepted Accounting Principles (GAAP) and the Securities Exchange Committee (SEC) require firms to present prior year's historical balance sheets, income statements, and the statement of cash flows, the lessee firms' comparative financial statements published after adopting Topic 842 would prompt instant and dramatic contrast (Trifts & Porter, 2017). The initial recognition of ROU and lease liability increases total assets, total liabilities, earnings before interest, taxes, depreciation, and amortization (EBITDA), and interest expense while decreases net income (Chambers & Dooley, 2015). Projected consequences of the sharp changes in reported financial data include negative impacts on firms' financial performance indicators, access to financing, the market for corporate debt, the firm's financial cost, and ultimately business strategies (Arimany-Serrat et al., 2015; Fülbier et al., 2008).

Topic 842 has a sweeping effect on every firm that leases assets (Weidner, 2017). The issuance of Topic 842 is FASB's answer to the long-standing criticism of SFAS No. 13 because its bright-line tests enabled lessees to achieve off-book financing through arranging lease contracts (Spencer & Webb, 2015). However, the standard-setting process of Topic 842 was full

of debates. Businesses lobbied against the proposed capitalization of operating leases and questioned its cost-benefit (Comiran & Graham, 2016). Scholars do not all agree with the usefulness of the across-the-board capitalization of operating leases. Akbulut (2016) examined the literature projecting the potential impacts of lease capitalization on financial statements and key accounting ratios published between 2000 to 2015 and concluded there is no common agreement among the findings and conclusions. The disagreements come from differences in sample firms and assumptions for interest rates and lease terms used in the modeling (Akbulut, 2016).

This study examined the impacts of Topic 842 on the U.S. Industrial Sector firms' financial performance metrics using data from comparative financial statements before and after the implementation of the new lease accounting standards. The Industrial Sector is one of the 11 Global Industry Classification Standard (GICS) industry classifications. Different industry sectors can generate significantly different empirical research results depending on industry grouping classifications (Hrazdil & Scott, 2013). Hrazdil and Scott (2013) compared GICS with three other alternatives (Standard Industrial Classification, North American Industry Classification System, and Fama–French classification). They demonstrated GICS is a more reliable industry grouping for financial analysis and research (Hrazdil & Scott, 2013). The Industrial Sector is a diverse group of industries, including manufacturers, agricultural businesses, miners, and construction companies engaged in business activities such as processing, assembly, conditioning, and lighting (Abdelaziz et al., 2011).

Problem Statement

The general problem to be addressed is the changes in the lessee firms' reported financial statements after adopting Topic 842, resulting in a comprehensive set of changes in financial

performance metrics and unknown implications to businesses. Both the credit agencies and scholars have used different approaches to project the impacts and implications of Topic 842 adoption. Findings of academic studies vary because sampled firms were from various industries and assumptions about the interest rates, total lease terms, and remaining lease terms were all different (Akbulut, 2016). On the one hand, Bohušová (2015) and Casabona and Coville (2018) argued the adoption of Topic 842 would dramatically change financial indicators because the capitalization of operating leases directly leads to financial ratio deterioration. On the other hand, Trifts and Porter (2017) and Nuryani et al. (2015) found the capitalization of operating leases significantly affected the firms' financial leverage ratios but not the profitability ratios.

There is no common agreement on the impacts of Topic 842 in literature, and an empirical study based on actual annual data post Topic 842's implementation is currently unavailable. Assessment of the lease capitalization after Topic 842 can validate the ex-ante research results and shed light on the cost versus benefit dispute of the lease accounting rule change (Comiran & Graham, 2016). The specific problem to be addressed is the changes in the lessees' reported financial statements after adopting Topic 842, resulting in changes in financial performance benchmarks to a selected group of industrial firms in the United States.

Purpose Statement

The purpose of this quantitative study was to add to the body of the accounting knowledge by examining the relationship between Topic 842 and changes of lessees' key financial performance metrics (as shown in Table 1) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the U.S. industrial firms. SEC requested FASB to start working on updating lease accounting standards in 2005, and Topic 842 was released in 2016 (Weidner, 2017). During the standard-setting period, there was a substantial number of

responses from firms across the industries, especially from the lessee firms, who would be directly affected (Mellado & Parte, 2017). Firms lobbied against the proposed updates because of the perceived high cost of implementation, possible increase in capital cost, and increased workload for management (Comiran, 2014). Not all scholars agree with the capitalization approach of Topic 842 either. Graham and Lin (2018) stated the separation of capital lease and operating lease in SFAS No. 13 better represents the nature of the asset categories. Instead, Topic 842 adversely affects the relevance of accounting treatment of lease assets (Graham & Lin, 2018). This study intends to enhance the understanding of the new lease standard's implications through measuring and comparing the changes in the financial performance metrics between the impacted and the non-impacted lessee firms in the U.S. Industrial Sector.

Table 1

List of Financial Ratios Tested

Category	Financial Ratio	Calculation
Asset Efficiency	Fixed Asset Turnover	Sales/Fixed Assets
	Total Asset Turnover	Sales/Total Assets
Profitability	Return on Asset (ROA)	Net Income/Total Asset
	Return on Equity (ROE)	Net Income/Shareholders' Equity
	Net Profit Ratio	Net Income/Sales
	EBITDA to Total Equity Ratio	EBITDA/Total Equity
	EBITDA to Total Assets Ratio	EBITDA/Total Assets
Financial Leverage	Asset to Equity Ratio	Total Assets/Total Equity
	Debt to Equity Ratio	Debt/Equity
	Debt to EBITDA Ratio	Debt/EBITDA
	Debt Ratio	Debt/Total Assets
	Interest coverage	EBITDA/Interest paid
Liquidity	Cash to Total Asset Ratio	Cash/Total Asset
	Net Working Capital to Total Asset	Net Working Capital/Total Asset
	Current Ratio	Current Asset/Current Liabilities
	Quick Ratio	Current Asset - Inventory-Prepaid/Current Liabilities
Credit Risk (Financial Distress and Risk of Bankruptcy)	Altman's Z-Score	Z = 3.25 + 6.56X1+3.26X2+6.72X3+1.05X4, X1 = (Current assets – Current Liabilities) /Total Assets X2 = Retained Earnings /Total Assets X3 = Earning Before Interest and Taxes / Total Assets X4 = Book Value Equity /Total Liabilities

Research Questions

Topic 842 requires firms to abolish the off-balance-sheet accounting for operating leases and report all operating leases on the financial statements through the use of the ROU asset and lease liability accounts (Graham & Lin, 2018; Sliwoski, 2017). Pricewaterhouse Coopers (PWC) estimated 53% of the entities would have a 25% increase in debt after reporting operating lease liability (Tahtah & Roelofsen, 2016). A frequently used method to roughly estimate the committed future cash flow obligations of operating leases is to multiply the current rent expense by eight (Shaked & Orelowitz, 2017). The total estimated off-balance sheet liability based on disclosures for the largest 1,000 firms is $742 billion (Trifts & Porter, 2017).

Operating leases are frequently used by air/transportation (aircraft, trucks, and trailers), retailers, and wholesalers (buildings; (Han, 2010). Equipment leasing is used more than bank loans, private placement, or other financing methods in the United States (Nevitt & Fabozzi, 2000). The Equipment Leasing & Financing Foundation (ELFF) reported 50% of firms' investment in the equipment (close to $900 billion) is financed through leasing, making leasing the most common payment method for equipment and software in 2018. The research questions are designed to investigate the changes in financial metrics within the Industrial Sector firms.

RQ 1: What are the differences between key financial performance ratios related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the industrial sector firms in the United States before and after its implementation?

RQ 2: What are the differences between key financial performance ratios related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the Topic-842 impacted industrial sector firms in the United States before and after its implementation?

RQ 3: What are the differences between key financial performance ratios related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the Topic 842 non-impacted industrial sector firms in the United States before and after its implementation?

Hypotheses

The adoption of Topic 842 (Leases) for public firms was effective for the fiscal year beginning December 15, 2018, and for other entities beginning December 15, 2019 (FASB, 2016). Later on, FASB postponed the effective date for all other types of entities to the fiscal year beginning December 15, 2020 (FASB, 2020). This study intends to investigate the relationship between financial performance metrics and Topic 842 by measuring to what extend the key financial metrics (i.e., dependent variables [DVs]), differ before and after implementing Topic 842 (i.e., the independent variable [IV]). When the purpose of causal-comparative is to determine the significance of the differences, the researcher uses *t*-tests to compare two independent or dependent groups (Morgan et al., 2019; Salkind, 2010). The participants of this study are the firms in the S&P Industrial Sector. When participants in the condition or level of the independent variable are somehow connected to participants in the other condition or level of the independent variable, paired or matched statistics (i.e., within-subject design, are used; (Morgan et al., 2019).

$H1_0$ = There is no significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within the industrial sector firms before and after implementing Topic 842.

$H1_1$ = There is a significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within the industrial sector firms before and after implementing Topic 842.

$H2_0$ = There is no significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842-impacted firms in the industrial sector before and after its implementation.

$H2_1$ = There is a significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842-impacted firms in the industrial sector before and after its implementation.

$H3_0$ = There is no significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842 non-impacted firms in the industrial sector before and after its implementation.

$H3_1$ = There is a significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842 non-impacted firms in the industrial sector before and after its implementation.

Nature of the Study

The proposed study uses a quantitative method, specifically, a causal-comparative design, to compare the changes in key financial ratios related to financial leverage, liquidity, asset efficiency, and profitability using data from the industrial sector firms' annual financial statements filed with EDGAR after Topic 842 took effect. Quantitative design is specific and can be distinctly defined and recognized, while qualitative design is less specific and does not have the same structural depth (Kumar, 2019). A causal-comparative study typically uses a continuous dependent variable and nominal/categorical independent variable (Schenker & Rumrill, 2004).

Discussion of Research Paradigm

Paradigm refers to organizing principles of new ideas and frameworks to describe phenomena (Burkholder et al., 2019). The paradigm framework developed by Creswell and

Creswell (2018) included three components: philosophical worldview, research design, and specific research method. The four most discussed worldviews are post-positivism (also called positivism and empirical science), constructivism, transformative, and pragmatism (Creswell & Creswell, 2018). Different worldviews lead to different research methods: quantitative, qualitative, and mixed-methods approaches in research (Creswell & Creswell, 2018).

"Post-positivists hold the deterministic philosophy in which causes (probably) determine effects or outcomes" (Creswell & Creswell, 2018, p. 6). Positivists develop knowledge based on observations and measurements and use quantitative more than qualitative research (Creswell & Creswell, 2018). Positivism is also called empirical science, post-positivism, and quantitative research because positivists reply on the scientific method to produce knowledge (Rahi, 2017). Quantitative research involves hypothesis generation, data collection, and hypotheses testing and examines the relationship between measurable variables using the statistical procedure to test objective theory (Burkholder et al., 2019; Creswell & Creswell, 2018).

Constructivism describes knowledge not as truths but as emergent, developmental, nonobjective, and constructed explanations (Fosnot, 2013). Constructivists study broad and general questions and rely on the participants' view of the situation to construct the meaning of the situation (Creswell & Creswell, 2018). Constructivists develop knowledge by interpreting the subjective meaning of experiences and is a qualitative paradigm (Rahi, 2017). The transformative worldview arises to address the concerns of the marginalized community, and its focuses often include an action plan to address injustices (Creswell & Poth, 2018; Mertens & Tarsilla, 2015). Because it incorporates personal and societal transformation actions, transformative researchers mainly adopt a cyclical mixed methods approach (Mertens, 2017). Researchers holding a pragmatic worldview emphasize the research problem and questions and

use pluralistic approaches (mixed methods) to develop knowledge (Creswell & Creswell, 2018). Pragmatists use the mixed-methods to strengthen the weakness in the study and focus on understanding the problem under study (Rahi, 2017). Pragmatism allows researchers to adopt a flexible and practical approach to address research questions (Brierley, 2017).

The researcher's paradigm in this study is post-positivism. Positivism is the single mainstream accounting research paradigm in North America because economics is the irrefutable source of theories and methods for accounting research (Lukka, 2010). Accounting researches based on positivism provide reliable and empirically viable answers to important questions policymakers are concerned about (Ryan et al., 2002b). This study aims to understand the impacts, if any, of Topic 842 on lessee firms' financial performance indicators. The knowledge about the new accounting policy is based on observing and measuring financial data; thus, post-positivism is the best fit for the purpose of this study.

Discussion of Design

One accounting research option is the positive accounting theory (PAT), which uses large samples and statistical testing on data from preferably listed corporations (Collin et al., 2009). PAT provides important insights into the relationship of return on equity, accounting values, and management's motivation for financial reporting (Ghanbari et al., 2016). PAT can be used for two purposes: (a) explain the association between facts and future predictions and (b) examine the choice between different accounting method and their impacts on reported earnings (Santoso & Sebayang, 2017). As a quantitative research methodology, PAT became dominant in accounting research in the 1960s and is characterized by its use of concepts and methods developed in economics and econometrics for the positive trend (Jeanjean & Ramirez, 2009). Ghanbari et al. (2016) stated PAT led to much empirical accounting research on the accounting

numbers and factors affecting management's choice of accounting methods. The investigation of the impacts of new lease accounting standards on firms' performance indicators uses statistical tests based on the publicly listed companies' archival data.

The other accounting research option is normative accounting theory (NAT), mainly used in developing accounting principles (Ghanbari et al., 2016). NAT investigates if user-specific and decision-specific qualities are present in the accounting data (Mozes, 1992). The major contribution of NAT to accounting literature is to debate the pros and cons of different approaches to improve the accounting system by exploring the qualitative attributes or characteristics of accounting principles (Kabir, 2005). The conclusions of NAT research are based on subjective reasoning, while PAT research conclusions are based on objective empirical study (Purba et al., 2018). The qualitative method is the dominant research method to NAT theorists, and research approaches are either interpretive studies or extensive analyses of the hermeneutical role of accounting (Rogowska, 2018). Empirical research identifies and estimates linkages between accounting information and economic decision-makers' actions (Lipe, 2001). Based on the purpose of this study, the PAT empirical method is a better fit.

Mixed-methods research provides more insights into the problem because it requires both quantitative and qualitative data because the combination of quantitative and qualitative data provides a complete picture of the research problem (Creswell & Creswell, 2018). The choice of research design depends on the expected outcome and the intent of the research (Creswell & Creswell, 2018). Pragmatism has been documented as the appropriate paradigm for mixed methods research (Brierley, 2017). A mixed-methods study could be an ideal option if the purpose of the study requires to include analysis of qualitative data to answer the research questions.

Discussion of Methods

Quantitative research examines the relationship between measurable variables using statistical procedures to tests objective theory (Creswell & Creswell, 2018). This study intends to investigate the relationship between the new lease accounting standards and firms' financial performance indicators by comparing financial metrics changes after the new accounting standard went into effect. In quantitative research, the confounding variable(s) (i.e., the unmeasured variable[s]), could be problematic when researchers are establishing the causality between the independent and dependent variables (Creswell & Creswell, 2018). The confounding variables in this study could be the overall economic condition, the overall business environment, or other factors concurrent with the implementation of Topic 842. Firms in the industrial sector naturally divide into Topic 842-impacted and Topic 842 non-impacted groups. In an attempt to investigate the relationship between changes in financial metrics and Topic 842, this study measures the changes in financial metrics within both the impacted and non-impacted groups in the same business sector. When participants are pairwise similar in relevant aspects, they are matched and measured at different times (i.e., paired-samples; (Rietveld & van Hout, 2017).

Causal-comparative. Causal-comparative research is also called ex-post facto research (Apuke, 2017). Causal-comparative design examines the relationships between independent and dependent variables after an action or event has occurred (Salkind, 2010). Researches using causal-comparative design generally examine differences in outcome between or among pre-existing or derived groups (Schenker & Rumrill, 2004). Causal-comparative is non-experimental quantitative research comparing two groups in terms of an already happened independent variable (cause; (Creswell & Creswell, 2018). The independent variables of causal-comparative

design are nominal or categorical in nature, while the dependent variables are continuous variables measured in amount or degree (Schenker & Rumrill, 2004). A major difference between causal-comparative design and experimental design is that the independent variables in a causal-comparative design cannot be manipulated (Kumar, 2019; Salkind, 2010). Non-experimental comparative design only conducts post-observations concerning the dependent variable, and the comparison is between/within groups already receiving different interventions (Kumar, 2019).

Descriptive. Descriptive research is more concerned with answering what, rather than how and why, of a phenomenon (Nassaji, 2015). Contrary to experimental research, descriptive research observes existing phenomena and covers research methods such as correlation study, qualitative study, survey, or content analysis (Atmowardoyo, 2018). Data collected for descriptive research are qualitative but are analyzed quantitatively using frequencies, averages, percentages, or other statistical methods to determine the relationship (Nassaji, 2015). The data in this study are quantitative, and the purpose was to compare the differences in the new lease accounting standards' impacts on the key financial ratios. As a result, a descriptive research design does not fit the purpose and data of this research.

Correlational. Correlational design is the other type of non-experimental research employing structural equation modeling, hierarchical linear modeling, or logistic regression to describe or measure the association or relationship between variables (Creswell & Creswell, 2018). Correlation design measures two or more characteristics and calculates the correlation between these characteristics (Curtis et al., 2016). Apuke (2017) stated research goals and variable types are two major differences between correlational and causal-comparative designs. The correlational study looks for relationships between variables within a single group and only

includes quantitative variables, while the causal-comparative study tries to identify the cause and effect of the relationship between two or more groups and uses a categorical independent or dependent variable (Apuke, 2017). This study examined the causality between Topic 842 and the consequential changes in key financial metrics; thus, causal-comparative design better serves the research purpose.

Summary of the Nature of the Study

FASB holds an annual summer program focusing on identifying and developing meaningful hypotheses about financial reporting issues suitable for empirical research (Dyckman & Zeff, 2015). Out of 43 lease accounting research papers from 2003 to 2013, 17 articles study the impacts of operating lease capitalization, and all of these papers use quantitative methods (Barone et al., 2014). From 2001 to 2015, 11 out of 21 pieces of literature are related to the assessment of the new lease accounting standards, and all 11 articles employ the quantitative method (Spencer & Webb, 2015). The causal-comparative quantitative method best serves the purpose of examining differences in financial metrics by measuring data from reported comparative financial statements.

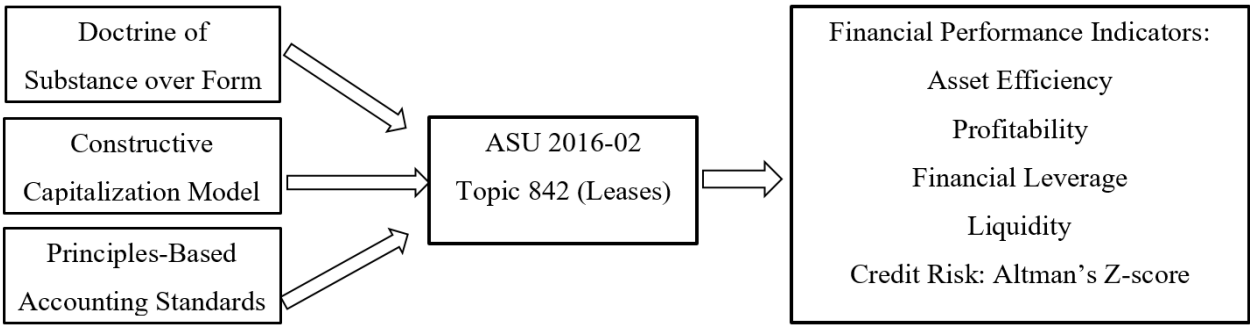
Theoretical Framework

The theoretical framework in this study revolved around the two major elements of the test: Topic 842 and financial performance metrics (as shown in Figure 1). The classification of leases in Topic 842 is an initiative toward the Substance over Form doctrine and was welcomed by the critics of the quality of disclosure approach used in the SFAS No. 13 (Hussey & Ong, 2010). The classifications of lease types in Topic 842 require lessee firms to capitalize operating leases as ROU assets and lease liabilities (Singer et al., 2020). The constructive capitalization model is the foundation of the critical change introduced in Topic 842 (Morales-Díaz et al.,

2019). The capitalization of the majority of the operating leases translates into systematic impacts on key balance sheet financial ratios, especially leverage ratios (Morales-Díaz & Zamora-Ramírez, 2018b). Arkan (2016) stated ratio analysis is a powerful tool that investors and stakeholders rely on for decision-making. Ratios, such as return on assets (ROA), return on equity (ROE), and net profit ratio, have a significant and strong positive relationship with the trend of firms' stock price (Arkan, 2016). Ratios measuring liquidity and leverage provide a fair prediction of financial distress or even bankruptcy (Altman, 1968; Demerjian, 2007).

Figure 1

Relationships Between Theories and Variables



Theories

Substance over Form Doctrine. The Substance over Form Doctrine, meaning the legal perspective of the transaction is insignificant when compared to the accounting system, arose in the United States (Provasi, 2019). The relationship between the accounting data based on legal forms or economic substances has been alternating over the years (i.e., sometimes, the judicial aspect prevails, while other times, the supremacy of Substance over Form prevails; (Provasi, 2019). In Statement No. 4 of the Accounting Principles Board (APB), former FASB, "Substance over Form" is one of the basic features of quality financial accounting (Meyer, 1976). In the Concepts Statement No. 8 (Conceptual Framework for Financial Reporting) published by FASB in 2016, "Substance over Form" is defined as part of the requirement for faithful representation,

where financial information needs to reflect the substance rather than the legal form of the economic transaction (FASB, 2016). The IASB defines "Substance over Form" as accounting for the substances and economic reality of transactions and economic events instead of their legal forms (IASC, 1989). In the conceptual framework published in 2018, IASB specifies "Substance over Form" as one of the characteristics of faithful representation as well (IASB, 2018)."Substance over Form" is part of the faithful representation for both the U.S. GAAP and IFRS.

A consequence of too much focus on the legal aspect of financial statements is creative accounting or other behaviors to circumvent regulatory guidelines (Kampanje, 2018). The stakeholders need to understand the lease obligations from economic and credit-risk perspectives because the classification of capital and operating leases is just an accounting distinction and is irrelevant to the evaluation of fixed commitments (Shaked & Orelowitz, 2017). Lease accounting should assess ownership based on economic substance rather than legal forms of the lease contract (Park & Na, 2017). The new lease accounting standard reinforces the trend toward economic substance (Weidner, 2017).

Constructive Capitalization Model. Imhoff et al. (1991) proposed capitalizing non-cancellable operating lease commitments at the inception of the lease contract. This method requires the balance sheet to report the estimated debt and assets as if the operating leases are the same as capital leases (Imhoff et al., 1991). A frequent criticism of SFAS No. 13 is that it encourages managers to restructure the lease contracts to avoid the capitalization required for capital leases to improve the firm's reported performance and financial ratios (Imhoff et al., 1997). Imhoff et al. (1997) asserted systematic capitalization of operating leases would affect both inputs to the calculation of ROA, meaning profitability increases and efficiency decreases.

Constructive capitalization of operating leases covers the shortfalls of SFAS No. 13 and provides more economically relevant information for better prediction, comparison, and evaluation of firm performance (Imhoff et al., 1997). Since managers are inclined to take advantage of the lease as an off-balance-sheet financing channel to hide debt, missing the capitalized operating lease significantly affects the relevance of financial ratios (Nuryani et al., 2015). Topic 842 is based on the constructive capitalization model, which treats the operating leases the same as the capital leases, meaning lessees now have to report lease assets and liability at the inception of the lease contract (FASB, 2016). Firms' financial measures and key performance indicators (KPIs) will change because of operating lease capitalization (Stillebroer & Jaspers, 2017).

Principles-based Accounting Standards. SEC recommends shifting toward principles-based accounting and defines the principles-based accounting standard-setting as objective-oriented (SEC, 2003). One characteristic of principles-based accounting standards is it eschews bright-line tests (SEC, 2003). Other than clearly defined objectives, principles-based standards provide few scope exceptions and less implementation guidance (Bjornsen, 2019). Researches have suggested that principle-based accounting standards contribute to more transparent and higher quality financial statements (Cohen et al., 2013). Topic 842 is the result of a joint project between FASB and IASB to remove the bright-line accounting rules separating operating leases from financing leases in the prior lease accounting standard (Hussey, 2018). Topic 842 is one of the FASB's moves towards principles-based accounting standards (Bjornsen, 2019). The main goal of the joint project is to update lease accounting standards based on principles that fairly present the substance of lease transactions (Bohušová, 2015).

Financial Ratio Analysis. Financial ratios, calculated using two or more values from the firm's financial statements (balance sheet, income statement, or the statement of cash flows), can

be used as indicators of the firm's financial performance (Arkan, 2016). Financial ratio analysis is the oldest, simplest, and practical tool for accountants and financial analysts to evaluate the firms' financial health (Arkan, 2016; Myšková & Hajek, 2017). The most frequently used ratios in assessing firms' financial performance are interest coverage, current ratio, debt to cash flow ratio, financial leverage, and net worth (Myšková & Hajek, 2017). Three main types of comparison using financial ratio analysis are cross-sectional (intra-industry and inter-industry), intertemporal, and arbitrary standard comparison (Arkan, 2016). Financial ratios can be used to measure firms' performance and monitor financial results (Myšková & Hajek, 2017). Empirical evidence showing financial ratio analysis is a useful tool to detect financial distress and bankruptcy with high accuracy (Darmawan & Supriyanto, 2018). With the addition of lease assets and liabilities on lessees' balance sheet, the capitalization approach of Topic 842 systematically impacts firms' profitability ratios, interest coverage, and liquidity ratios (Morales-Díaz et al., 2019; Wong & Joshi, 2015).

Altman's Z-score Model. Financial ratios, used individually to monitor the company's financial performance, normally give warnings when it is too late to take corrective actions; thus, it is necessary to combine multiple ratios into a single measure of probability (Mohammed, 2016). Altman's Z-score model, also called a multiple discriminant analysis model (MDA), was proposed by Edward I. Altman in 1968 (Arroyave, 2018). It is the most widely used financial model in predicting financial distress and the probability of bankruptcy because of its high accuracy (Arroyave, 2018). Altman's Z-score model has been used to monitor the firm's financial health and is 95% accurate when using the data one year from bankruptcy (Darmawan & Supriyanto, 2018). Bankruptcy is associated with several conditions of the firms' operation, such as operating and financial leverage, sales sensitivity, and liquidity (Darrat et al., 2016).

Altman (1968) investigated a set of 22 financial and economic ratios in predicting bankruptcy and constructed a non-linear prediction model using five financial ratios. When the Z-score is greater than 2.99, it means the company is in the safe-zone, a company with z-scores between 1.81 and 2.99 falls into the "grey zone," and when the company's Z-score is below 1.81, it means the company is under financial distress (Altman, 1968; Altman et al., 2019). Altman et al. (2019) updated the Z-score model in 1995, and the new model has been successfully applied in U.S. firms and many other countries. Compared to the model developed in 1968, the new model drops off the factor that is sensitive to industrial sector differences and has a constant term (3.25). The Z-score Model of 1995 is:

$Z = 3.25 + 6.56X_1+3.26X_2+6.72X_3+1.05X_4$, where

X_1 = (Current assets – Current Liabilities) /Total Assets

X_2 = Retained Earnings /Total Assets

X_3 = Earning Before Interest and Taxes / Total Assets

X_4 = Book Value Equity /Total Liabilities (Altman et al., 2019).

Actors

Financial data from the 2018 and 2019 fiscal years' comparative financial statements of all 73 Industrial Sector firms in the S&P 500 were tested. Firms included in the S&P index are updated each year to include only large-capitalization U.S.-based corporations meeting criteria for market value, earnings, and liquidity (Siegel & Schwartz, 2006). S&P firms cover 80% of the total U.S. capitalization and represent an important subset of operating firms in the United States with financial data publicly available (Bocken et al., 2017; S&P Global, n.d.). S&P Index is one of the most widely used benchmarks representing the U.S. publicly traded firms (Baral & Pokharel, 2017).

Variables

The availability of the lease-related assets and liability reported on financial statements provides an opportunity to reconcile actual results with the assumptions in the ex-ante researches. The IV in this study is the implementation of Topic 842. Topic 842 implementation divides the actor firms into impacted and non-impacted categories. As a result, the IV in this study is a dichotomous categorical variable. DVs in this study are financial ratios calculated using data from the actor firms' financial statements of the 2018 and 2019 fiscal years. As shown in Table 1, this study tests sixteen different ratios related to four aspects of firms' financial profile (asset efficiency, profitability, financial leverage, and liquidity). In addition to these four aspects of the actor firms' operation, Altman's Z-score (a combined ratio) is also tested because of its predictive implication for firms' credit strength.

Relationships Between Theories, Actors, and Variables

The doctrine of "Substance over Form," constructive capitalization model, and principles-based accounting are the fundamental building blocks supporting the new lease accounting standards. Financial statements should report what is actually on the ground instead of hiding behind the technicalities of accounting standards (Kampanje, 2018). In the context of lease accounting, the capitalization of operating leases aligns with the substance-over-form approach (Tsunogaya et al., 2016). Imhoff's constructive capitalization model is a widely accepted approach in ex-ante studies to simulate the impacts of the new accounting lease standards (Sari et al., 2016). The implementation of Topic 842 starts with public firms beginning December 15, 2018 (FASB, 2016). As a result, public firms' annual financial data reflecting Topic 842 were available before other entities. The IV in this study divides the firms into impacted and non-impacted firms. DVs in this study (listed in Table 1) use data from the actor

firms' annual financial statements. Financial ratios analysis is the most popular and widely used method because of its simplicity, and the additional information derived from the analysis process can provide input into more complex mathematical models (Myšková & Hajek, 2017). Altman's Z-score is an MDA model combining multiple financial ratios to detect financial distress and signal necessary actions to avoid bankruptcy (Joshi, 2019).

Summary of the Theoretical Framework

The Substance over Form Doctrine, principles-based accounting standard-setting framework, and constructive capitalization model are the drivers behind the issuance of Topic 842. The direct implication of adopting the new lease accounting standards is the capitalized lease assets and corresponding liabilities to lessee firms. Additionally, Topic 842 also impacts EBIDT and interest expense. To summarize, the implementation of Topic 842 leads to changes in the overall financial performance metrics and, possibly, firms' creditworthiness evaluation. Reporting operating lease liabilities invites the external users of financial statements to take a peek into the utilization of operating lease at an aggregated level from the insiders' perspective and mitigates the information asymmetry between internal and external users of financial statements. Understanding the magnitude of the changes in financial indicators driven by the adoption of Topic 842 will shed light on the effectiveness of Topic 842 in terms of the quality and relevance of lease accounting standards.

Definition of Terms

The purpose of the statistical tests on the changes in financial ratios and Altman's Z-score in this study was to examine the materiality of impacts of Topic 842 on lessee firms' financial statements and performance indicators. Terms defined are in the realm of lease accounting, financial ratio analysis, and financial distress. Topic 842 replaced the classifications of leases in

SFAS No. 13 and redefines how to report operating leases following the ROU model (i.e., ROU asset and lease liability; (Maiona, 2017). Financial ratios tested in this study were grouped under the categories of asset efficiency, profitability, financial leverage, liquidity, and credit risk. This study extended the tests on the change of ratios to Altman's Z-scores because Altman's Z-score combines a mixture of multiple ratios measuring the firm's credit risk. Analyzing and breaking down information from the financial statements provides a vast amount of information about the firms. (Arkan, 2016). Being able to assess financial distress and estimate bankruptcy risk is vital to managers in funding decisions and strategizing the firm's financial performance (Bărbuță-Mișu & Madaleno, 2020).

Lessor and Lessee: Lessee and lessor refer to the two entities entering into a lease contract. Lessor provides, while the lessee obtains the right to use the underlying assets for a period of time in exchange for consideration (FASB, 2016).

Finance Lease and Sale-type Lease: According to paragraph 842-10-25-2 in Topic 842, the lease is considered a finance lease to the lessee and a sale-type lease to the lessor if it meets any of the five criteria specified at the inception of the lease contract (FASB, 2016). These five criteria are:

a. There is ownership transfer of the underlying asset at the end of the lease term.
b. The lease contract grants the lessee an option to purchase the underlying asset.
c. The lease term represents the majority of the underlying asset's economic life.
d. The present value of the future payments and the residual value guaranteed by the lessee combined equals or is substantially more than the fair value of the underlying asset.

e. Because of the specialized nature, the underlying asset is not expected to have an alternative use to the lessor when the lease term ends (FASB, 2016).

Operating Lease: From the lessee's perspective, any lease that is not a finance lease is an operating lease (FASB, 2016). Unlike finance leases, operating lease contracts do not involve transferring the risk and benefits to a significant extent (Pancheva, 2015). However, non-cancellable operating leases represent the firm's commitment to future cash payments, and a higher level of operating leases means higher cash flow sensitivity to lessee firms (Dogan, 2016).

Right-of-use Asset and Lease Liability: Topic 842 requires lessees to recognize all non-cancellable leases using ROU assets and the corresponding lease liability, meaning the same accounting treatment for both financing leases and operating leases (FASB, 2016). The ROU asset represents the lessees' right to use the underlying assets during the lease term, while the lease liability represents the liability to make future cash payments (FASB, 2016). The ROU asset and lease liabilities are measured using the present value of the future lease payments and any guaranteed residual value by the lessee (FASB, 2016).

Asset Efficiency: Asset efficiency is also called turnover ratios or asset utilization (Chandra, 2020). Financial ratios in this category are inventory turnover, account receivable turnover, average collection period, fixed asset turnover, and total asset turnover (Block et al., 2019; Chandra, 2020). Ratios measuring asset efficiency reflect the firms' ability to manage, control, and use their assets efficiently in generating revenues and profit (Arkan, 2016). This study focused on fixed asset turnover and total asset turnover because lease accounting standards do not directly affect inventory turnover and account receivable turnover ratios.

Profitability: Profitability, also known as performance ratios, reflects the firm's ability to generate an adequate return on sales, assets, and equity (Block et al., 2019). Profitability ratios

measure the return to the firm's capital and financial cushion in relation to each dollar of sales (Arkan, 2016). Ratios such as gross profit margin, net profit margin, return on assets (ROA), earnings before interest, taxes, depreciation and amortization (EBITDA) to equity, and EBITDA to asset all measure a firm's profitability include ratios (Block et al., 2019; Chandra, 2020). This study focused on net profit margin, ROA, ROE, EBITDA to equity, and EBITDA to asset ratios. Gross profit was not tested because lease accounting has no direct impact on a firm's gross profit.

Financial Leverage: Financial leverage reflects the level a firm uses debt finance (Chandra, 2020). Financial ratios measuring financial leverage reveal the percentage of capital financed by debt and focus on the firm's ability to satisfy its long-term obligations (Arkan, 2016). Ratios related to financial leverage indicate to what extent the increase of a firm's capital is due to the use of debt financing (Chandra, 2020). This study examined the debt-to-equity ratio, asset-to-equity ratio, debt ratio, and interest coverage because lease accounting directly impacts lessee firms' total assets and total debt.

Liquidity: Liquidity, or solvency, refers to the firm's ability to meet its short-term obligations (Chandra, 2020). The ability to pay off current or short-term liabilities indicates the firm's ability to maintain its long-term debt-paying ability (Arkan, 2016). Financial ratios measuring a firm's liquidity include current ratio, quick ratio, net working capital to total asset, and cash to total asset ratio (Block et al., 2019). The deterioration of liquidity restricts the firm's operation activities, thus negatively affect the firm's financial performance (Durrah et al., 2016).

Credit Risk due to Financial Distress and Bankruptcy: Financial distress is a condition when a company experiences an irreversible financial difficulty, leading to bankruptcy eventually (Dance & Imade, 2019). Financial distress happens before bankruptcy when firms

have funding issues in working capital and a decline in sales (Darmawan & Supriyanto, 2018). Bankruptcy is a serious problem and can be costly; thus, an early warning system to detect potential bankruptcy is a useful tool for both the management and the investors (Darmawan & Supriyanto, 2018). Altman's Z-score is the most popularly used bankruptcy and default prediction model to assess firms' credit risk (Altman, 2018b).

Assumptions, Limitations, Delimitations

Open discussion of assumptions, limitations, and delimitations of research improves the quality of the findings and interpretation of the evidence introduced in the study (Theofanidis & Fountouki, 2018). This causal-comparative research focused on the S&P Industrial Sector firms and tested on the data directly pulled from the sample firms' financial statements filed with SEC EDGAR. The sample size was limited to the number of firms listed in the S&P Industrial Sector. The natural division of groups (impacted and non-impacted groups) is based on the existence of right-of-use assets and lease liability accounts on the balance sheet.

Assumptions

Given the high public scrutiny S&P firms face, it is assumed that the firms' reported financial data fairly represent the underlying business activities (Ritala et al., 2018). The financial data of sampled firms in this research were from the firms' audited financial statements, and the assumption was the published financial statements were fairly presented. Financial accounting is a heavily regulated profession (Wagenhofer, 2015). Wagenhofer (2015) stated the audited financial statements are attested by independent accounting experts subject to auditing standards and under their peers and government institutions' scrutinization. This study focused on the industrial sector firms, assuming year-to-year financial ratios for firms in the same business sector are comparable. A fundamental attribute of accounting information is

comparability, which allows the financial statement users to understand the economic events better and evaluate the target firm relative to the peer firms (Chen et al., 2018). Many types of business research and economic analyses are based on the foundation of industry classification schemes (Phillips & Ormsby, 2016). Phillips and Ormsby (2016) asserted GICS is a market-oriented classification designed to track firms' performance and is widely used by investors and academics. The most common participant selection approach for the causal-comparative study is choosing participants from comparable groups (Schenker & Rumrill, 2004). Two groups in the tests met the criteria of the S&P Index and the characteristics of the same GICS sector. They are divided based on whether these firms are impacted by Topic 842. GICS structure is reviewed annually to ensure market activities are reflected accurately and changes in the global environment are captured (Phillips & Ormsby, 2016). The assumption is other factors affecting the firms' financial performance are affecting all the sampled firms uniformly.

Limitations

One of the limitations of this study is the small sample size. When the empirical research aims to make inferences about the population from a sample, the sample size needs to be adequate (Taherdoost, 2017). The sample size in this study is pre-determined by the number of firms in the S&P Industrial Sector. The S&P Industrial Sector has 73 firms and is the largest group of all 12 S&P sectors. On average, 47% of the S&P firms use operating leases. In the industrial sector, 45% of firms use operating leases and is closest to the overall S&P percentage. Real Estate, Consumer Discretionary, and Communication sectors are the top three heavy users of operating leases, with 74%, 69%, and 50%, respectively. The sizes of the impacted and non-impacted groups in the industrial sector are comparable (i.e., 38 vs. 32; 3 firms' comparable financial statements are not available due to merging activities). With the largest number of total

firms and the most comparable sizes for comparison, the industry sector was the best choice. All the sampled firms were from the same business sector, which means the discovery from this study may not apply to other industry sectors due to cross-sectional differences.

Limitations of analyzing financial ratios are the fairness of the accounting information, the limited power of making predictions, and the inability to give answers (Arkan, 2016). Analyzing the changes in financial ratios does not answer why there were changes in the metrics. The test results cannot rule out the possibility of other factors contributing to the change in financial ratios. In this study, normalized EBITDA, an alternative to EBITDA, is also used in testing to exclude possible financial data fluctuations due to non-recurring or irregular business activities. The causal-comparative study cannot conclude with certainty what effects the independent variable (Topic 842) has on the dependent variables (financial metrics), and the "researcher can only conclude the groups differ with respect to that variable" (Schenker & Rumrill, 2004, p. 118).

Delimitations

S&P 500 index contains the 500 largest publicly traded firms in the United States and is frequently used in studies on large-sized firms (Lin & Chang, 2015). Capitalization of all non-cancellable operating leases leads to a systematic increase of total assets and total liability on the lessees' balance sheet (Arimany-Serrat et al., 2015). Some financial data, such as total assets, total liabilities, and EBIDTA, were used in calculations of more than one financial ratio in this study, which means changes in the metrics using the same data from the financial statements may be inter-related. This study did not test the inter-relationship between the dependent variables. Instead, the tests measured the significance of each variable's change individually before and after implementing Topic 842.

Significance of the Study

The debate over accounting methods for corporate leasing activities has lasted for over 30 years (Spencer & Webb, 2015). The lease standard-setting project was highly controversial, and the complex standard-setting process attracted heated debates among stakeholders (Mellado & Parte, 2017). Academic research can provide valuable information to policymakers about accounting standards' possible effects (Trombetta et al., 2012). Empirical studies based on archival data can be used to inform ex-ante debates about accounting standards (Trombetta et al., 2012). This study used archival data to investigate the changes in financial indicators pre and post Topic 842.

The responses to the Exposure Drafts (ED) during the standard-setting process revealed that the greatest disagreement was with the concept of recognizing leases as assets and liabilities on the financial statements and the complexity of this approach (Hussey, 2018). Scholars do not all agree with the usefulness and cost-benefit of the additional information provided by reporting what is already disclosed about the operating leases. Credit rating agencies, such as Moody's and Bloomberg, rely on the ad-hoc six times or eight times multiple of operating lease rents to estimate the capitalized operating lease assets and liability (Rajgopal, 2020; Shaked & Orelowitz, 2017). Trifts and Porter (2017) stated although the increase of assets and liability might be dramatic after implementing Topic 842, the anticipated responses to the new information from the market will be insubstantial because financial analyzers are already projecting the capitalized assets and liabilities. Rajgopal (2020) stated the problem with the multiplier estimation method was the heuristics in the accounting and valuation practice. Now that the operating lease obligation is reported on financial statements, the accuracy of such heuristic practice can be put to the test.

Reduction of Gaps

The practice of estimating the capitalized operating lease is a straightforward procedure; however, the possibility of error in projections based on estimated inputs and the aggregated information provided in footnote disclosure is high (Spencer & Webb, 2015). Assessment of the lease capitalization's impacts after it takes effect can provide information to determine if the new lease accounting standards truly level the playing field (Comiran & Graham, 2016). Researchers using quantitative factors after the implementation can complete the whole picture of the lobbying behaviors during lease accounting standard-setting (Mellado & Parte, 2017). Understanding the economic consequences of Topic 842 to the lessee firms after its adoption has indicative meanings for possible changes in existing debt agreements, earning ratio targets, potential share price impact, and lease-versus-buy decision models (Wong & Joshi, 2015).

Implications for Biblical Integration

Knowledge of and obedience to God is the sole purpose of both academic endeavors and the Christian faith (Esqueda, 2014). The ultimate goal for Christian business practitioners and researchers is to conduct their profession in a manner that pleases God through examining their philosophical beliefs and growing in wisdom, knowledge, and understanding (Austin & Smith, 2005). In other words, businesses and business researches should be service-driven instead of profit or market-driven. The accounting profession's focus should move towards biblically-informed professionalism and service to society (White, 1999).

On the surface, the controversies over the lease accounting revolve around possible abuse of operating leases as off-balance-sheet financing and whether reporting what used to be in the footnote translates into higher relevance and understandability to financial statement users. The underlying issue of lease accounting standards is whether not violating quantitative rules is the

same as following the principle and acting in good faith. Lease accounting has been part of the debate over the principles-based versus rules-based accounting framework as a faithful representation of economic essence (Wells, 2011). Jesus deals with the issue of superficial obedience on many occasions. In the book of Matthew, Jesus denounces the Pharisees, the Jewish church preachers and leading members, as hypocrites because they follow the rules only superficially. "… for ye pay tithe of mint and anise and cummin, and have omitted the weightier matters of the law, judgment, mercy, and faith: these ought ye to have done, and not to leave the other undone" (Matthew 23:23, KJV).

The Bible says, "But the wisdom that is from above is first pure, then peaceable, gentle, and easy to be intreated, full of mercy and good fruits, without partiality, and without hypocrisy" (James, 3:17, KJV). Acknowledging God is the source of wisdom and working in the spirit of service are the core characteristics of Gospel-centered professionalism (Van Helden & Reichard, 2019). The ultimate goal of accounting standards is to serve the needs of users. The new lease accounting standard's effectiveness has yet to be tested by various financial information user groups and stakeholders.

Benefit to Business Practice and Relationship to Cognate

This study aimed to enhance the understanding of economic consequences related to the change in accounting standards through performing statistical tests on secondary data published on the internet by the nonbusiness governmental entity. The availability of secondary data in digital format contributed to the development of big data analysis and represents great potential and substantial value to business research (Hair et al., 2019). Two implications of capitalizing operating leases are the economic effects on the reported accounting numbers and subsequent firm behaviors (Kusano et al., 2016). Financial information users rely more on data from

financial statements to evaluate and forecast firms' profitability, cash flow, dividends payout, equity growth, and subsequent economic decisions (Arkan, 2016). Bond investors and credit rating agencies use financial ratios to assess firms' financial performance, and they differentiate disclosed versus reported lease obligations (Kusano, 2019). Analysis comparing the change in key financial indicators before and after adopting Topic 842 can provide evidence about lease accounting standards' relevance and usefulness.

Summary of the Significance of the Study

Religious orientation is a contributing factor to the accountants' professionalism (Dunn & Sainty, 2019). In antiquity, accounting belongs to the palace and temple scribes; thus, the notion that accounting is and should relate to spirituality is very old (Fischer, 2017). Spirituality in accounting means ethical decisions beyond mere avoidance of violating rules (Fischer, 2017). Because of the bright-line rules in SFAS No. 13, lease classifications and reporting have been a logical and popular case for researches on principles-based versus rules-based accounting standards (Braun et al., 2015).

Topic 842 eliminates the differences between financial reporting of operating leases and financing leases and puts an end to off-balance-sheet financing. This study attempted to examine whether Topic 842 makes a difference in reported financial data. The materiality of the changes before and after Topic 842 in financial indicators shed light on if firms were overusing operating leases to hide debt and whether the simulation or projection by analyzers and credit agencies was sufficient. In the end, stakeholders and financial data users will be the final judge of lease accounting standards' usefulness.

A Review of the Professional and Academic Literature

"The lease relations promote the restoration of fixed assets, allow firms to raise the level of extensive and intensive use of property, combine the manufacturers with the necessary means of production, improve the conditions for the development of entrepreneurship" (Lebedyk & Riashchenk, 2019, p. 95). How to distinguish the economic substance and legal form of lease contracts in financial reporting has always been the focus of lease accounting controversy (Wolk et al., 2017). The documentation of "lease" originates from the time of Aristotle (384/383 -332 BC), who referred to lease as "Wealth is not in possession of the property, but in the use of it," as cited by Lebedyk and Riashchenk (2019, p. 95). The presentation of lease activities on financial statements eventually is reflecting the concept that the right to use means "wealth" (asset).

The first element of the literature review presented a brief history of how lease accounting standards developed at different times in the U.S. accounting history and how these standards were used in business practices. The two most influential lease accounting standards used in businesses worldwide are Topic 842 and IFRS 16. These standards adopted the uniform capitalization of operating leases, except these two standards are different regarding the lease classifications (Winiarska, 2020). The second element in this part focused on the literature about the lease convergence project between FASB and IASB to address the omission of lease liability on the lessees' reported financial statements. The debates over the accounting treatment for lease reporting were based on two opposing theories (i.e., constructive capitalization or asset specificity). The third element covered literature relating the theories of constructive capitalization and asset specificity to lease accounting standards and lease financial reporting quality. This literature review also presented literature on how investors and managers utilize financial metrics in business decision-making and the possible impacts of the new lease

accounting standards on financial metrics. The ex-ante studies on Topic 842 were organized according to different industry sectors. This literature review ended with a discussion of ex-post studies.

Lease Accounting Standards in Business Practices

The accounting treatment of leased assets has always been a controversial topic. The history of lease accounting is a typical example of the game between standard setters and managers' financial engineering (FE) activities to boost financial reports (Dye et al., 2015). The controversy of lease accounting traces back to the first lease accounting standard in 1949 (Barone et al., 2014; Beckman & Jervis, 2009). Lease accounting standards in the United States include Accounting Research Bulletin (ARB) 38 issued in 1949, Accounting Principles Board (APB) Opinion No. 5 in 1964, SFAS No. 13 in 1979, and ASU 2016-02 (Topic 842) issued in 2016 (Morales-Díaz et al., 2019). Morales-Díaz et al. (2019) stated the main change of these lease accounting standards over the years is on the lessee's lease accounting model while the lessor's lease accounting model remains the same (Morales-Díaz et al., 2019). At different times, the focus of lease accounting standards has always been on the lessees' side of the financial reporting of transactions.

ARB No. 38. In the 1920s, when firms did not have enough funds to purchase fixed assets, they had two options: purchasing through issuing loans or a technique called "buy-build-sell-lease," (i.e., acquiring the use of the assets through a lease contract; (Morales-Díaz et al., 2019). In the case of purchase through issuing a loan, firms were required to recognize purchased assets and liability related to the loan; in the "buy-build-sell-lease" situation, only the rental expense is recorded (Morales-Díaz et al., 2019). It did not take long before the accounting standard setters realized the issue of overusing leases to lease contracts to avoid reporting

liabilities. According to John Myers (1962), the American Institute of Certified Public Accountants (AICPA) director, firms started using leases primarily as a financing device in the 1930s because the lessees were only required to report lease payments as rental expenses. The increasing use of long-term leases as off-balance-sheet financing devices by the 1950s raised concern in the business community and the accounting profession (Corcoran, 1968). To address the issue of lease financing, the AICPA's Committee on Accounting Procedure, the predecessor of Accounting Principles Board, issued Accounting Research Bulletin (ARB) No. 38 (Disclosure of Long-Term Leases in Financial Statements of Lessees) in 1949 (Corcoran, 1968). ARB No. 38 identified the problem of using leases as a financing method and required disclosure of annual rentals and important obligations in financial statements and notes (Dye et al., 2015; Myers, 1962).

ARB No. 38 took the principles-based approach and called for capitalizing future payments on the balance sheet with assets and liability accounts for leases intended to finance the purchase (Caster et al., 2018). ARB No. 38 recommended capitalizing lease contracts on lessees' balance sheet when the lease contracts obviously implied a purchase in substance; however, ARB No. 38 did not provide any details about the measurement of lease-related assets or liabilities (Wolk et al., 2017). Morales-Díaz et al. (2019) asserted that the "utility paradigm" influenced this pronouncement because it accepted two possibilities, capitalize as a finance lease or disclose the lease information in the footnotes for the sophisticated users of financial statements to calculate the off-balance-sheet liability. Academia had doubt about the effectiveness of ARB No. 38. Caster et al. (2018) stated the issuance of ARB No. 38 did not change the lessee's or lessor's behaviors, and ARB No. 38 later became Chapter 14 of ARB No.

43 (Restatement and Revision of Accounting Research Bulletins). The use of leases to finance long-term assets lasted for another six decades (Caster et al., 2018).

ARS No. 4. In 1962, AICPA published Accounting Research Study (ARS) No. 4 (Reporting of Lease in Financial Statements), written by John Myers (Dye et al., 2015). John Myers, Ph.D., CPA, was commissioned by AICPA to address the prevalent use of leases to finance long-term assets (off-balance-sheet financing) and the concern of how the lease commitments should be reported on financial statements (Corcoran, 1968). ARS No. 4 clarified the sale and leaseback (i.e., the buy-build-sell-lease technique), was a typical example of how lessees were using lease contracts to finance long-term assets and suggested considering leases that conveyed the right to use the property as an asset (Wong & Joshi, 2015). ARS No. 4 concluded lessees needed to provide more information, incorporate property rights and related liability on the balance sheet, and treat the rent expense as payment toward lease obligation (Myers, 1962). ARS No. 4 also backed up the proposal of recognizing lease liability from a legal perspective. According to ARS No. 4, the non-cancellability of the lease contracts constitutes legal property rights qualifying capitalization (Morales-Díaz et al., 2019). Even the concept of non-cancellable lease capitalization was proposed as early as 1962; it was not stipulated in accounting standards until the issuance of Topic 842 in 2016.

Opinion No. 5, No. 7, No. 10, No. 27, and No. 31. Pursuant to ARS No. 4, APB published Opinion No. 5 (Reporting of Leases in Financial Statements of Lessees) in 1964, Opinion No. 7 (Accounting for Leases in Financial Statements of Lessors) in 1966, Opinion No. 10 (Obminus Opinion) in 1966, Opinion No. 27 (Accounting for Lease Transactions by Manufacturer or Dealer Lessors) in 1972, and Opinion 31 (Disclosure of Lease Commitments by

Lessees) in 1973 (Wong & Joshi, 2015). These publications provided details to future lease accounting standards and paved the way to SFAS No. 13 to calculate assets and liabilities.

Opinion No. 5 modified lease capitalization criteria and required lessees to capitalize lease contracts with either renewal option for the asset's useful economic life or bargain purchase options (Wolk et al., 2017). These criteria were similar to the criteria used in SFAS No. 13 for finance leases (Morales-Díaz et al., 2019). Opinion No. 5 specified the use of the present value of future rental payments and future purchase options as the reported assets and liabilities for the leases previously not required on financial statements (Corcoran, 1968). Two reasons behind the issuance of Opinion No. 5 were the heavy use of long-term leases as an alternative for financed purchase and disagreement among accounting professionals concerning financial reporting approaches for long-term leases (Morales-Díaz et al., 2019). Opinion No. 7 and Opinion No. 27 were related to the lease accounting from the lessors' perspective, and Opinion No. 27 established criteria for lessors to report as either operating or finance leases (Morales-Díaz et al., 2019). Opinion No. 27 was the first accounting standard providing explicit criteria to classify a lease as either a purchase/sale in essence (Dye et al., 2015). Opinion No. 10 was an amendment to Opinion No. 5, requiring parent companies to consolidate sale-type leases from subsidiaries (Wolk et al., 2017). According to Opinion 5 and Opinion 10, the capitalization of finance-lease depends on whether the lessor is a subsidiary or an independent entity (Wolk et al., 2017).

Opinion No. 31 was issued in 1974 to address the omission of many leases that should have been capitalized (Wolk et al., 2017). Opinion No. 31 also stipulated lessee firms needed to disclose rentals at both discounted present value and undiscounted amounts (Wolk et al., 2017). The required disclosure included the basis used in calculating rental payments and terms of renewal or purchase options (Morales-Díaz et al., 2019). Opinion 31, together with Accounting

Series Releases (ASR) 132 and 147 issued by SEC, became the foundation of four independent sufficient qualifying criteria for lease capitalization by lessees in SFAS No. 13 (Dye et al., 2015).

SFAS No. 13 (Topic 840). FASB devoted almost half of its staff in its first seven to eight years of existence to lease accounting and issued SFAS No. 13 in 1976 (Monson, 2001). One primary motivation to improve lease accounting was firms' financial bankruptcies with significant OBS liabilities at the time (Morales-Díaz et al., 2019). SFAS No. 13 changed both the concepts and capitalization criteria of leases (Wolk et al., 2017). SFAS No. 13 required lessees to report all capital leases on the balance sheet as both assets and liability while leaving operating leases as a current operating expense (FASB, 1976b). SFAS No. 13 was intended to end the game between standard setter and financial statement preparers' FE behavior (Dye et al., 2015). For lessees, if a lease meets one of the four specified financing transaction criteria, it is a capital lease; otherwise, it is an operating lease (FASB, 1976b). For lessors, if a lease meets the same financing transaction criteria used for lessees' capital lease, it is a sale-type, direct financing, or leveraged lease; otherwise, the lease is an operating lease (FASB, 1976b). The criteria for capital leases are:

- The lease agreement specifies ownership transfer at the end of the lease term.
- The lease agreement provides a bargain purchase option.
- The non-cancellable lease term is 75% or more of the expected economic life of the leased assets.
- The present value of the minimum lease payment is 90% or more of the leased asset's fair value (FASB, 1976a).

Because SFAS No. 13 provided specific criteria to categorize leases into either capital lease or operating lease, it was later called the bright-line rule and criticized for inviting gaming

and contractual manipulations (Sliwoski, 2017; Weidner, 2017). Regardless of the specific criteria for lease classification, the volume of operating leases kept growing while the financing leases continued to decrease (Giner et al., 2019). The implementation of SFAS No. 13 made operating lease the most common type of financing source for long-term assets (Caster et al., 2018). Caster et al. (2018) further stated that even the disclosed information allowed credit rating agencies to capitalize operating leases in their adjustments; the practice was still not ideal for addressing material omission from financial statements. Full capitalization of operating leases reported on financial statements will provide more transparency and consistency (Pierre & Guillaume, 2017). Morales-Díaz et al. (2019) stated SFAS No. 13 is mainly based on the purchase model instead of the property use model and classified leases into financial leases and operating leases. Caster et al. (2018) asserted SFAS No. 13 was rules-based accounting standards, which could create a concerning situation of "missing assets" due to the lack of symmetry between the lessee and lessor's lease type classification. For example, when the lessee structures the lease contract to meet the requirements of an operating lease, the lessor can find some way to record the same contract as sale-type-lease; as a result, the asset is missing from both the lessee and lessor's financial statement (Caster et al., 2018).

Proposed Accounting Standard Update. FASB issued Proposed Accounting Standard Updated in 2010 to invite comments on the proposed ROU model for all leases in accounting (FASB, 2010). The response from the business was unprecedented. There were over 1,700 comment letters to this proposal, much more than usual (Giner & Pardo, 2018). Comiran and Graham (2016) examined 1,454 comment letters. They found that 48% and 31% were either against or strongly against the idea of capitalizing all non-cancellable leases, 19% were neutral, and only 1% was in favor (Comiran & Graham, 2016). The three most frequently claimed

complaints are high implementation costs, perceived increase in the cost of capital after implementation, and administrative burden on management to implement the new lease accounting standards (Comiran & Graham, 2016). Some firms viewed the capitalization of effectively all the leases as detrimental because the front-loaded interest and amortization would adversely affect these firms' income at the beginning of the lease terms (Maiona, 2017). The lobbying intensity is associated with firm characteristics such as profitability, size, age, and insider ownership, and the negatively impacted firms are the most active in lobbying activities (Comiran & Graham, 2016; Mellado & Parte, 2017). Mellado and Parte (2017) believed future examinations of the quantitative and qualitative factors in the lease accounting standards would complete the picture of firms' lobbying behavior.

ASU 2016-02 (Topic 842). Regardless of the open criticism of SFAS No. 13, the use of operating leases became an essential form of financing and attributed to the growth of many firms over the years (Trifts & Porter, 2017). By 2015, the SEC estimated about $1.25 trillion of non-cancellable future cash flow obligations were omitted from the balance sheet through the use of operating leases (Weidner, 2017). ASU 2016-02, also referred to as Topic 842 or accounting standards codification 842 (ASC 842), was issued in 2016. The intention was to increase transparency and comparability of lease accounting by reporting lease assets and liabilities on the balance sheet and disclosing lease arrangements (FASB, 2016). The new accounting standards are more principles-based rules, which consider financing leases the same as lessees are basically "financing" the leased assets, similar to capital leases in SFAS No. 13 (Freeman, 2018). According to Topic 842, lease reporting does not depend on quantitative criteria and is not restricted by the lease contract's legal form (Spencer & Webb, 2015). Topic 842 aims to eliminate the separation of operating leases from capital leases in the financial reporting and

remove the incentives to structure operating lease contracts and "hide" debt from the balance sheet (Fülbier et al., 2008).

The Association for Investment Management and Research (AIMR), the former Chartered Financial Analyst (CFA) Institute, suggested requiring lessees to capitalize all the leases in its December 1993 White Paper (McGregor, 1996). This suggestion originated from the concern of unrecorded lease obligations on the lessees' balance sheet (Churyk et al., 2015). In 1996, FASB joined the other G4+1 organizations and published a Special Report principally drafted by Warren McGregor (Monson, 2001). The G4+1 special report (Accounting for leases: A New Approach) advocated removing the differences between finance leases and operating leases (Hussey, 2018). McGregor (1996) and FASB proposed to extend the accounting treatment of financing leases to any lease commitment of one year or longer and require lessees to report the liability associated with such leases using the present value of the unavoidable cash payment obligations. Topic 842 is effective to public corporations and not-for-profit organizations for the fiscal year beginning December 15, 2018. The effective date for all other entities was to start from fiscal year beginning December 15, 2020 for all other entities (FASB, 2016).

Compared with SFAS No. 13, Topic 842 provides principles-based guidance instead of the all-or-nothing approach and requires firms to abolish the off-balance-sheet accounting for operating lease and move all operating leases to the balance sheet (Graham & Lin, 2018; Sliwoski, 2017). The core similarity between Topic 842 and SFAS No. 13 is the operating lease expenses can be recognized using the straight-line method over the lease term; the core difference is the capitalization of all non-cancellable leases as assets and liability (Casabona & Coville, 2018). Because of the disruption caused by COVID-19, businesses face challenges and uncertainties, such as an increase or decrease of leases due to disruption of operation and

impaired right-of-use triggered by COVID-19 (Azih, 2020). The implementation of Topic 842 is facing more challenges, and the effective date for nonpublic organizations has been moved to the fiscal year beginning December 15, 2021 (FASB, 2020). Azih (2020) asserted there would be important decisions in lease arrangements because of complications from ROU impairments due to COVID-19, such as the implication of remote workforce and difficulty making rent payments.

ASU 2019-01. In March 2019, FASB issued ASU 2019-01 (Topic 842 Codification Improvements) to increase shareholders' awareness of Topic 842 and expedite its implementation (FASB, 2019). Three issues addressed in ASU 2901-01 are fair value determination by lessors, cash flow presentation of sale-type and direct finance leases, and clarification on transition disclosures requirements for interim periods after adopting Topic 842 (Accounting Developments 2019, 2020). The first two issues mainly affect non-manufacturer lessors, dealers, and lessors who are depository and lending entities (FASB, 2019). The clarification on transition disclosure requirements excludes interim disclosure about the effect on income in the year of adopting Topic 842 and affects both lessors and lessees (Accounting Developments 2019, 2020).

Lessor Accounting in Topic 842. Much of the literature on lease accounting focuses on reporting changes for lessees; however, there could be significant changes for lessors (Munter, 2018). Munter (2018) stated lessors, like lessees, also need to analyze required changes to process the implementation. According to Topic 842, lessors classify leases into sales-type, direct financing, or operating (Munter, 2018). Unlike lessees, the lessors do not prefer operating leases because of the higher net income in the early years of the lease term (Sliwoski, 2017). Lessors can only apply leveraged leases to transactions commenced before the effective date of the new lease accounting standards (FASB, 2016). Leveraged lease transactions allow the lessor

to net the leased assets with the related financing lessors incur at the inception of the lease arrangement; thus, the lessor can avoid reporting liabilities on its financial statement (Munter, 2018). Topic 842 also re-defines initial direct costs. According to Topic 842, the initial direct costs only include incremental lease arrangement costs that would not have incurred if the lease transaction had not been arranged (FASB, 2016). The implication of this stipulation is cost, such as legal fees and other internally allocated costs, will be expensed under Topic 842 instead of being capitalized as in the prior standards (Munter, 2018).

The Accounting Profession's Response to Lease Accounting Problem

There have been numerous studies on lease accounting, especially recently. Google Scholar's academic database returned 10,400 documents containing keywords such as "lease," "accounting," "IASB," "FASB," and 351 were published between January to August 2019 (Sorrentino et al., 2020). Since the 1950s, the academic world has tended toward recognizing leasing related assets and liabilities on the lessees' balance sheet; however, the economic world does not share the same attitude because of the political and lobbying pressures (Sorrentino et al., 2020). With operating lease becoming a popular source of financing, IFRS reported estimated public companies held about $2.18 trillion off-balance sheet lease liabilities (IFRS, 2016). The opportunistic use of operating leases impaired the transparency of the underlying transactions (FASB, 2016). As the result of the joint project between FASB and IASB, Topic 842 went into effect to public firms starting December 15, 2018. There has not been enough time for the financial statement users to understand or evaluate the businesses' reactions to the new lease accounting policy, and that was the motivation of this study.

The review of lease accounting standards by FASB in the United States is concurrent with the study of lease-related accounting issues by the IASB. FASB and IASB are the two most

significant accounting standard-setting authorities (Banik, 2018). The new lease accounting standards movement started in 2002 when FASB and IASB reached the Norwalk Agreement (Toudas, 2018). The Norwalk Agreement represents FASB and IASB's commitments to make the existing IFRS and U.S. GAAP fully compatible and coordinate future programs to maintain compatibility (Banik, 2018). The lease accounting standards in U.S. GAAP and IFRS were substantially different, making lease accounting a top item on the convergence project agenda in 2006 (Hussey, 2018). The joint project is one of the moves the United States made in addition to the Sarbanes-Oxley Act of 2002 to increase the reliability, comparability, consistency, and transparency of financial data (Fajardo, 2016). The FASB and IASB convergence project aims to achieve full compatibility between financial reporting standards and maintain such compatibility through future programs (Ong, 2018). The intention of the lease accounting project was to develop a single approach to lease accounting and recognize all the assets and liabilities arising from lease contracts on the balance sheet (Hussey, 2018). The plan was to create rigorous, improved, and uniform accounting report standards to support investors' or creditors' decision-making (Fajardo, 2016). In 2008, SEC proposed "Roadmap for the Potential Use of Financial Statements Prepared in accordance with International Financial Standards by US Issuers," setting forth milestones for U.S. issuers to use IFRS by 2014 because SEC believed this move could benefit the public's interest and protect investors (Elam, 2020).

Principles-based IFRS vs. Rules-based GAAP. The initial debate of principles-based versus rules-based accounting circled the lessee firms' tendency to take advantage of the lease classification standards for financial reporting (Braun et al., 2015). It is widely believed that the IFRS is principles-based, while U.S. GAAP is a more rules-based accounting system because of the bright-line rules, scope restrictions, exceptions, and detailed implementation guidance (Braun

et al., 2015; Sundvik, 2019). The principles-based accounting standards focus on the fundamental understanding and conceptual basis of the transactions and economic events (Aqel, 2012). The conceptual framework of IFRS emphasizes financial statements provide "true and fair representation" of the reporting firms (Fajardo, 2016).

On the other hand, the rules-based accounting standards provide more detailed implementation guidance, greater comparability between firms' financial statements, and less chance of litigations for preparers (Aqel, 2012). During the implementation process, the principles-based accounting standards offer more room for interpretations and require increased managerial judgment and strong corporate governance to ensure compliance (Bjornsen, 2019). The rules-based accounting standards are more complex, open to a higher chance of gaming or FE behaviors, and more costly because of the rules' frequent updates (Aqel, 2012). Rules-based GAAP has been blamed for financial scandals such as Enron and WorldCom because it allows structuring transactions for firms to stay technically compliant while avoiding the actual intent (Braun et al., 2015; Sundvik, 2019). Following rules-based accounting standards could result in accounting practice that complies with the letters of the rules rather than the spirit (i.e., a business practice focusing on form over substance rather than substance over form; (Aqel, 2012).

SFAS No. 13 is a typical example of accounting standards with bright-rule characteristics (Sundvik, 2019). Empirical evidence showed that principles-based accounting standards result in higher financial reporting quality (Folsom et al., 2017). Braun et al. (2015) surveyed 61 senior auditors and managers from two Big 4 firms and one national firm and found most participants agreed eliminating rules in lease accounting standards would enhance the quality of financial information. Tsunogaya et al. (2016) examined the effects of principle-based accounting standards on the auditor's judgment and discovered auditors who supported principles-based

accounting standards tended to suggest capitalization of leases. Sundvik (2019) asserted principles-based accounting standards and reporting quality are positively associated, and firms following the principles-based standards are less likely to engage in earning management. Braun et al. (2015) argued that auditors following principles-based accounting standards are more likely to agree with managements' proposed accounting treatment than auditors following rules-based accounting standards. On the other hand, auditors following rules-based accounting standards are more confident about their judgments with the knowledge about SEC examination (Braun et al., 2015).

SFAS No. 13 and its concurrent International Accounting Standards (IAS) 17 stipulated criteria to distinguish finance leases and operating leases, except IAS 17 does not have the bright-line quantitative threshold (Collins et al., 2012). Firms subject to IAS 17 were more inclined to report leases as capital leases (Collins et al., 2012). Tsunogaya et al. (2016) asserted there is no positive relationship between auditors' judgment and detailed criteria used in making the judgment. They further suggested adopting principles instead of more stringent guidelines could be more effective in supporting auditors' judgment of lease transactions capitalization (Tsunogaya et al., 2016).

The Lease Convergence Project. Both SFAS No. 13 (Topic 840) and IAS 17 have been criticized since their inceptions for giving rise to the flexible use of long-term operating leases to achieve off-balance-sheet financing (Paik et al., 2015). The rules-based SFAS No.13 was criticized for classifying leases based on the bright-line rules (Weidner, 2017). Although IAS 17 was more principles-based and classifies leases according to the transaction substances instead of the legal form of the lease contracts, the fine lines between the financing lease and operating leases lead to very different accounting treatments for economically similar transactions (Giner

& Pardo, 2018). Studies indicated both the users and the preparers of financial information were concerned with the abusive use of the operating leases to achieve off-balance-sheet financing and believed the financial information based on the lease accounting standards was of limited value to users (Giner & Pardo, 2018; Hussey, 2018). The decades' long criticism of lease accounting standards promoted the joint lease accounting standards between FASB and IASB (Hussey, 2018; Sliwoski, 2017; Trifts & Porter, 2017). The triggering point is SEC estimated there was about $1.25 trillion off-balance-sheet lease-related liability by U.S. firms in 2005 (Forbes & Gupta, 2019). The lease accounting project became a high-priority item right after SEC found the magnitude of operating lease usage and required a change (Mellado & Parte, 2017). In 2006, FASB and IASB issued Roadmap to shift the convergent project strategy from converging two standards to developing new standards to replace prior standards (Ong, 2018). The goal of the lease convergence project was to develop a set of new accounting standards to replace SFAS 13 and IAS 17 (Stallings, 2017).

The convergence project is based on the belief that lease reporting should be based on principles and provide a fair presentation of the substance of the lease transactions (Bohušová, 2015). The new lease accounting standard-setting process took ten years (Giner & Pardo, 2018). Four models under consideration were the whole asset model, the executory contract model, the hybrid model, and the right-of-use model (Morales-Díaz et al., 2019). Both Topic 842 and IFRS 16 followed the right-of-use model. During this process, IASB and FASB jointly published a discussion paper (Leases: Preliminary Views) in 2009 and two exposure drafts (EDs) in 2010 and 2013, respectively (Giner & Pardo, 2018; Hussey, 2018). These EDs caused heated debates in international media, and the effective dates of the new accounting standards were delayed several times (Mellado & Parte, 2017).

In 2014, after five years of deliberation, FASB and IASB reached the fundamental agreement to require capitalization of operating leases of 12 months or longer, and two boards also announced their decision to approach lease reporting differently because of the disagreement on the classification of leases (Fajardo, 2016; Forbes & Gupta, 2019). The IASB suggested the capitalization of all leases because the distinction of finance lease and operating lease according to the then-current accounting standards was arbitrary and could be inaccurate, especially when lease assets and liabilities meet the definition of assets and liabilities defined in the conceptual framework (Tsunogaya et al., 2016). FASB believed the characteristics of operating leases were significantly different from finance leases in the context of risk and rewards of ownership analysis and adopted the two-leases model (Bosco, 2017). The deep-rooted causes of the failure to reach completely converged lease accounting standards ranged from principles-based versus rules-based accounting division to the concept of American exceptionalism (Ong, 2018). The lease accounting standards issued by IASB and FASB were not converged because IASB implemented the single approach to present all leases as financing leases through capitalization, while FASB decided to use the dual approach (i.e., capitalize all non-cancellable leases), but kept the distinctions between operating leases and finance leases (Beckman, 2016; Fajardo, 2016). In other words, FASB decided to capitalize most operating leases on the balance sheet but maintain the operating leases as is for income statement recognition purposes (Stallings, 2017).

Lease Classification: Topic 842 vs. IFRS 16. The IASB and FASB's joint lease project resulted in the issuance of Topic 842 by FASB to replace Topic 840 and IFRS 16 by IASB to replace IAS 17 (Morales-Díaz et al., 2019). FASB issued Topic 842 in February 2016, and IASB issued IFRS 16 in January 2016 (Hussey, 2018). Messina and Ak (2020) stated the impacts on the balance sheet financial metrics seemed to be converging between Topic 842 and IFRS 16,

while the income statement and cash flow statements are diverging. Ong (2018) and Beckman (2016) argued the publication of two sets of lease accounting standards means the convergence project failed. Topic 842 and IFRS 16 are very similar, except for the lessee's lease classifications (Bosco, 2017). Both Topic 842 and IFRS 16 adopted the ROU and liability model and primarily focus on the lessees' financial reporting and satisfy the purpose of recognizing lease-related assets and liability (Casabona & Coville, 2018). The ROU model is expected to provide a more faithful representation of assets and liabilities on the lessees' balance sheet, which means greater transparency of firms' capital employment and financial leverage (Levanti, 2019).

Bohušová (2015) asserted IFRS 16 and Topic 842 lead to an increase of assets and liabilities ranging from 2% to 14.6% among public firms worldwide, but these two lease accounting standards impact income differently. With the addition of ROU assets and liabilities, Topic 842 and IFRS 16 created some consistency; however, differences still remain with respect to the income statement and the statement of cash flows (Fafatas & Fischer, 2016). IFRS 16 adopts the single lease approach and requires lessees to use lease assets and liability to report all lease contracts, except for short-term and low-value asset leases (Levanti, 2019). Under the new standards, operating lease expense splits into depreciation and interest expenses, resulting in a higher total amount of interest expense at the beginning of the lease term, and if the firms have a material amount of operating leases, their EBIT and EBITDA will increase more significantly (Bohušová, 2015; Levanti, 2019). Topic 842's dual approach kept the classifications of leases and treat finance leases as assets purchased on an installment basis (Sliwoski, 2017).

The classifications of finance and operating leases in Topic 842 are conceptually similar to SFAS No. 13, except for the 75% and 90% quantitative threshold for the economic life and

present value calculation (Casabona & Coville, 2018). According to section 10-25-2 in Topic 842, a lease as a finance lease if any of the five criteria are met at the inception of the lease:

- The lease includes ownership transfer of the underlying assets to the lessee at the end of the lease term.
- The lease offers the lessee a purchase option to acquire the underlying asset, and the lessee is reasonably certain to exercise the option.
- The lease term represents the majority of the underlying asset's economic life unless the lease commences near the end of the asset's life.
- The sum of the present value of the future lease payments and the residual value equal or exceeds the fair value of the underlying assets.
- The specialized nature of the underlying asset negates alternative use to lessor at the end of the lease term. (FASB, 2016)

Ironically, 75% and 90% thresholds are re-introduced in Topic 842-10-55-2 to evaluate lease terms (Freeman, 2018). The classification between a finance lease and an operating lease in Topic 842 causes a radical difference in reported expenses (Berman, 2016). Beckman (2016) stated the difference in lease classification between IFRS 16 and Topic 842 leads to differences in the lease-related expenses on the income statement. The difference in lease classification between Topic 842 and IFRS 16 also has different effects on the statement of comprehensive income and the statement of cash flows (Ananthanarayanan & Harris, 2019). Under Topic 842, the operating cash flow will increase, and the financial cash flow will decrease (Quach & Tu, 2020).

Lease Reporting: Topic 842 vs. IFRS 16. Beckman (2016) stated the comparability across all international firms was not achieved because the IASB and FASB eventually adopted

divergent approaches. IFRS 16 recognizes lease assets and liability on the balance sheet and reports depreciation of leased assets and interest on lease liability on the income statement as if all long-term leases are owned by the lessees regardless of the lease classification for the majority of the lease contracts (Akbulut, 2016). According to Topic 842, finance leases and operating leases result in different ROU amortization and interest expense of lease liability (Beckman, 2016). Berman (2016) stated that the total operating lease expense on the income statement over the lease terms would be the same as under SFAS No. 13; however, the total expense for finance leases will have an accelerated profile. The difference is because the finance lease requires straight-line ROU assets amortization and periodic interest expense on the outstanding lease liability (Berman, 2016). Under Topic 842, the finance lease requires straight-line amortization, and the same amount would hit the income statement during the lease terms, while under IFRS 16, the ROU amortization is a plug (i.e., the difference between lease payment and interest expense based on the outstanding liability balance; (Maiona, 2017). Different lease transaction classification also results in differences of liabilities accounts on the balance sheet. Maiona (2017) further stated the lease liability under IFRS meant more debt and greater impairment to equity than under Topic 842 because IFRS classifies all the lease liabilities as "debt," when lease liability under Topic 842 is categorized in the group of long-term liability rather than "debt."

Morales-Díaz et al. (2019) pointed out one limitation of IFRS 16 is the asymmetry between lessee and lessor's accounting models. The same asset can be recognized both on the lessor's and lessee's balance sheet when the lease is treated as an operating lease by the lessor and capitalization as ROU assets in the lessee's financial statement in the meantime (Morales-Díaz et al., 2019). An overwhelming amount of real estate leases that were counted as operating

leases under the prior lease accounting standards will be classified as finance leases under IFRS 16 but as operating leases under Topic 842, meaning there is limited comparability between EBIT/ EBITDA for firms under IFRS versus firms under U.S. GAAP (Maiona, 2017). There is also asymmetry between Topic 842 and IFRS 16 in lease-related obligations (Bellandi, 2019). Bellandi (2019) sampled 53 airline companies worldwide and compared the impacts of Topic 842 versus IFRS 16 to the airline industry because of its complex linkage with maintenance and interaction with maintenance reserves. They concluded the new lease accounting policies led to an asymmetry between the original assets and the object of capitalized decommissioning costs and maintenance reserves (Bellandi, 2019).

Opposing Theories Behind Lease Accounting Standards

The concept of constructive capitalization and asset specificity are two opposing approaches to lease accounting. Constructive capitalization supports the on-balance-sheet reporting of lease obligations specified in Topic 842 and IFRS 16 (Sari et al., 2016). However, promoters of asset specificity believe lease reporting under SFAS 13 is representationally faithful to the underlying economics of leases (Graham & Lin, 2018). Both theories claim better financial reporting quality. This section provides a brief background of these opposing theories and related empirical studies on the effects of constructive capitalization and returns on investment based on the assets' level of specificity.

Constructive capitalization. Capitalizing leases on the lessees' balance sheet is taking the viewpoint of the "substance-over-from" approach (Tsunogaya et al., 2016). Imhoff first proposed constructive capitalization (Giner & Pardo, 2018; Kusano et al., 2016; Nuryani et al., 2015). Imhoff and Thomas (1988) stated, according to SFAS No. 13, most leases that effectively meant purchases of the assets were only disclosed in the footnotes. The adoption of SFAS No. 13

encouraged managers to restructure the lease contracts and avoid the capitalization required for capital leases and improve the firm's reported performance and financial ratios (Imhoff & Thomas, 1988). SFAS No. 13 left out material financial information from the financial statement because businesses used significantly more assets to generate revenues than reported on their balance sheet (Imhoff & Thomas, 1988). The constructive capitalization of operating leases covers the shortfalls of SFAS No. 13 and provides more economically relevant information for better prediction, comparison, and evaluation of firm performance (Imhoff & Thomas, 1988).

Imhoff et al. (1991) studied the effects of constructive capitalization on the balance sheet and concluded firms were more levered in reality than the debt to equity ratio indicated on their balance sheets. He emphasized the necessity to capitalize the material long-term operating leases before evaluating financial results (Imhoff et al., 1991). Imhoff et al. (1991) made the following assumptions in the suggested capitalization model:

- The book value of the leased asset equals the lease liability at the inception of the lease.
- The book value of the leased assets and liability is zero at the end of the lease.
- The leased asset is depreciated using the straight-line method.
- The lease liability and its related liability are calculated using the effective interest rate method.
- Lease payments are the same throughout the lease term.

Imhoff et al. (1997) stressed the importance of long-term operating lease commitments to firms' risk and performance measurements. They asserted the constructive capitalization of operating leases systematically affects both inputs to ROA (i.e., profitability increase and efficiency decreases; (Imhoff et al., 1997). Imhoff et al. (1997) further illustrated the effects of

constructive capitalization of operating leases on the income statement and suggested the appropriate interest rate should be the weighted average of the marginal interest rates in effect at the inception of the leases (Imhoff et al., 1997). They disagreed with either the S&P's typical 10% or the then-current GAAP guideline specifying either the lower of incremental borrowing rate or the lessor's explicit rate of return at the inception of the lease contract (Imhoff et al., 1997).

Fülbier et al. (2008) stated market participants treated disclosed and OBS liabilities differently and modified the constructive capitalization model to simulate the effects of general capitalization of all noncancellable leases. The modified constructive capitalization model included the following changes:

- The company-specific interest rate is used whenever possible. The discount rate ranges from 4.5% to 7.7%, which generates higher lease assets and liability.
- The minimum lease payments are separated into five contract baskets with different expected remaining lifetimes.
- Information from the financial statement disclosure is used to infer the remaining life of the lease contracts.
- A shorter lifetime is incorporated to avoid exaggerated equity effects. (Fülbier et al., 2008).

Both the original and the modified constructive capitalization methods showed material impacts on multiple firms' financial indicators with variations depending on the industry groups (Sari et al., 2016). As the use of operating leases increases, the effects of operating lease on the income statements are just as important and material as its effects on the balance sheet, especially when ratios such as ROA and ROE are used for business decisions (Imhoff et al.,

1997). Berman (2016) stated the historical cost principle of asset acquisition stipulated the inclusion of all the costs incurred to bring the assets ready for use, and interest cost should be capitalized because it is part of the costs to bring the asset to the desired condition of the intended use.

The new accounting lease standards focus on the fact that all lease obligations are, in essence, the same in terms of both requiring future payments to cover both interest and principal (Graham & Lin, 2018). Scholars have been using the constructive capitalization method to simulate the possible impacts of the new lease accounting standards. Maglio et al. (2018) applied the constructive capitalization method on public companies across different industries and concluded if operating leases were ignored, firms' performances are not comparable, and it would be unfair to non-leasing firms. Kusano (2020) asserted recognized leases are risk-relevant in explaining firms' equity risk, while the disclosed leases are not. The investors' information processing, such as the cost of processing information and limited attention, also affects the risk-relevance between recognized vs. disclosed leases (Kusano, 2020). Several recent academics started to provide evidence of new lease accounting standards' impacts on corporate earnings, capital structure changes, and financial ratios (Rey et al., 2020).

Asset Specificity. Williamson (1985) defined asset specificity as long-term investment undertaken to support particular transactions with a much lower opportunity cost than the best alternatives. There are four types of asset specificity: physical assets, human assets, site-specificity, and dedicated assets (Williamson, 1985). Graham and Lin (2018) extended the concept of asset specificity into lease accounting and asserted firms tend to purchase assets with greater specificity (crucial to the firms' core business) and only lease assets with low asset specificity (more generalizable and less idiosyncratic to the firms' core business). They stated the

return on capital of purchased assets was higher than the return on operating lease assets; thus, SFAS No. 13 is a more relevant lease accounting standard (Graham & Lin, 2018).

Other scholars provided supports to the theory of asset specificity. Kermani and Ma (2020) asserted that the concept of asset specificity aligns closely with firms' investment behavior. Leasing provides lessees access to physical assets without the exposure to asset obsolescence and residual value uncertainty (Chatfield et al., 2017). For startup and high-growth firms, asset specificity is an important consideration because leasing maintains flexibility and preserves cash (Cotei & Farhat, 2017). Leasing is an efficient and flexible way of financing an investment project because it eliminates the risk of obsolescence, releases funds for more profitable investment, provides tax relief and funding at lower costs (Pancheva, 2015). In the meantime, operating leases separate ownership and use, thus creating hedging opportunities (Devos & Li, 2020). The higher average level of asset specificity in non-financial U.S. firms is associated with the phenomena of less disinvestment, greater response to uncertainty in investment decisions, or investment irreversibility (Kermani & Ma, 2020). Other considerations, such as the value of the firms' owned assets, growth level, firm size, and managers' urge to take advantage of the operating lease accounting policy, also affect firms' decision to lease assets (Nuryani et al., 2015).

Asset specificity matters in lease renewal decisions; tenants would rather pay a premium instead of purchasing assets with low asset specificity to their businesses (Wong & Cheung, 2017). Graham and Lin (2018) attributed the high rate of leased assets to low asset specificity and the low rate of leased assets to high asset specificity. For example, retail, apparel, engineering, accounting, and management consulting firms have a high leased asset rate because of low asset specificity, while paper, petroleum refining, and metal industry manufacturers have

a low leased asset rate because of high asset specificity (Graham & Lin, 2018). As a result, Topic 842 offers more lease liability relevance but less relevance between lease assets and financial reporting than SFAS No. 13 (Graham & Lin, 2018).

Variables in the Study

The purpose of this study was to examine the variations in financial metrics and credit risk of Industrial Sector firms. The IV in this study was the new lease accounting standard (Topic 842). The DVs were financial ratios measuring firms' asset efficiency, profitability, financial leverage, and liquidity, as listed in Table 1. Altman's Z-score was also tested to detect firms' credit risk. Participants were the Industrial Sector firms in the S&P Index. S&P firms are under a high level of scrutiny in terms of business activities, and their financial information is readily available (Ritala et al., 2018). Financial ratios analysis is vital to both managers and investors because managers need to monitor financial ratios to identify potential threats, and investors use ratios to evaluate a firm (Horváthová & Mokrišová, 2018). Paik et al. (2015) stated lenders also consider financial ratios when designing debt covenants and typically use balance-sheet-based financial metrics to set the maximum amount of debt. Implementation of Topic 842 will make financial statements a complete source of information and remove the need for adjustments, meaning constructive capitalization of operating leases may imply changes to the debt contracts (Paik et al., 2015).

Financial Ratios. Capitalization of operating leases provides relevant financial information for decision-making because the financial statements not reporting operating leases are biased and generate misleading financial ratios (Nuryani et al., 2015). Firms are not required to restate the prior year's financial statements after adopting Topic 842, making the comparability of financial performance and metrics more challenging (Gorman et al., 2020). A

wide range of financial metrics will be affected because the adoption of topic 842 will add about $3 trillion of operating leases to the assets in aggregate, meaning a 10% increase to the U.S. investible market, and it is the largest in recent history (Messina & Ak, 2020).

Many different ratios can be calculated based on information from the financial statements; identifying these ratios could be challenging (Tenney & Kalenkoski, 2019). Multiple ratios were used in each of the four categories of financial metrics in this study. Because capitalization of all non-cancellable leases will increase firms' total assets (fixed assets) and total liabilities, two variables selected to measure the asset efficiency category are fixed asset turnover and total asset turnover.

Variables measuring the firms' profitability are ROA, ROE, net profit ratio, EBITDA to total equity ratio, and EBITDA to total asset ratio. ROA is net income divided by total assets, and ROE is net income divided by total equity. Morales-Díaz and Zamora-Ramírez (2018b) stated the numerator of ROA could be net income adjusted for interest expense because ROA represents a return on assets regardless of how the assets are financed. The denominator of ROA can be average assets or current year's total assets (Morales-Díaz & Zamora-Ramírez, 2018b). In this study, net income was not adjusted because EBITDA to total asset ratio and EBITDA to total equity ratio are also tested. Total asset was used instead of average total assets (i.e., the average of current and prior fiscal years' total assets). The adoption of Topic 842 permanently changed lessee firms' capital structure, and pre-Topic 842 total assets are not comparable to total assets post-Topic 842. Averaging total assets based on pre and post Topic 842 does not have predictive meaning and would bias the calculation.

Selected variables measuring the financial leverage were the asset-to-equity ratio, debt-to-equity ratio, debt-to-EBITDA, debt ratio, and interest coverage ratio. Debt-to-EBITDA ratio

and interest coverage ratio evaluate the relationship between cash flow generated and interest expense. Debt-to-EBITDA is considered a solvency measurement; it is considered to capture firms' ability to fulfill the future debt obligation (Verriest et al., 2018). EBITDA is a hybrid measurement combining earnings and cash flows and accurately reflects the operation results and abstracts how firms finance their assets (Bouwens et al., 2019). Another reason for using EBITDA-related ratios is EBITDA is a one-size-fits-all accounting measurement that reflects firms profitability, cash flow (because non-cash expenses are added back), and credit quality (D'Souza et al., 2010). EBITDA is a critical financial metric for firms in various industries because it represents the view of net income without considering interest, taxes, depreciation, amortization expenses, and ratios using EBITDA to evaluate the firms' performance from a different perspective (Maiona, 2017). Fixed Assets, Total Assets, Debt, and EBITDA are some of the key financial measures impacted by Topic 842, and ratios using these measures are included in this study. For most lessees, accounting treatments for capital lease or operating lease make very small or unobservable differences on the net income, the above-the-bottom-line performance measures such as operating income and EBITDA should be emphasized instead (Lipe, 2001).

In the category of liquidity measurement, current ratios, quick ratios, net working capital to total asset, and cash to total asset ratios were measured. The current ratio measures the firms' ability to pay short-term liability (Durrah et al., 2016). The quick ratio is a more strict measurement of firms' liquidity than the current ratio because it measures the most liquid asset to current liability (Block et al., 2019). Working capital is the current assets minus the current liability. The working capital to total assets ratio measures the liquidity based on working capital

to the total assets position (Darmawan & Supriyanto, 2018). Firms with growth opportunities and riskier cash flow exposure hold more cash (Maheshwari & Rao, 2017).

EBITDA vs. Normalized EBITDA (NEBITDA). EBITDA was used in four different ratios in this study. EBITDA is a commonly used performance measurement for firm valuation, debt contracting, and executive compensation (Rozenbaum, 2019). EBITDA is not required either in GAAP or IFRS; however, it is used intensively in practice and plays a prime role in debt covenants (Verriest et al., 2018). Morales-Díaz and Zamora-Ramírez (2018b) asserted EBITDA would increase after capitalization of operating leases because the used-to-be rent expenses will be split into interest and amortization of ROU. Compared to the standard EBITDA, NEBITDA, or adjusted EBITDA, attempts to eliminate non-recurring, irregular, and one-time items and makes it easier to compare multiple business units or firms within the same industry (Naidji, 2020). Variable using EBITDA and variables using NEBITDA were both tested in the four variables in this study to avoid the possible distortion by non-recurring items.

Altman's Z-score. Accounting ratios can reflect a firm's financial health; however, they can only give warnings when it is too late to take corrective actions, making it necessary to combine multiple ratios into a single measure to test the probability of distress and failure (Mohammed, 2016). Horváthová and Mokrišová (2018) asserted using a suitable combination of selected financial ratios to predict the risk of bankruptcy, and these financial ratios should represent all areas of the financial health of a firm. Predictive models based on real-life financial data, such as Altman's Z-score, are essential in financial performance analysis (Myšková & Hajek, 2017). The first Z-score model developed in 1968 by Altman to predict the failure prediction model was a prototype of many different models used worldwide by researchers, bankers, and credit-rating agencies (Altman et al., 2017). The original Z-score function is:

$Z = 0.12X_1+0.14X_2+0.33X_3+0.06X_4+0.999X_5$

X_1 = Working Capital/Total Assets

X_2 = Retained Earnings/Total Assets

X_3 = Earnings before interest and taxes/Total Assets

X_4 = Market Value Equity / Book Value of the Total Debt

X_5 = Sales / Total Assets (Altman, 1968)

This model is based on publicly held manufacturing firms with an asset and liability size of less than $25 million (Altman et al., 2019). In 1983, the second generation of the Z-score model ($Z = 0.717X_1 + 0.847X_2 + 3.107X_3 + 0.420X_4 + 0.998X_5$) was developed, and this model is applicable to more diverse industrial grouping, firms in emerging markets, and for private firms (Rahman et al., 2020). Altman et al. (2019) further modified the Z-score for all industrial, manufacturing, and non-manufacturers to be $Z = 3.25 + 6.56X_1+3.26X_2+6.72X_3+1.05X_4$ (Altman et al., 2019). The X_5 variable in the original equation is taken off because it is sensitive to industrial sectors, and a constant term (3.25) is added instead to standardize the results (Altman et al., 2019). Considerations built into this new model include capitalization of leases, firms' reserves for contingency mature, minority interest and other liabilities, captive finance companies and other non-consolidated subsidiaries, goodwill and intangibles, and capitalized research and development costs (Altman, 2013).

The most obvious application of the distress and bankruptcy prediction model is the lending function for corporate credit risk assessment (Altman, 2018a). The bankruptcy prediction approach evolved out of the 128 statistical and artificial intelligence models reviewed for bankruptcy prediction; Altman's Z-score is the first of the top five most popular models (Altman et al., 2017). A review of different models also showed that ratios related to profitability and

solvency are most relevant to bankruptcy prediction (Altman et al., 2017). Joubert et al. (2017) used Altman's Z-score to examine the potential distortion caused by increased total assets and total liabilities due to operating lease capitalization. They concluded the additional assets and liability led to a reduction of Altman's Z-score but did not cause any firm to go from one zone to the other zone (Joubert et al., 2017).

Ex-ante Studies on Topic 842

The lease accounting evolves from the ownership model to the ROU model, requiring capitalization of substantially all leases (Akbulut, 2016). According to Morales-Díaz et al. (2019), ex-ante research using the constructive capitalization model projected significant changes in leverage and profitability ratios, mostly in retail and transportation in hotel businesses under both Topic 842 and IFRS 16 rules. Akbulut (2016) provided a summary of 12 studies on the impacts of IFRS 16 papers between 2001 to 2015 and concluded the reporting operating lease on financial statements lead to a substantial deterioration of financial ratios such as ROA, ROE, Debt-to-Equity. Akbulut (2016) believed the termination of distinction between a finance lease and an operating lease provides more information about the lease liability in terms of timing and amount. Arimany-Serrat et al. (2015) performed an empirical study on the 25 hotels in European countries and were able to match the firms' lobbying behaviors with the negative effects on the firms' profitability and volatility. After factoring in the future lease payment debt, the increased debt position means less credit availability and a problem with debt covenants (Arimany-Serrat et al., 2015). McKinsey & Co. highlighted three industries that would experience the most significant change of total assets and total liabilities under U.S. GAAP and IFRS are retailing, food and staples retailing, and transportation, with an increase of 64%, 55%, and 40.3%, respectively (Gakhar et al., 2018). This section presents current literature on Topic 842's impacts

on different industries' financial metrics, Topic 842 and firms' credit risk, suggested implementation strategies, and social implications of Topic 842 adoption.

Across Industry Overview. The overall trending of firms' performance measures includes the increased financial leverage with decreased interest coverage, and the results vary significantly among different business sectors (Morales-Díaz & Zamora-Ramírez, 2018b). Lloyd (2016) stated business sectors, such as airlines, travel and leisure, and retailers, would be significantly impacted. Within the same business sector, firms using operating leases more extensively will be more affected (Lloyd, 2016). Morales-Díaz and Zamora-Ramírez (2018b) highlighted the most impacted business sectors are retail, hotels, and transportation (Morales-Díaz & Zamora-Ramírez, 2018b). Capitalization of operating leases improves EBIT and EBITDA; however, its subsequent influence on profitability ratios is not straightforward, and the debt ratio consistently worsened across all the firms (Czajor & Michalak, 2017; Morales-Díaz & Zamora-Ramírez, 2018b). Fafatas and Fischer (2016) studied 109 U.S. firms and concluded, in terms of EBIT/Total Assets ratio, the retail industry, including restaurants, had the most significant decrease, followed by the airlines. The ratio changes vary widely among firms depending on the firm's commitment to operating leases in relation to the total assets and profitability. Messina and Ak (2020) summarized retail, casual dining, fast food with multiple outlets, and airlines carry large amounts of leases. The projected increase in energy, pharmaceutical and biotechnology, semiconductors and equipment, food and beverage, and tobacco to be around five percent (Gakhar et al., 2018).

Airline Industry. The increasing volatility and changing business model of the airline industry resulted in shorter airport and airplane lease terms to meet the near-term needs only (Messina & Smith, 2016). Messina and Smith (2016) stated airlines were more concerned with

the bottom line than ever and used different options for connecting traffic. The purchase or lease decision is a trade-off between gain from flexibility of leases and the cost of lease premium (Bourjade et al., 2017). Bourjade et al. (2017) did an empirical study on 73 airlines worldwide and concluded the leasing activities have a non-monotonic and concave effect on the airline's profit margin. Leasing activities diminish the profit margin of low-cost carriers more significantly than full-service carriers (Bourjade et al., 2017). Based on SFAS No. 13, airlines were able to structure the lease as operating leases when lessors recorded the same lease as sales-type lease and book revenue as long as they can find a third party to guarantee the residual value of the underlying assets (Caster et al., 2018). When uncertainty is high, a combination of six years of operating lease with fifteen years of financial lease covers most of the twenty-five years of estimated life for aircraft yet offers more flexibility than a finance lease (Bourjade et al., 2017). Caster et al. (2018) examined five financial ratios of 10 U.S. airline companies. They indicated the adoption of Topic 842 would decrease the current ratio, asset turnover, return on assets, times interest earned, but increase debt ratio (i.e., Topic 842 negatively impacts the working capital, financial leverage, solvency; (Caster et al., 2018). Gorman et al. (2020) made a benchmark comparison among four U.S. airlines based on their 2018 year-end 10-K filings and concluded 2017 financial results comparison was fair and comparable, but not the 2018 results because American Airlines and Delta adopted Topic 842 early.

Healthcare. The heavy use of real estate and equipment created the capital-intensive nature of healthcare because healthcare facilities use various leases and finance arrangements (Berman, 2016; Chatfield et al., 2017). After adopting Topic 842, real estate leases will remain operating leases, and the equipment leases will almost be finance leases, meaning the balance sheet will grow considerably after adopting Topic 842 (Berman, 2016). The value of the

capitalized leases for the U.S. healthcare system will be $10 billion, and the debt to total asset ratio will increase from 29% to 34% (Berman, 2016). Berman (2016) suggested bondholders and rating agencies will need to make adjustments. The negative impacts on financial performances could have unintended consequences such as firms' access to financing, market position, and business strategy (Arimany-Serrat et al., 2015). The expected negative impacts on lessees' debt ratio and interest coverage ratio could translate into higher borrowing costs and more debt covenants violations (Chatfield et al., 2017). Firms are looking at re-writing loan covenants upon implementing Topic 842 (Churyk et al., 2015).

Retail Industry. Retail firms typically have fixed commitments to lease contracts for store locations, and most of the lease agreements are operating leases without transfer of ownership at the end of lease terms (Shaked & Orelowitz, 2017). Gorman et al. (2020) asserted three industries would have the most impacted ROU assets: retail, transportation business, and customer service. Fafatas and Fischer (2016) studied 50 U.S. public firms with the highest operating lease amounts and concluded most of the firms were in retail, technology, airline, and oil industry sectors. They estimated the total value of capitalized operating leases for the 10 retailers was $34 billion (Fafatas & Fischer, 2016). There are over 100 retailers on the New York stock exchange, and most of them lease the facilities; for example, the estimated ROU assets for the top three (i.e., Amazon, Walmart, and Chipotle) are $23,114 million, $17,329 million, and $2,479 million, respectively (Gorman et al., 2020). The shift toward treating most leases as finance leases will impact real estate transaction decisions, meaning firms are motivated to downsize real estate portfolios and adopt more flexible real estate solutions under the new lease accounting environment (Stillebroer & Jaspers, 2017). Chatfield et al. (2017) collected lease data for all U.S. retail and service industries and grouped the 1,424 firms into eating and drinking

places, hotels and motels, retail, and services according to Standard Industrial Classification (SIC) codes. They concluded the retailers and places for eating and drinking would have the highest average lease payments to total assets ratio and debt covenants violation rate (Chatfield et al., 2017). As a result, the borrowing rates for the lessee firms in these two sectors would be affected after Topic 842 (Chatfield et al., 2017).

Lease Accounting and Credit Risk. When making lending decisions, suppliers and banks are interested in knowing the firm's payment capacity for pricing and credit evaluation (Mohammed, 2016). Chatfield et al. (2017) stated that accounting information is useful to creditors (lenders and bankers) when making lending decisions, meaning the increase of total debt after adopting Topic 842 would translate into higher borrowing costs to lessee firms. The distinction between operating lease and capital lease is irrelevant when analyzing the debtor's fixed commitment (Shaked & Orelowitz, 2017). Shareholders and creditors need to understand such distinction only matters to accounting treatment and makes no difference to the firms' future obligation (Shaked & Orelowitz, 2017). The inflexibility of operating lease payments increases firms' operating leverage, indicating firms are more vulnerable to business cycle risk (Dogan, 2016). Non-cancellable operating leases represent firms' commitment to future cash payments, and firms with heavy use of operating leases have higher cash flow sensitivity (Dogan, 2016). Although operating lease payment is only one element of the firm's inflexible commitment, its inflexibility is much higher than other fixed costs (Dogan, 2016).

Some scholars believed Topic 842 would have no material impact on firms' credit rating or borrowing costs since the credit rating agencies already incorporated capitalized operating leases in their analysis (Chatfield et al., 2017). Park (2018) stated credit rating agencies might give firms similar ratings regardless of the lease activities; however, the loan agencies do

consider firms' lease activities and assess firms differently based on their use of operating leases. The literature demonstrates market participants, in some cases, do consider the scenario of operating lease capitalization (Morales-Díaz & Zamora-Ramírez, 2018b). According to Churyk et al. (2015), credit rating agencies use different modeling methods, although these models are limited in terms of accuracy. For example, S&P's models capture the debt equivalent of the operating lease contracts, Moody's models try to capture the economic value of the leased assets, and Fitch uses a hybrid of both models (Churyk et al., 2015). The accuracy of these models is doubtful. These models still underestimate debt related to operating leases (Kraft, 2015).

Fafatas and Fischer (2016) argued even though sophisticated analysts were able to factor in the operating lease information from the footnote disclosure, the consistency of the evaluation of firms' profitability and credit-risk ratios is doubtful because the capitalization process requires a sufficient amount of assumptions. The footnote-disclosed information used in adjusting for operating leases did not have the same level of accuracy and transparency as the actual reported information on the financial statements required in the new lease accounting standards (Forbes & Gupta, 2019). The sophisticated institutional investors were able to factor in the off-balance-sheet operating leases into their modeling; however, small investors and individuals might not consider the disclosed lease obligation when making decisions about the stock purchase or bond investment (Messina & Ak, 2020).

In terms of credit rating, low-grade firms are more exposed to debt ratio change (Czajor & Michalak, 2017). It is uncertain how the numbers disclosed in the footnote would compare to the actual entries on the financial statements because the analyst relied on a variety of assumptions when incorporating the numbers from the footnotes into the firm valuation when the precision of the assumptions was never validated (Forbes & Gupta, 2019). Firms with low credit

ratings are reluctant to disclose full information about the operating leases because low-grade firms are more exposed to the change of debt ratio (Czajor & Michalak, 2017). The unlisted firms are more likely to use operating leases as a means to significantly lower a firm's cost of debt (Park, 2018).

Forbes and Gupta (2019) reviewed the available literature on the magnitude of the capitalized operating leases and concluded the financial world probably was not prepared for the potential impacts of the new lease standards. Gorman et al. (2020) warned the investors, agencies, and managers to take particular caution when benchmarking the performance indicators, monitoring debt covenants, designing compensation package, and acquiring assets. Evidence supports that the lenders' demand for accounting rules could help avoid bankruptcy-related costs (Graden, 2018). The new lease accounting model will provide investors and credit rating agencies with more precise information for financial position assessment and debt obligation valuation and more accurate evaluation of risk undertaken by the firms (Hladika & Valenta, 2018).

Implementation. During the transition period of Topic 842, FASB published guidance stating retrospective treatment is optional because documentation and research into prior years' records were more intensive than expected (Forbes & Gupta, 2019). The subsequent updates of Topic 842 give firms relief from deciding if the existing or expired lease contracts should be included at the transition date, which saves firms the cost to review all the contracts (Singer et al., 2020). The full retrospective can be very difficult and costly to apply in firms with intensive use of various leases (Morales-Díaz & Zamora-Ramírez, 2018a). Stillebroer and Jaspers (2017) suggested firms follow the three stages of lease accounting implementations: preparation, implementation, and operation. They further stated the transition requires a mature project

approach, appropriate toolset, and stakeholders' engagement (Stillebroer & Jaspers, 2017). Another relief is the election to avoid breaking down consideration paid into the lease and non-lease components (Singer et al., 2020). Singer et al. (2020) stated the cost and complexity to evaluate thousands of existing contracts can be significant; thus, FASB allows prior years' financial data in the comparative financial statements to stay as-is instead of retroactively applying Topic 842. The suggested steps to implement Topic 842 include planning ahead, taking inventory, creating a governance backbone, making a plan for company-specific circumstances, using tools, and establishing a proper procedure (Singer et al., 2020).

Implementing the new lease accounting standards can be costly and time-consuming (Chatfield et al., 2017). Chambers and Dooley (2015) asserted the lack of complete and usable information about operation lease would cause a significant problem in implementing Topic 842. Companies with heavy use of operating leases may not even have access to all the lease information because companies did not need to centralize operating lease information (Chambers & Dooley, 2015). The critical implementation step is to set up a system or procedure to extract, gather, and validate operating lease information such as lease term, lease payment, and discount rate (Chatfield et al., 2017). To avoid debt covenant violation, firms should evaluate anticipated impacts after adopting Topic 842 and prepare for applicable changes by re-calculating data needed to remain debt-covenant compliant (Churyk et al., 2015). Firms at the edge of breaching debt covenants are more likely to use operating leases as a financing method (Giner et al., 2019). During the transition period of the new lease accounting standards, corporate lawyers and accountants could also have restructured the lease contract to modify a longer-term lease into a series of short-term (less than 12 months) leases to avoid reporting the leases as assets or liability (Forbes & Gupta, 2019).

The challenge for multinational organizations is to assess differences between financial statements prepared under IFRS and U.S. GAAP in subsidiaries (Vollmer, 2017). U.S.-based firms with international operations may end up adopting both Topic 842 and IFRS 16 and need to set up a detailed plan to implement both correctly (Chatfield et al., 2017). Giner et al. (2019) simulated the impacts of IFRS 16 and sampled 74 largest firms in the Europe 100 index and discovered the strategy of reducing the lease terms to 5 years would minimize the impact of operating lease capitalization. Although the efficient market theory suggests there will not be any substantial market reaction after adopting Topic 842, there is always the possibility of fluctuations in the firm valuation as the firms settle to the new "normal" benchmarks (Forbes & Gupta, 2019).

Social Implications of Topic 842 in the US. Gorman et al. (2020) stated it is necessary to distinguish the immediate, medium, and long-term utilization of operating leases versus finance leases when understanding the impacts of Topic 842 on financial statements and ratios. Churyk et al. (2015) stated in the best scenario; the new lease standards could destroy about 190,000 U.S. jobs, reduce U.S. gross domestic product (GDP) by $27.5 billion each year, reduce household earnings by $7.8 billion per year. In the worst case, household earnings could decrease by $135.2 billion per year (Churyk et al., 2015). The consequences of Topic 842 depend on the contractual role of accounting, which could lead to changes in how firms act and contract (Arimany-Serrat et al., 2015). One possible change could be lessors will need to charge a higher price to compensate for the higher risk of short-term leases (Freeman, 2017).

Ex-post Studies on Topic 842

A handful of firms adopted Topic 842 early, and one-fourth of firms released interim financial statements after the first quarter of 2019 (Binfare et al., 2020). Binfare et al. (2020)

investigated a sample of 3,550 firms across industry groups and discovered 20% of firms used a higher discount rate than expected. The mean discount rate used in computing the present value of the lease obligation is 5.66% per annum, ranging from 0.33% to 14.45% per annum, the mean of the lease term is 8.24 years, ranging from one year to 53 years (Binfare et al., 2020). Attributes at the firm-level, such as age, size, and profitability, affect the choice of discount rate; in the meantime, industry-level characteristics have a more significant influence on decisions such as lease intensity, average remaining life, and lease renewal or extension choices (Binfare et al., 2020).

Based on 159,533 firm-year observations on U.S. firms from 1980 to 2014, Cook et al. (2021) concluded that firms' future cash flow volatility promotes lessee firms to hold more cash to cover operating lease obligations. The temporal higher cash holding position co-exists with firms' anticipation of the imminent increase in the cost of capital and future operating lease obligation (Cook et al., 2021). Cash reserves are critical to firms with refinancing risks, which are interdependent on firms' financial policy decisions (Harford et al., 2014). Operating lease obligation significantly influences U.S. firms' cash holding decisions and forms a temporal trend in corporate cash holdings (Cook et al., 2021).

Yoon (2020) studies the S&P 100 firms' first-quarter SEC filings after the Topic 842 adoption and found a noticeable decrease in the operating lease. During the same period, there was a significant increase in capital expenditure; both were driven by the firms that benefited most from the off-balance-sheet treatment of operating leases (Nissim, 2019). Yoon (2020) asserted the firms impacted by Topic 842 showed a significant increase in investment post Topic 842. Milian and Lee (2020) investigated the relationship between equity valuation and operating lease based on 2019 first-quarter earnings and public firms' daily stock returns. They asserted the

initial recognition of a significant amount of operating leases led to negative returns (Milian & Lee, 2020). Contrary to the belief in market efficiency, the evidence demonstrated equity investors did react to the changes on the firms' balance sheets (Milian & Lee, 2020). They further asserted Topic 842 is an improvement of accounting standards because financial statements post Topic 842 better reflect the economic essence and enable investors to take the amounts on financial statements at face value (Milian & Lee, 2020).

Summary of Literature Review

"Lease" means a form of economic relationship based on contracts but represents part of the ownership (i.e., the right of use and disposal; (Lebedyk & Riashchenk, 2019). With the increasing use of leases as a means to finance long-term assets, the definition of a lease in the business context has expanded beyond the traditional concept associated with "rent." The history of lease accounting standards demonstrated financial reporting related to leasing activities also experienced the path of expansion from rent expense, rent expense with disclosure, and the right-of-use capitalization with disclosure. Although the FASB and IASB's lease accounting convergence project did not result in identical lease accounting standards, Topic 842 still represents a significant advance in the comparability and transparency of financial information (Messina & Ak, 2020). Regardless of the differences in lease classifications between the U.S. GAAP and IFRS, the financial reporting of operating leases in both accounting systems follow the same underlying capitalization framework. Ex-ante research on Topic 842 provided indications of potential impacts on lessee firms' financial indicators and business risk. With Topic 842 adoption rolls out from public firms to all other entities, the influence of the new lease accounting on lease decisions, firm valuation, cost of capital, corporate governance, and management team accountability will take full effect.

Summary of Section 1 and Transition

Features of quality financial information include characteristics such as relevance, comparability, faithful representation, and understandability (Aifuwa & Embele, 2019). Implementing the new lease accounting standards across different types of entities at various stages will unveil the usefulness of Topic 842 and its contribution to the quality of financial reporting. The evolution of lease accounting standards is the history of moving toward the faithful representation of economic substance. Topic 842 is expected to close loops for speculative financial engineering activities by the management, and its impacts have yet to show. The full effects of Topic 842 on firms' investment decisions, lease-or-purchase decisions, and firms' overall cost of capital are currently unknown. The following section includes detailed discussions on the researcher's role, data collection, data analysis, quantitative reliability, and validity of this research project.

Section 2: The Project

This empirical study investigated the cause and effect relationship between Topic 842 and the significance of changes in lessee firms' financial performance metrics and credit risk. The lobbying activity during the lease standard-setting process was overwhelming (Comiran, 2014). There is a gap in the literature on the implications of adopting Topic 842 based on annual reported financial data analysis. This study was intended to provide empirical evidence to validate ex-ante studies and offer analysis based on factual data to investigate the relevance of the new lease accounting standards.

The Project section re-introduces the purpose statement of the study, highlights the researcher's role, and provides the rationale behind the research methodology based on the researcher's paradigm and nature of the data in this study. Other topics included in this section to explain the process of this project are a description of population and participants, discussion of sampling method, deliberation on data collection and organization, articulation of data analysis procedure, and overview of reliability and validity of the research.

Purpose Statement

The purpose of this quantitative study was to add to the body of the accounting knowledge by examining the relationship between Topic 842 and changes of lessees' key financial performance metrics (as shown in Table 1) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the U.S. industrial firms. FASB was requested by the SEC to start working on updating lease accounting standards in 2005 (Weidner, 2017). During the standard-setting period, there was a substantial number of responses from firms across the industries, especially from the lessee firms, who would be directly affected (Mellado & Parte, 2017). Firms lobbied against the proposed updates because of the perceived high cost of

implementation, possible increase in capital cost, and increased workload for management (Comiran, 2014). Not all scholars agree with the capitalization approach of Topic 842 either. Graham and Lin (2018) stated the separation of capital lease and operating lease in SFAS No. 13 better represents the nature of the asset categories. Instead, Topic 842 adversely affects the relevance of accounting for lease assets (Graham & Lin, 2018). This study intends to enhance the understanding of the new lease standard's implications through measuring and comparing the changes in the financial performance metrics between the impacted and the non-impacted lessee firms in the U.S. Industrial Sector.

Role of the Researcher

The purpose of accounting research was to reconcile accounting theory with practices and advance the accounting discipline (Hartmann, 2017). In an empirical study, the researcher collects, analyzes, and interprets data or facts to explain natural phenomena (Olalere, 2011). Good quantitative research is not only about statistics but involves qualities in problem, design, evidence, and procedure (O'Dwyer & Bernauer, 2013). This research examined the impacts of the new lease accounting policy on lessee firms' financial metrics. It was designed to provide evidence to enhance understanding of the implications of the new lease accounting rules. The role of the researcher in quantitative research includes formulating a research problem and research question, clearly stating objectives, developing hypotheses, performing an extensive review of concepts and theories/literature, preparing a research design, determining samples, collecting, organizing data, analyzing data, testing hypotheses, interpreting, discussing findings, and concluding or making recommendations (Tukur, 2016). This study utilized the causal-comparative method to investigate financial metrics' changes before and after Topic 842. Another name for the causal-comparative method is the ex-post-facto method (Lenell &

Boissoneau, 1996). In an ex-post-facto design study, the researcher investigates the extent to which a specific independent variable may affect the dependent variable (Leedy et al., 2019). In other words, the researcher identifies the event that has occurred and collects data to investigate the possible relationship between the factors and subsequent behaviors and characteristics by observing the differing circumstances for two or more groups (Leedy et al., 2019).

Analyzing Topic 842's impacts on the financial metrics can provide insights into the extent to which the new lease accounting standards affected the lessees' financial profile. The research results could have indicative meanings for management and investment decision in the era of capitalized operating leases. The significance testing plays an essential role in advancing accounting knowledge (Kim et al., 2018). This research measured the significance of the changes in DVs (financial ratios and Altman's Z-score) before and after Topic 842 on both impacted and non-impacted firms. One characteristic of a causal-comparative study is it is not experimentally manipulated (Schenker & Rumrill, 2004). The grouping of participants was based on whether the lessee firms had operating leases. The researcher could not influence if or how much the independent variable affects the dependent variables and could only reply on after-the-fact archival data. The researcher used IBM Statistical Package for Social Science (SPSS) to perform statistical tests on the collected data, analyze testing results, conclude, and interpret the implications.

This empirical research aims to add to the understanding of the consequences of the lease accounting policy. The data set is from an archival data source. Participants in this study were grouped naturally by their use of operating leases in businesses, which makes Topic 842 the independent variable of this study. The researcher's primary responsibilities included deciding on samples, collecting financial data from the archival database, building a database as SPSS

input, checking database integrity, performing statistical tests, interpreting the test results, and making conclusions.

Research Methodology

The research paradigm bridges the goals of the study with the chosen research method of achieving such goals (Houghton et al., 2012). The dominant methodology in a discipline lies in the nature of the assumptions and the linkage between observations and theoretical terms (Ryan et al., 2002a). Quantitative studies in accounting research place a premium on financial data and uses statistical techniques to analyze what is believed to be objective data (Olalere, 2011). They also use a theoretical lens is to determine which variables should be isolated, measured and which variables should be excluded or ignored (Easterbrook et al., 2008). This project attempted to measure the significance of the impacts lease accounting standards' had on financial performance metrics, making statistical testing on financial data a top choice.

Discussion of Fixed Design

Quantitative researchers use numerical data and statistical analysis to understand and describe a phenomenon, behavior, or issue (Burkholder et al., 2019). The fundamental divergence between fixed and flexible design lies in the logic of justification, and each researcher should decide on the research paradigm and adhere to his or her worldview (Antwi & Hamza, 2015). The positivists assume reality is objective and quantifiable (Antwi & Hamza, 2015). Burkholder et al. (2019) stated quantitative method fits the situation when the researcher plans to make standardized and systematic comparisons to prove correlational or causal relationships between variables. They further clarified the relationships between fixed-design research variables could be correlational or causal (Burkholder et al., 2019).

Empirical research means the research is based on direct or indirect observation, and it is one way of avoiding misleading results and flawed interpretation (Patten & Newhart, 2017). Statistical testing was introduced to accounting research in the 1960s and had been evolving ever since (Dyckman & Zeff, 2015). Dyckman and Zeff (2015) examined a broad sample of research and concluded mathematical modeling and statistical testing played more essential roles in accounting research. They further stated statistical testing needs to penetrate deeper into accounting research (Dyckman & Zeff, 2015). Measuring the changes of financial metrics provides quantifiable supports to the magnitude of impacts of Topic 842 on lessees' reported financial information. Performing statistical tests on each hypothesis about the changes pre and post of Topic 842 directly generates answers to the research question in this study.

Discussion of Causal-Comparative Method

Two major types of quantitative research methods are experimental and non-experimental (Patten & Newhart, 2017). The purpose of the causal-comparative (i.e., the ex-post-factor research method) is to explore how and why a particular phenomenon occurs (Lenell & Boissoneau, 1996). It is impossible and impractical to answer a causal question through experimenting; a researcher must settle with information based on non-experimental studies (Patten & Newhart, 2017). Quantitative ex-post facto research involves investigating existing circumstances like correlation research; it also clearly identifies independent and dependent variables like the experimental study (Leedy et al., 2019). The most an ex-post-facto study can conclude is whether certain variables tend to associate with certain pre-existing conditions; however, it cannot definitely show the independent variable was the cause of the condition in the dependent variable (Leedy et al., 2019; Lenell & Boissoneau, 1996).

The DVs in this study were financial performance metrics computed with data from financial statements. Before implementing Topic 842, reported financial data did not distinguish firms using operating leases from firms not using operating leases. After Topic 842 went into effect, the firms not using operating leases (non-impacted firms) don't have to make accounting treatment changes. In contrast, firms using operating leases (impacted firms) have to adopt a new set of rules on operating leases. Because firms are not required to restate the prior year's financial statements, comparative financial statements make the causal-comparative method the best fit for the purpose of comparing how the year-over-year financial data changed before and after implementing the new lease accounting standards.

The other type of quantitative research method is experimental, where researchers design experiments to give participants treatments and observe their behaviors (Patten & Newhart, 2017). Patten and Newhart (2017) summarized three types of experimental method designs: pretest-posttest randomized control group design, posttest-only randomized control group design, and Solomon randomized four-group design combining the first two designs. The grouping of the firms in this study was based on the existence of operating lease transactions. The researcher had no means to randomly group the participants or manipulate the "treatment" (Topic 842) on the participants (i.e., the experimental method was not an option for this study).

Summary of Research Methodology

Both the academics and the accounting policymakers benefit from evidence-based reasoning (Singleton-Green, 2010). This empirical study attempted to measure the significance of the changes in the dependent variables immediately before and after the occurrence of the independent variables. S&P Industrial Sector firms' financial data of pre and post the adoption of Topic 842 were used as input to calculate the selected dependent variables. The research purpose

and data types of the dependent and independent variables determine the causal-comparative research method best suited to the goal of this study.

Participants

This study's dataset comprised financial performance metrics calculated based on 70 S&P Industrial Sector firms' 2018 and 2019 financial reporting. Out of the total 73 firms in the S&P industrial sector, three firms were excluded. Two of them were added to S&P in March 2020, the other company went through merging activity between 2018 and 2019. None of these three had comparable financial data between 2018 and 2019 and was excluded. Thirty-eight of the 70 firms are in the non-impacted group because they do not have operating lease transactions. The impacted group includes 32 firms who had to report their operating leases under Topic 842 in 2019 fiscal financial statements. One firm in the impacted group was an early adopter, and its 2017 and 2018 financial statements were used instead. Table 2 shows how the impacted and non-impacted firms are further divided into GICS sub-industry sectors.

Table 2

Impacted and Non-impacted Industrial Sector Firms based on GICS Sub-Industry

GICS Sub-Industry	Non-impacted	Impacted	Excluded	Grand Total
Aerospace & Defense	7	3	1*	11
Agricultural & Farm Machinery	1			1
Air Freight & Logistics		4		4
Airlines	2	3		5
Building Products	3	4	1**	8
Construction & Engineering	1	1		2
Construction Machinery & Heavy Trucks	3			3
Diversified Support Services		2		2
Electrical Components & Equipment	2	2		4
Environmental & Facilities Services	2	1		3
Human Resource & Employment Services		1		1
Industrial Conglomerates	2	2		4
Industrial Machinery	10	4	1***	14
Railroads	1	3		4
Research & Consulting Services	2	2		4
Trading Companies & Distributors		1		1
Trucking	2			2
Grand Total	**38**	**32**	**3**	**73**

1* The company merged with another organization between 2018 and 2019, the prior year is not available.
1** and 1*** Only one year's filing available on SEC EDGAR.

Population and Sampling

A population can refer to the number of people or the total quantity of units or cases subject to research (Etikan et al., 2016). To collect data, test, or examine the whole population is practically infeasible; even if possible, it could be prohibitive in terms of time, cost, and resources (Sekaran & Bougie, 2016). Technically, the total population of this project could be all the public firms in the United States. S&P 500 indices serve as the sample frame for this study, and the researcher sampled all the firms in S&P Industrial Sector.

Discussion of Population

Sekaran and Bougie (2016) stated population is "the entire group of people, events, or things of interest the researcher wishes to investigate" (Sekaran & Bougie, 2016, p. 236). Public firms were first required to implement Topic 842. The effective dates for not-for-profit organizations and all other entities are the fiscal year beginning December 15, 2019, and December 15, 2022. The population in this study for annual financial data analysis is limited to all the U.S. public firms. According to The Global Economic, an organization serving researchers, businesses, academics, and investors, 4,397 firms were listed on the U.S. Stock Exchange in 2018. The historically smallest number of listed firms was 4,102 in 2012, and the maximum was 8,090 in 1996 (TheGlobalEconomy.com, 2019).

Discussion of Sampling

Burkholder et al. (2019) stated two distinguishing features of quantitative research are variables and sampling selection. They defined sampling as the process of selecting participants for the analysis (Burkholder et al., 2019). The sampling process aims to select items from the population so that the samples' characteristics can be generalized (Sekaran & Bougie, 2016). Sekaran and Bougie (2016) stated the sampling process involves decisions on sample design

choices and sample size. Two strategies of sampling are probability sampling (random sampling) and non-probability sampling (non-random sampling; (Burkholder et al., 2019). The choice of a specific sampling procedure depends on the purpose of the study and the population's parameters under investigation (Leedy et al., 2019).

Three types of non-probability sampling are convenience sampling, quota sampling, and purposive sampling (Leedy et al., 2019). Another name for purposive sampling is judgment sampling, meaning the researcher deliberately chooses particular participants due to the qualities these participants possess (Etikan et al., 2016). This study employed the purposive sampling method and sampled all firms in the S&P 500 Industrial Sector. The purposive sampling method is a strategic sampling approach based on the premise to seek the best data so that the research findings are a direct result of the sampled cases (Morse, 2010; Patton, 2015). When the researcher does not intend to generalize the findings to the whole research population, non-probability sampling can be a suitable approach (Burkholder et al., 2019). Although probability sampling (random sampling) is the preferred sampling method in a quantitative study, there are occasions when purposeful sampling is the preferred approach (Leavy, 2017).

A sample frame represents all the elements where the sample is drawn (Sekaran & Bougie, 2016). McNabb (2014) defined a sample frame as "the source or a list of sample units from which the sample is drawn" (McNabb, 2014, p. 81). In this study, the sample frame is the list of firms included in the S&P 500 indices for 2018 and 2019. Only the firms in the Industrial Sector in S&P were sampled. There are about 500 firms divided into 11 business sectors in the S&P indices. The S&P indices are the single best gauge of large U.S. firms and represent approximately 80% of the U.S. capital market (*S&P 500*, n. d.). The purpose of industry classification in accounting research is to control cross-sectional effects and correlation of

abnormal stock returns by focusing on specific industry practices (Krishnan & Press, 2003). Accurate industry classification contributes to valid statistical inferences in empirical studies (Kile & Phillips, 2009). GICS classification used in the S&P indices has a consistent advantage year over year and is the most pronounced in explaining cross-sectional variation, forecasting growth rate, and analyzing financial ratios (Bhojraj et al., 2003).

This purposive sampling project focused specifically on firms in the S&P Industrial Sector. The total possible sample size is 73, representing all the firms in S&P Industrial Sector. Except for the three excluded firms, the other 70 firms' financial data were retrieved from the SEC EDGAR database and tested in this study. Although findings based on the industrial sector may not apply to other business sectors, the purposive sampling method, which covers all and only the S&P industrial sector firms, satisfies this study's need for thoroughness and depth.

Summary of Population and Sampling

The rationale behind the purposive sampling was to concentrate on participants with particular characteristics that can benefit the relevant research (Etikan et al., 2016). This study aimed to evaluate the impacts of Topic 842 on industrial businesses in terms of financial performance metrics and credit risk. The sample size was limited to the available number of firms qualifying for the parameter specified by S&P GICS codifications. The purposive sampling approach focusing on a specific sector in S&P indices helped filter out the noises derived from firm size and industry-specific features.

Data Collection & Organization

Positivists and post-positivists adopt neutrality and practice objectively in the data collection process (Leavy, 2017). Steen (1991) stated a crucial distinction between data is verbal vs. non-verbal. One criterion of the empirical study is the testability of theories and hypotheses,

which gives non-verbal data a direct advantage of providing more direct access to the object under investigation (Steen, 1991). The quantitative analysis starts before the data collection, and the researcher needs to decide what the data are intended to demonstrate and which statistical tests to use (Carter, 2018).

Data Collection Plan

When planning data collection, researchers need to identify the type of data required, source (location) of data, and method to collect data, set criteria for the admissibility of data, and determine the approach to interpreting the data (Leedy et al., 2019). There are various data types, and they are collected through different techniques to diverging ends (Steen, 1991). This project planned to perform statistical analysis on quantitative data, which is non-verbal and numerical in nature. The target participants were S&P Industrial Sector firms whose financial data were available through SEC EDGAR filing or on the firms' websites.

"Quantitative researchers typically identify only a few variables to study and then collect data specifically related to those variables" (Leedy et al., 2019, p. 89). The DVs in this project were financial ratios related to firms' asset efficiency, profitability, financial leverage, liquidity, and credit risk. Firms' yearly 10-K filings provide financial data to calculate the financial ratios listed in Table 1. The researcher used an Excel worksheet to store raw data such as listing firms' symbols, names, and two years' financial data needed to calculate selected financial ratios. One standard data collection method for quantitative research is to perform content analysis by applying pre-specified rules to allocate information into pre-determined categories to collect data consistently (Carter, 2018). All the dollar amounts were reported in thousands in the worksheet, and the methods of computing non-SEC required data were the same across the firms. Manually inputting data to an Excel spreadsheet is prone to errors, making cleaning data for data entry

accuracy a necessity (Burkholder et al., 2019). The "Copy and Paste" function was used to transfer data from the original document to the Excel worksheet to avoid possible typing errors. The researcher also asked a team of college accounting students to collect the same data, and two sets of collected data were cross-checked for accuracy. The researcher also built formulae in the Excel worksheet to double-check if the financial accounts reconcile.

Instruments

This project used public archival data gathered from participating firms' 10-K annual filings with SEC EDGAR. Firms' financial statements provided direct input into data required in financial metrics calculation. EBIT, EBITDA, working capital, and the book value of equity are not required by SEC filing. This group of data were computed using information directly from financial statements. EBIT was calculated using earnings before tax (an SEC-required account) plus interest expense. EBITDA equals EBIT plus depreciation and amortization expenses from the statement of cash flows. NEBITDA is an alternative for EBITDA in this study. NEBITDA is also not required for SEC EDGAR filing and was computed using EBITDA adjusted for non-recurring and abnormal items to leave only maintainable and sustainable earnings in EBITDA. The book value of equity represents the common shareholders' equity (Ertugrul, 2020). Book value of equity in this study equals the total equity subtract preferred stocks. To summarize, the researcher used inputs from the publicly available archival database to construct interested DVs and performed statistical tests on these DVs in an attempt to answer the research question of the project.

Data Organization Plan

Researchers typically perform data structuring, cleaning, and exploring procedures before analyzing the data (Gray et al., 2014). The data were formatted for easy operation when

performing analysis. The best structure is to have one column for each variable and one row for each case (Gray et al., 2014). Each firm had one row for each reporting year, and every account from the financial statement had an individual column. Excel spreadsheets only kept raw data, and the formulae to calculate financial metrics were added in SPSS. One column was added for each target variable in SPSS. The next step of structuring was to create a new version of raw data and delete unnecessary data for the analysis, such as "depreciation" and "amortization" used in calculating EBITDA. The purpose of uploading raw data from Excel and computing ratios in SPSS was to avoid confusion and rounding issues of nested data (i.e., "data within data" or multilevel data). Structuring data also included recoding categorical variables from words to numbers for easy use during the analysis. Topic 842 impacted firms were coded "Group 1," and Topic 842 non-impacted firms were coded "Group 2." The fiscal year pre Topic 842 was coded as "Year 1," and post Topic 842 was coded as "Year 2."

Cleaning data means dealing with unreliable and invalid cases, missing data, or inconsistent data, not deleting inconvenient data (Gray et al., 2014). Inserting assisting columns checking the reconciliation of related accounts is a systematic way of catching inconsistent data. Examples of helping columns are the fixed assets entered should equal total assets subtract current assets, total assets entered should equal total liability add total equity. NEBITDA is an adjusted figure based on information from the income statement. Its accuracy was checked against Yahoo Finance and financial statement footnotes for reasonability.

After the data were loaded in SPSS, the first step was to complete exploratory data analysis (EDA; (Morgan et al., 2019). The researcher ran basic statistics such as boxplots or histograms to visualize the data. When a categorical variable is involved, cross-tabulation can be a useful test to get an idea of the frequencies of combinations of categories (e.g., scatter plots can

visualize data points based on independent and dependent variables; (Gray et al., 2014). Altman's Z-score was a numerical value based on the formula shown in Table 1. In the meantime, the credit-scoring model groups Altman's Z-scores into three zones (safe, gray, and distress), making this variable an ordinal data type. The researcher converted Altman's Z-score into an ordinal variable and recorded it in a separate column. Having individual columns for both the account used in ratio calculation and calculated ratios allowed the researcher to perform EDA tests on both the raw data and the computed ratios (DVs in this study). The testing process enhanced the researcher's understanding of the data set.

Summary of Data Collection & Organization

Quantitative content analysis needs to follow pre-specified rules to ensure consistent data collection and categorization (Carter, 2018). Locating data, retrieving data, and evaluating data are the three key elements of secondary data collection (Hox & Boeije, 2005). Data accuracy and integrity are critical to the reliability of the research. Collecting and organizing data are the beginning of understanding the data (Weller & Romney, 1988). It is recommended to use multiple sources, build a database, establish a chain of evidence, and exercise care while using electric sources (Burkholder et al., 2019).

Data Analysis

Two distinct levels of quantitative data analysis are descriptive analysis and inferential statistics (Carter, 2018). The descriptive analysis uses statistical techniques to transform numerical data to tables or charts to describe the findings, while inferential statistics are more complex and aim to draw conclusions and establish the extent to which findings from a sample can be generalized to the reference population (Carter, 2018). The ultimate goal of the descriptive analysis was to enhance the reliability and validity of this project. The three main

quantitative analysis approaches are univariate analysis, bivariate analysis, or multivariate analysis (Carter, 2018). This project involved the bivariate analysis approach.

The Variables

When the research question is concerning comparison the differences across groups, the study often involves one variable distinguishing if an event has happened to the participants (i.e., a dichotomous variable), and one or more continuous variables measuring the selected features of the groups in comparison (Gray et al., 2014). Two types of variables in the difference comparison study are discrete variables (categorical variables) and normal/scale variables (Burkholder et al., 2019). This project had one categorical IV, 16 scale-type DV, and one ordinal DV. Table 3 provides a list of variables in this project.

Table 3

Variables by Type & Range

Variable	Variable Type	Data Type	Range
Fixed Asset Turnover	Dependent	Scale	- ∞ to ∞
Total Asset Turnover			
Return on Asset (ROA)			
Return on Equity (ROE)			
Net Profit Ratio			
EBITDA to Total Equity Ratio			
EBITDA to Total Assets Ratio			
Asset to Equity Ratio			
Debt to Equity Ratio			
Debt to EBITDA Ratio			
Debt Ratio			
Interest coverage			
Cash to Total Asset Ratio			
Net Working Capital to Total Asset			
Current Ratio			
Quick Ratio			
Altman's Z-Score		Ordinal	Safe, Gray, and Distress
Topic 842 Implementation	Independent	Dichotomous	Yes or No

Descriptive Statistics

Descriptive statistics are helpful tools for researchers to understand the central tendency, range, and distribution shape of the ordinal and scale variables (Morgan et al., 2019). The in-depth descriptive studies and the structural model based on rigorous theory in the causal inference study strengthen the knowledge of phenomenon or behaviors under study (Gow et al., 2016). Morgan et al. (2019) stated the outputs of descriptive statistics could be used to check data error and assumptions. One critical assumption descriptive statistics output can varify is the

normality of variables. Running boxplots, bar charts, and stem-and-leaf plots on data can visually check the normality data of distribution and find extreme scores. Graphic method and frequency distribution can help evaluate the normality of the data distribution. Descriptive statistics of dichotomous variables provide meaningful outputs such as valid N, minimum, maximum, means. Another assumption for the paired *t*-test the researcher needed to verify is the normality of the differences of the paired variables. SPSS Explore function can perform Shapira-Wilk to test the normality assumption. Shapira-Wilk measures the correlation between data and the corresponding scores and is the best choice for the normality test (Thode, 2002).

Hypotheses Testing

Quantitative research is based on deductive reasoning, beginning with premises such as hypotheses or theories, then drawing the logical conclusion from testing results (Leedy et al., 2019). Hypotheses are theoretical statements or predictions the researcher makes concerning the relationship between the variables (Gray et al., 2014). The hypotheses in this project address the significance of changes in S&P industrial sector firms' financial metrics before and after Topic 842 took effect. Table 4 provides a list of hypotheses and relates the hypotheses to research questions in this project. Sekaran and Bougie (2016) defined hypotheses as "the logical conjectured relationship between two or more variables expressed in the form of testable statements" (p. 82). The process of testing the hypotheses and confirming the assumed relationship provides information to find solutions to the problems identified (Sekaran & Bougie, 2016).

Table 4

List of Hypotheses, Research Questions, and Variables

Hypotheses	Research Questions	Variables
$H1_0$ = There is no significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within the Industrial Sector firms before and after implementing Topic 842. **$H1_1$** = There is a significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within the Industrial Sector firms before and after implementing Topic 842.	**RQ 1:** What are the differences between key financial performance ratios related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the Industrial Sector firms in the US before and after its implementation?	**Independent Variable:** Implementation of Topic 842 **Dependent Variables:** Fixed Assets Turnover Total Assets Turnover Return on Assets Return on Equity Net Profit Ratio EBITDA to Total Equity Ratio EBITDA to Total Asset Ratio Asset to Equity Ratio Debt to Equity Ratio Debt to EBITDA Ratio Debt Ratio, Interest Coverage Cash to Total Asset Ratio Net Working Capital to Total Asset Current Ratio Quick Ratio Altman's Z-score
$H2_0$ = There is no significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842-impacted firms in the Industrial Sector before and after its implementation. **$H2_1$** = There is a significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842-impacted firms in the Industrial Sector before and after its implementation.	**RQ 2:** What are the differences between key financial performance ratios related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the Topic-842 impacted Industrial Sector firms in the US before and after its implementation?	
$H3_0$ = There is no significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842 non-impacted firms in the Industrial Sector before and after its implementation. **$H3_1$** = There is a significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842 non-impacted firms in the Industrial Sector before and after its implementation.	**RQ 3:** What are the differences between key financial performance ratios related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the Topic 842 non-impacted Industrial Sector firms in the US before and after its implementation?	

This project has three sets of hypotheses testing two naturally grouped participants (the impacted and non-impacted firms). All hypotheses measured the extent to which the dependent variables changed before and after the occurrence of the independent variable (Topic 842 implementation). The first set of hypotheses measured the differences of the overall Industrial Sector's financial metrics pre and post-Topic 842. The second and third sets of hypotheses measured pre and post-Topic 842 differences within Group 1 (the impacted firms) and Group 2 (the non-impacted firms). The impacts of Topic 842 on lessee firms' financial metrics at the overall industrial level were attributed to Group 1 and Group 2. Sub-hypotheses traced the contributors of the financial ratio changes to reported financial data.

Umstead and Mayton (2018) stated causal-comparative research uses inferential statistics to conclude or infer the results. The three most commonly used statistical tests in causal-comparative study are chi-squares, paired or independent t-tests, and ANOVA families variance

analysis tests such as ANOVA, MANOVA, or ANCOVA (Umstead & Mayton, 2018). Sixteen of the dependent variables (financial ratios) were scale type data, and one variable (credit-risk level based on Altman's Z-score) was ordinal type data. The DVs calculated using data from financial statements pre and post the occurrence of the IV were measured repeatedly within the industry (Group 1 and Group 2 combined) and within Group 1 and Group 2 separately. When the differences under investigation are longitudinal or in a single group (before and after intervention), the paired t-test is the appropriate test (Morgan et al., 2019). Altman's Z-score is an MDA expressed in numerical numbers, except the numerical data were clustered into three levels of credit risk (safe, gray, and distress). Depending on the normality assumption testing required for the paired *t*-test, either Paired *t*-test or Wilcoxon (the nonparametric alternatives of paired-t) was used in variable testings. After Altman's Z-score values were clustered into three levels, Wilcoxon signed-rank test was the only option.

Hypotheses Testing Alternatives

The assumptions for paired *t*-test are independent variable is dichotomous, and the dependent variable is normally distributed (Morgan et al., 2019). When the EDA process confirmed the variables' data type assumptions, the paired *t*-tests were used for scale-type variables. For a within-group investigation, if the dependent variable data type is ordinal or the paired *t*-test assumption is markedly violated, Wilcoxon is the non-parametric statistical test to replace the *t*-test (Morgan et al., 2019). Wilcoxon test is frequently used in the paired data test based on the dependent variable's data analysis (Rosner et al., 2006). The Wilcoxon signed-rank test and the paired *t*-test suggest the equivalent statistical decision (Wiedermann & von Eye, 2013).

Summary of Data Analysis

The researcher started the data analysis with descriptive statistics tests to understand patterns and data types of variables. The paired *t*-test was the chosen inferential statistics for within-group tests on all the variables. Depending on the results of descriptive tests and EDA, the non-parametric alternative of paired-*t* (i.e., Wilcoxon) was used instead. Finally, the researcher used additional statistical tests to trace the driver of the changes and validate the reasonability of the testing results.

Reliability and Validity

Reliability refers to the consistency of the data collection method, while validity is concerned with the truthfulness of the conclusion generated from the research (Carter, 2018). The reliability of quantitative data collection instruments has two elements: internal reliability (if the measurement is consistent within itself) and external reliability (if the measurements are consistent when performed by different researchers; (Carter, 2018). In a quantitative study, validity refers to the extent to which a concept is accurately measured (i.e., measurement validity; (Carter, 2018; Heale & Twycross, 2015).

Reliability

Leedy et al. (2019) stated reliability more or less takes four forms: inter-rater reliability (consistency between different data evaluator), test-retest reliability (consistency of the same evaluator over different times), equivalent-forms reliability (consistency between different versions of the same evaluation), and internal consistency reliability (consistency among items in the same evaluation). This project was based on public archival data. One advantage of research using archival data are the data recorded are not influenced by the researcher’s biases (Szabó et al., 2015).

This project's dependent variables were computed using financial data directly from participating firms' SEC filings. All financial data used in the financial metrics can be found directly on financial statements, except EBIT, EBITDA, NEBITDA, working capital, and equity book value. As a result, these figures were calculated based on reported financial data following consistent standards. Next, the researcher compared the calculated data with the information provided by aggregators or distributors such as Yahoo Finance and Google Finance. Boritz and No (2020) compared data from SEC 10-K filing with data provided by aggregator/distributor (Yahoo Finance, Google Finance, and Compustat) from the perspective of financial concepts, dollar amount, and reporting periods. They discovered the large firms' data has the lowest number of mismatches (Boritz & No, 2020). When the calculated amounts disagree with the aggregator or distributor's information, data based on SEC 10-K filing prevails.

Validity

When reliability is enhanced, accuracy is not necessarily increased (i.e., reliability is necessary but not sufficient for validity; (Leedy et al., 2019). Two broad measures of validity are external validity and internal validity (Burkholder et al., 2019; Roberts & Priest, 2006). External validity refers to the study results' ability to be applied or generalized to the population (Roberts & Priest, 2006; Sedgwick, 2013). "Internal validity addresses the reasons for the outcomes of the study and helps to reduce other, often unanticipated, reasons for these outcomes" (Roberts & Priest, 2006, p. 43).

This project employed the purposive sampling approach and focused on the firms in S&P Industrial Sector. Andrade (2020) asserted that the more purposive the sampling method is, the more limited the research's external validity is. The generalization of purposive sampling research results is limited to the population meeting the sample selection criteria (Andrade,

2020). Furthermore, the non-random selection of participants in purposive sampling impedes the researcher's ability to generalize the research results because the sample size is based on data saturation instead of statistical power (Etikan et al., 2016). As a result, the research understood the results might not be applicable to other industry sectors. The project was designed to offer an in-depth understanding of the firms in the S&P Industrial Sector. All the firms in the sector were included in the hypotheses testing.

Internal validity examines if the study was designed, conducted, and analyzed to generate trustworthy answers to the research question (Andrade, 2018). Campbell's classic article in 1957 identified seven threats to the validity of experimental design (Flannelly et al., 2018). Many researchers consider these threats pertinent to other quantitative research designs (Flannelly et al., 2018; Onwuegbuzie, 2000). The seven threats to validity are history, maturation, testing, instrument decay, statistical regression, selection, and mortality (Campbell, 1957). Ex-post facto design is one of the most commonly seen non-experimental research designs. History, selection, and maturation are commonly found threats to ex-post facto research (Flannelly et al., 2018; Giuffre, 1997).

A lot could have happened between the intervening points. The grouping of the participants is frequently self-selected for non-random yet unapparent reasons, and the participants may have changed due to the passage of time (Onwuegbuzie, 2000). In the case of this project, other events could have happened to any of the firms between the two financial reporting periods, and firms also could have internal changes in the meantime. To safeguard the validity of this project, the researcher added the following steps:

1. This project adopted the within-group comparison approach. Thus, the changes in the DVs pre and post Topic 842 were measured for the same groups to mitigate the selection threat of validity.
2. In addition to measuring changes in the financial metrics at the sector level, the within-group differences of the impacted and non-impacted firms were tested to explain the variations at the sector level fully. Sub-hypotheses was added to validate and trace the drivers of changes in financial ratios.
3. To avoid the threat of maturation, the researcher excluded the firms that went through structural changes over the selected time frame. NEBITDA reflecting businesses' regular and sustainable operating results was used in financial ratio calculation as an alternative for EBITDA.

Summary of Reliability and Validity

All data collection methods have the potential of errors; the researcher must make every effort to minimize possible errors and increase the findings' trustworthiness (Carter, 2018). Ibiamke and Ajekwe (2017) stated a challenge for accounting research is to ensure the research findings are rigorous, relevant, and trustworthy. The rigor of quantitative research has three elements: design-related validity, measurement-related reliability, and inference-related element validity of statistical conclusion (Leech et al., 2010). An internally valid study makes conclusions based on a set of observations with little ambiguity (Ibiamke & Ajekwe, 2017). Researchers should strive for the highest possible level of reliability and validity to secure the rigor of the findings. The coherence and consistency between the testing results of multiple selected DVs and the additional sub-hypotheses added rigor and trustworthiness to this project.

Summary Section 2 and Transition

This project was a quantitative, causal-comparative study investigating the significances of the changes in financial metrics pre and post the implementation of Topic 842. The research design, hypotheses, and selected participants work in alignment to answer the research question. In addition, the publicly accessible archival data of audited financial statements is a concrete source of reliable data for meaningful statistical tests. The hypothesis tests on three paired groups were built in the research design to enhance the validity of the testing results.

The researcher will present the outcome of the statistical analysis, interpret the results, and elaborate on the applications to the accounting profession practice in the final section. The last section will also include the results of statistical tests and interpretations of these results. The interpretation of the testing results was discussed in the context of answering the research questions in this project. Providing future research direction is one way to enhance the study's external validity (Onwuegbuzie, 2000). The researcher concludes the project with findings from this project, future research recommendations, and personal and professional growth reflections.

Section 3: Application to Professional Practice

This study utilized the causal-comparative method to explore the extent to which financial performance metrics changed after firms implemented Topic 842. Fields et al. (2001) stated, "Academic accounting researches must ultimately address the fundamental question of whether, under what circumstances, and how accounting choice matters" (p. 301). An integral part of the lease accounting project was to address the abusive use of operating leases as a means of an OBS financing tool. Understanding the impacts of these long-awaited accounting standards on reported financial data are indispensable for future updates and revision. Accounting researchers should fully utilize their expertise as accountants (Fields et al., 2001, p. 301). Ratio analysis is part of financial analysis, and the hypotheses testings in this study involve examining multiple ratios in the financial metrics.

This section starts with a detailed discussion of the testing results of the descriptive statistics and the rationale of outlier's treatment. Next, the hypotheses testing results were presented. Type I and Type II errors discussion discloses the fundamental parameters used in the statistical tests. The findings of this study were interpreted in relation to the theoretical framework and the current literature discussed in Section 1. The researcher also offered suggestions for possible application to professional practice and directions for future studies. This section ends with the researcher's reflection on this project from the perspectives of personal growth and the Christian worldview.

Overview of the Study

The purpose of this quantitative study is to enhance the understanding of the impacts of Topic 842 on firms' financial performance metrics by investigating the differences between selected financial ratios pre and post the implementation of Topic 842. This study focused on

firms in the S&P Industrial Sector and used the causal-comparative method to compare financial ratios measuring asset efficiency, profitability, financial leverage, liquidity, and credit risk. The hypotheses are tested to evaluate the significance of changes in financial metrics within the sector, within the impacted firms (Group 1), and within the non-impacted firms (Group 2).

The findings affirmed the expectation of higher assets after the capitalization of operating leases. The accompanying increase in debt also drove up the firms' financial leverage. Regardless of the dropping profitability, the industrial sector firms ended up with higher equity and increased cash holding positions. The differences between year-over-year financial ratios demonstrated an apparent contrast between volatility in Group 1 and stability in Group 2 firms, which indirectly proved the materiality of the impacts of Topic 842 on reported financial data. The finding of this study added to the literature with evidential supports for the effects of the new lease accounting standards and revealed the needs and directions for further studies. Two possible areas for future investigation are firms' capital structure management and the pattern of lease contracts. The new capital structure and lease contract behavior, in turn, will influence firms' stock valuation and cost of capital.

Presentation of the Findings

Financial ratios can be used to measure firms' financial well-being in terms of liquidity, asset efficiency, and profitability objectively (Tenney & Kalenkoski, 2019). This research was designed to examine differences in financial performance metrics measuring various aspects pre and post Topic 842. The financial ratios are interpretable in comparison with the prior year, competitors, industry, or pre-determined standards (Gibson, 2012). Three sets of hypotheses are established to address the related research questions on the differences of selected financial ratios

at the sector level and within each group (the impacted and non-impacted). The differences at the group levels are the contributing factors to variations at the sector level.

The consistency and coherence among various measures of financial performance add validity to this study. The changes among different ratios helped explain each other, and the researcher added sub-hypotheses to trace the drivers of the changes when there is a gap. The findings in this study reveal facts about financial data and pose questions for the next step of research. Because all the available firms in the industrial sector were included in the testing, only post-hoc G*power is calculated to support the discussion of Type I and Type II errors. The findings from the hypotheses testing are associated with how they address the research questions and are discussed in relation to the theoretical framework and current ex-ante and pos-ante studies in the literature.

Descriptive Statistics

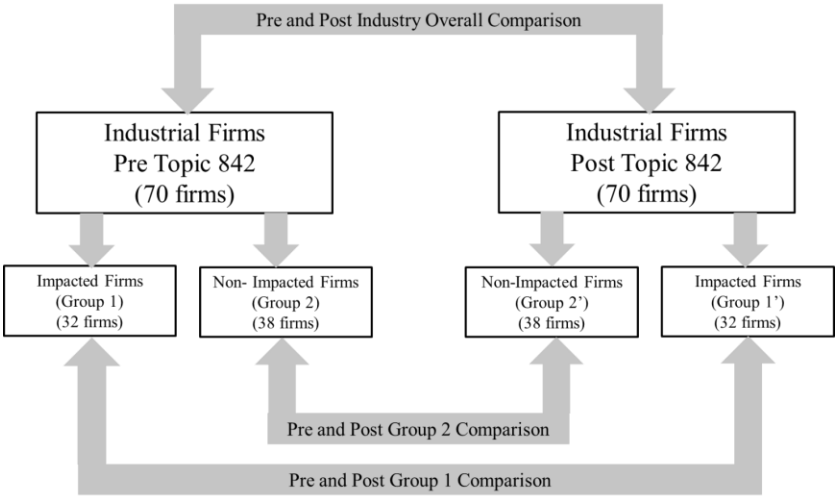
The research questions inquire to what extent the industrial sector firms' financial metrics and credit risk differ at the sector level, within Topic 842-impacted, and with non-impacted firms before and after its implementation. As illustrated in Figure 2, the comparisons of the financial performance measures are within the same group, and paired *t*-test is the most suitable statistical test option. Xu et al. (2017) stated although paired variables' outcomes are independent, they are not marginally independent because of the concept of conditional independence in statistics (i.e., when the matching factor is a continuous variable, perfect matching is very difficult to implement). The paired-*t* is in the form of the following formula:

$$T_2 = \frac{X_d}{\sqrt{\frac{1}{n(n-1)}\sum_{j=1}^{n}\left(X_{jd} - \bar{X}_d\right)}}$$

It means the paired-*t* is a one-sample *t*-test examining the differences within each pair (Xu et al., 2017).

Figure 2

Pre and Post Within Group Comparison Diagram



Appendix A provides a summary of descriptives for the overall Industrial Sector, Group 1 and Group 2. Surveys indicated researchers encounter difficulties coping with outliers, and SPSS marks outliers with either an asterisk (*) or a circle (o; (Leys et al., 2013). Values marked with circles are more than 1.5 interquartile range (IQR), but less than 3 IQR's away from the end of the box (Hinton et al., 2014; Leys et al., 2013). In univariate studies, the suggested threshold is the median should be plus or minus 2 or 2.5 units of IQR (Hoaglin & Iglewicz, 1987; Leys et al., 2013). When analyzing financial ratios, two ways to reduce the bias from outliers are omission and winsorization (replacing extreme values with substitute values; (Nyitrai & Virág, 2019). Removing outliers is one way of fulfilling the assumption of normality for parametric tests (Verma & Abdel-Salam, 2019).

In this study, the outliers marked with asterisks were deleted to meet the paired *t*-test assumptions. The approach of deleting a certain percentage or number of the top or bottom

observations implies that the specifically identifiable outliers do not fit the data set pattern; thus, including these data would increase the non-representativeness of the results (Faello, 2015). The researcher counted the number of outliers and their associated firms. It turned out the outliers are concentrated in a small group of firms. Appendix B provides three tables listing the names and the counts of times these firms' data were excluded. At the industry level, seven firms (10% of the firms) made up 50% of the outliers. This pattern applies to both Group 1 and Group 2. Over 50% (56% and 55% respectively) of the outliers are from the top four firms in each group. As a result, the outliers excluded for variable testings are limited to 10% of the total number of participants.

Financial Performance Trending of Industrial Sector. Researchers should check the data type and normality of assumptions to avoid the pitfalls in reporting findings before choosing parametric tests (Verma & Abdel-Salam, 2019). The descriptive tests provide the mean, standard deviation, minimum, maximum, and range of all dependent variables. The test result summaries in Appendix A reveal the following trends between the pre and post Topic 842 ratios:

1. The means of all ratios measuring asset efficiency and profitability decreased post Topic 842 implementation.
2. Out of all the financial leverage measurements, the means of Asset/Equity ratio, Debt/Equity ratio, Debt/EBITDA, Debto/NEBITDA, and Debt ratio increased post Topic 842. The interest coverage measured with both EBITDA and NEBITDA decreased post Topic 842, agreeing with higher Debt-related ratios.
3. Of the four measures for liquidity, the means for Cash/Total Assets, Current Ratio, and Quick Ratio increased, while the mean of Working Capital/Total Assets ratio dropped post Topic 842.

4. The year-over-year means of Altman's Z-score values increased at the sector level.

The asset efficiency ratios (also called asset utilization ratios) indicate how efficiently a firm operates its assets to generate cash, while the profit ratios measure how much profit a business generates within a particular context (Warrad & Al Omari, 2015). Both asset efficiency and profitability positively influence the firm's value, especially among firms with intensive debt monitoring (i.e., the higher the profitability and asset efficiency ratios, the more income the firm can distribute to its shareholders and the better the firm value; (Bukit et al., 2018). Akhtar et al. (2012) stated financial leverage is positively related to a firm's financial performance. The market expects firms with increasing financial leverage to show a higher growth rate, which in return enables the firm to pay the incremental interest expense (Akhtar et al., 2012). However, the industrial sector showed an overall increasing financial leverage yet decreasing asset efficiency and profitability post Topic 842.

Liquidity plays a critical role in a firm's success; a weak liquidity position poses a threat to a firm's profitability and solvency (Niresh, 2012). Managing liquidity means planning and controlling current assets to meet the short-term obligations and avoid excessive investment in current assets (Eljelly, 2004). The increases in current ratio and quick ratio indicate the firms were better off managing the balances between Current Assets and Current Liabilities. Working Capital is the safety cushion providing short-term funds, and the availability of the excessive amount of cash and working capital is viewed positively (Eljelly, 2004). In this case, the Cash/Total Asset ratio increased. Yet, the Working Capital/Total Asset ratio decreased, indicating the firms are worse off managing the balances between non-cash current assets and current liability.

The industrial sector's mean of Altman's Z-score score increased; however, 69 of the 70 firms remained in the same zone. The range of Altman's Z-score is 2.59 to 13.65 (one firm in the Grey zone) in Year 1 and 2.64 to 13.15 (two firms in the Gray Zone) in Year 2. The year-over-year Z-score changes did not result in firms transitioning from one zone to another. Only one firm changed from Safe to Grey zone, increasing the number of firms in Grey zone from one to two.

Impacted Firms (Group 1) and Non-impacted Firms (Group 2). Matching with the industry's overall performance, both Group 1 and Group 2 have lower asset efficiency in Year 2. All the means of the selected profitability ratios decreased at the Sector level, within Group 1 and within Group 2, except Group 1's Net Profit in Year 2 increased by 0.1% from 11.3% to 11.4%. The trend of Group 1 firms' financial leverage ratios mirrors the trend at the sector level. However, Group 2 firms' Asset/Equity and Interest Coverage based on NEBITDA deviated from the sector level trends.

Group 1 and Group 2 firms' liquidity measures diverged more obviously. Means of all Group 1 firms' liquidity measures dropped in Year 2, except for the Cash/Total Asset ratio increased). All means of Group 2 firms' liquidity ratios increased in Year 2. The Altman's Z-score had very little year-over-year change at the sector level. One Group 1 firm moved from Safe Zone to Grey zone, and all the firms in Group 2 maintained their original status. Group 1 firms' overall Z-score values decreased slightly, while Group 2 firms' Z-score values increased.

Testing for Assumptions. Paired *t*-test and its non-parametric alternative, Wilcoxon signed-rank test, suit the same participants or participants with similar characteristics (Verma & Abdel-Salam, 2019). The main assumption for the paired *t*-test is the differences of the paired groups have an approximately normal distribution (Morgan et al., 2019). Normal distribution

means the shape of the relative frequency histogram is a normal curve (Sullivan, 2022). Normality of data can be visualized using histogram, normal plot graph, or tested with Shapiro-Wilk (Pandis, 2015). If the assumption of normality is markedly violated, the non-parametric alternative of the paired *t*-test is Wilcoxon (Morgan et al., 2019; Pandis, 2015). It is recommended to use both visual assessment and the Shapiro-Wilk test to explore the normality (Ghasemi & Zahediasl, 2012). When the *p*-value of the Shapiro-Wilk is more than 0.05, the normality of the data can be assumed. Wilcoxon-signed-rank test compares the differences of means and assumes the difference is from continuous distributions and is symmetric around the median (Fay & Proschan, 2010; Rey & Neuhäuser, 2011). SPSS boxplot can be used to visually check the symmetry of the difference between the before and after outcomes of each variable (Hinton et al., 2014). Appendix C provides three tables showing the results of the Shapiro-Wilk tests and the Normal Q-Q plots for all variables meeting paired *t*-test assumption.

When the data sets failed the assumption tests for the paired *t*-test, the variable was tested for Wilcoxon test assumptions using the boxplot charts. These assumptions for the Wilcoxon tests include: 1) The independent variable for the Wilcoxon signed-rank is categorical. 2) The dependent variable(s) should be ordinal data type or measured at scale or continuous level. 3) The data distribution of the two related groups is symmetrical or has a similar shape (Verma & Abdel-Salam, 2019). Box plots were used to observe the symmetry of the data distribution, and outliers are removed in this process to keep the symmetry of data distribution.

Summary of Descriptive Statistics. The descriptive statistical tests provide a basic profile of the data type. The investigator also used the normal Q-Q plots to observe the data normality visually. Shapira-Wilk test results confirmed the normality assumption for the paired *t*-test for some of the variables and filtered out variables to be tested with Wilcoxon. The

confidence interval of Shapira-Wilk is five percent. The investigator created the box plots for variables failing the Shapira-Wilk threshold to evaluate the Wilcoxon test's symmetry criteria. The descriptive statistics revealed the deteriorations of asset efficiency and profitability at both sector and group levels. Furthermore, the changes in financial leverage ratios at the sector level and Group 1 mirrored each other. Other than the Asset/Equity ratio, Group 2 firms' other financial leverage ratios increased. At the sector level, liquidity ratios improved except for the Working Capital/Total Asset ratio. Group 1 firms' liquidity was worse off in Year 2, contrasting with the Group 2 firms' liquidity improvement in Year 2.

Hypotheses Testing

This study included three sets of hypotheses examining the year-over-year differences in selected financial ratios of the S&P Industrial Sector firms. Tested financial ratios cover four categories of financial performance: asset efficiency, profitability, financial leverage, and liquidity. Altman's Z-score is used as an indicator of firms' credit risk. Hypotheses testings were designed to address the research questions. Sub-hypotheses testings were added to trace the drivers of the change further and explain the implications of the hypotheses testing results. Type I and Type II errors analysis helped enhance the validity of the hypotheses testing.

Pre-tests and Corresponding Statistical Tests for Hypotheses. The descriptive statistics in the EDA process confirmed financial ratios scale type data. Altman's Z-score grouped into three ratings is ordinal type data. Paramatric tests suit variables of interval/ratio scale, non-paramatric tests fit normal or ordinal data (Morgan et al., 2019; Verma & Abdel-Salam, 2019). Typical assumptions for parametric tests include normality, randomness, absence of outliers, homogeneity of variances, independence of observations, and linearity (Verma &

Abdel-Salam, 2019, p. 66). Assumptions for non-parametric tests are randomness and independence between data of the paired groups (Verma & Abdel-Salam, 2019).

The research questions ask for the differences between pre and post Topic 842 financial metrics of the same grouping of firms (industry's overall, impacted, and non-impacted), which means the same firms are in both the pre-test post-test. Paired *t*-test is the best choice for this study. Pre-tests on statistical assumptions are Shapira-Wilk tests, boxplots, and normal Q-Q plots. Wilcoxon test was used for ordinal data and interval scale data or when the paired *t*-test assumption is violated. The data distribution symmetry of the Wilcoxon test refers to if two distributions are significantly similar in terms of shape and median (Sultan et al., 2020). The researcher used boxplots to detect outliers and observe the symmetry visually.

Hypotheses Tests and Inferences. Three sets of hypotheses were designed to answer the research questions of this study. The research questions focused on differences at the Sector level, within Group 1, and within Group 2. The changes in Group 1 and Group 2 both contributed to the changes in the sector. They can also form comparisons or contrast with each other. Because multiple ratios were selected in each category of the metrics, the researcher also looked for consistency among changes in different ratios when interpreting the findings.

Industry Overall Tests. To understand the impact of Topic 842 on the S&P Industrial Sector, the researcher starts with the changes of financial metrics at the sector level. The first research question and its corresponding hypotheses address the changes at the sector level:

RQ 1: What are the differences between key financial performance ratios related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the industrial sector firms in the United States before and after its implementation?

$H1_0$ = There is no significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within the industrial sector firms before and after implementing Topic 842.

$H1_1$ = There is a significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within the industrial sector firms before and after implementing Topic 842.

The industrial sector's asset efficiency and all profitability ratios decreased post Topic 842. The decreases in both asset efficiency measures (Fixed Asset Turnover and Total Asset Turnover) are statistically significant because the *p*-values are less than 0.05. Wilcoxon test shows 43 out of the 64 firms had lower Fixed Asset Turnover in Year 2. Although the profitability ratios deteriorated, the decreases in ROA, ROE, or Net Profit ratio are not statistically significant, where *p*-values are greater than 0.05. However, the significant decreases in profitability ratios measured with EBITDA (NEBITD) were noticeable. Thirty-nine of 63 firms had lower post EBITDA and NEBITDA/Equity ratios, and 46 out of 66 firms had a lower post NEBITDA/Total Assets Ratio. The *p*-values of all four tests are less than 0.05.

Under the capitalization approach in Topic 842, the used-to-be rental expenses are split into interest expense and amortization of lease liabilities. The lessee firms were expected to have higher EBITDA just because of this change by itself. Nissim (2019) tested over 1,700 U.S. public firms from 1989 to 2019 and concluded there had been a strong positive trend of amortization charges over 30 years. Combining the 30-year trending of U.S. public firms and the implementation of Topic 842, it is expected profitability measured with EBITDA would look more promising than profitability ratios measured using net income, such as Net Profit, ROA, or ROE. Further investigation is needed to trace the driver of the statistically significant decreases

in profitability. Sub-hypotheses A and B investigate the significance of changes in EBITDA and NEBITDA. Sub-hypotheses C and D examine the significance of changes in Total Assets and Total Equity.

Financial leverage measures included five different ratios. Only Assets/Equity and Debt/Equity ratios increased significantly (p-values < 0.05). Possible changes in either EBITDA or Debt could lead to changes in the Debt/EBITDA ratio. Regardless of the trending increase in EBITDA or DEBITDA, the Debt/EBITDA increased. In addition, the Debt Ratio increased as well, although these increases were not statistically significant. In the meantime, the Interest Coverage ratios decreased moderately, confirming higher financial leverage post Topic 842. Higher financial leverage indicates firms' capital structure is leaning toward debt financing.

Out of the above significance testings, one observation worth mentioning is the p-value of pre and post Topic 842 differences in Debt/NEBITDA ratio is 0.058, which is more than but very close to the five percent threshold. One problem with the dichotomous decision in null hypothesis significance testing (NHST) is researchers adopt a fixed significance level and convert a continuum of probability ranging from 0 to 1 into a dichotomous decision of rejecting vs. not rejecting the H_0 (Balluerka et al., 2005). Overall, the increase of Assets/Equity, Debt/Equity, Debt/EBITDA, and Debt Ratio agree with the decrease in interest coverage. To conclude, the industrial sector is more leveraged post Topic 842.

Out of the four selected liquidity measures, only one ratio (Cash/Total Assets) had a statistically significant decrease with a p-value of less than the threshold of 0.05. Forty-four of the 66 firms ended up with a higher Cash/Total Assets ratio in Year 2. It is worth further investigation why the Sector's Cash/Total Assets ratio had a significant increase while the firms were operating in a context of decreasing asset efficiency, deteriorating profitability, and higher

financial leverage. Sub-hypothesis F and G were designed to test the change of Cash and Fixed Assets accounts to trace the driver of year-over-year ratio differences.

Appendix D shows the hypotheses testing outcomes for all the variables and NHST decisions using a five percent confidence interval. Multiple financial ratios had statistically significant differences before and after the implementation of Topic 842. These changes cover every category of the financial performance profile. These differences are aggregate results of the changes in both Group 1 and Group 2. The null hypothesis of no significant differences is rejected. RQ 2 and RQ 3 in this study address the differences within these two groups, respectively.

Impacted Firms (Group 1). The Industrial sector firms are naturally divided into two groups based on the utilization of operating leases. The second research question inquires about the year-to-year differences within Group 1, whose performance directly contributed to the sector's outcomes. The corresponding hypotheses test the differences in the financial metrics within Group 1 over the same two-year period as the first set of hypotheses. A usual practice in ratio analysis is to compare against industry and history to establish what is "normal" (Nissim & Penman, 2001). The test results at the group level are discussed in relation to the trend of the financial measures at the sector level.

RQ 2: What are the differences between key financial performance ratios related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the Topic-842 impacted industrial sector firms in the United States before and after its implementation?

$H2_0$ = There is no significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842-impacted firms in the industrial sector before and after its implementation.

$H2_1$ = There is a significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842-impacted firms in the industrial sector before and after its implementation.

As shown in Appendix D, both ratios measuring asset efficiency decreased in Year 2 for Group 1 firms. These decreases are considered statistically significant, which agrees with the industry trending. Twenty out of the 29 firms' Fixed Asset Turnover and 21 out of the 29 firms' Total Asset Turnover decreased, and the *p*-values of the Wilcoxon tests are 0.021 and 0.011 (<0.05). The capitalization of operating leases required in Topic 842 can directly translate into higher assets for lessee firms. If the increases in the firms' Sales and Fixed Assets (subsequently Total Assets) were not proportional, the asset efficiency would drop. Both firms and the market expected a decrease in asset efficiency in Group 1, and the test results confirmed the en-ante studies.

The profitability measures for Group 1 mirrored the decreasing trend of the sector (i.e., all five ratios were lower in Year 2). The *p*-value of the *t*-test for EBITDA and NEBITDA/Total Assets ratio was 0.007 and 0.003 (<0.05), respectively, meaning the drops were statistically significant. The decreases in ROA, ROE, and EBITDA to Equity ratio were not significant because the *p*-values of the *t*-tests are greater than 0.05. It is safe to say Group 1 firms contributed to the overall deteriorating profitability at the sector level.

Group 1 firms' year-over-year differences in financial leverage measures also match with the trend of the sector. The firms' Assets/Equity, Debt/Equity, Debt Ratio, and Debt/NEBITDA ratios indicated higher financial leverage in Year 2. The differences of these financial leverage measures are statistically significant (*p*-value <0.05). In the meantime, the interest coverage measured using both EBITDA and NEBITDA decreased, although these decreases were not

statistically significant. The *p*-value (0.058) of the *t*-test for Debt/EBITDA is very close to the threshold of 0.05. The *t*-test of the Debt/NEBITDA ratio variation generated a *p*-value of 0.021 (<0.05). In other words, some ratios had statistically significant changes, and some changes were not considered statistically significant. The overall changes are pointing toward the same direction of higher financial leverage. The researcher can conclude that changes in Asset/Equity, Debt/Equity, Debt Ratio, and Debt/NEBITDA ratios indicated Group 1 firms were financially more leveraged post Topic 842. The changes in Group 1 firms' financial leverage contributed to the trend of the industry sector.

Out of the four liquidity ratios, only the Cash/Total Assets ratio increased, and the other three ratios (Working Capital/Total Assets, Current Ratio, and Quick Ratio) decreased. None of these changes were statistically significant. The increase of Cash/Total Assets and decrease of Working Capital/Total Assets match the sector's trend. The decreases in the Current Ratio and Quick Ratio are opposite to the sector's increasing trending. Group 1 firms' performance in liquidity does not help explain the increase of these two ratios at the sector level. Overall, the liquidity measures of the Group 1 had no significant year-over-year variations. The mean of Altman's Z-score value decreased; however, the *p*-value of the Wilcoxon test based on Z-score zones was less than 0.05. Only one firm moved down to the Grey zone, and the rest of the firms had no status change.

In summary, there were significant fluctuations in both ratios in asset efficiency, some profitability ratios, and some financial leverage ratios. Ratios related to Fixed Assets, Total Assets, EBITDA, and Debt had statistically significant year-over-year differences. The null hypothesis of no significant differences in the impacted firms before and after Topic 842 is rejected based on the testing results. In addition, the differences in Group 1 constitute the

changes at the sector level. Further investigation is needed from Group 2 to fully explain the performance at the sector level.

Non-impacted Firms (Group 2). Thirty-eight of the 70 firms did not report ROU or lease liability in Year 2 and are included in the non-impacted group (Group 2). The third research question and its corresponding hypotheses inquire to what extent Group 2 firms' financial metrics change before and after implementing Topic 842. Like the financial metrics results of Group 1, changes in financial metrics in Group 2 also contributed to the changes in the industrial sector. The trending of the changes in Group 2 also formed a comparison with the outcomes of Group 1.

RQ 3: What are the differences between key financial performance ratios related to asset efficiency, profitability, financial leverage, liquidity, and credit risk of the Topic 842 non-impacted industrial sector firms in the United States before and after its implementation?

$H3_0$ = There is no significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842 non-impacted firms in the industrial sector before and after its implementation.

$H3_1$ = There is a significant difference between the key financial performance metrics (DVs) related to asset efficiency, profitability, financial leverage, liquidity, and credit risk within Topic 842 non-impacted firms in the industrial sector before and after its implementation.

Appendix D summarizes the statistical tests performed and test results for Group 2. Group 2 firms' asset efficiency ratios decreased in Year 2 as well, except these changes are not statistically significant because the *p*-values of the paired *t*-tests are both greater than 0.05. In other words, although both the Group 1 and Group 2 firms had lower asset efficiency, the magnitude of such decreases in Group 2 is not as significant as in Group 1 or at the sector level.

The profitability ratios decreased in Year 2; however, there was no statistically significant decrease as *p*-values of all the tests are greater than 0.05. The outlook of the financial leverage measures for Group 2 is different from the trend of the sector and Group 1. None of the statistical tests generated a *p*-value of less than 0.05. The year-over-year differences in Assets/Equity and Interest Coverage based on NEBITDA indicate less financial leverage (i.e., smaller Asset/Equity ratio and higher interest coverage).

The category of liquidity is the only area Group 2 firms showed a significant year-over-year difference. All liquidity ratios increase in Year 2, indicating improved liquidity. The increase in the Cash/Total assets ratio is statistically significant, with a *p*-value of 0.02 (< 0.05). The Cash/Total Assets ratio increase is consistent with the differences of Group 1 and at the sector level. Regardless of the decreasing profitability, both Group 1 and Group 2 increased their cash holding position, except Group 2's increase was statistically significant. He and Wintoki (2016) sampled large U.S.-traded industrial sector firms and noticed increased cash holdings over the past three decades. They attributed the cash holding increase to the R&D investment activities driven by the intensive domestic and international competition (He & Wintoki, 2016). The increased cash holding position is not a singled-out occurrence in this study and agrees with the trend of U.S. firms. In this case, the cash holding position is not driven by organic business growth because of the deteriorating profitability and increasing financial leverage during the same period. Group 2 firms' Altman's Z-score value increased significantly in Year 2 (*p*-value < 0.05), and every firm was able to remain in the Safe Zone.

In summary, Group 2 firms showed more stability in financial performance over the two years. Table 5 provides a summary of decisions based on statistical tests. The year-over-year variations in financial metrics were not statistically different, except for the increases in the

Cash/Total Assets ratio and Altman's Z-score values. Therefore, the null hypothesis of no significant differences in financial metrics for Group 2 is rejected.

Table 5

Summary of Hypotheses Testing Results

Category	Industry Overall	Impacted Firms (Group 1)	Non-impacted Firms (Group 2)
Asset Efficiency	Significantly decreased	Significantly decreased.	No significant decrease in asset efficiency measures.
Profitability	No significant decrease in profitability ratios, except for profitability ratios calculated using EBITDA (NEBITDA).	EBITDA and NEBITDA to Total Assets ratios had a significant decrease. Other profitability measures moderately decreased.	No significant decrease in profitability measures.
Financial Coverage	Asset/Equity and Debt/Equity ratios significantly increased. No other measures had statistically significant change.	Assets/Equity, Debt/Equity, Debt/NEBITDA, and Debt Ratio had significant increases. Debt/EBITDA increased moderately. Interest Coverage ratios decreased moderately.	No significant increase in financial leverage.
Liquidity	The Cash/Total Assets ratio had a significant increase. Changes in other ratios are not significant.	No significant year-over-year differences. All liquidity ratios decreased, except Cash/Total Assets increased.	No significant increases in liquidity measures, except for Cash/Total Assets ratio.
Altman's Z	No significant difference.	No significant difference.	Altman's Z-score value significantly increased. No change in zone status for firms
Decisions based on Hypotheses Testing	The null hypothesis of no significant difference is rejected.	The null hypothesis of no significant difference is rejected.	The null hypothesis of no significant difference is rejected.

Sub-Hypotheses. Financial ratios are calculated using at least two values from the financial statements; thus, differences in the financial ratios can be traced to any factor going into the ratio calculation. The hypotheses testing revealed the changes in financial metrics and the magnitudes of these differences. In the meantime, the test results also exposed areas needing further investigation. The researcher developed sub-hypotheses to trace the driving factors behind the changes and enhance the robustness of the testing results. Morgan et al. (2019) stated reliability of the research indicates the consistency between scores and accuracy of data measurement, and it is a necessary prerequisite for measurement validity. The cohesiveness between the outputs of multiple tests on different ratios can prove the validity of the tests.

The first observation is the significant decrease in profitability measurements calculated using EBITDA or NEBITDA at the sector level. The sharp decline in profitability ratios measured with EBITDA/NEBITDA disagrees with the expectation of higher EBITDA post Topic 842. EBITDA was expected to increase because the used-to-be rental expense is now split

into interest expense and amortization of lease liability. Sub-hypotheses sets A and B address the extent to which EBITDA and NEBITDA changed at the sector level pre and post Topic 842.

Sub-HA$_0$ = There is no significant difference between the EBITDA amounts within the industrial sector firms before and after implementing Topic 842.

Sub-HA$_1$ = There is a significant difference between the EBITDA amounts within the industrial sector firms before and after implementing Topic 842.

Sub-HB$_0$ = There is no significant difference between the NEBITDA amounts within the industrial sector firms before and after implementing Topic 842.

Sub-HB$_1$ = There is a significant difference between the NEBITDA amounts within the industrial sector firms before and after implementing Topic 842.

Appendix E provides the test results on the differences between pre and post Topic 842 EBITDA and NEBITDA. The increase of EBITDA mean was $96,523 thousand and NEBITDA mean increased by $76,006 thousand. The *p*-value of Sub-Hypothesis set A is 0.066 (> 0.05) when 42 of the 66 firms have higher EBITDA. The null hypothesis Sub-HA$_0$ is retained. The *p*-value of sub-hypothesis set B is 0.008 (<0.05) when 47 of the 66 firms have higher NEBITDA, meaning the null hypothesis Sub-HB$_0$ is rejected. Industrial sector firms' NEBITDA had a significant increase in Year 2. The increases of EBITDA and NEBITDA agree with U.S. firms' trends and expectations of Topic 842; however, it doesn't explain the decrease in profitability ratios. It is necessary to investigate the other input to profitability ratios. Sub-hypotheses set C and D address the extent to which the industrial sector firms' Total Assets and Equity differ pre and post Topic 842.

HC$_0$ = There is no significant difference between the Total Assets amounts within the industrial sector firms before and after implementing Topic 842.

HC_1 = There is a significant difference between the Fixed Assets amounts within the industrial sector firms before and after implementing Topic 842.

HD_0 = There is no significant difference between the Equity amounts within the industrial sector firms before and after implementing Topic 842.

HD_1 = There is a significant difference between the Equity amounts within the industrial sector firms before and after implementing Topic 842.

As shown in Appendix E, Total Assets post Topic 842 is $1,415,518 thousand more in Year 2 on average, which is considered statistically significant because the *p*-value of the Wilcoxon test is less than 0.05 when 56 of the 65 firms had more Total Assets in Year 2. The null hypothesis of no significant difference in Total Assets pre and post Topic 842 is rejected. Total Equity in Year 2 also increased by $227,040 thousand on average, which is also considered statistically significant because the *p*-value of the Wilcoxon test is less than 0.05 when 48 of the 65 firms had an increase in Total Equity in Year 2. The increases in EBITDA or NEBTIDA were not proportional to Total Assets and Equity increases, causing dropping profitability. The results of sub-hypotheses A through D revealed the significant decreases of profitability ratios measured with EBITDA were driven by the decreased incremental profitability of the additional Total Assets and Equity.

The second observation is the significant decreases in asset efficiency at the sector level. The increase in Total Assets could lead to a decline in the Sales/Total Assets ratio. The other influencing factor is the changes in Sales. Implementing Topic 842 means higher Fixed Assets and Total Assets; however, it may not directly translate into lower asset efficiency. Sub-hypotheses set E is to test the differences of year-over-year sales account.

HE_0 = There is no significant difference between the Sales amounts within the industrial sector firms before and after implementing Topic 842.

HE_1 = There is a significant difference between Sales amounts within the industrial sector firms before and after implementing Topic 842.

As shown in Appendix E, the average increase in Sales is $479,624 post Topic 842, which is considered statistically significant because the *p*-value of the Wilcoxon test is less than 0.05, when 49 of the 66 firms had higher Sales in Year 2. The increased Sales would increase asset efficiency unless the magnitude of the increases in Fixed Assets and Total Assets were more considerable. Combining the increases of both Sales and Total Assets with the decreasing asset efficiency, the researcher can conclude the return on the incremental assets is not as promising as the already-existing assets pre Topic 842.

The third observation is the increased cash holding position conflicts with the decreased asset efficiency and profitability at the sector level. The recognition of ROU alone will increase the overall level of Total Assets, which conflicts with the observation of a significantly higher Cash/Total Assets ratio. Total Assets increased significantly in Year 2, making it necessary to test the differences between the Cash accounts pre and post Topic 842. Sub-hypotheses set F addresses how Cash accounts differ pre and post Topic 842 within the sector level.

HF_0 = There is no significant difference between the Cash amounts within the industrial sector firms before and after implementing Topic 842.

HF_1 = There is a significant difference between the Cash amounts within the industrial sector firms before and after implementing Topic 842.

The results in Appendix E show a significant increase in the Cash account in Year 2, with 50 of the 65 firms ended up with more Cash post Topic 842. The mean of the Cash account

increased by $260,634 thousand. This discovery leads to the question of what motivated firms to keep more cash under the environment of declining profitability. Cash is the least productive type of asset because Cash and Cash equivalent generate very little accounting return (Shah, 2011). Two main reasons U.S. corporations hold more cash are precautionary motive and repatriation taxes, meaning flexibility for transactions and uncertainty and credit constrain (Sánchez & Yurdagul, 2013). Sánchez and Yurdagul (2013) explained the need to hold cash would alleviate once firms obtain credit to access funds. It is beyond the scope of this study to evaluate the relationship between the possible credit constrain or fund availability and the increase of Cash holding position in Year 2. The researcher can only conclude the Cash account increase is the driving force of the Cash/Total Assets ratio increase. The increasing Cash account also contributed to increases in the industry's overall Current Ratio and Quick Ratio. In the end, the significant increase in Cash holding is one of the contributors to the growth in Total Assets.

The increase in Sales casts doubt on the decrease in the Sales/Fixed Asset ratio. The increase in Cash account also confuses the actual driver of the decreased Sales/Total Assets ratio. Sub-hypotheses set G tests the differences of Fixed Assets at the sector level post Topic 842. The output of sub-hypotheses set G can further validate the driver of the decreased Fixed Assets Turnover.

HG_0 = There is no significant difference between the Fixed Assets amounts within the industrial sector firms before and after implementing Topic 842.

HG_1 = There is a significant difference between the Fixed Assets amounts within the industrial sector firms before and after implementing Topic 842.

Based on the output of the Wilcoxon test, 52 of the 65 firms had more Fixed Assets post Topic 842. The *p*-value of the test is less than 0.05, indicating the increase of the mean Fixed

Assets ($926,306 thousand) is statistically significant. Further investigation into the management's rationale behind higher cash holding position in the context of deteriorating profitability, higher financial leverage, higher Fixed and Total Assets seems necessary for future studies. In this study, sub-hypotheses are tested only at the sector level because the number of firms in the positive ranks is higher than the total number of firms in Group 1 or Group 2. That is to say, firms in both groups contributed to the change at the sector level, and no further test is needed at the group level.

Type I (α) and Type II (β) Errors. Type I error is referred to as false positive, meaning the null hypothesis is rejected when it is true; while Type II error is referred to as false negative when an investigator fails to reject a false null hypothesis (Banerjee et al., 2009). Without statistical power, statistical tests are of limited use (Faul et al., 2007). Cohen published the first study on the statistical power of psychological studies in 1962 (Borkowski et al., 2001). The power of a test is calculated as 1- β, meaning the possibility of rejecting a null hypothesis when it is false (Verma & Abdel-Salam, 2019). The conventional Type II error rate should be 0.2 (i.e., the power of tests should be 0.8, meaning β is four times the value α; (Cohen, 1989). In today's social sciences, the conventional confidence interval (α) is 5%, and β is kept at 20% or less, in other words, the power of the statistical tests is 80% or higher (Banerjee et al., 2009; Verma & Abdel-Salam, 2019). "G*Power 3 provides generic power analysis routines that may be used for any test based on the *t*, *F*, χ^2, z, or binomial distribution" (Faul et al., 2007, p. 189).

Appendix F shows the power of the statistical tests for variables using G*Power. Testing results with more than 80% G*Power are highlighted in green. The table shows more tests at the sector level meet the 80% threshold. The G*Powers of one asset efficiency ratio, two ratios in profitability, and two ratios in the financial leverage categories are greater than 80%. Three

factors affecting the power of the test are level of significance (α), sample size, and effect size (Borkowski et al., 2001). The power of *t*-statistics improves with the increase of sample size (Kim et al., 2018). In this study, all industrial sector firms are included as participants. In other words, increasing the sample size means including firms from different sectors.

Niemann et al. (2008) sampled 403 firms from different S&P sectors from 1998 to 2002 and illustrated that financial ratios are affected by sectoral or regional heterogeneity. Different business sectors vary substantially in balance sheet structure, fixed assets standards, and profitability standards (Niemann et al., 2008). Taking the lease transactions, for example, the researcher observed heterogeneity in the industrial sector. Table 6 shows the percentages of Topic 842 impacted firms vary from 100% in the Technology sector and 74% in Real Estate Sector to 31% in the Information Technology Sector. The purposive sample is subjective and not probability-based, which makes it hard to defend its sample representativeness (Sharma, 2017). This study recruited all the firms in the industrial sector, and the researcher intends to only investigate this sector. The generalization of the testing results outside the Industrial Sector is not a concern when the whole population is sampled.

Table 6

Lease Transaction Utilization within S&P Firms

GICS Sectors	Not-impacted	Impacted	Total	% of Impacted Firms
Communication Serv	11	15	26	58%
Consumer Discretion	15	46	61	75%
Consumer Staples	21	12	33	36%
Energy	17	9	26	35%
Health Care	36	26	62	42%
Industrials	40	33	73*	45%
Information Technol	48	22	70	31%
Materials	17	11	28	39%
Real Estate	8	23	31	74%
Technology		1	1	100%
Utilities	18	10	28	36%
Grand Total	**231**	**208**	**439**	**47%**

Financial Institutions are excluded.

* Only 70 of the 73 firms are included as participants due to the unavailability of comparative financial statements for 3 firms.

Summary of the Hypotheses Testing. To summarize the results of the hypotheses tests, all three null hypotheses of no significant differences before and after Topic 842 implementation were rejected. The industrial sector experienced a significant decrease in asset efficiency, which can be attributed to the significant decline in Group 1 firms and a moderate decrease in Group 2 firms. Profitability ratios based on EBITDA or NEBITDA at the sector level and in Group 1 significantly decreased. There was no significant decrease in profitability ratios in Group 2 firms. Based on observation on the means of profitability ratios shown in Appendix A, Group 1 firms had higher profitability than Group 2 firms both pre and post Topic 842 in every selected. It is beyond the scope of this study to investigate the differences between financial performances of firms involved vs. firms not involved in operating lease transactions; however, this pattern is worth further investigation in future studies.

The Industrial Sector's overall financial leverage measures based on Total Assets and Total Debt significantly increased. Group 1 also showed a significant increase in financial leverage ratios calculated using Total Assets and Debt. In contrast, Group 2 showed no

significant differences in financial leverage ratios. In terms of liquidity, the performance of Group 2 went the opposite direction from the trend in Group 1 and sector. All liquidity ratios increased for Group 2, with a significant increase in the Cash/Total Assets ratio. Although the Altman's Z-score values in Group 2 significantly increased, Group 2 firms all maintained in their pre Topic 842 zone.

Relationship of the Findings

This section discusses the findings in relation to research questions. The findings are also related to the theoretical framework and literature review in Section 1 of this study. Outcomes of the hypotheses and sub-hypotheses testings are compared with ex-ante and post-ante studies in the literature. Accounting standard changes have profound implications for firms, analysts, and the accounting profession. Evidence from empirical contributes to the understanding of such implications for various stakeholders and future studies.

The Research Questions. "Industry classification is an important component of the methodological infrastructure of accounting research" (Krishnan & Press, 2003, p. 685). The researcher selected to explore the S&P Industrial Sector's differences in financial metrics and credit risk pre and post Topic 842 implementation. The three research questions in this study inquire the extent to which the financial metrics measuring asset efficiency, profitability, financial leverage, liquidity, and credit risk differ pre and post Topic 842 within the S&P Industrial Sector (RQ 1), within the impacted firms in the sector (RQ 2), and within the non-impacted firms in the sector (RQ 3). The participants included all the firms in the S&P Industrial Sector. Sub-hypotheses were used to trace the drivers of ratio changes. The changes in the impacted and non-impacted firms together lead to the year-over-year variations at the sector level. In other words, RQ 2 and RQ 3 are designed to provide breakdowns and root causes of the

differences at the sector level. The magnitude and directions of differences in Group 1 match the activities at the sector level pre and post Topic 842. In addition, Group 1 firms' financial performance showed more volatility, while the Group 2 firms showed more stability.

The Theoretical Framework. As shown in Figure 1, Topic 842 has three underlying theories: the doctrine of principles-based accounting, substance over form, and constructive capitalization. Topic 842 is one of FASB's joint projects with IASB to navigate away from the rules-based lease accounting standards (Collins et al., 2012). FASB proposed moving away from rules-based accounting in the wake of numerous accounting scandals in the early 2000s (Bailey & Sawers, 2018). This causal-comparative research is not designed to establish the association between Topic 842 and financial metrics changes. However, it provides empirical evidence supporting the significant changes in financial data post implementing Topic 842 and adds to the literature on the impacts of the new lease accounting standards.

The ideal accounting standards should improve representativeness, accuracy, bias suppression, consistency in ethicality, and correctability (Bailey & Sawers, 2018). Both the management and the auditors' perspectives are embedded in the lease accounting treatment decision. When regulations lack adequate checks, punishment, and rewards, creative accounting practices are unavoidable under the motivation of greed and intention to deceive users of financial reporting (Akpanuko & Umoren, 2018). Invoking the doctrine of Substance over Form when there is a conflict between legal correctness and economic essence refocus the attention of decision-makers to the accounting substances of financial transactions; thus, the linked transactions are reported as a whole (Akpanuko & Umoren, 2018). The findings from the hypotheses testings identified the impacted firms as the primary contributor to the differences at the Sector level. The sub-hypotheses testings traced the drivers of the differences in financial

metrics to (statistically) increased Fixed Assets, Total Assets, EBITDA, and cash holding position. In other words, the findings add to the evidences of material differences in reported financial data post Topic 842.

Proponents of asset specificity theory believers do not see the need of capitalizing operating leases because firms tend to invest in assets with high specificity and lease assets of low specificity (i.e., the non-essential assets in the business operations; (Shi et al., 2018). The constructive capitalization of operating leases aims at removing the distinctions between an operating lease, finance lease, or sales-type lease on reported financial data to stop the abusive use of the operating leases as an OBS financing method. Lessee firms' Fixed Assets, Total Assets, and Debt were expected to increase. The replacement of rental expense with the amortization of the operating lease-related liability was expected to increase the lessee firms' EBITDA. The findings confirmed the expected changes at the sector level; in the meantime, the findings also posed questions for future research. The significantly increased cash holding position and the declines in asset efficiency and profitability were contradictory before further investigations could explain the underlying rationale. The rationale of higher Fixed Assets and Total Assets is unknown, especially in Group 2 firms. Only time will prove whether firms would eventually switch from operating leases to purchase and own since both are reported as assets and liability anyways.

The Literature. The findings confirmed the ex-ante studies' projection of significant changes in financial leverage and profitability ratios, such as ROA and ROE deterioration. Decreased interest coverage and increased EBITDA also match with the projections in ex-ante studies. The trend of increasing Fixed Assets and Total Assets after implementing Topic 842 in this study agrees with the ex-post observations based on the first-quarter financial results. Firms

were projected to have less credit availability due to the increased debt position. The industrial sector's financial leverage ratios increased significantly; however, firms still ended up with more cash at hand. Cook et al. (2021) discovered a high cash holding position among lessee firms in the last 30 years due to the need to cover operating lease obligations. They stated the higher cash holding is a temporal trend in anticipation of the rising cost of capital (Cook et al., 2021). This study discovered both the firms with and without operating leases increased their cash reserves. It is beyond the scope of this study to investigate whether the fear of "less credit availability and increased cost of borrowing" was causing the firms to retain more cash at hand. However, the findings in this study confirmed the need to re-establish financial performance benchmarks because there were statistically significant differences in every category of the financial metrics.

The ex-ante studies mainly focused on airlines, healthcare, and retail industries. The sampled firms in this study are composed of airlines, machinery, trucking, construction, building engineering, and other sub-industries. The changes of EBITDA in relation to Total Assets were uncertain in the ex-ante studies. The Industrial Sector firms' EBITDA/Total Assets ratio had a statistically significant decrease. The ex-ante studies projected ROU assets values for a couple of major retailers such as Walmart, Amazon, and the healthcare industry. However, there were no ex-ante or post-ante studies on specific industry sectors based on any industrial coding system. The industrial sector's total recognized operating lease ROU in Years 2 was $44,490 million. The researcher cannot conclude the magnitude of this increase without comparing it with other industries or pre-determined expectations. Yoon (2020) noticed a significant increase in capital expenditure in conjunction with a noticeable decrease in operating leases in the first quarter post Topic 842 adoption. Firms had over two years to respond to the changes in Topic 842. The recognized ROU assets would not have included the portion of operating leases switched into

owned assets. Switching from leasing assets to purchased assets or finance leases may be a viable option for firms because both purchased assets and finance leases offer more asset depreciation options.

The Problem. This research is designed to investigate the holistic impacts of Topic 842 lessee firms' financial metrics. The process of complying with GAAP changes alters managers' information set and changes their investment decisions, especially capital expenditure decisions (Shroff, 2017). The findings from this study might add to the literature on the actual effects of accounting standards change by providing evidence from the reported financial data. Barth et al. (2007) stated firms applying IAS standards showed an improvement in accounting quality. There were fewer earnings-smoothing or earnings-management practices but more timely recognition of losses and a higher association of accounting amounts with firm returns and stock price (Barth et al., 2007). IAS and FASB launched the new lease accounting standards at about the same time. Both IFRS and GAAP lease accounting standards adopted the constructive capitalization theory, although they diverge in lease classification approaches. The findings in this research provide insights into the changes in financial metrics by comparing the differences in the S&P Industrial sector's financial measurements under the U.S. GAAP pre and post Topic 842 implementation. The discoveries and questions identified from the findings can be used as a pointer for further investigation within the United States or in comparison with the implications of IFRS 16.

Summary of the Findings

In summary, the findings from this study provide evidence exemplifying statistically significant differences in various financial measures in the S&P Industrial Sector after Topic 842 took effect. The researcher used three sets of hypotheses to address each of the three research questions and designed sub-hypotheses to trace the driver of the ratio changes. It can be

concluded there were significant differences in financial ratios pre and post Topic 842 implementation. As a result, the null hypotheses of no significant differences are rejected (See Table 5 for details). The impacted firms showed more volatility than the non-impacted firms in every category of financial performance measures. The impacted groups' year-over-year variations dictated the fluctuations of multiple ratios at the sector level.

The overall asset efficiency deterioration was driven by the disproportional increase of Fixed Assets and Total Assets to the increase in Sales. The expected increase in EBITDA did not match the increases in Equity and Total Assets, leading to a significant decrease in profitability. There were more variations in financial leverage ratios within the impacted firms, which match the differences at the sector level. There were no significant variations in liquidity and Altman's Z-score at the sector level. In contrast with the year-over-year performance fluctuations of the impacted firms, the non-impacted firms had no significant changes, except for a significant increase in the Cash/Total Assets ratio. The whole industrial sector ended up in a significantly higher amount of cash regardless of dropping profitability. The underlying reasons for variations of the financial metrics are unknown, especially the increased cash holding position. It has yet to be discovered whether the increase in Fixed Assets was driven by ROU lease assets or increased capital expenditure and if the higher cash holding position is an indicator of the increasing cost of capital.

Application to Professional Practice

"Accounting research is the joint connection between accounting theory and standards" (Zalaghi & Khazaei, 2016, p. 227). This study was designed to explore the magnitude of the changes in reported financial data due to the change in the accounting treatment of operating leases. The finding of this study might be of interest to professionals in accounting standard-

setting, credit rating and financial institutions, lessor firms, and auditing practices. The S&P lessee firms' financial performance volatility post Topic 842 would caution financial statement users for different purposes. Specific findings from this study, such as decreased profitability, increased equity, assets, and cash holding position, would caution stakeholders of various interests.

Improving General Business Practice

The accounting theory is expected to enable standard-setting authorities to deduct standards (Zalaghi & Khazaei, 2016). The standard-setting process for Topic 842 was full of controversy. The proponents of asset specificity theory believe the previous lease accounting standard was more representationally faithful. The lobbying activities were intensive during the standard-setting period. As illustrated in Figure 1, Topic 842 is based on the doctrine of "substance of form," the constructive capitalization model, and the concept of principle-based accounting standards. Financial ratios are the direct outputs of implementing the new accounting standards. A high-quality accounting standard is expected to "improve financial reporting by enhancing financial statement users' ability to make investment and credit decisions" (Linsmeier et al., 1998, p. 161). The ultimate goal of accounting standards is to achieve better understandability, comparability, and decision usefulness of financial reporting (Palmrose & Kinney Jr, 2018). Understanding how new lease accounting standards impacted the reported financial data are necessary for future updates and revisions.

The credit agencies and sophisticated financial statement users were adjusting financial data based on disclosed operating lease information. The incremental operating-lease-related capitalization adjustments do not add more explanatory power to the credit ratings of S&P firms; instead, these adjustments will better explain bank loan decisions when the risk of bankruptcy is

high (Altamuro et al., 2014). Nuryani et al. (2015) stated small firms had used leases as a cheaper funding alternative due to the financial constraints of obtaining external funding. This study affirms majority of S&P Industrial Sector firms managed to remain in the safe zone regardless of the year-over-year volatility in financial metrics. The significant increases in assets and equity when asset efficiency and profitability were dropping would be of particular interest to equity investors. The impacted firms were worse off than the non-impacted firms in various financial measures, indicating the magnitude of Topic 842's effects on financial statements. The realistic changes in financial indicators affect bankers' assessment of the borrowers' ability to repay and credit rating (Durocher & Fortin, 2009). The credit rating agencies and financial institutions would be the first ones to respond to the implications of the financial metrics' variations.

There was a significant increase in Total Assets at the sector level, mainly driven by additions to the Fixed Assets. Capitalization of operating leases was expected to increase Fixed Assets (thus Total Assets) and liability; however, the amount of equity increased significantly under the climate of dropping profitability. S&P firms have fewer restrictions when issuing shares in the equity market. Yoon (2020) discovered a marked decrease in operating activities and a significant increase in capital expenditure post Topic 842. This study alerts the equity investors to understand the firms' capital structures post Topic 842. It also prompts the lessor firms' interests in knowing if lessees are shifting from operating leases to purchases.

Although Topic 842 implementation is only required for public firms so far, auditors of all firms following GAAP will eventually determine if firms have performed adequate work to ensure reasonable opening entries upon the initial implementation (Austin, 2020). Accounting standard-setters, auditors, and regulators have been looking for characteristics of high-quality

audits (Palmrose & Kinney Jr, 2018). In response to the request of the SEC, FASB requested capitalization of operating leases to stop OBS financing; however, lease accounting is still one of the issues with largely unresolved disputes about the true meaning of underlying economics of various commercial arrangements (Palmrose & Kinney Jr, 2018). Findings highlighting the areas of significant differences in a business sector comprised of machinery, building products, aerospace and defense, and airlines could be informative to auditors' judgments.

Potential Application Strategies

Jiang et al. (2018) sampled 211 financial accounting standards between 1973 and 2014 found the most frequent reason for FASB to take on a project is to reduce diverse practices and inconsistency in guidance. The majority of standards are intended to enhance comparability (Jiang et al., 2018). Literature documented the most significant dispute over the new lease accounting standards during the ED phase was the concept of capitalized assets and liability. Topic 842 requires capitalization of assets and liability but kept the classifications of lease types from SFAS No. 13. Recognizing assets and liability related to operating leases remove the distinctions between an operating lease and financing lease or sale-type lease on the balance sheet; however, the implications for income statement and statement of cash flows remain post Topic 842. Technically, the same cash payment could be reported differently on the income statement and the statement of cash flows depending on the lease type.

Findings in this study indicated significant changes in capital structure, profitability, and cash holding positions. In other words, there were material differences in financial data related to balance sheets, income statements, and the statement of cash flows post Topic 842. The challenges for the accounting standard-setting organization are to understand how firms will transact in response to the shifts in financial performance benchmarks and the implications of

different lease types on the income statement and the statement of cash flows. In addition, as the implementation of Topic 842 rolls out to other forms of entities, evaluating the new lease accounting standards' effectiveness and financial representativeness of the underlying economics is necessary. Lease is one of the major topics followed by a series of minor standards to address implementation issued after the original standards went into effect (Jiang et al., 2018). Suggested actions to enhance the effectiveness of the accounting standard-setting include the following:

Leverage the Participation of the Academic Community. FASB expressed the need for the academic community's involvement in the process of accounting standard-setting (Nashwa, 2004). Internationally, academics have called to get more engaged in the standards-setting process because of the positive influences academic research could have at different stages of the due process (Larson & Herz, 2011). There has been a trend of more participation from the academic community in the form of journal articles, comment letters, discussion memorandums, and membership of the FASB and its committee in the last 20 years (Nashwa, 2004). Given the short amount of time Topic 842 has been in effect, efforts from the academic community can assist in constructing the complete picture of post Topic 842 lease transactions.

Incorporate the Experience of Stakeholders in Standards Updates. Stakeholders of new accounting standards, such as public accounting firms, preparers, and specialized associations, are most likely to provide first-hand information about implementation issues or require exemptions or alternatives (Jiang et al., 2018). The implementation of Topic 842 is challenging for both the financial statement preparers and the auditors. One example of these challenges is the identification of all the contracts accurately. On the one hand, the preparers need to make sure all the lease arrangements are reviewed, and the lease and non-lease components are separately correctly; on the other hand, the auditors need to understand the

preparers' internal process to determine the completeness of the initial entry (Austin, 2020; Singer et al., 2020). These challenges require IT support, data and system capacity, established internal control and processes (Scott, 2020). In addition, the concern of finding an appropriate discount rate that both the preparers and auditors agree on still exists (Austin, 2020). Collecting and acting upon the information provided by various stakeholders is critical to the process of accounting standard-updating.

Rely on SEC for International Harmonization of Accounting Rules. The SEC is the federal regulatory agency with an oversight role in standard-setting (SEC, n.d.). FASB is directly accountable to SEC. Lease accounting is one of the subject matters SEC initiated and pressured FASB to stop the abusive use of OBS financing through lease transactions (Palmrose & Kinney Jr, 2018). Topic 842 diverges from IFRS 16 in terms of lease classification. The differences between Topic 842 and IFRS 16 will shift to the income statement, statement of comprehensive income, and statement of cash flows (Ananthanarayanan & Harris, 2019). Findings from this study revealed significant differences in data on the income statement and the statement of cash flows post Topic 842. As a result, the comparability between financial statements prepared under GAAP and IFRS 16 will continue to be a challenge.

Summary of Application to Professional Practice

The potential impacts of Topic 842 started with its implementation in public firms, and its full effects will take place after all entities have adopted the new lease accounting standards. The stakeholders have yet to see the full impact of Topic 842. FASB decided to move toward principles-based accounting standards in the hope of achieving better quality, or less aggressive, financial reporting (Agoglia et al., 2011). FASB incorporated the theory of constructive capitalization; yet decided to inherit the lease classifications from SFAS No. 13. The issue of

comparability between financial statements under IFRS and GAAP still exists, especially the income statement. Both the market and FASB are learning how the firms will react to the upcoming changes. The academic community, stakeholders, and SEC can all contribute to the advancement of lease accounting standards.

Recommendations for Future Study

In the process of investigating the year-over-year changes in the industrial sector's financial performance, several areas for future study are identified. The researcher humbly acknowledges this study ends up with more unanswered questions than resolved, making it an exploratory investigation for future research. Directions for further research are in two categories: capital structure management and pattern of leasing transactions post Topic 842.

The lessee firms' assets were expected to increase. In reality, over 80% of the firms in the sector ended up with more Fixed Assets (Total Assets), and 74% of firms had higher equity post Topic 842. In other words, most of the firms in the sector (both impacted and non-impacted firms) experienced a change in capital structure post Topic 842. The shift in capital structure and its implication have yet to be understood. When firms choose between equity or debt issuances, firms tend to make financial choices to maintain a target debt ratio (Hovakimian et al., 2001). Further study is necessary to understand if the source of the additional assets is operating-lease-related assets, acquired assets in place of used-to-be leased assets, or other new capital investment.

Additionally, over 77% of the firms in the sector held more cash despite the decreasing profitability. Recognizing ROU-related assets and liabilities is only a change of accounting treatment; it does not require more cash outlay from lessee firms. Without improvement in profitability, the sustainability of a higher cash holding position is doubtful, and its motivation or

drive is fully understood. Further investigation is necessary to understand the underlying rationale and its implications to the capital market.

Topic 842 maintained the classifications of the leases as in the previous lease accounting standards. Capitalizing operating leases will remove the differences between lease types on the balance sheet; however, the same lease payment will result in different presentations on both the income statement and the statement of cash flows simply because of the lease types. For example, in a financing lease, the amortization of ROU assets is generally based on the straight-line method; thus, the interest is the highest at the initiation of a financing lease (Freeman, 2018). Thus, the differences between the lease types on the income statement and the statement of cash flows will be the primary factors influencing firms' lease contracting choices. Once the dust has been settled after implementing the new lease accounting standards, future studies can follow up with the lease transaction pattern in the era of Topic 842.

Reflections

This project has been a challenging and rewarding experience. This process provides an opportunity for the researcher to attempt to conduct an in-depth study on the topic of lease accounting standards and learn to be an independent thinker. Each step in this project has been a learning process. Other than professional growth in conducting research, integrating accounting research with the Christian worldview provides the researcher a chance to look at accounting standards from the perspective of the spiritual battle between human's sinful nature and faithful representation of economics.

Personal and Professional Growth

The original motivation for choosing the topic of lease accounting was curiosity about the magnitude of differences in reported financial data and the differences between U.S. GAAP and

IFRS in lease accounting standards. Due to the complexity of the topic, the research process has been challenging. This project became a learning experience of constructing a meaningful research project and fulfilling the project's purpose by following the scientific process.

At the beginning of the project, the biggest challenge was developing a research problem while keeping bias and expectations at bay. The research questions and hypotheses design went through several rounds of revisions. Every step in the project involved searching for options, debating over the options, making a decision, and executing the decision. The researcher has been learning and re-learning "to be honest with oneself" and stay open-minded when performing research.

The access to archival public data has been smooth. However, the data collection and testing required meticulous attention to detail because of the number of variables involved. Validity and reliability are the determinants of the rigor of a quantitative study; thus, providing evidence addressing the tools and instruments utilized in the research is a critical step in good quality research (Heale & Twycross, 2015). Investigating and rationalizing outliers treatment, test assumptions, and G*power calculations increased the researcher's confidence in the research results. The concluding portion of the project is one critical inquiry process. The biggest challenge was to avoid over-stretch when interpreting the test results. There were expected and unexpected testing results. The unexpected testing results offer another opportunity to work on the topic in more depth and width. The biggest surprise is the researcher ends up with more questions and deeper curiosity about the research topic, which is also the most rewarding part of the whole process.

Biblical Perspective

From the Biblical perspective, the case of lease accounting standards involves two questions. The first question is the root cause of deviation from the faithful representation of financial reporting. Is the lease transaction, accounting standards, or any other factors the source of the problem? The second question is the long-term solution to the quality of financial reporting, whether the system of principles-based or rules-based accounting standards answers the challenge.

Leases can provide a convenient and flexible form of corporate financing, which is more advantageous than a loan and purchase of an asset (Pancheva, 2015). Besides being an attractive financing method to acquire assets, leasing can also minimize the risks of owning an asset for lessor/lessee firms, encourage firms to specialize in different functions, and solve contracting impediments (Merrill, 2020). Leasing has been a viable option for small and medium-sized enterprises (SMEs) or new and young enterprises to grow and achieve efficiency (Kraemer-Eis & Lang, 2012). However, lease and lease accounting standards eventually incubated the practice of contractual manipulations to hide liabilities and manage earnings.

The development of lease transactions from an efficient and viable financing tool to abusive use of OBS financing is a typical example of human beings' sinful nature when facing temptation and weak faith in following through with the original intention. The Bible says, "But every man is tempted, when he is drawn away of his own lust, and enticed" (James 1:14, KJV). Accounting practice should not depend on calculated financial results but rather on stewardship of stakeholders' trust. The problem with lease accounting rules is they shield firms from litigation (Donelson et al., 2012). How rule-abiding practices turned out to be an abusive use of accounting rules for unspoken purposes is the question for the accounting professionals in the

long term. The case of lease accounting standards is just one exposure of the underlying battle of right or wrong.

An example from the old testament is Israel wanted a king to rule over them. The reason for a king was "That we also may be like all the nations; and that our king may judge us, and go out before us, and fight our battles" (1 Samuel 8:20 KJV). The thoughts of having a king over Israel sounded appealing, although the hidden drive was the avoidance of God's kingship. The desire to be "like all the nations" is addressed in 2 Corinthians in the Bible. "For we dare not make ourselves of the numbers, or compare ourselves with some that commend themselves…" (2 Corinthians 10:12 KJV). Paul pointed out the problem of misplaced confidence in human strength and countered his opponents because comparing with one another threatens the congregation (Ellington, 2012). Israel ended up deviating from Yahweh worship and followed the "sin of Jeroboam," and the tolerance of other religions led to the collapse of Solomon's empire (Hubbard, 1991). The Bible addresses the issue of rule-abiding injustice. "But now, after that ye have known God, or rather are known of God, how turn ye again to the weak and beggarly elements, whereunto ye desire again to be in bondage" (Galatians 4:9, KJV). The ultimate answer to faithful business conduct is recognizing the limitation of human beings' morality and turning to Bible doctrine. Focus on God's principles is the only way to righteousness. Neither determinations nor ethics standards can cleanse human beings' sinful nature.

Although FASB started the lease standards-setting project with an intention to converge to principles-based accounting standards, the GAAP lease accounting standards ended up with more convergence on the balance sheet than on the income statement. Time will tell if IFRS or GAAP lease accounting standards better address the concerns of abusive use of operating leases.

"The quality of financial reporting determines and depends upon the value of accounting reporting" (Herath & Albarqi, 2017, p. 1). The ultimate criterion of comparison between these two accounting standard systems is whether the principles-based or rules-based system leads to a faithful representation of the underlying economics with a foundation on ethical practices in the accounting profession. A profession is established based on the professionals' ability to exercise judgment while applying specialized knowledge (Flanagan & Clarke, 2007). Accounting professionals have the duty to be competent, put clients' interests before their own, and serve the public interest (Duska et al., 2018).

The "Parables of Talents" in Matthew 25:14-30 describes what three servants did with the talents their master entrusted them with before traveling into a far country. When the master returned, the three servants were held accountable for the opportunity to take action and make the most out of the entrusted talents. The third servant said, "And I was afraid, and went and hid thy talent in the earth; lo, there thou hast that is thine" (Matthew 25:25, KJV). Although the third servant protected the talent very well and waited patiently for the master's return, he was called "wicked and slothful" while the other two servants were rewarded because they made more of what they were given. The master is not looking for automated robotic loyalty. Jesus instructed the believers to seek first God's kingdom, which means to strive for true progress, use gifts and talents in real practice for his glorious return (Timmer, 2017).

In the context of the accounting profession, the practice of professional judgment does not mean following the rules rigidly or being satisfied as long as the rules are not violated. Rules and regulations are necessary but not sufficient conditions for effective accounting practice (Flanagan & Clarke, 2007). The rule-oriented approach is not enough for accountants to maintain leadership in professional ethics or the accounting profession to gain trust in the public's minds

(Warth, 2000). Rules can not guarantee the quality of financial reporting and do not represent the highest standards the accounting profession should aim for. Agoglia et al. (2011) stated financial preparers tend to be less aggressive when applying a less precise, more principles-based lease classification standard. The increasingly regulated environment hinders accounting practitioners from exercising professional judgment (Flanagan & Clarke, 2007). The true challenge for the accounting profession is its ability to put the principles of the faithful financial representation of economics into practice.

Summary of Reflections

The journey of the dissertation project has been a process of learning how to change a general intellectual curiosity into a specific problem and search for answers through applying a scientific process. This project left much to be desired; however, it has been a healthy practice for the researcher and opens doors for future research possibilities. In addition, the Biblical integration section of the project allows the researcher to look at professionalism and accounting knowledge in the context of the Christian worldview at a unique time in history. The truth of the COVID-19 and the disease may be told in full later. The reality is Christians were forced to reflect their faith at home. Contemplating business research from the Christian worldview has been a source of strength and power for the researcher.

Summary of Section 3

This quantitative study utilizes the causal-comparative research method to examine the differences between the financial performance metrics immediately before and after the implementation of Topic 842. This study covers all the 73 firms in the S&P Industrial Sector (3 firms were excluded due to unavailability of comparative financial statements). Paired *t*-test or

its non-parametric alternatives, Wilcoxon, were used to compare the pre and post Topic 842 financial performance within the sector, the impacted firms, and non-impacted firms.

This study found significant differences in the financial performance metrics at the sector level driven by the fluctuations from the impacted firms. The stability of the non-impacted firms contrasts with the volatility in Topic 842-impacted firms. The researcher can conclude implementing Topic 842 corrected the omission of material financial data related to the extensive use of the operating leases as an OBS financing tool. The implementation of Topic 842 led to (statistically) significant changes in industrial sector firms' financial performance profile, especially firms utilizing operating leases. Decreases in asset efficiency and profitability despite higher sales could be an early warning for investment returns. Increases in financial leverage and equity, together with higher cash position, indicate firms have taken actions to realign the capital structure. Future studies will answer the motivation for higher cash holding and complete the picture of how firms transact and choose among three types of leases to embrace Topic 842 fully.

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Appendix A: Descriptives

Financial Metrics		Industrial Sector Overall						Impacted Firms (Group 1)						Non-impacted Firms (Group 2)					
Category	Variables	Valid N	Range	Minimum	Maximum	Mean	Std. Deviation	Valid N	Range	Minimum	Maximum	Mean	Std. Deviation	Valid N	Range	Minimum	Maximum	Mean	Std. Deviation
Asset Efficiency	Pre_FA_TO	64	4.577	0.268	4.845	1.2618	0.803	29	4.633	0.307	4.940	1.308	0.991	35	4.577	0.268	4.845	1.362	0.895
	Post_FA_TO	64	4.389	0.299	4.688	1.2178	0.782	29	3.654	0.316	3.970	1.184	0.831	35	4.389	0.299	4.688	1.334	0.868
	Pre_TA_TO	63	1.661	0.250	1.911	0.7936	0.356	29	2.169	0.287	2.455	0.845	0.473	38	1.661	0.250	1.911	0.814	0.349
	Post_TA_TO	63	1.638	0.274	1.913	0.7649	0.348	29	1.922	0.293	2.214	0.794	0.424	38	1.638	0.274	1.913	0.789	0.357
Profitability	Pre_ROA	64	0.304	-0.072	0.232	0.0885	0.056	31	0.304	-0.072	0.232	0.097	0.073	35	0.159	0.013	0.172	0.082	0.041
	Post_ROA	64	0.237	-0.029	0.208	0.0844	0.049	31	0.237	-0.029	0.208	0.090	0.058	35	0.150	0.017	0.167	0.080	0.038
	Pre_ROE	64	2.076	-0.498	1.578	0.2500	0.248	28	0.777	-0.234	0.543	0.234	0.148	37	11.840	-8.360	3.480	0.078	1.536
	Post_ROE	64	1.622	-0.270	1.352	0.2322	0.210	28	0.625	-0.174	0.451	0.219	0.119	37	16.250	-14.290	1.960	-0.090	2.435
	Pre_NP	64	0.399	-0.109	0.290	0.1102	0.069	29	0.399	-0.109	0.290	0.113	0.084	35	0.221	0.015	0.236	0.104	0.050
	Post_NP	64	0.381	-0.064	0.317	0.1084	0.063	29	0.381	-0.064	0.317	0.114	0.080	35	0.251	-0.010	0.241	0.099	0.048
	Pre_EBITDA_Equity	63	2.846	0.061	2.908	0.4798	0.388	30	2.846	0.061	2.908	0.527	0.498	34	2.246	-0.983	1.262	0.395	0.347
	Post_EBITDA_Equity	63	2.633	0.006	2.639	0.4527	0.359	30	2.441	0.198	2.639	0.500	0.447	34	2.043	-0.745	1.299	0.376	0.318
	Pre_NEBITDA_Equity	63	2.932	0.108	3.040	0.4941	0.398	31	2.826	0.214	3.040	0.547	0.507	34	2.290	-1.030	1.261	0.396	0.351
	Post_NEBITDA_Equity	63	3.141	-0.047	3.094	0.4716	0.406	31	2.901	0.193	3.094	0.534	0.511	34	2.083	-0.801	1.281	0.378	0.330
	Pre_EBITDA_TA	66	0.371	0.012	0.383	0.1616	0.071	30	0.371	0.012	0.383	0.175	0.081	36	0.248	0.047	0.295	0.150	0.060
	Post_EBITDA_TA	66	0.321	0.034	0.356	0.1517	0.062	30	0.321	0.034	0.356	0.163	0.069	36	0.217	0.053	0.270	0.143	0.055
	Pre_NEBITDA_TA	66	0.334	0.049	0.383	0.1616	0.071	32	0.334	0.049	0.383	0.182	0.082	35	0.248	0.060	0.308	0.154	0.057
	Post_NEBITDA_TA	66	0.379	-0.024	0.355	0.1534	0.062	32	0.298	0.058	0.355	0.166	0.067	35	0.227	0.057	0.284	0.150	0.056
Financial Coverage	Pre_Assets_Equity	63	23.214	-6.745	16.469	2.9005	2.378	31	15.037	1.433	16.470	3.277	2.752	35	37.715	-6.745	30.970	3.462	5.161
	Post_Assets_Equity	63	23.257	-5.634	17.623	3.0274	2.437	31	16.232	1.388	17.620	3.542	3.062	35	20.622	-5.634	14.988	3.049	2.751
	Pre_Debt_Equity	63	23.214	-7.745	15.469	1.9005	2.378	31	15.036	0.433	15.469	2.277	2.752	34	12.954	-7.745	5.209	1.653	1.960
	Post_Debt_Equity	63	23.257	-6.634	16.623	2.0274	2.437	31	16.235	0.388	16.623	2.542	3.063	34	12.029	-6.634	5.395	1.698	1.831
	Pre_Debt_EBITDA	66	11.113	0.801	11.914	4.6203	2.412	30	7.719	0.801	8.520	3.897	2.076	36	11.087	0.827	11.914	5.223	2.532
	Post_Debt_EBITDA	66	9.764	0.840	10.604	4.8461	2.225	30	8.435	0.840	9.275	4.243	2.017	36	9.755	0.849	10.604	5.348	2.292
	Pre_Debt_NEBITDA	66	16.280	0.793	17.073	4.6512	2.648	31	16.271	0.801	17.073	4.186	3.028	35	9.633	0.793	10.425	4.950	2.151
	Post_Debt_NEBITDA	66	14.631	0.805	15.436	4.7773	2.380	31	14.596	0.840	15.436	4.563	2.829	35	8.903	0.805	9.708	4.991	1.941
	Pre_Debt_Ratio	66	0.904	0.244	1.148	0.6440	0.177	31	0.685	0.302	0.987	0.615	0.177	35	0.904	0.244	1.148	0.670	0.175
	Post_Debt_Ratio	66	0.949	0.229	1.177	0.6516	0.183	31	0.732	0.279	1.011	0.630	0.183	35	0.949	0.229	1.177	0.671	0.184
	Pre_Int_Cov (EBITDA)	64	102.967	-2.022	100.944	14.2978	13.509	28	102.967	-2.022	100.944	17.413	18.739	36	27.519	2.682	30.202	11.875	6.618
	Post_Int_Cov (EBITDA)	64	97.044	0.143	97.187	13.9659	13.450	28	95.953	1.234	97.187	17.110	18.516	36	32.600	0.143	32.743	11.520	6.863
	Pre_Int_Cov (NEBITDA)	64	98.096	2.809	100.905	14.5740	13.341	27	97.714	3.190	100.905	17.867	18.758	35	27.393	2.809	30.202	12.031	6.571
	Post_Int_Cov (NEBITDA)	64	100.323	-3.222	97.101	14.0988	13.513	27	93.481	3.620	97.101	17.007	18.552	35	33.690	0.140	33.835	11.928	6.952
Liquidity	Pre_Cash_TA	65	0.277	0.001	0.279	0.0575	0.049	32	0.276	0.002	0.279	0.062	0.054	35	0.159	0.001	0.161	0.055	0.043
	Post_Cash_TA	65	0.331	0.002	0.333	0.0648	0.055	32	0.331	0.003	0.333	0.070	0.064	35	0.165	0.002	0.167	0.066	0.049
	Pre_WC_TA	66	0.773	-0.208	0.566	0.0961	0.141	32	0.773	-0.208	0.566	0.108	0.166	35	0.506	-0.156	0.350	0.086	0.112
	Post_WC_TA	66	0.706	-0.203	0.503	0.0957	0.137	32	0.706	-0.203	0.503	0.100	0.160	35	0.516	-0.168	0.347	0.096	0.116
	Pre_Current_Ratio	65	2.584	0.412	2.996	1.3977	0.551	32	4.884	0.412	5.295	1.559	0.871	34	2.522	0.474	2.996	1.360	0.556
	Post_Current_Ratio	65	3.184	0.341	3.525	1.4436	0.640	32	4.170	0.341	4.511	1.540	0.827	34	3.077	0.448	3.525	1.444	0.654
	Pre_Quick_Ratio	65	2.087	0.265	2.351	1.0976	0.482	32	2.087	0.265	2.351	1.221	0.529	34	1.919	0.310	2.228	0.980	0.397
	Post_Quick_Ratio	65	2.537	0.205	2.742	1.1348	0.547	32	2.388	0.220	2.607	1.216	0.570	34	2.442	0.263	2.705	1.061	0.517
Altman's Z	Pre Z-Score Zones	70	2	1	3	2.9900	0.120	32	2	1	3	3.000	0.000	38	2.000	1	3	2.970	0.162
	Post Z-Score Zones	70	2	1	3	2.9700	0.168	32	2	1	3	2.970	0.177	38	2.000	1	3	2.970	0.162
	Pre Z-Score Value	70	11.060	2.590	13.650	6.9964	2.162	32	10.380	3.280	13.650	7.215	2.443	38	9.240	2.590	11.830	6.812	1.908
	Post Z-Score Value	70	10.510	2.640	13.150	7.0425	2.175	32	10.330	2.820	13.150	6.996	2.378	38	9.210	2.640	11.850	6.817	2.060

Note: Yellow highlighted cells are post> pre

Appendix B: Counts of Outlier Firms

Industrial Sector Outliers

Company Names	Count of Symbol	Cumulative % of Total
Boeing Company	14	13%
Rollins Inc.	8	21%
Equifax Inc.	8	28%
Wabtec Corporation	7	35%
General Electric	7	41%
Rockwell Automation Inc.	6	47%
Masco Corp.	4	50%
Expeditors	4	54%
TransDigm Group	4	58%
Robert Half International	4	62%
American Airlines Group	4	65%
Fortive Corp	4	69%
Lockheed Martin Corp.	4	73%
Waste Management Inc.	4	77%
Parker-Hannifin	3	79%
Illinois Tool Works	3	82%
Jacobs Engineering Group	3	85%
3M Company	2	87%
Fastenal Co	2	89%
Johnson Controls International	2	91%
Old Dominion Freight Line	2	93%
A.O. Smith Corp	2	94%
C. H. Robinson Worldwide	2	96%
FedEx Corporation	1	97%
Copart Inc	1	98%
Roper Technologies	1	99%
Nielsen Holdings	1	100%
Grand Total	**107**	

Impacted Firms Outliers

Company Names	Count of Symbol	Cumulative % of Total
Rollins Inc.	8	21%
Masco Corp.	5	33%
General Electric	5	46%
Robert Half International	4	56%
Expeditors	3	64%
Fortive Corp	3	72%
C. H. Robinson Worldwide	2	77%
3M Company	2	82%
A.O. Smith Corp	2	87%
United Parcel Service	1	90%
Teledyne Technologies	1	92%
Verisk Analytics	1	95%
Flowserve Corporation	1	97%
Nielsen Holdings	1	**100%**
Grand Total	**39**	

Non-impacted Firms Outliers

Company Names	Count of Symbol	Cumulative % of Total
Boeing Company	14	23%
Equifax Inc.	9	37%
Wabtec Corporation	6	47%
Rockwell Automation Inc.	5	55%
American Airlines Group	4	61%
Waste Management Inc.	4	68%
Jacobs Engineering Group	4	74%
Lockheed Martin Corp.	4	81%
TransDigm Group	3	85%
Old Dominion Freight Line	2	89%
Illinois Tool Works	2	92%
Johnson Controls International	2	95%
Parker-Hannifin	2	98%
Roper Technologies	1	100%
Grand Total	**62**	

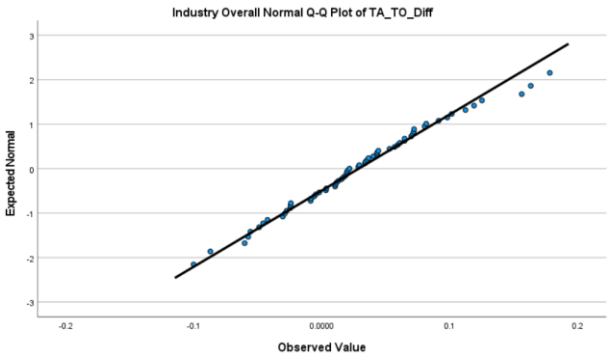
Appendix C: Assumption Tests

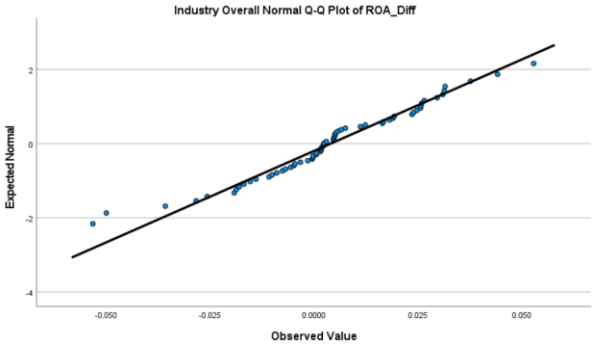
Industry Overall Tests of Normality

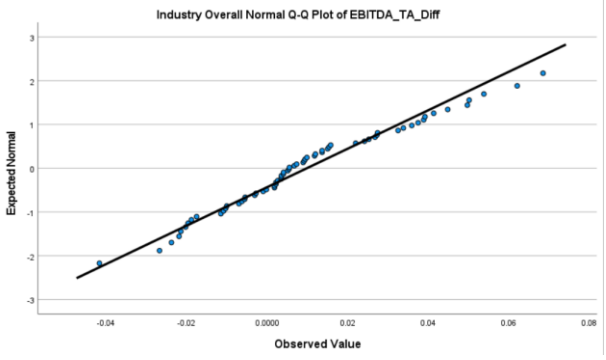
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
TA_TO_Diff	0.063	63	.200*	0.988	63	**0.804**
ROA_Diff	0.106	64	0.073	0.974	64	**0.201**
EBITDA_TA_Diff	0.109	66	0.049	0.975	66	**0.211**
Debt_EBITDA_Diff	0.148	66	0.001	0.964	66	**0.051**
WC_TA_Diff	0.065	66	.200*	0.984	66	**0.537**
Current_Ratio_Diff	0.088	65	.200*	0.966	65	**0.071**
Quick_Ratio_Diff	0.065	65	.200*	0.985	65	**0.609**
Zscore_Diff	0.099	64	0.18968	0.988	64	**0.786**

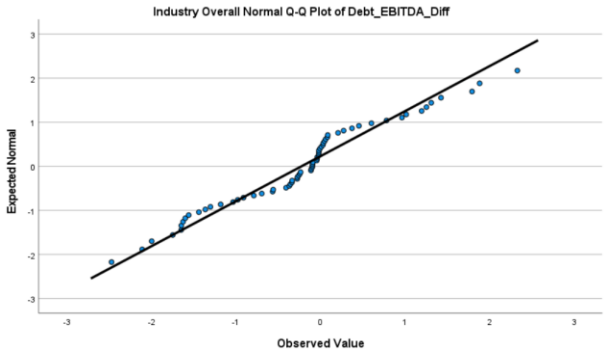
*. This is a lower bound of the true significance.

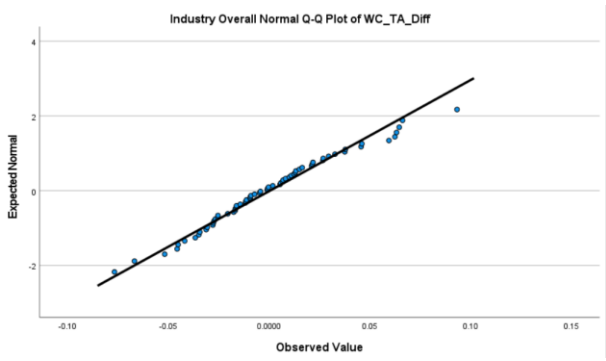
a. Lilliefors Significance Correction

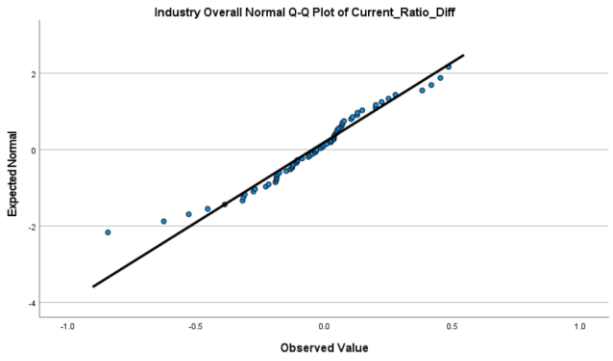


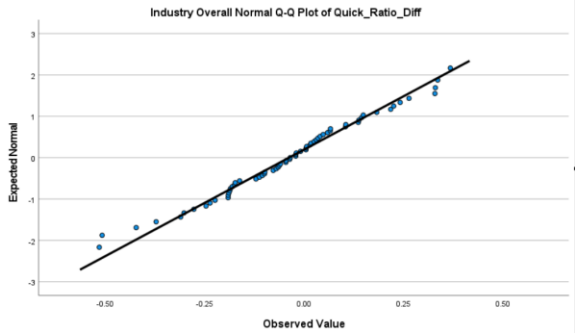


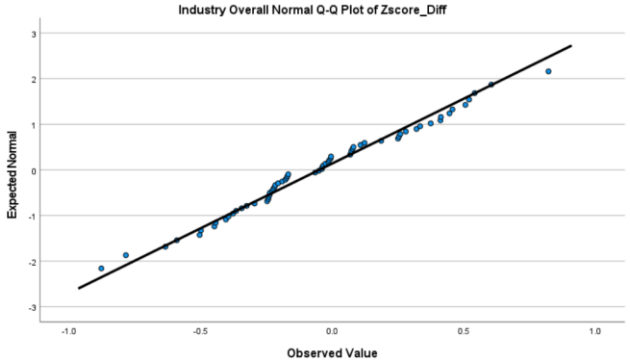










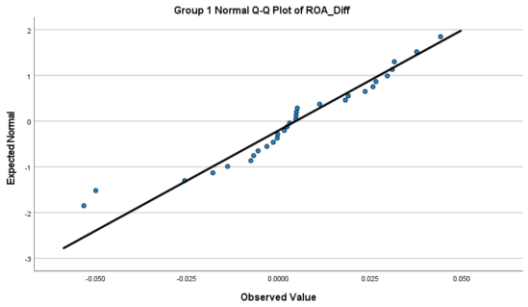


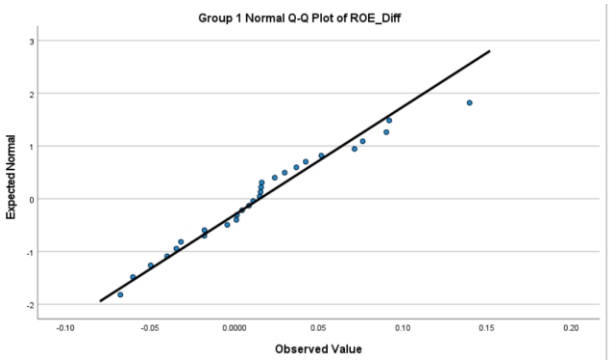
Group 1 Variables Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	**Sig.**
ROA_Diff	0.129	30	.200*	0.944	30	**0.113**
ROE_Diff	0.133	28	.200*	0.969	28	**0.565**
NP_Diff	0.120	29	.200*	0.973	29	**0.657**
EBITDA_Equity_Diff	0.110	30	.200*	0.965	30	**0.423**
NEBITDA_Equity_Diff	0.105	31	.200*	0.958	31	**0.252**
EBITDA_TA_Diff	0.124	30	.200*	0.970	30	**0.552**
NEBITDA_TA_Diff	0.166	30	0.03505	0.952	30	**0.192**
Debt_EBITDA_Diff	0.141	30	0.13059	0.956	30	**0.245**
Debt_NEBITDA_Diff	0.159	31	0.04371	0.948	31	**0.134**
Debt_Ratio_Diff	0.150	31	0.07235	0.935	31	**0.061**
Int_Cov_EBITDA_Diff	0.119	28	.200*	0.980	28	**0.853**
Int_Cov_NEBITDA_Diff	0.145	27	0.15368	0.943	27	**0.143**
Cash_TA_Diff	0.138	32	0.12524	0.954	32	**0.185**
WC_TA_Diff	0.168	32	0.02234	0.934	32	**0.050**
Current_Ratio_Diff	0.141	32	0.108	0.950	32	**0.146**
Quick_Ratio_Diff	0.108	32	.200*	0.975	32	**0.650**
Zscore_Diff	0.079	30	.200*	0.991	30	**0.995**

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction


Group 1 Normal Q-Q Plot of ROA_Diff
Expected Normal
Observed Value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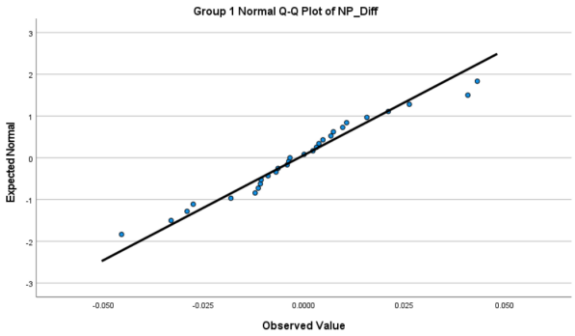
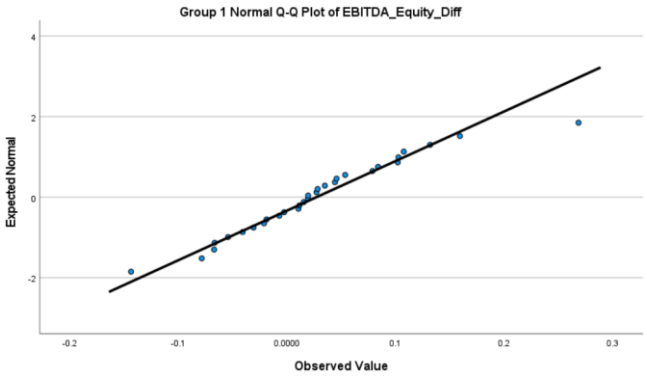
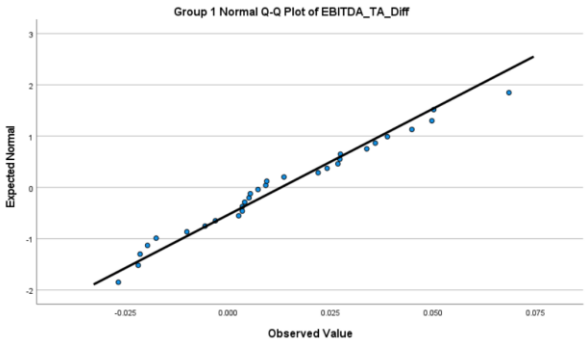
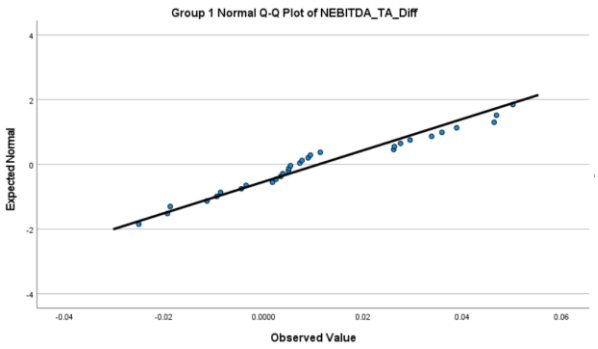
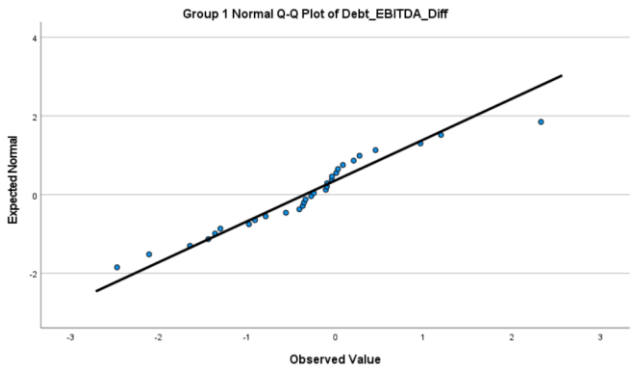
Expected Normal
Observed Value

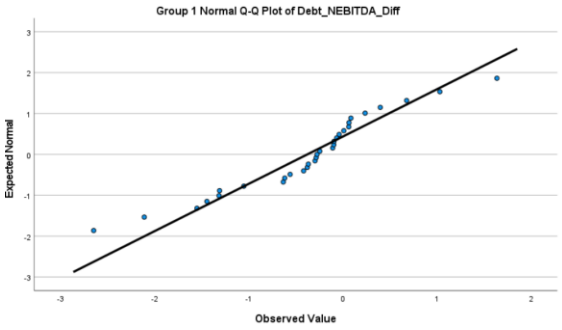

Group 1 Normal Q-Q Plot of NP_Diff
Expected Normal
Observed Value

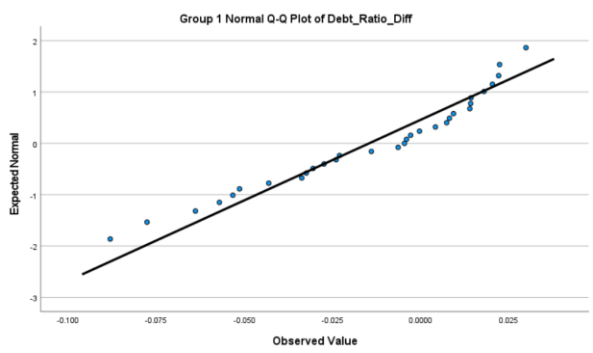

Group 1 Normal Q-Q Plot of EBITDA_Equity_Diff
Expected Normal
Observed Value

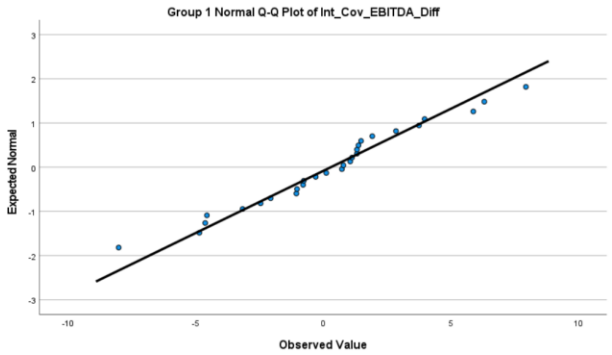

Group 1 Normal Q-Q Plot of EBITDA_TA_Diff
Expected Normal
Observed Value

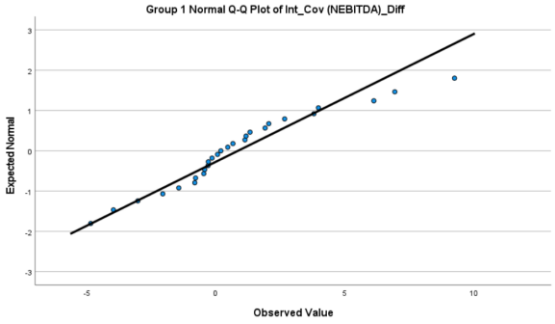

Group 1 Normal Q-Q Plot of NEBITDA_TA_Diff
Expected Normal
Observed Value

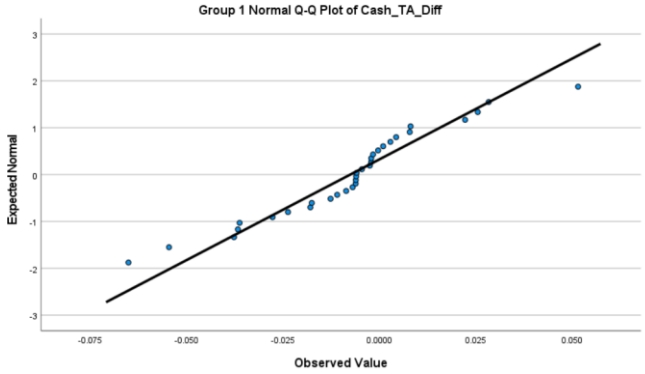

Group 1 Normal Q-Q Plot of Debt_EBITDA_Diff
Expected Normal
Observed Value

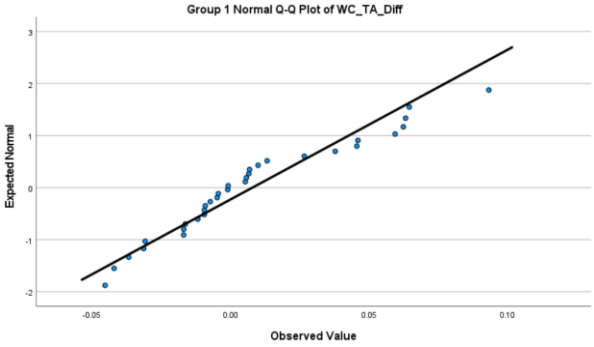

Group 1 Normal Q-Q Plot of Debt_NEBITDA_Diff
Expected Normal
Observed Value

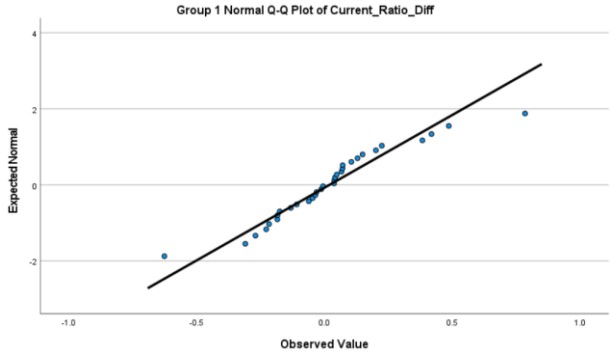

Group 1 Normal Q-Q Plot of Debt_Ratio_Diff
Expected Normal
Observed Value

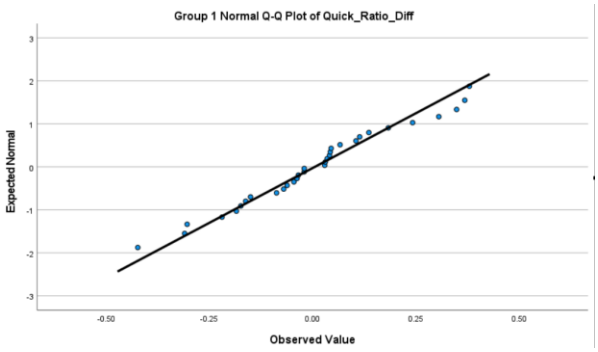

Group 1 Normal Q-Q Plot of Int_Cov_EBITDA_Diff
Expected Normal
Observed Value

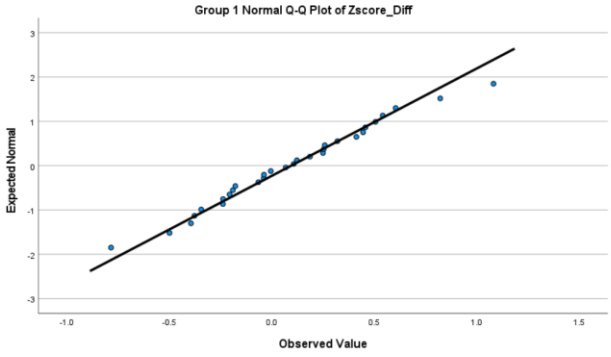

Group 1 Normal Q-Q Plot of Int_Cov (NEBITDA)_Diff
Expected Normal
Observed Value


Group 1 Normal Q-Q Plot of Cash_TA_Diff
Expected Normal
Observed Value


Group 1 Normal Q-Q Plot of WC_TA_Diff
Expected Normal
Observed Value


Group 1 Normal Q-Q Plot of Current_Ratio_Diff
Expected Normal
Observed Value


Group 1 Normal Q-Q Plot of Quick_Ratio_Diff
Expected Normal
Observed Value


Group 1 Normal Q-Q Plot of Zscore_Diff
Expected Normal
Observed Value

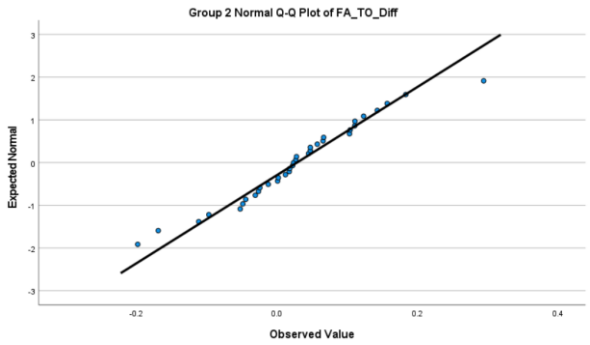
Appendix C: Assumption Tests (Continued)

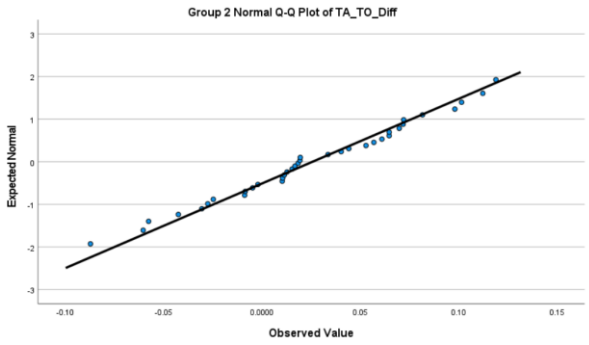
Group 2 Variables Tests of Normality

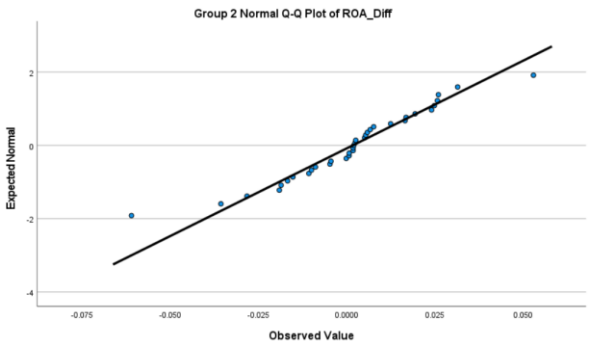
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
FA_TO_Diff	0.090	35	.200*	0.977	35	**0.675**
TA_TO_Diff	0.104	36	.200*	0.983	36	**0.853**
ROA_Diff	0.122	35	.200*	0.964	35	**0.297**
EBITDA_TA_Diff	0.152	36	0.035	0.961	36	**0.230**
NEBITDA_TA_Diff	0.128	35	0.156	0.945	35	**0.082**
Debt_EBITDA_Diff	0.167	36	0.012	0.946	36	**0.077**
Debt_NEBITDA_Diff	0.183	35	0.005	0.951	35	**0.126**
Debt_Ratio_Diff	0.085	35	.200*	0.972	35	**0.512**
WC_TA_Diff	0.112	35	.200*	0.958	35	**0.206**
Current_Ratio_Diff	0.127	34	0.181	0.960	34	**0.244**
Quick_Ratio_Diff	0.108	34	.200*	0.944	34	**0.080**
Zscore_Diff	0.105	35	.200*	0.982	35	**0.811**

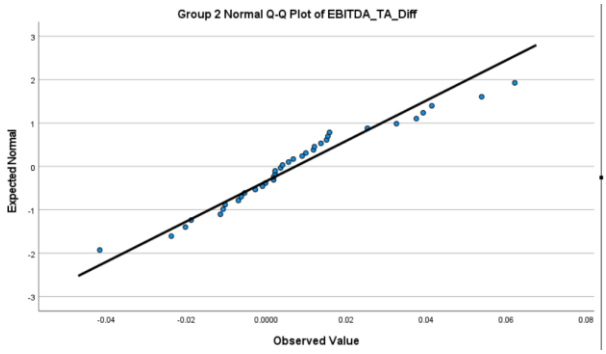
*. This is a lower bound of the true significance.

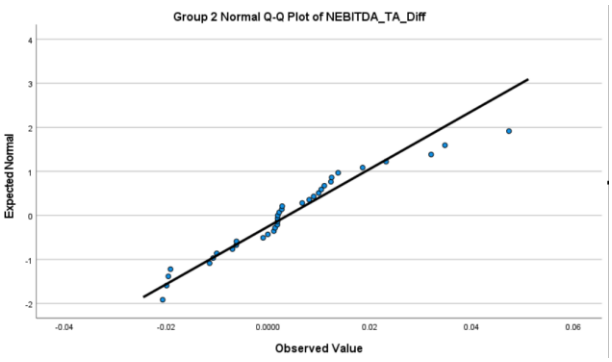
a. Lilliefors Significance Correction

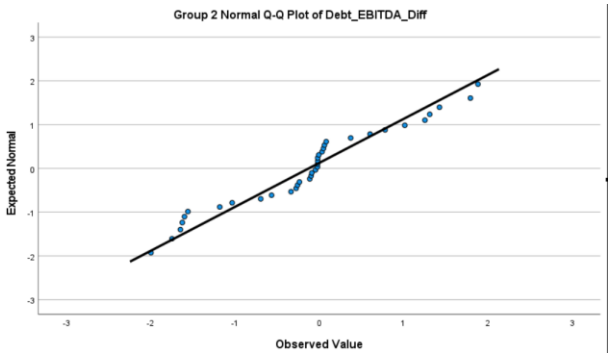


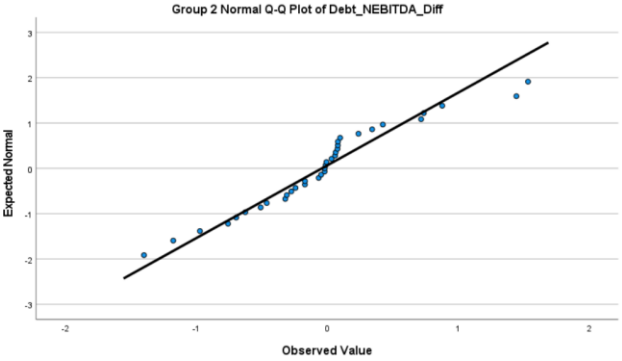


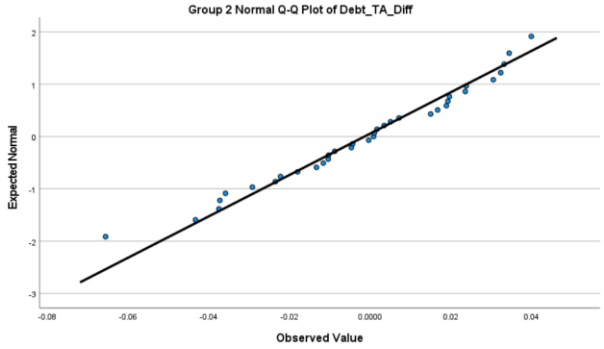


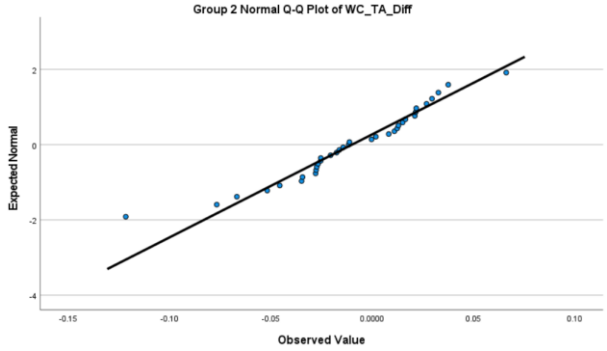


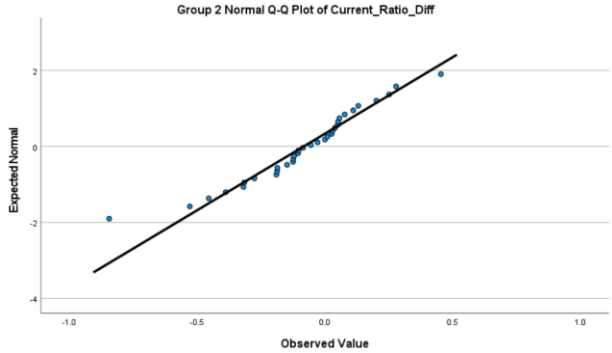

Group 2 Normal Q-Q Plot of NEBITDA_TA_Diff
Expected Normal
Observed Value

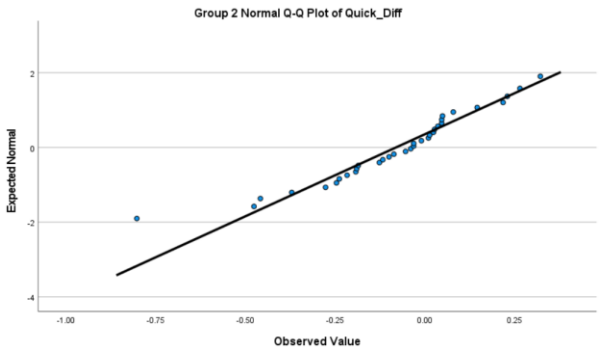

Group 2 Normal Q-Q Plot of Debt_EBITDA_Diff
Expected Normal
Observed Value

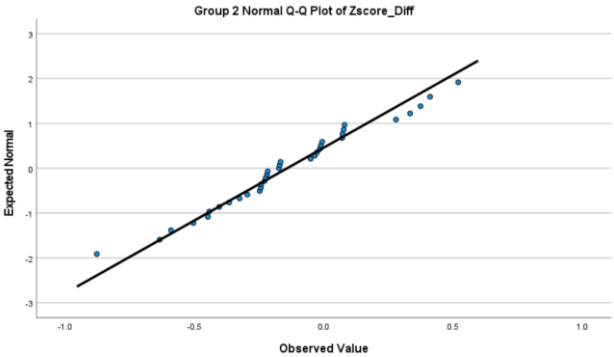

Group 2 Normal Q-Q Plot of Debt_NEBITDA_Diff
Expected Normal
Observed Value


Group 2 Normal Q-Q Plot of Debt_TA_Diff
Expected Normal
Observed Value


Group 2 Normal Q-Q Plot of WC_TA_Diff
Expected Normal
Observed Value


Group 2 Normal Q-Q Plot of Current_Ratio_Diff
Expected Normal
Observed Value


Group 2 Normal Q-Q Plot of Quick_Diff
Expected Normal
Observed Value


Group 2 Normal Q-Q Plot of Zscore_Diff
Expected Normal
Observed Value

Appendix D: Research Questions and Hypotheses

Industry-Level Testing (RQ 1)

				Wilcoxon Signed-rank Test					Paired t-test					
Category	**Variables**	**Mean Diff (Post - Pre)**	**Valid N**	**Negative Ranks**	**Positive Ranks**	**Ties**	**Z**	**Asymp. Sig. (2-tailed)**	**Correlation**	**Sig**	**t**	**df**	**Sig. (2-tailed)**	**Decision**
Asset Efficiency	FA_TO	-0.0441	64	43[a]	21[b]		-2.481[b]	0.013						Reject the null hypothesis
	TA_TO	-0.0287	63						0.986	0.000	-3.894	62	0.000	Reject the null hypothesis
Profitability	ROA	-0.0040	64						0.936	0.000	-1.591	63	0.117	Fail to reject the null hypothesis
	ROE	-0.0178	63	38[a]	25[b]		-1.397[b]	0.163						Fail to reject the null hypothesis
	NP	-0.0018	64	30[a]	34[b]		-0.174[b]	0.862						Fail to reject the null hypothesis
	EBITDA_Equity	-0.0271	63	39[a]	24[b]		-2.410[b]	0.016						Reject the null hypothesis
	NEBITDA_Equity	-0.0225	63	39[a]	24[b]		-2.335[b]	0.02						Reject the null hypothesis
	EBITDA_TA	-0.0098	66						0.949	0.000	-3.511	65	0.001	Reject the null hypothesis
	NEBITDA_TA	-0.0082	66	46[c]	20[b]		-2.935[b]	0.003						Reject the null hypothesis
Financial Coverage	Assets_Equity	0.1269	63	28[a]	35[b]		-2.068[b]	0.039						Reject the null hypothesis
	Debt_Equity	0.1269	63	28a	35b		-2.068[b]	0.039						Reject the null hypothesis
	Debt_EBITDA	0.2259	66						0.914	0.000	1.874	65	0.065	Fail to reject the null hypothesis
	Debt_NEBITDA	0.1261	66	25[a]	41[b]		-1.894[b]	0.058						Fail to reject the null hypothesis
	Debt_Ratio	0.0076	66	30[a]	36[b]		-1.511[b]	0.131						Fail to reject the null hypothesis
	Int_Cov (EBITDA)	-0.3319	64	37[a]	27[b]		-0.702[b]	0.483						Fail to reject the null hypothesis
	Int_Cov (NEBITDA)	-0.4752	64	32[a]	32[b]		-0.548[b]	0.583						Fail to reject the null hypothesis
Liquidity	Cash_TA	0.0073	66	22[a]	44[b]		-2.905[b]	0.004						Reject the null hypothesis
	WC_TA	-0.0004	66						0.971	0.000	-0.087	65	0.931	Fail to reject the null hypothesis
	Current_Ratio	0.0459	65						0.931	0.000	1.552	64	0.126	Fail to reject the null hypothesis
	Quick_Ratio	0.0372	65						0.937	0.000	1.545	64	0.127	Fail to reject the null hypothesis
Altman's Z	Z-score Zones		70	1[a]	0[b]	69[c]	-1.000[b]	0.317						Fail to reject the null hypothesis
	Z-score Values	0.0504	64						0.98800	0.000	1.145	63	0.257	Fail to reject the null hypothesis

a. Post < Pre
b. Post > Pre
c. Post = Pre

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.

Impacted Firms (Group 1 - RQ 2)

				Wilcoxon Signed-rank Test					Paired t-test					
Category	**Variables**	**Mean Diff (Post - Pre)**	**Valid N**	**Negative Ranks**	**Positive Ranks**	**Ties**	**Z**	**Asymp. Sig. (2-tailed)**	**Correlation**	**Sig**	**t**	**df**	**Sig. (2-tailed)**	**Decision**
Asset Efficiency	FA_TO	-0.1236	29	20[a]	9[b]		-2.303[b]	0.021						Reject the null hypothesis
	TA_TO	-0.0506	29	21[a]	8[b]		-2.541[b]	0.011						Reject the null hypothesis
Profitability	ROA	-0.0047	31						0.937	0.000	-1.522	30	0.138	Fail to reject the null hypothesis
	ROE	-0.0150	28						0.957	0.000	-1.627	27	0.115	Fail to reject the null hypothesis
	NP	0.0013	29						0.972	0.000	0.341	28	0.736	Fail to reject the null hypothesis
	EBITDA_Equity	-0.0270	30						0.991	0.000	-1.820	29	0.079	Fail to reject the null hypothesis
	NEBITDA_Equity	-0.0123	31						0.989	0.000	-0.888	30	0.381	Fail to reject the null hypothesis
	EBITDA_TA	-0.0129	30						0.961	0.000	-2.926	29	0.007	Reject the null hypothesis
	NEBITDA_TA	-0.0166	30						0.94	0.000	-3.164	29	0.003	Reject the null hypothesis
Financial Coverage	Assets_Equity	0.2648	30					0.036						Reject the null hypothesis
	Debt_Equity	0.2649	31	12[a]	19[b]		-2.097[b]	0.036						Reject the null hypothesis
	Debt_EBITDA	0.3460	30						0.890	0.000	1.970	29	0.058	Fail to reject the null hypothesis
	Debt_NEBITDA	0.3770	31						0.959	0.000	2.430	30	0.021	Reject the null hypothesis
	Debt_Ratio	0.0199	31						0.985	0.000	2.546	30	0.016	Reject the null hypothesis
	Int_Cov (EBITDA)	-0.3025	28						0.982	0.000	-0.450	28	0.656	Fail to reject the null hypothesis
	Int_Cov (NEBITDA)	-0.5434	27						0.986	0.000	-1.418	26	0.168	Fail to reject the null hypothesis
Liquidity	Cash_TA	0.0076	32						0.935	0.000	1.849	31	0.074	Fail to reject the null hypothesis
	WC_TA	-0.0079	32						0.978	0.000	-1.287	31	0.208	Fail to reject the null hypothesis
	Current_Ratio	-0.0194	32						0.954	0.000	-0.421	31	0.677	Fail to reject the null hypothesis
	Quick_Ratio	-2.4364	32						0.939	0.000	-0.154	31	0.879	Fail to reject the null hypothesis
Altman's Z	Z-score Zones		32	1[a]	0[b]	31[c]	-1.000[b]	0.317						Fail to reject the null hypothesis
	Z-score Values	-0.0940	30						0.98600	0.000	-1.248	29	0.222	Fail to reject the null hypothesis

a. Post < Pre
b. Post > Pre
c. Post = Pre

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.

Appendix D: Research Questions and Hypotheses (Continued)

Non-Impacted Firms (Group 2 - RQ3)

				Wilcoxon Signed-rank Test					Paired t-test					
Category	**Variables**	**Mean Diff (Post - Pre)**	**Valid N**	**Negative Ranks**	**Positive Ranks**	**Ties**	**Z**	**Asymp. Sig. (2-tailed)**	**Correlation**	**Sig**	**t**	**df**	**Sig. (2-tailed)**	**Decision**
Asset Efficiency	FA_TO	-0.0285	35						0.994	0.000	-1.739	34	0.091	Fail to reject the null hypothesis
	TA_TO	-0.0025	37						0.974	0.000	-1.872	36	0.069	Fail to reject the null hypothesis
Profitability	ROA	-0.0016	35						0.863	0.000	-0.466	34	0.644	Fail to reject the null hypothesis
	ROE	-0.1679	37	20[a]	17[b]		-0.641[b]	0.521						Fail to reject the null hypothesis
	NP	-0.0053	35	16[a]	19[b]		-0.098[b]	0.922						Fail to reject the null hypothesis
	EBITDA_Equity	-0.0194	34	20[a]	14[b]		-1.342[b]	0.180						Fail to reject the null hypothesis
	NEBITDA_Equity	-0.0175	34	20[a]	14[b]		-1.479[b]	0.139						Fail to reject the null hypothesis
	EBITDA_TA	-0.0073	36						0.933	0.000	-2.028	35	0.050	Fail to reject the null hypothesis
	NEBITDA_TA	-0.0038	36						0.963	0.000	-1.485	34	0.147	Fail to reject the null hypothesis
Financial Coverage	Assets_Equity	-0.0413	35	18[a]	17[b]		-0.311[b]	0.756						Fail to reject the null hypothesis
	Debt_Equity	0.0451	34	17[a]	17[b]		-0.624[b]	0.533						Fail to reject the null hypothesis
	Debt_EBITDA	0.1257	35						0.92	0.000	0.758	34	0.454	Fail to reject the null hypothesis
	Debt_NEBITDA	0.3577	35						0.959	0.000	0.386	34	0.702	Fail to reject the null hypothesis
	Debt_Ratio	0.0015	35						0.991	0.0000	0.337	34	0.738	Fail to reject the null hypothesis
	Int_Cov (EBITDA)	-0.3548	36	21[a]	15[b]		-0.408[b]	0.683						Fail to reject the null hypothesis
	Int_Cov (NEBITDA)	0.1034	35	16[a]	19[b]		-0.311[b]	0.756						Fail to reject the null hypothesis
Liquidity	Cash_TA	0.0104	35	12[a]	23[b]		-2.326[b]	0.020						Reject the null hypothesis
	WC_TA	0.0100	35						0.949	0.000	1.623	34	0.114	Fail to reject the null hypothesis
	Current_Ratio	0.0830	34						0.929	0.000	1.951	33	0.060	Fail to reject the null hypothesis
	Quick_Ratio	0.0809	34						0.909	0.000	2.072	33	0.046	Fail to reject the null hypothesis
Altman's Z	Z-Score Zones		35	0[a]	0[b]	38[c]	-0.000[b]	1.000						Fail to reject the null hypothesis
	Z-score Values	0.1418							0.990	0.000	2.725	34	0.010	Reject the null hypothesis

a. Post < Pre
b. Post > Pre
c. Post = Pre

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.

Appendix E: Sub-Hypotheses

Summary of Sub-Hypotheses

				Wilcoxon Signed-rank Test				Paired t-test					
Sub-Hypotheses	**Variables**	**Mean Difference (Post - Pre) in 000'**	**Valid N**	**Negative Ranks**	**Positive Ranks**	**Z**	**Asymp. Sig. (2-tailed)**	**Correlation**	**Sig**	**t**	**df**	**Sig. (2-tailed)**	**Decision**
Sub-Hypo A	EBITDA	96,523	66	24[a]	42[b]	-1.837[b]	0.066						Fail to reject the null hypothesis
Sub-Hypo B	NEBITDA	76,006	66	19[a]	47[b]	-2.673[b]	0.008						Reject the null hypothesis
Sub-Hypo C	Total Assets	1,415,518	65	9[a]	56[b]	-5.747[b]	0.000						Reject the null hypothesis
Sub-Hypo D	Equity	227,040	65	17[a]	48[b]	-3.454[b]	0.001						Reject the null hypothesis
Sub-Hypo E	Sales	479,624	66	17[a]	49[b]	-3.702[b]	0.000						Reject the null hypothesis
Sub-Hypo F	Cash	260,634	65	15[a]	50[b]	-4.401[b]	0.000						Reject the null hypothesis
Sub-Hypo G	Fixed Assets	926,306	65	13[a]	52[b]	-4.975[b]	0.000						Reject the null hypothesis

a. Pos < Pre
b. Post > Pre
c. Post = Pre

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.

Appendix F: G*Power Calculations

Industrial Sector Tests					
Category	**Ratios**	**Test Performe**	**p-value**	**Decision**	**G*Power**
Asset Efficiency	FA_TO	Wilcoxon	0.013	Null rejected	57%
	TA_TO	Paired t-test	0.000	Null rejected	98%
Profitability	ROA	Paired t-test	0.117	Failed to reject Null	35%
	ROE	Wilcoxon	0.163	Failed to reject Null	23%
	NP	Wilcoxon	0.862	Failed to reject Null	10%
	EBITDA_Equity	Wilcoxon	0.016	Null is rejected	78%
	NEBITDA_Equity	Wilcoxon	0.02	Null is rejected	72%
	EBITDA_TA	Paired t-test	0.001	Null is rejected	93%
	NEBITDA_TA	Wilcoxon	0.003	Null is rejected	90%
Financial Leverage	TA_Equity	Wilcoxon	0.039	Null is rejected	81%
	Debt_Equity	Wilcoxon	0.039	Null is rejected	81%
	Debt_EBITDA	Paired t-test	0.065	Failed to reject Null	45%
	Debt_NEBITDA	Wilcoxon	0.058	Failed to reject Null	81%
	Debt_Ratio	Wilcoxon	0.131	Failed to reject Null	54%
	Int_Cov (EBITDA)	Wilcoxon	0.483	Failed to reject Null	12%
	Int_Cov (NEBITDA)	Wilcoxon	0.583	Failed to reject Null	19%
Liquidity	Cash_TA	Wilcoxon	0.004	Null is rejected	72%
	WC_TA	Paired t-test	0.931	Failed to reject Null	5%
	Current_Ratio	Paired t-test	0.126	Failed to reject Null	34%
	Quick_Ratio	Paired t-test	0.127	Failed to reject Null	33%
Altman's Z	Z-Score Zones	Wilcoxon	0.317	Failed to reject Null	16%
	Z-Score Values	Paired t-test	0.257	Failed to reject Null	21%

Impacted Firms (Group 1)					
Category	**Ratios**	**Test Performe**	**p-value**	**Decision**	**G*Power**
Asset Efficiency	FA_TO	Wilcoxon	0.021	Null is rejected	62%
	TA_TO	Wilcoxon	0.011	Null is rejected	77%
Profitability	ROA	Paired t-test	0.138	Failed to reject Null	32%
	ROE	Paired t-test	0.115	Failed to reject Null	35%
	NP	Paired t-test	0.736	Failed to reject Null	7%
	EBITDA_Equity	Paired t-test	0.079	Failed to reject Null	42%
	NEBITDA_Equity	Paired t-test	0.381	Failed to reject Null	14%
	EBITDA_TA	Paired t-test	0.007	Null is rejected	81%
	NEBITDA_TA	Paired t-test	0.003	Null is rejected	87%
Financial Leverage	TA_Equity	Wilcoxon	0.036	Null is rejected	64%
	Debt_Equity	Wilcoxon	0.036	Null is rejected	83%
	Debt_EBITDA	Paired t-test	0.058	Failed to reject Null	48%
	Debt_NEBITDA	Paired t-test	0.021	Null is rejected	65%
	Debt_Ratio	Paired t-test	0.016	Null is rejected	70%
	Int_Cov (EBITDA)	Paired t-test	0.656	Failed to reject Null	7%
	Int_Cov (NEBITDA)	Paired t-test	0.168	Failed to reject Null	27%
Liquidity	Cash_TA	Paired t-test	0.074	Failed to reject Null	43%
	WC_TA	Paired t-test	0.208	Failed to reject Null	24%
	Current_Ratio	Paired t-test	0.677	Failed to reject Null	7%
	Quick_Ratio	Paired t-test	0.879	Failed to reject Null	8%
Altman's Z	Z-Score Zones	Wilcoxon	0.317	Failed to reject Null	15%
	Z-Score Values	Paired t-test	0.222	Failed to reject Null	23%

Appendix F: G*Power Calculations (Continued)

Non-impacted Firms (Group 2)					
Category	**Ratios**	**Test Performe**	**p-value**	**Decision**	**G*Power**
Asset Efficiency	FA_TO	Paired t-test	0.091	Failed to reject Null	40%
	TA_TO	Paired t-test	0.069	Failed to reject Null	45%
Profitability	ROA	Paired t-test	0.644	Failed to reject Null	7%
	ROE	Wilcoxon	0.521	Failed to reject Null	16%
	NP	Wilcoxon	0.922	Failed to reject Null	5%
	EBITDA_Equity	Wilcoxon	0.18	Failed to reject Null	24%
	NEBITDA_Equity	Wilcoxon	0.224	Failed to reject Null	22%
	EBITDA_TA	Paired t-test	0.05	Failed to reject Null	63%
	NEBITDA_TA	Paired t-test	0.147	Failed to reject Null	42%
Financial Leverage	TA_Equity	Wilcoxon	0.533	Failed to reject Null	14%
	Debt_Equity	Wilcoxon	0.533	Failed to reject Null	11%
	Debt_EBITDA	Paired t-test	0.454	Failed to reject Null	11%
	Debt_NEBITDA	Paired t-test	0.702	Failed to reject Null	6%
	Debt_Ratio	Paired t-test	0.738	Failed to reject Null	7%
	Int_Cov (EBITDA)	Wilcoxon	0.683	Failed to reject Null	10%
	Int_Cov (NEBITDA)	Paired t-test	0.002	Failed to reject Null	62%
Liquidity	Cash_TA	Wilcoxon	0.02	Null is rejected	65%
	WC_TA	Paired t-test	0.114	Failed to reject Null	67%
	Current_Ratio	Paired t-test	0.06	Failed to reject Null	47%
	Quick_Ratio	Paired t-test	0.046	Failed to reject Null	52%
Altman's Z	Z-Score Zones	Wilcoxon	1	Failed to reject Null	N/A
	Z-Score Values	Paired t-test	0.01	Null is rejected	75%

Note. The green highlighted G*Power values are greater than 80%.