Voluntary Adoption of Clawback Provisions and Firms' Risk-taking Behavior

Course	: Master thesis in Accounting, Auditing, and Control
Student name	: Davina Amalia
Student number	: 481596
Supervisor	: Dr. Michael H. R. Erkens
Co-reader	: Dr. Y. Gan
Date	: 25 September 2020

Acknowledgement

This thesis is part of the requirements for the completion of my master study in Erasmus School of Economics, Erasmus University Rotterdam. To begin with, I would like to express my sincere gratitude and highest appreciation to everybody who has contributed in helping me throughout this journey. Foremost, I thank God for the continuous blessings. Furthermore, I would like to express my deepest gratitude to my family for their endless prayers and encouragement. I would like to thank my master thesis supervisor, Dr. Michael H. R. Erkens, for his constant guidance and help. Also, I immensely grateful for all of my friends in Rotterdam, Achmad, Alex, Athaya, Bernie, Gloria, Nat, Tika, Ton, and Zhafran for their support and companion this past one year. Last but not least, my gratitude also goes to my supportive friends in Jakarta who always believe in me.

Jakarta, September 2020
Davina Amalia

Abstract

This thesis examines the effect of voluntary adoption of clawback provisions on firms' risk-taking behavior. Employing research and development, and capital expenditure as proxies for risk-taking, the findings show that firms who adopt clawback provisions cut down their expenditure in research and development. On the other hand, firm-initiated clawback provisions do not affect firms in terms of capital expenditure level. Furthermore, incorporating industry competitiveness as a moderating variable, the findings show insignificant results of industry competition on clawback adopters' research and development expenditure level. Whereas, tighter competition within an industry reduces the level of capital expenditure of clawback adopters. Overall, the findings provide new insights regarding the effect of competition within an industry on firms' decision regarding their risk. Therefore, the findings should be of interest for regulators, standard setters, and other related market participants as the findings are relevant for current debate concerning mandatory implementation of clawback provisions by the Securities and Exchange Commision (SEC).

Keywords: clawback provisions, risk-taking, industry competitiveness, research and development, capital expenditure

Table of Contents

1. Introduction 5
2. Theoretical Background 8
    2.1 Theory 8
        2.1.1 Agency Theory 8
    2.2 Literature Review 9
        2.2.1 Definitions of Clawback Provisions 9
        2.2.2 Determinants and Consequences of Clawback Provisions 10
        2.2.3 Sarbanes-Oxley Act and Risk-taking Behavior 12
            2.2.3.1 Risk-taking Behavior: R&D and Capital Expenditure 12
        2.2.4 Industry Competitiveness 15
3. Hypotheses Development 16
    3.1 Voluntary Clawback Provisions and Managements' Risk-taking Behavior 16
    3.2 Industry Competitiveness 17
4. Sample and Research Design 19
    4.1 Data and sample selection 19
    4.2 Research Design 20
        4.2.1 Difference-in-differences 20
        4.2.2 Risk-taking Measures 22
        4.2.3 Industry Competitiveness 23
5. Empirical Results 25
    5.1 Descriptive Statistics 25
    5.2 Two-sample T-test 27
    5.3 Clawback Provisions on Firms' Risk-taking Behavior 29
    5.4 Clawback Provisions, Firms' Risk-taking Behavior,
        and Industry Competitiveness 31
    5.5 Additional Testing 34
6. Discussion and Conclusion 38

References 40

Appendix: Variable Definition 44

Appendix: Libby Boxes 46

1. Introduction

Since the infamous accounting scandals like Enron and WorldCom, the Congress have been trying to reinstate public trust. One of which is by introducing clawback provisions, which can be defined as a contract that allows firms to recoup any compensation given to the executives if proven to be involved in any accounting misconduct, under Sarbanes-Oxley Act (SOX). Section 304 of the SOX of 2002 penalizes CEOs and CFOs for any misconduct that led to financial statement restatement, to return the compensation 12 months after the initial issuance of the financial statement. Additional to Section 304, the Securities and Exchange Commission (SEC) proposed a rule for mandatory adoption of clawback under Section 954 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. Although Section 954 has not passed the law, firm-initiated clawback has increased largely. According to Erkens et al. (2018), the adoption rate for non-financial firms of Russell 3000 firms was 12% in 2007 and significantly increased to 45% in 2013. The growing adoption rate indicates the benefits of clawback provision for firms exceed their costs.

Less financial reporting restatement, improved financial reporting quality, and reduced audit fees (Chan et al., 2012; Dehaan et al. 2013) are several benefits of clawback adoption. As compensation is linked to the performance which shown in financial report, Chan et al. (2012), Dehaan et al. (2013), and Natarajan & Zheng (2017) find that to compensate higher risk borne by the executives for any restatement due to the adoption of clawback, the executives' compensation will be higher. Furthermore, they argue that such recoupment policies may mitigate agency problems by restricting excessive risk-taking behavior. However, research done by Chan et al. (2015) show that clawback adoption possesses unintended consequences. They find that although clawback disincentives earnings management activities which shown by decreasing amount of accruals, the adoption of clawback creates unintended consequences such as increasing real transactions management (e.g. R&D expenses). Contrary to previous literature, Erkens et al. (2018) discover that the consequences of firm-initiated clawback is not entirely attributable to adoption of clawback provisions itself, but rather as a result of clawback design. By partitioning clawback to strong and weak clawback, they find that strong clawback adopters experience improved financial reporting quality, reduced possibility of CEO turnover, and reduced CEO pay. On another stream, Biddle et al. (2018) in their study regarding post-clawback investment efficiency find that firms shift their investment mix from research and development to capital expenditure subsequent to clawback adoption.

As Kothari et al. (2002) find different degree of uncertainty between research and development and capital expenditure in forecasting future benefits, this thesis examines the

effect of clawback adoption on firms' risk taking measured by research and development and capital expenditure. Therefore, the first research question (RQ) is as follows:

RQ 1: does the voluntary adoption of clawback provisions affect firms' risk-taking behavior?

In addition, as the dynamic and uncertain environment pushes firms to create innovative products in order to outperform their competition, industry competitiveness thus can be seen as one of the factors that affect managements' risk-taking decision. The intuition behind this is if the industry becomes more competitive, the firms are expected to rigorously take risk to stay in business (Schmidt, 1997). However, considering the obscurity possessed in research and development and capital expenditure, it is possible that the firms take fewer risk by restricting research and development expenses as well as capital expenditure, especially when its compensation is linked to its performance. Thus, the second research question is as follows:

RQ 2: does industry competitiveness moderate the effect on the relation between voluntary adoption of clawback provisions and firms' risk-taking behavior?

Employing 19,029 firm-year observations over the period of 2004 of 2019, I execute difference-in-differences method as well as regression models. For difference-in-differences method, the availability of data at least two years before and after the adoption is required to ascertain the reliability of pre- and post-adoption analysis. Following prior research regarding clawback provisions and risk-taking (Biddle et al., 2008 and Coles et al., 2006), I use research and development and capital expenditure as proxies for risk-taking. Furthermore, this thesis extends prior research by taking into account a moderating variable of industry competitiveness to see its effect on the association between clawback provisions and firms' risk-taking decision.

The findings show a negative and significant effect of clawback adoption on research and development expenditure level, indicating that firms reduce their research and development expenses subsequent to clawback adoption. However, the effect of clawback provisions on capital expenditure is insignificant. Taking into account industry competitiveness into the analyses, I find insignificant effect of industry competition on the level of research and development expenses for clawback adopters. Whereas, I find a negative and significant effect of industry competition on the level of capital expenditure for clawback adopters. This suggests that tighter competition within an industry would consequently lower clawback adopters' level of capital expenditure. Overall, the findings provide new insights regarding the effect of competition within an industry on decision regarding firms' risk. Hence, should be of interest for regulators, standard setters, and other related market participants as the findings are relevant for current debate concerning mandatory implementation of clawback provisions by the SEC.

This thesis is constructed in the following way. First, I provide the underlying theory and literature review regarding clawback provisions and risk-taking measures in section 2. Section 3 provide the hypotheses development for this research. Next, I describe the sample selection process and research design in section 4. In section 5, the regression results are presented. Lastly, section 6 consists of the discussion and conclusion of the results.

2. Theoretical background

This section provides the underlying theory and relevant literature review. First, the underlying theory explains the background theory behind the hypotheses. Next, the literature review provides the relevant literature for this study. Combined, it provides a brief background of clawback provisions and managements' risk-taking behavior.

2.1 Theory

2.1.1 Agency theory

Agency theory, which was first originated by Jensen & Meckling (1976) explains the relationship between the principals (shareholders) and the agents (managers). Jensen & Meckling (1976, p.5) define agency relationship as *"a contract under which one or more person (the perincipal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent."* In an organization where decentralization occurs, the principals and the agents have divergent preferences. As agency theory argues that both parties are utility maximizers, in which the principals are risk-neutral while the agents are risk-averse, the theory assumes that the agents attempt to act in their own interest. The divergent preferences intensifies with the presence of information asymmetry, a situation where one party (the agents) has more information in contrast to the other party (the principlas) (Anthony et al., 2014; Pratt & Zeckhauser, 1985). Extra information owned by the agents enables them over discretion that is not fully observed by the prinicpals (Pratt & Zeckhauser, 1985). Dechow (1994) argues that managements' right over discretion can lead to "opportunistic behavior" that includes managements indulging in aberrant activities and shirking to the detriment of shareholders (i.e. earnings manipulation).

Jensen & Meckling (1976) further explains the mechanisms to forestall divergent preferences through incentives and monitoring. Incentives-compensation schemes are deemed prominent in aligning the principals' and the agents' divergent preferences by enabling the agents to make choices that induce Pareto efficient (Gjesdal, 1982). While incentives-compensation schemes are of great importance for corporate governance, suboptimal incentives-compensation schemes can contribute to corporate failures leading up to destruction of shareholders' value (Faulkender et al., 2010). Alternatively, monitoring through formal control system can serve as a mechanism to curtail challenges ensued as a result from principal-agent relationship (Hölmstrom, 1979; Jensen & Meckling, 1976; Stiglitz, 1975). Dyl (1988) adds support to this notion by showing that monitoring restrain managements' discretionary behavior, which subsequently increase the welfare experienced by the shareholders. Whilst

Cornett et al. (2008) suggest that manipulation of earnings by means of managements' discretion is lower as monitoring increases. Linking agency problem to clawback provisions, Babenko et al. (2012) posit that the application of clawback provisions is able to mitigate agency problems by restricting the executives from excessive risk-taking behavior as extra liabilities are borne by the executives.

2.2 Literature review

2.2.1 Definitions of clawback provisions

Flawed executive compensation schemes is considered to trigger accounting scandals and corporate failures which consequently resulted in shareholders' value obliteration, such as the collapse of Enron, Lehman Brothers, and WorldCom (Faulkender et al. 2010). Thenceforward, the U.S. Congress have been trying to reinstate public trust. One of which is by introducing clawback provisions. Under Sarbanes-Oxley Act (SOX), clawback provisions can be defined as a contract that allows firms to recoup any compensation given to the executives if proven to be involved in any accounting misconduct. Section 304 of the SOX of 2002 states:

> If an issuer is required to prepare an accounting restatement due to the material noncompliance of the issuer, as a result of misconduct, with any financial reporting requirement under the securities laws, the chief executive officer and chief financial officer of the issuer shall reimburse the issuer for (1) any bonus or other incentive-based or equity-based compensation received by that person from the issuer during the 12-month period following the first public issuance or filing with the Commission (whichever first occurs) of the financial document embodying such financial reporting requirement; and (2) any profits realized from the sale of securities of the issuer during that 12-month period" (15 U.S.C. § 7243).

However due to difficulty in detecting accounting misconduct, the probability of prosecution by the SEC upon clawback provisions is limited (Fried & Shilon, 2011).

Supplementary to Section 304, the SEC proposed a new rule for mandatory adoption of clawback under Section 954 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, which states:

> (2) in the event that the issuer is required to prepare an accounting restatement due to the material noncompliance of the issuer with any financial reporting requirement under the securities laws, the issuer will recover from any current or former executive officer of the issuer who received incentive-based compensation (including stock options

awarded as compensation) during the 3-year period preceding the date on which the issuer is required to prepare an accounting restatement, based on the erroneous data, in excess of what would have been paid to the executive officer under the accounting restatement" (15 U.S.C. § 78j-4).

Upon this new rule, recoupment of any kind of compensation by executives is triggered not only by misconduct but also any material misstatement thus, puts more pressure on Chief Executive Officer (CEO) and Chief Financial Officer (CFO), which consequently affects how firms prepare their financial report. However, due to contention on whether clawback provisions yield to favorable outcomes for firms, Section 954 has not passed the law. Nevertheless, firm-initiated clawback has increased largely (Babenko et al., 2012; Dehaan et al., 2013; Erkens et al., 2018). According to Erkens et al. (2018), the adoption rate for non-financial firms of Russell 3000 firms was 12% in 2007 and significantly increased to 45% in 2013. The growing adoption rate may indicate the benefits of clawback provisions for firms exceed their costs.

2.2.2 Determinants and consequences of clawback provisions

Increasing adoption rate of firm-initiated clawback provisions has led to numerous studies on the cause and effect of clawback provisions on firms. Prior studies largely highlighted the positive outcomes from the adoption of clawback provisions on firms (Chan et al., 2012; Dehaan et al., 2013; Iskandar-Datta & Jia, 2013; Natarajan and Zheng, 2017). While few studies casted a doubt on the consequences of a mere clawback adoption (Chan et al., 2015; Erkens et al., 2018).

When firms decide to initiate clawback provisions, they are required to determine the kind of action that triggers recoupment of executives' pay. The decision to adopt clawback may differ depend on firms' characteristics. Brown et al. (2015) find a strong evidence that firm size is one of the most significant contributing reasons for clawback adoption, as larger firm size increases the risk of government scrutiny. On the other hand, Babenko et al. (2019) denote that 24.7% of reporting firms adopt clawback to alleviate issue regarding compensation schemes. While both unintentional and intentional accounting restatement due to fraud is the strongest triggers for clawback (Babenko et al., 2012, 2019; Brown et al., 2015; Chan et al., 2012), firm-initiated clawback usually determined by more than one trigger (Babenko et al., 2012, 2019). In some cases, voluntary adoption of clawback is triggered by action that may be harmful to a firm, for instance excessive risk-taking behavior done by executives (Babenko et al. 2019).

Chan et al. (2012) examine whether voluntary clawback adoption is simply a signal to investors regarding the firms' quality of financial reporting. The findings show that relative to nonclawback adopters, clawback adopters appear to have fewer accounting misstatement which indicates improved financial reporting quality. Additionally, clawback adopters improve their internal control system in order to avoid restatement which consequently results in lower audit risk as well as audit fees. Taking everything into consideration, the findings imply that firm-initiated clawback is not merely a signal of financial integrity. Consistent with Chan et al. (2012), Dehaan et al. (2013) find a strong evidence of improved financial reporting quality due to less restatement, which leads to increased market participants' belief on the financial statement relative to nonclawback adopters. Furthermore, Dehaan et al (2013) document increased executives' pay to compensate increased risk of getting caught following clawback provisions. Similar results to Chan et al. (2012) and Dehaan et al. (2013) are documented by Natarajan & Zheng (2017) regarding the potential accounting restatement and executives' compensation subsequent to clawback provisions.

In contrast to Dehaan et al., (2013) and Natarajan & Zheng (2017), Iskandar-Datta & Jia (2013) find no evidence of increased CEO compensation subsequent to clawback provisions. Nevertheless, significant decrease in bid-ask spread is experienced by clawback adopters compared to non-adopters. This result implies that clawback provisions enhances firms' information transparency. Additionally, firms with previous misreporting history show prominent increase of stock price in response to clawback adoption. On the other hand, Erkens et al. (2018) argues that the effect of clawback provisions is not entirely attributable to adoption of clawback provisions, rather as a result of clawback design. By capturing the characteristics of non-financial firms of Russell 3000 firms, Erkens et al. (2018) create a Clawback Strength Index. The index represents the strength of clawback adopted by the firms. Strong clawback indicates large incentives for firms to put pressure on their executives regarding the likelihood of compensation forfeiture, while weak clawback indicates clawback adoption by firms is merely a formality. The results show that strong clawback adopters experience enhanced financial reporting quality subsequent to decreased financial restatements. Further, strong clawback adopters have lower likelihood of CEO turnover as well as lower incentive pay for CEO. To sum, question mark still applies on whether the adoption of clawback differ under different economic or environmental circumstances.

Looking from other perspectives, Dechow (1994) believes that accruals are able to enhance earnings' power to measure firm performance. Accruals are able to address matching and timing problems, making earnings more accurately predict firm performance.

Nevertheless, discretion over accruals given to managements can also be used for earnings manipulation. In line with Dechow (1994), prior literature denotes the quality of financial reporting can be reflected on accruals quality (Dehaan et al., 2015), with higher accruals represents more earnings manipulation (Dechow et al., 2013) which subsequently results in accounting restatement that triggers clawback policies. Chan et al. (2015) examine the unintended consequences of decreased accruals following clawback provisions. Albeit clawback policies' ability in discouraging executives' misbehavior, it causes executives to manage firms' real transaction as a way for manipulation. As managing real transactions are unlikely to attract government scrutiny, firms usually opt for this option than managing accruals (Cohen et al., 2008). Analyzing both clawback and nonclawback adopters, Chan et al. (2005) find that even though clawback adopters' accruals decrease, the level of real transaction management such as cutting advertising, R&D and selling, general, and administrative expenses increases. This finding implies clawback provisions does not necessarily fully address earnings manipulation, firms choose other method to manipulate earnings that is less risky.

2.2.3 Sarbanes-Oxley Act and risk-taking behavior

Bargeron et al. (2010) argue that the adoption of SOX 2002 affects firms' risk-taking behavior. Firms response to risk-taking behavior is observable through two ways, extra liability that lies on directors for laws violation and requirement to disclose adequate internal control system. By comparing U.S. public firms to non-U.S. firms, they find substantial decrease in U.S. firms' risk-taking measures, such as research and development (R&D) expenditure and capital expenditure, while total of cash and cash equivalent increases. The findings imply that the imposed law discourages firms to take risky investment. This thesis specifically examines how clawback policies of Dodd-Frank 2010 of SOX 2002 affects firms' risk-taking behavior measured by R&D spending and capital expenditure, while incorporating environmental changes that may affect the association.

2.2.3.1 Risk-taking behavior: R&D and capital expenditure

Prior literature document recoupment of executives' compensation policies creates more pressure on executives, thus executives are compensated higher (Babenko et al., 2012; Dehaan et al., 2013). In consequence, much literature investigates the association between executives' compensation and their risk-taking behavior (Coles et al., 2006; Larraza-Kintana et al., 2007; Low, 2009; Wright et al., 2007). According to Wright et al. (2007, p.82), risk taking can be defined as *"the distribution of possible outcomes from a choice."* They argue

that when executives are faced with risk-taking decision, executives acknowledge all possible outcomes and will not choose the outcome that they cannot get benefit from. As executives' compensation is linked to their performance, executives with higher salaries are more concern for their wealth loss and subsequently lessen the tendency to opt for risky projects. Correspondingly, Larraza-Kintana et al. (2007) hold similar view that as executives consider potential losses more than gains, executives are more likely to take fewer risk to protect their wealth but will take greater risk when dealing with loss. Nevertheless, the possible outcome from such investment may be different from expected, considering the uncertainty of the future.

Financial Accounting Standard Board (FASB) in the Statement of Financial Accounting Standards (SFAS) No. 2 about research and development states that, *"there is normally a high degree of uncertainty about the future benefits of individual research and development projects, although the element of uncertainty may diminish as a project progresses. Estimates of the rate of success of research and development projects vary markedly-…"* (paragraph 30). Considering this characteristic, higher investment in R&D indicates a riskier investment. This is exemplified in the work undertaken by Kothari et al. (2002) who analyze the degree of uncertainty of R&D expenditure and capital expenditure to future earnings. Incorporating more than 50,000 firm-year observations, the results show both R&D expenditure and capital expenditure are positively associated with the standard deviation of future earnings, yet the coefficient of R&D expenditure is way above the coefficient of capital expenditure. These results indicate that investment in R&D reflects more uncertain future benefit in comparison with capital expenditure. Due to the fact that the outcome from R&D and capital expenditure takes extensive time, there is also a possibility that the outcome does not payoff. Hence, one can expect that the degree of uncertainty influence investment behavior. This is evident in existing studies by Carruth et al. (2000) and Dixit & Pindyck (1994) that show irreversibility effect of greater uncertainty that leads to lower investment rates. Individuals tend to delay decision to invest until they obtain further information regarding the investment.

Nevertheless, Coles et al. (2006) argue that reallocation of investment dollars to R&D is one of the methods to encourage executive with compensation plan to increase risk-taking behavior. Although it has been widely known that high risk projects generate high return, the expected return may not be achieved due to uncertainty. In a situation of investment with negative return, executives with incentives compensation packages linked to their performance will try to cover up their financial losses by earnings management (Benmelech et al., 2010; Bens et al., 2012; Gerety & Lehn, 1997; Kedia & Philippon, 2007). In particular, Gerety &

Lehn (1997) find a positive association between R&D expenditure with the likelihood of indictment by SEC regarding accounting scandal. This due to the reason that product from R&D activities is difficult to be verified. This finding confirms the notion that high risk investment spurs financial misreporting.

All things considered, clawback provisions are expected to prevent executive misbehavior that financially favors them even though such behavior may harmful to shareholders. Babenko et al. (2019) show that one of the reasons and triggers for clawback adoption is excessive risk-taking behavior. Additionally, they examine the potential effect that clawbacks have on executives' risk-taking behavior. They argue that when executives opt for high risk projects or set high targets, it would subsequently promote them and their subordinates to perform inappropriate activities. To avoid inappropriate activities, firms voluntarily apply clawback policies. This argument refers as risk-reduction hypothesis. Using two instrumental variables, namely executives' previous exposure to clawbacks and shareholder proposals regarding compensation, they find a causality between clawbacks and firms' investment policy and financial policy. In other words, the adoption of clawback provisions discourages executives to take excessive risk.

In another stream, Lin (2016) argues as clawback provisions reduce information asymmetry problem through enhanced financial reporting quality, such provisions would subsequently harness firms' tendency to overinvest, which captured by lower capital expenditure. Under different settings, Biddle et al. (2018) document different findings. As R&D and capital expenditure possess different timing regarding their future benefit, they try to extend prior findings by examining the effect of clawback provisions on firms' investment mix that resembles firms' growth opportunities. The rationale is when R&D expenditure is increased, firms' earnings number would be reduced. Whereas, as the idea of capital expenditure is to support current firms' operations it would subsequently increase firms' earnings, even though at the expense of higher depreciation cost. Additionally, as value of the shares is deemed to represent investors' expectations about firms' growth opportunities (McConnell et al., 1985), there might be a possibility that executives will exert more capital expenditure. Combined, firms would try to increase capital expenditure while suppress R&D expenditure contemporaneously. Eventually, Biddle et al. (2018) reveal clawbacks shift capital investment to capital expenditure in expense of R&D cost, with higher capital expenditure helps firms to enhance reported earnings.

2.2.4 Industry Competitiveness

Wiseman and Gomez-Mejia (1998) posit that risk-taking behavior varies across different situations. Prior studies regarding industry competition point out industry competitiveness as one of the contributing factors in increased firms' risks (Gaspar & Massa, 2006; Raith, 2003). Greater industry competition can be manifested in lower entry costs, wider range of product substitutes, and larger market size (Ali et al., 2014; Raith, 2003; Karuna et al., 2007). Gaspar & Massa (2006) argue that industry competition affects the degree of uncertainty faced by firms. Firms' profitability is more difficult to forecast considering the competitiveness the firms are operating in. Contrary, firms operating in a more stable condition would find less difficulties in forecasting their profitability. This implies that higher uncertainty of firms' future profitability consequently increases firms' risk. On the other hand, Schmidt (1997) argues that greater competition might incentivize firms to innovate and explore any opportunities in order to stay in the business, which reflected on firms' more rigorous risk-taking behavior. Innovation in form of novel ideas, unique products, and services are believed to bring firms to market success. This conjecture is supported by Kim & Mauborgne (1997) who argue that instead of outperform the competitors conventionally, to achieve sustainable growth firms should pursue innovation. By incorporating Indian IT industry which possesses high knowledge-intensity, Varma et al. (2018) find that firms able to generate or gain competitive advantage by innovating. Such innovation usually requires firms much investments, reflected in firms' R&D expenditure and capital expenditure decision.

Nevertheless, as R&D and capital expenditure have high degree of uncertainty regarding future outcomes (Kothari et al., 2002), greater competition may encourage or discourage executives' decision to invest in R&D and capital expenditure. Due to inherent uncertainty in R&D and capital expenditure, greater competition increase executives' reluctances to invest. With relatively small assurance of fruitful outcomes, it is more appealing to not invest. On the other hand, as market success is possible to be achieved through innovation (Varma et al., 2018), executives would invest more in R&D and capital expenditure. Additionally, Karuna et al. (2012) claim that greater competition increases executives' discretion. Executives with performance-based compensation are likely to utilize their increased discretion to reap higher personal earnings, thus tend to engage in risky activities.

3. Hypotheses Development

This section uses the aforementioned underlying theory and literature review of clawback provisions and risk-taking measures to develop the hypotheses. First, this section develops hypotheses of the association between voluntary clawback provisions and managements' risk-taking behavior denoted in risk-taking measures, such as R&D spending and capital expenditure. Next, this section develops hypotheses of the moderating effect of industry competitiveness on the association between voluntary clawback provisions and the managements' risk-taking behavior.

3.1 Voluntary clawback provisions and managements' risk-taking behavior

Clawback provisions are believed to serve as a tool for mitigating agency conflicts by placing extra liability on executives. Initiation of such provisions may be triggered by several events, such as earnings restatement, executives' misbehavior, excessive risk-taking, and so forth (Babenko et al., 2019). Even though excessive risk-taking may triggers firms to adopt clawback provisions, this association may work the other way around in which clawback provisions could discourage executives to engage in excessive risk-taking. Following prior findings, firms' risk-taking can be measured by the level of R&D expenses and capital expenditure (Babenko et al., 2019; Bargeron et al., 2010; Coles et al., 2006; Gerety & Lehn, 2007). Despite of the ability of both R&D expenses and capital expenditure as proxies for risk-taking, these measures possess different degree of uncertainty in forecasting future benefits (Kothari et al., 2002). Higher degree of uncertainty possessed by R&D makes R&D to be considered as a riskier investment relative to capital expenditure. Since high risk investments often generate high expected returns, such investments are more preferable by executives. Executives can utilize their rights over discretion to opt for high risk investments to boost up their personal earnings even at the expense of shareholders. However, due to the possibility that the outcomes from R&D activities may generate zero or negative returns, executives are likely to engage in earnings management to conceal the loss. In line with previous conjecture, Efendi et al. (2007) find that firms with risky investment have higher probability of financial reporting misstatement. Consequently, when there is a possibility that executives' compensation might be recouped in the future, executives would be discouraged to take high risk investment. In addition, as executives' compensation is found to be higher when clawback provisions are in place, executives as loss-averse will tend to take fewer risk to avoid potential loss. All things considered, it is predicted that the adoption of clawback provisions would subsequently reduce excessive risk-taking, measured by R&D expenses when executives are

making investment decision. Incorporating aforementioned arguments, the first hypothesis is as follows:

H1: voluntary adoption of clawback provisions is negatively associated with R&D expenses

The hypothesis above is stated in alternative form. The corresponding null hypothesis is that voluntary adoption of clawback provision is not associated with R&D expenses.

Meanwhile, capital expenditure possesses lower degree of uncertainty in forecasting future benefits and is considered as less risky investments. Thus, opposite effect on capital expenditure might appear as a result of voluntary clawback provisions. In support to this conjecture, Biddle et al. (2018) find firms-initiated clawbacks shift capital investment mix from R&D expenses to capital expenditure to mimic firms' growth opportunities. All things considered, it is predicted that the adoption of clawback provisions will subsequently increase firms' risk-taking behavior, measured by capital expenditure, when executives are making investment decision. Therefore, the second hypothesis is as follows:

H2: voluntary adoption of clawback provisions is positively associated with capital expenditure

The hypothesis above is stated in alternative form. The corresponding null hypothesis is that voluntary adoption of clawback provisions is not associated with capital expenditure.

3.2 Industry Competitiveness

It has been widely known that different industries face different threats. In order to stay competitive and outperform its rival, the firms are expected to always seek for opportunities. Schmidt (1997) argues that increased competitiveness may result in reduced profits and in order to stay in the business, firms will exert more effort. To avoid business disutility, firms operating in greater competition would have to either increase their production efficiency which subsequently lowers product cost, or to differentiate by delivering innovation in forms of new product, services, or idea to the marketplace. When firms opt to innovate, firms require much investments in R&D and in capital expenditure to finance the ongoing operations. Correspondingly, the probability of having lower profits from tight competition encourages executives to take higher risk shown in more spending in R&D and capital expenditure. In addition, Karuna et al. (2012) argue that greater competition will subsequently increase executives' discretion. Thus, despite of the inherent uncertainty of future benefits embedded in R&D and capital expenditure, executives are more likely to engage in risky activities considering the tight competition the firms are operating in. As previously predicted that

voluntary adoption of clawback provisions discourages executives' risk-taking behavior measured by R&D, while contemporaneously enhance the capital expenditure level. All things considered, greater industry competition will attenuate the negative association between voluntary adoption of clawback provisions and R&D, and enhance the positive association between clawback provisions and capital expenditure. Therefore, the third hypotheses are as follow:

H3a: industry competitiveness will moderate the association between voluntary adoption of clawback provisions and R&D expenses, with the relationship being weaker when the level of competitiveness is higher

H3b: industry competitiveness will moderate the association between voluntary adoption of clawback provisions and capital expenditure, with the relationship being stronger when the level of competitiveness is higher

The hypotheses above are stated in alternative form. The corresponding null hypothesis is that industry competitiveness does not affect the negative relationship between voluntary adoption of clawback provisions and R&D expenses, and the positive relationship between voluntary adoption of clawback provisions and capital expenditure.

4. Sample and research design

This section provides the sample construction procedure for this research and the method used for this research. Sample selection procedure is described in section 4.1. In section 4.2, I explain the research design to test the three hypotheses for this research. Furthermore, section 4.2.1 explain the difference-in-differences method used for this research. Next, section 4.2.2 provides the model used to analyze the impact of firm-initiated clawback provisions on managements' risk-taking behavior, measured by research and development, and capital expenditure. Lastly, section 4.2.3 describes the effect of a moderating variable, industry competitiveness, on the association between firm-initiated clawback provisions and managements' risk-taking decision.

4.1 Data and sample selection

The data required to test the three hypotheses in this research is retrieved from Wharton Research Data Services (WRDS). The data regarding financial information is retrieved from Compustat Fundamentals Annual Database, while the data regarding firms' stock return is retrieved through Center for Research in Security Prices (CRSP). Further, the data regarding clawback provisions is obtained from my thesis supervisor, Dr. Michael Erkens. The sample related to clawback consists of Russel 3000 firms over the period 2007 and 2016. To provide reliable analysis regarding the pre- and post-adoption of clawback, at least data of two years before and after is required. Hence, the sample period is extended from 2004 to 2019.

Table 1 provides the schematic representation of sample selection procedure. I retrieved the datasets from Compustat and CRSP by entering companies cusip obtained from Dr. Michael Erkens. The initial dataset from Compustat consists of 12,126 and 7,573 firm-year observations for clawback adopters and non-clawback adopters respectively. The sample entails of 847 clawback firms and 601 non-clawback firms. Whereas, the initial dataset from CRSP consists of 141,624 and 84,163 firm-year observations for clawback adopters and non-clawback adopters respectively, which entails of 851 clawback firms and 596 non-clawback firms. Duplicates are removed with respect to cusip8 and fyear, resulting in total of 12,111 and 11,199 firm-year observations for Compustat and CRSP respectively for clawback adopters. While for non-clawback adopters, removing duplicates with respect to cusip8 and fyear resulting in the deletion of 40 and 76,938 firm-year observations for Compustat and CRSP respectively. Furthermore, the dataset from Compustat and CRSP are merged, resulting in total of 20,448 firm-year observations. Finally, firms with incomplete data and financial firms with SIC code within 5999 and 7000 are excluded from the sample due to different requirements

and regulations applied, resulting in final sample of 19,029 firm-year observations, which entails of 795 clawback adopters and 590 non-clawback adopters.

Table 1: sample selection procedure

	Clawback Adopters		Non-clawback Adopters		Total	
	Firms	Firm-year	Firms	Firm-year	Firms	Firm-year
Database from Compustat	847	12,126	601	7,573	1,448	19,699
Less: Duplicates to cusip8 and fyear	0	-15	0	-40	0	-55
Total	**847**	**12,111**	**601**	**7,533**	**1,448**	**19,644**
Database from CRSP	851	141,624	596	84,163	1,447	225,787
Less: Duplicates to cusip8 and fyear	0	-130,425	0	-76,938	0	-207,363
Total	**851**	**11,199**	**596**	**7,225**	**1,447**	**18,424**
Merged Compustat with CRSP	858	12,530	607	7,918	1,465	20,448
Less: Financial Firms	-1	-16	0	0	-1	-16
Less: Incomplete Data	-62	-877	-17	-542	-79	-1,403
Total	**795**	**11,653**	**590**	**7,376**	**1,385**	**19,029**

4.2 Research Design

4.2.1 Difference-in-differences

To test the hypotheses, I implement a difference-in-differences method. The difference-in-differences method is used in this research to analyze the pre- and post-adoption effect of firm-initiated clawback provisions on the outcome variable for treatment and control group. Bertrand et al. (2004) believe that difference-in-differences method is suitable for counterfactual analysis as this method able to overcome the endogeneity problems that may occur. As I do not implement propensity score matching in this research, I assign pseudo-adoption year for firms with no clawback provisions in place as a mean to compare the counterfactual between both treatment and control groups. The pseudo-adoption year is assigned through a random draw between 2007 and 2016. The pseudo-adoption year for non-clawback adopters is able to help execute the difference-in-differences test for clawback and

non-clawback adopters. The availability of data at least two years before and after the adoption is required to ascertain the reliability of pre- and post-adoption analysis.

Table 2 presents the difference-in-differences test results for two outcome variables, namely (1) research and development and (2) capital expenditure. Table 2 below shows the pre- and post-adoption mean of treatment and control group for each outcome variable. The means of research and development before clawback adoption are 0.543 and 0.202 for non-clawback and clawback adopters respectively. After clawback adoption, the means of research and development are 0.582 and 0.105 for non-clawback and clawback adopters respectively. The difference-in-differences estimator for research and development shows an amount of -0.136, which is negative and significant. This indicates that the level of firms' research and development expenditure is reduced significantly after the firms initiated clawback provisions.

Furthermore, the pre-adoption means of capital expenditure for non-clawback and clawback adopters show the amount of 0.143 and 0.097 respectively. Whereas, the post-adoption means are 0.136 for non-adopters and 0.092 for adopters. The difference-in-differences estimator for capital expenditure is 0.003, which is positive but insignificant. This indicates that after the adoption of clawback provisions, firms' level of capital expenditure is insignificantly increased.

Table 2: difference-in-differences test

	Afterclaw = 0	Afterclaw = 1
Claw = 0	(1) 0.543	(1) 0.582
	(2) 0.143	(2) 0.136
Claw = 1	(1) 0.202	(1) 0.105
	(2) 0.097	(2) 0.092
Difference-in-differences	(1) -0.136**	
Estimator	(2) 0.003	

Table 2 presents the difference-in-differences test for the outcome variable. (1) denotes the mean value of R&D while, (2) denotes the mean value of Capex. Claw is a binary variable equals to one if a firm adopts clawback provisions, and zero otherwise. Afterclaw is a binary variable equals to one if the firm-years after the adoption have clawback in place, and zero otherwise. All variables are defined in Appendix. *, **, *** denotes significance level at 0.1, 0.05, and 0.01, respectively.

4.2.2 Risk-taking measures

Even though much prior literature (Chan et al., 2012; Dehaan et al., 2013; Iskandar-Datta & Jia, 2013; Natarajan and Zheng, 2017) has highlighted the advantage of clawback provisions, the initiation of clawback provisions may possess unintended consequences on firms' risk-taking behavior. Bargeron et al. (2010) find that the adoption of SOX 2002, affects how firms engage in risk-taking behavior. Thus, this research is aimed to examine the impact of clawback provisions initiation, the Dodd-Frank 2010, on the level of risk taken by the firms. Prior research on managements' risk-taking behavior (Bargeron et al., 2010; Coles et al., 2006) and the effect of clawback provisions adoption on managements' risk-taking behavior employ research and development expenditure, and capital expenditure as the dependent variable. Therefore, this research use research and development expenditure, and capital expenditure as the proxies to estimate the risk-taking level. To examine the first hypothesis, the regression model is formulated as follows:

$$R\&D = \alpha + \beta 1Claw + \beta 2Afterclaw + \beta 3Claw * Afterclaw + \beta 4Leverage + \beta 5Cash + \beta 6Size + \beta 7MTB + \beta 8Growth + \beta 9StockReturn + Fixed\ effects + \varepsilon \quad (1)$$

To examine the second hypothesis, the regression model is formulated as follows:

$$Capex = \alpha + \beta 1Claw + \beta 2Afterclaw + \beta 3Claw * Afterclaw + \beta 4Leverage + \beta 5Cash + \beta 6Size + \beta 7MTB + \beta 8Growth + \beta 9StockReturn + Fixed\ effects + \varepsilon \quad (2)$$

Referring to equation (1) and (2), the independent variable (X) is the adoption of clawback provisions. Two binary variables namely Claw and Afterclaw is employed in this research. Claw represents a binary variable equals to one if a firm voluntarily adopts clawback provisions, and zero otherwise. In addition, Afterclaw is a binary variable that takes value of one if the firm-years after the adoption have clawback in place, and zero otherwise. The coefficient of interest is represented by β3, which is the interaction variable of Claw and Afterclaw. β3 is the difference-in-differences estimator for the outcome variable following clawback provisions. The dependent variable (Y) used in this research is managements' risk-taking behavior, measured by R&D and Capex. R&D is measured by research and development expenses scaled by total assets. While, Capex is measured by capital expenditure scaled by total assets.

Furthermore, control variables are included in the regression models following prior literature regarding clawback provisions and firms' risk (Biddle et al., 2018; Coles et al., 2006). The first control variable is leverage (Leverage), which calculated as the sum of debt in current liabilities and long-term debt scaled by total assets. Leverage is a widely known measure of financial risk. Higher leverage ratio indicates higher financial risk, which according to Coles et al. (2006) would positively and negatively affect firms' R&D and capital expenditure respectively. Next is cash (Cash) as measured by cash scaled by total assets. Cash is included as a proxy to account for cash that available to afford new projects. Next is size of the firm (Size), which calculated by the logarithm value of total assets. The size of the firm is expected to capture the variation in the degree of risk-taking decision across firms. Prior literatures (Coles et al., 2006; Guay, 1999; Low, 2009) find an evidence that the size of the firms is negatively associated with firm risk. The fourth control variable is market-to-book ratio (MTB), which represents the market's expectations of future cash flows. High market-to-book ratio indicates that investors would pay extra for the assets' book value, thus a sign of a growing cash flows. Next is sales growth (Growth) as defined by the logarithm value of the ratio of current year sales to previous year sales, is employed to capture the firms' growth opportunities. The sixth control variable is stock return (StockReturn) that captures the firms' annual return. Lastly, I include industry fixed effects, which able to control bias due to time-varying industry characteristics that may results in cross-sectional differences in the outcome variable. In addition, year fixed effects are included to control changes associated with macroeconomic events and regulatory changes that may affect the outcome variable.

4.2.3 Industry competitiveness

Following equation (1) and (2), the moderating variable is included in the regression model to examine whether the proportion industry competitiveness would enhance or alleviate the association between the adoption of clawback provisions and managements' risk-taking behavior. Herfindahl-Hirschman Index (HHI) is a widely known index used to measure industry competitiveness due to its straightforward method (Calkins, 1983). To calculate the HHI, the firms are clustered by their two-digit SIC code. The HHI is calculated as follows:

$$HHI_{jt} = \sum_{i=1}^{n} (MS_{ijt})^2 \quad (3)$$

Where HHI_{jt} is the Herfindahl-Hirschman Index for industry j in year t and MS_{ijt} is the market share of firm i in industry j in year t. To measure HHI, firms are clustered by their two-

digit SIC industry code. The market share is calculated by dividing the firm's sales to the sum of all firms' sales in the industry. The index ranges from 0 to 1, with an index approaching zero indicates high level of competitiveness, while higher index indicates lower level of competitiveness. Following prior research regarding industry competitiveness (Zhang, 2018), observations contain missing and negative sales are excluded, and for a more straightforward interpretation, the index is reversed (RevHHI) by multiplying the initial HHI index with -1. Therefore, higher index value indicates higher level of industry competitiveness. To examine the third hypothesis, the regression models are formulated as follow:

$$R\&D = \alpha + \beta 1Claw + \beta 2Afterclaw + \beta 3RevHHI + \beta 4Claw * Afterclaw + \beta 5Claw * HHI + \beta 6Claw * Afterclaw * RevHHI + \beta 7Leverage + \beta 8Cash + \beta 9Size + \beta 10MTB + \beta 11Growth + \beta 12StockReturn + Fixed\ effects + \varepsilon \quad (4)$$

$$Capex = \alpha + \beta 1Claw + \beta 2Afterclaw + \beta 3RevHHI + \beta Claw * Afterclaw + \beta 5Claw * HHI + \beta 6Claw * Afterclaw * RevHHI + \beta 7Leverage + \beta 8Cash + \beta 9Size + \beta 10MTB + \beta 11Growth + \beta 12StockReturn + Fixed\ effects + \varepsilon \quad (5)$$

Referring to equation (4) and (5), Claw represents a binary variable equals to one if a firm voluntarily adopts clawback provisions, and zero otherwise. Afterclaw is a binary variable that takes value of one if the firm-years after the adoption have clawback in place, and zero otherwise. The coefficient of interest is represented by β6, which is the interaction variable of Claw, Afterclaw, and RevHHI. The control variables included in equation (4) and (5) are equal to equation (1) and (2) unless stated otherwise.

5. Empirical Results

This section provides the empirical results of this research. Section 5.1 represents the descriptive statistics of the variables used for this research. Section 5.2 provides the two-sample t-test for the dependent variables used in this research. Section 5.3 reports the regression results of clawback provisions on firms' risk-taking decision. Section 5.4 reports the effect of a moderating variable on the association between clawback provisions on firms' risk-taking behavior. Lastly, section 5.5 provides the additional testing for this research.

5.1 Descriptive statistics

Table 3 reports the descriptive statistics of the variables used for this research. Panel A provides statistics for all firms for the sample period, while Panel B and Panel C separately summarizes the statistics for firms who adopt clawback and firms who do not during the sample period of 2004 to 2019. In order to address problem related to outlier, all variables are winsorized at 1% and 99%. In general, the descriptive statistics shown on Table 3 Panel A are consistent with findings from prior studies regarding clawback provisions by Babenko et al. (2019), Biddle et al. (2018), and Erkens et al. (2018). Incorporating the total of 19,029 firm-year observations, Panel A reports that the mean of risk-taking measures, research and development (R&D) and capital expenditure (Capex) is 0.313 and 0.112, respectively. Furthermore, the leverage for all samples shows an amount of 0.234 while the size of the firm (Size) is 7.049 which is higher than its median value (6.969). The growth (Growth) for the total samples shows a positive mean value of 0.074. In addition, the mean value of reversed Herfindahl-Hirschman Index (RevHHI) for all samples that ranges from -1 to 0 is -0.016, which is above the 50^{th} percentile.

Furthermore, Panel B and Panel C reveal values of R&D and Capex for clawback and non-clawback adopters separately. The mean values of R&D and Capex are both higher for non-clawback adopters compared to clawback adopters. The means of R&D and Capex for clawback adopters are 0.153 and 0.094, respectively. While, the mean values of R&D and Capex for non-clawback adopters are higher by 0.566 and 0.139, respectively. Compared to non-clawback adopters, clawback adopters generate higher leverage (0.252 > 0.205) and have higher amount of available cash to finance new project (Cash). Moreover, Panel B and Panel C show that the size of the firm is bigger for firms who adopt clawback (7.629) in contrast to firms who do not adopt clawback (6.134). In addition, clawback adopters generate lower sales growth than non-clawback adopters by 0.023, while there is a small difference by 0.001 of mean values in stock return (StockReturn) for both groups. Furthermore, firms with no

clawback provisions in place possess higher market-to-book ratio (2.353) conversely to clawback adopters (1.995). Non-clawback adopters appear to possess higher mean of reversed HHI as opposed to clawback adopters, which is -0.005 and -0.023 respectively. These numbers suggest that non-clawback adopters compete in a more competitive market in comparison to clawback adopters. Lastly, firms with recoupment of compensation policy generate larger return on assets (ROA) as opposed to firms with no such policy applied (0.111 > 0.044).

Table 3: descriptive statistics

Panel A: all firms

Variable	Obs.	Mean	SD	Min.	Median	Max.
R&D	19,029	0.313	1.858	0	0.002	38.141
Capex	19,029	0.112	0.275	0	0.036	2.895
Leverage	19,019	0.234	0.218	0	0.204	1.311
Cash	18,975	0.198	0.222	0.000	0.114	0.967
Size	19,029	7.049	1.819	1.956	6.969	12.325
MTB	18,399	2.132	1.508	0.601	1.623	10.9
Growth	19,029	0.074	0.265	-1.279	0.051	1.822
StockReturn	19,029	0.002	0.046	-0.077	0.019	0.088
RevHHI	18,955	-0.016	0.071	-0.711	0.000	0
NetPPE	18,990	0.269	0.242	0.002	0.183	0.932
ROA	18,951	0.085	0.183	-1.438	0.115	0.461

Panel B: clawback adopters

Variable	Obs.	Mean	SD	Min.	Median	Max.
R&D	11,653	0.153	1.092	0	0.001	38.141
Capex	11,653	0.094	0.208	0	0.037	2.895
Leverage	11,652	0.252	0.202	0	0.236	1.311
Cash	11,631	0.156	0.179	0.000	0.092	0.967
Size	11,653	7.629	1.724	2.197	7.528	12.325
MTB	11,366	1.995	1.299	0.601	1.574	10.9
Growth	11,653	0.065	0.225	-1.279	0.049	1.822
StockReturn	11,653	0.002	0.046	-0.077	0.019	0.088

RevHHI	11,623	-0.023	0.084	-0.711	0.000	0
NetPPE	11,633	0.278	0.236	0.002	0.196	0.932
ROA	11,619	0.111	0.133	-1.438	0.120	0.461

Panel C: non-clawback adopters

Variable	Obs.	Mean	SD	Min.	Median	Max.
R&D	7,376	0.566	2.629	0	0.005	38.141
Capex	7,376	0.139	0.354	0	0.036	2.895
Leverage	7,367	0.205	0.238	0	0.126	1.311
Cash	7,344	0.265	0.263	0.000	0.173	0.967
Size	7,376	6.134	1.573	1.956	6.015	12.325
MTB	7,033	2.353	1.772	0.601	1.731	10.9
Growth	7,376	0.088	0.318	-1.279	0.055	1.822
StockReturn	7,376	0.001	0.045	-0.077	0.019	0.088
RevHHI	7,332	-0.005	0.037	-0.711	0.000	0
NetPPE	7,357	0.255	0.251	0.002	0.162	0.932
ROA	7,332	0.044	0.237	-1.438	0.103	0.461

Table 3 presents the descriptive statistics of the variables used for this research. Panel A represents statistics for all companies. Panel B (Panel C) represents statistics for clawback (non-clawback) adopters. All variables are winsorized at 1% and 99%. All variables are defined in Appendix.

5.2 Two-sample t-test

Table 4 presents the results of two-sample t-test for the dependent variables used in this research. Two-sample t-test calculates the difference in means of the two compared groups, namely clawback adopters and non-clawback adopters. According to Panel A, the mean of R&D is lower for clawback adopters as opposed to non-clawback adopters ($0.153 < 0.566$). The mean difference between two compared groups for R&D is 0.413, with a standard error of 0.027. The t-value is 15.0153, which is bigger than the threshold of 1.96. This indicates that there is a statistically significant difference between the means of R&D for clawback adopters and non-clawback adopters. Alternatively, as the null hypothesis takes the value equals to zero, the p-value of alternative hypothesis is smaller than its significance level of 0.05 ($Pr(|T| > |t|) = 0.0000$). This means that the difference of means of R&D between the two groups is statistically significant. Furthermore, Panel B reports the difference in means of Capex of the

two groups. The mean of Capex for clawback adopters is lower than the opposed group (0.094 < 0.139) by 0.004, with a standard error of 0.004. The t-value shows an amount of 10.8678, which is higher than 1.96 threshold. This indicates that the differential means of Capex of the two compared group is statistically significant. In addition, the p-value associated with the alternative hypothesis is smaller than 0.05 (Pr(|T| > |t|) = 0.0000), indicating that the null hypothesis is failed to be accepted in favor of the alternative hypothesis.

Table 4: Two-sample t-test

Panel A: Two-sample t-test of R&D

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Non-clawback	7,376	0.566	0.031	2.629	0.506	0.626
Clawback	11,653	0.153	0.010	1.092	0.133	0.173
combined	19,029	0.313	0.013	1.858	0.287	0.339
diff		0.413	0.027		0.359	0.466
diff = mean(Non-clawback) – mean(Clawback)						t = 15.0153
Ho: diff = 0					degrees of freedom = 19027	
Ha: diff < 0			Ha: diff != 0			Ha: diff > 0
Pr(T < t) = 1.0000			Pr(|T| > |t|) = 0.0000			Pr(T > t) = 0.0000

Panel B: Two-sample t-test of Capex

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Non-clawback	7,376	0.139	0.004	0.354	0.131	0.147
Clawback	11,653	0.094	0.002	0.208	0.091	0.098
combined	19,029	0.112	0.002	0.275	0.108	0.115
diff		0.044	0.004		0.036	0.052
diff = mean(Non-clawback) – mean(Clawback)						t = 10.8678
Ho: diff = 0					degrees of freedom =19027	
Ha: diff < 0			Ha: diff != 0			Ha: diff > 0
Pr(T < t) = 1.0000			Pr(|T| > |t|) = 0.0000			Pr(T > t) = 0.0000

Table 4 presents the two-sample t-test of the dependent variables used for this research for non-clawback and clawback adopters. Panel A depicts two-sample t-test of R&D. Panel B depicts two-sample t-test of Capex. Both panels include number of observations, mean, standard error, standard deviation, and 95% confidence interval. All variables are defined in Appendix.

5.3 Clawback provisions on firms' risk-taking behavior

Table 5 reports the OLS regression results. Column 1 lists all the variables used in the regression, including control variables, and industry and year-fixed effects. Column 2 reports the OLS regression results for clawback initiations on R&D, while column 3 on Capex. Referring to (1), the results show a positive and significant effect of Claw and Afterclaw on the level of research and development expenditure respectively. The variable of interest that captures the effect of clawback provision on risk-taking measures is represented by the term Claw*Afterclaw. The coefficient interest of Claw*Afterclaw shows a negative and significant (-0.129, p-value < 0.01) effect on R&D after controlling for other variables and including industry- and year-fixed effects. The level of research and development is reduced by 12.9% for firms adopting clawback provisions. This result is in line with prior literature regarding clawback adoption on firms' risk (Babenko et al., 2019; Biddle et al., 2018), that shows a negative and significant result on research and development level after clawback adoption. Put differently, the result suggests that firms that adopt clawback in opposed to firms that do not adopt clawback do differ significantly from each other in terms of research and development level.

Taking into account the other control variables, the coefficient of Leverage is positive and significant (0.204, p-value < 0.01), implying that increase in leverage by one would subsequently increase the research and development expenses level by 0.204. Furthermore, the coefficient of Cash is positive significantly (1.983, p-value < 0.01). Consistent with prior research regarding risk-taking level by Coles et al. (2006), the coefficient of Size is negative significantly at one percent significance level (-0.052, p-value < 0.01), while the coefficient of StockReturn is negative but insignificant. Increase in firm size, as measured by the logarithm value of firms' total assets, by one percent would decrease the R&D level by 0.00052 units. Similarly, the coefficient of Growth that captures the firms' growth opportunities is negative and significant (-0.712, p-value < 0.01). Overall, the results in Table 5 suggest that firm-initiated clawback provisions reduces firms' risk-taking behavior in terms of research and development level, which support the prediction mentioned in hypothesis 1. In other words, the first hypothesis is failed to be rejected in favor of the null hypothesis.

Referring to (2), the result shows a negative and significant (-0.024, p-value < 0.01) relationship between Claw and firms' capital expenditure level. However, the coefficient of Afterclaw shows a negative but insignificant effect on capital expenditure. Similar to findings by Biddle et al. (2018) that find a positive and significant result of firm-initiated clawback provisions on capital expenditure level, the variable of interest in this regression, namely

Claw*Afterclaw, shows a positive result but is insignificant. The insignificant result may due to other variables that are not captured in the regression model but correlate with the variable of interest. In other words, the result suggests that firms that adopt clawback in opposed to firms that do not adopt clawback do not differ significantly from each other in terms of capital expenditure level.

Considering the other control variables into account, the result shows a positive and significant effect of leverage on capital expenditure (0.048, p-value < 0.01). This result suggests that increasing level of leverage would consequently increase the level of capital expenditure. The coefficient of Cash is positive and significant (0.056, p-value < 0.01), implying that more cash available to finance new projects would increase the firms' capital expenditure level. Nevertheless, the results are similar to Biddle et al. (2018) in terms of firm size and market-to-book ratio. A negative and significant effect of Size on Capex (-0.005, p-value < 0.01) confirming that as firm size increases by one percent would subsequently decrease the firm's capital expenditure level by 0.00005 units. Whereas, a positive and significant relationship between MTB and Capex (0.005, p-value < 0.01) implying that one percent increase in market-to-book ratio would increase the capital expenditure level by 0.5%. Overall, the results in Table 5 suggest that firm-initiated clawback provisions insignificantly increases firms' risk-taking behavior in terms of capital expenditure level, which do not support the prediction mentioned in hypothesis 2. In other words, the second hypothesis is failed to be accepted in favor of the null hypothesis.

Table 5: OLS regression results of clawbacnk provisions on R&D and Capex

Variables	R&D (1)	Capex (2)
Claw	0.118***	-0.024***
	(2.90)	(-4.33)
Afterclaw	0.119**	-0.004
	(2.25)	(-0.57)
Claw*Afterclaw	-0.129***	0.000
	(-2.63)	(0.03)
Leverage	0.204***	0.048***
	(3.04)	(5.18)
Cash	1.983***	0.056***
	(23.30)	(4.78)
Size	-0.052***	-0.005***
	(-5.67)	(-4.23)
MTB	0.057***	0.005***

	(6.11)	(4.05)
Growth	-0.712***	-0.003
	(-15.62)	(-0.41)
StockReturn	-1.051	-0.048
	(-0.74)	(-0.25)
Constant	-0.012	0.101***
	(-0.47)	(3.19)
Observations	18,944	18,399
R-squared	0.274	0.39
Adjusted R-squared	0.338	0.379
Industry FE	YES	YES
Year FE	YES	YES

Table 5 presents the OLS regression results for firm-initiated clawback provisions on managements' risk-taking behavior, measured by R&D and Capex. The second column shows the effect of firm-initiated clawback provisions on R&D, and the third column for Capex. The standard error is between the parentheses. All variables are defined in Appendix. *, **, *** denotes significance level at 0.1, 0.05, and 0.01, respectively.

5.4 Clawback provisions, firms' risk-taking behavior, and industry competitiveness

Table 6 reports the OLS regression results for hypothesis 3, which examine the effect of clawback provisions on firms' risk-taking behavior by taking into account a moderating variable of industry competitiveness into the equation. The third hypothesis predicts that industry competitiveness will moderate the relationship between voluntary adoption of clawback provisions and R&D, and capital expenditure, with the relationship being weaker for R&D and stronger for capital expenditure when the level of competitiveness is higher. Considering the tight competition the firms are operating in, allocation to R&D and capital expenditure is expected to increase. Column 1 lists all the variables used in the regression, including control variables, and industry- and year-fixed effects. Column 2 reports the OLS regression results for clawback initiations on R&D with a moderating variable, RevHHI, while column 3 on Capex.

Referring to (1), the results show both a positive and significant effect of Claw (0.081, p-value < 0.05) and Afterclaw (0.109, p-value < 0.05) on the level of research and development. The coefficient of interaction variable of Claw*Afterclaw on R&D is negative significantly (-0.143, p-value < 0.01), similar to the previous regression in Table 5. The result implies that the level of R&D is reduced by 14.3% for firms adopting clawback provisions. In other words, the level of R&D does differ significantly between clawback and non-clawback adopters. The variable of RevHHI alone does not affect the level of R&D, shown by the negative but

insignificant value. The variable of interest that captures the effect of industry competition on the relationship of clawback provisions on risk-taking measures is represented by term Claw*Afterclaw*RevHHI. In line with my expectation, the coefficient of interest shows a positive association, but is insignificant. This suggests that higher industry competitiveness does not affect the level of research and development for clawback adopters.

Consistent with Table 5 column 2, other control variables in Table 6 column 2 shows similar signs. The effect of Leverage on R&D is positively significant (0.298, p-value < 0.01), implying that increase in leverage would enhance the research and development level. Confirming prior findings (Biddle et al., 2018; Coles et al., 2006), firm size negatively affects the level of R&D (-0.05, p-value < 0.01). Put differently, bigger firms would alter their risk-taking decision by cutting down the research and development expenses. Whereas, higher market-to-book ratio would enhance firms' risk-taking on research and development expenses (0.062, p-value < 0.01). Furthermore, the effect Growth on R&D shows a negative and significant value (-0.664, p-value < 0.01), which indicates that increase in sales growth by one percent would consequently reduce the research and development spending level by 0.00664 units. Nonetheless, the coefficient of StockReturn remains negative and insignificant. Overall, the results in Table 6 column 2 suggest that higher industry competition does not affect the relationship between clawback provisions and R&D level, which do not support the prediction mentioned in hypothesis 3a. In other words, hypothesis 3a is failed to be accepted in favor of the null hypothesis.

Referring to Table 6 column 3, the coefficient of Claw is negative and significant (-0.022, p-value < 0.01). The interaction variable of Claw*Afterclaw on Capex shows a negative value but remains insignificant. The effect of RevHHI on Capex is positive and insignificant, implying that increased industry competitiveness alone exert no effect on firms' capital expenditure level. The variable of interest is represented in terms of Claw*Afterclaw*RevHHI, which captures the moderating effect of industry competition for firms adopting clawback on ther Capex level. The coefficient of interest is significant but negative (-0.13, p-value < 0.05), suggesting that industry competition does affect the relationship between firm-initiated clawback adoption and capital expenditure. Tighter market competition would consequently lower the capital expenditure level of clawback adopters. This result is in the opposite direction from the initial prediction. Even though firms are expected to take incremental investments in R&D and capital expenditure in order to stay in competition, reduced capital expenditure in tighter market competition may be due to higher restatement risk. The likelihood of firms to partake in financial statement restatement is increased when firms engage in risky investments

(Effendi et al., 2007). Accordingly, with recoupment policy placed on executives, clawback adopters would lower their risk by cutting down capital expenditure level.

Leverage does affect the capital expenditure, with increase in leverage by one would contemporaneously increase capital expenditure by 0.073. Consistent with previous results in Table 5 and prior literature (Biddle et al., 2018; Coles et al., 2006; Guay, 1999; Low, 2009), firm size is negatively associated with capital expenditure (-0.006, p-value < 0.01). Whilst, higher market-to-book ratio (0.004, p-value < 0.01) is positively affecting capital expenditure, with increase in market-to-book ratio leads to more investment in capital expenditure. Nevertheless, firms' annual stock return remains insignificantly affecting the capital expenditure level. Overall, the results in Table 6 column 3 suggest that higher industry competition attenuates the relationship between clawback provisions and capital expenditure level, which do not support the prediction mentioned in hypothesis 3b. In other words, hypothesis 3b is failed to be accepted in favor of the null hypothesis.

Table 6: OLS regression results of clawbacnk provisions on R&D and Capex with a moderating variable of RevHHI

Variables	R&D (1)	Capex (2)
Claw	0.081**	-0.022***
	(2.03)	(-3.78)
Afterclaw	0.109**	-0.006
	(2.03)	(-0.76)
RevHHI	-0.484	0.159
	(-0.61)	(1.39)
Claw*Afterclaw	-0.143***	-0.005
	(-2.84)	(-0.67)
Claw*RevHHI	-0.174	-0.182
	(-0.21)	(-1.51)
Claw*Afterclaw*RevHHI	0.064	-0.13**
	(0.17)	(-2.44)
Leverage	0.298***	0.073***
	(4.67)	(7.91)
Cash	2.548***	0.087***
	(34.54)	(8.15)
Size	-0.05***	-0.006***
	(-5.72)	(-4.93)
MTB	0.062***	0.004***
	(6.85)	(2.93)
Growth	-0.664***	0.009

	(-14.37)	(1.32)
StockReturn	-1.422	-0.035
	(-0.99)	(-0.17)
Constant	-0.076	0.081**
	(-0.33)	(2.40)
Observations	18,386	18,386
R-squared	0.234	0.282
Adjusted R-squared	0.23	0.279
Industry FE	YES	YES
Year FE	YES	YES

Table 6 presents the regression results for firm-initiated clawback provisions on managements' risk-taking behavior, measured by R&D and Capex, while incorporating a moderating variable, RevHHI. The second column shows the effect of firm-initiated clawback provisions on R&D with a moderating variable, RevHHI, and the third column for Capex. The standard error is between the parentheses All variables are defined in Appendix. *, **, *** denotes significance level at 0.1, 0.05, and 0.01, respectively.

5.5 Additional testing

In this section I present the additional testing for the effect of firm-initiated clawback adoption on firm risk-taking decision. I employ leverage (Leverage) to measure the risk taken by the firms. Following prior literature on management's risk-taking behavior (Coles et al., 2006), I include additional variables that are considered to have effects on leverage, namely research and development expenses (R&D), net property, plant, and equipment (NetPPE), and return on assets (ROA). Table 7 reports the results of voluntary adoption of clawback provisions on firms' level of leverage, complementing hypothesis 1 and 2. The results show a negative but insignificant effect of Claw, and a negative and significant effect of Afterclaw (-0.02, p-value < 0.01) on the level of leverage respectively. The variable of interest that captures the effect of clawback provisions on risk-taking measures is represented by the term Claw*Afterclaw. The coefficient interest of Claw*Afterclaw shows a positive and significant (0.019, p-value < 0.01) effect on Leverage after controlling for other variables and including industry- and year-fixed effects. The level of leverage is increased by 1.9% for firms adopting clawback provisions. This result suggests that firms adopting clawback possess higher financial risk in oppose to firms who are not. The result is in line with Fang and Zhong (2014) who claim that manager with greater likelihood of compensation loss would be encouraged to take on larger risk exposure, which in this research is measured using leverage.

R&D significantly affects Leverage, with increase in research and expenditure spending would reduce firms' leverage amount by 0.8% (-0.008, p-value < 0.01). On the other hand, the

size of the firm positively associated with leverage (0.03, p-value < 0.01). This result indicates that larger firm exerts more leverage. Return on assets negatively affects the amount of leverage (-0.178, p-value < 0.01), suggesting that firms who generate more return on assets reduce their financial risk by 17.8%. Overall, the results in Table 7 suggest that firm-initiated clawback provisions significantly increases firms' risk-taking behavior in terms of leverage level.

Table 7: OLS regression results of clawbacnk provisions on Leverage

Variable	Leverage
Claw	-0.005
	(-1.02)
Afterclaw	-0.02***
	(-3.44)
Claw*Afterclaw	0.019***
	(3.55)
R&D	-0.008***
	(-8.65)
Size	0.03***
	(28.96)
MTB	-0.002*
	(-1.85)
NetPPE	0.133***
	(12.18)
ROA	-0.178***
	(-18.16)
Constant	-0.026
	(-1.01)
Observations	18,375
R-squared	0.37
Adjusted R-squared	0.36
Industry FE	YES
Year FE	YES

Table 7 presents the OLS regression results for firm-initiated clawback provisions on managements' risk-taking behavior, measured by Leverage. The standard error is between the parentheses. All variables are defined in Appendix. *, **, *** denotes significance level at 0.1, 0.05, and 0.01, respectively.

Table 8 reports the OLS regression results complementing hypothesis 3, which examine the effect of clawback provisions on firms' risk-taking behavior by taking into account a moderating variable of industry competitiveness into the equation. The coefficient of

interaction variable of Claw*Afterclaw on Leverage is positive and significant (0.02, p-value < 0.01), similar to the previous regression in Table 6. The result implies that firms' leverage is increased by 2% for firms adopting clawback provisions. The variable RevHHI alone does not affect the level of leverage, shown by the negative but insignificant value. The variable interest that captures the effect of industry competition on the relationship of clawback provisions on leverage is represented by the term Claw*Afterclaw*RevHHI. The variable of interest shows a negative but insignificant result, indicating that industry competition does not affect the clawback adopters in terms of leverage.

Consistent with previous regression in Table 7, the control variables show the same sign on leverage. The effect of R&D on Leverage is negative and significant (-0.008, p-value < 0.01), whereas firm size positively affects leverage (0.034, p-value < 0.01). Nevertheless, the coefficient of ROA on Leverage remains negative and significant (-0.146, p-value < 0.01), indicating that firms with more return on assets would lower their leverage level. Overall, the results in Table 8 suggest that higher industry competition does not affect the association between clawback provisions and firms' level of leverage, which do not support the prediction mentioned in hypothesis 3.

Table 8: OLS regression results of clawbacnk provisions on Leverage with a moderating variable of RevHHI

Variable	Leverage
Claw	-0.003
	(-0.70)
Afterclaw	-0.023***
	(-3.65)
RevHHI	-0.108
	(-1.16)
Claw*Afterclaw	0.02***
	(3.30)
Claw*RevHHI	0.271***
	(2.76)
Claw*Afterclaw*RevHHI	-0.065
	(-1.51)
R&D	-0.008***
	(-8.72)
Size	0.034***
	(32.98)
MTB	-0.006***

	(-5.47)
NetPPE	0.105***
	(14.35)
ROA	-0.146***
	(-14.83)
Constant	-0.011
	(-0.39)
Observations	18,379
R-squared	0.266
Adjusted R-squared	0.263
Industry FE	YES
Year FE	YES

Table 8 presents the regression results for firm-initiated clawback provisions on managements' risk-taking behavior, measured by Leverage, while incorporating a moderating variable, RevHHI. The standard error is between the parentheses All variables are defined in Appendix. *, **, *** denotes significance level at 0.1, 0.05, and 0.01, respectively.

6. Discussion and conclusion

This thesis aims to examine the effect of voluntary clawback provision adoption by firms on firms' risk-taking decision. Growing popularity of clawback provisions has led to numerous studies on the cause and effect of clawback provisions on firms. Much literature has highlighted the positive outcomes yielded from this compensation recoupment policy. Fewer accounting restatement, improved internal control system, and increased executives' pay are several examples of the benefit from adopting clawback provisions. Contrary to previous findings, Erkens et al. (2018) posit that the effect of clawback policy is not entirely attributable to its adoption, rather as a result of the clawback design. Initially, this thesis examines the effect of firm-initiated clawback provisions on firms' risk-taking behavior measured by research and development spending and capital expenditure. Next, I test the effect of clawback provisions on firms' risk-taking behavior by taking into account a moderating variable of industry competitiveness measured by Herfindhal-Hirschman Index.

The analyses regarding the clawback provisions are based on a sample of Russel 3000 firms over the period 2004 and 2019. To test the hypotheses, I employ research and development expenses and capital expenditure as proxies for firms' risk-taking. The OLS regression result for hypothesis 1 reports a negative and significant effect of clawback adoption on firms' level of research and development expenses. The result indicates that firms with clawback provisions in place would cut down their investment in research and development. On the other hand, the OLS regression result for hypothesis 2 is insignificant. This suggests that clawback provisions do not affect firms' decision in terms of capital expenditure. Taking into account a moderating variable of industry competitiveness, the OLS regression results for hypothesis 3a shows an insignificant effect of tighter industry competition for clawback adopters on their research and development expenditure. Whereas the OLS regression results for hypothesis 3b contradicts the initial prediction. The result shows a negative and significant effect of higher industry competition for clawback adopters in terms of capital expenditure, indicating that firms employing compensation recoupment policy would invest less on capital expenditure when the competition within its industry is enhanced. The contradictory result may be due to higher financial restatement risk as the consequence of greater investment risk (Effendi et al., 2007).

In addition, I run an additional test in complement to the three hypotheses. In the additional test I employ leverage as a proxy of risk-taking decision and include three additional control variables of research and development expenditure, return on assets, and net property, plant, and equipment. The findings show that firms who adopt clawback provisions increase

their level of leverage. However, the findings report no effect of industry competition on the relationship between firm-initiated clawback and leverage.

This thesis is subject to several limitations. First, I do not employ a propensity score matching method. Propensity score matching method is able to match treatment and control group based on specific characteristics that influence firms to adopt clawback provisions. By controlling the characteristics, propensity score matching is deemed to generate more accurate results. Second, Erkens et al. (2018) discover that the outcomes from clawback adoption on firms depend on the clawback design itself. The outcomes experienced by the firms differ depending on the strength of the clawback. In this thesis, I do not take into account clawback design into my analysis. Considering the clawback design into my analysis would lead to more accurate results.

This thesis contributes to literature regarding clawback provisions by examining the consequences of firm-initiated clawback provisions on firms' risk-taking behavior. Following prior literature concerning firms' risk and clawback provisions (Babenko et al. 2019, Biddle et al., 2018, Coles et al., 2006), I analyze the effect of clawback provisions on risk-taking decisions taken by the firms and extend prior research by employing a moderating variable of industry competitiveness to see its effect on the association between clawback provisions and firms' risk-taking decision, which has not been studied previously. The findings provide new insights regarding the effect of competition within an industry on decision regarding firms' risk. The findings should be of interest for regulators, standard setters, and other related market participants as the findings are relevant for current debate concerning mandatory implementation of clawback provisions by the SEC.

References

Ali, A., Klasa , S., & Yeung, E. (2014). Industry Concentration and Corporate Disclosure Policy. *Journal of Accounting and Economics*, 240-264.

Anthony, R. N., Govindarajan, V., Hartmann, F. G., Kraus, K., & Nilsson, G. (2014). *Management Control System* (First European ed.). London: McGraw-Hill Education.

Babenko, I., Bennett, B., Bizjak, J. M., & Coles, J. L. (2012). Clawback Provisions.

Babenko, I., Bennett, B., Bizjak, J. M., Coles, J. L., & Sandvik, J. J. (2019, April 30). Clawback Provisions and Firm Risk. *Fisher College of Business Working Paper*, 1-60.

Bargeron, L. L., Lehn, K. M., & Zutter, C. J. (2010). Sarbanes-Oxley and Corporate Risk-taking. *Journal of Accounting and Economics*, 34-52.

Benmelech, E., Kandel, E., & Veronesi, P. (2010). Stock-based Compensation and CEO (Dis)Incentives. *Quarterly Journal of Economics*, 1769–1820.

Bens, D. A., Goodman, T. H., & Neamtiu, M. (2012). Does Investment-Related Pressure Lead to Misreporting? An Analysis of Reporting Following M&A Transactions. *The Accounting Review*, 839-865.

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics*, *119*, 249–275.

Biddle, G. C., Chan, L. H., & Joo, J. H. (2018). Do Clawback Adoptions Influence Capital Investment Mix? *Available at SSRN 3042973*.

Brown, B. A., Davis-Friday, P. Y., & Guler, L. (2011). Economic Determinants of the Voluntary Adoption of Clawback Provisions in Executive Compensation Contracts. *Baruch College Working Paper*, 1-38.

Calkins, S. (1983). The New Merger Guidelines and the Herfindahl-Hirschman Index. *California Law Review*, 402-429.

Carruth, A., Dickerson, A., & Henley, A. (2000). What Do We Know About Investment Under Uncertainty? *Journal of Economic Surveys*, 119-153.

Chan, L. H., Chen, K. C., Chen, T. Y., & Yu, Y. (2012). The effects of firm-initiated clawback provisions on earnings quality and auditor behavior. *Journal of Accounting and Economics*, 180-196.

Chan, L. H., Chen, K. C., Chen, T. Y., & Yu, Y. (2015). Substitution between Real and Accruals- Based Earnings Management after Voluntary Adoption of Compensation Clawback Provisions. *The Accounting Review, 90*(1), 147-174.

Cohen, D. A., Dey, A., & Lyz, T. Z. (2008). Real and Accrual-Based Earnings Management in the Pre- and Post-Sarbanes-Oxley Periods. *The Accounting Review*, 757-787.

Coles, J. L., Daniel, N. D., & Naveen, L. (2006). Managerial incentives and risk-taking. *Journal of Financial Economic*, 431–468.

Cornett, M. M., Marcus , A. J., & Tehranian, H. (2008). Corporate Governance and Pay-for-performance: The Impact of Earnings Management. *Journal of Financial Economics*, 357-373.

Dechow, P. M. (1994). Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals. *Journal of Accounting and Economics*, 3-42.

Dehaan, E., Hodge, F., & Shevlin, T. (2013). Does Voluntary Adoption of a Clawback Provision Improve Financial Reporting Quality? *Contemporary Accounting Research*, 1027-1062.

Dixit, Avinash K. & Pindyck, Robert S. (1994) Investment Under Uncertainty, *Princeton: Princeton University Press.*

Dyl, E. A. (1988). Corporate Control and Management Compensation: Evidence on the Agency Problem. *Managerial and Decision Economics*, 21-25.

Effendi, J., Srivastava, A., & Swanson, E. P. (2007). Why do corporate managers misstate financial statements? The role of option compensation and other factors. *Journal of Financial Economics*, 667–708.

Erkens, M. H., Gan, Y., & Yurtoglu, B. B. (2018). Not all clawbacks are the same: Consequences of strong versus weak clawback provisions. *Journal of Accounting and Economics*, 291-317.

Fang, M., & Zhong, R. (2004, May 1). Default Risk, Firm's Characteristics, and Risk Shifting. *Yale ICF Working Paper*, 1-43.

Faulkender, M., Kadyrzhanova, D., & Prabha, N. (2010). Executive Compensation: An Overview of Research on Corporate Practices and Proposed Reforms. *Journal of Applied Corporate Finance*, 107-118.

Fried, J., Shilon, N., (2011). Excess-pay Clawbacks. Harvard Law School Working Paper.

Gaspar, J., Massa, M., 2006. Idiosyncratic volatility and product market competititon. Journal of Business, 3125-3152.

Gerety, M., Lehn, K., 1997. The Causes and Consequences of Accounting Fraud. Managerial and Decision Economics, 587-99.

Gjesdal, F. (1982). Information and Incentives: The Agency Information Problem. *The Review of Economic Studies*, 373-390.

Guay, W. (1999). The Sensitivity of CEO Wealth to Equity Risk: An Analysis of the Magnitude and Determinants. *Journal of Financial Economics*, 43-71.

Hölmstrom, B. (1979). Moral Hazard and Observability. *The Bell Journal of Economics*, 74-91.

Iskandar-Datta, M., & Yonghong, J. (2013). Valuation Consequences of Clawback Provisions. *The Accounting Review,*, 171-198.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure. *Journal of Financial Economics*, 305-360.

Karuna, C., 2007. Industry Product Market Competition and Managerial Incentives. *Journal of Accounting & Economics*, 275-97.

Karuna, C., Subramanyam, K. R., & Tian, F. (2012). Industry Product Market Competition and Earnings Management. *Working Paper University of Houston*, 1-53.

Kedia, S., & Philippon, T. (2007). The Economics of Fraudulent Accounting. *The Review of Financial Studies*, 2169-2199.

Kim, C. W., & Mauborgne, R. (1997). Value Innovation: The Strategic Logic of High Growth. *Harvard Business Review*, 103-112.

Kothari, S. P., Laguerre, T. E., & Leone, A. J. (2002). Capitalization versus Expensing: Evidence on the Uncertainty of Future Earnings from Capital Expenditures versus R&D Outlays. *Review of Accounting Studies*, 355–382.

Larraza-Kintana, M., Wiseman, R. M., Gomez-Mejia, L. R., & Welbourne, T. M. (2007). Disentangling Compensation and Employment Risks Using the Behavioral Agency Model. *Strategic Management Journal*, 1001-1019.

Lin, Y.-C. (2016). Do Voluntary Clawback Adoptions Curb Overinvestment? *Corporate Governance International Review*, 255-270.

Low, A., (2009). Managerial Risk-taking Behavior and Equity-based Compensation. Journal of Financial Economics, 470–490.

McConnell, J. Muscarella, C.J. (1985). Corporate capital expenditure decisions and the market value of the firm, *Journal of Financial Economics*, 399-422.

Natarajan, R., & Zheng, K. (2017). Clawback Provision of SOX, Financial Misstatements, and CEO Compensation Contracts. *Journal of Accounting, Auditing & Finance*, 74-98.

Pratt, J. W., & Zeckhauser, R. J. (1985). Principals and Agents: The Structure of Business. *Harvard Business School Press*, 1-10.

Raith, M. (2003). Competition, Risk, and Managerial Incentives. *The American Economic Review*, 1425-1436.

Schmidt, K. M. (1997). Managerial Incentives and Product Market Competition. *Review of Economic Studies* , 191-213.

Stiglitz, J. E. (1975). Incentives, Risk , and Information: Notes Towards a Theory of Hierarchy. *The Bell Journal of Economics*, 552-579.

Varma, A., Bhalotia, K., & Gambhir, K. (2018). Innovating for Competitive Advantage: Managerial Risk-taking Ability Counterbalances Management Controls. *Journal of Management and Governance*.

Wiseman, R., & Gomez-Mejia, L. R. (1998). A behavioral agency model of managerial risk taking. *The Academy of Management Review*.

Wright, P., Kroll, M., & Krug, J. A. (2007). Influences of Top Management Team Incentives on Firm Risk Taking. *Strategic Management Journal*, 81–89.

Zhang, H. (2008). Product Market Competition and Corporate Governance: Substitutes or Complements? Evidence from CEO Duality. *Working Paper University of Toronto*, 1-83.

Appendix

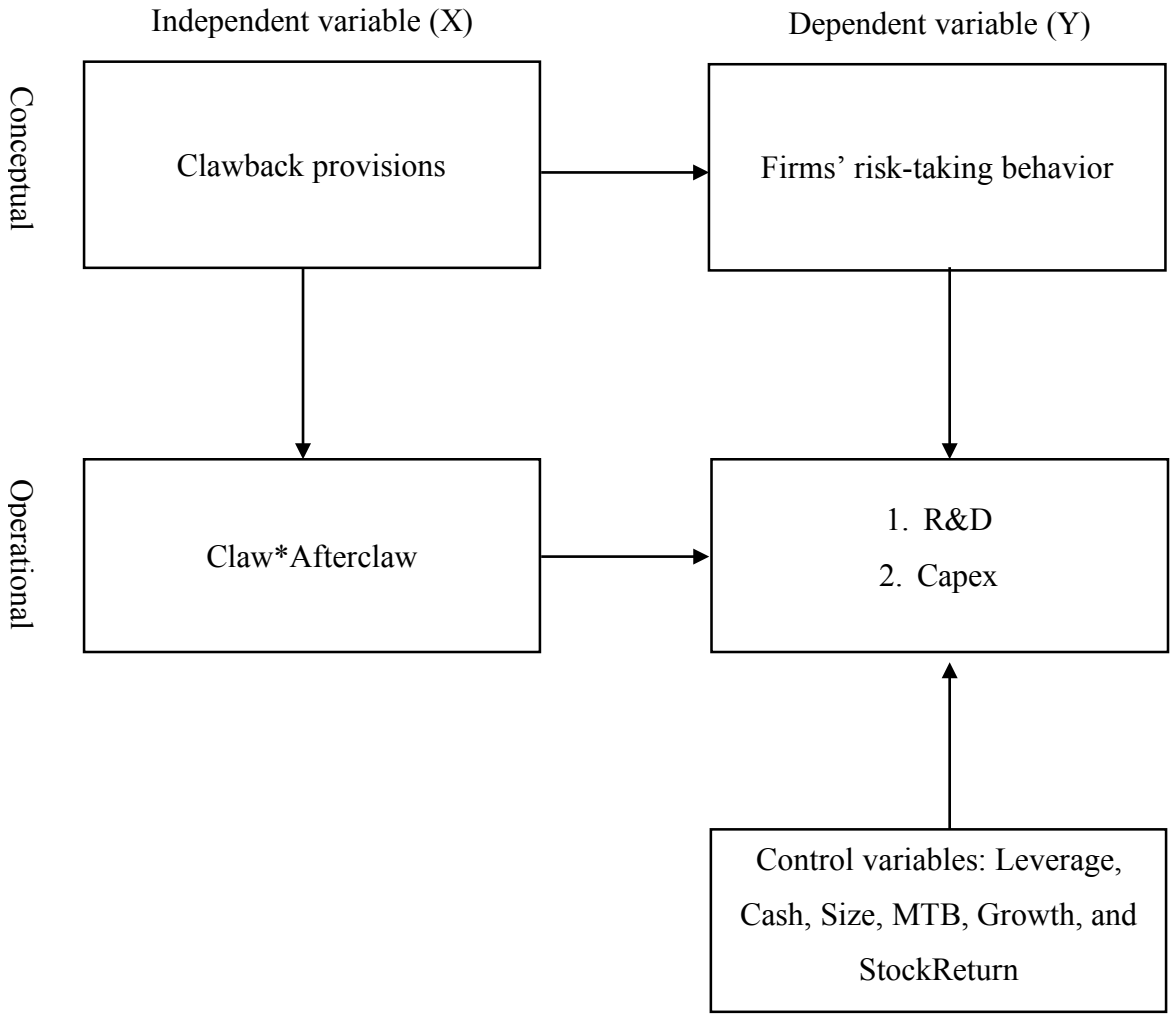
Variables Definition

Variable	Definition	Source
Claw	Dummy variable equals to 1 if the firm adopts clawback provision, and 0 otherwise	Dr. Michael Erkens
Afterclaw	Dummy variable equals to 1 if the firm-years after the adoption have clawback in place, and 0 otherwise	Dr. Michael Erkens
RevHHI	Herfindahl-Hirschman Index, calculated using sales of the firm to total sales of firms in its industry multiplied by -1	Compustat
R&D	Research and development spending measured by research and development expenses scaled by total sales	Compustat
Capex	Capital expenditure measured by capital expenditure scaled by total sales	Compustat
Cash	Excess cash available to finance new projects, measured by cash scaled by total assets	Compustat
Growth	Sales growth, measured by the logarithm value of current-year sales to last-year sales	Compustat
Leverage	Firm leverage calculated by the sum of debt in current liabilities and long-term debt, scaled by total assets	Compustat
MTB	Market-to-book ratio measured by the sum of total assets subtracted by total equity and a multiplication of common shares outstanding and closing price, scaled by total assets	Compustat
Size	Firm size measured by the logarithm value of total assets	Compustat

StockReturn	Stock return is measured by annualizing monthly return of firms' value-weighted return	CRSP
ROA	Return on assets calculated by operating income before depreciation scaled by total assets	Compustat
NetPPE	Net property, plant, and equipment calculated by total (net) property, plant, and equipment scaled by total assets	Compustat

Libby Boxes

To test hypothesis 1 and 2:



To test hypothesis 3a and 3b: