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# Losing Altitude: The Impact of ASC 842: Leases on the Reported Liquidity of Large U.S. Airlines

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**LOSING ALTITUDE: THE IMPACT OF ASC 842: LEASES ON THE  
REPORTED LIQUIDITY OF LARGE U.S. AIRLINES**

Doctoral Dissertation Research

Submitted to the Graduate Faculty of

Gardner-Webb University

In Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Business Administration

By

Philip John Slater

May 2021

**LOSING ALTITUDE: THE IMPACT OF ASC 842: LEASES ON THE  
REPORTED LIQUIDITY OF LARGE U.S. AIRLINES**

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Dissertation Committee Approval:

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## ABSTRACT

The airline industry in the United States represents fertile ground for research due to its susceptibility to extraneous demand shocks such as fuel price hikes, terrorist attacks, and global pandemics coupled with high leverage and high reliance on leasing. Accounting Standards Codification (ASC) 842: Leases became effective January 1<sup>st</sup>, 2019, requiring capitalization of the majority of leased assets. This study was motivated by how the act may have affected both reported airline liquidity and attempts to restructure leases to avoid capitalization, which may provide an initial impact. The objective of this study was to examine whether passage of ASC 842: Leases has affected both reported airline liquidity among large, publicly-traded US airlines and potential lease restructure attempts by examining reported liquidity metrics used by financial users such as creditors and stockholders. Using a sample of large, publicly-traded airlines incorporated in the US, the current study used quarterly Securities and Exchange Commission (SEC) filings from 2017-2019 to determine if passage of the act was associated with a change in reported liquidity and possible restructure attempts. MANOVA with follow-up ANOVA was used to determine any change in the means of selected liquidity ratios attributable to ASC 842: Leases. The results indicated a significant overall effect and significant associations between the act and a decrease in the means of the quick ratio and net current assets as a percentage of total assets ratio. No significance was found between the act and the cash ratio. These findings are significant due to the high demand for liquidity and threat of extraneous demand shocks. The results provide early evidence that suggest management have not attempted lease restructures to circumvent the capitalization requirements of the act and warrants further research to investigate the generalizability of these findings.

## ACKNOWLEDGMENTS

I would like to thank the members of my dissertation committee, Dr. Earl Godfrey (Chair), Dr. Felice Policastro (Reader) and Dr. Chad Greenfield (Reader) for their patience, understanding and encouragement during this long journey. I owe each of them a debt that I can never repay. Their advice, encouragement, approachability, suggestions and refinements along the way have provided invaluable assistance. I would especially like to thank Dr. Godfrey, the Chair of my Dissertation Committee who helped me refine my dissertation topic and realize throughout this doctoral journey that with industriousness, fortitude and patience, this endeavor was possible. Dr. Policastro provided invaluable assistance with statistics, and Dr. Greenfield provided a wealth of knowledge with respect to operationalization and methodology.

Thank you to my parents, Colin and Joan Slater, my sister Michelle Slater, and other members of my family and friends for always encouraging me throughout this journey. I hope that the achievement of this degree will make you all proud.

Thanks to my cohort who supported me throughout this journey; my hope is that I have supported you reciprocally. That has always been my intention. While all members of the inaugural Gardner-Webb University doctoral cohort have provided assistance along the way, it is both right and appropriate for me to provide special mention to Tracy “Max” Davis; another member of the cohort who has been a good friend, listener, and encourager throughout. Again, I hope that I have reciprocated these traits, and believe that the end of my doctoral journey signals only, in the words of Winston Churchill, the “end of the beginning” of a genuine and valued friendship.

## **DEDICATION**

I dedicate this dissertation to my parents, Colin and Joan Slater, and my sister, Michelle Slater; all of whom have supported me and provided advice and guidance through the various stages of this degree. I also dedicate this dissertation to my colleague and good friend, Alan ‘Bruce’ DeBole who has truly been a mentor and an inspiration to me in terms of what can be achieved through hard work and determination. I very much appreciate the hours spent proof reading my dissertation and making helpful suggestions. Finally, I dedicate this dissertation to my late Belgian Malinois, Jack, who was a faithful and loyal companion, family member and friend for 13 of the best years of my life. I will always love you and miss you and you will never be replaceable.

## TABLE OF CONTENTS

	<b>Page</b>
LIST OF TABLES.....	ix
LIST OF APPENDICES.....	x
CHAPTER 1: INTRODUCTION .....	1
Background, Context and Theoretical Framework.....	1
Research Focus and Methodology .....	3
Assumptions, Limitations, and Delimitations.....	7
Significance of Research.....	7
CHAPTER 2: REVIEW OF THE LITERATURE .....	9
Development of ASC 842: Leases .....	9
Capital Structure, Leverage, and Liquidity.....	10
Liquidity.....	13
Interconnectedness of Liquidity.....	13
Liquidity Ratios and Reporting.....	15
Relationships Between and Usage of Variables .....	17
Liquidity Shocks .....	19
Liquidity and Merger/Acquisition Activity .....	24
ASC 842: Leases and IFRS 16: Leases.....	25
Effects of the New Leasing Standards .....	27
IFRS 16: Leases .....	30
Conclusion .....	32
CHAPTER 3: METHODOLOGY .....	34
Hypotheses Development .....	34
Research Questions and Hypotheses .....	35
Research Methodology .....	38
Research Design.....	41
Application of Experimental Controls .....	44
Population and Sample Selection.....	47
Validity .....	48
Reliability.....	50
Data Collection and Management.....	50
Data Analysis Procedures .....	52
Ethical Considerations .....	58
Assumptions, Limitations, and Delimitations.....	59
Summary.....	61
CHAPTER 4: RESULTS.....	63
Introduction.....	63
Data Analysis Procedures .....	64
Descriptive Findings and Statistics.....	65
Tests of Assumptions.....	69



Results of the Study .....	78
Summary .....	83
CHAPTER 5: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS .....	85
Discussion .....	85
Conclusions .....	86
Multivariate Tests .....	86
Univariate Tests: Tests of Between-Subjects Effects .....	87
Implications .....	89
Theoretical Implications .....	90
Implications for Practice .....	91
Limitations .....	91
Recommendations for Research .....	92
REFERENCES .....	95
APPENDICES .....	112

## LIST OF TABLES

	<b>Page</b>
Table 1. Airlines Included in the Study .....	47
Table 2. Case Processing Summary .....	65
Table 3. Descriptive Statistics – Full Sample .....	67
Table 4. Descriptive Statistics – Pre and Post Groups.....	69
Table 5. Mahalanobis Distance.....	71
Table 6. Kolmogorov-Smirnov Test.....	71
Table 7. Correlation Matrix .....	74
Table 8. Box’s Test of Equality of Covariance Matrices.....	76
Table 9. Levene’s Test of Equality of Error Variances .....	77
Table 10. Multivariate Tests .....	78
Table 11. Tests of Between-Subjects Effects .....	79
Table 12. Descriptive Statistics – Split Sample 1 .....	80
Table 13. Descriptive Statistics – Split Sample 2.....	80
Table 14. Multivariate Tests – Split Sample 1.....	81
Table 15. Multivariate Tests – Split Sample 2.....	81
Table 16. Tests of Between-Subjects Effects – Split Sample 1 .....	82
Table 17. Tests of Between-Subjects Effects – Split Sample 2.....	82

**LIST OF APPENDICES**

	<b>Page</b>
Appendix A. Airlines Included Based on Fiscal Year Revenues and Total Assets.....	113
Appendix B. IRB Exemption Confirmation.....	116
Appendix C. Descriptive Statistics: Bar Chart of Means: Pre and Post Groups.....	118
Appendix D. Frequency Distribution Histograms for Main Study.....	120
Appendix E. Normal Dependent Variable Q-Q Plots.....	124
Appendix F. Dependent Variable Box Plot Diagrams.....	127

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## CHAPTER 1: INTRODUCTION

### Background, Context and Theoretical Framework

The U.S. airline industry represents both an interesting and fascinating study with respect to some of the more unique facets of this sector. This industry deals with a plethora of issues pertaining to liquidity risk (Armen, 2013), high leverage (Kiraci & Aydin, 2018a; Nicolau & Santa-María, 2012), and a high reliance on leased assets (Bourjade et al., 2017; Gritta & Lippman, 2003). Critical to this last facet, one of the most significant and impactful financial reporting changes to the U.S. airline industry has been the recent passage of ASC 842: Lease Accounting as promulgated by the Financial Accounting Standards Board (FASB; Gorman et al., 2020). Notwithstanding firms that chose to early adopt, the standard became effective as of January 1, 2019 for publicly-traded companies. The standard called for, with limited exceptions, virtually all previously classified operating leases which had been held off balance sheet to be reported on the balance sheet, affecting a variety of firms in an array of industries (Freeman, 2018). This represents a significant change in financial reporting in the area of lease accounting. Indeed, Harris and Sunna (2013) estimated that approximately \$1.3 trillion of operating lease obligations would be added to corporate balance sheets. Another estimate by Bryant and Felsted (2017) forecasted the additional amount at approximately \$3 trillion; thus the impact to corporate balance sheets will be significant.

The aim of this new accounting standard and the spirit in which it was passed speaks to a greater demand for transparency in financial reporting among investors, creditors, analysts etc.; specifically closing the loophole that allowed firms to not report a significant percentage of their assets and associated liabilities. It was also noted that

passage of such an act would enhance both transparency and comparability between firms that leased versus owned assets as investors and other entities scrutinizing a firm's financial statements didn't have an effective or robust method of comparing between the two (DiSalvio & Dorata, 2014). Details of the debt associated with the lease were typically buried in footnote disclosures and required, at best, significant and convoluted estimation and manipulation procedures to attempt to provide any sort of comparability (DiSalvio & Dorata, 2014). Firms in a variety of industries had used leasing and the corresponding right of use assets as a practical means of obtaining capital assets without the need for significant cash expenditures. Obtaining assets in this manner not only lessened the risk of obsolescence for the firm leasing the asset but also provided for greater cash flow flexibility (DiSalvio & Dorata, 2014).

Although the financial and reporting effects of the new leasing standard are likely to be felt across a wide range of industries, it will be especially impactful to firms in industries that rely heavily on leased assets such as railroads, construction, and indeed the airline industry. It was previously noted and worth mentioning again that once new leasing standards were passed and lease assets and liabilities added to the balance sheet, it was likely to have a dramatic and profound effect on the financial statements of firms (Singh, 2011). Indeed, the passage of ASC 842: Leases represents a significant change for the leasing industry as a whole (Halladay, 2011).

In the literature surrounding financial accounting and reporting, the concept of liquidity is an extremely well defined and developed construct. Brunnermeier and Pedersen (2009) defined an asset's liquidity as "the ease with which it is traded" (p. 2201). Likewise, Lippman and McCall (1986) defined liquidity as "the length of time it

takes to sell an asset” (p. 43), further noting that “cash is the most liquid asset” (p. 43). It is evident that the concept and importance of liquidity is replete throughout the academic literature and financial presses alike.

With the advent and promulgation of ASC 842: Leases, and the tangible affect this will have on financial reporting especially in industries that rely heavily on lease financing, it stands to reason that many financial ratios typically reported in the financial presses may have been altered, and that companies may have looked to restructure leases in an attempt to avoid or lessen the capitalization requirements that the act mandates which increase assets and liabilities on the balance sheet. While the literature surrounding both leasing and liquidity is well developed even within the airline industry, it is not known (presumably due to the recent passage of the act) how or to what extent the passage of ASC 842: Leases has affected or will affect reported airline liquidity in the United States or if airlines may have attempted to restructure leases to avoid capitalizing them to the greatest extent possible.

### **Research Focus and Methodology**

The purpose of this quasi-experimental ex post facto study was to examine whether passage of ASC 842: Leases was associated with a change in the reported liquidity of large, publicly-traded U.S. airlines, and if any evidence existed that airlines may have attempted to restructure leases to avoid having to capitalize them; thus affecting the balance sheet and financial ratios, including liquidity ratios. Cook (2015) noted that assignment in quasi-experimental research studies are characterized by administrator judgment. Likewise, in supporting quasi-experimental research design, Reichardt (2009) noted that randomized experimental studies are not always possible due

to practical constraints and that research typically progresses best when a variety of experimental methods are employed. A determining characteristic of ex post facto studies is study research after the event has occurred (Johnson & Christensen, 2014). Causal-comparative studies investigate the association between an independent variable and dependent variables by comparing two or more groups (Brewer & Kuhn, 2010). The research design was also justified in this case as the association between the independent variable and dependent variables had already occurred (Brewer & Kuhn, 2010). Wallen and Fraenkel (2001) noted that three variants of the causal-comparative research design exist: exploration of causes, exploration of effects, and exploration of consequences. The latter was utilized in this research study as the exploration of consequences research design examines how one or more dependent variables is affected by a specific intervention (Wallen & Fraenkel, 2001).

This study extends the literature in the areas of leasing and liquidity by deductively and empirically demonstrating an association between passage of the act and reported liquidity. The study also provides early evidence of an initial implication of ASC 842: Leases in that no evidence was found supporting management attempts to restructure leases to avoid the capitalization requirements. The study utilized a dataset of quarterly 10-Q Securities and Exchange Commission (SEC) airline filings retrieved from the Mergent Online database spanning years 2017-2019 and specifically examined three variables that are typically representative of liquidity. The variables chosen to represent liquidity in the study were (a) Quick Ratio, (b) Net Current Assets as a Percentage of Total Assets, and (c) Cash Ratio.

The research questions posited in this study were as follows:

*RQ<sub>1</sub>: Was the passage of ASC 842: Leases associated with a change in the reported liquidity of large, publicly-traded airlines based in the United States?*

*RQ<sub>2</sub>: Has the airline industry preemptively attempted to reduce the initial impact of ASC 842: Leases by restructuring them to avoid capitalization?*

The specific null and directional research hypotheses at the multivariate and univariate levels being tested in the study were as follows:

#### Multivariate Hypotheses

*MH<sub>10</sub>: Passage of ASC 842: Leases was not associated with any change in the vector mean of the dependent variables representing the liquidity construct in the study.*

*MH<sub>1a</sub>: Passage of ASC 842: Leases was associated with a decrease in the vector mean of the dependent variables representing the liquidity construct in the study.*

*MH<sub>20</sub>: Passage of ASC 842: Leases was not associated with lease restructuring by airlines designed to circumvent lease capitalization requirements.*

*MH<sub>2a</sub>: Passage of ASC 842: Leases was associated with lease restructuring by airlines designed to circumvent lease capitalization requirements.*

#### Univariate Hypotheses

*UH<sub>10</sub>: Passage of ASC 842: Leases was not associated with a change in the mean of the dependent variable Quick/Acid-Test Ratio, which was being used to operationalize the liquidity construct.*



UH1<sub>A</sub>: *Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Quick/Acid-Test Ratio, which was being used to operationalize the liquidity construct.*

UH2<sub>0</sub>: *Passage of ASC 842: Leases was not associated with a change in the mean of the dependent variable Net Current Assets as a Percentage of Total Assets, which was being used to operationalize the liquidity construct.*

UH2<sub>A</sub>: *Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Net Current Assets as a Percentage of Total Assets, which was being used to operationalize the liquidity construct.*

UH3<sub>0</sub>: *Passage of ASC 842: Leases was not associated with a change in the mean of the dependent variable Cash Ratio, which was being used to operationalize the liquidity construct.*

UH3<sub>A</sub>: *Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Cash Ratio, which was being used to operationalize the liquidity construct.*

The study utilized a Multivariate Analysis of Variance (MANOVA) with follow-up Analysis of Variance (ANOVA) statistical technique to compare the means of the two groups and determine any statistically significant associations between the three variables previously mentioned and passage of ASC 842: Leases at both the multivariate and univariate levels. The use of MANOVA with follow-up ANOVA testing to compare the vector and individual means of different groups is a well validated and documented methodology which is replete throughout the literature. This statistical test has been used widely in airline industry analysis to compare airline accidents and stock return

performance (Bruning & Kuzma, 1989), small versus large airlines on such factors as competitive responses and propensity for action (Chen & Hambrick, 1995), purchasing or leasing of desired aircraft (Robles & Sarathy, 1986) and airline liquidity (Soman, 1999). MANOVA with follow-up ANOVA testing has also been used extensively to measure data covering pre and post groups (Caffrey, 2018; Jayasundara et al., 2020; Soukup et al., 2019).

### **Assumptions, Limitations, and Delimitations**

1. It was assumed that the airlines sampled in this study had provided numerically accurate portrayals of their financial results and position in their SEC filings. All airlines included in the sample were subject to independent audit which increased the credibility of this assumption.
2. A limitation of this study was that the findings were restricted to large publicly-traded U.S. airlines, and may not be generalizable to other airlines of similar size in other regions.
3. A delimitation of this study was that it was specifically confined to airlines of a certain threshold size operating in a specific region of the world.

### **Significance of Research**

The significance of this research lay in its ability to show an association between the passage of ASC 842: Leases and the reported liquidity of the firms selected for the sample, as well as providing early evidence of an initial implication of ASC 842: Leases in showing no evidence of potential management attempts to restructure leases to avoid the capitalization requirements. Findings in this area fill a gap in the research and represent a significant contribution to the literature in this field due to the high demand

for strong liquidity in this industry, and the susceptibility of the industry to sudden extraneous demand shocks which can negatively and rapidly affect a firm's cash flows. These findings also provide insight into how management may quantitatively respond to acts and legislation that affects financial reporting. Findings of this nature help provide valuable insights to firm stockholders (current and prospective), creditors and firm managers, as well as analysts and researchers both within and outside of academia. The results allow for an enhanced understanding by all firm stakeholders of the significance of ASC 842: Leases on the reported liquidity of large, publicly-traded airlines based in the U.S.

This dissertation proceeds as follows. Chapter 2 contains a discussion of the extant and seminal body of literature pertaining to liquidity and leasing. The research methodology was identified and the hypotheses were developed in Chapter 3. The results of the study were reported in Chapter 4. Finally, in Chapter 5 discussions of the limitations and implications of the study were presented along with suggestions for future research.

## CHAPTER 2: REVIEW OF THE LITERATURE

### Development of ASC 842: Leases

The airline industry in the United States provides an excellent opportunity for research due to its reasonably unique combination of industry traits. Examples of these traits are a highly leveraged capital structure, a high demand for liquidity, the industry's susceptibility to extraneous demand shocks which can cause revenue to rapidly decrease, and a high reliance on leased assets. With respect to this last facet, leasing, a significant and potentially highly disruptive change was recently introduced: The passage by FASB of ASC 842: Leases. With minor exceptions, this standard required firms to capitalize leases previously classified as operating leases. Before passage of the act, neither the asset nor corresponding liability associated with operating leases were included on a firm's balance sheet; rather they were typically classified as operating leases, and immediately expensed in the period in which the leasing expense was incurred. The underlying objective associated with the standard was relatively straightforward: increase financial reporting accuracy and transparency by ensuring that firms capitalize lease obligations, and remove the need for complicated and ambiguous reconciliations attempted by creditors, analysts etc. to understand a firm's true financial position. While the financial reporting effects of the act are likely to be pervasive across a multitude of industries, the effects are most likely to be experienced by firms who have historically relied to a great extent on lease financing. Examples of such industries are railroads, agriculture and farming, construction, and indeed the airline industry, which is the focus of this study

The purpose of this literature review was to serve as both a study and synthesis of prior published seminal works with reference to the particular challenges and dynamics of liquidity in the U.S. airline industry; specifically examining if the literature addresses how the passage of ASC 842: Leases may have affected liquidity among large, publicly-traded U.S. airlines – an industry that already contends with a unique operating model and one that is exposed to a multitude of operational and financial risks that can drastically and expeditiously affect liquidity. This literature review also examined whether any early evidence existed that management may have attempted to restructure leases to lessen the balance sheet impact of the act. Extant and seminal literature pertaining to the variables chosen as representative of liquidity in this study were also examined to provide a theoretical and empirical justification for their usage and inclusion in the study.

### **Capital Structure, Leverage, and Liquidity**

The U.S. and indeed the global airline industry are well known for their high leverage and high operating costs. In a 2004 study, Capobianco and Fernandes noted that of the major global airlines in developed countries, the majority possessed leverage levels which were greater than the average of the sample taken in the research study covering a variety of industries. Likewise, it was also noted that the majority of airlines in the United States do not replicate the practice of low-cost airlines such as Southwest or JetBlue in decreasing liabilities during downswings in demand and increasing them when demand for airline services increases (Guzhva & Pagiavlas, 2003). In this sense, it points to adoption of a more conservative financial management policy by major airlines. In a similar fashion, major airlines based in Canada that exhibit similar capital structures

coupled with similar financial and operating policies means that they are particularly susceptible to extraneous shocks such as fuel price hikes (Shalom, 2008).

Why is it that in the U.S. and indeed global airline industry the major carriers carry such high debt loads and leverage? As previously noted, the airline industry, regardless of the size of a particular carrier can be considered an extremely capital intensive industry. It is unlikely due to the vast amounts of capital needed that even the largest airlines would be able to fund startup and subsequent expansion purely from cash flow and retained earnings. Airlines have to contend with a variety of high variable and fixed costs, from pilot salaries to landing slots (which at major airports can prove extremely costly) to purchase/lease of a variety of aircraft. Landing slot fees can vary widely by airport, region, time of year, passenger and competitor demand for the airport in question, and airplane routing often makes it difficult for airlines to budget effectively for these costs due to their variance, often putting unexpected strains on liquidity (Morrison & Winston, 2007). Major U.S. and global airlines are also more likely to be faced with collective bargaining issues and disputes from pilots unions, which can often lead to scheduled flight disruption and higher salary and benefit costs (Hirsch, 2006). Due to the specialized and extremely technical nature of their job, rigorous and recurring training requirements, and the enormous responsibility entrusted to them, the average airline captain is very highly compensated; especially at the major airlines (Gershkoff, 1989). For example, Indeed.com reports the average captain at American Airlines earns annual compensation of \$196,356: 174% higher than the national average (including other U.S. carriers such as low-cost/budget airlines). Most if not all of the major U.S. airlines employ pilots who are part of unions, and thus have to deal with collective

bargaining agreements and attempt to handle disputes as effectively and efficiently as possible, so as not to cause disruption to passengers. Pilot unions have agreements pertaining to flight hour limitations for pilots, minimum compensation requirements, and airline use of non-union pilots, meaning the major airlines, relative to the low-cost airlines are often at a considerable financial and operational disadvantage due to these collective bargaining agreements, and thus are more financially and operationally constrained (Karsh et al., 1984).

In a research study commissioned to analyze and identify determinants of capital structure in the airline industry, Kiraci and Aydin (2018b) posited that airlines generally follow the classical pecking order theory (Myers & Majluf, 1984) with respect to changes in capital structure over time. The study concluded that one of the main determinants of firm likelihood to adhere to the aforementioned theory was the regulatory environment in the country in which the airline operates; lending support to an association between the legislative environment and a firm's capital structure and extent of leverage. With respect to the U.S. airline industry deregulation of the 1970s, the literature provides evidence that this legislative change was associated with subsequent changes in airline capital structure. In their book *The Economic Effects of Airline Deregulation*, Morrison and Winston (2010) noted that due to the fairly rapid introduction and passage of deregulation in the U.S. in the late 1970s, it took U.S. airlines considerable time to adjust their capital structure, as they had previously developed a different capital structure based on the regulated environment in which they operated.

## **Liquidity**

The concept of liquidity represents an extremely important and prominent construct in the financial presses, the world of practicing, and the academic literature alike. Liquidity plays an important role in every industry throughout the world and successful firms keep a watchful eye on this construct. As would be expected, the topic of liquidity pervades in the academic literature; representing a well-defined and discussed topic. Gopalan et al. (2012) noted that an asset can be considered liquid if “it can be converted into cash quickly and at a low cost” (p. 333). Likewise, Hayes (2018) noted that “in common usage, a liquid asset is one that can be exchanged readily for money, the liquid asset *par excellence*” (p. 1205). In aligning with the aforementioned definitions, Schlingemann et al. (2002) discussed liquidity in the context of how an asset in a particular market could be considered as more liquid if the asset can be sold expeditiously without need for a discount. With these definitions in mind, it is clear that for any business to operate successfully, attention must be paid to maintaining certain levels of liquidity to hedge against business and financial risk as well as maintaining the ability to use current cash flow and working capital to settle current obligations and liabilities.

### **Interconnectedness of Liquidity**

Noteworthy also is that liquidity as a construct does not operate in isolation. Rather, this construct is closely connected to other areas of the enterprise. An instructive example of such a connection would be the relationship between a firm’s liquidity and leverage. In this context, the literature makes note that in an environment of plentiful liquidity, the cost of capital for individual and corporate borrowers tends to decline, which makes debt issuance more attractive for corporate issuers and may lead to



adjustments of corporate capital structure (Davies, 2008). Likewise, Clayton (2009) discussed what he termed *the feedback loop* between liquidity and leverage; expounding upon this cyclical relationship by positing that when firms have increased access to debt financing, this in turn increases transaction velocity which in turn drives a subsequent increase in liquidity which could then cause the firm to proceed with further debt issuances, thus demonstrating a cyclical nature. To further solidify the association between liquidity and leverage, research by Sibilkov (2009) on asset liquidity and capital structure noted that airline leverage is positively related to the liquidity of its assets. Sibilkov also found that the association between liquidity and the secured debt of airlines is positive, whereas the correlation between liquidity and unsecured debt is curvilinear. This would lend evidence in support of the supposition that when airlines choose to increase secured leverage, principally through the mechanism of aircraft acquisition; this drives an increase in their operating and revenue-generating ability. As a result, the airline's liquidity position is enhanced through greater revenue generation ability, as airlines are able to acquire planes with greater fuel efficiency, open/expand new routes etc. The conclusions of Sibilkov also highlight a need for future research to determine why the relationship between airline liquidity and unsecured debt is curvilinear.

A further example of the interconnectedness of liquidity throughout a firm is provided in considering the relationship between levels of liquidity and a firm's cost of capital. The literature notes that when a firm's stock is more highly liquid, investors typically demand lower risk premiums which translate into lower costs of capital for the firm (Amihud & Mendelson, 2000). Likewise, Ortiz-Molina and Phillips (2010) found that firms that possess more highly liquid assets, especially during periods of higher asset

liquidity experience lower costs of capital. A final example of the interconnectedness and pervasiveness of liquidity throughout the firm is provided through consideration of the relationship between liquidity and debt/loan covenants. In researching the evolution of corporate debt and its relation to debt covenants, credit markets, and corporate governance, Whitehead (2009) found that increased liquidity among firms was correlated to a decline in covenants and monitoring among creditors. Thus, it is evident that the literature is replete with examples of how the construct of liquidity can be considered both interconnected to other areas of the firm and pervasive not only from an internal standpoint, but in considering external influences and relationships as well.

### **Liquidity Ratios and Reporting**

Liquidity is primarily expressed in financial reporting through various ratios which are frequently reported via an array of mediums and also well documented and used both in industry, financial analysis, and the academic literature. While there are an array of liquidity ratios which may be utilized to assist in determining a firm's liquidity, some ratios tend to be more prevalent than others, and are used with greater frequency. Some examples of the more prevalent ratios include the quick/acid-test ratio, net current assets as a percentage of total assets ratio, and the cash ratio.

All of these more prevalent ratios are frequently and pervasively discussed and documented in the literature, and represent metrics that have been both widely and historically used in the field of financial analysis. Research conducted by Gibson (1987) pertaining to how chartered financial analysts view financial ratios surveyed four hundred chartered analysts and accordingly assigned each liquidity ratio with a significance rating based upon the analyst's responses. The research noted that the quick ratio and the

current ratio were the most widely used and were considered the most important by analysts; earning scores of 7.10 and 6.34 on a 10-point scale respectively (Gibson, 1987). The current ratio, which is very similar to the quick ratio, can be considered an older but less strict measure of liquidity. Beaver (1966) noted that at the beginning of the century, ratio analysis was in an “embryonic state” (p. 71) and further noted that “it began with the development of the current ratio” (p. 71).

The cash ratio is an extremely important metric of a firm’s financial health, and could be considered as one of the more important and telling ratios considering the accrual based accounting system that the majority of firms use. Giacomino and Mielke (1993) found that evaluation of cash flow ratios can assist in effective and accurate firm analysis from the standpoint of firm profitability and strength and also noted that cash flow ratios are particularly efficacious indicators of potential future firm distress. Cash ratios are noted in a variety of research studies including determinants of corporate cash holdings (D’Mello et al., 2008), investigating changing trends in U.S. firms cash holdings (Bates et al., 2009), researching associations between cash holdings and managerial entrenchment (Jiang & Lie, 2016) and impacts of liquidity ratios on firm profitability (Saleem & Rehman, 2011).

Other pervasive and widely-used financial metrics pertaining to liquidity are the quick/acid-test ratio and the working capital ratio metrics respectively. Beaumont Smith and Begemann (1997) noted that the quick/acid-test ratio is a narrower and stricter measure of liquidity than the current ratio and also that the working capital ratio can be construed as a measure of how well the firm’s currently maturing assets can cover the firm’s currently maturing liabilities. Rahayu and Hari (2016) investigated associations

between quick ratio and dividend policy on a national exchange. Likewise, Warrad (2014) used quick ratio to investigate an association between this liquidity ratio and the profitability of publicly-listed banks in Jordan. Finally, Murphy et al. (1996) noted the quick ratio as part of the liquidity dimension in measuring performance in entrepreneurship research.

As with the aforementioned ratios, the literature is certainly not silent on the net current assets to total assets ratio. This ratio is also sometimes referred to as the working capital to total assets ratio. In research to determine the impact of effective working capital management on the profitability of an enterprise, Arshad and Gondal (2013) noted the prominence and importance of the net current assets to total assets (NCA/TA) ratio, which was a key determinant of liquidity and ultimately profitability in the study. Likewise, in a research study investigating the empirical analysis of useful financial ratios, Chen and Shimerda (1981) noted that the working capital/total assets ratio achieved a high factor loading in the principal components analysis utilized in the study. Finally, another study employing a multivariate analysis of the characteristics of merged firms principally through multiple discriminant analysis noted that the net working capital to total assets ratio was assigned to and highly correlated with the liquidity factor constructed in the study (Sorensen, 2000).

### **Relationships Between and Usage of Variables**

The literature surrounding liquidity also notes examples of the relationships between the variables proposed in this study and instances of their concurrent usage and application in studies that have dealt with liquidity. For example, there are a plethora of studies whereby both current ratio and quick/acid-test ratio were used simultaneously,

pertaining to liquidity and profitability tradeoffs in the pharmaceutical sector (Hristova et al., 2019), liquidity and stability of the agriculture industry in the Czech Republic (Lánský & Mareš, 2017), and stock market risk analysis for public sector banks (Rao, 2014). The applications to the pharmaceutical and agricultural industries are particularly salient due to their similarly capital-intensive nature.

Likewise, studies involving concurrent use of quick ratio and cash ratio include performance of money deposits and liquidity management in Nigerian banks (Olubukola Otekunrin et al., 2019), determinants of corporate cash holdings (D'Mello et al., 2008), research investigating the power of cash flow ratios (Mills & Yamamura, 1998), and Beaver's (1966) seminal work: "Financial Ratios as Predictors of Failure."

Research investigating pharmaceutical firms in Bangladesh utilized current ratio, quick ratio, and cash ratio to determine associations between ratio analysis and performance evaluation (Hossan & Habib, 2010). Finally, research is noted that employed the quick/acid-test ratio and net working capital/total assets to study empirical tests of financial ratio analysis for failure prediction in small businesses (Edmister, 1972). Thus, the literature indicates that all of the variables proposed for use in the study to measure liquidity are robust, well developed and widely used both separately and concurrently, and represent appropriate measurements of liquidity.

In conclusion, it would seem evident that the construct of liquidity is replete throughout the literature and that the concept of ratios pertaining to liquidity for purposes of financial reporting, analysis, and decision making as well as the relationships between these variables is well developed, well defined, and well validated in the academic literature.

## **Liquidity Shocks**

It is appropriate to note that some industries tend to be more susceptible to liquidity shocks than others. An excellent and instructive example of such an industry is the U.S. airline industry. This industry requires enormous amounts of liquidity to maintain servicing on debt and lease payments, pay highly skilled workers such as pilots who command high salaries, pay for landing slots at airports, and pay for the fluctuating cost of fuel. Potentially exacerbating the aforementioned significant and typically recurring fiscal outlays, airlines also have to contend with fluctuating passenger demand due to an array of unforeseen events. Examples of such events that may decimate airline demand include global pandemics such as SARS (Severe Acute Respiratory Syndrome) and the more recent COVID-19 (Coronavirus), terrorist events such as September 11, and sudden fuel price hikes. In addition to these factors, the advent and proliferation of low-cost carriers such as Southwest Airlines and JetBlue who have been able to compete extremely effectively with the larger, legacy carriers such as United Airlines, Delta Airlines and American Airlines have also affected liquidity as passengers enjoy increased choice in the U.S. domestic market. All of these potentially detrimental factors on airline liquidity are discussed below. Milne (2005) noted that (prior to passage of ASC 842) since the events of September 11, airlines around the world have struggled with worsening financial positions, increasing concerns over debt levels which would only be exacerbated if off-balance sheet leasing arrangements were included. These proved to be fortuitous and prophetic words.

A factor affecting liquidity that U.S. and indeed global airlines have on occasion had to contend with is the sudden outbreak and expeditious spread of worldwide

pandemics such as SARS and the more familiar and recent COVID-19. Both of the aforementioned pandemics started in a confined area of the globe and spread rapidly throughout the world. At least part of the cause of this exponential spread is attributable to the airline industry via this industry unknowingly transporting multitudes of asymptomatic but nonetheless infected persons, livestock, and other commercial products around the globe. Typically with a pandemic, preventive measures are slow to be enacted due to political stalemates, economic concerns and logistical difficulties, typically enhancing the spread. To this end, Bowen and Laroe (2006) noted that in just a matter of a few months, SARS spread from the Chinese mainland to over 25 countries all over the world. The rapid spread and diffusion of this first global pandemic of the 21<sup>st</sup> century was at least in part attributable to the airline industry which transported infected persons/passengers across the globe (Bowen & Laroe, 2006). Global pandemics have the obvious and unfortunately necessary effect of decimating demand for air travel. As has been seen with COVID-19, airlines are operating only a fraction of their scheduled passenger services and are even turning to less frequently used airports to park their airliners due to lack of demand. Clearly, such a dramatic decrease in demand in such a compressed time period causes huge liquidity issues for airlines who are still responsible for meeting debt and lease service payments on existing agreements as well as paying staff that are unable to be furloughed.

Another issue which can dramatically affect airline liquidity in a compressed period of time is fuel price hikes. One of the airline industry's largest variable costs is that of fuel, which short of utilizing hedging contracts, the airlines have very little control over and very little warning of when a sudden price increase does occur. The literature

addresses such risk mitigation strategies, with Lim and Hong (2014) noting that a common strategy among airlines is to enter into fuel price hedging contracts to attempt to cushion the financial blow of sudden fuel cost increases. Likewise, Morrell and Swan (2006) found that the majority of airlines are utilizing hedging options via contracts pertaining to crude oil, jet fuel and gas oil, but that very few airlines have contracts covering more than 12 months anticipated consumption. It is also noted in the literature that with respect to fuel price hedging, Asian airlines had greater exposure than European airlines, but less exposure than North American airlines (Berghöfer & Lucey, 2014) suggesting a riskier position being taken by U.S. airlines.

A further challenge that major U.S. and global airlines have had to contend with in more recent times is the emergence and proliferation of low-cost carriers such as Southwest Airlines in the U.S. market and EasyJet in the European market. These competing carriers have enjoyed immense success all around the world due to their simplistic approach to air travel and the overwhelming popularity of their operating model which introduces a significantly lower base fare than the large carriers, with passengers able to ‘buy up’ additional services such as checked baggage services and in-flight meals and entertainment if they so desire. This is in stark contrast to the legacy carriers whose model generally involves less flexibility in ticketing and pricing options. How have the major, legacy carriers in the U.S. and around the world attempted to deal with the threat from these competing carriers and the liquidity threat they pose? In order to answer this question, the strategic response by large incumbent airlines to the introduction of a low-cost competing carrier into the market should be considered. Tan (2016) noted that a typical response is to decrease mean airfare, in addition to lowering



their 10<sup>th</sup> and 90<sup>th</sup> percentile fares in an attempt to remain competitive. Another strategy that may be employed is one of cutting prices to the point of financial loss on a particular route with the aspiration that competitors will be forced out of the market due to a lack of financial reserves and perhaps also a lesser ability to raise capital in the credit markets to increase liquidity given the need (Tan, 2016). Likewise, Morrell (2005) found that another strategy some of the large carriers worldwide have employed is introducing their own competing subsidiaries designed to compete directly with the low-cost carriers, and hopefully create a differentiated market segment. Examples of subsidiary airlines created for this purpose are Qantas' JetStar and Lufthansa's Eurowings. Morrell also noted the limited success of this endeavor due to limited consumer perception of differentiation between the subsidiary airline and its parent.

Likewise, it has been found that the major U.S. airlines do not tend to follow the practice of low-cost airlines such as Southwest Airlines in lowering liabilities during periods of decreased demand for airline services and subsequently increasing them during increased periods of demand for airline services (Guzhva & Pagiavlas, 2003). In this sense, it does not appear that the major U.S. airlines are capitalizing on economic upswings and utilizing more conservative financial management practices which in turn could help them lessen their financial risk and improve their liquidity position during periods of decreased demand for their services. In a similar fashion, major Canadian airlines that also deal with highly leveraged capital structures and legacy costs, coupled with similar financial mismanagement practices during improved market conditions means that they are particularly susceptible to extraneous shocks such as fuel price hikes (Shalom, 2008). When the cost of jet fuel suddenly and unexpectedly increases, major

Canadian airlines such as Air Canada and Westjet are actually subject to a greater disadvantage due to the fact that their airplane fleets tend to be less efficient, and may burn as much as 30-40% extra fuel on a typical trip, making it even harder to compete with Canada's proliferation of low-cost carriers (Shalom, 2008). A case in point is noted by a New York Times article on June 6, 2018 noting that the cost of jet fuel had risen 50% in the last year, with executives warning that the likely courses of action would be to either increase fares or attempt to cut capacity (White, 2018). Thus, the research implications are that this issue of financial mismanagement tied to shorter-term liquidity and longer-term solvency and leverage is not confined to the U.S. or even the North American market, but appears to be indicative of major carriers across the globe (Shalom, 2008).

There are many factors that can potentially place enormous strains on airline liquidity, and to compound this, many of these factors aggravate each other. Consider as an example the terrible and tragic events of September 11, 2001. Global demand for airline travel all but evaporated overnight and airlines around the world suddenly found themselves struggling to find cash to pay their high fixed costs in the midst of an extreme loss of revenue-related cash flow. As Blunk et al. (2006) noted, the U.S. airline industry began 2001 on the back of 24 consecutive quarters of profitability, with net profits for fiscal year 2000 totaling around \$8 billion. During the first part of 2001, a recession had already cost airlines this profitability as fewer people could now afford to travel, and those that could were more likely to conserve cash (Blunk et al., 2006). To exacerbate this problem, the sheer extremes of the financially detrimental effects on the airline industry of the September 11 terrorist attacks caused airlines in the U.S. and around the

world to go into a period of financial crisis (Blunk et al., 2006). Airline liquidity, already stretched due to the recession that had taken hold in early 2001 could not cope for a sustained period of time with the drastic decrease in demand for airline services caused by September 11. These tragic events are instructive of how the financial and operating models of airlines, even when the economy is strong and demand for airline services is high, can change quickly and within just a few short months airlines can face drastic liquidity problems. These events are also instructive relative to how factors with differing levels of predictive capability can compound to cause financially disastrous short-term and long-term financial crises for U.S. and international airlines (Blunk et al., 2006). These extreme events ultimately caused many airlines around the world to file Chapter 11 Bankruptcy (restructuring) and in some unfortunate cases, these filings were followed by a Chapter 7 Bankruptcy (liquidation) filing as some airlines that had restructured were simply unable to continue operating as a going concern (Ito & Lee, 2005).

### **Liquidity and Merger/Acquisition Activity**

With respect to a more ancillary use of liquidity, it is noted that some firms within these industries have successfully used liquidity as a tool to purchase distressed firms that have undergone such shocks, resulting in a merger or acquisition of some type. In discussing the latter topic, Almeida et al. (2011) termed these “liquidity mergers” (p. 526) and proceeded to note that these types of mergers occur when assets are specific at the industry level and thus can be transferred among firms. In essence, firms are able to effectively leverage a strong liquidity position to either acquire or merge with a firm in the same industry but with a weaker liquidity position; taking advantage of the arrangement by possibly transferring industry-specific assets from one firm to the other

(Almeida et al., 2011). Mergers and acquisitions and the associated benefits of economies of scale and increased liquidity through consolidated operations are certainly no stranger to the airline industry. Just in the decade preceding the tragic events of September 11, 2001, there were a number of high profile mergers in the U.S. airline market including America West's acquisition of USAir on September 27, 2005, Delta and Northwest's merger on December 31, 2009, and United Airlines' acquisition of Continental Airlines on October 1, 2010 (Prince & Simon, 2017).

#### **ASC 842: Leases and IFRS 16: Leases**

Another noteworthy and interesting development is the recent passage of *Accounting Standards Codification (ASC) 842: Lease Accounting* and *International Financial Reporting Standard (IFRS) 16: Leases*. These U.S. and international rules respectively, almost identical in content and purpose and having been contemplated for some time, were passed by the respective bodies and became effective for reporting periods on or after January 1, 2019 for public companies. In order to obtain a clearer understanding of the new leasing standard, it is prudent to look first at the Financial Accounting Standard Board's updated definition of a lease which advises that a lease represents a contract that "conveys the right to control the use of identified property, plant, or equipment for a period of time in exchange for consideration" (Freeman, 2018, p. 29). A brief discussion of the need for passage of these rules and the implications they have for transparency in financial reporting as well as their implications on financial reporting ratios (as one example) is warranted. Prior to passage of these rules, firms were able to class leases as 'operating leases' which meant they were kept off the balance sheet, and no asset or liability was reported. This strategy represented a legal and GAAP-

approved way of ensuring debt was not reported on the balance sheet (Freeman, 2018). It also allowed firms to both comply with the existing rules and operate within the prescribed framework, while at the same time essentially misreporting their financial position via non-reporting of assets and liabilities that they all but owned (Freeman, 2018).

The magnitude of this problem is presented in financial terms as noted by Sacarin (2017) who explained that prior to passage of these respective leasing rules, it was estimated that approximately 85% of lease commitments for firms reporting under IFRS or U.S. GAAP frameworks (estimated at approximately \$3.3 trillion) were not being disclosed on balance sheets, with no asset recorded at all, and a revenue expenditure appearing on the income statement each period equivalent to the leasing expense. Prior to passage of *IFRS-16: Leases* companies that followed IFRS reporting requirements were following and complying with the guidelines as set forth by *IAS 17: Leases*, issued in 1997. This leasing standard had been criticized over the years since its inception and passage due to its failure to disclose leased assets that were controlled by the entity and the associated liability on the statement of financial position (Sacarin, 2017). The ramifications of this inadequacy in financial reporting meant that the statement of financial position, the statement of comprehensive income, and the statement of cash flows did not provide adequate information for investors, creditors etc. in making financial decisions (Sacarin, 2017). It is also noted that this system of financial reporting caused indebtedness and liquidity ratios to be skewed (Sacarin, 2017).

## **Effects of the New Leasing Standards**

With the recent passage and promulgation of ASC 842 for U.S. companies and IFRS 16 for firms in countries that have adopted IFRS, financial reporting has changed drastically, and likewise financial transparency has been increased. In providing some magnitude and perspective to the extent of these changes, Freeman (2018) noted that firms who have historically relied heavily on operating lease financing will now likely appear to be leveraged to a much greater extent than before, as their reporting of debt with respect to both short-term and long-term liabilities on the balance sheet increases drastically. Freeman also saliently pointed out that firms current ratios may be detrimentally affected, in that current liabilities may increase due to the new reporting rules, but current assets may not. This may also have negative effects on other liquidity ratios such as the quick/acid-test ratio and net assets to total assets ratio. From the standpoint of longer-term financial reporting, firms' debt-to-equity ratios may also be negatively affected as reported levels of long-term liabilities will increase, whereas equity may not (Sacarin, 2017). Total Asset Turnover is another ratio which may be detrimentally affected, as more assets will now be included on the balance sheet and thus entered into the calculation, with no extra income included (Sacarin, 2017). Finally, it should be noted that two of the most widely reported and salient metrics pertaining to firm health, that of net income and earnings per share respectively, could also be negatively affected. Freeman noted that with interest and depreciation expense replacing the former rent expense, net income is likely to be inversely affected especially in the early years, and thus will likely see a corresponding decrease.

Likewise, earnings per share will necessarily have to be decreased by virtue of the fact that net income is part of its calculation. Thus, the literature appears to support the postulate that the passage and promulgation of ASC 842 and IFRS 16 pertaining to lease accounting will have a significant effect on both the financial reporting and financial position of firms which had previously relied heavily on lease financing. It can also be gleaned from the literature that the extent of the effect may be dependent upon the degree to which the entity was relying on leased assets before passage of the acts, and if, due to passage of these acts, the entity has made any plans to reduce reliance on such leasing schemes; especially as the financial and reporting incentives to do so have, for the most part, been removed.

In research studying the balance sheet value of capitalized leases, Binfare et al. (2020) found that 20% of firms appeared to subjectively adjust discount rates implicit in capitalized leases in order to lower the lease-associated liabilities and thus appear less leveraged than they otherwise would. This provokes an interesting and noteworthy corollary question with respect to the effects of the leasing standard pertaining to whether management may have preemptively attempted to restructure leasing arrangements to avoid the balance sheet capitalization requirements associated with the act. By way of providing an example as to a mechanism which would facilitate restructuring attempts designed to lower lease-associated assets and liabilities, Winiarska (2020) noted that leases with terms under 12 months are generally exempted from the capitalization requirements. There does not appear as yet to be any research in the literature that addresses and answers whether management may have attempted to restructure leases so as to lessen or avoid completely the capitalization requirements associated with the act.

*IFRS 16: Leases* was issued by the International Accounting Standards Board (IASB) on January 13, 2016 and became effective for reporting periods beginning on or after January 1, 2019. Noteworthy here is that early adoption was permitted for firms who had also applied *IFRS 15: Revenue from Contracts with Customers*. In the same fashion, FASB has more recently voted to allow adoption of its U.S. equivalent, *ASC 842: Leases* to be extended through January 1, 2021 for private companies and certain non-profits at least in part due to the COVID-19 pandemic which has swept through and caused severe disruption to much of the country (Tysiac, 2020). The effective date for *ASC 842: Leases* implementation for publicly-traded companies has remained unchanged. Notwithstanding early adoption, public companies were required to implement the new standard as of January 1, 2019.

As previously mentioned, the impact of *ASC 842: Leases* is expected to be both significant and pervasive, especially in industries that rely heavily on leased assets such as the construction, retail, and transportation industries. It is expected that the impact of *ASC 842* on the U.S. airline industry will be widespread owing to the high reliance on and percentage of leased assets (planes, as an example) that typify this industry. In publishing research that examined the potential effect of the passage of *ASC 842* on some key metrics and ratios within the U.S. airline industry including total asset turnover, liabilities to assets, and liabilities to equity, Gorman et al. (2020) advised caution with respect to the comparability of some of these ratios due to the options available to firms when choosing to ‘early-adopt’ the new leasing standard. Gorman et al. noted that upon *ASC 842* adoption, firms can choose from one of two financial reporting approaches. The first approach is to simply restate the comparative financial statements presented in the



company's annual financial report to enhance comparability. The second approach, and one that has been adopted by some firms including American Airlines and Delta Airlines, is known as the Modified Retrospective Approach, and requires that the company recognize a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption (Gorman et al., 2020).

A further likely benefit of the passage of ASC 842 (and IFRS-16 internationally) is to introduce an element of uniformity to financial reporting that was not necessarily present beforehand. This statement is offered on the grounds that even before passage of ASC 842, when firms were allowed to keep operating leases off-balance sheet and only disclose significant details of these leases in the notes to the financial statements, the market and analysts were not necessarily fooled. Gorman et al. (2020) made reference to the variety of techniques that market analysts, investors, and creditors utilized to adjust financial ratios and other reporting numbers to, in essence, account for operating leases as on-balance sheet debt, and further noted that even the savviest of financial statement analysts struggled to accurately capture and report the associated liabilities that were tied to these leasing obligations. Passage of ASC 842 means that such nebulous and inconsistent calculations are no longer required, and an era of increased uniformity and transparency in financial reporting is being ushered in. Only time will tell what longer-term affect *ASC 842: Leases* will have on firms' financial ratios and key reporting metrics.

### **IFRS 16: Leases**

With respect to IFRS-16: Leases, some European studies have already begun to analyze and forecast the potential effect of passage of this act on firm financial

statements. As has been predicted for ASC 842: Leases in the United States, firms reporting under IFRS-16: Leases in countries utilizing IFRS are expected to see potential increases in leverage, decreases in interest coverage, and further potential effects and ramifications associated with debt covenants (Stancheva-Todorova & Velinova-Sokolova, 2019). Importantly, this study makes reference to a 2016 PriceWaterhouseCooper study that predicted a 47% median increase in debt, a 0.37 median increase in leverage ratio, and a 5.7% median decline in solvency for the U.S. airline industry (Stancheva-Todorova & Velinova-Sokolova, 2019). Likewise, in research investigating the effects of IFRS-16: Leases on a sample of 646 European companies quoted on European stock exchanges, Zamora-Ramírez and Morales-Díaz (2018) predicted significant increases in assets and liabilities, a significant increase in leverage, and a decrease in interest coverage, which aligns with the Stancheva-Todorova and Velinova-Sokolova (2019) study previously referenced. Importantly, Zamora-Ramírez and Morales-Díaz also found that the transportation industry will be one of the most significantly affected industries due to its high reliance on leased assets. Finally, the authors highlight the need for careful examination of debt covenants once the act comes into force, alluding to the possibility of a firm breaching a debt covenant by virtue of nothing other than passage of the act, which has changed the financial reporting and associated ratios in this area (Zamora-Ramírez & Morales-Díaz, 2018).

Further discussion on how the implementation of IFRS-16: Leases is likely to affect key financial ratios is provided by Grossman and Grossman (2010) who predicted large increases in current liabilities for 90 sampled U.S. firms representing a cross-section of industries. Likewise, a study of 102 retail firms based in the United Kingdom

examined how passage of an act requiring capitalization of operating leases would impact financial reporting. The study noted evidence of a significant impact in these areas, citing changes to return on assets, return on equity, and interest coverage ratios (Goodacre, 2003). These findings are echoed by Chambers and Dooley (2015) who analyzed IASB's exposure draft on the proposed changes to lease accounting issued in August 2010 and found that balance sheet recognition of leased assets and liabilities would likely be associated with an increase in debt ratios. The same study also noted a likely increase in interest expense, necessarily lowering interest coverage ratios, *ceteris paribus* (Chambers & Dooley, 2015). In addition, Segal and Naik (2019) noted that passage and application of IFRS 16: Leases will be associated with extensive changes to financial reporting especially on the balance sheet, income statement, and statement of cash flows, with creditors, preparers and analysts being the main affected parties.

Finally, a hypothetical case study intended for use by university students at both the undergraduate and graduate levels by Ananthanarayanan et al. (2020) noted that the capitalized lease requirements under IFRS-16 caused financial ratios and financial performance metrics to be affected, underscoring and highlighting the need for future study to confirm if lease capitalization has indeed had such an effect.

## **Conclusion**

This literature review has closely examined airline liquidity, with particular focus and attention on some of the extraneous factors that can cause airline liquidity to change. Some of these factors include sudden fuel price hikes, global pandemics such as SARS and the more recent COVID-19, and the passage of new leasing standards both in the U.S. and internationally. Attention has also been given to the advent, passage, and

promulgation of *IFRS 16: Leases* and *ASC 842: Leases* respectively, due to their huge influence on and implications to financial reporting. It was noted that airlines are part of a unique industry in terms of capital structure, potential liquidity issues, and high level of fixed costs such as debt service payments and leasing agreements. While there is at least some scant literature pertaining to the predicted and indeed early effects of *IFRS 16: Leases* on international carriers, there is currently a vacuum of research that is yet to present any early evidence of how passage of *ASC 842: Leases* has affected the liquidity of publicly-traded U.S. airlines, especially large, legacy airlines such as United Airlines and American Airlines. This literature review has also examined whether any evidence existed that management has responded to this act by attempting to restructure leases to lessen the impact of capitalization effects and noted a lack of evidence either way, hence the need for this study to be undertaken.

Chapter 3 introduces and discusses the methodology to be undertaken as part of this study.

## CHAPTER 3: METHODOLOGY

### Hypotheses Development

The focus of the research conducted in this study was to examine the relationship, if any, between the reported liquidity of large, publicly-traded airlines operating in the United States and the recent passage of ASC 842: Leases. The study also examined whether any early evidence existed to suggest management may have responded to ASC 842: Leases by attempting to restructure leases to avoid capitalization. This research was undertaken due to the somewhat unique operating model and position that the airline industry finds itself in. Some contributing factors to this uniqueness are highly leveraged capital structures (Fulghieri & Nagarajan, 1996), susceptibility to extraneous demand shocks such as global pandemics (Bowen & Laroe, 2006), sudden fuel price hikes (Pfaender & Mavris, 2012), and a high reliance on leased assets (Bourjade et al., 2017).

As has been mentioned, this new rule requires publicly-traded airlines in the U.S. to capitalize as a 'right-of-use' asset the vast majority of assets that had been previously classified as operating leases, and thus kept off-balance sheet (Trifts & Porter, 2017). This study was motivated by the passage of this recent act from the standpoint of how it may affect reported airline liquidity and if there was any early evidence of airlines restructuring leases to attempt to avoid the capitalization requirements.

The purpose of this study was to investigate whether passage of ASC 842: Leases was associated with a change in the reported liquidity of large, publicly-traded U.S. airlines and to ascertain if any early evidence existed of airlines restructuring leases to attempt to avoid the capitalization requirements. The study extended the literature in the areas of liquidity and leasing by attempting to demonstrate an association between

passage of ASC 842: Leases and the reported liquidity of selected publicly-traded airlines in the US; also examining whether any early evidence existed that airlines may have restructured leases to avoid lease capitalization requirements.

### **Research Questions and Hypotheses**

The research questions posited in this study were as follows:

*RQ<sub>1</sub>: Was the passage of ASC 842: Leases associated with a change in the reported liquidity of large, publicly-traded airlines based in the United States?*

*RQ<sub>2</sub>: Has the airline industry preemptively attempted to reduce the initial impact of ASC 842: Leases by restructuring them to avoid capitalization?*

Based on the above research questions the following general a priori null and research hypotheses were developed and postulated:

*MH1<sub>0</sub>: Passage of ASC 842: Leases was not associated with any change in the vector mean of the dependent variables representing the liquidity construct in the study.*

*MH1<sub>a</sub>: Passage of ASC 842: Leases was associated with a decrease in the vector mean of the dependent variables representing the liquidity construct in the study.*

*MH2<sub>0</sub>: Passage of ASC 842: Leases was not associated with lease restructuring by airlines designed to circumvent lease capitalization requirements.*

*MH2<sub>a</sub>: Passage of ASC 842: Leases was associated with lease restructuring by airlines designed to circumvent lease capitalization requirements.*

These general a priori null and research hypotheses represent the overall research questions which relate to the construct of liquidity and whether airlines may have attempted to restructure lease obligations to avoid capitalization. In order to operationalize the liquidity construct, three variables were selected which were examined in Chapter 2 (Literature Review) and found to be well developed and validated measurable indicators of the liquidity construct set forth in this research study. The three variables and the specific, directional hypotheses relating to each variable are listed and described in the next section.

A commonly used liquidity ratio which is found in both the academic literature and practicing is the ‘quick’ or ‘acid test’ ratio. This ratio is considered to be a stricter metric than the current ratio, as inventories and pre-paid assets are typically removed from the numerator (current assets) with no change to the denominator (current liabilities). This necessarily lowers the quotient of this ratio, making it a stricter indicator of liquidity than the current ratio (Beaumont Smith & Begemann, 1997). With validation that the quick/acid-test ratio was an appropriate indicator of liquidity, the respective null and research hypotheses postulated:

UH1<sub>0</sub>: *Passage of ASC 842: Leases was not associated with a change in the mean of the dependent variable Quick/Acid-Test Ratio, which was being used to operationalize the liquidity construct.*

UH1<sub>A</sub>: *Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Quick/Acid-Test Ratio, which was being used to operationalize the liquidity construct.*

The next variable chosen to represent liquidity in the research study was net current assets as a percentage of total assets. Once again, this metric is widely reported in financial publications; both practicing and academic. This ratio is typically calculated as working capital (current assets – current liabilities) divided by total assets, and is sometimes referred to as the working capital to total assets ratio. An example cited in the financial reporting literature notes the importance of this metric as a key liquidity measure (Arshad & Gondal, 2013). With validation that the net current assets as a percentage of total assets ratio was an appropriate indicator of liquidity, the respective null and research hypotheses postulated:

*UH2<sub>0</sub>: Passage of ASC 842: Leases was not associated with a change in the mean of the dependent variable Net Current Assets as a Percentage of Total Assets, which was being used to operationalize the liquidity construct.*

*UH2<sub>A</sub>: Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Net Current Assets as a Percentage of Total Assets, which was being used to operationalize the liquidity construct.*

The final variable selected for the study to measure the liquidity construct was the cash ratio. The cash ratio is calculated as cash and cash equivalents divided by current liabilities, and provides a measure of an enterprise's liquidity. This metric also pervades in the areas of financial reporting and the academic literature. For example, Giacomino and Mielke (1993) noted the importance of this ratio in firm financial analysis, and point to the saliency of this metric in accurate and effective analysis. With validation that the cash ratio was an appropriate indicator of liquidity, the respective null and research hypotheses postulated:



UH3<sub>0</sub>: *Passage of ASC 842: Leases was not associated with a change in the mean of the dependent variable Cash Ratio, which was being used to operationalize the liquidity construct.*

UH3<sub>A</sub>: *Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Cash Ratio, which was being used to operationalize the liquidity construct.*

The data required for this research study were retrieved via the Company Analysis tool from the Mergent Online database which was fully accessible to students via the Gardner-Webb University Library portal. The study retrieved quarterly ratios for the three aforementioned liquidity variables for fiscal years 2017-2019 in order to calculate accurate and representative means for the respective groups. The reports were downloaded into Microsoft Excel where the data were examined, cleaned, and a further binary/dummy variable was added, with 0 and 1 denoting pre and post ASC 842: Leases respectively.

### **Research Methodology**

Based on the research questions posited in this study and subsequent hypotheses, it was determined that a quasi-experimental quantitative study was most appropriate as it facilitated analysis of comparative data (Babbie, 2016). Causal-comparative or ex post facto studies are specifically characterized by study after the event has occurred (Johnson & Christensen, 2014). Cook (2015) found that assignment in quasi-experimental studies is typically determined by researcher judgment. Likewise, Reichardt (2009) noted that randomized experimental studies are often not possible owing to practical constraints and

that research generally progresses best when a diverse set of experimental methods are employed.

This research study utilized a MANOVA and subsequent ANOVAs (post-hoc testing) to examine and critically compare the vector means and individual means of the two groups (pre and post ASC 842: Leases) and test for significance. MANOVA can be distinguished from ANOVA in that MANOVA utilizes two or more response variables as part of its design. The overall objective of a MANOVA is to ascertain whether manipulation of the independent variable(s) causes a change in the response/dependent variables (French et al., 2008). Use of this particular statistical tool provided a method of determining if there were any statistically significant associations between passage of ASC 842: Leases and the pre and post data groups containing the means for the previously mentioned variables representing liquidity in the study. The researcher engaged in this type of research ultimately seeks to determine if any significant differences exist in the variation of mean scores among the variables (Latimer et al., 2011). Utilization of this design enabled the researcher to determine if there were any statistically significant differences among groups.

The use of MANOVA helped safeguard against Type I errors which may have otherwise occurred if multiple ANOVA's were run independently instead (French et al., 2008). Hair et al. (2019) noted that when the number of dependent variables in a MANOVA are kept to five or fewer, MANOVA provides greater or least equal statistical power than single ANOVAs. Another advantage of MANOVA was that by simultaneously examining multiple dependent variables, the probabilities of determining which factors were significant increased (French et al., 2008). MANOVA is prone to

certain assumptions which are typically checked before running the experiment, notably univariate and multivariate normality, linearity among the dependent variables, and homogeneity of variance and covariance across the range of predictor variables (French et al., 2008).

Use of MANOVA is widely documented and supported by the literature in many areas including ecology (Scheiner, 1993), psychology and the behavioral sciences (Warne, 2014), education (Keselman et al., 1998), and business and financial reporting (Bruning & Kuzma, 1989). Further examples of the application of this technique exist specifically in the business literature pertaining to the fields of management (Abramson et al., 1993), entrepreneurship (Correia, 2016), accounting (Murphy, 1999), liquidity (Soman, 1999), and purchasing or leasing of aircraft (Robles & Sarathy, 1986). Ateş et al. (2019) noted that MANOVA is a suitable methodology when several measurements will be taken on an object in one or more samples (Ateş et al., 2019). More specifically, and as it pertains to this research study, MANOVA with follow up ANOVA testing has been widely and pervasively used in the literature to compare data for pre and post groups (Caffrey, 2018; Jayasundara et al., 2020; Parthasarathy et al., 2010; Youngblood, 2017) including unbalanced designs (Allison, 2012; Ayeni, 2004; Hamidi et al., 2019; Rubin & Stroud, 1977; Soukup et al., 2019; Widmier & Jackson, 2002).

The particular research methodology utilized in this study, one-way MANOVA with follow-up ANOVA was selected based on a number of factors, and upon a review of the literature as above. The planned experiment involved testing the difference in means between two groups which would typically involve either an ANOVA or MANOVA. ANOVA alone was not warranted in this study, as the research design indicated the use

of multiple dependent variables and testing of an interaction effect. In this experiment the two groups represented before and after passage of ASC 842: Leases, respectively. To facilitate this, a binary/dummy categorical variable was added to the dataset once they were downloaded into Microsoft Excel to numerically represent pre and post ASC 842: Leases respectively and thus test the interaction effect.

The use of MANOVA allowed the researcher to determine if there were any differences across groups when using two or more continuous dependent variables. The three dependent variables selected for this study to represent the liquidity construct all represented metric, continuous variables; hence the selection of MANOVA was an appropriate choice for this study. A further selection factor related to the presumption that, with respect to internal validity, the dependent variables chosen to represent liquidity in this research study were, at a minimum, at least somewhat correlated, as they were ultimately measuring the same construct.

A further reason for selection of MANOVA with follow-up ANOVA testing as an appropriate statistical test was justified on the basis that the research conducted posed both multivariate and multiple univariate research questions and associated hypotheses in attempting to answer the overall research questions. More specifically, three separate univariate hypotheses were postulated relating to the individual variables chosen to represent the liquidity construct. MANOVA provided the researcher with the ability to test all of these variables simultaneously through joint testing.

### **Research Design**

The research design employed in this study was as follows. Upon deciding the research questions and subsequent hypotheses, it was determined that the data needed to

attempt to answer the research questions existed in the Mergent Online database, to which the institution subscribed. Due to this subscription, accessing the data needed for the study was found to be relatively straightforward and seamless and involved no extra costs on the part of the researcher or the institution.

The study specifically examined three variables which had been validated in the literature and chosen to represent the liquidity construct which is central to the research questions posed in the study. The three variables are listed again below for reference purposes:

1. Quick / Acid-Test Ratio
2. Net Assets as a Percentage of Total Assets Ratio
3. Cash Ratio

Upon selection of these variables, the Mergent database was consulted to determine if access to quarterly data pertaining to these variables or the data needed to calculate these variables were feasible. Via the *Company Analysis list* feature in Mergent Online, the airlines chosen as part of the sample were selected and data pertaining to all aforementioned ratios retrieved with respect to quarterly SEC filings. Mergent Online also offered the user the ability to download the results into an Excel spreadsheet format to facilitate further analysis. This method of data retrieval was selected as it represented the most expeditious and cost-effective means of accessing and retrieving the data required for the study.

With respect to the credibility and accuracy of the Mergent Online database, it was noted by Kessler (2011) that this database represented one of the longest and most complete sources of financial information available for domestic and international firms.

It was also noted that with over 30 years of financial data on a variety of firms, the database sets itself apart (Kessler, 2011).

The use of Mergent Online as a reputable and credible database and retrieval tool is widely accepted and endorsed in the literature in a variety of fields. For example, Tailab's (2014) study on the effect of capital structure on the profitability of American energy firms and Zain's (2013) study of audit fees in Malaysia both utilized the Mergent Online database as the primary means of data retrieval. Likewise, it is noted that Berríos's (2013) research into the relationship between bank credit risk, profitability, and liquidity, and Abebe and Alvarado's (2013) study of alternative perspectives of Founder-CEO status and firm performance all relied on datasets retrieved from the Mergent Online database. Thus, it is reasonable to conclude that utilization of this database yielded an accurate and complete dataset which facilitated credible and valid results.

Once the quarterly data pertaining to the variables representing liquidity had been retrieved from the Mergent Online database and downloaded into spreadsheet format, a check for missing data was performed. No missing data was noted. Had there been any missing data, it would have been the intention of the researcher to manually calculate any missing data using other retrieval tools which were also available in Mergent Online. For example, if a missing data point pertained to the quick ratio variable, it would have been relatively straightforward to download audited balance sheet(s) for the period(s) in question via Mergent Online and manually calculate and input the missing data point(s). Once the dataset was complete, a dummy/binary categorical variable was added to represent pre and post ASC 842: Leases respectively, which represented the control and treatment groups. As the data were downloaded in the correct format for analysis, there

was no identifiable need to code the data, other than the addition of the previously mentioned binary/dummy categorical variable.

Once the complete data set was assembled, cleaned, and coded in spreadsheet format (Microsoft Excel), the dataset was copied into the statistical processing package. This research study utilized IBM's Statistical Package for the Social Sciences (SPSS) Version 26 to facilitate data processing and analysis. IBM SPSS is a well-known, widely used and extremely reputable statistical software package that is capable of a variety of advanced statistical and analytical techniques such as multivariate regression analysis, correlation, ANOVA, and indeed MANOVA; as was undertaken in this study.

The use of SPSS in the literature is well developed and pervasive; with the statistical package being utilized in an array of studies across a variety of different industries and disciplines. For example, Valiquette et al. (1994) used SPSS Matrices to compute Cohen's Kappa coefficients, and D'Amico et al. (2001) utilized SPSS MANOVA to investigate power analysis for multivariate and repeated measures designs. Likewise, Logio et al.'s (2008) Criminal Justice Research text expounded upon data analysis with SPSS, and Shek and Ma (2011) utilized SPSS for longitudinal data analysis using linear mixed models.

Based on the above, it was concluded that use of IBM SPSS as a statistical processing and analysis tool was both appropriate and acceptable based on the literature, and increased the credibility and validity of the research.

### **Application of Experimental Controls**

As has been previously noted, this within-subjects study created and coded a binary/dummy variable to split the dataset into two groups. The first group denoted 0

represented data points pertaining to pre ASC 842: Leases and the second group denoted 1 represented data points pertaining to post ASC 842: Leases. Thus, the experimental design of this study was such that all data points coded 0 represented the control group and all variables coded 1 represented the treatment group.

Certain restrictive control elements were purposefully introduced into this study as part of the research design to prevent confounding to the greatest possible extent. Secrest et al. (2020) noted that restriction repeatedly has been recognized as a valuable approach to minimize confounding and other sources of bias. As Jager et al. (2008) noted, confounding can be addressed during study design and may be prevented by techniques such as randomization, matching or restriction. Likewise, Bours (2020) stated in order to make valid inferences pertaining to cause-and-effect associations, the effects of confounding must be either controlled beforehand through research design or eliminated thereafter via statistical analysis. Specifically with respect to restriction, Bours noted that only individuals with certain characteristics are included in a study. Groups are thus created which reduce the chance of confounding by any restricted variables and correlates thereof (Bours, 2020). To wit, the following restrictive controls were introduced as part of the research design: A control for firm size was introduced in that the researcher chose to examine 'large' airlines, which for the purposes of this study were defined as any airline with both revenues and total assets of over \$1 billion in each year of the study. A further control was introduced by limiting the study to publicly-traded airlines; thus excluding private airlines. This control was also prudent due to the perceived difficulty of retrieving financial data for private firms. The research study also



was confined to airlines operating in the United States, thus a control was introduced to the study with respect to geographic region.

Other macroeconomic factors were examined to determine if there was a need to introduce any further controls to account for potentially confounding variables, to which it was determined that no further controls were necessary, and the restrictive controls as set forth by Jager et al. (2008) and Bours (2020) and subsequently included as part of the research design sufficed. For example, a cursory examination of U.S. inflation and Gross Domestic Product (GDP) covering fiscal years 2018 and 2019 (the years before and after passage of ASC 842: Leases, respectively) did not note a significant or anomalous change relative to other years examined. U.S. inflation increased marginally from 1.9% in 2018 to 2.3% in 2019 (U.S. Inflation Calculator, 2020). Likewise, U.S. GDP did not see a significant or anomalous change relative to other years examined, increasing approximately 4% from 2018 to 2019 (Trading Economics, 2020). Furthermore, a review of the literature and current events around the time of passage of ASC 842: Leases did not reveal any potentially confounding events which would warrant inclusion of an experimental control. It should be further noted that as macroeconomic factors such as GDP and inflation would not have differed among the subjects of the study, they would not be correlated with the independent variable and thus would not confound the associative relationship being studied (Bours, 2020).

Finally, it should be noted that although more data points pertaining to first and second quarter, 2020 were available, the decision was made to not include these due to the unprecedented impact the COVID-19 pandemic has had on both the U.S. and indeed global airline industry, and the likely confounding impact this would have on the results

of the study. Thus, a further control was introduced here with respect to limiting the post ASC 842: Leases longitudinality of the study so as to control for this.

### **Population and Sample Selection**

The population in this research study represented large, publicly-traded airlines headquartered and operating in the United States. In this study, ‘large’ was defined as any publicly-traded airline headquartered and operating in the United States with both revenues and total assets of over \$1 billion in each year of the study (2017-2019). See Appendix A for full financial justification information on included airlines. Table 1 shows the airlines that were initially included in the study.

**Table 1**

*Airlines Included in the Study*

Number	Airline	Stock Ticker
1	Delta Airlines	DAL
2	American Airlines Group	AAL
3	United Airlines Holdings	UAL
4	Southwest Airlines	LUV
5	Alaska Air Group	ALK
6	JetBlue Airways Corporation	JBLU
7	SkyWest Airlines	SKYW
8	Hawaiian Holdings	HA
9	Allegiant Airlines	ALGT
10	Sprit Airlines <sup>a</sup>	SAVE

<sup>a</sup> Airline removed due to large number of outliers.

The total sample size (after removal of Spirit Airlines) was 324 data points, with 36 data points respectively for each of the airlines included in the study. As will be expounded upon further in Chapter 4, Spirit Airlines was removed from the study due to a large number of outliers and extreme values. For each variable, there were 108 data points; 12 for each airline. In instances such as this research where the population was relatively small, the literature supported the use of a census, with Israel (1992) noting that use of a census eliminates sampling error, and thus is attractive for small populations. While the initial research plan involved use of a census, one airline was removed due to an extreme number of outliers in an attempt to normalize the dataset and increase the validity and robustness of the parametric statistical testing. It is further noted that the airline represented a small firm with much smaller market share. A commonly used formula for determining minimum sample size is  $N > 50 + 8m$ , where  $N$  is the minimum sample size and  $m$  is the number of dependent variables (Tabachnick et al., 2007). In this study, there are three dependent variables, thus the required minimum sample size was 74. As this study included a total of 324 data points, the minimum sample size was easily surpassed. Lund and Lund (2013) also noted with respect to sample size that the number of cases in each group should exceed the number of dependent variables. This threshold was easily surpassed.

### **Validity**

Validity is a seminal concept which must be addressed in experimental design. Leedy and Ormrod (2019) defined validity as “the extent to which the strategy yields accurate assessments of the characteristic or phenomenon in question” (p. 104). With respect to the validity of the research study, this section is divided into two parts. The

first part addresses internal validity from the standpoint of ensuring that the research is actually measuring what it is intended to measure. The second section addresses external validity, which speaks to the generalizability of the results of the study.

With regards to internal validity, it was confirmed in Chapter 2 (Literature Review) that the variables selected for use in the study were common and well accepted indicators of liquidity in the literature. Thus it is believed that usage of these particular variables in this research study adequately captured and quantified the construct of liquidity and as a result, provided internal validity to the study from the standpoint of the research study adequately addressing the research questions. It was also determined that the use of the Mergent database for data retrieval and SPSS as the statistical software package were well documented in the literature.

With respect to external validity, it can be posited that the study was generalizable to large, publicly-traded airlines headquartered in the United States on the basis that the sample included in the research study represented nine out of the ten airlines from the population of interest, and that the airline removed from the study was also a much smaller airline with much less market share. It should also be noted that this study may well be generalizable to large airlines based in other countries and perhaps other industries that also rely heavily on lease financing and have a need for strong liquidity, however separate research would need to be undertaken to investigate this, as this study purposefully only included airlines based in the United States which fall under the purview and jurisdiction of ASC 842: Leases.

**Reliability**

Reliability is an important facet of experimental design. Reliability is defined by Leedy and Ormrod (2019) as “the degree to which an assessment strategy consistently yields very similar results when the entity being assessed hasn’t changed” (p. 107).

In order to enhance the reliability of the study, the researcher decided to confirm the initial results (using the full sample) with a split-half reliability technique. This technique essentially split the sample into two randomly assigned groups and identical statistical procedures were conducted on both split-half samples to confirm that the results and outputs were similar to each other and the main sample. The use of split-half reliability is well developed and pervasive throughout the literature, with examples provided in the fields of psychology (Charter, 2000), education (Chakrabartty, 2013), nursing (Heale & Twycross, 2015), and financial management (Kershaw & Webber, 2008). Utilization of such a split-half technique can be considered as having provided test-retest reliability.

**Data Collection and Management**

This section describes the procedures used by the researcher to gain access to the required database for the study, the search and filter parameters applied, and download format selection. This section also discusses data management, security and backup.

As has been previously mentioned, it was determined that the variables selected to represent liquidity in this study were located in the Mergent Online database. The institution maintains a subscription to this database, meaning the researcher was granted full access to the features of Mergent Online. Mergent Online was accessed through the institution’s library website/portal. More specifically, by selecting the ‘Databases by

Title' link and further selecting M to display all institutional library databases beginning with this letter. Once Mergent Online was selected from the list, the researcher input his institutional credentials and was subsequently granted full access to the database. Upon accessing the database, the researcher selected 'Classification Search,' selecting a Primary NAICS code of 481111 (Scheduled Passenger Air Transportation). The researcher then selected the airlines to be included in the study, which were then added to the company analysis list. Upon inclusion of the airlines to be investigated in the study, the ratios were adjusted to quarterly, the time period for data inclusion selected, and the Excel spreadsheet was generated and downloaded. The completed report was then opened in Microsoft Excel format, and the researcher was able to save the format and check for accuracy, consistency, and any missing data.

Once downloaded from the Mergent Online database, the dataset was maintained in Microsoft Excel spreadsheet format pending transference into the SPSS statistical package. Although the data in both formats were kept securely to ensure the data could not be tampered with or altered in any way, it is worth noting that the dataset ultimately pertained to publicly-available information promulgated via publicly-traded enterprises, and thus the confidentiality of the dataset and participants was not a particular requirement or concern of this research study. A potential issue that was of concern to this research study was the security and integrity of the dataset. To ensure data security and integrity, the downloaded dataset was password protected. The computer that stored the downloaded dataset required a password in order to gain access, and the dataset itself required a separate, different password. Both passwords were randomized so that no third party would be able to gain access to either the machine and/or the dataset.

The issue of data backup should also be addressed in this section. Once the dataset from Mergent Online had been downloaded into Microsoft Excel format and data cleaning and coding procedures applied, the dataset was uploaded into the SPSS statistical package. At this point, a backup copy of the complete dataset was saved to a USB portable data storage device. While the data storage device itself did not require a password to access, the completed dataset contained in the Excel spreadsheet required a password to gain access. These procedures helped ensure the security and integrity of the dataset.

When the completed dataset was uploaded into the SPSS statistical package, the transfer was straightforward as SPSS had the ability to read this spreadsheet format and ensure data accuracy and integrity throughout the transfer. Once the transfer was complete, the SPSS dataset was scrutinized by the researcher to ensure accuracy. The researcher also checked to ensure the variables were correctly categorized by SPSS as ratio scale.

### **Data Analysis Procedures**

This section lists the main research questions, research and null hypotheses, along with the separate hypotheses pertaining to each variable representing liquidity in the study. Each hypothesis pertaining to the individual variables were discussed from the standpoint of the relevant data to be collected. This section ends with a discussion on the relevance and appropriateness of the statistical procedure to be used, demonstrating how the procedure aligned with and helped answer the research questions.

The research questions postulated in this study are below:

*RQ<sub>1</sub>: Was the passage of ASC 842: Leases associated with a change in the reported liquidity of large, publicly-traded airlines based in the United States?*

*RQ<sub>2</sub>: Has the airline industry preemptively attempted to reduce the initial impact of ASC 842: Leases by restructuring them to avoid capitalization?*

Based on the above research questions, the following general a priori null and research hypotheses were postulated:

*MH1<sub>0</sub>: Passage of ASC 842: Leases was not associated with a change in the vector mean of the dependent variables representing the liquidity construct in the study.*

*MH1<sub>a</sub>: Passage of ASC 842: Leases was associated with a decrease in the vector mean of the dependent variables representing the liquidity construct in the study.*

*MH2<sub>0</sub>: Passage of ASC 842: Leases was not associated with lease restructuring by airlines designed to circumvent lease capitalization requirements.*

*MH2<sub>a</sub>: Passage of ASC 842: Leases was associated with lease restructuring by airlines designed to circumvent lease capitalization requirements.*

Based on the above overall research questions, the following general a priori null and research univariate hypotheses were postulated with respect to the individual variables representing liquidity:

*UH1<sub>0</sub>: Passage of ASC 842: Leases was not associated with a change in the mean of the dependent variable Quick/Acid-Test Ratio, which was being used to operationalize the liquidity construct.*



UH1<sub>A</sub>: *Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Quick/Acid-Test Ratio, which was being used to operationalize the liquidity construct.*

Quarterly data pertaining to the quick/acid-test ratio were collected from the Mergent Online database for fiscal years 2017-2019 and downloaded into spreadsheet format. Once the dataset was complete, it was uploaded into the SPSS statistical package for processing and analysis.

UH2<sub>0</sub>: *Passage of ASC 842: Leases was not associated with a change in the mean of the dependent variable Net Current Assets as a Percentage of Total Assets, which was being used to operationalize the liquidity construct.*

UH2<sub>A</sub>: *Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Net Current Assets as a Percentage of Total Assets, which was being used to operationalize the liquidity construct.*

Quarterly data pertaining to net current assets as a percentage of total assets were collected from the Mergent Online database for fiscal years 2017-2019 and downloaded into spreadsheet format. Once the dataset was complete, it was uploaded into the SPSS statistical package for processing and analysis.

UH3<sub>0</sub>: *Passage of ASC 842: Leases was not associated with a change in the mean of the dependent variable Cash Ratio, which was being used to operationalize the liquidity construct.*

UH3<sub>A</sub>: *Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Cash Ratio, which was being used to operationalize the liquidity construct.*

Quarterly data pertaining to the cash ratio were collected from the Mergent Online database for fiscal years 2017-2019 and downloaded into spreadsheet format. Once the dataset was complete, it was uploaded into the SPSS statistical package for processing and analysis.

Once the dataset had been uploaded into the SPSS statistical package, descriptive statistics to determine the skewness, kurtosis and normality of the dataset were run. Gravetter et al. (2016) noted that descriptive statistics involve certain procedures to organize data. The dataset was also checked for outliers by preparing box-plots and Q-Q plots in SPSS to further check for normality. Field (2018) noted that the removal of any outliers is important in a study to help prevent bias. Likewise, Gravetter et al. (2016) noted that the presence of even a single outlier may severely distort the interpretation of the relationships between variables. These findings provided a theoretical justification for removal of one airline due to a large number of outliers, and to help ensure the robustness and validity of the parametric statistical testing. As previously noted, the dataset underwent assumption testing to ensure maximum validity of the results. These assumptions included two or more dependent variables measured on a continuous level, a single categorical independent variable, independence of observations, adequate sample size, univariate and multivariate normality, linearity among the dependent variables, and homogeneity of variance and covariance across the range of predictor variables (French et al., 2008; Laerd Statistics, 2015a). Each of the assumptions is discussed in more detail below.

The first assumption pertaining to two or more dependent variables measured at the interval or ratio level (Laerd Statistics, 2015a) was met. The researcher selected three

dependent variables for this study which had been confirmed in the literature as appropriate and validated measures of liquidity.

The second assumption pertaining to one independent variable consisting of two or more categorical groups (Laerd Statistics, 2015a) was met. The two separate groups for this study represented the pre and post groups respectively.

A third assumption of MANOVA was the assumption of independence of observations, more specifically that the dependent variable scores for participants are independent of other participants' scores (Grice & Iwasaki, 2007). Skelton (2015) noted that observations can be classed as independent of each other if no differences influence the other data points, which was the case in this research study. Field (2013) noted that independence of observations and errors works on the premise that the method of data collection for one study participant did not affect or influence the responses of another participant, which was also the case in this study. Likewise, Uttley (2019) discussed the assumption of independence in noting that for within-subjects designs, we would not expect responses from the same participants to be independent, but that responses between different participants in within-subjects designs should be independent, which was the case in this study, thus this assumption was met.

The next assumption required that the research study have an adequate sample size. While larger sample sizes are better for MANOVA, there should at a minimum be more cases in each group than the number of dependent variables being analyzed (Lund & Lund, 2013). As the sample size was 324, this assumption was met.

The next assumption to be tested related to no univariate or multivariate outliers (Laerd Statistics, 2015b). Once the dataset had been input into SPSS, this assumption was

tested visually using box-plots to detect outliers. Any data point that fell outside the range of 1.5 box-lengths was classified by SPSS as an outlier and was identified by circular icons with corresponding case numbers (Laerd Statistics, 2015b). At this point and as previously noted, one airline was removed due to a large number of outliers and extreme values. Multivariate outliers were checked using Mahalanobis distance. The part of this assumption pertaining to multivariate normality was checked indirectly (as no direct test is available) using the Kolmogorov Smirnov test as the sample size is greater than fifty. Normal Q-Q plots were also scrutinized to check for normality.

The next assumption that was checked pertained to linearity of the variables. The dependent variables used in the study needed to be reasonably correlated with each other. With respect to linearity, the SPSS statistical package was used to construct scatterplot matrices to test this assumption and ensure linearity as if the variables had not been related in a linear fashion, the power of the tests would have been reduced (Laerd Statistics, 2015a). Once the dataset had been uploaded into the SPSS statistical software package, a Pearson R test was performed to check the correlations between variables and test for linearity.

The next assumption pertained to homogeneity of variance-covariance matrices (Laerd Statistics, 2015a). This assumption was tested in the SPSS statistical package using the Box's *M* test of equality of covariance. A non-significant result ( $P > .01$ ) indicated this assumption has been satisfied.

The final assumption pertained to homogeneity of variances (Laerd Statistics, 2015a). This was tested in the SPSS statistical package using Levene's test of equality of variances. A non-significant result ( $P > .05$ ) indicated this assumption has been satisfied.

The statistical procedure employed in this research study, namely MANOVA with follow-up ANOVA testing, was conducted simultaneously on all of the variables representing liquidity. One of the benefits of MANOVA with follow-up ANOVA testing, a parametric statistical test, was its ability to simultaneously analyze the variables and then subsequently analyze the individual variables in testing for statistical significance. As has been mentioned previously in the study, MANOVA compared the differences in vector means between the two groups by creating a linear combination of the dependent variables, and also looked for a statistically significant association between the change in the dependent variables and the independent treatment; in this case passage of ASC 842: Leases. The control and treatment groups were represented by a binary/dummy variable in SPSS, with 0 representing reported data before passage of the act (the control group) and 1 representing reported data thereafter (the treatment group). Follow-up ANOVA testing allowed the researcher to examine any statistically significant associations between the treatment and each individual dependent variable. The research questions posited in this study asked whether passage of ASC 842: Leases was associated with any change in the liquidity of large, publicly-traded U.S. airlines, and whether any early evidence existed that airlines may be restructuring leases to avoid capitalization requirements, thus the structuring of control and treatment groups and subsequent application of this statistical procedure provided insight toward addressing the research questions.

### **Ethical Considerations**

Due to the nature of the research conducted in this study and its exclusive use of secondary data, the fact that the research involved no human or animal participants and

that the data being retrieved and analyzed were publicly-available; there were no obvious ethical considerations to address with respect to informed consent and protecting the rights and well-being of participants.

It was the expectation of the researcher that with respect to Institutional Review Board (IRB) review and approval, this study would qualify for and be awarded ‘exempt’ status. This statement was posited by the researcher on the grounds that the study presented no more than minimal risk and qualified for ‘exempt’ status under Category 4: *Secondary Research Uses of Identifiable Private Information or Identifiable Biospecimens* under federal regulation 45 CFR 46, as the identifiable private information was publicly available. Confirmation of the IRB exemption for the study was received by the Gardner-Webb University IRB Administrator on February 23, 2021, and is included in Appendix B.

No ethical considerations pertaining to storage and management of the data were envisioned by the researcher. Again, while the data could be used to identify the research subjects, it was also publicly-available and can be accessed and downloaded by anyone at any time. The researcher will store and maintain original and backup copies of all data and coding including Microsoft Excel files, IBM SPSS datasets and processing/analysis outputs for a minimum of three years.

### **Assumptions, Limitations, and Delimitations**

This section provided a discussion of the assumptions, limitations, and delimitations of the research study, and is further incorporated and discussed in Chapter 5.

### *Assumptions*

1. It was assumed in this research study that the airlines that were sampled in this study had provided numerically accurate portrayals of their financial results and position in their quarterly SEC filings. All airlines included in the sample were subject to independent audit which increased the credibility of this assumption and minimized any errors in reporting.
2. It was assumed in this research study that the researcher's prescribed definition of 'large' (revenues and assets over \$1 billion in each year of the study) had appropriately included all airlines that met these criteria, and not inappropriately included any airlines that did not meet these criteria.
3. It was assumed in this research study that the dataset would maintain integrity when transferred from Microsoft Excel to the IBM SPSS statistical package. Randomized accuracy checks were performed by the researcher once transference was complete.

### *Limitations*

1. A limitation of this study was that the findings were restricted to large publicly-traded U.S. airlines, and may not be generalizable to private airlines, airlines that do not meet the definition of 'large' as prescribed in this study, or private and publicly-traded airlines operating outside of the United States.
2. A limitation of this study was that there may potentially be other individual variables or combinations of variables that represent the construct of liquidity more accurately than the variables chosen in this study. The researcher

included appropriate citations from the literature, citing the validity and pervasiveness of the variables chosen to represent liquidity in the study.

### ***Delimitations***

1. A delimitation of this study was that it has specifically been confined to airlines of a certain threshold size operating in a specific region of the world.
2. A delimitation of this study was that it purposefully only included publicly-traded airlines, trading on U.S. stock exchanges.

### **Summary**

Chapter 3 of this dissertation provided a detailed discussion of the planned methodology of the research study, focusing on a more in-depth presentation of the research questions and related hypotheses. Appropriate references to the literature were provided for the variables representing liquidity in the study, strengthening the internal validity of the study and presenting a compelling case for use of these variables to represent the liquidity construct.

Also discussed in this chapter in detail were the planned statistical procedures to be used in the study, with appropriate citations from the literature confirming the pervasiveness of this statistical procedure in prior research studies and confirming its validity with respect to helping answer the research questions. The validity of the research study, with respect to both internal and external validity, as well as the reliability of the research were discussed and addressed in the context of the planned methodology; lending support and credibility to the research design.

Data collection, analysis, and management procedures were also discussed in detail in the context of the research design, as well as ethical considerations (of which



there are very few, if any), assumptions, limitations, and delimitations of the study, and how all of these components align in furtherance of the overall research objective and ultimately answering the questions posed. Chapter 4 presents the results of the study.

## CHAPTER 4: RESULTS

### Introduction

The results of the research study are presented in this chapter. The first section introduces the descriptive findings and statistics for the variables used in the study. The second section details the data analysis procedures, including tests of assumptions for use of the MANOVA with follow-up ANOVA statistical tool. The third section covers the results of the study including a split-half reliability test conducted to increase internal validity and ensure test-retest reliability, and the fourth section provides a brief summary of the chapter.

The purpose of this research study was to ascertain whether any significant association existed between passage of ASC 842: Leases and the reported liquidity of large, publicly-traded U.S. airlines, and to see if any early evidence existed with respect to management attempts to restructure leases in an attempt to avoid capitalization requirements. To test these suppositions and operationalize the liquidity construct, three variables which had been validated in the literature were selected to represent liquidity. These three variables were (a) Quick/Acid-test Ratio, (b) Net Current Assets as a Percentage of Total Assets, and (c) Cash Ratio. Sub-hypotheses were introduced pertaining to the three variables which posited in each case that passage of ASC 842: Leases may be associated with a decrease in the mean of the variable across groups. Data pertaining to these variables were retrieved from the Mergent Online database and a binary/dummy variable added to represent pre (0) and post (1) ASC 842: Leases respectively. The completed dataset was transferred into the SPSS statistical package for further processing and analysis. A one-way MANOVA with follow-up ANOVA

statistical test was conducted due to the variables being utilized for the study being metric, continuous in nature. Another reason for selection of the one-way MANOVA with follow-up ANOVA statistical test were the groupings of the data and need for the researcher to compare both the multivariate vector means and univariate means of the two groups and determine if any statistical significance existed between passage of the act and the vector means of the variables operationalizing liquidity at either the univariate or multivariate levels.

### **Data Analysis Procedures**

With the completed, cleaned and coded dataset uploaded into the SPSS statistical package, the following procedures were conducted in SPSS in order to accurately process and analyze the dataset, and ultimately attempt to answer the research questions set forth in the study.

The first analysis to be conducted involved calculation and processing of descriptive statistics pertaining to the variables included in the dataset. Examples of descriptive statistics captured at this juncture include the mean, median, skewness and kurtosis of the data. The descriptive statistics included here are designed to provide summary statistics pertaining to the dataset utilized in the study and also orient the reader to the dataset at a more topological level. Next, further analysis was conducted pertaining to the assumptions of MANOVA and ANOVA in order to ensure the robustness of these parametric tests. Examples of assumptions included in the analysis are the level of measurement of the groupings and variables and the assumption of multivariate homogeneity of variance between groups. All of the assumptions are discussed in a following section. Results of the tests are then presented with respect to multivariate and

univariate significance to determine if any statistically significant association existed between passage of ASC 842: Leases and the liquidity of large, publicly-traded U.S. airlines, and also to determine if any early evidence existed of management attempts to restructure leases to avoid capitalization, which may provide an early implication of the act. Finally, a procedure was conducted in order to ensure the internal validity of the sample and increase test-retest reliability. The procedure, known as the split-half method (Cronbach, 1947) randomly splits the dataset into two halves and compares the scores and statistics with each other. The use of this procedure is well documented and developed in the literature, with examples provided in the fields of psychology (Callender & Osburn, 1977), education (Lord, 1956) and management (Robinson & Pearce, 1988).

### **Descriptive Findings and Statistics**

The sample selected for this study included large publicly-traded airlines based in the United States. The research questions posited in this study and the subsequent research design returned a relatively small number of participant airlines who accounted for the sample in question. Table 2 details the Case Processing Summary from SPSS.

**Table 2**

*Case Processing Summary*

	Cases					
	<u>Valid</u>		<u>Missing</u>		<u>Total</u>	
	N	Percent	N	Percent	N	Percent
Quick ratio	108	100.0%	0	0.0%	108	100.0%
Net current assets %TA	108	100.0%	0	0.0%	108	100.0%
Cash ratio	108	100.0%	0	0.0%	108	100.0%

In the analysis of Table 2, there were a total of 324 data points ( $n = 324$ ), with 108 data points for each variable covering the airlines utilized in the study. There were an equal amount of data points for each variable. All variables were included in the study, indicating a missing cases value of 0.

Descriptive statistics pertaining to the three dependent variables included in the dataset are detailed in Table 3.

**Table 3***Descriptive Statistics – Full Sample*

		Statistic	Std. error
Quick ratio	Mean	.5640	.01857
95% Confidence interval for mean	Lower bound	.5272	
	Upper bound	.6008	
	5% Trimmed mean	.5618	
	Median	.5500	
	Variance	.037	
	Std. deviation	.19303	
	Minimum	.22	
	Maximum	.98	
	Range	.76	
	Interquartile range	.28	
	Skewness	.215	.233
	Kurtosis	-.732	.461
Net current assets	Mean	-9.2416	.64621
%TA	95% Confidence interval for mean	Lower bound	-10.5226
		Upper bound	-7.9605
	5% Trimmed mean	-9.2574	
	Median	-10.1400	
	Variance	45.100	
	Std. deviation	6.71562	
	Minimum	-22.84	
	Maximum	5.80	
	Range	28.64	
	Interquartile range	9.15	
	Skewness	.147	.233
	Kurtosis	-.483	.461

(continued)

		Statistic	Std. error
Cash Ratio	Mean	.1547	.01554
	95% Confidence interval for mean	Lower bound Upper bound	.1239 .1855
	5% Trimmed mean	.1570	
	Median	.1685	
	Variance	.026	
	Std. deviation	.16150	
	Minimum	-.21	
	Maximum	.52	
	Range	.73	
	Interquartile range	.20	
	Skewness	-.447	.233
	Kurtosis	.324	.461

Some of the notable and pertinent descriptive statistics included the mean and median which are presented for each of the three variables. Skewness helps describe the asymmetry of a distribution and can theoretically range from  $-\infty$  to  $+\infty$ , although a normal distribution will be represented with a skewness of 0 (Ho & Yu, 2015). Each of the three variables indicated very low skewness. The literature notes that the kurtosis of a normal distribution is 3 (Ho & Yu, 2015). The kurtosis values indicated in Table 3 represent low amounts of kurtosis.

Table 4 details the descriptive statistics for the pre and post groups respectively, and is included as a means of comparison.

**Table 4***Descriptive Statistics – Pre and Post Groups*

	Binary/Dummy variable	Mean	Std. deviation	N
Quick ratio	0	.6117	.17959	64
	1	.4945	.19272	44
	Total	.5640	.19303	108
Net current assets %TA	0	-7.5677	6.02292	64
	1	-11.6764	6.98855	44
	Total	-9.2416	6.71562	108
Cash ratio	0	.1544	.15787	64
	1	.1552	.16849	44
	Total	.1547	.16150	108

Noteworthy in Table 4 was that two of the three variables shown reflected decreases in the mean between Group 0 (pre ASC 842) and Group 1 (post ASC 842). Appendix C provides bar charts pertaining to descriptive statistics provided in this section.

### **Tests of Assumptions**

It was noted that in order to produce valid results for a one-way MANOVA with follow-up ANOVA testing, certain assumptions need to be checked (Lund & Lund, 2013). These assumptions were univariate and multivariate normality, lack of univariate and multivariate outliers, independence of observations, adequate sample size, level of measurement of the variables, linearity, and homogeneity of variance-covariance matrices (Lund & Lund, 2013).

The first assumption of MANOVA and ANOVA to be discussed in this section pertained to univariate and multivariate normality. While there is no direct test available



for multivariate normality (Hair et al., 2019), univariate normality can be tested and examined by preparation of frequency distribution histograms for each dependent variable. Hair et al. (2019) also noted that when studies contain larger sample sizes (as is the case in this study); violations of this assumption have little impact. Likewise, Jungbok (2016) confirmed that violations of the normality assumption have little impact with a larger sample size. For reference purposes, a frequency distribution histogram for each dependent variable with a normality line superimposed is included in Appendix D. Lund and Lund (2013) also noted that the MANOVA statistical technique is reasonably robust to any violation of the normality assumption at the univariate and multivariate levels. Included in Appendix E are Normal Q-Q plots confirming the linearity and normal distribution of the dependent variables included in the study. SPSS classifies outliers as data points that are greater than 1.5 box lengths away from the edges of the box. Included in Appendix F are boxplots indicating that none of the three variables included any outliers upon removal of one airline which contained a large number of outliers and extreme values and was removed from the study.

In addition to examining descriptive statistics, normal Q-Q plots, and box plots in SPSS to check for normality of the dataset and existence of any univariate outliers, the researcher also examined whether the dataset contained any multivariate outliers by checking the Mahalanobis distance in SPSS. The results of this test revealed a maximum distance of 13.2 (see Table 5). This value was then checked against a critical chi-square value based on three degrees of freedom of 16.27. As the maximum distance in the dataset was less than the critical value, this provided evidence indicating there were no multivariate outliers.

**Table 5***Mahalanobis Distance*

	Minimum	Maximum	Mean	Std. deviation	N
Predicted value	.10	.70	.41	.156	108
Residual	-.651	.854	.000	.468	108
<b>Mahal. distance</b>	.278	<b>13.202</b>	2.972	2.400	108
Cook's distance	.001	.081	.010	.013	108

As a final test for normality of the dataset, the researcher ran the Kolmogorov-Smirnov test. Noteworthy here was that the Shapiro-Wilks test for normality was not used as Green and Salkind (2016) recommended that for sample sizes over 50, the Shapiro-Wilks test not be used, thus the Kolmogorov-Smirnov test was used instead, as this was more appropriate for sample sizes over 50. The null hypothesis tested was that the dataset was nonsignificant which indicated a normal distribution. The results were all non-significant at the .01 level ( $p > .01$ ) thus this test provided further evidence that the dataset was normally distributed.

**Table 6***Kolmogorov-Smirnov Test*

	<u>Kolmogorov-Smirnov</u>		
	Statistic	df	Sig.
Quick ratio	.074	108	.190
Net current assets %TA	.098	108	.012
Cash ratio	.097	108	.013

A further assumption of MANOVA and ANOVA pertained to independence of observations. As Skelton (2015) noted, observations can be classed as independent of each other if no differences influence the other data points, which was the case in this study. Hair et al. (2019) noted that there are numerous situations whereby randomization

is not possible, often owing to the nature of the research question and type of study (ex post facto, quasi-experimental design). Furthermore, as B. Frey (personal communication, November 22, 2020) noted, the math correlates the pretest and posttest scores and uses that information to remove the variability due to that relationship before performing its standard mean comparison. Uttley (2019) expounded upon the assumption of independence in noting that for within-subjects designs, we would not expect responses from the same participants to be independent, but that responses between different participants in within-subjects designs should be independent, which is the case in this study. Finally, Field (2013) noted that independence of observations and errors works on the premise that the method of data collection for one study participant did not affect or influence the responses of another participant. Considering the ex post facto, quasi-experimental nature and research design of the study, this assumption is satisfied. Examples of studies that have included the same subjects/data in pre and post group comparisons include Jayasundara et al. (2020), Caffrey (2018), Soukup et al. (2019), and Parthasarathy et al. (2010).

The next assumption of MANOVA examined pertained to sample size. Lund and Lund (2013) noted that in order for the sample size to be adequate, there must be more cases in each group than the number of dependent variables being analyzed. Owing to the large sample size included in this study ( $N=324$ ), this assumption was easily satisfied.

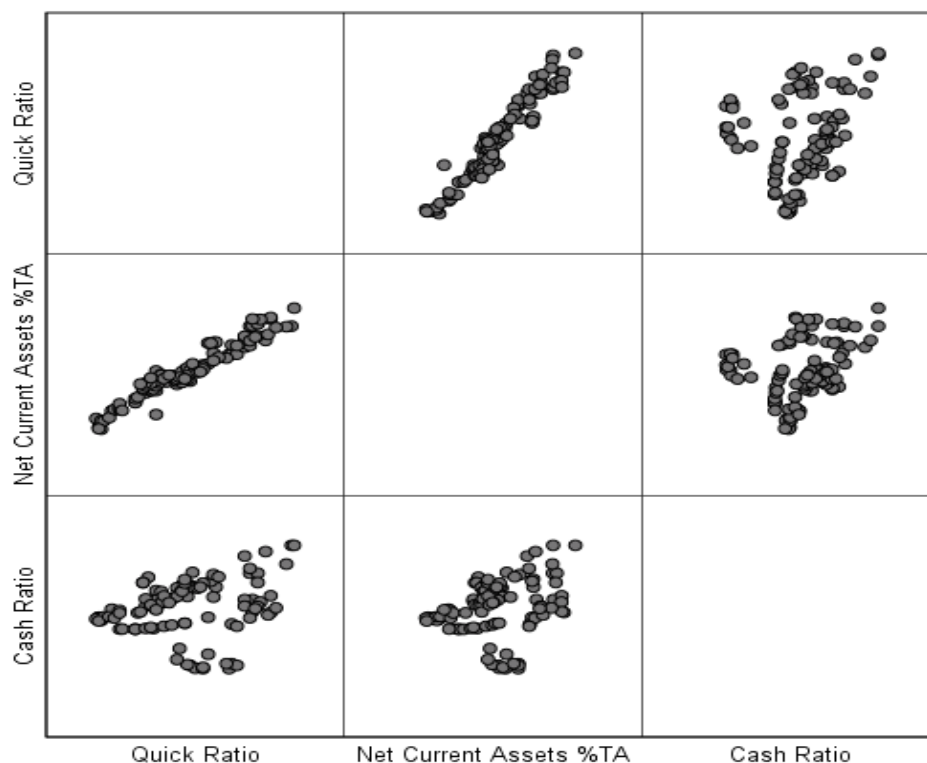
Another assumption of the MANOVA and ANOVA statistical techniques pertained to the level of measurement of the groupings and variables. The groupings should represent categorical variables and thus be either nominal or ordinal in nature, and the dependent variables to be utilized in the study should be, at minimum, scale

continuous variables (Scheiner, 1993). For this study, the groupings were nominal (i.e., pre and post ASC 842: Leases) and the variables were ratio continuous, thus this assumption was met.

A further assumption of MANOVA was linearity of the dependent variables, however it was noted by Field (2013) that parametric procedures are typically robust to slight violations of this assumption. A scatterplot matrix was utilized to determine linearity of the variables, as if the variables were not related in a linear fashion, then the statistical test's ability to identify differences may be diminished (Laerd Statistics, 2015a). The scatterplot matrix pertaining to the variables utilized is displayed in the figure.

### Figure

*Dependent Variable Scatterplot Matrix*



The scatterplot matrix above confirmed that the variables utilized in the study were related in a linear fashion, which would generally be expected as the variables in question are ultimately measuring the same construct, that of liquidity. Normal Q-Q plots (Included in Appendix E) also noted the linearity of the variables.

To further confirm the linearity of the variables in the study, a correlation matrix detailing the linearity of the dependent variables is shown in Table 7.

**Table 7**

*Correlation Matrix*

		Quick ratio	Net current assets %TA	Cash ratio
Quick ratio	Pearson correlation	1	.964**	.244*
	Sig. (2-tailed)		.000	.011
	N	108	108	108
Net current assets %TA	Pearson correlation	.964**	1	.270**
	Sig. (2-tailed)	.000		.005
	N	108	108	108
Cash ratio	Pearson correlation	.244*	.270**	1
	Sig. (2-tailed)	.011	.005	
	N	108	108	108

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Two of the three dependent variables indicated medium correlations, and the other indicated a stronger correlation. As these variables were operationalizing and representing the liquidity construct, a medium to high correlation would be expected. French et al. (2008) noted that MANOVA works well when there at least moderate correlations between the dependent variables. Furthermore, Patel and Bhavsar (2013)

noted that when stronger levels of linearity exist, MANOVA can detect combined differences that are not present in the univariate (i.e., ANOVA) tests, further commenting that if the dependent variables are uncorrelated, there is typically no reason to analyze them together. Likewise, Grice and Iwasaki (2007) stated, “When the variables are independent (i.e., uncorrelated) the results from multivariate analyses are completely predictable from univariate or bivariate analyses of those same variables” (p. 220), further noting,

insisting that linearity be low is thus tantamount to insisting that one’s multivariate results match a series of univariate analyses performed on the same dependent variables. Such reasoning leaves us to wonder why we should bother with multivariate statistics at all. (p. 220)

Finally, Hair et al. (2019) noted that “using multiple items to increase reliability results in a net gain of power; even if the items are somewhat redundant and positively correlated” (p. 407).

A further assumption of MANOVA pertained to multivariate homogeneity of variance across groups. As part of an overall MANOVA statistical test, this particular test is referred to as the Box’s Test of Equality of Covariance Matrices. More specifically, the Box’s M test tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups, typically utilizing a significance level of .05. The Box’s M Test statistic is shown in Table 8.

**Table 8***Box's Test of Equality of Covariance Matrices*

Box's M	9.078
F	1.464
df1	6
df2	57927.530
Sig.	.186

The Box's M Test indicated a non-significant result ( $p > .05$ ) thus the null hypothesis that the observed covariance matrices of the dependent variables were equal across groups could be accepted and this assumption was met.

The final assumption which was examined pertaining to the MANOVA and ANOVA statistical techniques was the assumption of multivariate homogeneity of variance between groups. The test for this assumption is known as Levene's Test. More specifically, Levene's Test tested the null hypothesis that the error variance of the dependent variable was equal across groups. Table 9 details the Levene's Test of Equality of Error Variances:

**Table 9***Levene's Test of Equality of Error Variances*

		Levene statistic	df1	df2	Sig.
Quick ratio	Based on mean	.044	1	106	.835
	Based on median	.030	1	106	.862
	Based on median and with adjusted df	.030	1	102.923	.862
	Based on trimmed mean	.033	1	106	.857
Net current assets %TA	Based on mean	.409	1	106	.524
	Based on median	.635	1	106	.427
	Based on median and with adjusted df	.635	1	104.684	.427
	Based on trimmed mean	.379	1	106	.540
Cash ratio	Based on mean	1.040	1	106	.310
	Based on median	1.198	1	106	.276
	Based on median and with adjusted df	1.198	1	104.323	.276
	Based on trimmed mean	1.084	1	106	.300

With respect to Levene's Test of Equality of Error Variances, it was noted that none of the variables were significant at the .05 level ( $p > .05$ ); thus, the null hypothesis that the error variance of the dependent variables was equal across groups was accepted, and this assumption was satisfied.



## Results of the Study

The first noteworthy result presented in this section pertained to the multivariate level. Table 10 details the results of the multivariate tests.

**Table 10**

### *Multivariate Tests*

	Effect	Value	F	Sig.	Partial Eta squared	Observed power
Binary/dummy variable	Pillai's Trace	.099	3.828	.012	.099	.806
	Wilks' Lambda	.901	3.828	.012	.099	.806

In analyzing the multivariate tests, it was noted that the significance values were identical because the research study only utilized two groups. It was further noted that both Wilks Lambda and Pillai's Trace were significant at the .05 level ( $p < .05$ ), indicating a statistically significant difference between the pre and post groups with respect to ASC 842: Leases.

With respect to univariate testing, a separate, follow-up ANOVA was conducted on each dependent variable to determine which variables, if any, were significant, and at what level. In order to account for multiple univariate tests of the dependent variables, the researcher applied a Bonferroni correction in order to ascertain statistical significance while also controlling for Type I error rates. This correction is noted in the literature as an adjustment made to P values when multiple independent or dependent statistical tests are being performed simultaneously on a single set of data (Napierala, 2012). The Bonferroni correction adjusted the alpha value that would indicate significance by taking the multivariate significance level (.05) and dividing it by the number of dependent variables

that were tested at the univariate level, yielding a univariate significance level of .0167 (.05/3). The results are detailed in Table 11.

**Table 11**

*Tests of Between-Subjects Effects*

Source	Dependent variable	F	Sig.	Partial Eta squared	Observed power
Binary/dummy variable	Quick ratio	10.456	.002	.090	.893
	Net current assets %TA	10.639	.001	.091	.898
	Cash Ratio	.001	.982	.000	.050

With respect to the statistics presented in Table 11, at the univariate level, it was noted that two of the three dependent variables (quick ratio and net current assets as a percentage of total assets ratio) were significant at the Bonferroni-adjusted .0167 level ( $P < .0167$ ), indicating a statistically significant difference between the pre and post groups with respect to ASC 842: Leases on these variables at the univariate level. Conversely, the cash ratio was not significant at the .0167 level ( $p > .0167$ ) indicating no statistically significant difference between the pre and post groups with respect to ASC 842: Leases on this variable at the univariate level.

As discussed in the introduction to the chapter, in order to assure internal validity of the experiment and provide confirmation of test-retest reliability, a split-half reliability test was conducted after the testing on the full sample. The procedure randomly split the dataset into two approximately equal halves, enabling the researcher to compare the descriptive statistics of the split samples, as well as the multivariate and univariate significance levels for each split sample and determine goodness of fit and alignment with respect to the overall sample dataset. Notable and key summary tables and statistics are presented and discussed below.

Tables 12 and 13 present the descriptive statistics for the split-half samples utilized in the research study (labeled Split Sample 1 and Split Sample 2 henceforth respectively).

**Table 12**

*Descriptive Statistics – Split Sample 1*

	Binary/dummy variable	Mean	Std. deviation	N
Quick ratio	0	.6356	.16958	34
	1	.4816	.16972	25
	Total	.5703	.18486	59
Net current assets %TA	0	-6.9365	6.07289	34
	1	-12.0732	6.78952	25
	Total	-9.1131	6.82732	59
Cash ratio	0	.1691	.14393	34
	1	.1369	.17838	25
	Total	.1555	.15878	59

**Table 13**

*Descriptive Statistics – Split Sample 2*

	Binary/dummy variable	Mean	Std. deviation	N
Quick ratio	0	.6382	.17172	34
	1	.4900	.15366	20
	Total	.5833	.17901	54
Net current assets %TA	0	-6.7997	6.00234	34
	1	-11.9545	6.02101	20
	Total	-8.7089	6.46082	54
Cash ratio	0	.1393	.16325	34
	1	.1352	.17418	20
	Total	.1378	.16575	54

For purposes of comparison, it was noted that in both split samples utilized in the research study, the mean of all three dependent variables decreased. This trend aligned with the full sample for the quick ratio and net current assets as a percentage of total assets ratio, and was very similar to the trend in the cash ratio (the post group mean was slightly higher for the full sample). This finding lends support and internal validity to the overall research sample utilized in the study.

With respect to the two Multivariate Tests for split samples 1 and 2 respectively, significance values were examined for both Pillai's Trace and Wilks' Lambda in order to confirm both the internal validity and test-retest reliability of the study. It should be noted that both values were identical due to the research design of the study examining only two groups (before and after). Excerpts from the tables showing the pertinent data are displayed in Tables 14 and 15.

**Table 14**

*Multivariate Tests – Split Sample 1*

Effect		Value	F	Sig.	Partial Eta squared	Observed power
Binary/dummy variable	Pillai's Trace	.179	3.992	.012	.179	.810
	Wilks' Lambda	.821	3.992	.012	.179	.810

**Table 15**

*Multivariate Tests – Split Sample 2*

Effect		Value	F	Sig.	Partial Eta squared	Observed power
Binary/dummy variable	Pillai's Trace	.165	3.287	.028	.165	.718
	Wilks' Lambda	.835	3.287	.028	.165	.718

Noteworthy in Tables 14 and 15 was that both Pillai's Trace and Wilks Lambda reported identical significance values across the split samples due to there only being two groups in the research study. Both split samples were significant at the .05 level ( $p < .05$ ). This result provided further evidence of the internal validity and test-retest reliability of the research study.

The final set of comparative tables examined pertained to the univariate level and examined tests of between-subjects effects through a follow-up ANOVA procedure to determine if the univariate findings at the whole sample level also pertained to the split samples used in the research study. Alignment of the whole sample and split-sample findings helped to increase the internal validity of the study. Excerpts from these tables are shown in Tables 16 and 17.

**Table 16**

*Tests of Between-Subjects Effects – Split Sample 1*

Source	Dependent variable	F	Sig.	Partial Eta squared	Observed power
Binary/dummy variable	Quick ratio	11.871	.001	.172	.923
	Net current assets %TA	9.326	.003	.141	.851
	Cash ratio	.590	.446	.010	.117

**Table 17**

*Tests of Between-Subjects Effects – Split Sample 2*

Source	Dependent variable	F	Sig.	Partial Eta squared	Observed power
Binary/dummy variable	Quick ratio	10.121	.002	.163	.877
	Net current assets %TA	9.266	.004	.151	.848
	Cash ratio	.007	.933	.000	.051

With respect to the comparative tables (16 and 17), it was noted that at the univariate level, the dependent variables quick ratio and net current assets as a percentage of total assets ratio remained statistically significant at the .0167 (Bonferroni adjusted) level in both split-samples. This matched the trend observed in the overall sample. The dependent variable cash ratio was not significant at the .0167 (Bonferroni adjusted) level in either split-sample, which also matched the trend observed in the overall sample. This final test provided further evidence of the internal validity of the experiment as well as showing a high degree of test-retest reliability via the split-half reliability technique.

### **Summary**

This chapter presented the results of the study, including important procedures pertaining to data analysis. Descriptive findings, statistics, and tests of assumptions were also examined and key information presented in both textual and tabular format. The results of the overall study were then presented supported by appropriate tables, and this analysis was followed by the results of the split-half reliability procedure.

The purpose of this research study was to ascertain whether any significant association existed between passage of ASC 842: Leases and the liquidity of large, publicly-traded U.S. airlines, and to determine if passage of the act was associated with management attempts to restructure leases to avoid capitalization requirements, which may have provided an early implication of the act. The research design and methodology included testing sub problems pertaining to the variables used to operationalize the liquidity construct. The multivariate results indicated a significant association ( $p < .05$ ) between passage of the act and the three dependent variables when tested jointly for significance. The univariate results noted that the dependent variables quick ratio and net

current assets as a percentage of total assets were significant at the Bonferroni-adjusted .0167 level ( $p < .0167$ ) whereas the dependent variable cash ratio was not significant at the .0167 level ( $p > .0167$ ).

In Chapter 5, conclusions are drawn pertaining to the data presented in this chapter and its relevance to answering the research questions posited in the study, along with implications of the study. Also presented are limitations, delimitations and key assumptions made in the study, along with suggestions for future research.

## **CHAPTER 5: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS**

### **Discussion**

Liquidity is of paramount importance to airlines due to their typically highly leveraged capital structures (Nicolau & Santa-María, 2012), high reliance on leased assets (Gritta & Lippman, 2003) and susceptibility to extraneous demand shocks which can drastically and expeditiously affect their liquidity (Armen, 2013). With respect to reliance on leased assets, FASB's passage of ASC 842: Leases has represented a significant change for the leasing industry as a whole (Halladay, 2011). Airlines have been impacted by this new standard, with the majority of formerly expensed operating leases now being capitalized on balance sheets as a 'right-of-use' asset and a corresponding liability also being recorded. Predictive studies forecasted that passage of this act would significantly change financial reporting for airlines, and would likely cause a multitude of reporting changes. For example, Freeman (2018) predicted changes to airline financial ratios.

This study investigated whether passage of ASC 842: Leases was associated with a change in the reported liquidity of large, publicly-traded U.S. airlines, and looked for an early implication of the act with respect to potential lease restructure attempts by airlines to avoid capitalization requirements. The research study reviewed the relevant and pertinent literature and selected three widely reported metrics pertaining to liquidity which were validated in the literature and analyzed quarterly SEC filings from large, publicly-traded U.S. airlines both prior to and post enactment of ASC 842: Leases to attempt to answer these questions.



The importance of this research was grounded in its extension of the literature in the areas of liquidity and leasing, which was achieved by investigating a proposed association between the reported liquidity of large, publicly-traded airlines based in the U.S. and passage of ASC 842: Leases; specifically postulating a decrease in liquidity. The study was designed to contribute an enhanced understanding of the topic by attempting to demonstrate such an association, and also present early evidence of changes in liquidity attributable to the act as well as examine if the act had caused management to restructure leases to avoid capitalization, which would also provide an initial implication of the act.

The remainder of this chapter is organized as follows: The next section presents a summary of findings and conclusions, implications of the study are then discussed, followed by recommendations for future research and practice.

## **Conclusions**

Based on the research questions asked and the type of variables utilized in the study, a MANOVA with follow-up ANOVA statistical test was conducted. The findings and conclusions below were split into two types. The next section discusses the findings of the multivariate tests and accompanying conclusions, with the following section providing the findings and resultant conclusions at the univariate level.

### ***Multivariate Tests***

There was a significant difference between the reported liquidity of large, publicly-traded U.S. airlines pre and post ASC 842: Leases when examined jointly on the variables (a) Quick/Acid-test Ratio, (b) Net Current Assets as a Percentage of Total Assets Ratio, and (c) Cash Ratio. Wilks  $\lambda = .901$ ,  $F(3, 104) = 3.828$ ,  $p = .012$ , partial  $\eta^2 =$

.099. The MANOVA was evaluated at a significance (alpha) level of .05. These findings enabled acceptance of the initial multivariate research hypothesis and subsequent rejection of the null hypothesis pertaining to a decrease in liquidity. These findings also enabled acceptance of the second null hypothesis pertaining to there being no evidence of management attempts to restructure leases to attempt to avoid the capitalization requirements of the act.

***Univariate Tests: Tests of Between-Subjects Effects***

A separate ANOVA was conducted for each dependent variable utilized in the study representing the liquidity construct, which pertain to and align with each of the sub hypotheses introduced and developed in the study. Each ANOVA was evaluated at a Bonferroni-adjusted significance (alpha) level of .0167. The findings and conclusions for these sub hypotheses are discussed below.

***Quick/Acid-Test Ratio***

*H<sub>1a</sub>: Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Quick/Acid-Test Ratio, which was being used to operationalize the liquidity construct.*

There was a significant difference between the pre and post ASC 842: Leases groups for the quick ratio,  $F(1, 106) = 10.456$ ,  $p = .002$ , partial  $\eta^2 = .090$ , with the mean of the post ASC 842 group (.4945) being significantly lower than the mean of the pre ASC 842 group (.6117), thus the research hypothesis introduced and postulated in the study is accepted and the null hypothesis rejected. This finding also aligns with the predictions of Freeman (2018) who forecasted that firm's reported current ratios (which this ratio is very similar to) may be affected detrimentally by passage of the act.

*Net Current Assets as a Percentage of Total Assets Ratio*

*H<sub>2a</sub>: Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Net Current Assets as a Percentage of Total Assets, which was being used to operationalize the liquidity construct.*

There was a significant difference between the pre and post ASC 842: Leases groups for the net current assets as a percentage of total assets ratio,  $F(1, 106) = 10.639$ ,  $p = .001$ , partial  $\eta^2 = .091$ , with the mean of the post ASC 842 group (-11.676) being significantly lower than the mean of the pre ASC 842 group (-7.568), thus the research hypothesis introduced and postulated in the study is accepted and the null hypothesis rejected. This finding may lend support to the work of Sacarin (2017) who hypothesized that total asset turnover would possibly be negatively affected due to more assets being included on the balance sheet with no extra income included. If total assets have increased due to the new operating lease capitalization requirements, this ratio may have decreased, *ceteris paribus*.

*Cash Ratio*

*H<sub>3a</sub>: Passage of ASC 842: Leases was associated with a decrease in the mean of the dependent variable Cash Ratio, which was being used to operationalize the liquidity construct.*

There was not a significant difference between the pre and post ASC 842: Leases groups for the cash ratio,  $F(1, 106) = .001$ ,  $p = .982$ , partial  $\eta^2 = .000$ , with the mean of the post ASC 842 group (.1552) being slightly higher than the mean of the pre ASC 842 group (.1544), thus the research hypothesis introduced and postulated in the study is rejected and the null hypothesis accepted. While there is no prior literature pertaining to

ASC 842: Leases addressing a change in either direction to this ratio, the literature relating to IFRS 16: Leases (a practically identical standard) does make reference to this. Stancheva-Todorova and Velinova-Sokolova (2019) noted that the new standard should not affect the inflows or outflows of cash between lessee and lessor; thus there should be no effect on the actual cash flows for lessor or lessee. This prior prediction is supported by this finding.

This study extends our understanding of the passage of ASC 842: Leases and its effect on the reported liquidity of large, publicly-traded U.S. airlines. Further, the results provide support for the research hypotheses that the reported liquidity of these airlines has decreased, as represented by the quick/acid-test ratio and net current assets as a percentage of total assets ratio. While acceptance of the null hypothesis was appropriate for the cash ratio, it should be noted that this finding is also significant and extends our understanding in this area. These findings have helped to confirm earlier predictions and forecasts in the literature, and thus present a notable and viable extension of the literature in these fields. These findings also support the null hypothesis that management have not attempted to restructure leases to avoid the capitalization requirements of the act, as evidenced by a decrease in two accrual-based liquidity metrics, and no change in the cash ratio.

### **Implications**

Large, publicly-traded airlines based in the U.S. represent a unique industry given their high amounts of leverage, high reliance on leased assets, susceptibility to extraneous demand shocks, and strong need for liquidity. This study sought to ascertain if there was an association between passage of ASC 842: Leases and the reported liquidity of large,

publicly-traded U.S. airlines, and also looked for evidence of management restructuring of leases as a potential early implication of the act.

### ***Theoretical Implications***

This study sought to examine the liquidity of publicly-traded U.S. airlines via three proxy variables; specifically seeking answers to the following questions:

*RQ1: Was the passage of ASC 842: Leases associated with a change in the reported liquidity of large, publicly-traded airlines based in the United States?*

*RQ2: Has the airline industry preemptively attempted to reduce the initial impact of ASC 842: Leases by restructuring them to avoid capitalization?*

The primary implications and contributions of the study were as follows: (a) Passage of ASC 842: Leases was significantly associated with a decrease in reported liquidity, as measured by the quick/acid-test ratio; (b) Passage of ASC 842: Leases was significantly associated with a decrease in reported liquidity, as measured by the net current assets as a percentage of total assets ratio; and (c) Passage of ASC 842: Leases was not significantly associated with a decrease in reported liquidity, as measured by the cash ratio. Due to the potentially large number of variables which could be used to measure the liquidity construct, it is foreseeable that any research study involving multiple indicators of this construct may not always see movements in the same direction. These findings extend the literature in the areas of liquidity and leasing by demonstrating a statistically significant association between passage of ASC 842: Leases and a composite of these variables. The study also offers early evidence that management has not attempted to restructure leases in response to the act or move toward an acquisition

strategy, as evidenced by decreases in two accrual-based liquidity ratios and no change in the cash ratio.

### ***Implications for Practice***

The findings of this study provide insight to firm managers and executives, creditors and bondholders, stockholders (both current and prospective) as well as a variety of other stakeholders by demonstrating the aforementioned association between passage of ASC 842: Leases and the reported liquidity of large, publicly-traded U.S. airlines. An instructive example of practical application of these study findings would be creditors negotiating, setting and monitoring debt/loan covenants for an airline. These study findings also call into question the need for a reevaluation of existing debt covenants to determine if adjustments are necessary due to the reporting of certain key liquidity ratios having changed, but cash inflows and outflows having remained largely invariant. These findings can also be leveraged by firm managers when negotiating loan covenants in their ability to show mostly invariant cash flows relative to ASC 842: Leases, as well as analysts and other researchers in evaluating accrual-based versus cash-based liquidity metrics.

### **Limitations**

This study is the first of its kind to specifically evaluate liquidity relative to the U.S. airline industry post passage of ASC 842: Leases. This is also the first study that has looked for evidence of management attempts to restructure leases in response to ASC 842: Leases in the U.S. airline industry. Thus, the study provides early evidence and findings of changes in reported liquidity for large, publicly-traded U.S. airlines and also offers early evidence that management has not attempted to restructure leases to avoid

capitalization requirements. Certain controls were introduced in this study as part of the research design; namely controlling for airline size, geographical region of the airline, and the type of firm (publicly-traded). To the extent that these controls were introduced, the findings in this study may not be generalizable to other airlines globally or other industries that have similar operating and financial characteristics. A limitation of this study is found in the relatively short elapse of time since effective date of ASC 842: Leases, and the limited amount of data available since this date, hence this study offering early evidence. While it would have been possible to extend the longitudinality of the post ASC 842: Leases group via inclusion of more recent data, the decision was made to not incorporate this extra data due to the more recent COVID-19 pandemic which has swept the globe, and the concern that this would introduce a confounding element to the study which would be extremely difficult to control for.

### **Recommendations for Research**

The research design, findings, and limitations of the current study have spawned a number of viable suggestions for potential future research which could be undertaken as a logical corollary to the current research study.

While the research conducted in this study specifically examined the airline industry in the United States, other notable industries in the U.S. with potentially similar characteristics include telecommunications, construction, commercial banks, and retail. A suggestion for future research would be to extend the analysis to one or more of these industries to determine if passage of ASC 842: Leases has had a similar impact with respect to reported liquidity.

Due to the research design constraint placed on the study with respect to geographic region, the results presented in the study may only be valid in the region studied, and may not be generalizable to other countries and regions. A possible suggestion to enhance the generalizability of the results presented in this study would be to replicate the current study in one or more geographic regions of the world to determine the extent of external validity contained in this study, and determine if the results are confined to just one geographic region or if they are generalizable to other regions.

Another research design limitation placed on the study was with respect to firm size, the results obtained in the current study may only be valid for airlines that were included in the study by virtue of their size. To the extent that the large airlines included in the study are not representative of all airlines, the findings of this study may not be generalizable to other airline populations. Thus, a suggestion for future research would be to replicate the study to all airlines located in the U.S. and perhaps abroad, to determine if the findings of the current study are generalizable to this larger population.

Another control element introduced in the current study pertained to the population only including publicly-traded U.S. airlines. To the extent that publicly-traded airlines differ from private airlines, the results of the current study may not be generalizable to this population also. A suggestion for future research would be to replicate the study to include private airlines to determine the generalizability of the current study to this population.

It is possible that variables representing liquidity have been omitted from the current study that would further inform our current understanding of the association between passage of ASC 842: Leases and the reported liquidity of large, publicly-traded



U.S. airlines. Future research could be undertaken to determine if any other combination of variables more accurately represents the liquidity construct.

Finally, due to the limited amount of data available post passage of ASC 842: Leases, the current study has introduced early evidence and findings of changes in reported liquidity of large, publicly-traded U.S. airlines, as well as early evidence suggesting management has not attempted to restructure leases to avoid capitalization requirements. A suggestion for further study would be to replicate this study in the future, including more post ASC 842: Leases data to determine if these findings still hold. Any such future research would have to be cognizant of the significant confounding effect of the COVID-19 pandemic on U.S. and indeed global aviation, and would have to find appropriate methodology to control for this confounding effect.

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## **Appendices**

**Appendix A**

**Airlines Included in Study Based on Fiscal Year Revenues and Total Assets**

<b>Airline</b>	<b>Stock Ticker</b>	<b>Total Revenues (Thousands)</b>	<b>Total Assets (Thousands)</b>
Delta Airlines 2019	DAL	\$47,007,000.00	\$64,532,000.00
Delta Airlines 2018	DAL	\$44,438,000.00	\$60,266,000.00
Delta Airlines 2017	DAL	\$41,244,000.00	\$53,292,000.00
American Airlines Group 2019	AAL	\$45,768,000.00	\$59,995,000.00
American Airlines Group 2018	AAL	\$44,541,000.00	\$60,580,000.00
American Airlines Group 2017	AAL	\$42,207,000.00	\$51,396,000.00
United Airlines Holdings 2019	UAL	\$43,259,000.00	\$52,611,000.00
United Airlines Holdings 2018	UAL	\$41,303,000.00	\$44,792,000.00
United Airlines Holdings 2017	UAL	\$37,736,000.00	\$42,326,000.00
Southwest Airlines 2019	LUV	\$22,428,000.00	\$25,895,000.00
Southwest Airlines 2018	LUV	\$21,965,000.00	\$26,243,000.00
Southwest Airlines 2017	LUV	\$21,171,000.00	\$25,110,000.00
Alaska Air Group 2019	ALK	\$ 8,781,000.00	\$12,993,000.00
Alaska Air Group 2018	ALK	\$ 8,264,000.00	\$10,912,000.00
Alaska Air Group 2017	ALK	\$ 7,933,000.00	\$10,740,000.00
JetBlue Airways Corporation 2019	JBLU	\$ 8,094,000.00	\$11,918,000.00
JetBlue Airways Corporation 2018	JBLU	\$ 7,658,000.00	\$10,426,000.00
JetBlue Airways Corporation 2017	JBLU	\$ 7,015,000.00	\$ 9,781,000.00
SkyWest Airlines 2019	SKYW	\$ 2,971,963.00	\$ 6,657,129.00
SkyWest Airlines 2018	SKYW	\$ 3,221,679.00	\$ 6,313,212.00
SkyWest Airlines 2017	SKYW	\$ 3,204,268.00	\$ 5,458,279.00

Hawaiian Holdings 2019	HA	\$ 2,832,228.00	\$ 4,126,624.00
Hawaiian Holdings 2018	HA	\$ 2,837,411.00	\$ 3,196,646.00
Hawaiian Holdings 2017	HA	\$ 2,695,628.00	\$ 2,859,831.00
Allegiant Airlines 2019	ALGT	\$ 1,840,965.00	\$ 3,010,803.00
Allegiant Airlines 2018	ALGT	\$ 1,667,447.00	\$ 2,498,668.00
Allegiant Airlines 2017	ALGT	\$ 1,503,778.00	\$ 2,180,157.00

**Appendix B**  
**IRB Exemption Confirmation**

Mail - Philip Slater - Outlook — Mozilla Firefox

https://outlook.office.com/mail/deeplink?popoutv2=1&version=20210308001.09

Reply all Delete Junk Block

**Re: IRB Exemption Confirmation - DBA Student**


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**From:** Sydney Brown <skbrown@Gardner-Webb.edu>  
**Sent:** Tuesday, February 23, 2021 12:08 PM  
**To:** Philip Slater <pslater@gardner-webb.edu>; irb <irb@gardnerwebb.onmicrosoft.com>; David Granniss <dgranniss@Gardner-Webb.edu>  
**Cc:** Earl Godfrey <egodfrey@Gardner-Webb.edu>; Sandy Mankins <smankins@Gardner-Webb.edu>  
**Subject:** Re: IRB Exemption Confirmation - DBA Student

Mr. Slater,  
The IRB has reviewed your communication. Based on the information provided, no IRB application is required to complete your study utilizing secondary and publicly available financial ratio data. If anything changes regarding the scope or nature of the data you are collecting, please don't hesitate to reach out to make further inquiry as to whether an IRB application is necessary.

We wish you best of luck in completing your research and earning your DBA!  
Sydney Brown

**Sydney K. Brown, PhD**  
Dean, Gayle Bolt Price of Graduate Studies  
Administrator, GWU Institutional Review Board  
Professor, School of Education  
142 Memorial Dr.  
Office: (704) 406-3019  
Cell: (919)451-0203

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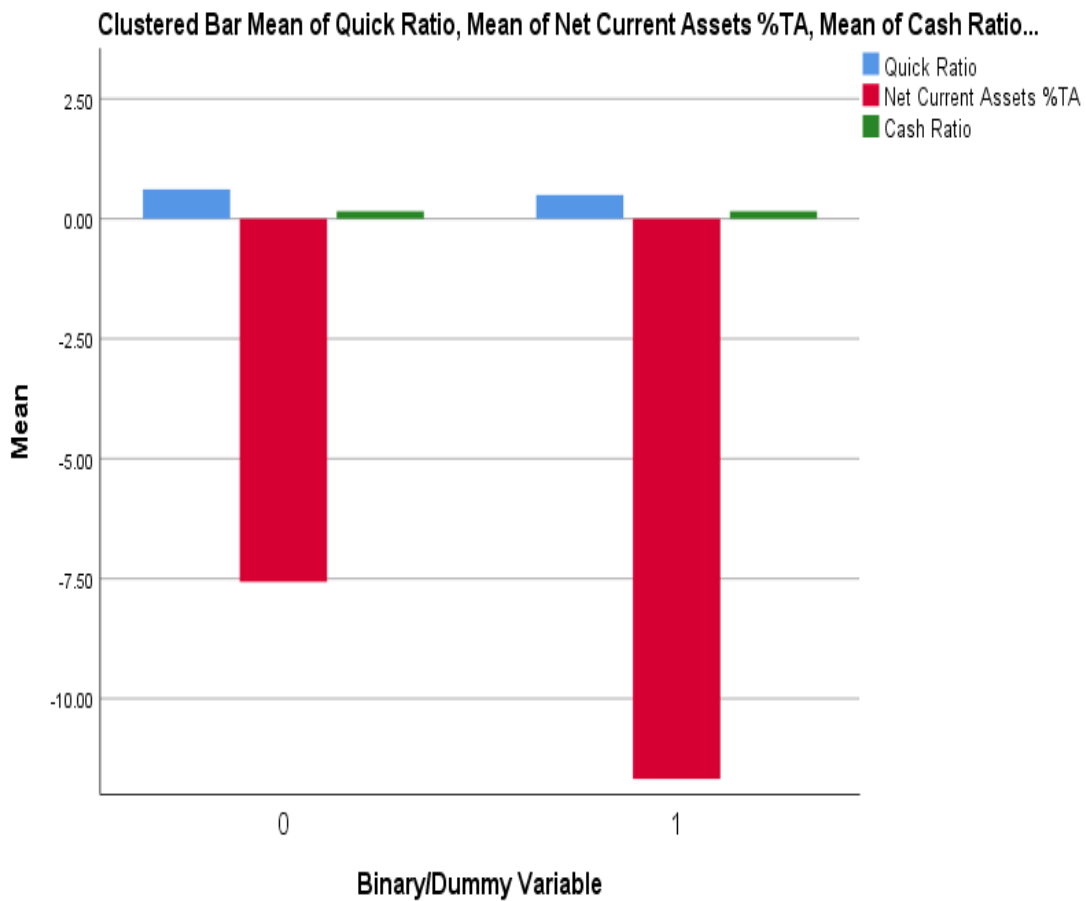
**From:** Philip Slater <pslater@gardner-webb.edu>  
**Sent:** Monday, February 22, 2021 8:13 PM  
**To:** irb <irb@gardnerwebb.onmicrosoft.com>; Sydney Brown <skbrown@Gardner-Webb.edu>; David Granniss <dgranniss@Gardner-Webb.edu>  
**Cc:** Earl Godfrey <egodfrey@Gardner-Webb.edu>; Sandy Mankins <smankins@Gardner-Webb.edu>  
**Subject:** IRB Exemption Confirmation - DBA Student

Windows taskbar: 11:49 AM 3/17/2021



**Appendix C**

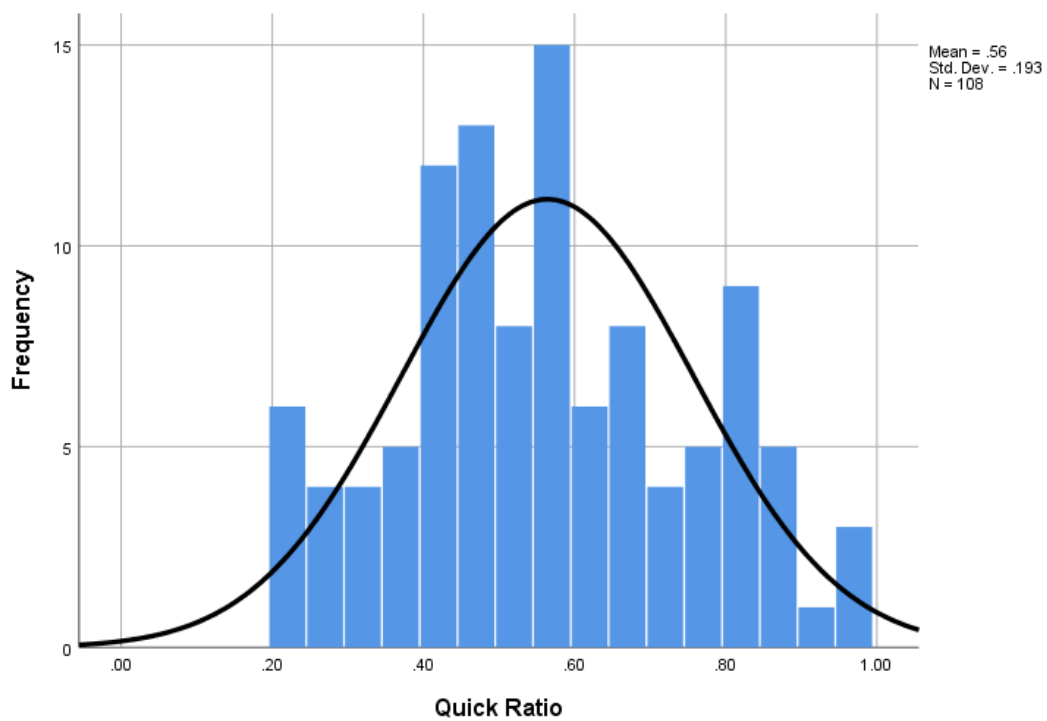
**Descriptive Statistics: Bar Chart of Means: Pre and Post Groups**



**Appendix D**

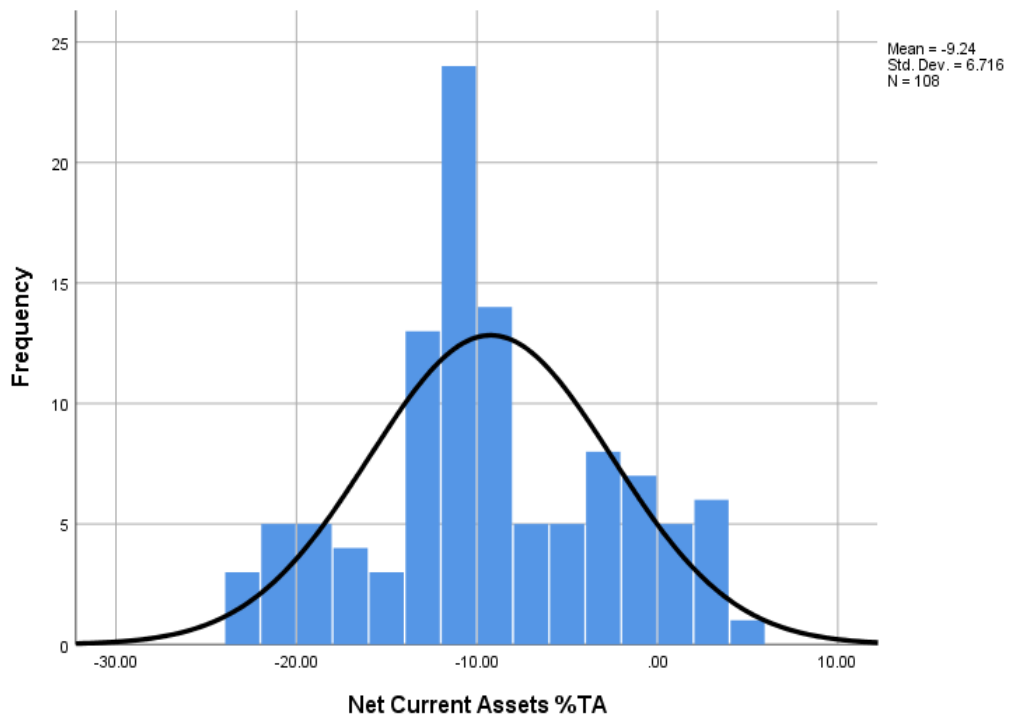
**Frequency Distribution Histograms for Main Study**

Quick Ratio Histogram with Normal Curve Superimposed

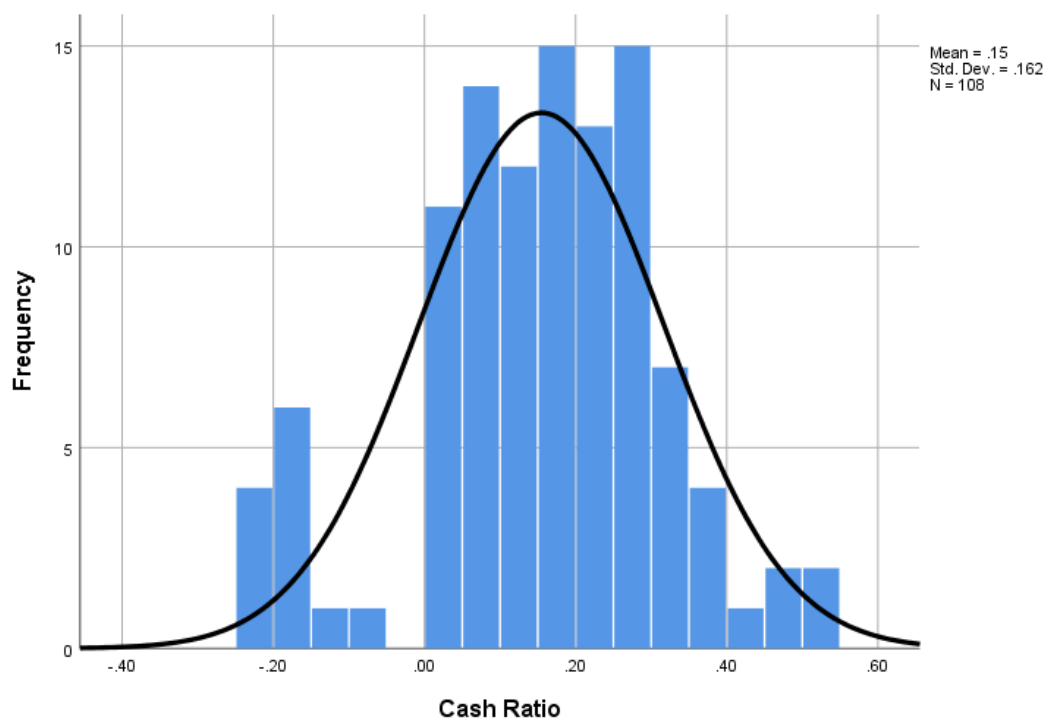


## Net Current Assets as a Percentage of Total Assets Histogram with Normal Curve

Superimposed

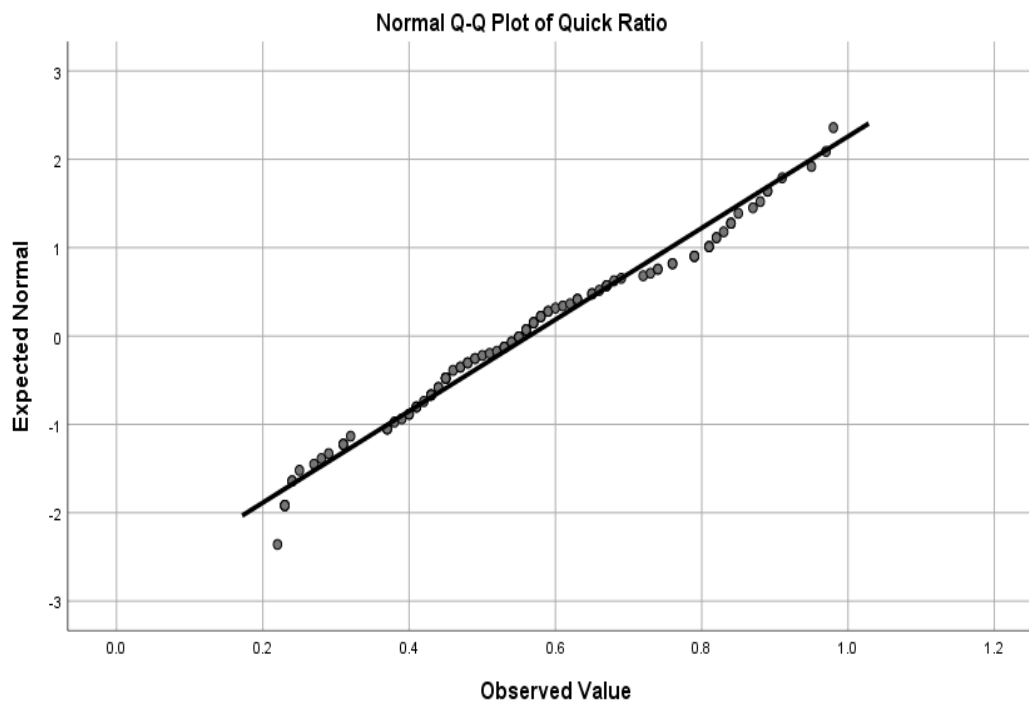


Cash Ratio Histogram with Normal Curve Superimposed

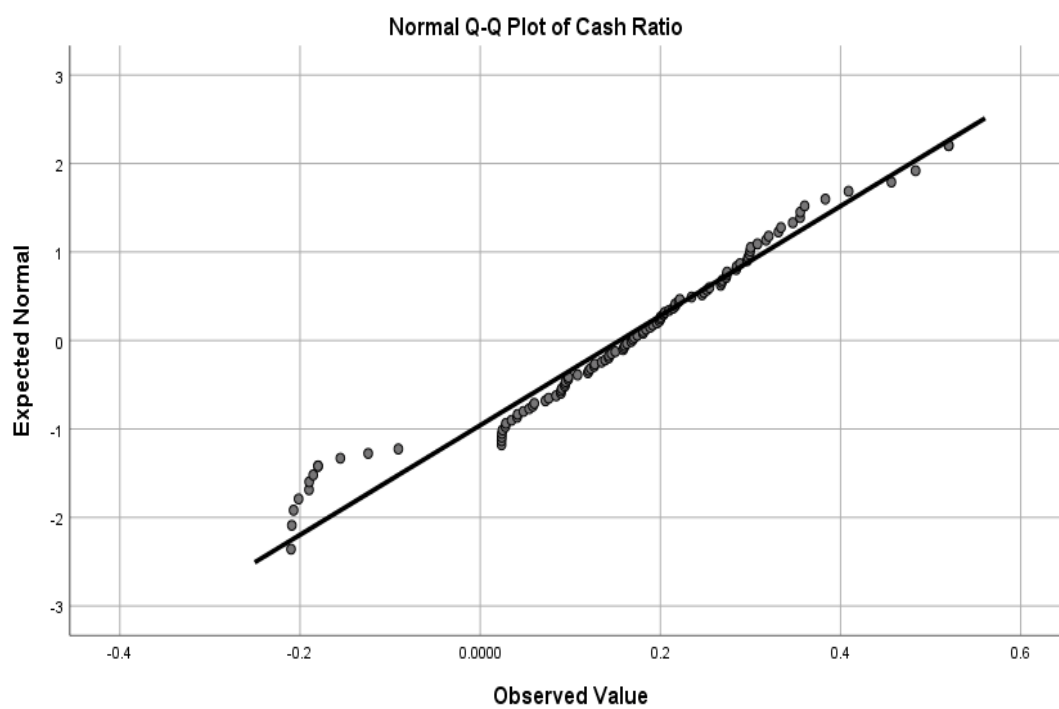
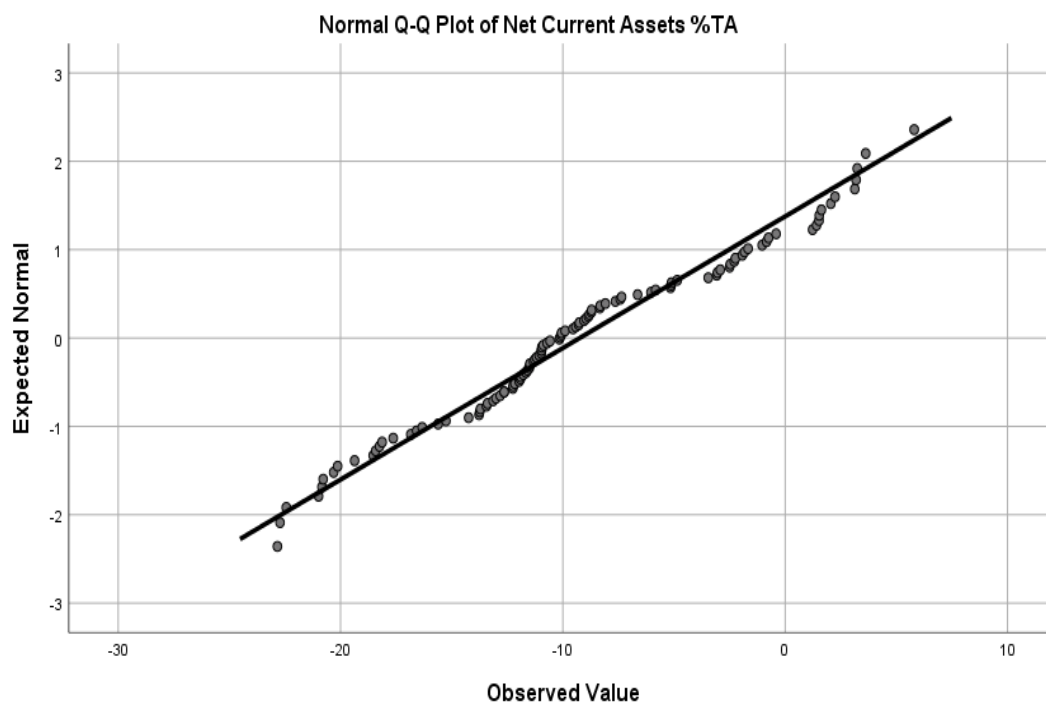


## **Appendix E**

### **Normal Dependent Variable Q-Q Plots**







## **Appendix F**

### **Dependent Variable Box Plot Diagrams**

