

**PREDICTING THE RISK OF FRAUD IN EQUITY CROWDFUNDING OFFERS
AND ASSESSING THE WISDOM OF THE CROWD**

A Dissertation
Submitted to the
the Temple University Graduate Board

In Partial Fulfillment
of the Requirements for the Degree
DOCTOR OF BUSINESS ADMINISTRATION

by
Carla Cabarle
May 2019

Examining Committee Members:

Sudipta Basu, Advisory Chair, Accounting
Jayanthi Krishnan, Accounting
Connie Mao, Finance
Jing Gong, Management Information Systems

ABSTRACT

Regulation Crowdfunding, enacted in May 2016, is intended to facilitate capital formation in startups and small businesses funded primarily by small investors (Securities and Exchange Commission (SEC), 2016b). This dissertation investigates (1) the risk of fraud in equity crowdfunding offerings and (2) whether investors respond to fraud signals by selecting (rejecting) offers with low (high) fraud risk.

Because equity crowdfunding is quite new, no frauds have yet been identified. Therefore, I employ a predictive analytics tool, Benford's Law, to assess the fraud risk of the offering. I select observable indicators to represent the Fraud Triangle dimensions—incentives, opportunities and rationalization—and test if they predict fraud risk. I also compare offer funding outcomes to my fraud risk assessments to identify if investors' selections consider fraud risk appropriately.

The relaxed auditor assurance and disclosure requirements attracts both honest and dishonest founders, but I find that the risk of fraud is higher in equity crowdfunding offers than in public offerings as reported by other studies. I find that there are several individual fraud indicators and models that explain fraud risk, but these do not predict whether the offer is funded or not (funding outcomes) or the amount that is raised if funded.

This dissertation is the first to apply Benford's Law to equity crowdfunding offers and map fraud attributes to fraud risk and funding outcomes. My dissertation can inform investors, issuers, regulators, intermediaries and practitioners of the high risk of fraud in equity crowdfunding offerings and of several noteworthy fraud indicators.

ACKNOWLEDGEMENT

I am sincerely grateful to my committee members, Dr. Sudipta Basu, Dr. Jayanthi Krishnan, Dr. Connie Mao and Dr. Jing Gong, for your guidance, encouragement and dedication in helping me attain a life-long professional goal.

To my parents, Grace and Russ Tilton, and my in-laws, Charlene and Charlie Jacobs, thank you for your love and laughter. Thank you for always lending an ear, sharing your words of wisdom and for tirelessly cheering me on.

I would not have succeeded without the steadfast and loving support of my husband, Ken and my children, Grace and Jordan. Thank you for inspiring and encouraging me and for your unconditional love. You are my everything, always and forever.

TABLE OF CONTENTS

ABSTRACT	ii
ACKNOWLEDGEMENT	iii
LIST OF TABLES	vi
LIST OF FIGURES	viii
CHAPTER	
1 INTRODUCTION	1
2 USING BENFORD’S LAW TO PREDICT RISK OF FINANCIAL STATEMENT FRAUD IN EQUITY CROWDFUNDING OFFERINGS	18
Literature Review.....	18
Regulation Crowdfunding.....	18
Benford’s Law	20
Conceptual Model and Hypotheses	23
Data and Analysis	27
Results.....	39
3 IS THE “CROWD” WISE? DO UNSOPHISTICATED INVESTORS CORRECTLY EVALUATE FRAUD RISK IN EQUITY CROWDFUNDING OFFERINGS?	54
Literature Review.....	55
Voluntary Disclosure Theory.....	55
Signaling Theory.....	58
Fraud Theory.....	59
Conceptual Model and Hypotheses	62
Incentives and Opportunities	62
Rationalization	63
Data and Analysis	76
Data Collection	76
Data Analysis and Results	76
4 CONCLUSION AND EXPECTED CONTRIBUTION.....	95
Gateway to Future Research.....	99
REFERENCES CITED.....	101

APPENDIX A COMPARISON OF REGISTRATION, DISCLOSURE AND ASSURANCE REQUIREMENTS OF EXEMPT AND NONEXEMPT REGISTRATIONS OF INITIAL SECURITIES ISSUE.....	115
APPENDIX B COMPARISON OF INVESTOR LIMITATIONS AND RESTRICTIONS IN NONEXEMPT AND EXEMPT OFFERINGS	121
APPENDIX C ACFE FRAUD TREE	123
APPENDIX D BENFORD’S LAW.....	124

LIST OF TABLES

Table 1: Descriptive Statistics.....30

Panel A: by Oversubscription Tier30

Panel B: Type of Securities Offered31

Panel C: Intermediary Market Share.....32

Panel D: Independent CPA Market Share33

Panel E: Firm-Year Meet/Just Beat (M/JB).....35

Panel F: Fraud Risk, Measured by MAD Scores, of Firm-Year Meet/Just Beat Categories36

Panel G: Fraud Risk, Measured by KS Scores, of Firm-Year Meet/Just Beat Categories36

Panel H: Fraud Risk, Measured by MAD Scores, of Total Filings37

Panel I: Fraud Risk, Measured by MAD Scores, of Filings by Life-cycle Stage ..37

Panel J: Firm Risk, Measured by MAD Scores, of Filings by Meet/Just Beat (M/JB) Categories38

Panel K: Fraud Risk, Measured by MAD Scores, of All Filings by Mandatory Assurance Level.....39

Table 2: Comparison of Noncompliance to Benford’s Law in Studies of Crowdfunders and Other Public Companies40

Table 3: Nonconformities to Benford’s Law across Life-Cycle Stages.....401

Panel A: Tests Using Chi-square and KS Statistics.....41

Panel B: Tests Using MAD Scores42

Table 4: Nonconformities to Benford’s Law across Meet/Just Beat by Filing.....43

Panel A: Tests Using Chi-square and KS Statistics.....43

Panel B: Tests Using MAD Scores: Small or Zero Profits Compared to Small Losses.....45

Panel C: Tests Using MAD Scores: Small or Zero Profits Compared to Large Losses.....46

Panel D: Tests Using MAD Scores: Small or Zero Profits Compared to Large Profits.....46

Panel E: Tests Using MAD Scores: Small or Zero Profits Compared to all M/JB Categories47

Table 5: Nonconformities to Benford’s Law across Assurance Levels Mandated by Oversubscription Tier.....	48
Panel A: Tests Using Chi-Square and KS Statistics	48
Panel B: Tests Using MAD Scores: Levels of Mandatory Assurance: Review (Tier 2) Compared to Review with Subsequent Audit (Tier 3), determined by oversubscription).....	49
Panel C: Tests Using MAD Scores: Mandatory External Assurance (Tiers 2 and 3, determined by oversubscription) Compared to Internal Assurance by Management Certification (Tier 1).....	50
Table 6: Pearson Correlation Matrix of MAD score, Life-cycle Stage, Meet/Just Beat, Mandatory Review Tiers and Mandatory External vs. Internal Assurance	52
Table 7: Regression of Fraud Risk, Measured by MAD Score, on Potential Predictors ...	53
Table 8: Empirical Proxies for the Three Dimensions of the Fraud Triangle	68
Panel A: Incentives Dimension.....	68
Panel B: Opportunities Dimension	69
Panel C: Rationalization Dimension.....	70
Table 9: Summary Statistics for Fraud Determinant Proxies.....	78
Table 10: Relation of Fraud Attributes to Fraud Risk.....	79
Panel A: Differences in Fraud Attributes between Firms with High and Low Fraud Risk.....	79
Panel B: Regression of Fraud Risk on Incentives Dimension Proxies	81
Panel C: Regression of Fraud Risk on Opportunities Dimension Proxies.....	82
Panel D: Regression of Fraud Risk on Rationalization Dimension.....	84
Table 11: Regression Analysis of Overall and Reduced Fraud Risk Models	86
Panel A: Fraud Model I, Mandatory Assurance	86
Panel B: Fraud Model II Mandatory Review.....	88
Table 12: Differences in Fraud Attributes between Funding Outcomes.....	90
Table 13: Funding Outcomes of Revised and Reduced Fraud Models.....	91
Panel A: Determinants of Whether an Offering is Funded for Different Fraud Risk Models.....	91
Panel B: Determinants of Funding Amounts for Different Fraud Risk Models....	93

LIST OF FIGURES

Figure 1: The Fraud Triangle14

Figure 2: Benford’s Distribution of First Digits21

Figure 3: Equity Crowdfunding Financial Statement Fraud Model24

Figure 4: Firm-Years’ Earnings, Scaled by Total Assets, by Oversubscription Tier.....34

Figure 5: Distributions of MAD Scores of Filings by Life-cycle Stage42

Figure 6: Distributions of MAD Scores of Filings by Meet/Just Beat Categories44

Figure 7: Distributions of Firm-Year MAD Scores by Meet/Just Beat Categories44

Figure 8: Distributions of MAD Scores of Filings by Oversubscription Tier Size: Tier 1,
Tier 2 and Tier 349

Figure 9: Propensity to Commit Fraud Model60

Figure 10: Fraud Risk-Funding Outcome Matrix75

Figure 11: Hypothesis 8 Mapping Fraud Attributes to Fraud Risk and Funding
Outcomes75

CHAPTER 1

INTRODUCTION

Regulation Crowdfunding (17 CFR 227, 2016) was enacted under Title III of the Jumpstart Our Business Startups (JOBS) Act on May 16, 2016, to govern the offering and sale of small company equity and debt securities (herein referred to as “equity crowdfunding”) to the public (Pub. L. No. 112-106, 126 Stat. 306, 2012). The act was intended to stimulate the economy and boost small business growth and capitalization by allowing many investors to make small investments online, while at the same time reducing the costs and burdens of making an initial public offering (IPO) (Securities and Exchange Commission (SEC), 2016). The “crowd” can be made up of both accredited and unaccredited investors.¹ Under Regulation Crowdfunding, a small business may offer unregistered securities up to \$1 million (inflation-adjusted) in a 12-month period through an SEC-approved intermediary.

The assurance and disclosure requirements vary with the size of equity crowdfunding campaigns. Each campaign is assigned to a tier that is determined by aggregating the issues in the previous twelve months, including the current offering’s oversubscription amount. The oversubscription amount is the maximum amount the issuer will accept in the current offering. Tier 1 (campaigns less than or equal to

¹ The SEC defines an accredited investor as a person whose net worth is at least \$1 million (excluding the value of the primary home) or who earned at least \$200,000 (\$300,000 with spouse) annually in each of the previous two years. Retrieved from: https://www.sec.gov/files/ib_accreditedinvestors.pdf. Another label for this type of investor is sophisticated. A unaccredited investor is not specifically defined by the SEC, so I infer that anyone who is not an accredited investor is unaccredited. Other labels for this type of investor are nonaccredited, ordinary and unsophisticated.

\$100,000 in 2016) requires the least assurance in that the financial statements and tax data must only be certified by an executive officer of the issuer. Tier 2 (\$100,001 to \$500,000) requires certification and an independent certified public accountant (CPA) review. Tier 3 (\$500,001 to \$1 million) requires certification and independent CPA review for the first issue under Regulation Crowdfunding, and audited financial statements are required for subsequent issues. All dollar amounts are adjusted annually for inflation.² If the issuer has audited financial statements, they must be included at any tier. A review provides much less assurance than an audit for a much lower cost.³

Each offering tier requires that the issuer disclose two years of financial statements, or since inception, if shorter.⁴ The required statements are the balance sheet,

² Inflation adjustments as of May 5, 2017: Tier 1 offers are \$107,000 or less, Tier 2 offers are between \$107,000 and \$535,000, and Tier 3 offers are \$535,000 to \$1.07 million.

³ “In a review of financial statements, the CPA seeks to obtain limited assurance as a basis for reporting whether the CPA is aware of any material modifications that should be made to the financial statements in order for them to be presented in accordance with an applicable financial reporting framework. A review is substantially less in scope than an audit, and often is performed for privately held companies that are required to provide financial statements to outside parties such as banks, creditors, or potential purchasers. Reviews of financial statements are conducted in accordance with the AICPA Statements on Standards for Accounting and Review Services (SSARSs), except for reviews of certain interim financial information that are conducted in accordance with the AICPA Statements on Auditing Standards (SASs). Reviews of subject matter other than historical financial statements are performed in accordance with the AICPA Statements on Standards for Attestation Engagements (SSAEs)” Retrieved from <https://www.aicpa.org/Advocacy/State/DownloadableDocuments/Attest-Service-Chart-Color-Nonfillable.pdf>

⁴ Disclosures are filed with the SEC on Form C. Amendments to the initial offering are filed on Form C/A.

statement of comprehensive income, statement of cash flows, and statement of changes in stockholders' equity, all prepared in accordance with U.S. Generally Accepted Accounting Principles (GAAP). Notes to the financial statements are included and the financial condition of the issuer is discussed, which include material trends, uncertainties, historical data, liquidity, and capital resources. Additional required disclosures include the current number of employees and a discussion of the material risk factors of the investment. During the offer period, the issuer must inform the public of its progress towards its funding goal.⁵

The issuer must offer the securities through a SEC-registered intermediary, which can be a broker-dealer or an online funding portal. The intermediary acts like a gatekeeper and is responsible for educating investors, advertising offerings and

⁵ The Regulations prohibits certain companies from offering stock through crowdfunding, such as non-U.S. companies, certain investment companies and companies that failed to fulfill annual reporting requirements. Also disqualified are companies that do not include a specific business plan or if they state that they plan to merge with or acquire another company.

An offering that is exempt from registration is not permitted to solicit and advertise an offering. However, equity crowdfunding issuers are permitted to advertise general information about the offer and direct investors to their intermediary. The issuer can then communicate with investors about the terms of the offering, operations and other information on the intermediary's platform, provided the issuer always identifies itself as the issuer.

administering the campaign.⁶ The intermediary may reasonably rely on the investor's representations including those regarding annual income, net worth and other investments made. Intermediaries can request additional documentation from the investor to verify compliance with the investment limits but are not required to do so. Opening investor accounts has few requirements, except that the intermediary must require an account opener to agree to electronic delivery, presumably to reduce printing and mailing costs.

Both the SEC and the Financial Industry Regulatory Authority (FINRA) provide basic investment information on their websites in an effort to educate investors about the risks of investing. Basic education may deter an investor from investing but may not be enough for those who are attempting to evaluate a specific offering or compare offerings.

Although these securities are unregistered, the offering documents are filed with both the SEC and the intermediary. The documents must include data about the company's officers, directors, and 20% or more owners, including all positions and

⁶ Per Regulation Crowdfunding, Title 17, Part 227, Subpart C, an intermediary is required to

- provide educational materials to investors and require affirmation by the investor of their understanding of the risk of the investment
- implement procedures to decrease the risk of fraud, including obtaining background and securities enforcement history check on each officer, director and 20% or greater owner
- publish information about the company and the offer
- provide discussion forums, and
- facilitate the offer and sale.

offices held with the issuer, when each person served and their business experience over the past 3 years.⁷ Other required data includes:

- Description of the business and anticipated business plan
- Planned purpose and intended use of the proceeds
- Price of the securities or the method to determine price
- Funding target
- Deadline for offering
- Policy for accepting investments greater than target offering (oversubscriptions)
- Related party transactions
- Ownership and capital structure
- Material terms of indebtedness

Equity crowdfunding should not be confused with other well-known crowdfunding mechanisms, such as rewards-based (e.g. Kickstarter), donations-based (e.g. GoFundMe), or loan-based (e.g. LendingClub) crowdfunding. These crowdfunding mechanisms are similar in that each solicits interest and participation from online crowds. The distinguishing feature of equity crowdfunding is that securities are exchanged for a capital investment in the startup or small company, whereas the other mechanisms offer a product, a philanthropic sentiment or a debt instrument.

⁷ President, vice president, secretary, treasurer or principal financial officer, comptroller or principal accounting officer and any person routinely performing similar functions.

According to the *2015 Crowdfunding Industry Report: Market Trends, Composition and Crowdfunding Platforms* (Massolution, 2015), equity crowdfunding raised approximately \$1.11 billion in 2014. The report also noted that the global average equity crowdfunding campaign was \$275,461, while the North America average equity crowdfunding campaign was \$175,000. These North American campaigns, which were permitted and governed by state law, were offered before the federal (U.S.) Regulation Crowdfunding.

Before Regulation Crowdfunding, private placements, which are unregistered securities offerings and the type of stock issue most similar to equity crowdfunding, were available only to accredited investors. Accreditation is intended to “identify persons who can bear the economic risk of investing in these unregistered securities” because unregistered securities tend to be riskier than registered offerings for reasons such as resale restriction, extent of general solicitation permitted, quality of disclosure and level of assurance requirements (SEC, 2013, p. 108; 2015, 2016b).⁸ Regulation Crowdfunding was enacted to allow and induce unaccredited investors to invest in unregistered securities offered by startups and small companies before they conduct an IPO. Appendix A and B compare the features of Regulation Crowdfunding offerings with other exempt and nonexempt offerings.

⁸ https://www.sec.gov/files/ib_accreditedinvestors.pdf

Legislators crafted Regulation Crowdfunding with the expectation that unaccredited investors would embrace crowdfunding in the same way accredited investors embrace private placement investing. Senator Mark Warner (D-VA) stated, “There is now the ability to use the Internet as a way for small investors to get the same kind of deals that up to this point only select investors have gotten that have been customers of some of the best-known investment banking firms, where we can now use the power of the Internet, through a term called crowdfunding” (158 CONG. REC. S1689, 2012). Similarly, Senator Carl Levin (D-MI) said, “Our bill creates new opportunities for crowdfunding but establishes basic regulatory oversight, liability, and disclosure rules that will give investors the confidence to participate in this promising emerging source of money for growing companies” (158 CONG. REC. S1781, 2012).

At first glance, the JOBS Act and Regulation Crowdfunding appear to be a win-win for the firm and the investor, particularly the unaccredited investor. A firm can gauge public interest in its stock through a crowdfunding campaign without committing to accounting changes and internal control policies that would be required for an IPO. The issuers are provided an online platform on which they can share data with current or prospective investors. Accordingly, Regulation Crowdfunding enables buyers to easily find and invest in startups and small businesses that issue stock, debt or a future interest at a low cost.

To reduce investors' potential losses, investment limits are imposed. The tiered annual investment limit depends upon the investor's earnings, net worth or both.⁹ Additionally, the investor is generally prohibited from transferring the stock for one year after its issuance so that the stock does not become widely traded in its first year.¹⁰ The SEC (2016b, p. 437) states that this holding-period restriction protects investors by giving them a chance to evaluate whether they should continue to hold the stock based on the company's performance. The SEC (2016b, p. 411) also surmises that unaccredited investors are unlikely to monitor their investments.

The investment limits make equity crowdfunding less appealing to accredited investors. During the development of the JOBS Act, Senator Jeff Merkley (D-OR) remarked:

low-dollar investments from ordinary Americans may help fill the void, providing a new avenue of funding to the small businesses that are the engine of job creation. The Capital Raising Online While Deterring Fraud and Unethical Non-Disclosure (CROWDFUND) Act (Title III of the JOBS Act) would provide startup companies and other small businesses

⁹ In 2016, if an investor's income or net worth was less than \$100,000, s/he could invest up to the greater of \$2,000 or 5% of annual income or net worth across all crowdfunding offers in a 12-month period. If the investor both earned \$100,000 or more and had net worth of \$100,000 or more, the overall limit increased to 10% of the lesser of annual income or net worth. All crowdfunding investments made by an investor were not to exceed \$100,000 in a 12-month period. Spouses can calculate their net worth and income jointly. These limits are adjusted annually for inflation. On May 5, 2017, the \$100,000 limit was adjusted to \$107,000 and the \$2,000 investment limit adjusted to \$2,200.

¹⁰ The one-year holding period rule allows for some exceptions: an investor can transfer without penalty to the issuer, to an accredited investor as part of a registered offering, or to a family member or family trust.

with a new way to raise capital from ordinary investors in a more transparent and regulated marketplace. (157 CONG. REC. S8458-02, 2011)

Legal analysts, fraud practitioners and academics have noted potential downsides of capital formation through equity crowdfunding. Many agree that weak disclosure leads to information asymmetry, which increases the potential for fraud, and therefore reduces the protection of unaccredited investors. In its offering prospectus, the issuer can select data to highlight the company's mission, strengths and goals, and choose the amount of funding to raise based on their financial goals to expand and grow or their need to cover operational costs. Equity crowdfunders can also choose a level of assurance and structure their offering accordingly. This allows unscrupulous equity crowdfunders to choose their funding tier with the intent to deceive, misstate, or embellish so as to defraud investors.

Internal controls are an integral component of a company's management control system, which should guide strategy and decisions to achieve an organization's overall objectives (COSO, 2013).¹¹ Effective internal controls make fraud less likely; 42% of financial statement frauds in organizations with less than 100 employees occur because of internal control deficiencies and these organizations have a median loss of \$200,000. (Association of Certified Fraud Examiners (ACFE), 2018).

¹¹ The original COSO framework of internal control included five components: the control environment, risk assessment, control activities, information and communication, and monitoring (COSO, 1992). COSO later enhanced the internal control framework to provide an integrative approach for managers to assess and manage risks (COSO, 2013). This new model, shown in Appendix C, assigns attributes and principles to each of the five original components of the internal control model.

In the wake of the corporate scandals of the late 1990's and early 2000's, Congress enacted the Sarbanes-Oxley Act of 2002 (SOX) aimed at improving corporate disclosure and transparency rules. Based on the 1992 framework for effective internal controls proposed by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), SOX sections 302(a) and 302(b) required the CEO and CFO respectively to report on and certify the effectiveness of the internal controls over financial reporting. Section 404 of SOX subsequently required that publicly traded companies receive and disclose auditor attestation of the adequacy and effectiveness of the firm's internal control over financial reporting.

The enactment of SOX mistakenly increased the public's trust in the stock market, given the subsequent Great Recession (Hochberg et al., 2009). Unfortunately the massive frauds revealed during the Great Recession of 2008-9 showed that these provisions were ineffective in preventing or detecting fraud. Romano (2005a, b) contends that most of these SOX provisions can be characterized as "quack corporate governance." High audit fees for the new internal control audits resulted in continuous pushback from industry leaders, so the Dodd-Frank Act of 2010 permanently exempted small public companies (with market capitalization less than \$75 million) from the internal control auditor attestation requirement of SOX Section 404.

Registered public offerings after SOX require certification by management that the internal controls are effective. Further, the offerings are required to include an independent audit of both the financial statements and of the internal controls to provide

investors with transparent data. IPOs must comply with SOX 404 one year after going public. These regulatory requirements do not apply to small private companies including equity crowdfunders.

Poor controls can lead to data or reporting errors, omissions and misrepresentations, which can have far-reaching impact if a company offers securities to the public through either a registered or unregistered offering. The SEC requires registered stock offerings to disclose risky characteristics, events and transactions and have an independent auditor provide assurance that the data contains no material misstatements and that the internal controls are effective. Regulation Crowdfunding permits unregistered offerings, so these strict assurance and disclosure requirements do not apply. This lack of data and/or validation may not discourage investors from investing in unstable or fraudulent companies.

In small, private companies, internal controls may be weak or ineffective due to a lack of resources such as personnel, space, or technology, which results in an improper separation of duties or safeguarding of assets (e.g. Moldof, 2014). With this high autonomy combined with less oversight and prescriptive guidance, the likelihood of misstatement, fraud and theft is high (Brennan & McGrath, 2007; Hermanson et al., 2012). ACFE (2018) found that financial statement fraud is about twice as pervasive in small companies (less than 100 employees) than larger organizations (more than 100 employees).

Because these internal controls are costly and burdensome, founders and top executives often do not implement them. A small private company with weak internal controls has little to no impact on the general public. Executives in private business self-reported that they spend very little time implementing, monitoring, and maintaining internal controls, and most reported that they are the sole party responsible for internal controls (Cabarle, 2017). These same executives reported that many controls are weak or lacking. Further, most executives interviewed do not document their controls or regularly assess their effectiveness, and many of these executives are the only person with access to and responsibility for preparing journal entries and financial statements, as well as the safeguarding of assets. These executives even occasionally override their own controls or direct others to override the established controls, and unless a third party, such as a mortgage lender, requires an audit, many neither have their financial statements audited nor engage a CPA to study and document their internal controls.

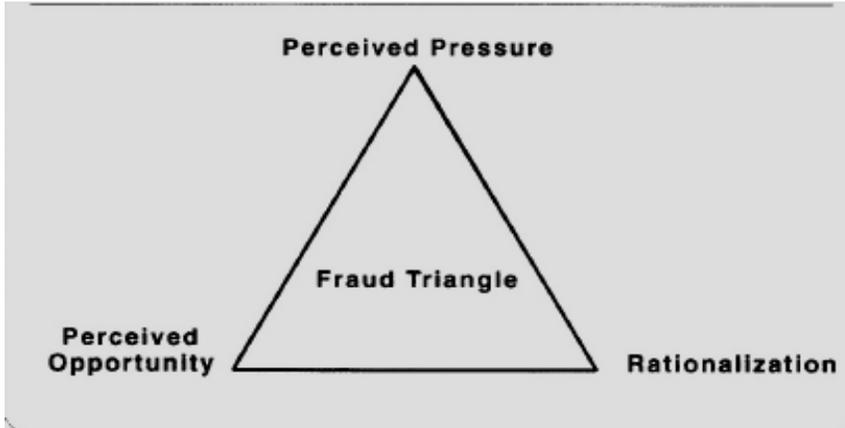
Top-level executives and owners commit larger frauds with longer duration than middle-level managers or employees. ACFE (2018) reported that the median fraud committed by executives and owners was \$850,000, and that most fraud was committed in the Accounting department. Notably, the CEO and/or CFO are involved in an overwhelming majority of fraud cases (COSO, 2010; Dunn, 2004). Owners and executives are responsible for most of the financial statement fraud perpetrated (ACFE, 2018).

Heminway (2016) raises the concern that web-based solicitation is an easy avenue for raising capital by unscrupulous people because investors cannot easily verify issuer data. Recently, service providers have begun offering a compliance check and due diligence to investors that may improve the investor experience. One such provider, CrowdCheck.com, offers a review and report of the issuer's fulfillment of the disclosure requirements, SEC requirements, executive backgrounds, standing of business, and an analysis of how the company's plans may impact the investor's future exit.

The ACFE (2018), in their Global Fraud Study, analyzed 2,690 fraud cases investigated and reported by Certified Fraud Examiners from January 2016 to October 2017 and found that these cases caused total losses around the world in excess of \$7 billion dollars. The ACFE Fraud Tree, as shown in Appendix C, displays three categories of fraud: asset misappropriation, corruption, and financial statement fraud. In the 2018 Global Fraud Study, the median loss due to financial statement fraud was \$800,000 whereas the median loss of the other two categories combined totaled \$364,000 (ACFE, 2018), a ratio of 2:1.

My analysis is conducted through the lens of Cressey's Fraud Triangle (1953), a seminal work in the fraud field, which is displayed in Figure 1. I also rely on Statement on Auditing Standards (SAS) No. 99, Consideration of Fraud in a Financial Statement

Figure 1: The Fraud Triangle (Cressey, 1953)



Audit (AICPA, 2002) which provides techniques and fraud detection guidelines commonly used by auditors and forensic accountants.¹²

In Chapter 2, I use Benford’s Law, an analytics tool that auditors use, to assess the risk of fraud in an audit, to predict the level of financial statement fraud risk in equity crowdfunding offers. I also tested three attributes - life cycle stage, earnings (meet/just beat), and mandatory assurance - for a relation to the fraud risk assessment.

The assessments from Chapter 2 are used in the Chapter 3 analysis which delves deeper into the possible attributes of equity crowdfunding that together provide an environment where financial statement fraud can thrive. SAS No. 99 and The Propensity

¹² Statement on Auditing Standard (SAS) No. 99 requires that auditors “plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether caused by error or fraud.” The Public Company Accounting Oversight Board issues similar guidance in AS 2401, Consideration of Fraud in a Financial Statement Audit, which reorganized AU 316 of the same name.

to Commit Fraud model designed by Albrecht et al. (2008c) provide examples of each of the three dimensions of fraud, incentives, opportunities and rationalization. These examples guide the identification of fraud factors that are prevalent in high fraud risk equity crowdfunding offers, as determined by the Chapter 2 results. Chapter 3 integrates signaling theory, voluntary disclosure theory, and fraud theory to assess the wisdom of the crowd through an analysis of funding outcomes by fraud signals.

Cressey (1953) posits that there are three determinants to financial fraud:

opportunity, incentives (pressure) and rationalization. He states,

Trusted persons become trust violators when they conceive of themselves as having a financial problem which is non-shareable (pressure), are aware this problem can be secretly resolved by violation of the position of financial trust (opportunity), and are able to apply to their own conduct in that situation verbalizations which enable them to adjust their conceptions of themselves as trusted persons with their conceptions of themselves as users of the entrusted funds or property (rationalization). (Cressey, 1953)

The Fraud Triangle has been tested and used as the framework in many empirical studies that have identified specific indicators, such as weak controls and fast growth, that can be attributed to fraud or to a particular fraud determinant (Bell & Carcello, 2000; Albrecht et al., 2008b; Hogan et al., 2009, Lou et al., 2009). The Public Company Accounting Oversight Board (PCAOB, 2010) points out that all three legs of the triangle do not have to be present in order for there to be fraudulent activities and they specify that an auditor may determine that fraud is present even if only one of the dimensions is present.

One of the standards that auditors must adhere to is based on Cressey's Fraud Triangle. SAS No. 99 requires that auditors closely attend to the three elements of the

triangle to detect if there is an intentional act (fraud) that causes or if there are unintentional acts (errors) that result in a misstatement of financial statements. The factor that differentiates the two is the intent of the perpetrator(s).

SAS No. 99 states that

Fraudulent financial reporting need not be the result of a grand plan or conspiracy. It may be that management representatives rationalize the appropriateness of a material misstatement, for example, as an aggressive rather than indefensible interpretation of complex accounting rules, or as a temporary misstatement of financial statements, including interim statements, expected to be corrected later when operational results improve. (AICPA, 2002)

Depending on the offer size selected, an equity crowdfunder may provide only a management certification or a review.¹³ Although an equity crowdfunder can elect to have its financial statements audited, it is not required in the initial filings. As in any

¹³ The objective of a review is explained in Statements on Standards for Accounting and Review Services (SSARS) No. 21 and No. 23. “A review differs significantly from an audit of financial statements in which the auditor obtains reasonable assurance, which is a high, but not absolute level of assurance, that the financial statements are free of material misstatement. A review does not contemplate obtaining an understanding of the entity's internal control; assessing fraud risk; testing accounting records by obtaining sufficient appropriate audit evidence through inspection, observation, confirmation, or the examination of source documents; or other procedures ordinarily performed in an audit. Accordingly, in a review, the accountant does not obtain assurance that he or she will become aware of all significant matters that would be disclosed in an audit. Therefore, a review is designed to obtain only limited assurance as a basis for reporting whether the accountant is aware of any material modifications that should be made to the financial statements in order for the statements to be in accordance with the applicable financial reporting framework.” (AICPA, 2014). AR-C Secs. 90-A4 and 90A-A4 is accessible from

<https://www.aicpa.org/content/dam/aicpa/research/standards/compilationreview/downloadabledocuments/ssars-21-summary.pdf>.

public offer, fraudulent equity crowdfunding filings are not prevented through mandated assurance (management certification, reviews or audits). Consequently, the appeal of high rewards may outweigh equity crowdfunders' expected cost of fraud detection.

Moreover, whether the entrepreneur or executives unintentionally misstate financial statements, overstate future prospects, or intentionally mislead investors, misstatements may not be detected by the unsophisticated prospective investor. Small investors are unlikely to pursue litigation or demand administrative penalties after losses, mainly because of the high cost associated with litigation (Knyazeva, 2016). The firm's ability to select the level of assurance and disclosure by way of offer (oversubscription) size provides an opportunity to intentionally exacerbate information asymmetry, which in turn reflects the fraudster's attitude about committing the fraud (rationalization).

Accordingly, financial statement misrepresentation is more likely to occur if there is easy access to capital (incentive) (e.g., Brennan & McGrath, 2007; Kumar & Langberg, 2009). These inherent organizational characteristics of an equity crowdfunding stock issue may let dishonest founders, executives, and managers defraud or mislead their target investors.

CHAPTER 2

USING BENFORD'S LAW TO PREDICT RISK OF FINANCIAL STATEMENT

FRAUD IN EQUITY CROWDFUNDING OFFERINGS

Literature Review

Regulation Crowdfunding

As a purported mechanism to protect investors, firms are generally required to register their securities offers with the SEC. Registration entails filing a registration statement that includes audited financial statements. The purpose of the registration is to provide investors with financial and non-financial data about the firm so that they can make informed investment decisions. The audit requirement provides limited assurance to the investor that the financial statements are free of material misstatement caused by error or fraud. Several registration exemptions are permitted, particularly for small offerings, which reduce the cost and regulatory burden for the issuer. Regulation Crowdfunding is one such exemption.

In each registration exemption, Regulation A+, Regulation D (now rescinded), and Regulation Crowdfunding, the SEC comments that information asymmetry, the quality of the disclosures and qualification of the investor are of concern. In the Final Rules for Regulation A+, the SEC (2015, p. 297) says, “While we acknowledge that requiring audited financial statements is likely to result in stronger investor protections due to reduced likelihood of fraudulent financial statements being presented, this

alternative would likely place a relatively greater burden on smaller issuers due to the fixed-cost nature of some audit costs.”

SEC (2013), in the Final Rules for Rule 506 of Regulation D, acknowledges that unaccredited investors need more information than accredited, sophisticated investors. SEC (2013, p. 93) says, “The risks to investors of fraudulent offerings conducted under Rule 506(c) may be mitigated to some extent by the requirement that issuers sell only to accredited investors (and take reasonable steps to verify such status), who, by virtue of meeting the requirements of the definition, may be better able to assess their ability to take financial risks and bear the risk of loss than investors who are not accredited investors.” SEC (2013, p. 96) further notes that unaccredited investors “could also face an additional cost in the form of heightened risk of significant losses on their investments, which they may not be able to manage or diversify in a way that accredited investors could.”

For Regulation Crowdfunding, the SEC (2016b, p. 420) states that “audited financial statements can benefit investors in evaluating offerings...by providing them potentially higher-quality financial statements.” However, the cost of audited statements may outweigh the benefits to the issuer, particularly if the issuer is a new organization (SEC, 2016). According to the AICPA revised accounting and review standards (“AR-C”), accountants are not required to assess fraud risk in a review (AR-C Secs. 90-A4 and 90A-A4).

An additional investor protection is the annual investment limit imposed by the SEC on an unaccredited investor. For instance, if an investor earns \$100,000 annually and has a net worth of \$100,000, s/he can invest an annual maximum of \$10,000 across all equity crowdfunding offers (see fn. 3). This limit is arbitrary, so \$10,000 may be too high. A possible solution to further mitigate investor risk is to reduce the annual maximum, but this also limits potentially lucrative investment opportunities.

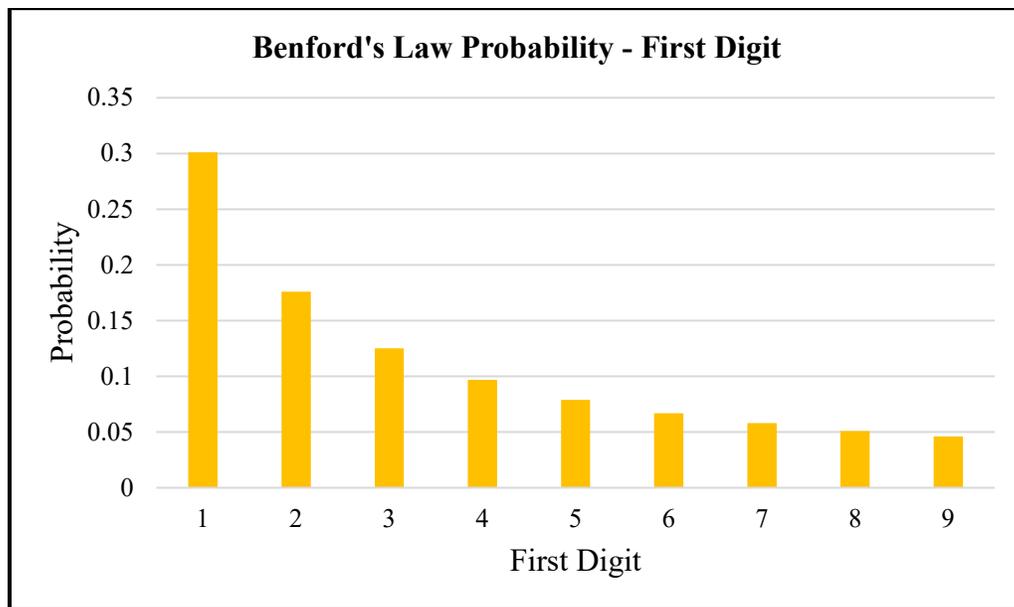
Benford's Law

Benford's Law describes features of many natural distributions of numbers accurately. Nonconformity with the law suggests that the dataset has been falsified. Auditors employ Benford's Law for audit planning and as an analytic procedure during the audit in conjunction with other tools, such as ratio analysis and trend analysis, to uncover fraudulent accounting data (Durtschi et al., 2004). Its primary use is to detect falsifications in transactional data. Estimating the likelihood of a misstatement is useful in forensic accounting and auditing and a common practice to reduce time and resources expended. Once a dataset is deemed likely to include misstatements, auditors and forensic accountants deploy their professional skepticism to further investigate any deviations.

Benford's Law was originally stated by Simon Newcomb in 1881, but Frank Benford popularized the theory in 1938. Newcomb and Benford theorized that the frequency of the first-digit of each number (whether it is number 1 through 9) in some naturally occurring unmanipulated datasets will closely approximate a particular distribution and if it does not, then one can conclude that the dataset is not free from

manipulation or errors (Newcomb, 1881; Benford, 1938). Figure 2 demonstrates Benford's Distribution of First Digits which shows that digits do not follow a pattern of equal frequency. Instead, the natural distribution follows a pattern of decreasing frequencies as the digit increases from 1 to 9. The Chi-square statistic at 95% and 99% confidence levels are commonly used to gauge the level of nonconformity that translates to statistical evidence of falsification.

Figure 2: Benford's Distribution of First Digits



Appendix D includes more information about the use of Benford's Law.

Prior studies suggest that Benford's Law is a reliable tool for detecting fraud risk in public company financial statements (Saville, 2007; Coleman, 2014; Amiram et al., 2015; Nigrini, 2017a). Amiram et al. (2015) conducted a multi-faceted study on the efficacy of Benford's Law as both a detection and a predictive tool for aggregate and

firm-year financial statement fraud in publicly traded companies.¹⁴ Furthermore, they utilized the Kolmogorov-Smirnoff (KS) statistic and the Mean Absolute Deviation (MAD) statistic, which “overcome many of the disadvantages of existing measures of accounting or earnings quality” (p. 1,543). The KS statistic is the maximum cumulative deviation of the actual distribution from the expected distribution. The KS statistic is particularly useful when the number of observations is small and because it uses a unique critical test value that is calculated for each dataset. The test value is dependent upon the number of values in the set and is the maximum value that demonstrates compliance with an expected distribution (here, Benford’s Law) at the desired confidence level.

Amiram et al. (2015) found that 85.63% of their sample of 43,332 firm-year financial statements complied with and 14.37% diverged from Benford’s Law, using the KS statistic, at a 95% confidence level (Amiram et al., 2015).¹⁵ Furthermore, their study segregated fraud scores by the number of line items, or data points analyzed and the bottom 1% closely matches my sample. Amiram’s bottom 1% of firms had 100 items, and my sample has a mean of 76 datapoints per filing. Their noncompliance score for the

¹⁴ Amiram et al. (2015) also ran a simulation to test the theory. They introduced errors into a compliant dataset and the new dataset showed divergence. They also compared results from pre-restated financials to restated financials and found that the pre-restatements were not in conformity with Benford’s Law, but the restated financials were in conformity.

¹⁵ Amiram et al. (2015) found that, on average, the income statement data were the most divergent and the statement of cash flows data were the least divergent from Benford’s Law.

bottom 1% has a mean KS statistic of 0.0362. Dyck et al. (2013) found in their study of securities class action suits filed that approximately 14.5% of large publicly traded firms were alleged to engage in fraud.

Coleman (2014) found that when the KS statistic was applied to a sample of 18,086 financial statements from 2010 to 2012, 93% of the statements were compliant at a 20% confidence interval. Coleman (2014) reports that the non-compliant companies “were 30% more likely to have an adverse 302 opinion, 45% more likely to have an adverse 404 opinion and 50% more likely to file a non-timely filing in the following two years.” Coleman (2014) concluded, “companies with financial statements that do not conform to Benford’s distribution have a greater chance of having poor internal and disclosure controls. And having poor internal and disclosure controls can lead to low quality financials either due to intentional or unintentional means.”

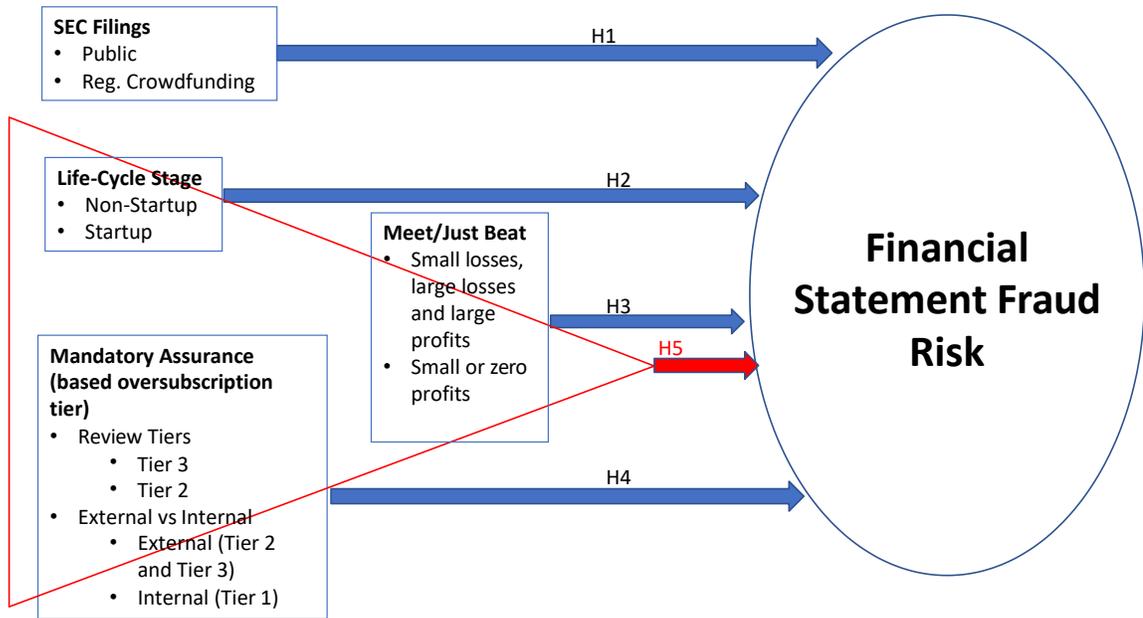
Saville (2006) tested the income statements of 1,020 companies listed on the Johannesburg Stock Exchange. He tested both known fraudulent companies and companies with no known fraud. Saville (2006) found that Benford’s Law correctly detected anomalies in the fraud companies 100% of the time and correctly showed conformity in the non-fraud companies 88.4% of the time.

Conceptual Model and Hypotheses

Regulation Crowdfunding offers likely have a higher risk of financial statement fraud than public company offerings because the former are not required to submit audited financial statements nor provide any assurance on the effectiveness or existence

of internal controls. Other factors also may influence the likelihood of fraud risk, such as life-cycle stage or a propensity to meet or just beat earnings. Figure 3 depicts these arguments as a conceptual model.

Figure 3: Equity Crowdfunding Financial Statement Fraud Model



Regulation Crowdfunding is designed to attract startups and small companies that may have weak internal controls and relaxed assurance requirements, as compared to other public company offerings. This hypothesis is depicted by the top blue arrow in Figure 3. Fraud risk is assessed using Benford’s Law, which has been shown to detect and predict fraud in prior studies of public company offerings.

H1: Firms offering securities under Regulation Crowdfunding are at higher risk for fraudulent financial reporting than other public companies.

My second hypothesis is based on the Amiram et al. (2015, p. 1554) finding that “smaller, younger, more volatile and growing” companies are more likely not to conform to Benford’s Law. To test this hypothesis, I stratified the dataset by life-cycle stage at the time of the filing into two groups: Startups and Non-startups. The number of years of financial statement data included in the filing served as the basis of the stratification. If only one year was included, the firm was assigned to the Startup category; otherwise the firm was coded as a Non-startup. The second blue arrow in Figure 3 represents my second hypothesis.

H2: Startups have a higher fraud risk than non-startups in their equity crowdfunding offerings.

My third hypothesis stems from the “meet or just beat” literature. Carlsaw (1988) found that companies tend to round up earnings when they fall slightly short of a round number. Hayn (1995) found discontinuities around zero when plotting firms’ earnings, in that there were more firms reporting small or zero profits than expected and less firms reporting small losses than expected. A company disclosing small profits may actually be fraudulently inflating true operating losses to attract investors to their offering (Burgstahler & Dichev, 1997). Burgstahler and Dichev estimate that 8-12% of companies reporting small losses and 30-44% of firms reporting small profits manipulate earnings. To test their hypotheses, they scaled earnings based on several factors such as market value and book value of common equity, total assets, and previous year sales. They found that results were similar regardless of how earnings were scaled. Byzalov and Basu

(2019) designed a nonlinear interpolation approach to identify discontinuities in distributions which they argue is a more reliable test than the histogram or logit-based discontinuity tests that are currently used in earnings management studies. Their extended OLS approach can handle multiple explanatory variables and small sample size and avoids flaws of common logit tests. Using this approach, Byzalov and Basu (2019) found that 12% of small losses were manipulated. The third blue arrow in my conceptual model (Figure 3) represents my third hypothesis.

H3: Filings with small or zero profits have a higher fraud risk than those with small or large losses or large profits.

Theoretically, a fraudulent firm may risk the cost of a higher level of assurance because of a perceived (and actual) low likelihood of detection coupled with the potential to raise a significantly larger amount of funds. However, from an accounting practitioner point of view, an untruthful company might choose a funding target that would not expose them to scrutiny from an outside accountant. Conversely, an honest company may be more likely to select a higher level of assurance because they don't have anything to hide while allowing them an opportunity to raise significantly more funds. Moreover, SEC (2016) indicates, "the issuer has the ability to select its offering amount, and since the choice of offering determines which financial statement requirements will apply... the issuer...effectively also chooses its financial statement requirement." The fourth blue arrow in Figure 3 depicts my fourth hypothesis:

H4: Fraud risk is higher in offerings that are mandated to provide internal assurance (management certification) than those for which external assurance (reviews or audits) are required (Tier 1 as compared to Tiers 2 and 3). Additionally, firms with weaker external assurance requirements are likely to be a higher fraud risk than those with stricter external assurance mandates (Tier 2 as compared to Tier 3).

Lastly, the unique characteristics of an equity crowdfunding offering contribute to a higher risk of fraud. The three variables individually tested for correlation to the risk assessment are also expected to collectively contribute to the risk assessment. The red triangle and red arrow in Figure 3 represent my next hypothesis:

H5: Life cycle stage, meet/just beat earnings and mandatory assurance, as representative of the dimensions of the Fraud Triangle, are collectively positively related to high fraud risk firms.

Data and Analysis

More than 1,700 Form C and an almost equal number of Form C-A (amended filings) were filed between the inception of Regulation Crowdfunding on May 16, 2016 and April 15, 2019. Many of the Form C filings are new funding rounds by the same issuer and many of the Forms C-A are repeated amendments of offerings. From the Electronic Data Gathering, Analysis and Retrieval System (EDGAR found at www.sec.gov/edgar), I downloaded the filed Forms C and CA, along with the accompanying financial statements and CPA assurance, for the first 135 companies that filed Form C. I gathered only the initial offering and its related amendments and did not

consider subsequent required annual filings or new offerings. Thirty-five filings that included less than ten financial statement data points in the Form C attachments were excluded from the study because the Benford's Law test results would be skewed.

Consistent with Amiram et al.'s (2015) study, I tested the crowdfunders' financial statement data by entering all numbers from the income statement, balance sheet, retained earnings statement and statement of cash flows into a preformatted, online Excel spreadsheet created by Stephen Miller and Mark Nigrini.¹⁶ Absolute values are required in the spreadsheet. Additionally, if the issuer included comparative financial statements for the previous year, I ran additional tests on the comparative year and then on the dataset of both years combined. The actual distribution of first-digits (1 through 9) was compared to the expected distribution according to Benford's Law and then conformity to the expected distribution was tested using the Chi-square statistic at both the 95% and 99% confidence levels. I also followed Amiram et al. (2015) and calculated the KS statistic and MAD score for each firm-year, at the 95% confidence level.

Because the number of years reported varied between filers, I created two datasets. The first dataset (Firm-Year) included reports on a firm-year basis and Benford's Law was tested by each year reported (N=165). The second dataset (Filing)

16

https://www.google.com/url?q=http://web.williams.edu/Mathematics/sjmiller/public_html/tas2011/benford/MillerNigrini_ExcelBenfordTester_Ver301.xls&sa=U&ved=0ahUKEwiSksSW8c3XAhWEh1QKHUwcB6oQFggEMAA&client=internal-uds-cse&cx=009666538401071136191:cryoyzw_i2o&usg=AOvVaw3XKk73lgRrY399k22LZBvB

included all years reported in a filing as one observation and Benford's Law was run on the aggregate (N=100).

Definitions and descriptive statistics for the variables studied are reported in Table 1, Panels A through K and include variable definitions.

Summary statistics in Table 1 Panel A suggest some interesting insights. Many firms amended the initial filing (Form C/A). An analysis of the mean oversubscription by tier shows that Tier 2 offers are not at the maximum of the tier (\$500,000), whereas the mean oversubscription for the other two tiers are near their maximums. The mean target amount is quite low in Tiers 2 and 3 relative to the oversubscription amount. Firms with larger losses offer in Tier 3, however firms with the highest revenues offer in Tier 2. Also, Tier 2 firms have the lowest negative cash flows from operations. Lastly, less than half of the offerings were funded.

Table 1 Panel B describes frequencies of security types offered by tier. The SAFE security (Simple Agreement for Future Equity) is not really a security, rather a promise by the issuer to grant equity to the investor sometime in the future, and this interest is offered most frequently. The popularity of the security type varies by tier. Most of the offers in Tier 1 are SAFE securities, whereas Tier 2 is comprised mostly of debt securities and Tier 3, common stock. SAFE securities are also popular in Tiers 2 and 3.

Table 1: Descriptive Statistics

Panel A: by Oversubscription Tier

Descriptives	Tier 1	Tier 2	Tier 3	Totals
N	22	22	56	100
# of Startups ^a	6	9	20	35
# of Non-startups ^b	16	13	36	65
# of Filings with Large Losses ^c	6	11	25	42
# of Filings with Small Losses ^c	8	6	19	33
# of Filings with Small or Zero Profits ^c	7	4	11	22
# of Filings with Large Profits ^c	1	1	1	3
# of Firms which Filed One or More Form C-A (Amended Offer) of Initial Offer	15	18	37	70
# of Filings Verified by Crowdcheck	1	2	4	7
Mean Employees	3	9	5	6
Mean Target Offer	\$42,045	\$80,934	\$117,241	\$92,711
Mean Oversubscription	\$97,904	\$353,864	\$990,462	\$654,048
Mean Net Income/(Loss) ^c	(\$72,803)	(\$111,859)	(\$293,240)	(\$204,840)
Mean Revenues ^c	\$103,434	\$401,447	\$323,995	\$292,511
Mean Cash ^c	\$48,946	\$87,538	\$107,770	\$90,378
Mean Accounts Receivable ^c	\$5,557	\$11,434	\$12,349	\$10,654
Mean Total Assets ^c	\$170,435	\$417,556	\$612,996	\$472,635
Mean Short-Term Liabilities ^c	\$26,356	\$182,530	\$257,121	\$189,943
Mean Long-Term Liabilities ^c	\$98,399	\$321,785	\$310,552	\$266,350
Mean Cash Flows Provided by (Used for) Operating Activities ^d	(\$131,483)	(\$55,598)	(\$362,764)	(\$244,306)
# Offers funded	9	17	23	49
Mean funding achieved	\$59,405	\$218,319	\$405,454	\$276,970

^a Firms that reported one year of financial data

^b Firms that reported two years of financial data

^c Based on most recent fiscal year

^d Based on cumulative two most recent fiscal years

Table 1 continued

Panel B: Type of Securities Offered

Securities	Tier 1	Tier 1 %	Tier 2	Tier 2 %	Tier 3	Tier 3 %	Totals	Totals %
Common Stock	5	23%	4	18%	22	39%	31	31%
Debt	4	18%	10	45%	11	20%	25	25%
Preferred Stock	4	18%	0	0%	6	11%	10	10%
SAFE ^a	9	41%	8	36%	17	30%	34	34%
Totals	22	100%	22	100%	56	100%	100	100%

Tiers are based on oversubscription amount.

^a Simple Agreement for Future Equity

Table 1 Panel C shows the market share of intermediaries in the sample and Panel D shows the market share of CPAs who compiled, reviewed or audited the financials in the sample. Of the three most popular intermediaries, the top two comprise 65% of the market: WeFunder and StartEngine Capital. Most offers hosted by these intermediaries are in Tier 3. There are also three top CPAs offering assurances in the equity crowdfunding market that captured 44% of the offerings with most in Tier 3 and none in Tier 1 (in which assurance is not required).

Table 1 continued

Panel C: Intermediary Market Share

Intermediaries	Tier 1	Tier 1 %	Tier 2	Tier 2 %	Tier 3	Tier 3 %	Totals	Totals %
Wefunder Portal LLC ^a	9	41%	9	41%	31	55%	49	49%
StartEngine Capital, LLC ^a	1	5%	1	5%	14	25%	16	16%
FlashFunders LLC ^a	5	23%	0	0%	2	4%	7	7%
SeedInvest	0	0%	2	9%	3	5%	5	5%
First Democracy VC	1	5%	2	9%	1	2%	4	4%
NextSeed US LLC	1	5%	3	14%	0	0%	4	4%
Opendeal Inc.	0	0%	3	14%	1	2%	4	4%
TruCrowd Inc.	2	9%	0	0%	2	4%	4	4%
NetCapital Funding Portal Inc.	2	9%	0	0%	0	0%	2	2%
Crowdfunder.com	0	0%	1	5%	0	0%	1	1%
Jumpstart Micro Inc.	0	0%	1	5%	0	0%	1	1%
LocalStake Marketplace LLC	1	5%	0	0%	0	0%	1	1%
North Capital Private Securities	0	0%	0	0%	1	2%	1	1%
Venture Co Brokerage	0	0%	0	0%	1	2%	1	1%
Totals	22	100%	22	100%	56	100%	100	100%

Tiers are based on oversubscription amount.

^a Designated as market leaders

Table 1 continued

Panel D: Independent CPA Market Share

CPAs	Tier 1	Tier 1 %	Tier 2	Tier 2 %	Tier 3	Tier 3 %	Totals	Totals %
Tyra ^a	0	0%	5	23%	16	29%	21	21%
Artesian ^a	0	0%	3	14%	9	16%	12	12%
McKennon ^a	0	0%	5	23%	6	11%	11	11%
Bauer	1	5%	1	5%	1	2%	3	3%
Other (single filings)	4	18%	8	36%	24	43%	36	36%
None	17	77%	0	0%	0	0%	17	17%
Totals	22	100%	22	100%	56	100%	100	100%

Tiers are based on oversubscription amount.

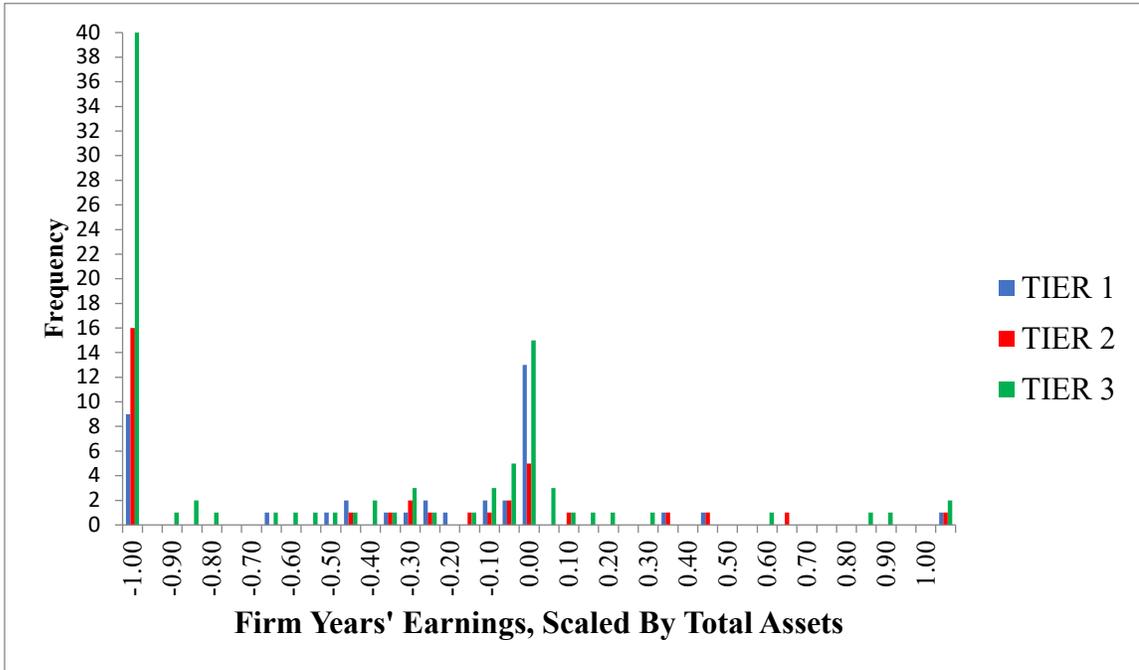
^a Designated as market leaders

To test the effect of firm earnings on the level of fraud risk, I scaled the reported earnings for each firm-year and filing by the end-of-year total assets. I plotted the firm-years' scaled earnings to identify any discontinuities at zero and to establish appropriate cut-offs for four groups: Large losses, small losses, small or zero profits, and large profits (Figure 4). These Meet/Just Beat categories were then applied to both the Firm-Year dataset and the Filing dataset. I set the Small or Zero Profits group as an indicator variable (1) and set all of the other categories to a dummy variable (0), similar to Barton and Simko (2002) and Matsumoto (2002).

The scaled earnings of the most recent firm year were used to group firms in the Filing dataset. The Histogram reveals that there is a spike in the number of firm years with scaled profitability slightly below zero and slightly above or at zero and there is

higher frequency in the number of firms reporting large scaled losses. There were very few firms reporting large scaled profits.

Figure 4: Firm-Years' Earnings, Scaled by Total Assets, by Oversubscription Tier



This figure depicts each oversubscription tier's discontinuities in scaled earnings bins surrounding zero. The Figure is truncated at -1 and +1 on the X-axis, so the extreme bins represent frequencies for those bins and more extreme bins. There are some Tier 1 firm-years with small losses and none with small profits, however, most Tier 1 firm years are at zero with a lot of large losses as well. There are many Tier 2 firm years with small losses and much fewer with small profits, however, more than half of the Tier 2 firm years report large losses. There are many Tier 3 firm years with small losses, but fewer with small profits, however, more than half of the Tier 3 firm years report large losses and only a few firm years report high earnings.

Table 1 Panel E shows frequencies of offerings stratified by firm-year earnings category by tier. Of the four earnings groups, Large Loss firms dominated the sample and the minority was the Large Profit group. Large Loss firms comprise most of the Tier 3 offerings and the Small or Zero Profits group has an equal number of Tier 3 offerings as the Small Loss group.

Table 1 continued

Panel E: Firm-Year Meet/Just Beat (M/JB)

M/JB Groups	Tier 1	Tier 1 %	Tier 2	Tier 2 %	Tier 3	Tier 3 %	Totals	Totals %
Large Losses ^a	9	24%	16	46%	40	43%	65	39%
Small Losses ^a	13	34%	9	26%	25	27%	47	28%
Small or Zero Profits ^a	15	39%	9	26%	25	27%	49	30%
Large Profits ^a	1	3%	1	3%	2	2%	4	2%
Firm Years, N	38	100%	35	100%	92	100%	165	100%

Tiers are based on oversubscription amount.

^a Firm Year M/JB is firm year earnings scaled by Firm Year Total Assets and is categorized based on the following ranges:

Large Losses: M/JB is less than or equal to -1.0.

Small Losses: M/JB is less than zero and greater than -1.0.

Small or Zero Profits: M/JB is greater than or equal to zero and less than 1.0.

Large Profits: M/JB is greater than or equal to 1.0.

Table 1 Panel F reports the Firm-Year mean MAD scores of the four earnings categories. The Small or Zero Profit group has the highest mean MAD score, excluding the Large Profit group for its small number of observations, and Small Losses by firm-year has the lowest mean MAD score.

Table 1 continued

Panel F: Fraud Risk, Measured by MAD Scores, of Firm-Year Meet/Just Beat Categories

Firm Year M/JB Categories	N	Mean	Std Dev	Q1	Median	Q3
Total	165	0.062	0.033	0.040	0.053	0.076
Large Losses	65	0.062	0.033	0.042	0.052	0.079
Small Losses	53	0.056	0.027	0.036	0.050	0.066
Small or Zero Profits	43	0.068	0.039	0.043	0.057	0.081
Large Profits	4	0.073	0.033	0.044	0.068	0.107

Firm Year M/JB: Firm years were coded based on the relative size of the reported net income or loss over total assets. Each firm year's scaled earnings were calculated using the firm year's net income or loss and end of firm-year total asset.

Table 1 Panel G displays summaries of KS scores by firm-year earnings categories and results are consistent with the MAD score summaries. These results are consistent with Burgstahler and Dichev (1997) that small profits (small losses) firms have the highest (lowest) fraud risk.

Table 1 continued

Panel G: Fraud Risk, Measured by KS Scores, of Firm-Year Meet/Just Beat Categories

Firm Year M/JB Categories	N	Mean	Std Dev	Q1	Median	Q3
Total Firm Years	165	0.193	0.133	0.111	0.151	0.230
Large Losses	65	0.195	0.143	0.116	0.146	0.218
Small Losses	53	0.170	0.097	0.104	0.148	0.213
Small or Zero Profits	43	0.212	0.150	0.113	0.159	0.290
Large Profits	4	0.259	0.168	0.111	0.242	0.424

Table 1 Panels H, I, J and K summarize the Filing dataset mean MAD scores of total filings and of the three explanatory variables: life-cycle stage, meet/just beat and mandatory assurance. I used MAD scores from the Filing dataset to measure fraud risk and test risk differences between subgroups of the three explanatory variables. Table 1

Panel H reports the mean MAD score of the Filing dataset, 0.054, and the standard deviation, 0.027, which indicates a low variation in the dataset.

Table 1 continued

Panel H: Fraud Risk, Measured by MAD Scores, of Total Filings

Filings	N	Mean	Std Dev	Q1	Median	Q3
Total	100	0.054	0.027	0.034	0.046	0.068

To study the relation of the life-cycle stage to fraud risk in the Filing dataset, I categorized firms as Startups if they reported data for only one year and Non-startups if they reported two years. Out of the 100 companies that were analyzed for this study, 35 were at the startup stage with only one firm-year reported in the filing and 65 firms reported two years. Table 1 Panel I shows that the Startup group has a higher mean MAD score than the Non-startup group which indicates a higher fraud risk.

Table 1 continued

Panel I: Fraud Risk, Measured by MAD Scores, of Filings by Life-cycle Stage

Life-Cycle Stages	N	Mean	Std Dev	Q1	Median	Q3
Startup	35	0.070	0.025	0.052	0.067	0.083
Non-startup	65	0.045	0.024	0.029	0.039	0.051

The life-cycle stage of the firm is determined at the time of offering by the number of years of financial statement data included in the filing. If only one year was included, the firm was assigned to the Startup category. Otherwise the firm was coded as a Non-startup. Indicator variable assigned a value of 1 if firm was designated as a Startup; value of 0 if firm was categorized as a Non-startup.

Table 1 Panel J reports mean MAD scores of M/JB categories in the Filing dataset. Consistent with the Firm-year results, the Small or Zero Profit category has a higher mean than their counterparts (excluding Large Profits due to a very small number of observations), suggesting that this category has a higher fraud risk. Small Losses has the lowest mean MAD score consistent with the least fraud risk.

Table 1 continued

Panel J: Firm Risk, Measured by MAD Scores, of Filings by Meet/Just Beat (M/JB)

Categories

Filing M/JB Categories	N	Mean	Std Dev	Q1	Median	Q3
Large Losses	42	0.054	0.004	0.033	0.045	0.072
Small Losses	33	0.045	0.023	0.031	0.038	0.054
Small or Zero Profits	22	0.062	0.025	0.042	0.060	0.075
Large Profits	3	0.082	0.033	0.049	0.083	0.115

Filing by M/JB Categories: The entire filings were coded based on the relative size of the reported net income or loss over total assets. Each filing's M/JB was calculated using the most recent year's net income or loss and end-of filing year total assets. M/JB is categorized based on the following ranges:

Large Losses: M/JB is less than or equal to -1.0.

Small Losses: M/JB is less than zero and greater than -1.0.

Small or Zero Profits: M/JB is greater than or equal to zero and less than 1.0.

Large Profits: M/JB is greater than or equal to 1.0.

Indicator variable value of 1 assigned for small or zero profit filings and 0 for all other profitability categories.

I stratified the sample by the oversubscription amount specified in Form C (or Form CA, if the filing was amended) to study the effect of the selection of the mandatory assurance level on fraud risk. One stratification, "Mandatory Review Tiers," differentiates filings that were required to include an independent auditor review from those with no such requirement. A second stratification, "Mandatory External-Internal

Assurance,” differentiates filings that are required to include an independent auditor review (Tiers 2 and 3) from those in which only an internal assurance through management certification (Tier 1) is required. The mean MAD score is similar across these the three mandatory assurance levels in Table 1 Panel K suggesting that the level of fraud risk is similar.

Table 1 continued

Panel K: Fraud Risk, Measured by MAD Scores, of All Filings by Mandatory Assurance Level

Mandatory Assurance Levels	N	Mean	Std Dev	Q1	Median	Q3
Oversubscription Tier 1	22	0.056	0.032	0.032	0.043	0.085
Oversubscription Tier 2	22	0.055	0.028	0.029	0.051	0.076
Oversubscription Tier 3	56	0.052	0.025	0.036	0.046	0.063

Mandatory Assurance Levels is stratified in two ways: by *Mandatory Review*, which compares Tier 2 to Tier 3 and by *Mandatory Assurance*, which compares the internal verification tier (Tier 1) to external assurance tiers (Tiers 2 and 3).

Mandatory Review: Oversubscription Tiers 2 and 3 require an independent review of the financial statements included in the offer documents. Tiers 2 and 3 differ in that Tier 3 requires that subsequent Reg. Crowdfunding offers must include audited financial statements. Indicator variable of 1 for Tier 2 offers and 0 for Tier 3 offers.

Mandatory Assurance: Oversubscription Tier 1 is mandated to include an internal assurance of the financial statement data whereas Tiers 2 and 3 require external assurance. Indicator variable 1 for Tier 1 offers, and 0 for all others.

Results

Hypothesis 1. Table 2 compares Benford’s Law test results from my study and those conducted on other public firms. Compared to other public firms, Regulation Crowdfunding offerings are at a higher risk of financial statement fraud, so I reject the null hypothesis that the risk is equal. Using the KS statistic, the percent of noncompliant

filings in this study exceeds the fraud risk estimates of Amiram et al. (2015) and Dyck et al. (2013) (14.4%, 14.5% respectively). Additionally, both the mean MAD score of the filing sample (0.054) and the firm year sample (0.062) far exceeds that of the Amiram et al. (2015) sample (0.030). The KS scores of the study (0.151) are also much greater than the Amiram et al. (2015) KS scores of the firm years with the fewest datapoints (0.036).

Table 2: Comparison of Noncompliance to Benford’s Law in Studies of Crowdfunders and Other Public Companies

Benford’s Law Test Results	N	Current study	Amiram et al. (2015)
Mean MAD statistic for filing	100	0.054 ^a	0.030 ^b
Mean MAD statistic by firm year	165	0.062 ^a	0.030 ^b
Noncompliance % using KS statistic, 95% confidence for filing	100	36.0%	n/a
Noncompliance % using KS statistic, 95% confidence for firm year	165	34.6%	14.4% ^c
Mean KS statistic by firm year	165	0.151	0.036 ^a

^a Nigrini (2012) found that the MAD score of compliant firms was 0.006 or less.

^b Amiram et al. (2015) reports an “FSD” (Financial Statement Divergence) score which is the Kolmogorov-Smirnoff (KS) statistic when evaluating firm year compliance with Benford’s Law. Because the KS statistic relies on a critical value that takes the number of data points into account, I the sample mean KS statistic by firm year to Amiram’s FSD score from their bottom 1% of line items (100 items). The mean number of data points per sample firm-year is 76. The mean MAD statistic is the mean of the Mean Absolute Deviation of the firm’s 1st digit distribution compared to the expected distribution under Benford’s Law.

^c Similar result to Dyck et al. (2013) study that estimates the pervasiveness of fraud at 14.5% of large public firms.

Hypothesis 2. The Startup group had greater risk for financial statement fraud. As shown in Table 3 Panel A, based on Chi-square and KS statistics, both at the 95% confidence levels, 51.4% and 42.9% of the Startup group, respectively, did not comply with Benford's Law. The Non-startup group was divergent 63.1% of the time using Chi-square, and 32.3% using the KS statistic. Both groups showed a much higher frequency of fraud risk than that of publicly traded companies (approximately 14% in Table 2).

Table 3: Nonconformities to Benford's Law across Life-Cycle Stages

Panel A: Tests Using Chi-square and KS Statistics

Life-Cycle Stages	N	# of deviant offers using Chi-Square Statistic ^a	% of deviant offers using Chi-Square Statistic ^a	# of deviant offers using KS Statistic ^a	% of deviant offers using KS Statistic ^a
Startups	35	18	51.4%	15	42.9%
Non-startups	65	41	63.1%	21	32.3%
Total (n)	100	59	59.0%	36	36.0%

^a 95% confidence level

Figure 5 shows the distributions of MAD scores for the Startup group and the Non-startup group. This figure shows the Non-startup group has a lower fraud risk than the Startup group. Non-startups are more frequent in the lower MAD scores and have a higher grouping around the sample mean. Startups are much more evenly distributed around the sample mean. Both distributions are skewed to the right towards high fraud risk. Accordingly, Table 3 Panel B shows that the mean MAD score is much higher for Startups than Non-startups (0.070 and 0.045, respectively) and the difference is statistically significant. Thus, I reject the null hypothesis of equal fraud risk in favor of the alternative that Startups have more fraud risk.

Figure 5: Distributions of MAD Scores of Filings by Life-cycle Stage

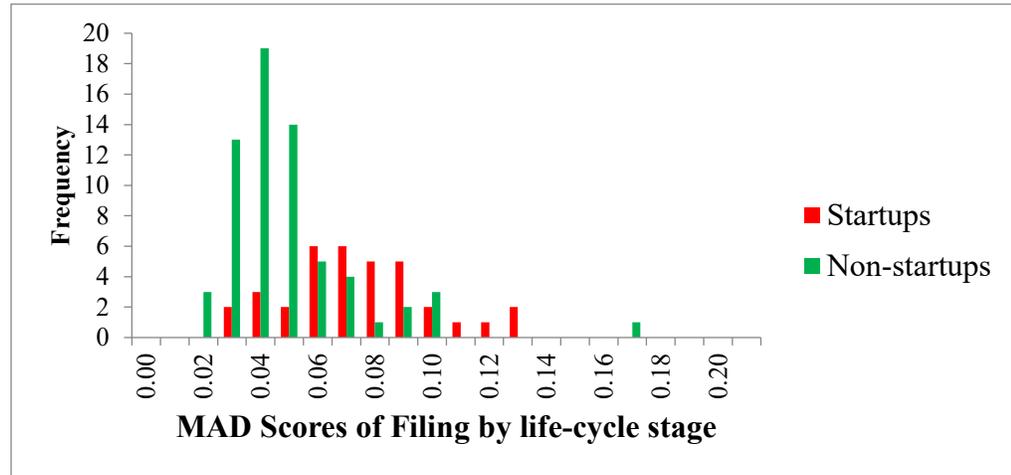


Table 3 continued

Panel B: Tests Using MAD Scores

Life-Cycle Stages	N	Mean MAD score	Variance	df	t-statistic	P(T<=t) one tail
Startups	35	0.070	0.064%	67	4.670***	0.000
Non-startups	65	0.045	0.058%			

Sample size was sufficient for this test. I ran a power analysis with Cohen’s D at 0.8, statistical power at 0.8 and $\alpha = 0.05$. The minimum sample size for each group was 21 and the minimum total sample for a one-tailed *t*-test was 42, both of which were met in this study.

***results are statistically significant at $\alpha=0.0$

Hypothesis 3. The results in Table 4 are somewhat consistent with my third hypothesis that filings with small or zero profits have a higher fraud risk than those with small or large losses or large profits. Table 4 Panel A shows that nonconformity using Chi-square is equally pervasive among all groups, except Small Losses, which shows significantly less occurrences than the other M/JB categories. Using the KS statistic, the

groups with the highest frequency of nonconformity are the Large Profits group and the Small or Zero Profit group which is aligned with the Meet/Just Beat literature.

Table 4: Nonconformities to Benford's Law across Meet/Just Beat by Filing

Panel A: Tests Using Chi-square and KS Statistics

Meet/Just Beat ^a	N	# of deviant offers using Chi-Square Statistic ^b	% of deviant offers using Chi-Square Statistic ^b	# of deviant offers using KS Statistic ^b	% of deviant offers using KS Statistic ^b
Large Losses	42	28	66.7%	15	35.7%
Small Losses	33	14	42.4%	9	27.3%
Small or Zero Profits	22	15	68.2%	10	45.5%
Large Profits	3	2	66.7%	2	66.7%
Total (n)	100	59	59.0%	36	36.0%

^a Using the criteria shown under Table 1, Panel E, M/JP categories are assigned to each firm year and to each filing, which may or may not include two years of data. For comparison purposes, the Filing dataset (N=100) is used for the t-tests and regressions. The M/JP category assigned to each filing is the category assigned to its most recent firm year.

^b 95% confidence level

Figure 6 shows the distributions of MAD scores by profitability of the filing and Figure 7 shows distributions of MAD scores by profitability of the firm-year. Figure 6 shows that the distribution of the frequencies increases with each group's number of observations in the Filing dataset. There are only three Large Profit firms, so this figure may not adequately depict the real distribution of Large Profit firms' MAD scores. The Large Loss group and the Small Loss group's means are similar. The Small or Zero Profits group mean MAD score is higher than all of the other groups.

Figure 6: Distributions of MAD Scores of Filings by Meet/Just Beat Categories

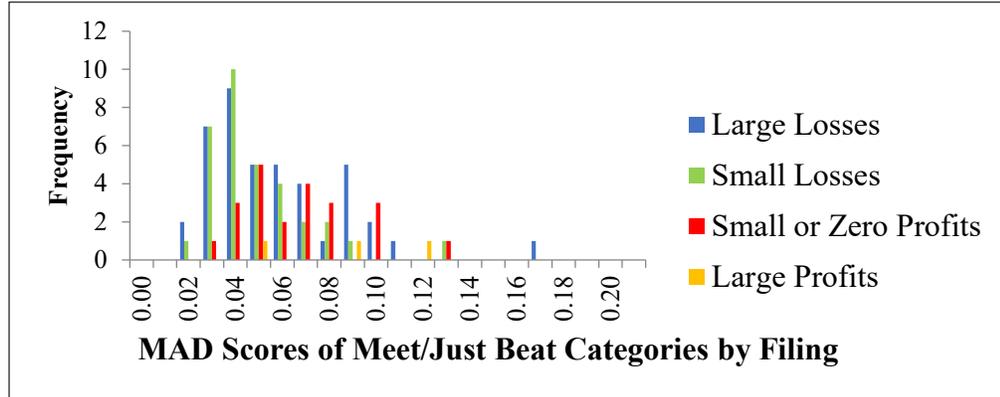
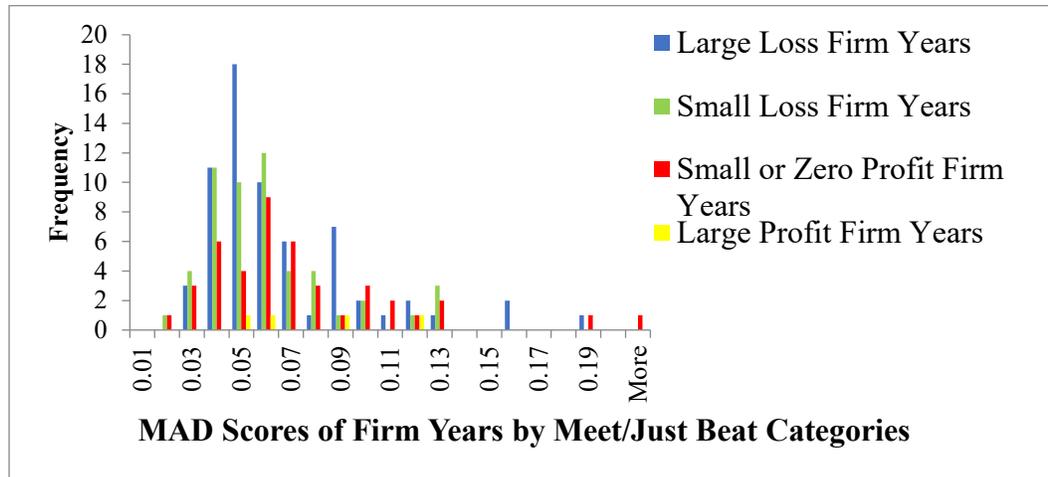


Figure 7 shows similar results to Figure 6; the distribution of the Large Profits group cannot be accurately interpreted because of the small number of observations and Large Loss firms have the lowest mean MAD scores. However, the firm-year dataset in Figure 7 has a higher mean MAD score in the Small Loss group which makes the comparison to the Small or Zero Profit group similar by firm-year. There are also more outliers and higher MAD scores in the Firm-Year dataset than in the Filing dataset.

Figure 7: Distributions of Firm-Year MAD Scores by Meet/Just Beat Categories



The results of the H3 *t*-tests are shown in Table 4 Panels B, C, D and E. The Small or Zero Profits group mean MAD (0.062) is greater than the Small Loss group mean MAD (0.045), and the difference in means is significant according to the *t*-test. The mean MAD scores of the Small or Zero Profit group is similar to the Large Loss group (0.054) and the difference is insignificant. The mean MAD Score is higher for the Large Profit group (0.082), but the results are not statistically different from the Small or Zero Profit group at $p=0.05$. The Small or Zero Profits group is a higher fraud risk than only one of the other M/ JB categories when compared as individual groups. However, when comparing the Small or Zero Profits group mean MAD to the mean MAD for all other groups combined (0.051), the difference in means is marginally significant ($p=0.055$). Therefore, I reject the null hypothesis because Small or Zero Profits have a higher risk of fraud than the other groups.

Table 4 continued

Panel B: Tests Using MAD Scores: Small or Zero Profits Compared to Small Losses

Meet/Just Beat ^a	N	Mean MAD Score	Variance	df	<i>t</i> -statistic	P(T≤ <i>t</i>) one tail
Small or Zero Profits	22	0.062	0.060%	42	2.464***	.009
Small Losses	33	0.045	0.050%			

Sample size was sufficient for this test. I ran a power analysis with Cohen’s D at 0.8, statistical power at 0.8 and $\alpha = 0.05$. The minimum sample size for each group was 21 and the minimum total sample for a one-tailed *t*-test was 42, both of which were met in this study.

^aM/ JB categories are based on the same criteria shown in Table 1, Panel E, however the MAD scores analyzed in Table 4, Panel B is by filing, not firm year. This is the same protocol explained in Table 4, Panel A.

***results are statistically significant at $\alpha=0.01$

Table 4 continued

Panel C: Tests Using MAD Scores: Small or Zero Profits Compared to Large Losses

Meet/Just Beat ^a	N	Mean MAD Score	Variance	df	t-statistic	P(T<=t) one tail
Small or Zero Profits	22	0.062	0.100%	48	1.063	0.147
Large Losses	42	0.054	0.100%			

Sample size was sufficient for this test. I ran a power analysis with Cohen's D at 0.8, statistical power at 0.8 and $\alpha = 0.05$. The minimum sample size for each group was 21 and the minimum total sample for a one-tailed *t*-test was 42, both of which were met in this study.

^a M/JB categories are based on the same criteria shown in Table 1, Panel E, however the MAD scores analyzed in Table 4, Panel C is by filing, not firm year. This is the same protocol explained in Table 4, Panel A.

Table 4 continued

Panel D: Tests Using MAD Scores: Small or Zero Profits Compared to Large Profits

Meet/Just Beat ^a	N	Mean MAD Score	Variance	df	t-statistic	P(T<=t) one tail
Small or Zero Profits	22	0.062	0.01%	2	-1.039	0.204
Large Profits	3	0.082	0.01%			

Sample size was insufficient for this test. I ran a power analysis with Cohen's D at 0.8, statistical power at 0.8 and $\alpha = 0.05$. The minimum sample size for each group was 21 and the minimum total sample for a one-tailed *t*-test was 42. The Large Profits group did not meet the minimum sample size requirements.

^a M/JB categories are based on the same criteria shown in Table 1, Panel E, however the MAD scores analyzed in Table 4, Panel D is by filing, not firm year. This is the same protocol explained in Table 4, Panel A.

Table 4 continued

Panel E: Tests Using MAD Scores: Small or Zero Profits Compared to all M/JB

Categories

Meet/Just Beat ^a	N	Mean MAD Score	Variance	df	t-statistic	P(T<=t) one tail
Small or Zero Profits	22	0.062	0.01%	36	1.639	0.055*
All other M/JB categories	78	0.051	0.01%			

Sample size was insufficient for this test. I ran a power analysis with Cohen's D at 0.8, statistical power at 0.8 and $\alpha = 0.05$. The minimum sample size for each group was 21 and the minimum total sample for a one-tailed *t*-test was 42. The Large Profits group did not meet the minimum sample size requirements.

^a M/JB categories are based on the same criteria shown in Table 1, Panel E, however the MAD scores analyzed in Table 4, Panel E is by filing, not firm year. This is the same protocol explained in Table 4, Panel A.

* denotes significance level 0.10

Hypothesis 4. Inconsistent with my hypothesis, selection of the oversubscription tier is not an individual indicator of fraud risk. Table 5 Panel A shows the Chi-squared and KS statistic results.

Table 5: Nonconformities to Benford's Law across Assurance Levels Mandated by Oversubscription Tier

Panel A: Tests Using Chi-Square and KS Statistics

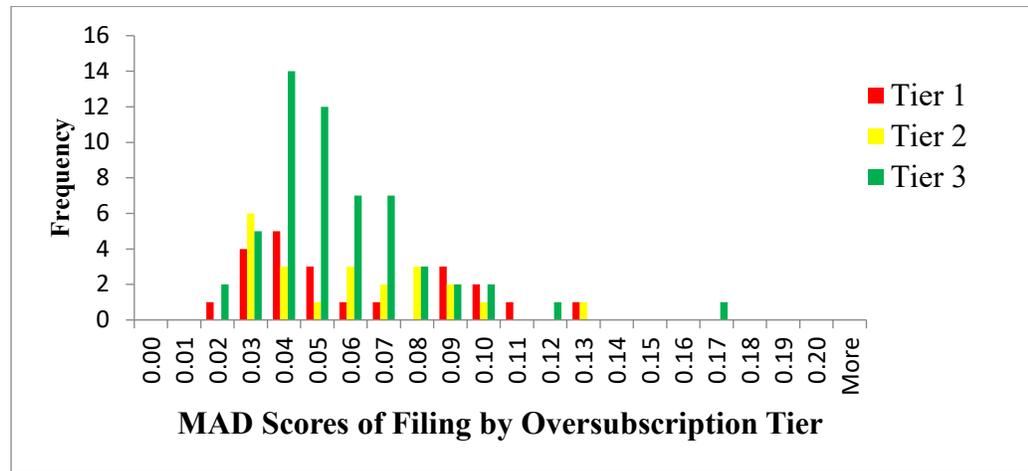
Mandatory Assurance Level	N	# of deviant offers using Chi-Square Statistic ^a	% of deviant offers using Chi-Square Statistic ^a	# of deviant offers using KS Statistic ^a	% of deviant offers using KS Statistic ^a
Tier 1 (Management Certification)	22	13	50.0%	11	50.0%
Tier 2 (Review)	22	12	54.5%	6	27.3%
Tier 3 (Review, subsequent Audit)	56	34	60.7%	19	33.9%
Total	100	59	59.0%	36	36.0%

^a 95% confidence level

Firms that were required only to have management certification were nonconforming to Benford's Law at a rate of 50.0% (Chi-squared) and 50.0% (KS). Tier 3 offerings, which are required to have the most stringent assurance, diverged much more frequently at a rate of 60.72% (Chi-squared) but much less frequently using the KS statistic (33.9%). Tier 2 firms diverged similarly to Tier 3 at 54.5% (Chi-squared) but much less frequently using the KS statistic (27.3%). Although Chi-squared shows that noncompliance is the most frequent in Tier 3 offerings, the more accurate KS statistic (for small samples) depicts a different result; the KS statistic shows that noncompliance is most pervasive in Tier 1.

Distributions of MAD Scores by Oversubscription Tiers are displayed in Figure 8.

Figure 8: Distributions of MAD Scores of Filings by Oversubscription Tier Size: Tier 1, Tier 2 and Tier 3



I conducted two *t*-tests to determine whether the selection of the oversubscription tier, which mandates assurance level, is a predictor of fraud risk. First, the mean MAD (0.055) for the filings that must be reviewed (Oversubscription Tier 2) is compared to the mean MAD of the filings that require reviews and whose subsequent offers require audits (Tier 3). These results are shown in Table 5, Panel B.

Table 5 continued

Panel B: Tests Using MAD Scores: Levels of Mandatory Assurance: Review (Tier 2) Compared to Review with Subsequent Audit (Tier 3), determined by oversubscription)

Mandatory Review Tiers ^a	N	Mean MAD Score	Variance	df	<i>t</i> -statistic	P(T<=t) one tail
Tier 2	22	0.055	0.1%	35	0.438	0.332
Tier 3	56	0.052	0.1%			

Sample size was sufficient for this test. I ran a power analysis with Cohen’s D at 0.8, statistical power at 0.8 and $\alpha = 0.05$. The minimum sample size for each group was 21 and the minimum total sample for a one-tailed *t*-test was 42, both of which were met in this study.

^a Oversubscription Tiers 2 and 3 require an independent review of the financial statements included in the offer documents. Tiers 2 and 3 differ in that Tier 3 requires that subsequent Regulation Crowdfunding offers must include audited financial statements.

The second *t*-test compared mean MAD for the filings that require external assurance (Oversubscription Tier 2 and Tier 3) to those that require only an internal assurance (Oversubscription Tier 1). These results are shown in Table 5, Panel C.

Selection of the oversubscription tier, which mandates the level of assurance, does not appear to indicate more fraud risk in any one tier at standard significance levels.

Table 5 continued

Panel C: Tests Using MAD Scores: Mandatory External Assurance (Tiers 2 and 3, determined by oversubscription) Compared to Internal Assurance by Management Certification (Tier 1)

Mandated External-Internal Assurance ^a	N	Mean MAD Score	Variance	df	<i>t</i> -statistic	P(T<=t) one tail
Internal (Tier 1)	22	0.056	0.01%	29	0.466	0.322
External (Tier 2 and Tier 3, combined)	78	0.053	0.07%			

Sample size was sufficient for this test. I ran a power analysis with Cohen’s D at 0.8, statistical power at 0.8 and $\alpha = 0.05$. The minimum sample size for each group was 21 and the minimum total sample for a one-tailed *t*-test was 42, both of which were met in this study.

^a Oversubscription Tier 1 is mandated to include an internal assurance of the financial statement data (management certification) whereas Tiers 2 and 3 require external assurance (auditor review).

Hypothesis 5. I tested the relationships of the independent variables (life-cycle stage, meet/just beat earnings, mandatory reviews tiers and external-internal assurance) with the dependent variable (MAD score) using bivariate correlations. The two assurance

variables were too similar to include in the same correlation matrix and one was automatically deleted from the test. Hence, this Pearson correlation coefficient was not reported in Table 6.

Life-cycle stage and Meet/Just Beat are correlated with fraud risk in Table 6. Mandatory review tiers are also slightly correlated with Meet/Just Beat. The external-internal assurance variable is not significantly related to fraud risk, life-cycle stage and Meet/Just Beat in Table 6.

I then ran two multiple regressions in order to test the two assurance variables separately. The first column in Table 7 shows a regression of fraud risk on life-cycle stage, Meet/Just Beat and mandatory review tiers. The three independent variables predict fraud risk (adjusted R^2 is 18.3% and the F-statistic is significant). There are only 78 observations in the first regression because the Mandatory Review Tiers variable excludes offers requiring management certifications ($n=22$). The second column of Table 7 reflects the second regression that substitutes the Mandatory Review Tiers independent variable with Mandatory External-Internal Assurance. This regression showed similar results to the first, however, the likelihood marginally increased (adjusted R^2 is 18.8% and the F-statistic is significant). Both regressions show that Life-Cycle Stage is the strongest predictor of fraud risk of the variables tested and is statistically significant ($p < 0.01$). The Meet/Just Beat variable is marginally significant in the second regression. Thus, there is little suggestive evidence that the three variables together predict fraud risk better than any variable alone, and I fail to reject the null hypothesis.

Table 6: Pearson Correlation Matrix of MAD score, Life-cycle Stage, Meet/Just Beat, Mandatory Review Tiers and Mandatory External vs. Internal Assurance

Variables	MAD Score	Life Stage	Meet/Just Beat
Life-Cycle Stage	0.432** (0.000)		
Meet/Just Beat	0.195* (0.055)	0.059 (0.565)	
Mandatory Review ^a	0.060 (0.599)	0.095 (0.408)	0.192* (0.099)
External vs Internal Assurance ^b	0.053 (0.598)	-0.086 (0.395)	0.139 (0.175)

All variables are defined in Table 1. Pearson correlations are reported with 2-tailed p -values in parentheses below each coefficient.

^a Tier 2 vs. Tier 3; $N=78$

^b Tier 2 and Tier 3 vs. Tier 1; $N=100$

*, **, and *** Correlation is significant at $p<0.10$, $p<0.05$, and $p<0.01$, respectively, (2-tailed).

Table 7: Regression of Fraud Risk, Measured by MAD Score, on Potential Predictors

Independent Variables	Prediction	1 st Regression Fraud Risk	2 nd Regression Fraud Risk
<i>Life-cycle Stage</i> ^a	+	0.438*** (4.150)	0.420*** (4.538)
<i>Meet/Just Beat</i> ^b	+	0.136 (1.264)	0.160* (1.721)
<i>Mandatory Review Tiers</i> ^c	+	-0.195 (-0.021)	
<i>Mandatory External-Internal Assurance</i> ^d	+		0.072 (0.776)
<i>Observations</i>		78	100
<i>Adjusted R²</i>		0.183	0.188
<i>F-statistic</i>		0.001	0.000

All continuous variables are winsorized at the extreme one percentiles. *, **, and *** indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, for a two-tailed test; t -statistics are reported in parentheses and are based on standard errors clustered at the state level.

^a Life-cycle Stage indicator variable: value of 1 if firm was designated as a Startup; value of 0 if firm was categorized as a Non-startup.

^b Meet/Just Beat indicator variable: value of 1 for small or zero profit filings and 0 for all other categories.

^c Mandatory Review Tiers indicator variable: value of 1 for Tier 2 offers and 0 for Tier 3 offers; N = 78

^d Mandatory External-Internal Assurance indicator variable: value of 1 for Tier 1 offers, and 0 for all others.

CHAPTER 3

IS THE “CROWD” WISE? DO UNSOPHISTICATED INVESTORS CORRECTLY EVALUATE FRAUD RISK IN EQUITY CROWDFUNDING OFFERINGS?

The U.S. Congress hoped that the “wisdom of the crowd” would facilitate sound evaluations of equity crowdfunding investments. “[T]he backers of [crowdfunding] argue that the hard work of making investment decisions – filtering out the best investments and limiting fraud – can be solved by tapping the ‘wisdom of crowds’ over the internet” (Waters, 2012). But is a “crowd” composed of unsophisticated investors wise enough to properly differentiate high fraud risk firms from low fraud risk firms?

I develop an expanded fraud model of indicators that collectively predict fraud risk as assessed using Benford’s Law. I test funding outcomes against this model to determine whether unsophisticated investors make low-fraud-risk investment selections and avoid high-fraud-risk investments in the equity crowdfunding market.¹⁷ I apply Fraud Theory, Signaling Theory and Voluntary Disclosure Theory to analyze the unsophisticated investor in the equity crowdfunding market where an issuer can easily defraud investors who do not know how to detect a fraud.

My practical contribution is to highlight the risk of fraud in equity crowdfunding offers and demonstrate the effect of false signals on funding outcomes so that investors may better interpret fraud risk signals.

¹⁷ An equity crowdfunding offering can either be funded or unfunded. A funded offering is defined as one that achieves at least the minimum offer amount (the “target”), and an unfunded offering is one that does not raise the minimum.

Literature Review

Empirical studies find that fraudulent financial reporting is associated with several variables including information asymmetry and lack of transparency (Ndofor, Wesley & Priem, 2013), weak internal controls (Loebbecke, Eining & Willingham, 1989; Bell & Carcello, 2000; Brennan & McGrath, 2007), and easy access to capital funding (Kumar & Langberg, 2009).

Although the extant research has studied the information needs of sophisticated, accredited investors, it has not been studied whether unsophisticated, unaccredited investors in the equity crowdfunding environment are provided the data they need to make informed investment decisions. This study synthesizes Voluntary Disclosure Theory, Signaling Theory and Fraud Theory to assess the level of information asymmetry that is present in the equity crowdfunding market.

Voluntary Disclosure Theory

Voluntary Disclosure Theory, or Disclosure Credibility Theory, explains how voluntary disclosures by information holders (or generators) affect information users. Sophisticated investors value and utilize data that firms voluntarily provide in the registration statement for stock offerings. An investor's information asymmetry is diminished when the registration statements or annual reports include truthful voluntary disclosures, which in turn, improves the funding outcome of the issue and decreases the cost of capital (Myers & Majluf, 1984; Barry & Brown, 1986; Merton, 1987; Healy & Palepu, 1993, 1995; Beneish et al., 2008; Basu et al., 2018). Johnstone (2016) identified mediating factors that influence this impact, such as the content, precision and

uncertainty of the information and the distribution mode of such data. Dutta and Nezlabin (2017) found that the effect of disclosure on the cost of capital when information asymmetry is reduced is more predictable when the precision of disclosure is correlated with the persistence of cash flows.

Grossman and Hart (1980) and others have studied the disclosure decisions of firms and argue that firms are incentivized to disclose all of their private information to prevent an “unraveling result” (Grossman, 1981; Milgrom, 1981; Milgrom & Roberts, 1986). Therefore, firms in certain circumstances disclose all of their data to outsiders because outsiders infer that omitted data must be bad news. In other words, outsiders infer quality when insiders disclose data and infer risk when disclosures are absent. Beyer et al. (2010, pp. 300-301) summarize the results of these studies by identifying six conditions that incentivize firms to disclose: “(1) disclosure is costless; (2) investors know that firms have, in fact, private information; (3) all investors interpret the firms’ disclosure in the same way and firms know how investors will interpret that disclosure; (4) managers want to maximize their firms’ share prices; (5) firms can credibly disclose their private information; and (6) firms cannot commit ex-ante to a specific disclosure policy.” Beyer et al. (2010) noted that firms will not fully disclose when one or more of the six conditions is not met. Dye (2017) criticizes the unraveling result theory by noting that it requires the assumption that buyers are fully aware of “all relevant dimensions of the product they are considering” in order to explain the firm’s choice of making complete or incomplete disclosures. He refers to his model (Dye, 1985), and Jung and Kwon (1988) that state that investors cannot differentiate a firm’s reason for

nondisclosure, that is, the reason for nondisclosure could be that the firm (or manager) did not have the information or that that firm (or manager) had the information but chose to omit it. Instead, he concludes that the investor's skepticism affects his/her assessment of firm value, so that if the investor believes the manager received but omitted information, the perception of the value of the investment is diminished (Dye, 2017). Diamond and Verrecchia (1991) and other scholars agree that voluntary disclosures reduce information asymmetry and ultimately, the cost of capital (Coller and Yohn, 1997; Leuz and Verrecchia, 2000). Fishman and Hagerty (2003) contend that informed, sophisticated investors interpret the disclosures and apply their interpretation to their assessment of firm value, whereas uninformed, unsophisticated investors notice disclosures but do not use them in evaluating the firm.

Voluntary disclosures are most effective when investors find them trustworthy. Investors value and trust disclosures if management is perceived to have few incentives to mislead them, if management is deemed competent, if the disclosures are externally validated, and if the disclosure itself seems precise and plausible (Mercer, 2004). Hirst et al. (2008) summarized prior research on voluntary disclosure decisions related to earnings forecasts and frame the construct in terms of antecedents, characteristics and consequences. Nagar et al. (2003) theorized that managers' equity-based incentives affect the decision to disclose. They found that good news is disclosed to protect management's self-interest and bad news is disclosed to prevent negative assumptions. Other scholars have also studied the reasons issuers voluntarily disclose. Dye (1986) asserts that voluntary disclosures are made if the outcome aligns with personal incentives and others

have argued that truthful disclosures mitigate litigation risk (Verrecchia, 2001; Hanley and Hoberg, 2012).

Additionally, investor' perceptions of the independent auditor's opinion on the fair representation of the financial statements and on the effectiveness of the organization's internal controls have been studied as well. Basu et al. (2018) found that there is a negative relationship between disclosures of internal control weaknesses in an IPO prospectus and the degree of IPO underpricing, which is consistent with the disclosures reducing information asymmetry.

Signaling Theory

Signaling theory explains how parties attempt to influence others' perceptions using words or actions. It is commonly used in investment studies and is used here to understand equity crowdfunding issuers' behavior, specifically the extent to which they send true or false signals. Zhang & Wiersema (2009) claim that securities issuers signal firm quality via financial statement quality. Signals can be used to deceive (false signal) or inform (true signal), and low-quality firms may falsely signal if they benefit from doing so (Connelly et al., 2011). If the cost of implementing quality is high, the issuer may falsely signal high quality without incurring the cost. When high- and low-quality firms both benefit from signaling high quality (i.e., when a high-quality firm sends a true signal of high quality and a low-quality firm sends a false signal of high quality), users cannot easily distinguish between high- and low-quality firms (Kirmani & Rao, 2000). In this case "a pooling equilibrium may occur when the gains from falsely claiming high

quality outweigh the losses from being discovered,” which results in information asymmetry (Kirmani & Rao, 2000).

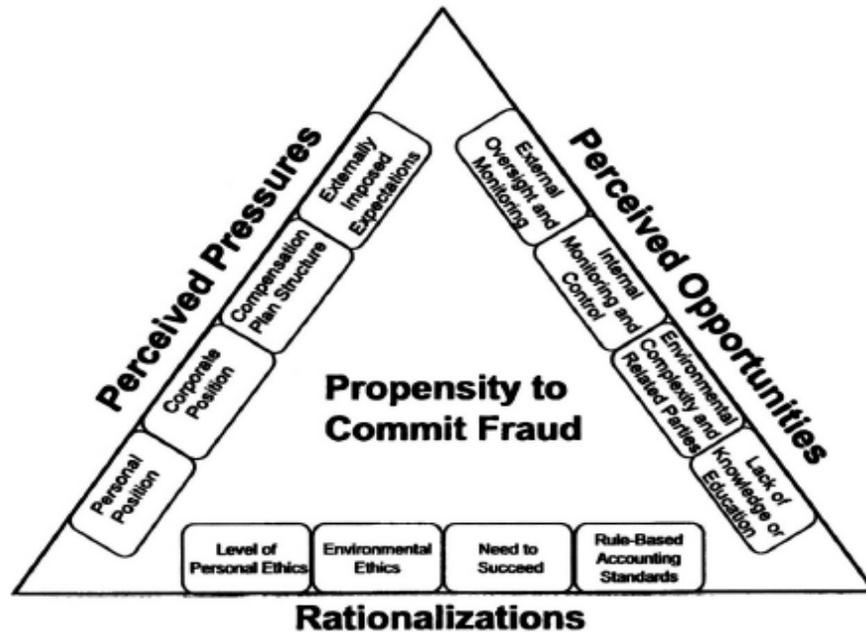
Investors perceive less risk when negative data is disclosed, particularly when the firm is not required to publicly share the data. However, in Equity Crowdfunding, some negative data must be disclosed, including common fraud risk factors. Some red flags may not be as strong an indicator of fraud as others, and some red flags are likely present even in honest firms. This makes it difficult to distinguish an honest, true signaler from a fraudulent, false signaler. It is important to identify fraud signals that indicate high or low fraud risk in order to properly interpret and evaluate the equity crowdfunder’s signals.

Fraud Theory

Figure 9 displays an adaptation of Cressey’s Fraud Triangle, the Propensity to Commit Fraud Model (Albrecht et al., 2008). The authors elaborated upon Cressey’s model by identifying various factors that can represent each of the three dimensions of the triangle and they posit that the existence of one or many of the factors increases the propensity to commit fraud.

In Albrecht et al.’s (2008c) model, perceived pressure (incentives) can be exemplified with four broad categories of internal or external factors: the personal position of the fraudster, the position of the firm, compensation plan structures, and externally-imposed expectations. Perceived opportunity may occur with four groups of factors: external oversight and monitoring, internal monitoring and control, environmental complexity and related parties and lack of knowledge or education. The third

Figure 9: Propensity to Commit Fraud Model (Albrecht et al., 2008c)



determinant, rationalization, may occur due to the level of personal ethics, the level of environmental ethics, a need to succeed and rule-based accounting standards.

Incentives, the “I want...” component of the triangle, come in many forms and have been shown to present as either internal (personal) incentives or external (firm) pressures (Lister, 2007). Internal incentives are the inner desires of the fraudster, such as wealth and success, that are triggered or exacerbated when the firm offers the executive or manager various incentives tied to firm performance. For example, executive stock options have been linked to misrepresented financial statements (Burns & Kedia, 2006). External pressure is the need or desire for the firm to succeed. Examples of external

pressure are the need or desire for external financing (Dechow et al., 1996; Efendi et al., 2007), and decreasing cash flows in years of increasing revenues (Rosner, 2003).

Opportunity, the “I can...” dimension of the triangle has been connected to weak controls and a weak control environment (Loebbecke et al., 1989; Kenyon & Tilton, 2006) and is negatively correlated with the risk of detection (Cressey, 1953). A common proxy variable for opportunity is the existence of related party transactions (Wilks & Zimbleman, 2004; Moyes et al., 2005; Jian & Wong, 2010).

Rationalization is the most difficult to examine and has been the least studied of the three dimensions of the Fraud Triangle. It is the “I deserve...” element of the Fraud Triangle. Rationalization is the attitude of the fraudster that lets him defraud.

Rationalization is the result of the perpetrator’s ethics and his ability to self-justify his behavior. Some scholars have measured rationalization by the identification of events that indicate a problem, error or fraud has occurred. Two of these proxy variables measured are an auditor change and earnings-affected restatements (St. Pierre & Anderson, 1984; Loebbecke et al., 1989; Stice, 1991; Krishnan & Krishnan, 1997; Skousen et al., 2009; Lou et al., 2009). Other researchers have used observable financial data that reflects decisions made by the fraudster that show self-interest, such as use of discretionary accruals (Beneish, 1997; Francis & Krishnan, 1999; Vermeer, 2003; Skousen et al., 2009).

SAS No. 99 provides a checklist of financial reporting fraud indicators that auditors should notice and investigate when conducting an audit and each is linked to one of the dimensions of the Fraud Triangle: incentive (pressure), opportunity and

rationalization (attitudes) (Cressey, 1953).¹⁸ Albrecht et al. (2008c) notes that the Fraud Triangle dimensions can differ in weights or strengths for fraud to occur. The Public Company Accounting Oversight Board (PCAOB, 2010) warns that a fraud can occur even if only one of the dimensions exists.

Conceptual Model and Hypotheses

I applied my practitioner experience and professional skepticism to select observable explanatory variables from a preliminary evaluation of the data and chose known fraud indicators that are derived from the mandated disclosed data. I then categorized the fraud indicators by the dimension of the triangle the variables best represented using examples from extant research and SAS 99. The two overarching questions I investigated in this chapter are whether the mandated and voluntary disclosures are sufficient to indicate fraud risk and whether and to what extent investors are funding high fraud risk (or rejecting low fraud risk) offers.

Incentives and Opportunities

The proxy variables for the Incentives and Opportunity dimensions evaluated in this study are primarily derived from the SAS No. 99 checklist and papers by Skousen et al. (2009) and Lou et al. (2009). Both studies used a matched sample of known fraud firms and no-fraud firms and used a simple logistic model based on SAS No. 99 to test the proxy variables. The model developed by Skousen et al. (2009) categorized fraud firms with 69.77 % accuracy and no-fraud firms with 72.09% accuracy. They found that

¹⁸ SAS No. 99 (and its PCAOB counterpart, AS 2401) is a Statement on Auditing Standard entitled “Consideration of Fraud in a Financial Statement Audit.”

there was a correlation between fraud and various incentive/pressure measures of financial stability, external pressure and personal need. Furthermore, they found that the nature of operations, ineffective monitoring by the board and audit committee and CEO duality (the CEO is also the chairperson of the board) were significant Opportunity variables that related to fraud. Lastly, they found that the three proxies tested for Rationalization: change in auditor, the audit report opinion and management's use of discretionary accruals were not significant.

Lou et al. (2009) studied Taiwanese public companies with known fraud and compared them to those with no known fraud to determine specific proxies and found that there was a positive relation between fraud and three pressure/incentive variables: analyst forecast error, successive losses and two or more successive years of negative cash flow. To measure the Opportunity dimension of the triangle, Lou et al. (2009) used equity investment ratio as an indicator of complex transactions and the percent of sales with related parties and found that complex transactions are related to an increase risk of fraud.

Other factors that can highlight the incentive aspect of fraud are MICE (money, ideology, coercion and entitlement), which are very difficult to identify and assess (Dorminey et al., 2011).

Rationalization

Rationalization, as defined in fraud studies, is the attitude that fraudulent actions are justified. An analysis of the signal sent by the firm may provide insight into whether a decision-maker is acting honestly or is rationalizing dishonest behavior. When evaluating

Rationalization, SAS No. 99 warns, “risk factors reflective of attitudes/rationalizations by those charged with governance, management, or employees, that allow them to engage in and/or justify fraudulent financial reporting, may not be susceptible to observation by the auditor.” Nonetheless, the voluntary disclosure literature demonstrates that the disclosure decision reflects a cost-benefit comparison of a warranty, inspection, or certification of quality (Grossman & Hart, 1980; Grossman, 1981). In equity crowdfunding, filers weigh the benefits of raising potentially larger sums against the cost of the assurance and the risk of fraud detection. Additionally, signaling theory indicates that warranty signals are used to suggest high quality (Kirmani & Rao, 2000; Boulding & Kirmani, 1993; Kelley 1988). When a firm hides its true nature with a false signal, this indicates that managers feel that investors’ welfare is less important than the wants or needs of the firm and/or manager(s).

Equity crowdfunders can decide whether to obtain any independent assurance, either through the mandated assurance level connected to the oversubscription tier selected or through a higher assurance voluntarily conducted. These two actions potentially reflect a self-interested decision (the fraudster chooses to warrant as a false signal and the honest firm warrants as a true signal) and are therefore, selected as proxies in this chapter.

Additionally, the decision to warrant at a higher level of assurance or through an external validation service (e.g. CrowdCheck), is a rationalization proxy. The major reason to provide voluntary assurance is to increase funding success, so a dishonest firm might pay more for the warranty, particularly if the risk of fraud detection is low, as in a

review. The risk of detection is even lower if the CPA is not independent of the intermediary who has a stake in the success of the offer. To decipher the issuer-CPA relationship, I selected as proxies whether the location (state) of the CPA matched the location of the issuer and if the CPA was in the small group of market leaders providing assurances in the crowdfunding market. This proxy does not test auditor tenure with or auditor independence from the issuer; it tests the auditor's independence from the intermediary.

Another self-interested, measurable decision that may reflect a cost-benefit analysis by the equity crowdfunder is an amendment of the offering to increase the oversubscription to a higher tier. The equity crowdfunding oversubscription amendment can be used as a proxy because an amendment to increase tiers is an observable outcome of a decision made in the crowdfunder's self-interest (Jensen & Meckling, 1976; Dechow et al., 1996; Efendi et al., 2007). For this reason, an amended offering that increases the oversubscription tier is used in this study as a proxy for rationalization.

Minor changes can be made the crowdfunding offering, such as a deadline extension or the correction of a clerical error, so these amendments do not warrant discussion. However, when the offering is amended to increase the oversubscription amount and the level of assurance remains the same (i.e. Tier 2 to Tier 3), the change could indicate fraud risk. Notably, the cost of a review is fairly small and the risk of fraud detection is fairly low (fraud risk is not evaluated in a review), so a switch from Tier 1 to Tier 3 may provide a much higher payoff (up to an additional \$900,000 compared to a

maximum increase of \$500,000) when a filer changes oversubscription amounts from Tier 1 to Tier 3 as compared to a change from Tier 2 to Tier 3.

Alternatively, an honest issuer may have had second thoughts and decided they wanted to try to raise more money than originally planned. They may have sought the advice of a professional after the fact and determined that they could afford to comply with a higher assurance requirement. In other words, the benefits of raising more capital outweigh the costs. The honest manager is not as concerned about the risk of fraud detection in their decision making because he/she believes the data are presented honestly and correctly.

Another potential predictor of fraud risk is the type of the security offered (Watts & Zimmerman, 1978; Watts & Zimmerman 1990; Goyal, 2011; Hieble, 2015). The four categories of securities are common stock, preferred stock, debt and SAFE (Simple Agreement for Future Equity) investments. A SAFE is a financing method used in crowdfunding that promises the investor a future stake in the company if certain events occur. The SAFE is not a current stake in the company at the time of the investment. According to the SEC (2017) and FINRA, SAFE investments are very high risk¹⁹. Because it may be a fraud indicator and it is a measurable decision made by the firm, whether the offering is a SAFE interest is a rationalization proxy.

¹⁹ https://www.sec.gov/oiea/investor-alerts-and-bulletins/ib_safes;
<http://www.finra.org/investors/highlights/5-things-you-need-know-about-safe-securities-and-crowdfunding>

Lastly, the intermediary's market position is selected as a rationalization proxy. By itself, I do not expect the intermediary's market position to affect the level of risk, however, I expect that it will increase fraud risk by enhancing the relationship between the other rationalization proxies and fraud risk.

The following hypotheses are mapped to the Fraud Triangle dimensions and proxy variables are described in Table 8 Panels A, B and C.

H6a: Firms that disclose data that reveal a high need for financing (incentives) are more likely to have high fraud risk than those that disclose a low need for financing.

The incentives attributes that I selected for this study are financial condition, financial stability, financial liquidity, and personal needs of the officers or shareholders. I also include the Chapter 2 incentive variable, Meet/Just Beat.

H6b: Firms with observable fraud risk opportunities are more likely to have high fraud risk than firms that do not have observable fraud risk opportunities.

The Opportunity attributes selected are the nature of the operations, particularly related party transactions, life-cycle stage (Chapter 2), monitoring by a board of directors and internal controls based on the experience of the internal top accountant.

H6c: Firms that voluntarily signal quality (rationalization) at a low cost and low likelihood of fraud detection are more likely to have higher fraud risk than those that disclose only at the mandated assurance level.

Table 8: Empirical Proxies for the Three Dimensions of the Fraud Triangle

Panel A: Incentives Dimension

Independent Variables ^a	Definitions	Proxies ^a
<i>Meet/Just Beat</i>	Scaled earnings by total assets, categorized by discontinuities using histogram approach	Indicator variable assigned a value of 1 if small or zero profit group; value of 0 if not in small or zero profit group (Chapter 2 of this study)
<i>Financial Condition</i> ^b	Financial condition scaled by target offer amount	Aggregate Net Income (loss) from Operations / Target Offer Amount
<i>Financial Stability</i> ^b	Financial stability scaled by target offer amount	Aggregate Cash Flows provided by (used from) Operations / Target Offer Amount
<i>Financial Liquidity</i> ^c	Financial liquidity scaled by target offer amount	Working Capital / Target offer amount
<i>Personal Need</i> ^c	Personal need: Firms ability to pay accrued expenses or loans due to officers or shareholders	(Officer or Shareholder Accruals + Officer or Shareholder Loans Payable) / Target Offer Amount

^a Independent variables and proxies selected are based on SAS No. 99, Lou et al. (2009) and Skousen et al. (2009).

^b These variables will be analyzed on an aggregate basis to reflect all of the years' information disclosed in the offer.

^c These variables will be analyzed on a firm-year basis using the most recent year's data because they are balance sheet items.

Table 8 continued

Panel B: Opportunities Dimension

Independent Variables ^a	Definitions	Proxies ^a
<i>Nature of Operations</i>	Nature of operations: Significant or unusual transactions with related parties disclosed (including loans, agreements, contractual liabilities with shareholders and related parties of shareholders)	Indicator variable assigned a value of 1 if significant related party transactions are reported in MD&A; value of 0 if none are disclosed
<i>Life-cycle Stage</i>	Life cycle stage: Startup or Nonstartup, based on number of years of financial statements included in the filing	Indicator variable assigned a value of 1 if startup stage; value of 0 if not in startup stage (Chapter 2 of this study)
<i>Ineffective Monitoring</i>	Ineffective monitoring of management: Board composition	Indicator variable assigned a value of 1 if no board or if board is dominated by insiders; value of 0 if board is dominated by outsiders
<i>Ineffective Internal Controls</i>	Ineffective internal controls: Presence and expertise of internal accountant	Indicator variable assigned a value of 1 if no CPA or experienced accountant in top internal financial role; value of 0 if CPA or experienced accountant in top internal financial role

^a Independent variables and proxies selected are based on SAS No. 99, Lou et al. (2009) and Skousen et al. (2009).

Table 8 continued

Panel C: Rationalization Dimension

Independent Variables ^a	Definitions	Proxies ^a
<i>Mandatory Assurance</i>	Oversub. mandated assurance level: external or internal (use amended level per Form C/A, if applicable)	Indicator variable assigned a value of 1 if Tier 1 (internal); value of 0 if Tier 2 or Tier 3 (external). (Variable was also used in Chapter 2 as a proxy for rationalization.)
<i>Mandatory Review</i>	Review Tiers: Tier 2 auditor review or Tier 3 auditor review/subsequent audit	Indicator variable assigned a value of 1 if Tier 2 (Review); value of 0 if Tier 3 (Review/Audit). (Variable was also used in Chapter 2 as a proxy for rationalization.)
<i>Voluntary Assurance</i>	Voluntary Assurance or Verification	Indicator variable assigned a value of 1 if higher assurance, attestation or external verification voluntarily provided; value of -0- if provide only mandated level and no external verification.
<i>Revised Tier Choice</i>	Restated (amended) oversubscription tier	Indicator variable assigned a value of 1 if offer amended the oversubscription to a higher tier; value of -0- if filing or tier was not amended.
<i>CPA-Issuer State Match</i>	Comparison of state of CPA and of filer	Indicator variable assigned a value of 1 if different states; value of -0- if same state
<i>CPA Market Position</i>	Market position of independent CPA	Indicator variable assigned a value of 1 if CPA is ranked as a top market leader (Table 1 Panel D); value of -0- if CPA is not a designated market leader
<i>SAFE Security</i>	Type of Security	SAFE security is assigned a value of 1; other equity and debt is assigned a value of -0- (Table 1 Panel B).
<i>Portal Market Position</i>	Market position of intermediary	Indicator variable assigned a value of 1 if the intermediary is ranked as a top market leader (Table 1 Panel C); value of -0- if the intermediary is not a designated market leader.

The Rationalization attributes are mandated and voluntary assurances, amendments to the oversubscription amount, the CPA's probable relationship with the issuer (measured by location), the CPA's market share, the intermediary's market share and the type of security offered.

Based on Fraud Theory (Cressey, 1953; Albrecht et al, 2008c; Lou et al., 2009; Skousen et al., 2009; PCAOB, 2010), I posit the following:

H7: Fraud risk is higher when fraud attributes representative of the Fraud Triangle are present and fraud risk is lower when the attributes are absent.

Hypotheses 7 is tested using regression models of the factors tested in Hypotheses 6a, 6b and 6c and follows prior research on the dimensions of the Fraud Triangle (Beasley, 1996; Lou et al., 2009; Skousen et al., 2009). The model below represents the observable fraud indicators that, when combined, are expected to represent high fraud risk.

$$\begin{aligned} \text{High Fraud Risk}_i = & \alpha + \beta_1 \text{Meet/Just Beat}_i + \beta_2 \text{Financial Condition}_i + \beta_3 \text{Financial} \\ & \text{Stability}_i + \beta_4 \text{Financial Liquidity}_i + \beta_5 \text{Personal Need}_i + \beta_6 \text{Nature of Operations}_i + \beta_7 \text{Life-} \\ & \text{cycle Stage}_i + \beta_8 \text{Ineffective Monitoring}_i + \beta_9 \text{Ineffective Internal Controls}_i + \\ & \beta_{10} \text{Mandatory Assurance}_i + \beta_{11} \text{Mandatory Review}_i + \beta_{12} \text{Voluntary Assurance}_i + \\ & \beta_{13} \text{Revised Tier Choice}_i + \beta_{14} \text{CPA-Issuer State Match}_i + \beta_{15} \text{CPA Market Position}_i + \\ & \beta_{16} \text{SAFE Security}_i + \beta_{17} \text{Portal Market Position}_i + \varepsilon_i \end{aligned}$$

Congress imposes an annual investment limitation in this market so investing in equity crowdfunders may not appeal to the accredited investor. Additionally, most crowdfunders have high operational risk due to historical losses or early-stage operations,

so they may be avoided by the sophisticated investor. For these reasons, unsophisticated investors generally make up the “crowd” in the equity crowdfunding market. Some investing behavior adopted by accredited investors may not apply to the unaccredited group.

A basic principle of investing is that risk-averse investors seek a higher rate of return for a high-risk investment, reflected in a lower price of the security. Risk-neutral and risk-averse investors may be attracted to investments that provide lower rates of return for a low-priced security. However, equity crowdfunders self-select a price per share of the offering because a true market value cannot be determined without the ability to trade. Unlike an IPO road show where firms can test the market, equity crowdfunders cannot solicit interest before filing with the intermediary and the filing must include the offer price. Additionally, the issuers can only solicit through the intermediary. Furthermore, the concept of semi-strong market efficiency, which is that the price of the securities quickly reflects all publicly available information, does not apply to equity crowdfunding offers because the price per share is chosen by the firm. This lack of information may be a disadvantage to investors.

A competitive environment elicits information sharing because firms will adopt full-disclosure to encourage the most favorable outcome for the firm (Grossman & Hart, 1980; Grossman, 1981). Milgrom & Roberts (1986) contend that competition is not necessary when the buyer is informed and sophisticated. Informed consumers evaluate purchases by applying a worst-case-scenario based on the information they are given or not given. If information is absent, informed consumers assume the worst—that is, that

the seller is withholding information that would have changed the consumer's decision. Sophisticated buyers find and verify information on their own, employ skepticism, and then make their decision; however, uninformed, unsophisticated investors do not follow this protocol. Instead, unsophisticated buyers are "naively credulous" thinking that the data they receive is complete. They are not skeptical and instead take the data at face value.

Furthermore, the SEC acknowledges, "the limited track record (of new crowdfunding issuers) may translate into a higher level of information asymmetry between issuers and investors. The potentially reduced quality of financial disclosure...may affect the likelihood of detecting fraud, which would decrease investor protection." Although information asymmetry concerns were raised in each rule, the SEC gave more weight to the cost of additional requirements than the benefit of better quality and more data (SEC, 2013, 2016).

The results in the previous chapter suggest that equity crowdfunding issuers are more likely to include potentially fraudulent financial data in their offers than in public companies' IPOs (26.7% and 14.37% respectively). In light of the relaxed requirements for equity crowdfunders explained in the previous chapter, fraudulent issuers may structure the offer and their business operations to receive the least oversight so that any fraud will not be detected. Of course, there are many honest crowdfunders who utilize the requirements as intended, to reduce their compliance burden while raising relatively small amounts of capital as compared to IPOs.

Equity crowdfunding differs from other public offerings because investors are able to communicate with one another through the portal, which has been shown to positively and negatively influence investment, depending upon the timing and the perceived expertise of the communicator (Vismara, 2018). Funding occurs more frequently when sophisticated investors have public profiles that are accessible to other potential investors, particularly if they do so in the early stage of the offer (Vismara, 2018). Although the research shows a positive outcome to the issuer by raising funds, I suspect that unsophisticated investors are not experienced or informed enough to correctly interpret issuer signals so as to select low fraud risk firms and avoid high fraud risk firms. To test this suspicion, I posit:

H8: Equity crowdfunding offerings with high fraud risk are more likely to be funded and raise more funds than equity crowdfunding offerings with low fraud risk.

Undiversified investors generally do not use complex fraud risk assessments and financial analysis tools (Brazel et al., 2015). If unaccredited investors are risk averse, they may select crowdfunding firms that appear to be low risk, but appearances can be misleading. Both high and low fraud risk firms will disclose the required data in the filing (which are based on fraud risk factors), but high fraud risk firms will falsify the numbers in the financial statements. If there is a pooling equilibrium, the crowd cannot properly distinguish between high-fraud-risk and low-fraud-risk firms. If there is a separating equilibrium, the crowd can distinguish between high and low fraud risk.

Figure 10 depicts a matrix of the possible relationships of fraud risk to funding outcome, with particular attention on two outcomes, unfunded low-fraud-risk offerings and funded high-fraud-risk offerings.

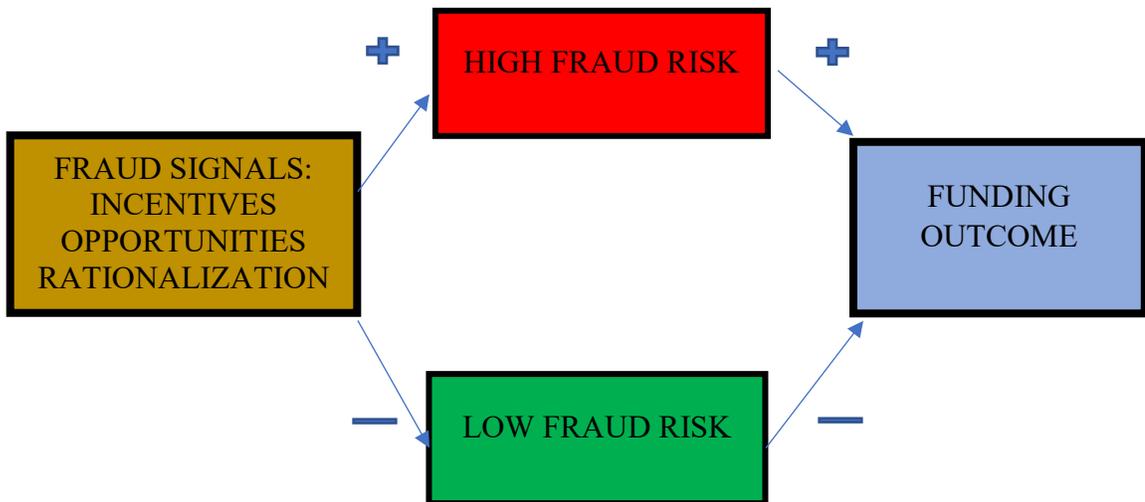
Figure 10: Fraud Risk-Funding Outcome Matrix

	High Fraud Risk	Low Fraud Risk
Funded Offers	High Fraud Risk and Funded *	Low Fraud Risk and Funded
Unfunded Offers	High Fraud Risk and Unfunded	Low Fraud Risk and Unfunded *

*denotes the funding outcomes of interest in this study

Figure 11 depicts Hypothesis 8 with a model of the effect of observable fraud attributes on funding outcomes. I predict information asymmetry, reflected by a pooling equilibrium, will cause the funding outcome to not be aligned with my fraud risk assessment of the offering.

Figure 11: Hypothesis 8 Mapping Fraud Attributes to Fraud Risk and Funding Outcomes



Data and Analysis

Data Collection

I used my Filing sample of 100 offerings. I extracted data from both the .xml files of the preformatted Forms C, CA and C-U along with the appended financial statements and management discussion and analysis. The data includes the explanatory variables and funding outcomes for each offering. When funding outcome information was absent, I searched the firm's website, the intermediary's portal and the internet to determine the outcome. It was necessary to calculate some of the explanatory variables from the extracted data.

All Incentive proxies are based on financial data, so they are scaled for comparability. The target amount of the offering is used for scaling to add the perspective of need to these proxies. Indicator variables (1,0) are assigned to all other independent variables that represent the Opportunity and Rationalization aspects of the fraud triangle. Definition and proxies for all independent variables are listed in Table 8 Panels A, B and C.

Data Analysis and Results

Descriptive statistics pertinent to each variable representing the three Fraud Triangle dimensions and funding outcome are included in Table 9. The first Incentives variable is *Meet/Just Beat*, which was also used in Chapter 2. The four remaining Incentives variables, *Financial Condition*, *Financial Stability*, *Financial Liquidity and Personal Need*, are proxies scaled by total assets. The means of financial condition, stability and liquidity all indicate losses. The four Opportunities variables and the eight

Rationalization variables are all binary variables with the 0 state representing the hypothesized low-fraud-risk states described above.

Table 9 also provides summary data for amounts funded and the scaled issue amount that I created, called issue spread. The issue spread formula is

$$\text{Issue Spread} = \text{Funded amount less the Target Offer amount} / \text{Target Offer amount}$$

Forty-nine offers were funded in the sample period with a mean funding of \$276,970.

Hypotheses 6a, 6b, 6c

To test my first set of hypotheses (H6a, 6b and 6c), I ran *t*-tests to compare fraud risk across attributes representing the three dimensions of the Fraud Triangle to determine if any resulted in a significant difference, at $p < 0.01$, 0.05, and 0.10, between fraud risk groups (high and low). For the purpose of the *t*-tests, fraud risk groups were stratified as high or low fraud risk based on the KS statistic, 95% confidence. The *t*-test results in Table 10 Panel A show that none of the means of the five Incentives attributes (*Meet/Just beat*, *Financial Condition*, *Financial Stability*, *Financial Liquidity* and *Personal Need*) were significantly different in the high or low fraud groups and none of the four Opportunities attributes' means differed significantly between the fraud groups. Only one Rationalization attribute, the match of CPA state to the filer's (*CPA-Issuer State Match*) resulted in a significant difference at $p < 0.05$.

Table 9: Summary Statistics for Fraud Determinant Proxies

Variables	N	Mean	Std Dev	Q1	Median	Q3
<i>Meet/Just Beat</i>	100	0.170	0.378	0.000	0.000	0.000
<i>Financial Condition</i>	100	-5.034	13.062	-4.981	-1.122	0.000
<i>Financial Stability</i>	100	-4.259	11.624	-5.048	-1.275	-0.120
<i>Financial Liquidity</i>	100	-1.044	7.843	-0.584	0.015	0.408
<i>Personal Need</i>	100	2.266	8.652	0.000	0.031	0.778
<i>Nature of Operations</i>	100	0.560	0.499	0.000	1.000	1.000
<i>Life-cycle Stage</i>	100	0.350	0.479	0.000	0.000	1.000
<i>Ineffective Monitoring</i>	100	0.910	0.288	1.000	1.000	1.000
<i>Ineffective Internal Controls</i>	100	0.830	0.378	1.000	1.000	1.000
<i>Mandatory Assurance</i>	100	0.220	0.416	0.000	0.000	0.000
<i>Mandatory Review</i> ^a	78	0.260	0.439	0.000	0.000	1.000
<i>Voluntary Assurance</i>	100	0.150	0.359	0.000	0.000	0.000
<i>Revised Tier Choice</i>	100	0.060	0.239	0.000	0.000	0.000
<i>CPA-Issuer State Match</i> ^a	83	0.630	0.487	0.000	1.000	1.000
<i>CPA Market Position</i> ^a	83	0.530	0.502	0.000	1.000	1.000
<i>SAFE Security</i>	100	0.340	0.476	0.000	0.000	1.000
<i>Portal Market Position</i>	100	0.720	0.451	0.000	1.000	1.000
<i>Funded Offering</i> ^b	49	\$276,970	\$275,599	\$100,000	\$183,000	\$328,460
<i>Issue Spread</i> ^c	49	3.189	4.558	0.568	1.311	4.141

All variables are defined in Table 8.

^a Difference in N of *Mandatory Review* (N=78) and *CPA-Issuer State Match*, *CPA Market Position* (N=83) due to five (5) Tier 1 filings that included four (4) with CPA compilation (no assurance) and one (1) with CPA review.

^b *Funded Offerings*' descriptive statistics exclude unfunded offers.

^c *Issue Spread*: Scaled funding outcome calculated by (amount raised less target offer) / target offer

Table 10: Relation of Fraud Attributes to Fraud Risk

Panel A: Differences in Fraud Attributes between Firms with High and Low Fraud Risk

Fraud Dimensions and Attributes	High Fraud Risk ^a		Low Fraud Risk ^b		t-Statistic	
	Mean	SD	Mean	SD	t-value	Pr> t
Incentives						
<i>Meet/Just Beat</i>	0.220	0.422	0.140	0.350	0.985	0.328
<i>Financial Condition</i>	-5.383	12.066	-4.838	13.679	-0.199	0.842
<i>Financial Stability</i>	-3.887	8.349	-4.469	13.171	0.239	0.812
<i>Financial Liquidity</i>	-1.171	6.405	-0.973	8.593	-0.121	0.904
<i>Personal Need</i>	1.936	4.928	2.452	10.201	-0.285	0.776
Opportunities						
<i>Nature of Operations</i>	0.580	0.500	0.550	0.502	0.349	0.728
<i>Life-cycle Stage</i>	0.420	0.500	0.310	0.467	1.043	0.299
<i>Ineffective Monitoring</i>	0.920	0.280	0.910	0.294	0.173	0.863
<i>Ineffective Internal Controls</i>	0.780	0.422	0.860	0.350	-0.985	0.328
Rationalization						
<i>Mandatory Assurance</i>	0.310	0.467	0.170	0.380	1.465	0.148
<i>Mandatory Review</i>	0.240	0.436	0.260	0.445	-0.225	0.823
<i>Voluntary Assurance</i>	0.170	0.378	0.140	0.350	0.347	0.730
<i>Revised Tier Choice</i>	0.080	0.280	0.050	0.213	0.731	0.466
<i>CPA-Issuer State Match</i> ^c	0.790	0.418	0.550	0.503	2.309**	0.024
<i>CPA Market Position</i> ^c	0.640	0.488	0.047	0.504	1.485	0.143
<i>SAFE Security</i>	0.360	0.487	0.330	0.473	0.331	0.741
<i>Portal Market Position</i>	0.720	0.454	0.720	0.453	0.037	0.971

All variables are defined in Table 8.

^a High Fraud Risk Filings are categorized as noncompliant using the KS Statistic, 95% confidence; N = 36

^b Low Fraud Risk Filings are categorized as compliant using the KS Statistic, 95% confidence; N = 64

^c N=83

*, **, *** Significant at p -value < 0.10, 0.05, and 0.01, respectively.

I next ran regressions of fraud risk, measured by the MAD score, on proxies for each fraud dimension. The results from the regression of fraud risk on Incentive variables are reported in Table 10 Panel B. I ran one regression with all of the Incentive variables and then a second one that excluded the multicollinear variables, *Financial Condition* and *Financial Stability*. Both regressions indicate a very weak and insignificant relationship between the variables and fraud risk (adjusted R^2 of 0.06 and 0.025, respectively). However, *Meet/Just Beat* was significant in both regressions. I ran a third regression of a reduced Incentive dimension model of the one significant variable in the first two regressions (*Meet/Just Beat*). The adjusted R^2 very slightly increased (to 0.026), however, *Meet/Just Beat* became less significant. Because of the insignificant relationships shown in the *t*-tests and regressions, I fail to reject the null hypotheses of H6a. This result shows that the financial measures I derived from the mandated disclosures for the Incentives dimension are insufficient for the investor to make an informed decision regarding fraud risk.

Table 10 Panel C depicts the regression of fraud risk on the proxies for the Opportunities Dimension. There are two models; one is a full model and the other is a reduced model of only the significant variables from the full model regression. The full model shows a significant relation to fraud risk (adjusted R^2 is 0.222; F-statistic is significant). Two variables, *Life-cycle Stage* and *Ineffective Monitoring*, are significant in the full model. The same variables are significant in the reduced model, however, the adjusted R^2 fell to 0.201 (F-statistic is significant). *Ineffective Monitoring* is only marginally significant in the reduced model ($p < 0.10$). Although the univariate *t*-tests

found no difference, the regressions found a significant relationship between the Opportunities variables and fraud risk, hence I reject the null of H6b.

Table 10 continued

Panel B: Regression of Fraud Risk on Incentives Dimension Proxies

Independent Variables	Prediction	Full Incentives Dimension Model	Excluding Multicollinear	Reduced Incentives Dimension
<i>Meet/Just Beat</i>	+	0.189* (1.698)	0.205** (2.042)	0.189* (1.910)
<i>Financial Condition</i>	-	0.069 (0.237)		
<i>Financial Stability</i>	-	-0.004 (-0.014)		
<i>Financial Liquidity</i>	-	-0.003 (-0.022)	0.037 (0.335)	
<i>Personal Need</i>	+	-0.100 (-0.795)	-0.117 (-1.061)	
<i>Observations</i>		100	100	100
<i>Adjusted R²</i>		0.060	0.025	0.026
<i>F-statistic</i>		0.360	0.147	0.059

All variables are defined in Table 8. All continuous variables are winsorized at the extreme one percentiles. *, **, and *** indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, for a two-tailed test; t -statistics are reported in parentheses and are based on standard errors clustered at the state level.

Table 10 continued

Panel C: Regression of Fraud Risk on Opportunities Dimension Proxies

Independent Variables	Prediction	Full Opportunities Dimension Model	Reduced Opportunities Dimension
<i>Nature of Operations</i>	+	-0.142 (-1.598)	
<i>Life-cycle Stage</i>	+	0.427*** (4.678)	0.404*** (4.442)
<i>Ineffective Monitoring</i>	+	0.210** (2.233)	0.177* (1.945)
<i>Ineffective Internal Controls</i>	+	-0.144 (-1.514)	
<i>Observations</i>		100	100
<i>Adjusted R²</i>		0.222	0.201
<i>F-statistic</i>		0.000	0.000

All variables are defined in Table 8. All continuous variables are winsorized at the extreme one percentiles. *, **, and *** indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, for a two-tailed test; t -statistics are reported in parentheses and are based on standard errors clustered at the state level.

Table 10 Panel D displays the regression of fraud risk on the proxies for the Rationalization dimension. Because *Mandatory Assurance* and *Mandatory Review* are highly correlated, they are not included in the same regression. I ran regressions of each with the remaining Rationalization variables, both resulting in insignificant relationships with fraud risk. In both full models, the CPA's state compared to the filer's state, *CPA-Issuer State Match*, was significantly related to fraud risk, so I ran a third regression of a reduced model including only this variable. The adjusted R^2 increased (0.044), the F-statistic is significant in the reduced model and the results of the *t*-test are in agreement, therefore I reject the H6c null hypothesis.

The results from H6a, 6b and 6c testing show that there are a few high-fraud-risk factors identifiable from the offering data, and the Opportunities dimension is the strongest predictor of fraud risk. However, many of my expected high-fraud-risk factors do not individually predict fraud risk in equity crowdfunding offers.

Hypothesis 7

Next, I conducted regressions to test H7, the efficacy of my overall fraud model, to determine if the independent variables collectively predict fraud risk, measured by the MAD score. The first column in Table 11 Panel A reports the regression results of the full model (Full Model I) which includes *Mandatory Assurance* and excludes *Mandatory Review*. The regression resulted in an adjusted R^2 of 0.248 and the F-statistic of the model is significant at 0.003. Four explanatory variables showed significant relationships with fraud risk: *Life-cycle Stage*, *Ineffective Monitoring*, *Mandatory Assurance* and *CPA-Issuer State Match*, $p < 0.10$. All the other explanatory variables in the overall model were

Table 10 continued

Panel D: Regression of Fraud Risk on Rationalization Dimension

Independent Variables	Prediction	Full Model I, excluding Oversub.- mandated assurance	Full Model II, excluding Mandatory Review Tiers	Reduced Rationalization Dimension
<i>Mandatory Assurance</i>	+	0.223 (1.529)		
<i>Mandatory Review</i>	+		0.055 (0.392)	
<i>Voluntary Assurance</i>	+	-0.116 (-0.823)	-0.089 (-0.706)	
<i>Revised Tier Choice</i>	+	-0.007 (-0.066)	-0.034 (-0.257)	
<i>CPA-Issuer State Match</i>	+	0.282** (2.329)	0.245* (1.921)	0.235** (2.179)
<i>CPA Market Position</i>	+	-0.052 (-0.408)	-0.041 (-0.315)	
<i>SAFE Security</i>	+	0.061 (0.514)	0.055 (0.444)	
<i>Portal Market Position</i>	+	-0.051 (-0.449)	-0.005 (-0.040)	
<i>Observations</i>		83	78	83
<i>Adjusted R²</i>		0.020	-0.025	0.044
<i>F-statistic</i>		0.642	0.294	0.032

All variables are defined in Table 8. All continuous variables are winsorized at the extreme one percentiles. *, **, and *** indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, for a two-tailed test; t -statistics are reported in parentheses and are based on standard errors clustered at the state level.

insignificant. *Financial Condition* and *Financial Stability* were highly correlated (Table 10 Panel B), so I ran a revised model regression excluding both. These results are also shown in the second column of Table 11 Panel A.

The adjusted R^2 of the Revised Model I was higher at 0.264 and the F-statistic was 0.001.

The same explanatory variables were significant ($p < 0.10$), so I ran a third regression of only the significant independent variables from the second regression. This Reduced Model I is:

$$\text{High Fraud Risk}_i = \alpha + \beta_1 \text{Life-cycle Stage} + \beta_2 \text{Ineffective Monitoring}_i + \beta_3 \text{Mandatory Assurance}_i + \beta_4 \text{CPA-Issuer State Match}_i + \varepsilon_i$$

The adjusted R^2 of the reduced model was 0.267 and the F-statistic was significant (0.000). All four variables were significant ($p < 0.05$) in the predicted direction.

I conducted a second set of regressions (Model II) that included *Mandatory Review* and *Mandatory Assurance*. As with model I, I ran a full model, a revised model that excludes multicollinear variables and a reduced model. The results are reported in Table 11 Panel B. The Full Model II's adjusted R^2 was 0.227; the Revised Model II and Reduced Model II had adjusted R^2 s of 0.237 and 0.217, respectively. The full, revised and reduced models had significant F-statistics. Model II had three significant variables: *Nature of Operations*, *Life-cycle Stage*, and *CPA-Issuer State Match*.

Because each regression showed a significant relation between the explanatory variables representing the fraud triangle and fraud risk, I reject the null hypothesis of H7. I use the Revised Models I and II and the Reduced Models I and II in my next hypothesis test.

Table 11: Regression Analysis of Overall and Reduced Fraud Risk Models

Panel A: Fraud Model I, Mandatory Assurance

Independent Variables	Prediction	Fraud Risk: Full Model I	Fraud Risk: Revised Model I	Fraud Risk: Reduced Model I
<i>Mandatory Assurance</i>	+	0.253* (1.825)	0.259* (1.905)	0.270*** (2.777)
<i>Meet/Just Beat</i>	+	0.151 (1.338)	0.174 (1.652)	
<i>Financial Condition</i>	-	0.256 (1.737)		
<i>Financial Stability</i>	-	-0.200 (-0.617)		
<i>Financial Liquidity</i>	-	-0.157 (-0.915)	-0.093 (-0.785)	
<i>Personal Need</i>	+	-0.141 (-1.090)	-0.124 (-1.105)	
<i>Nature of Operations</i>	+	-0.174 (-1.620)	-0.173 (-1.635)	
<i>Life-cycle Stage</i>	+	0.391*** (3.721)	0.397*** (3.857)	0.389*** (3.947)
<i>Ineffective Monitoring</i>	+	0.204* (1.882)	0.25* (1.918)	0.200** (2.047)
<i>Ineffective Internal Controls</i>	+	-0.159 (-1.402)	-0.152 (-1.378)	
<i>Voluntary Assurance</i>	+	-0.094 (-0.703)	-0.086 (-0.658)	
<i>Revised Tier Choice</i>	+	-0.023 (-0.226)	-0.147 (-0.147)	
<i>CPA-Issuer State Match</i>	+	0.313*** (2.714)	0.298*** (2.711)	0.261*** (2.736)
<i>CPA Market Position</i>	+	-0.042 (-0.347)	-0.034 (0.289)	
<i>SAFE Security</i>	+	0.055 (0.502)	0.049 (0.452)	
<i>Portal Market Position</i>	+	0.011 (0.104)	0.014 (0.129)	
<i>Observations</i>		100	100	100
<i>Adjusted R²</i>		0.248	0.264	0.267
<i>F-statistic</i>		0.003	0.001	0.000

Table 11 Panel A continued

All variables are defined in Table 8. All continuous variables are winsorized at the extreme one percentiles. *, **, and *** indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, for a two-tailed test; t -statistics are reported in parentheses and are based on standard errors clustered at the state level.

Table 11 continued

Panel B: Fraud Model II Mandatory Review

Independent Variables	Prediction	Fraud Risk: Full Model II	Fraud Risk: Revised Model II	Fraud Risk: Reduced Model II
<i>Mandatory Review</i>	+	-0.030 (-0.215)	-0.021 (-0.159)	
<i>Meet/Just Beat</i>	+	0.132 (1.153)	0.159 (1.439)	
<i>Financial Condition</i>	-	0.418 (1.060)		
<i>Financial Stability</i>	-	-0.309 (-0.839)		
<i>Financial Liquidity</i>	-	-0.215 (-1.136)	-0.097 (-0.786)	
<i>Personal Need</i>	+	-0.147 (-1.037)	-0.122 (-1.020)	
<i>Nature of Operations</i>	+	-0.191* (-1.734)	-0.191* (-1.750)	-0.207** (-2.117)
<i>Life-cycle Stage</i>	+	0.408*** (3.766)	0.418*** (3.927)	0.376*** (3.843)
<i>Ineffective Monitoring</i>	+	0.170 (1.438)	0.190 (1.642)	
<i>Ineffective Internal Controls</i>	+	-0.133 (-1.046)	-0.137 (-1.108)	
<i>Voluntary Assurance</i>	+	-0.092 (-0.760)	-0.074 (-0.631)	
<i>Revised Tier Choice</i>	+	-0.022 (-0.173)	-0.014 (-0.116)	
<i>CPA-Issuer State Match</i>	+	0.284** (2.324)	0.263** (2.262)	0.229** (2.335)
<i>CPA Market Position</i>	+	-0.034 (-0.275)	-0.019 (-0.161)	
<i>SAFE Security</i>	+	0.052 (0.445)	0.051 (0.442)	
<i>Portal Market Position</i>	+	0.019 (0.144)	0.026 (0.205)	
<i>Observations</i>		100	100	100
<i>Adjusted R²</i>		0.227	0.237	0.217
<i>F-statistic</i>		0.007	0.004	0.000

Table 11 Panel B continued

All variables are defined in Table 8. All continuous variables are winsorized at the extreme one percentiles. *, **, and *** indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, for a two-tailed test; t -statistics are reported in parentheses and are based on standard errors clustered at the state level.

Hypothesis 8

To test Hypothesis 8, whether investors differentiate equity crowdfunding offerings based on fraud risk factors, I ran t -tests and regressions. First, I ran t -tests to compare fraud attributes to funding outcomes to identify if there were differences in the means of the explanatory variables between funding outcomes (funded, unfunded). The t -test results shown in Table 12 indicate that one of the five Incentives variables, *Personal Need*, and two of the eight Rationalization variables, *Mandatory Review* and *CPA Market Position*, differed significantly between funding outcomes. The difference in means in these three explanatory variables suggests a separating equilibrium; investors apparently use this information to differentiate offers. However, most of the variables (14 of 17) are not significantly different when evaluating funding outcomes, which suggests a pooling equilibrium or lack of statistical power to detect differences.

I then ran regressions of funding outcomes on the independent variables in Revised and Reduced Fraud Models (I and II) to test if investors differentiate offers based on a set of fraud-risk predictors. I separately tested the relation of funded status (in Table 13 Panel A) and funding amounts if funded (Table 13 Panel B) on the fraud-risk predictors.

Table 13 Panel A displays the regressions of funded status (proxied by an indicator variable, 1 if funded, 0 if unfunded) on the fraud-risk predictors from Revised

and Reduced Fraud Models I and II. The adjusted R²s indicate a weak relationship between funded status and the predictors from the Revised Fraud Models I and II (0.072 and 0.126, respectively), and an even weaker relation with the predictors from the

Table 12: Differences in Fraud Attributes between Funding Outcomes

Fraud Attribute	Funded		Unfunded		<i>t</i> -Statistic	
	Mean	SD	Mean	SD	<i>t</i> -stat	Pr> <i>t</i>
Incentives						
<i>Meet/Just Beat</i>	0.220	0.422	0.120	0.325	1.415	0.161
<i>Financial Condition</i>	-6.730	17.332	-3.405	6.625	-1.258	0.213
<i>Financial Stability</i>	-5.676	15.318	-2.898	6.198	-1.197	0.234
<i>Financial Liquidity</i>	-2.085	10.319	-0.043	4.178	-1.287	0.203
<i>Personal Need</i>	3.782	11.947	0.809	2.606	1.704*	0.094
Opportunities						
<i>Nature of Operations</i>	0.550	0.503	0.570	0.500	-0.176	0.861
<i>Life-cycle Stage</i>	0.290	0.456	0.410	0.497	-1.322	0.189
<i>Ineffective Monitoring</i>	0.900	0.306	0.920	0.272	-0.409	0.684
<i>Ineffective Internal Controls</i>	0.840	0.373	0.820	0.385	0.174	0.862
Rationalization						
<i>Mandatory Assurance</i>	0.180	0.391	0.250	0.440	-0.854	0.395
<i>Mandatory Review</i>	0.380	0.490	0.130	0.343	2.552**	0.013
<i>Voluntary Assurance</i>	0.140	0.354	0.160	0.367	-0.194	0.846
<i>Revised Tier Choice</i>	0.060	0.242	0.060	0.238	0.050	0.960
<i>CPA-Issuer State Match</i>	0.660	0.480	0.60	0.497	0.590	0.557
<i>CPA Market Position</i>	0.630	0.488	0.430	0.501	1.894*	0.062
<i>SAFE Security</i>	0.370	0.487	0.310	0.469	0.561	0.576
<i>Portal Market Position</i>	0.650	0.481	0.780	0.415	-1.458	0.148

All variables are defined in Table 8. Funded N=51; Unfunded N=49
 *, **, *** Significant at *p*-value < 0.10, 0.05, and 0.01, respectively.

Table 13: Funding Outcomes of Revised and Reduced Fraud Models

Panel A: Determinants of Whether an Offering is Funded for Different Fraud Risk Models

Independent Variables ^a	Prediction	Revised Fraud Model I	Reduced Fraud Model I	Revised Fraud Model II	Reduced Fraud Model II
<i>Mandatory Assurance</i>	+	-0.251 (-1.648)	-0.182 (-1.617)		
<i>Mandatory Review</i>	+			0.347** (2.496)	
<i>Meet/Just Beat</i>	+	0.204* (1.725)		0.175 (1.476)	
<i>Financial Liquidity</i>	-	-0.168 (-1.270)		-0.146 (-1.101)	
<i>Personal Need</i>	+	0.104 (0.825)		0.062 (0.486)	
<i>Nature of Operations</i>	+	-0.215* (-1.810)		-0.212* (-1.814)	-0.094 (-0.852)
<i>Life-cycle Stage</i>	+	-0.214* (-1.857)	-0.200* (-1.753)	-0.217* (-1.905)	-0.175 (-1.588)
<i>Ineffective Monitoring</i>	+	-0.091 (-0.762)	-0.019 (-0.167)	-0.178 (-1.436)	0.077 (0.702)
<i>Ineffective Internal Controls</i>	+	0.186 (1.496)		0.144 (1.086)	
<i>Voluntary Assurance</i>	+	0.051 (0.348)		0.108 (0.859)	
<i>Revised Tier Choice</i>	+	0.014 (0.121)		-0.152 (-1.167)	
<i>CPA-Issuer State Match</i>	+	0.033 (0.266)	0.052 (0.466)	-0.027 (-0.214)	
<i>CPA Market Position</i>	+	0.075 (0.563)		0.085 (0.662)	
<i>SAFE Security</i>	+	0.140 (1.141)		0.114 (0.926)	
<i>Portal Market Position</i>	+	-0.210* (-1.762)		-0.006 (-0.044)	
<i>Observations</i>		100	100	100	100
<i>Adjusted R²</i>		0.072	0.017	0.126	0.006
<i>F-statistic</i>		0.153	0.258	0.060	0.329

Table 13 continued

^a Dependent variable is funding outcomes (1) Funded, (0) unfunded

All variables are defined in Table 8. All continuous variables are winsorized at the extreme one percentiles. *, **, and *** indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, for a two-tailed test; t -statistics are reported in parentheses and are based on standard errors clustered at the state level.

Reduced Models I and II (0.017 and 0.006, respectively). Except for *Life-cycle Stage*, the variables that predict funded status differ from those that predict fraud risk in Table 11.

Because the *Life-cycle Stage* coefficient is opposite in sign to that in the fraud model regression, I infer that investors correctly interpret the heightened risk of investing in a startup.

Table 13 Panel B shows the regression of funding amounts, measured by issue spread, on the fraud-risk predictors from Revised and Reduced Fraud Models I and II. The adjusted R^2 of Revised Fraud Model I was 0.448, and the adjusted R^2 of Revised Fraud Model II was 0.526 (F-statistic of both models was significant, $p < 0.01$). However, the best fraud-risk predictors from Reduced Models I and II in Table 11 are much less related to funding amounts. Adjusted R^2 is -0.001 and -0.028, respectively and both models' F-statistics were insignificant.

These results suggest that the variables that predict fraud risk are not used by investors to evaluate an offering, with the sole exception of *Life Cycle Stage*. However, the individual variables that are most predictive of fraud risk and the reduced models consisting only of these significant variables do not predict the funded status nor the funding amount if funded. Investors appear to ignore potential fraud-risk data but do not seem to be systematically fooled by issuers.

Table 13 continued

Panel B: Determinants of Funding Amounts for Different Fraud Risk Models

Independent Variables ^a	Prediction	Revised Fraud Model I	Reduced Fraud Model I	Revised Fraud Model II	Reduced Fraud Model II
<i>Mandatory Assurance</i>	+	0.178 (1.173)	-0.065 (-0.405)		
<i>Mandatory Review</i>	+			-0.350** (-2.159)	
<i>Meet/Just Beat</i>	+	-0.288** (-2.074)		-0.225 (-1.690)	
<i>Financial Liquidity</i>	-	-0.420** (-2.752)		-0.456*** (-3.193)	
<i>Personal Need</i>	+	0.294* (1.938)		0.309** (2.173)	
<i>Nature of Operations</i>	+	-0.024 (-0.173)		0.049 (0.378)	0.111 (0.691)
<i>Life-cycle Stage</i>	+	0.253* (1.770)	0.024 (0.141)	0.294** (2.182)	-0.011 (-0.069)
<i>Ineffective Monitoring</i>	+	-0.046 (-0.341)	-0.241 (-1.479)	0.003 (0.022)	
<i>Ineffective Internal Controls</i>	+	0.013 (0.097)		0.006 (0.043)	
<i>Voluntary Assurance</i>	+	-0.371** (-2.417)		-0.426*** (-3.075)	
<i>Revised Tier Choice</i>	+	-0.118 (-0.839)		0.041 (0.273)	
<i>CPA-Issuer State Match</i>	+	0.198 1.420	0.178 (1.086)	0.207 (1.590)	0.199 (1.215)
<i>CPA Market Position</i>	+	-0.124 (-0.846)		-0.101 (-0.746)	
<i>SAFE Security</i>	+	-0.296* (-1.959)		-0.308** (-2.208)	
<i>Portal Market Position</i>	+	0.065 (0.477)		-0.110 (-0.746)	
<i>Observations</i>		49	49	49	49
<i>Adjusted R²</i>		0.448	-0.001	0.526	-0.028
<i>F-statistic</i>		0.004	0.426	0.001	0.595

Table 13 continued

^aDependent variable is funding outcomes by issue spread. Observations (N=49) include only those offers that achieved their minimum target offer.

All variables are defined in Table 8. All continuous variables are winsorized at the extreme one percentiles. *, **, and *** indicate $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, for a two-tailed test; t -statistics are reported in parentheses and are based on standard errors clustered at the state level.

CHAPTER 4

CONCLUSION AND EXPECTED CONTRIBUTION

Equity crowdfunding is a newly regulated mechanism for small private companies to raise capital through the issue of stock to online investors under SEC auspices. Equity crowdfunding has the potential to benefit startups, small private businesses and ordinary investors. However, as with all security issuances, if issuers employ deceptive practices, investors could be harmed. My primary purpose is to inform unaccredited (unsophisticated) investors about the high level of risk in investing in equity crowdfunding offers and to highlight factors that could help identify fraud risk.

Without the Regulation Crowdfunding provisions, many small firms would seek capital infusion from venture capitalists, angel investors and hedge funds, thus shutting out small investors from potentially lucrative investments. Such opportunities are especially important when low interest rates make bond investments and savings accounts unattractive. Dharmapala and Khanna (2016) report that when the JOBS Act retroactively classified some Initial Public Offerings as Emerging Growth Companies in order to reduce the disclosure and compliance requirements of smaller firms, the affected firms' market value increased, indicating that the stock market finds net benefit in decreased compliance costs. These results are consistent with Zhang (2007) who showed that stock market viewed the Sarbanes-Oxley Act of 2002 as harmful to listed firms, and with Khan, Li, Rajgopal and Venkatachalam (2018) who found that the FASB's standards from 1973-2009 did not increase public firms' value.

Audit data analytics (ADA) is a toolkit of techniques used by auditors to identify and assess the risk of material misstatements due to fraud (AICPA, 2017. 2002). ADA can detect or predict anomalies or fraud in financial statements because anomalies in financial statement numbers have been shown to be evidence of deception (Carslaw, 1988; Thomas, 1989). These techniques can be applied to publicly available financial data to evaluate equity crowdfunding investments. I apply an analytical tool, Benford's Law, which can identify financial data that is likely to contain misstatements (Amiram et al., 2015), to predict financial statement fraud in equity crowdfunding campaigns. I identify equity crowdfunding offerings as having high fraud risk when the financial data disclosed is noncompliant with Benford's Law.

Fraud Theory is integrated with Disclosure Theory and Signaling Theory to provide insight into the behavior of unsophisticated investors in the equity crowdfunding market. Many academic studies apply Fraud Theory to various known frauds to identify the red flags, or fraud indicators, that existed in previous financial statements, disclosures and SEC filings. Forensic accountants and auditors use commonly known red flags to assess the validity of the fraudster's or the client's financial statements.

I used relevant red flags from academic studies and practitioner recommendations to select variables. I mapped these variables to those that are reported in the equity crowdfunding filings. I use these variables to test if there is a relationship between unsophisticated investors' wisdom (measured by the funding outcomes) and the presence or absence of fraud indicators in the initial equity crowdfunding offering.

In Chapter 2, compliant and noncompliant offerings were studied to evaluate if firm life-cycle stage, or firm earnings and assurance mandates are related to fraud risk. In Chapter 3, these offerings were studied using a broader array of explanatory variables representative of the Fraud Triangle to determine additional predictors of fraud risk. I tested the same variables to determine their relation to funding outcomes. Lastly, I tested the alignment of funding outcomes with my identified fraud-risk predictors.

The analysis in Chapter 2 suggests that fraud risk is significantly related to life-cycle stage in that startups are riskier than non-startup firms. Firm earnings and assurance mandates are not independently related to fraud risk but when combined with life-cycle stage, Meet/Just Beat has a marginally significant relation with fraud risk in one specification.

In Chapter 3, I expanded my Chapter 2 fraud model to include additional fraud factors that represent each dimension of the Fraud Triangle and questioned whether “the crowd” was “wise” enough to discern high-fraud-risk factors from low-fraud-risk factors. I concluded that there are several models that explain fraud risk (Revised Fraud Risk Models I and II and Reduced Fraud Risk Models I and II). However, the Reduced Fraud Models, which consist only of the significant variables from the Revised Models, were not significantly related to funding decisions made by investors.

The results of this dissertation and future studies could help refine public policy regarding assurance and disclosure requirements of equity crowdfunding offerings. Equity crowdfunding may have a higher financial statement fraud risk than public offerings, and it appears that investors do not differentiate (intentionally or not)

investments based on fraud risk indicators. However, more regulation might lead to less participation in equity crowdfunding if additional costs exceed additional benefits.

My dissertation also contributes to practice. Portals and other websites offering investment advice can use Benford's Law to test filings as a service to investors. My dissertation also adds to the extant practitioner literature that demonstrates to forensic accountants and auditors the practical application of Benford's Law testing for financial statement data, rather than using it only for transactional testing.

My dissertation has several limitations that can be addressed in future research. One such limitation is the small sample size. I sampled the first 135 filers and eliminated 35 because of an insufficient number of data points for Benford's Law testing. Interestingly, two of the 35 discarded filings achieved their minimum funding targets, even without any financial information for investors to view. Most of the 100 filers studied reported two years of statements, for a total of 165 firm-years. The sample was not chosen at random, which could affect the generalizability of the results. I studied the first crowdfunding offerings so that their funding would have been completed before I began the study detailed in the Chapter 3, which investigates their funding outcomes. Data analysis was very time consuming as I used manual data entry to test for compliance with or divergence from Benford's Law. Future research could use advanced webscraping software (e.g. Python) and statistical software (e.g. R) to automate or speed up some of these data procurement and analysis steps.

Arguably, the information needs of unsophisticated investors are at least equal to, if not greater than accredited investors. However, the relaxed SEC regulations that govern

equity crowdfunding offerings may entice unscrupulous firms that deceive investors to obtain easy capital. I draw attention to the high likelihood that these offerings contain fraudulent data and that investments should be made with caution. Because equity crowdfunding is so new, it may take time to detect fraud in these offerings, and it remains an open question whether investors will pursue legal remedies against the fraud firms.

Gateway to Future Research

Investors select companies that have a similar value system to theirs, have products that appeal to them, or seem like a good investment. Future research could test for other characteristics that are common to minimum funded offers, overfunded offers and withdrawn offers. It would also be interesting to identify factors that correlate to meeting, exceeding or missing the funding goal, as well as factors associated with the effective use of funds. These studies could contribute to fraud theory, investor behavior theory and signaling theory as they pertain to equity crowdfunding.

Benford's Law could be applied to ongoing annual reporting and trend analysis could be performed to find anomalies. Additionally, subsequent filings can be analyzed to determine if fraud indicators are still present in the companies that were previously identified as high risk.

It remains to be seen if unsophisticated investors value the reduced costs under Regulation Crowdfunding. As time passes, funding patterns can be studied to determine whether Tier 1 offers are funded more often than Tier 2 or 3, which may indicate that reduced costs are important to investors. Information asymmetry should be a major concern for all investors, particularly when they are risk-averse. Intermediaries and the

SEC should increase awareness that equity crowdfunding offerings have a higher propensity for financial statement fraud so that investors can be better informed.

REFERENCES CITED

- 157 CONG. REC. S8458-02 (2011).
- 158 CONG. REC. S1689 (2012).
- 158 CONG. REC. S1781 (2012).
- 17 CFR 230.251 et seq. (2016). Regulation A. Retrieved from https://ecfr.io/Title-17/se17.3.230_1251.
- 17 CFR 227.100 et seq. (2016). Regulation Crowdfunding. Retrieved from <https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=7f0011da1b61cc93f357e5451165f049&mc=true&n=pt17.3.227&r=PART&ty=HTML>.
- 17 CFR 230.500 et seq. (1982). Regulation D. Retrieved from https://www.ecfr.gov/cgi-bin/text-idx?SID=e282de4f5c69b6a69c70dd05d5b92d39&mc=true&node=sg17.3.230_1498.sg11&rgn=div7.
- Abbott, J. I., Vito, M. E., & Cabarle, C. (2017). Implications of the 2012 JOBS Act for investors. *Journal of Taxation of Investments*, 34(2): 3-18.
- Abdullahi, R., & Mansor, N. (2015). Fraud Triangle and Fraud Diamond Theory: Understanding the convergent and divergent for future research. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 5(4): 38-45.
- Alali, F., & Wang, S. (2017). Characteristics of financial restatements and frauds: An analysis of corporate reporting quality from 2000-2014. *The CPA Journal*, 87(11): 32-41.
- Albrecht, C., & Albrecht, C. (2008a). The nature of financial statement fraud. *Internal Auditing*, 23(4): 22-27.
- Albrecht, W. S., Albrecht, C., & Albrecht, C. C. (2008b). Current trends in fraud and its detection. *Information Security Journal: A Global Perspective*, 17(1): 2-12.

- Albrecht, C., Albrecht, C. C., Dolan, S., & Malagueno, R. (2008c). Financial statement fraud: Learn from the mistakes of the U.S. or follow in the footsteps of its errors. *Internal Auditing*, 23(2): 30-37.
- American Institute of Certified Public Accountants (AICPA), (1987). National Commission on Fraudulent Financial Reporting (Treadway Commission), *Report of the National Commission on Fraudulent Financial Reporting*, New York.
- American Institute of Certified Public Accountants (AICPA), (2002). *AU Section 316: Consideration of fraud in a financial statement audit*, New York. Retrieved from <https://www.aicpa.org/Research/Standards/AuditAttest/DownloadableDocuments/AU-00316.pdf>.
- American Institute of Certified Public Accountants (AICPA), (2014). *Statements on standards for accounting and review services: Clarification and recodification*. Retrieved from <https://www.aicpa.org/content/dam/aicpa/research/standards/compilationreview/downloadabledocuments/ar-c-00090.pdf>.
- American Institute of Certified Public Accountants (AICPA), (2015). *CPA services*, New York. Retrieved from <https://www.aicpa.org/Advocacy/State/DownloadableDocuments/Attest-Services-Chart-Color-Nonfillable.pdf>
- American Institute of Certified Public Accountants (AICPA), (2017). *Audit guide: Audit data analytics*, New York.
- Amiram, D., Bozanic, Z., & Rouen, E. (2015). Financial statement errors: Evidence from the distributional properties of financial statement numbers. *Review of Accounting Studies*, 20(4): 1540-1593.
- Association of Certified Fraud Examiners (ACFE), (2016), *Report to the nations on occupational fraud and abuse—2016 Global fraud study*. Retrieved from <http://www.acfe.com/rtn2016/docs/2016-report-to-the-nations.pdf>.
- Association of Certified Fraud Examiners (ACFE), (2018), *Report to the nations—2018 global study on occupational and abuse*. Retrieved from <https://www.acfe.com/report-to-the-nations/2018/>

- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6): 1173-1182.
- Barry, C. B., & Brown, S. J. (1986). Limited information as a source of risk. *The Journal of Portfolio Management*, 12(2): 66–72.
- Barton, J. & Simko, P. J. (2002) The balance sheet as an earnings management constraint. *The Accounting Review*, 77(Supplement), 1-27.
- Basu, S., Krishnan, J., Lee, J. E. & Zhang, Y. (2018). Economic determinants and consequences of the proactive disclosure of internal control weaknesses and remediation progress in IPO. *Auditing: A Journal of Practice & Theory*, 37(4): 1-24.
- Bauguess, S., Gullapalli, R., & Ivanov, V. (2015). Capital raising in the U.S.: An analysis of the market for unregistered securities offerings, 2009-2014. White Paper: [Division of Economic and Risk Analysis (DERA), Securities and Exchange Commission (SEC)].
- Bell, T. B., & Carcello, J. V. (2000). A decision aid for assessing the likelihood of fraudulent financial reporting. *Auditing: A Journal of Practice & Theory*, 19(1): 169-184.
- Beneish, M. (1999). Incentives and penalties related to earnings overstatements that violate GAAP. *The Accounting Review*, 74(4): 425-457.
- Beneish, M. D., Billings, M. B., & Hodder, L. D. (2008). Internal control weaknesses and information uncertainty. *The Accounting Review*, 83(3): 665-703.
- Benford, F. A. (1938). The law of anomalous numbers. *Proceedings of the American Philosophical Society*, 78(4): 551-572.
- Berle, A. A. & Means, G. C. (1932). *The modern corporation and private property*. New York, NY: Macmillan.
- Beyer, A., Cohen, D., Lys, T. Z., & Walther, B. R. (2010). The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics*, 50(2): 296-343.

- Boulding, W., & Kirmani, A. (1993). A consumer-side experimental examination of signaling theory: do consumers perceive warranties as signals of quality? *Journal of Consumer Research*, 20(1): 111-123.
- Brazel, J., Jones, K., Thayer, J., & Warne, R. (2015). Understanding investor perceptions of financial statement fraud and their use of red flags: evidence from the field. *Review of Accounting Studies*, 20(4): 1373-1406.
- Brennan, N. M., & McGrath, M. (2007). Financial statement fraud: Some lessons from US and European case studies. *Australian Accounting Review*, 17(2): 49-61.
- Burke, J., & Kincanon, E. (1991). Benford's Law and physical constants: The distribution of initial digits. *American Journal of Physics*, 59(10): 952.
- Burns, N., & Kedia, S. (2006). The impact of performance-based compensation on misreporting. *Journal of Financial Economics*, 79(1): 35-67.
- Burgstahler, D., & Dichev, I. (1997). Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics*, 24(1): 99-126.
- Byzalov, D. & Basu, S. (2019). Modeling the determinants of meet-or-just-beat behavior in distribution discontinuity tests. Working paper. SSRN: <https://ssrn.com/abstract=3252163>.
- Cabarle, C. (2017). An in-depth inquiry and qualitative study of the accounting executive's role in small, private business. Working Paper, Stockton University.
- Carslaw, C. (1988). Anomalies in income numbers: Evidence of goal oriented behavior. *The Accounting Review*, 63(2): 321-327.
- Coleman, D. (2014). Benford's Law and financial statements. Retrieved from www.auditanalytics.com/blog/benfords-law-and-financial-statements/
- Coller, M., & Yohn, T. L. (1997). Management forecasts and information asymmetry: An examination of bid-ask spreads. *Journal of Accounting Research*, 35(2): 181-191.
- Committee of Sponsoring Organizations of the Treadway Commission (COSO) (1992). *Internal control—Integrated framework*. COSO, New York.

- Committee of Sponsoring Organizations of the Treadway Commission (COSO) (1999). *Fraudulent financial reporting: 1987-1997: An analysis of US public companies*. COSO, New York.
- Committee of Sponsoring Organizations of the National Commission of Fraudulent Financial Reporting (the Treadway Commission) (2010), *News release*. Retrieved from <https://www.coso.org/documents/COSOReleaseonFraudulentReporting2010PDF001.pdf>.
- Committee of Sponsoring Organizations of the National Commission of Fraudulent Financial Reporting (the Treadway Commission) (2013), *Internal control – integrated framework, executive summary*. Retrieved from <https://www.coso.org/Documents/990025P-Executive-Summary-final-may20.pdf>.
- Connelly, B. L., Certo, S. T., Ireland, R. D., Reutzel, C. R. (2010). Signaling theory: A review and assessment. *Journal of Management*, 37(1): 39-67.
- Cressey, D. R. (1953). *Other People's Money: A Study on the social psychology of embezzlement*. Glencoe, IL: Free Press.
- Das, S. & Zhang, H. (2003). Rounding-up in reported EPS, behavioral thresholds, and earnings management. *Journal of Accounting and Economics*, 35(1): 31-50.
- Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1996). Causes and consequences of earnings manipulation: An analysis of firms subject to enforcement actions by the SEC. *Contemporary Accounting Research*, 13(1): 1-36.
- Degeorge, F., Patel, J., & Zeckhauser, R. J. (1999). Earnings management to exceed thresholds. *The Journal of Business*, 72(1): 1-33.
- Desai, H., Hogan, C. E., & Wilkins, M. S. (2006). The reputational penalty for aggressive accounting: Earnings restatements and management turnover. *The Accounting Review*, 81(1): 83–112.
- Devaney, T. (2011, April 27). Startups seek new form of microfinance. *Washington Times*, A.9.

- Dharmapala, D., & Khanna, V. (2016). The costs and benefits of mandatory securities regulation: Evidence from market reactions to the JOBS Act of 2012. *Journal of Law, Finance & Accounting*, 1(1), 139-186. Retrieved from <https://www.nowpublishers.com/article/Details/LFA-0004>
- Diamond, D., & Verrecchia, R. E. (1991). Disclosure, liquidity, and the cost of capital. *The Journal of Finance*, 46(4): 1325–1359.
- Dorminey, J. W., Fleming, A. S., Kranacher, M. J., & Riley Jr, R. A. (2010). Beyond the fraud triangle. *The CPA Journal*, 80(7), 17.
- Drake, P. D., & Nigrini, M. J. (2000). Computer assisted analytical procedures using Benford's Law. *Journal of Accounting Education*, 18(2): 127-146.
- Dunn, P. (2004). The impact of insider power of fraudulent financial reporting. *Journal of Management*, 30(3): 397-412.
- Durtschi, C., Hillison, W., & Pacini, C. (2004). The effective use of Benford's Law to assist in detecting fraud in accounting data. *Journal of Forensic Accounting*, 5(1): 17-34.
- Dutta, S. & Nezhlobin, A. (2017). Information disclosure, firm growth, and the cost of capital. *Journal of Financial Economics*, 123(2): 415-431.
- Dyck, A., Morse, A., & Zingales, L. (2013). How pervasive is corporate fraud? Working paper. SSRN: <https://ssrn.com/abstract=2222608>.
- Dye, R. A. (1985). Disclosure of nonproprietary information. *Journal of Accounting Research*, 23(1): 123-145.
- Dye, R. A. (1986). Proprietary and nonproprietary disclosures, *The Journal of Business*, 59(2): 331-366.
- Dye, R. A. (2017). Some recent advances in the theory of financial reporting and disclosures. *Accounting Horizons*, 31(3): 39-54.
- Efendi, J., Srivastava, A., & Swanson, E. (2007). Why do corporate managers misstate financial statements? The role of option compensation and other factors. *Journal of Financial Economics*, 85(3): 667-708.

- Feldstein, A., & Turner, P. (1986). Overflow, underflow, and severe loss of significance in floating-point addition and subtraction. *IMA Journal of Numerical Analysis*, 6(2): 241-251.
- Financial Industry Regulatory Authority. *Be safe – 5 things you need to know about SAFE securities and crowdfunding*. Retrieved from <http://www.finra.org/investors/highlights/5-things-you-need-know-about-safe-securities-and-crowdfunding>
- Fishman, M. J., & Hagerty, K. M. (2003). Mandatory versus voluntary disclosure in markets with informed and uninformed customers. *Journal of Law, Economics, and Organization*, 19(1): 45-63.
- Francis, J., & Krishnan, J. (1999). Accounting accruals and auditor reporting conservatism. *Contemporary Accounting Research*, 16(2): 135-165.
- Grossman, S. J., & Hart, O. D. (1980). Disclosure laws and takeover bids. *The Journal of Finance*, 35(2): 323-334.
- Grossman, S. (1981). The informational role of warranties and private disclosure about product quality. *The Journal of Law and Economics*, 24(3): 461-483.
- Hanley, K. W., & Hoberg, G. (2012). Litigation risk, strategic disclosure, and the underpricing of initial public offerings. *Journal of Financial Economics*, 103(2): 235-254.
- Harris, J., & Bromiley, P. (2007). Incentives to cheat: The influence of executive compensation and firm performance on financial misrepresentation. *Organization Science*, 18(3): 350-367.
- Hayn, C. (1995). The information content of losses. *Journal of Accounting and Economics*, 20(2): 125-153.
- Healy, P. M., & Palepu, K. G. (1993). The effect of firms' financial disclosure strategies on stock prices. *Accounting Horizons*, 7: 1-11.
- Healy, P. M., & Palepu, K. G. (1995). The challenges of investor communications: The case of CUC International, Inc. *Journal of Financial Economics*, 38(2): 111-141.

- Healy, P. M., & Palepu, K. G. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics*, 31(1): 405-440.
- Heminway, J. M. (2016). Securities crowdfunding and investor protection, CESifo DICE Report 2/2016; University of Tennessee Legal Studies Research Paper No. 292. Available at SSRN: <https://ssrn.com/abstract=2810757>.
- Hermanson, D. R., Smith, J. L., & Stephens, N. M. (2012). How effective are organizations' internal controls? Insights into specific internal control elements. *Current Issues in Auditing*, 6(1): A31-A50.
- Hirst, D., Koonce, L., & Venkataraman, S. (2008). Management earnings forecasts: A review and framework. *Accounting Horizons*, 22(3): 315-338.
- Hochberg, Y., Sapienza, P., & Vissing-Jørgensen, A. (2009). A lobbying approach to evaluating the Sarbanes-Oxley Act of 2002, *Journal of Accounting Research* 47(2): 519-583.
- Hogan, C. E., Rezaee, Z., Riley, R. A., Jr., & Velury, U. K. (2008). Financial statement fraud: Insights from the academic literature. *Auditing: A Journal of Practice & Theory*, 27(2): 231-252.
- Huang, S., Lin, Y., Chiu, C., & Yen, A. (2017). Fraud detection using fraud triangle risk factors. *Information Systems Frontiers*, 19(6): 1343-1356.
- Hurt, C. (2015). Pricing disintermediation: Crowdfunding and online auction IPOs. *University of Illinois Law Review*, 2015(1), 217-261.
- Husted, B. (2007). Agency, information, and the structure of moral problems in business, *Organization Studies*, 28(2): 177-195.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4): 305-360.
- Jian, M., & Wong, T. J. (2010). Propping through related party transactions. *Review of Accounting Studies*, 15(1): 70-105.
- Johnstone, D. (2016). The effect of information on uncertainty and the cost of capital. *Contemporary Accounting Research*, 33(2): 752-774.

- Jung, W. O., & Kwon, Y. K. (1988). Disclosure when the market is unsure of information endowment of managers. *Journal of Accounting Research*, 26(1): 146-153.
- Kalay, A. (2015). Investor sophistication and disclosure clienteles. *Review of Accounting Studies*, 20(2), 976-1011.
- Kassem, R., & Higson, A. (2012). The new Fraud Triangle model. Retrieved from <https://dspace.lboro.ac.uk/dspace-jspui/handle/2134/10100>.
- Kelley, C. (1988). An investigation of consumer product warranties as market signals of product reliability. *Journal of the Academy of Marketing Science*, 16(2): 72-78.
- Kenyon, W., & Tilton, P. D. (2006). Potential red flags and fraud detection techniques. *A Guide to Forensic Accounting Investigation*, 231-269, Wiley.
- Khan, U., Li, B., Rajgopal, S., & Venkatachalam, M. (2018). Do the FASB's standards add shareholder value? *The Accounting Review*, 93(2): 209-247.
- Kirmani, A., & Rao, A. R. (2000). No pain, no gain: A critical review of the literature on signaling observable product quality. *Journal of Marketing*, 64(2): 66-79.
- Kline, W., Kotabe, M., Hamilton, R., Balsam, S. (2017). Executive compensation: An examination of the influence of TMT compensation on risk-adjusted performance, *Journal of Strategy and Management*, 10(2): 187-205.
- Knyazeva, A. (2016). Regulation A+: What do we know so far? White Paper: [Division of Economic and Risk Analysis (DERA)].
- Krishnan, J. & Krishnan, J. (1997). Litigation risk and auditor resignations. *The Accounting Review*, 72(4): 539-560.
- Kumar, P., & Langberg, N. (2009). Corporate fraud and investment distortions in efficient capital markets. *The RAND Journal of Economics*, 40(1): 144-172.
- Leuz, C., & Verrecchia, R. E. (2000). The economic consequences of increased disclosure. *Journal of Accounting Research*, 38(Supplement): 91-124.
- Library of Congress and the SEC (2010, August). Behavioral patterns of U.S. investors. Retrieved from <https://www.sec.gov/investor/tools/behaviorialpatterns.htm>.

- Lister, L. M. (2007). A practical approach to fraud risk: Comprehensive risk assessments can enable auditors to focus antifraud efforts on areas where their organization is most vulnerable. *Internal Auditor*, 64(6): 61-65.
- Loebbecke, J. K., Eining, M. M., & Willingham, J. J. (1989). Auditors' experience with material irregularities—frequency, nature, and detectability. *Auditing: A Journal of Practice & Theory*, 9(1): 1-28.
- Lou, Y., & Wang, M. (2009). Fraud risk factor of the fraud triangle: Assessing the likelihood of fraudulent financial reporting. *Journal of Business & Economics Research*, 7(2): 61-78.
- Mackevicius, J., & Giriunas, L. (2013). Transformational research of the fraud triangle. *Ekonomika*, 92(4): 150-163.
- Massolution (2015). *Crowdfunding industry report: Market trends, composition and crowdfunding platforms*, Retrieved from http://reports.crowdsourcing.org/index.php?route=product/product&product_id=5
- Matsumoto, D. A. (2002). Management's incentives to avoid negative earnings surprises. *The Accounting Review*, 77(3): 483-514.
- Merton, R. C. (1987). A simple model of capital market equilibrium with incomplete information. *The Journal of Finance*, 42(3): 483-510.
- Milgrom, P. R. (1981). Good news and bad news: Representation theorems and applications. *The Bell Journal of Economics*, 12(2): 380-391.
- Milgrom, P. R., & Roberts, D. J. (1986). Relying on the information of interested parties. *The RAND Journal of Economics*, 17(1): 18-32.
- Miller, K. D., & Leiblein, M. J. (1996). Corporate risk-return relations: Returns variability versus downside risk. *Academy of Management Journal*, 39(1): 91-122.
- Mitnick, B. M. (1975). The theory of agency: The policing "paradox" and regulatory behavior. *Public Choice*, 24(1): 27-42.
- Moldof, A. (2014). The most important internal controls to include in a small company environment. *Internal Auditing*, 29(1): 39-42.

- Moyes, G., Lin, P., & Landry, R. (2005). Raise the red flag. *The Internal Auditor*, 62(5): 47-51.
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2): 187-222.
- Nagar, V., Nanda, D., & Wysocki, P. D. (2003). Discretionary disclosure and stock-based incentives. *Journal of Accounting and Economics*, 34(1-3): 283-309.
- Ndofor, H. A., Wesley, C., & Priem, R. L. (2015). Providing CEOs with opportunities to cheat: The effects of complexity-based information asymmetries on financial reporting fraud. *Journal of Management*, 41(6): 1774-1797.
- Newcomb, S. (1881). Note on the frequency of use of the different digits in natural numbers. *American Journal of Mathematics*, 4(1): 39-40.
- Nigrini, M. J. (1996). Taxpayer compliance application of Benford's Law. *Journal of American Taxation Association*, 18(1): 72-92.
- Nigrini, M. J., & Miller, S. J. (2007). Benford's Law applied to hydrology data—results and relevance to other geophysical data. *Mathematical Geology*, 39(5): 469-490.
- Nigrini, M. J. (2012). *Benford's Law: Applications for forensic accounting, auditing and fraud detection*. Hoboken, NJ: Wiley.
- Nigrini, M. J. (2015) Chapter 8: Detecting fraud and errors using Benford's Law. In S. J. Miller (Ed.), *Benford's law: Theory and applications*. Princeton, NJ: Princeton University Press.
- Nigrini, M. J. (2017a). Audit sampling using Benford's Law: A review of the literature with some new perspectives. *Journal of Emerging Technologies in Accounting*, 14(2): 29-46.
- Nigrini, M. J. (2017b). *Identifying fraud numbers using audit data analytics*, Proceedings Fall 2017 Institute of Fraud Prevention, Alexandria, Virginia.
- O'Connor, J. P., Priem, R. L., Coombs, J. E., & Gilley, K. M. (2006). Do CEO stock options prevent or promote fraudulent financial reporting? *Academy of Management Journal*, 49(3): 483-500.

- Omar, N., & Mohamad Din, H. (2010). Fraud diamond risk indicator: An assessment of its importance and usage. *2010 International Conference on Science and Social Research (CSSR)*, 607-612.
- Public Company Accounting Oversight Board (PCAOB) (2010). *PCAOB Release No. 2010-004: Auditing standards related to the auditor's assessment of and response to risk and related amendments to PCAOB standards*. Retrieved from https://pcaobus.org/Rulemaking/Docket%20026/Release_2010-004_Risk_Assessment.pdf
- Pub. L. No. 107–204, 116 Stat. 745 (2002). (Sarbanes-Oxley Act of 2002)
- Pub. L. No. 112-106, 126 Stat. 306 (2012). (Jumpstart Our Business Startups Act, enacted April 12, 2012).
- Rasmusen, E. (1994). *Games and information*, 2nd ed. Oxford: Blackwell.
- Romano, R. (2005a). Quack corporate governance: Sarbanes-Oxley may have satisfied a political need, but it will do little to protect investors or strengthen the market. *Regulation*, 28(4): 36-44.
- Romano, R. (2005b). The Sarbanes-Oxley Act and the making of quack corporate governance. *The Yale Law Journal*, 114(7): 1521-1611.
- Rosner, R.L. (2003). Earnings manipulation in failing firms, *Contemporary Accounting Research*, 20(2): 361-408.
- Ross, S. A. (1973). The economic theory of agency: The principal's problem. *The American Economic Review*, 63(2): 134-39.
- Sanders, W. G. (2001). Behavioral responses of CEOs to stock ownership and stock option pay. *Academy of Management Journal*, 44(3): 477-493.
- Saville, A. D. (2006). Using Benford's Law to detect data error and fraud: an examination of companies listed on the Johannesburg Stock Exchange. *South African Journal of Economic and Management Sciences*, 9(3): 341-354.
- Schatte, P. (1988). On strong versions of the central limit theorem. *Mathematische Nachrichten*, 137(1): 249-256.

- Shette, R., & Kuntluru, S. (2014). Rounding-up in reported income numbers. *Review of Accounting and Finance*, 13(2): 156-170.
- Skousen, C., Smith, K., & Wright, C. (2009). Detecting and predicting financial statement fraud: The effectiveness of the fraud triangle and SAS No. 99. *Advances in Financial Economics*, 13: 53-81.
- Stice, J. (1991). Using financial and market information to identify pre-engagement factors associated with lawsuits against auditors. *The Accounting Review*, 66(3): 516-533.
- St. Pierre, K., and J. Anderson. 1984. An analysis of the factors associated with lawsuits against public accountants. *The Accounting Review*, 59(2): 242-263.
- Thomas, J. K. (1989). Unusual patterns in reported earnings. *The Accounting Review*, 64(4): 773-787.
- U. S. Securities and Exchange Commission (2015, December 21). *Jumpstart Our Business Startups Act frequently asked questions*. Retrieved from <https://www.sec.gov/divisions/corpfin/guidance/cfjjobsactfaq-title-i-general.htm>.
- U. S. Securities and Exchange Commission (2013). *Eliminating the prohibition against solicitation and general advertising in Rule 506 and Rule 144A offerings: Final regulations*. Retrieved from <https://www.sec.gov/rules/final/2013/33-9415.pdf>.
- U. S. Securities and Exchange Commission (2015). *Regulation A: Final regulations*. Retrieved from <https://www.sec.gov/rules/final/2015/33-9741.pdf>
- U. S. Securities and Exchange Commission (2016). *Regulation Crowdfunding: Final regulations*. Retrieved from <https://www.sec.gov/rules/final/2015/33-9974.pdf>
- U. S. Securities and Exchange Commission (2016). *Exemptions to facilitate intrastate and regional securities offerings: Final regulations*. Retrieved from <https://www.sec.gov/rules/final/2016/33-10238.pdf>
- U. S. Securities and Exchange Commission (2017). *Rule 504 of Regulation D: A small entity compliance guide for issuers*. Retrieved from <https://www.sec.gov/divisions/corpfin/guidance/rule504-issuer-small-entity-compliance.html>

- U. S. Securities and Exchange Commission (2017). *Investor bulletin: Be cautious of SAFEs in crowdfunding*. Retrieved from https://www.sec.gov/oiea/investor-alerts-and-bulletins/ib_safes
- Varian, H. R. (1972). Benford's Law. *American Statistician*, 26(3): 65.
- Vermeer, T. (2003). The impact of SAS No. 82 on an auditor's tolerance of earnings management. *Journal of Forensic Accounting*, 5: 21-34.
- Verrecchia, R. E. (2001). Essays on disclosure. *Journal of Accounting and Economics*, 32(1/3): 97-180.
- Vismara, S. (2018). Information cascades among investors in equity crowdfunding. *Entrepreneurship Theory and Practice*, 42(3): 467-497.
- Waters, R., Startups seek the 'wisdom of crowds,' *Financial Times*, Apr. 3, 2012, Retrieved from <https://www.ft.com/content/c1f1695c-7da8-11e1-9adc-00144feab49a>
- Watts, R. L., & Zimmerman, J. L. (1978). Towards a positive theory of the determination of accounting standards. *The Accounting Review*, 53(1): 112-134.
- Watts, R. L., & Zimmerman, J. L. (1990). Positive accounting theory: A ten year perspective. *The Accounting Review*, 65(1): 131-156.
- Wilks, T. J., & Zimbelman, M. F. (2004). Decomposition of fraud-risk assessments and auditors' sensitivity to fraud cues. *Contemporary Accounting Research*, 21(3): 719-745.
- Zhang, X., Bartol, K. M., Smith, K. G., Pfarrer, M. D., & Khanin, D. M. (2008). CEOs on the edge: Earnings manipulation and stock-based incentive misalignment. *Academy of Management Journal*, 51(2): 241-258.
- Zhang, X. (2007). Economic consequences of the Sarbanes-Oxley Act of 2002. *Journal of Accounting and Economics*, 44(1-2): 74-115.
- Zhang, Y., & Wiersema, M. F. (2009). Stock market reaction to CEO certification: The signaling role of CEO background. *Strategic Management Journal*, 30(7): 693-710.

APPENDIX A

COMPARISON OF REGISTRATION, DISCLOSURE AND ASSURANCE REQUIREMENTS OF EXEMPT AND
NONEXEMPT REGISTRATIONS OF INITIAL SECURITIES ISSUE.

Offering ^a	Applicable SEC Registration Exemption ^b	Offering Limitation	Solicitation and Advertising Restrictions ^c	Disclosure Requirements for Initial Filing ^d	Level of Assurance Required for Initial Offering
Domestic Company Initial Public Offering (IPO)	Nonexempt	No offer limit	Investors are solicited by underwriter and by road show	Status as accelerated, nonaccelerated or small reporting company dictates financial statement disclosures and SOX compliance requirements	Audit of financial statements
Private placement	Regulation D Rule 504, amended 1/20/17 ^e	Up to \$5 million in a 12-month period	No general solicitation allowed (unless state exempted and sold exclusively to accredited investors)	None	None

APPENDIX A continued

Offering ^a	Applicable SEC Registration Exemption ^b	Offering Limitation	Solicitation and Advertising Restrictions ^c	Disclosure Requirements for Initial Filing ^d	Level of Assurance Required for Initial Offering
Private Placement	Regulation D Rule 506(b) ^e	Unlimited amount can be raised	No general solicitation permitted	No disclosures required to accredited investors; For unaccredited investors: F/S disclosures required for registered offerings and must provide opportunity to ask questions and receive answers	None
Private Placement	Regulation D Rule 506(c) ^e	Unlimited amount can be raised	Yes, if all investors are accredited and status is verified	None	None

APPENDIX A continued

Offering ^a	Applicable SEC Registration Exemption ^b	Offering Limitation	Solicitation and Advertising Restrictions ^c	Disclosure Requirements for Initial Filing ^d	Level of Assurance Required for Initial Offering
Regulation A+ Tier 2	Regulation A ^f , amended (effective: June 19, 2015)	“mini-IPO”; up to \$50 million in 12-month period; can sell a limited portion of existing shares owned by existing stockholders (secondary sales)	“testing the waters” allowed (notice of potential offering to gauge interest)	Two years of financial statements ^d	Audit of financial statements

APPENDIX A continued

Offering ^a	Applicable SEC Registration Exemption ^b	Offering Limitation	Solicitation and Advertising Restrictions ^c	Disclosure Requirements for Initial Filing ^d	Level of Assurance Required for Initial Offering
Regulation A+ Tier 1	Regulation A ^f , amended (effective: June 19, 2015)	up to \$20 million in 12-month period; can sell a limited portion of existing shares owned by existing stockholders	“testing the waters” allowed (notice of potential offering to gauge interest)	Two years of financial statements ^d	None, unless otherwise available
Regulation Crowdfunding offerings Tier 3 ^g	Title III of JOBS Act; Sec 4(a)(6) amendment to 1933 Act (effective 5/16/16)	Offering between \$500,001 to \$1 million	Brief notice is allowed. Can include number and type of securities offered, price, closing date, issuer’s contact information, and link to intermediary platform	Two years	For first time regulation crowdfunding issuer: Review of financial statements, but audit if available. If not initial offer, must include have audited financial statements.

APPENDIX A continued

Offering ^a	Applicable SEC Registration Exemption ^b	Offering Limitation	Solicitation and Advertising Restrictions ^c	Disclosure Requirements for Initial Filing ^d	Level of Assurance Required for Initial Offering
Regulation Crowdfunding offerings Tier 2 ^g	Same as Regulation Crowdfunding offering above	Offering between \$100,001 to \$500,000	Same as Regulation Crowdfunding offering above	Two years	Review of financial statements, but audit if available
Regulation Crowdfunding offerings Tier 1 ^g	Same as Regulation Crowdfunding offering above	\$100,000 or less	Same as Regulation Crowdfunding offering above	Two years of financial statements and data from tax returns (total income, taxable income and total tax)	Management certification of financial statements and included tax data, but review or audit only if available

APPENDIX A continued

^a All offerings described are subject to the antitrust provisions of federal securities laws.

^b The Securities Act of 1933 requires that issuers register the sale of their securities with SEC unless it meets an exemption. Registration entails filing with the SEC a prospectus which is the solicitation of the offer. Registration also includes a description of the company, of the securities offered, as well as information about management and the audited financial statements.

^c Per the SEC, “‘General solicitation’ includes advertisements published in newspapers and magazines, public websites, communications broadcasted over television and radio, and seminars where attendees have been invited by general solicitation or general advertising. In addition, the use of an unrestricted, and therefore publicly available, website constitutes general solicitation. The solicitation must be an “offer” of securities, but solicitations that condition the market for an offering of securities may be considered to be offers.” <https://www.sec.gov/info/smallbus/secg/general-solicitation-small-entity-compliance-guide.htm>

^d The shorter of the number of years shown or time since inception.

^e Regulation D information compiled from https://www.ecfr.gov/cgi-bin/text-idx?SID=e282de4f5c69b6a69c70dd05d5b92d39&mc=true&node=sg17.3.230_1498.sg11&rgn=div7 and <https://www.sec.gov/files/unregistered-offering10-2015.pdf> (Bauguess et al.,2015)

Note: Regulation D Rule 505 was repealed May 22, 2017.

^f Regulation A+ information compiled from <https://www.sec.gov/rules/final/2015/33-9741.pdf> and https://www.sec.gov/files/Knyazeva_RegulationA%20.pdf (Knyazeva, (2016).

^g Regulation Crowdfunding information compiled from <https://www.sec.gov/rules/final/2015/33-9974.pdf>

APPENDIX B

COMPARISON OF INVESTOR LIMITATIONS AND RESTRICTIONS IN
NONEXEMPT AND EXEMPT OFFERINGS

Offering	Investor Restrictions, Qualifications and Investment Limitation Amounts	Resale Restrictions
Domestic Company Initial Public Offering (IPO) ^a	No restrictions but underwriters typically sell IPO shares to institutional investors and wealthy individuals.	No resale restrictions; may sell on secondary market
Private placement Reg. D Rule 504 ^b	Accredited and unaccredited allowed	Restricted resales
Private Placement Reg. D Rule 506(b) ^b	Unlimited number of accredited investors are permitted. Allowed a maximum of 35 unaccredited investors and unaccredited investors must also be “financially sophisticated” (either investor or purchase representative has sufficient knowledge of business and investment matters)	Restricted resales
Private Placement Reg. D Rule 506(c) ^b	No unaccredited investors allowed	Restricted resales
Regulation A+ Tier 2 ^b	Accredited investors – no investment limit; unaccredited investors are permitted but are prohibited from investing more than 10% the greater of their annual income or net worth	no resale restrictions imposed by regulation
Regulation A+ Tier 1 ^b	Accredited and unaccredited investors are permitted; No investment limit	no resale restrictions imposed by regulation
Regulation Crowdfunding Tier 3 ^b	Accredited and unaccredited are permitted; unaccredited investors are prescribed investment limitations (either 2% or 10% of net income and/or net worth)	General resale is restricted for one year; can resell to issuer, accredited investor, family member or due to death or divorce.
Regulation Crowdfunding Tier 2 ^b	Same as Regulation Crowdfunding offering above.	Same as Regulation Crowdfunding offering above.
Regulation Crowdfunding Tier 1 ^b	Same as Regulation Crowdfunding offering above.	Same as Regulation Crowdfunding offering above.

APPENDIX B continued

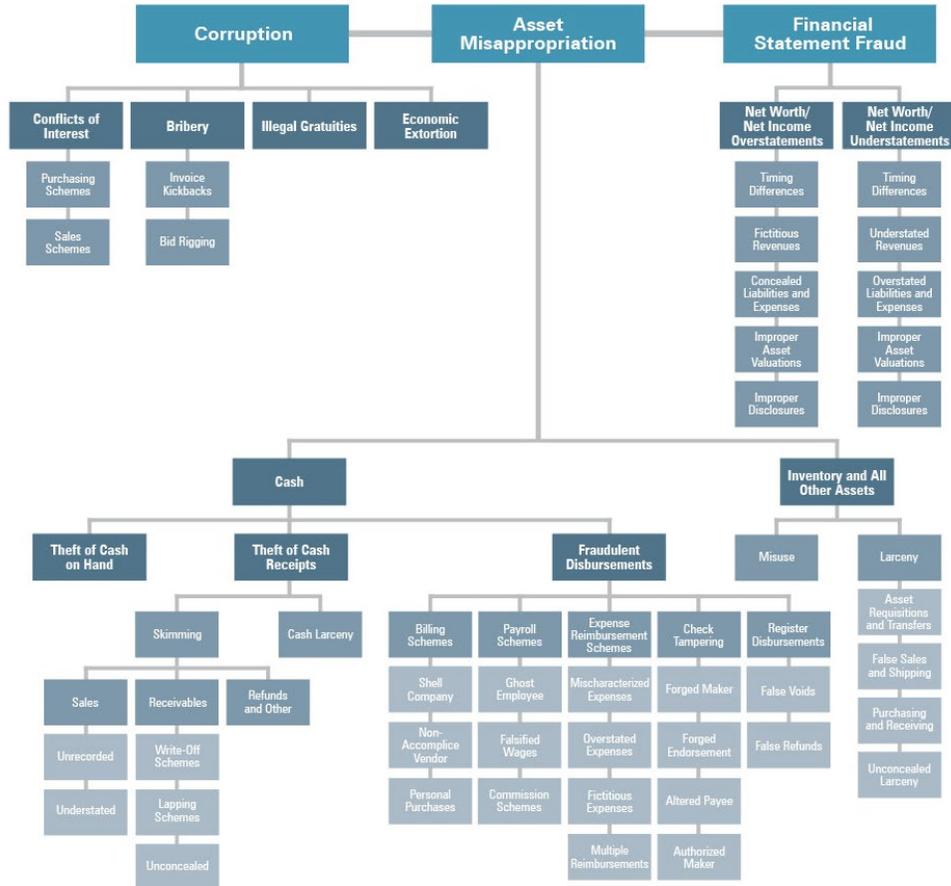
^a Nonexempt from SEC registration requirements

^b Exempt from SEC registration requirements

APPENDIX C

ACFE FRAUD TREE (ACFE, 2016, 2018)

Figure 3: Occupational Fraud and Abuse Classification System (Fraud Tree)



© 2016 Association of Certified Fraud Examiners, Inc. All rights reserved.

APPENDIX D

BENFORD'S LAW

Benford's Law has been empirically tested in many disciplines, such as physics (Burke & Kincanon, 1991), computer science (Feldstein & Turner, 1986; Schatte, 1988) and economics (Varian, 1972). It has also been widely used as an audit tool to detect anomalies in transactional data, such as accounts receivable billings or accounts payable invoices. Earnings of both New Zealand and U.S. companies (Carslaw, 1988; Thomas, 1989) have also been analyzed for conformity to Benford's Law. Thomas (1989) found that earnings manipulation could be detected with Benford's Law, however when comparing aggregate data (not firm-year earnings data), loss firms deviated in the opposite direction than profitable firms due to firms rounding up positive numbers and not rounding up negative numbers.

Benford's Law has been shown to predict fraud in U.S. publicly traded companies and is most telling when the data set has many falsified numbers (Nigrini, 2017b). It is not effective in analyzing data with symmetric or Normal distributions. In 1996, Mark Nigrini studied the efficacy of Benford's Law as a tool to predict manipulation of tax return data (Nigrini, 1996). In 2015 in *Benford's Law: Theory and Applications*, edited by Steven Miller, Nigrini applies Benford's Law to data from the 2000 U.S. Census as a means to evaluate the validity of the tool. Nigrini assumes that the Census data is highly accurate data and when he analyzed the Census data, the results showed the data was conforming to Benford's Law. Accordingly, Miller and Nigrini (2007) studied another set of presumably highly accurate data, streamflow data from the U.S. Geological Survey

(USGS), an agency of the federal government. They found that this data also conformed to Benford's Law. Drake and Nigrini (2000) tested the first two digits of a company's invoices for conformity to Benford's Law and identified anomalies in certain transactions that were then further investigated through normal auditing procedures. This study showed that some of the anomalies were not indicative of fraud, however, the researchers concluded that the divergence from Benford's Law was an effective first line of defense as a means to highlight invoices that were potentially fraudulent.