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FINANCIAL DERIVATIVES, EARNINGS MANAGEMENT, AND FIRM PERFORMANCE

Evidence from the global financial crisis

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ABSTRACT

The quality of corporate governance and risk management is one of the main determinants of firm performance during economic downturns. The global financial crisis of 2007–08 reduced the global market capitalization by approx. 50%, making it one of the most acute financial crises. Only a few studies have investigated the direct impact of financial derivatives usage and earnings management simultaneously on market performance for non-financial firms during this period. These studies report mixed results on the phenomenon varying based on the sample and the empirical methodology used.

This study aims to identify the effect of the two income smoothing techniques on the market performance of non-financial firms during the global financial crisis. It uses a binary variable indicating the use of financial derivatives and the absolute amount of discretionary accruals during a specific year as the main independent variables, while firm performance is measured by a novel variable - the cumulative monthly stock returns during the year. The sample includes 297 firms listed on the S&P 500 index between 2005 and 2009, which allows comparison of results observed during the pre-crisis period and the crisis period. In addition to Pooled OLS, fixed-effects models are used in the regression analysis.

The empirical findings suggest that using financial derivatives has a positive impact on firm performance, while the magnitude of discretionary accruals has a negative impact. These relationships are stronger during the crisis period, especially for larger firms and firms with more independent boards. Although the results are robust and of significance to academics as well as practitioners, further research using a larger sample and a longer time horizon may enhance their validity and address any potential endogeneity bias.

KEY WORDS: Derivatives, Earnings Management, Firm Performance, Financial Crisis

1. INTRODUCTION

The global financial crisis of 2007–08, often recognized as the most acute financial crisis since the great depression of the 1930s, resulted in a decline of over 50% in the global stock market capitalization. Although the financial sector was most affected by the crisis, non-financial sectors around the world also experienced the impacts up to a great extent. (Clarke, 2010; Kirkpatrick 2009.) During the crisis, uncertainty and risk related to the reliability of public corporate information, were higher than before (Lin, Jiang, Tang & He 2014). Kirkpatrick (2009), in an article discussing the relevance of corporate governance during the financial crisis, concluded that the quality of corporate governance and risk management in a non-financial firm is a significant determinant of firm performance in chaotic times. Several other papers have studied the impact of corporate governance quality on firm performance during the financial crisis of the late 2000s, but only a few have focused directly on the issues of earnings management and hedging. Further, the association between risk management activities and firm performance during the period comprising the global financial crisis has mostly been studied using a sample of financial firms.

1.1. Background and Basis for Research

Mixed results have been reported by previous studies on the relationship between hedging using financial derivatives and firm performance. Panaretou (2014) finds a positive relationship between using foreign currency derivatives and firm performance measured by Tobin's Q for a sample of non-financial firms listed in the United Kingdom during 2003-2010. However, the author reports a lower hedging premium for firms during 2007-2010. On the other hand, Bartram, Brown, & Conrad (2011), using a global sample of firms from 47 different countries, find that hedgers had significantly lower systematic risk during the crisis period of 1998-2002. But, they only find weak results for higher alphas for hedgers during the period, although hedgers had a significantly lower drop in Return on Assets during the period compared to non-hedgers. After further analysis of the impact of derivatives use on firm value, they conclude that the benefits of using

derivatives to hedge financial risk are higher during times of economic distress. In an influential study conducted by Allayannis & Weston (2001) on the impact of foreign currency derivatives usage on firm value in non-financial U.S. firms, they find a hedging premium of up to approx. 5 % of firm value during the period 1990-1995. Another paper, by Nelson, Moffitt & Affleck-Graves (2005), shows similar results concerning the impact of foreign currency derivatives usage and firm performance. This study uses abnormal stock returns of U.S. non-financial firms during the period of 1995–1999 and reports a 4.3 % hedging premium for foreign currency hedgers per year, but no premium for interest-rate and a negative impact of commodity derivatives users. Yin & Jorion (2006) perform a similar study using a sample of oil & gas firms from the United States during 1998–2001. Interestingly, they find that hedgers' stocks exhibit lower sensitivity to oil & gas prices, but do not have earn a hedging premium relative to non-hedgers.

The consequences of earnings management on firm performance have been researched heavily in the last few decades, especially after a few major accounting scandals. Dechow, Weili & Schrand (2010), taking into consideration the previous literature on the impact of earnings quality on firm value, conclude that investors react negatively to financial misstatements by firms. Xing & Yan (2018), studying the association between systematic risk and the quality of accounting information in U.S. firms, find that firms with high quality of accounting information exhibited lower systematic risk. Aldamen, Keith, Kelly, Mcnamara & Nagel (2011) state that audit committees have a primary role in overseeing the risk management and earnings management practices of firms. In their paper, they use the characteristics of audit committees as proxies for the quality of earnings and the quality of risk management practices of a sample of U.S. firms during 2008–2009 and attempt to find their relationship with firm performance during the global financial crisis period. They find that firms the size of audit committee has a negative effect on firm performance. They also find a positive impact of the financial expertise and experience of the audit committee members and firm performance during the crisis period. They use the change in share price as the measure of firm performance. Most papers on this subject use indirect measures of earnings management and risk management practices to find their impact on non-financial firms' performance during 2008–2009. However, the paper by Lin et. al (2014) discussed the relationship between financial reporting quality,

measured by the amount of discretionary accruals, and firm performance of non-financial companies from the United Kingdom between 2008–2009. The authors find that firms with a higher quality of earnings had higher stock liquidity during the crisis. They state that the lower trust and higher information risk during the period could have been reduced by enhancing the transparency of financial performance of firms, and the firms that undertook the related steps suffered the less consequences.

Attia (2012), investigating the relationship between artificial and real income smoothing, find evidence using a sample of non-financial firms from the United States during 1993-2004 that the two smoothing devices are used together in order to achieve an efficient risk management strategy. Barton (2001) also finds that discretionary accruals and derivatives are used as partial substitutes to achieve a desirable volatility in the firm earnings, which helps managers gain value for private gains while also avoiding additional interest and tax related costs. However, Choi, Mao & Upadhyay (2015), following Barton (2011), perform a similar study during 1996-2006, and find contrary results. The authors report a complementary relationship between the two income smoothing techniques after the introduction of FAS 133 in 1998, which made it mandatory for listed firms in the United States to report the fair market value of their outstanding derivatives and to recognize the ineffective part of cash flow hedges immediately, giving rise to the belief that hedging using financial derivatives had become inefficient (Choi et al. (2015).

Based on the previous literature discussed above, it can be concluded that mixed results have been found for the impact of artificial and income smoothing on firm performance. However, the evident relationship between the two smoothing devices makes it important to study the simultaneous effect of the two techniques on firm performance, especially during a time of market uncertainty. Considering that the primary objective of hedging is to avoid losses due to unforeseeable changes in foreign exchange rates, interest rates, and commodity prices, it would be beneficial to study the effect of hedging practices of firms on their performance during a financial crisis, which is an exogenous shock for non-financial firms. Also, as mentioned earlier, due to increased uncertainty and information risk during a crisis, and the widely found significance of financial reporting quality for

firm value, the direct impact of prevalent earnings management on firm performance during the crisis is an important subject.

1.2. Purpose of the Study

This study would fill in this gap in the existing literature contribute to the research community by using direct proxies for earnings management and hedging practices of non-financial U.S. firms as explanatory variables and compounded monthly stock returns during the period as the dependent variable. To proxy for hedging, a binary variable indicating whether a firm uses financial derivatives to hedge financial risk or not will be used. The absolute amount of discretionary accruals for a firm during a given year will be used as a proxy for earnings quality. Healy (1985) defines discretionary accruals as the adjustments made by a manager of a firm to its cash flows in order to modify the timing of reported income and expenses. Overall, the aim of this thesis is to identify the simultaneous impact of artificial and real income smoothing on firm performance during the period 2005-2009, with an emphasis on the period representing the global financial crisis (2008-2009). The study uses a sample of non-financial and non-utility firms listed on the S&P 500 stock index during the whole sample period. Various quantitative analytical methods are used to answer the primary research question, which is: *Does the use of financial derivatives and discretionary accruals have an impact on firm performance during an economic downturn?* The role of corporate governance in the relationship between income smoothing devices and firm performance will also be explored. Since endogeneity-related issues have been highlighted in previous similar studies, measures including fixed-effects regression models have been utilized to achieve reliable results. However, due to a limited data set and resources, endogeneity effects could not be elimited completely and may be present up to some extent.

1.3. Thesis Structure

This study is divided into six different chapters, with the first chapter serving as an introduction to the subject of the research. It also describes the motivation behind the study based on the empirical and theoretical background information. The second chapter lays down the theoretical foundations, discussing the importance of accounting information quality, the factors influencing earnings management and the use of financial derivatives for hedging purposes, as well as the consequences of management choices concerning risk management. The third chapter discusses in length previous studies investigating similar relationships and forms research hypotheses based thereon. The fourth chapter focuses on the research methodology applied in this study by describing the data and the empirical methods used. The fifth chapter compares the results obtained in this study by using the respective analytical models with previous literature. The last chapter forms conclusions based on the results and includes suggestions for further research.

2. THEORETICAL BACKGROUND

This chapter lays down the theoretical foundations for this study. The different sections in the chapter deal with specific aspects of this study, including the quality of reported financial information, accrual and earnings management, financial risk and hedging, and rationales for using financial derivatives for hedging purposes.

2.1. Financial Accounting Information

Financial accounting information disclosed by a public firm is the result of the firm's fundamental performance, its internal accounting practices, and the respective external accounting information reporting systems, such as the International Financial Reporting Standards. This information gives the stakeholders a comprehensive picture of a firm's financial performance during a specific period as well as its current financial position, and is the basis for various economic decisions. For instance, managerial compensation plans in public firms are commonly tied, in part, to an accounting performance measure or a public performance measure. The effect of accounting performance on a firm's stock price, which is one of the public performance measures, is widely documented. Also, the relationship between managerial compensation plans and management turnover, and subsequently the association between management turnover and a firm's stock performance is also evident from previous governance research. (Bushman & Smith 2001; Dechow, Ge & Schrand 2010.) Thus, the role of accounting information is vital in the current corporate environment.

All publicly listed firms in the United States are required to publish financial statements on a quarterly and annual basis. According to Elliott and Elliott (2006), financial statements portray the financial consequences of past transactions and group them into certain categories based on the type of effect they entail on the organization. In order to ensure that the accounting information publicly disclosed by a firm is of high quality, various external control mechanisms have been put in place. In the United States of America, the Security and Exchange Commission (SEC) is the main body of control over

the financial and accounting practices of publicly listed firms. The SEC is responsible for monitoring the reporting standards issued by the Financial Accounting Standards Board and the implementation of the established rules by public firms in their financial statements. Stakeholders of a firm are often interested in the firm's published balance sheet, income statement, cash flow statement, and the statement of changes in equity, supplemented with notes that clarify accounting policies and derivation of accounting figures. Public firms are required to conform to the applicable accounting standards when making these statements, and are subject to regular audits by external auditing entities. (Imhoff 2003.) Firms listed on the New York Stock Exchange and NASDAQ are also required to have a board of directors majorly composed of outside (or independent) members, consistent with the theory that having more independent board directors enhances the control over management's financial accounting and reporting practices (Huang, Louwers, Moffitt & Zhang 2008). Accounting standards and external auditors assist managers in communicating with their stakeholders by allowing them to report their past financial performance and related future transactions in a reliable and consistent manner (Healy and Wahlen 1999).

2.2. Accrual Accounting and Earnings Management

Most corporations use cash accounting or accrual accounting in order to prepare their financial statements. While small companies may qualify for using cash accounting, publicly listed firms are required to use accrual accounting while preparing their financial statements. Under cash accounting, a firm records an economic transaction when a cash flow occurs, whereas under accrual accounting, the transaction is recorded when the exchange of goods or services takes place and not when the cash is paid or received. Hence, accruals are revenues that have been recorded but not yet been earned, and expenses that have incurred but not yet been recorded. (Duchac, Reeve & Warren 2010.) The use of accrual accounting does not only inform a firm's stakeholders of the past cash revenues and expenses, but also of the future payment obligations and the expected cash in-flows from a transaction or an asset (Elliott & Elliott 2006). Financial statement items,

such as, inventories, depreciation, accounts receivables, employee benefit-related expenses, bad debt reserves, etc. are commonly affected by the use of accruals.

Quality of Financial Information

Financial information quality is a broad concept, where different academics and standard setters have different measures to evaluate the usefulness of the information. However, Elliott and Elliott (2006) explain that the basic qualitative features of useful accounting information are reliability, relevance, comparability, and understandability. Briefly, financial accounting information should be of some economic significance, be complete and free from bias, be consistent, and be perceivable by its users, which include investors, customers, suppliers, employees, the government, standard setters, and creditors. Various studies have suggested the fixation of financial market participants with a company's bottom-line figure, the earnings (Chan, Chan, Jegadeesh & Lakonishok 2006). Consequently, there has been extensive research done on the effects of earnings quality.

A meta-analysis study by Bilal, Chen & Komal (2018) mentioned that researchers use different proxies of earnings quality, such as, the quality of accruals, real earnings management, target beating, earnings restatement, and the strength of internal controls. Accruals quality is connected with the discretion used by managers in creating provisions and estimates that do not directly affect present cash flows, but influence the bottom-line earnings figure, whereas real earnings management is the strategic timing of corporate decisions that directly impact the firm's cash flows. Target beating is the deliberate upward manipulation of earnings and downward direction of analyst estimates by managers in order to control market reaction. Akhigbe, Kudla & Madura (2007) define earnings restatement as the process of adjusting previously published accounting information, which may require a reassessment of the firm's future cash flows. Internal controls comprise of the measures taken by a firm to ensure the accuracy and reliability of accounting practices, and can be associated with the independence of the board members, expertise of the audit committee, and the type of relationship with the external auditing firm. (Bilal, Chen & Komal 2018.) According to Dechow, Ge & Schrand (2010), previous literature on proxies of earnings quality does not indicate the superiority of any

specific quality measure. The authors further state that the quality of earnings depends on the type of decision that is to be subsequently made.

Earnings Management

Corporate managers have a good knowledge of their firm's past performance as well as the underlying micro- and macro-factors that affect the business and the industry it operates in. They should hence be given an opportunity to use their judgement in producing estimates for the financial reports. Indeed, even while conforming to the rules and standards set by accounting standards such as the Generally Accepted Accounting Principles (GAAP) or the International Financial Reporting Standards (IFRS), managers do have some discretion while preparing the financial statements. Managers are required to use their judgement for various corporate decisions, such as the expected life of fixed assets, the value of current inventory, expected bad debts, and future human resources-related costs. The need for managerial discretion arises from the available choice of accounting methods that affect the firm's financials. For instance, managers can choose whether to employ a straight-line depreciation method or an accelerated depreciation method when valuing fixed assets. They also have various choices concerning inventory valuation and receivables policy. Healy and Wahlen (1999) report that accounting discretion is an opportunity for managers to provide external stakeholders with credible private information that may otherwise be limited by accounting standards. However, due to monitoring and auditing inefficiency, management discretion may be misused for personal gains. (Healy and Wahlen 1999; Dechow and Skinner 2000.)

Jensen (1994) mentions that human beings, by nature, are self-interested, and managerial compensation in the form of equity and stock options, or performance-based compensation contracts, may provide managers with the incentives to engage in activities not in line with shareholder welfare. One such unethical practice by corporate managers is **earnings management**. Sevin and Schroeder (2005) define earnings management as the deliberate effort by corporate managers to influence short-term earnings reported in financial statements. Healy and Wahlen (1999) elaborate on the definition of earnings management by claiming that managers indulge in this practice either to mislead

stakeholders or to affect the contractual consequences of reported earnings. Referring to previous studies, Sevin and Schroeder (2005) explain that managers may be motivated to manage earnings using unethical practices in order to influence the stock price, increase their performance-based compensation, and maintain or enhance creditor relations, etc. According to them, managers face pressures to meet or beat analysts' earnings forecasts due to their belief that investors and creditors make decisions based on certain benchmarks.

Sevin and Schroeder (2005), referring to the remarks made by Arthur Levitt, a former SEC chairman, on earnings management, explain that there are five major techniques that reduce the reliability of reported financial information. The first technique is known as "taking an earnings bath", which means, overstating one-time restructuring expenses in the current period to reduce expenses to be reported in the future. The second technique is "creative acquisition accounting", the practice of stating artificially large in-process research and development charges to avoid future expenses. According to Kokoszka (2003), these expenses occur during a merger, and merger accounting dictates the immediate write-off of these expenses by the acquiring firm. But, in order to misuse this accounting practice, the firm may overstate the expenses to reduce current period earnings. The third technique is commonly called creating "cookie jar" reserves, wherein a firm overstates sales returns or warranty costs in times of good financial performance and uses those overstatements in times of financial distress. Abarbanell and Lehavy (2003) attempt to find an association between earnings management and analyst recommendations and show that firms that receive a "buy" signal are more likely to engage in income-increasing earnings management in order to meet or slightly beat analysts' forecasts, whereas firms with a "sell" signal are more likely to manage earnings downwards, indicating that these firms may have more incentives to take earnings baths or inflate accounting reserves. The fourth earnings management technique violates the materiality accounting concept by ignoring financial reporting errors and underestimating their significance. The fifth income-smoothing technique is the recognition and reporting of unearned revenue. A firm may be tempted to accelerate its growth and can potentially use this practice to report an artificially high income in a specific period.

One of the primary responsibilities of the board of directors is to ensure that managers act in the interest of the company's shareholders. Healy and Palepu (2001) explain that corporate management has superior information about the firm's prospects than do the outside shareholders, and this is commonly known as information asymmetry. Information asymmetry exists in firms where there is a separation of ownership and control, i.e. when shareholders of a firm do not actively participate in management-related activities. This relationship between shareholders and managers is a typical agency relationship found in corporations, wherein the managers (agents) are given the responsibility to act on behalf of the stakeholders and maximize shareholders' utility. The diversion of interests between the shareholders and the management is not an uncommon phenomenon, and it incurs agency costs. Jensen and Meckling (1976) state that agency costs can be divided to three types: monitoring costs, bonding costs, and residual costs. Board of directors' fees and options-based management compensation are examples of monitoring costs, whereas the contractual obligation of a manager to stay with the company in case of an acquisition and lose the opportunity to obtain another potentially better employment is an example of bonding costs. Despite the measures taken to minimize agency problems, there are unexpected costs that arise due to information asymmetry, and these costs are known as residual costs. (Jensen and Meckling 1976.)

Accrual accounting provides managers with accounting discretion that should be used effectively in order to provide a realistic view of a firm's financial position and performance. However, in certain cases when managers have incentives to do so, it may also lead managers to misuse this discretion for private gains. For instance, managers may use accruals to reach a pre-determined earnings target and potentially influence the market value of the firm. Accounting accruals directly impact reported earnings without having any future consequences on the actual accounting cash flows, and when used unethically, are a potential sign of earnings management. This type of earnings management is referred to as accruals-based earnings management, and has been the focus of many studies related to earnings quality and earnings management. (Dechow & Skinner 2000; Hong & Anderson 2011.)

Discretionary Accruals and Modified Jones Model

Accruals can be decomposed into two types- discretionary accruals and non-discretionary accruals. While non-discretionary accruals are a result of the firm's business conditions, its operational model and the accounting policies, discretionary accruals arise from estimates that require managerial judgement. (Christensen, Frimor & Şabac 2013.) According to Mantone (2013), discretionary accruals are expenses that are not mandatory to be recorded, such as accrued management bonuses, bad debt and warranty allowances, inventory, etc. Managers may use discretionary accruals to maintain a low level of volatility in earnings from year to year or from quarter to quarter; this is also known as income smoothing, or, earnings management. Discretionary accruals can be estimated using various available methods; some of the most commonly used methods are the Jones Model and the Modified Jones Model. Dechow, Sloan & Sweeney (1995) explore the assumptions and efficiency of different models that are used to estimate discretionary accruals and detect earnings management. In their research, they conclude that the Modified Jones Model performs the best in estimating discretionary accruals to detect earnings management, although all the models performed sub-optimally in conditions of extreme financial performance.

Modified Jones Model

Discretionary accrual models before the Jones Model assumed that non-discretionary accruals are constant. However, Jones Model relaxed that assumption by stating that business and economic conditions impact a firm's normal (or non-discretionary) accruals. Jones (1991), in her model, suggests that a firm's revenues and its property, plant and equipment influence the amount of normal accruals during a period, but this is under the assumption that all revenues are non-discretionary. Dechow et al. (1995) propose a modification of the original Jones Model by claiming that not all revenues are non-discretionary, and they further state that all changes in credit sales are due to managerial discretion with the motive of managing earnings.

According to the Modified Jones Model, non-discretionary accruals can be calculated as:

$$(1) \quad NDA_t = \alpha_1(1/A_{t-1}) + \alpha_2(\Delta REV_t - \Delta REC_t) + \alpha_2 PPE_t)$$

where

NDA_t = non-discretionary accruals in year t;

A_{t-1} = total assets in year t-1;

ΔREV = total tevenue in year t – total revenue in year t-1;

ΔREC_t = net receivables in year t – net receivables in year t-1;

PPE_t = gross property, plant and equipment in year t; and

α_1, α_2 and α_3 = firm-specific parameters

The estimates of the firm-specific parameters α_1, α_2 and α_3 are obtained from the following regression:

$$(2) \quad \frac{TA_t}{A_{t-1}} = a_1(\frac{1}{A_{t-1}} + \frac{a_2(\Delta REV_t - \Delta REV_t)}{A_{t-1}} + \frac{a_3 PPE_t}{A_{t-1}} + \varepsilon_t$$

where

TA_t = total accruals in year t, and **total accruals = net income – cash earnings**;

a_1, a_2 and a_3 = OLS estimates of α_1, α_2 and α_3; and

ε_t = error term

2.3. Financial Risk and Derivatives

Globalization has allowed corporations around the world to expand their business operations outside their own countries, but the high level of integration has also exposed these firms to various financial risks. Besides the pre-existing risk of unforeseeable changes in commodity prices (commodity price risk) and interest rates (interest rate risk), globalization introduced other types of risks that multinational firms need to manage. Further, globalization led to a higher degree of exposure to commodity price risk and interest rate risk due to inter-dependence among countries. Firms that acquire or sell raw materials, goods, or services in countries besides the one in which they are based, often

deal with transactions in multiple currencies. Therefore, any appreciation or depreciation in those currencies may lead to potential losses for the firms; this risk is known as transaction exchange risk and is a type of foreign exchange risk. (Bakaert, Hodrick & Zhang 2012.)

Since the 1980s, the market for financial instruments that offer individuals and institutions the opportunity to hedge their exposure to financial risks has boomed; these financial instruments are known as financial derivatives. A financial derivative is an investment, whose price is based on the price of an underlying asset, such as equities and bonds, or interest rates, currency exchange rates, etc. These financial derivatives are traded on organized exchange platforms as well as over the counter. The most commonly used derivatives are forwards, futures, options, and swaps. (Bakaert et al. 2012.) A forward contract is an agreement that specifies the obligation of the holder (seller) to buy (sell) an asset at a particular price on a particular date in the future. Forward contracts can be bought or sold in the over-the-counter market. A futures contract is similar to a forward contract, but is only traded on an organized exchange. An option contract provides the right, but not the obligation, to buy or sell an asset at a specified price before or on a particular date in the future. Options are traded on over-the-counter markets as well as on exchanges. A swap is an agreement between two parties to exchange their future cash flows and is an over-the-counter investment. (Hull 2015.) Bartram, Brown & Fehle (2009), in a cross-section of over 7000 non-financial firms across the world in the year 2000 or 2001, find that approximately 60% of the firms use at least one type of financial derivative. The most common derivative users were located in the United States, Japan, and United Kingdom and belonged to the utilities and chemical industry.

2.3.1. Rationales for Hedging

Brown (2001) states that traditional theories of risk management suggest the motivations for firms to engage in derivatives hedging are often to decrease the variance of operating cash flows in order to reduce financial distress costs. Purnanandam (2008) defines financial distress as the situation when a firm has low cash in-flows and incurs losses despite being solvent. Aretz, Bartram & Dufey (2007) explain that the existing financial

distress as well as the probability of a firm facing financial distress in the future incurs various direct and indirect costs for the firm. Direct costs, such as lawyer fees and administrative & accounting fees that are incurred during the bankruptcy usually account for only about 3% of the financial distress costs. Indirect costs, however, which relate to high employee turnover, increased recruiting and training costs, lack of power over suppliers and customers, constitute the major proportion of financial distress costs. When the inflow of cash is low, raising more debt causes more expenses; hence, using financial derivatives to smoothen future cash flows may add value to a firm.

Another reason for firms to adopt risk management practices is to avoid underinvestment costs. According to Froot, Scharfstein & Stein (1993), when a firm incurs low cash flows and thus carries costly external debt, it responds by reducing investments and rejecting positive net-present-value projects, increasing underinvestment costs. This is due to the tradeoff between creating wealth for creditors or for shareholders, also known as agency conflict, which often arises from information asymmetry among stakeholders. By using financial derivatives as hedging instruments, a firm can thus increase its earnings and utilize investment opportunities in growth projects, maximizing value for shareholders as well as creditors (banks or bondholders). (Aretz et al. 2007; Gay & Nam 1998.)

Apart from risk management theories related to firm-specific factors that influence the decision to hedge financial risks using derivative instruments, theories concerning management individual characteristics, CEO compensation structures, and managerial ownership also exist. Adkins, Carter and Simpson (2007), quoting previous studies, mention that equity ownership of high-level managers and directors may impact the decision to hedge positively due to the increased risk-aversion and incentives of a less volatile income. However, ownership of stock options by CEOs may influence the decision negatively, since the value of options increases with the increase in firm's earnings' volatility (and consequently stock price volatility). The option-like convex compensation scheme increases the motivation for CEOs to undertake risky activities for personal gains, further strengthening agency conflicts.

Another important cluster of unrelated factors that influence the decision to use financial derivatives is the CEO's (and other high-level management's) personal risk appetite and the level of overconfidence, which have been shown to be highly influenced by individual characteristics, such as age, gender, education, working experience, and tenure. Adam, Fernando & Golubeva (2015), consistent with numerous previously conducted studies, find that managerial overconfidence significantly influences corporate risk management activities. Beber & Fabbri (2012) argue that while controlling for firm-specific and country-specific factors, the use of financial derivatives in non-financial firms may be partially explained by the informational advantage of CEOs who own MBA degrees or the overconfidence gained because of the high perceived value of the degree in the society. Gloede & Menkhoff (2014) find that among financial professionals, working experience in the field reduced the amount of overconfidence. According to Beber et al. (2015), managerial overconfidence is a reducing function of working experience and age, wherein inexperienced young managers overestimate their skills. Other studies have also provided evidence of gender's impact on risk appetite of CEOs as well as retail investors.

However, previous literature has shown that the corporate outcomes are influenced by corporate governance. Goel and Thakor (2008) show that although an overconfident manager is more likely to be appointed as the CEO, an overly overconfident CEO would be fired by the board of directors when the respective trait of the manager is discovered. Indeed, studies that aim to analyze the risk management policies of firms do not always control for management's personal traits, but postulate that management's income smoothing activities are a result of the firm's quality of corporate governance quality. For instance, Huang, Zhang, Deis & Moffitt (2008), in their research paper on the contribution of artificial and real income smoothing to firm value, carry this assumption and find that firms with a higher proportion of independent board members and more financial sophisticated audit committee members engage more in real income smoothing and less in artificial income smoothing.

3. LITERATURE REVIEW

This chapter deals with previous literature on the subject of derivatives hedging, earnings management, and the impact of these two income smoothing devices on firm performance. In the first section, the results reported by earlier studies on the factors determining the usage of financial derivatives in non-financial firms are discussed. This section is divided into three sub-sections specific to particular theories of hedging. The second section lays down the foundation for this study by discussing studies on the impact of artificial and real income smoothing on firm performance. In the last section of this chapter, the research motivation and objectives are outlined and hypotheses are formed based on the theoretical background and previous empirical literature.

3.1. Firms and Hedging with Derivatives

The traditional theories of risk management imply that the use of financial derivatives is entirely dependent on the characteristics of the firm and the business environment it operates in. The most famous theories of financial distress, underinvestment costs and tax incentives, are based on characteristics such as firm size, leverage, liquidity, growth opportunities, dividend policy, tax convexity, etc. Bartram, Brown & Fehle (2009) clearly specify the theoretical relationships between these variables and the likely use of derivatives by non-financial firms. Based on the theory of financial distress, smaller firms, firms with lower liquidity, with a low dividend payout, and higher leverage, are more likely to use derivatives to hedge financial risk. The underinvestment theory states that firms with more research and development expenditures and a higher market-to-book ratio are more probable to use derivatives. In this chapter, the findings of various studies on the relationship between firm-specific factors and the use of financial derivatives are discussed.

3.1.1. Financial Distress Costs

In one of the earliest studies in the field done by Nance, Smith & Smithson (1993), they hypothesize the relationships between firm size, profitability, and liquidity, and a firm's decision to use financial derivatives based on the theories stated above. Using a logit regression, they find that firm size is positively related to the decision to use derivatives, which is contradictory to their prediction and the theory of financial distress. They conclude that this might be due to the informational advantage of larger firms. It is important to note that this result is commonly found in most studies related to the corporate use of derivatives (Bodnar, Consolandi, Gabbi & Jaiswal-Dale 2013). Indeed, a meta-analysis by Arnold, Rathgeber & Stöckl (2014), that used results from 37 previous studies, provided evidence of this common finding. The positive relationship between firm size and the likelihood of derivatives usage has been explained by various theories, one of them being the economies of scale and fixed costs theory. Lievenbrück & Schmid (2014) and Allayannis & Ofek (2001), finding similar results, state that larger firms with established risk management systems incur less start-up costs associated with adopting the use of derivatives. Entrop & Merkel (2017) explain the similar finding with the possible higher exposure of larger firms to foreign exchange rate risk and interest rate risk. In contrast, Croci, Giudice & Jankensgård (2017) find a negative relationship between firm size and the decision to use derivatives. However, this is most likely due to the restricted sample of oil and gas firms in Italy, which are mainly large in size and hence lead to a biased result.

While the relationship between profitability and hedging with derivatives has not been evident, the results for the impact of liquidity on the same have been significantly uniform. Arnold, Rathgeber & Stöckl (2014), in their meta-analysis of 37 prior studies, conclude that the summary effect of liquidity on the use of derivatives is significant and negative. This is in line with the financial distress hypothesis, that firms with less cash flow are financially restricted to engage in hedging. This is especially true for smaller firms (Bartram et al. 2009). Geczy, Minton & Schrand (1997), in their influential study of the determinants of derivatives usage in the United States, also find that a higher

liquidity ratio is negatively related to the use of derivatives. They elaborate and mention that lower availability of internal funds increases the incentives for firms to hedge.
The significance of dividend policy is related to the profitability of the firm, assuming that a publicly listed firm only pays out dividends to its shareholders in a profitable scenario. However, it can be argued that firms have the option to raise more debt in order to pay out dividends to its shareholders, which is an inefficient way to provide value, albeit a possible case. Also, a firm's decision to pay out dividends may also be discretionary, and may subsequently lead to less use of financial derivatives due to less free funds available. (Arnold et al. 2014; Barton 2001.) Graham & Rogers (2002) propose that dividend payout and hedging with derivatives may be substitutes. Hence, the results related to the effect of dividend payout on hedging decision may not be reliable. Nevertheless, Nance et al. (1993) find a positive association between dividend payout decision and the decision to use derivatives. Bodnar, Giambona, Graham & Harvey (2016), using a sample of non-financial firms from across the world, also find a positive relationship between the two. It is noteworthy that both these studies gathered data using surveys, which may have affected the validity of the findings.

3.1.2. Underinvestment Costs

Analyzing previous studies, the relationship between underinvestment costs, as proxied by firm leverage, market-to-book ratio & research and development expenditure, and the use of financial derivatives cannot be predicted with confidence. While some studies find a significant impact of underinvestment costs on the decision to use derivatives, other studies find no significant impact. Interestingly, new variables - the interaction of leverage and market-to-book ratio and the interaction of leverage and R&D costs and leverage, are found to be more important with the rationale that they proxy for growth firms with high amounts of debt and thus higher underinvestment costs. Bartram et al. (2009), who studied the determinants of the use of financial derivatives in firms across all industries in 50 countries, find that leverage, as well as the interaction between leverage and market-to-book ratio, positively influence the decision to use derivatives. In contrast, Allayannis & Ofek (2001) find a negative impact of leverage and a positive impact of R&D costs on derivatives hedging in a sample of S&P 500 firms in 1993. Croci,

Giudice & Jankensgård (2017) also find a positive relationship between leverage and the likely use of derivatives in a sample of Italian oil and gas firms between 2000 and 2013. Graham & Rogers (2002), in an effort to find the tax incentives of non-financial U.S. firms to hedge using derivatives, show a negative impact of R&D costs and a higher market-to-book ratio on the magnitude of derivatives used, but a positive impact of the interaction between debt ratio and R&D costs and the extent of hedging with derivatives. A similar result was published by Barton (2001) in a sample of non-financial Fortune 500 companies between 1994 and 1996, who find that firms with high underinvestment costs are more likely to use derivatives and more to use them more. Geczy et al. (1997), using a similar sample as Barton (2001) in 1990, also find similar results. Using survey data and a logistic regression model, Nance et al. (1993) also found no impact of leverage on the decision to hedge with derivatives. According to them, the reason is that other variables that proxy for investment opportunity set (R&D costs, market-to-book ratio) were used. Also, since leverage is a factor that is used to test the financial distress hypothesis (that predicts a positive influence on derivatives use) as well as the underinvestment hypothesis (growth firms usually have lower debt ratio), the effect of leverage on the decision to use derivatives is minimized due to other substitute variables (Graham et al. 2002).

Considering the controversial results obtained by previous studies on the proxies for underinvestment costs, it is evident that the underinvestment hypothesis has not proven to be very successful in explaining the usage of financial derivatives by corporates in order to manage risk. The meta-analysis by Arnold et al. (2014) also provided consistent results, stating that the evidence for underinvestment hypothesis is limited.

3.1.3. Risk Exposure

Graham and Rogers (2002) state that in imperfect market conditions, hedging can provide value to firms that hedge financial risks using derivatives by reducing costs related to undesirable price movements in foreign exchange rates, interest rates, commodity prices, etc. In their restricted sample of 469 non-financial firms from the U.S. in 1995, they observe that 442 of the firms are exposed to either currency risk or interest rate risk, or

both. Similar to most studies, they proxy currency risk by foreign sales, and interest rate risk by the ratio of floating debt to total assets and by the sensitivity of a firm's operating income to the LIBOR rate. Using OLS regression, they find that exposure to currency risk positively impacts the magnitude of derivatives usage. They do not find any significant effect of interest rate risk. Bartram et al. (2014) find a significant positive relationship between FX exposure and the decision to use derivatives for hedging purposes. Lievenbrück & Schmid (2014), using a sample of energy utility companies from across the world from 2000 to 2009, find that risk exposures have a positive impact on the decision to use the specific types of derivative. Specifically, they find that FX exposure positively impacts the decision to use currency derivatives, commodity price risk positively affects the decision to use commodity derivatives, and interest rate risk positively affects the decision to use interest rate derivatives as well as commodity derivatives. Allayannis et al. (2001) also find a positive relationship between FX exposure and the use of derivatives in a sample of S&P 500 non-financial firms from 1993. In their research, while other firm-specific factors also showed a significant impact on the decision to use derivatives, only exposure proxies displayed a significant and positive impact on the extent of derivatives usage. Graham et al. (2002) and Geczy et al. (1997), who also used a sample of non-financial firms from the U.S., find a similar result concerning the impact of FX exposure on the magnitude of the derivatives use. Similarly, Klimczak (2008) also a found the similar relationship using a sample of non-financial listed companies from Poland between 2001 and 2005. Considering the uniformity of the relationship between risk exposure and the use of derivatives, it is evident that despite the intermediate effect of firm-specific characteristics, exposure to a specific type of risk induces a firm's decision to hedge using financial derivatives at least to some extent.

3.2. Previous Studies on the Impact of Earnings Management and Hedging with Derivatives on Firm Performance

Tang & Chang (2015) investigate the intermediary effect of corporate governance on the value relevance of earnings management using a sample of listed Taiwanese firms during 1996 - 2008. They first run separate OLS regressions on firm value estimated by Tobin's

Q and Return on Assets as dependent variables, and discretionary accruals and current discretionary accruals as independent variables. They find that the two earnings quality measures have a statistically significant negative relationship with the value indicators, meaning that higher values for discretionary accruals and current discretionary accruals result in lower firm value. The authors then include corporate governance measures into the equations and find that the relationship between earnings quality and firm value is influenced by corporate governance factors. The results of the study indicate that higher discretionary accruals and current discretionary accruals lead to higher firm value in firms with effective corporate governance, but lead to lower firm value in firms with poor corporate governance. This finding is consistent with the theory that opportunistic managers use accounting discretion for private gains, whereas value-adding managers use accounting discretion to communicate useful information on the firm's future prospects to shareholders. (Tang & Chang 2015.)

Chen, Kim & Yao (2017), in a recent study, attempt to find out whether earnings smoothing increases or decreases stock price crash risk after an earnings announcement. They use a sample of 6627 non-financial, non-utility firms listed in the United States during 1993 - 2011, a 19-year period, with a total of 157,722 firm-year observations. Their research uses the distribution of daily stock returns on the sample firms as a measure of stock price crash risk and the correlation between the change in discretionary accruals and the change in pre-managed earnings as the indicator of earnings management. The authors also use various control variables, including a measure of smoothing aggressiveness - the absolute value of discretionary accruals. They report a significant and negative correlation between earnings smoothing and crash risk. Next, they perform a regression analysis and find that higher earnings smoothing in the current period (quarter) leads to a higher realized crash risk in the subsequent period, and this finding is reported to be statistically significant at the 1 % significance level. Further, they observe a significant and positive coefficient on their smoothing aggressiveness measure, implying that higher level of absolute discretionary accruals is related to a higher stock price crash risk. The authors also perform a regression using stock return measures as dependent variables, and find with statistically significant coefficients that earnings

smoothing and aggressiveness thereof is negatively related to market return, depicting the value-destroying effect of earnings management. (Chen, Kim and Yao 2017.)

The study by Lin, Jiang, Tang and He (2014) takes a different approach to identifying the effect of financial reporting quality on firm's market performance. The authors use a diversified sample of firms from the United Kingdom during 2005 and 2009 with a total of 4251 firm-year observations and determine the impact of earnings quality on the stock market liquidity as measured by firm-specific bid-ask spread, which has shown to be positively related to market value. They argue that good quality financial reporting reduces information asymmetry in the market during crisis period and increases investor confidence in the firms. By proxying for earnings quality with the absolute amount of discretionary accruals calculated using performance-matched Jones model, and employing OLS regression methodology, the authors report a negative and significant coefficient on the interaction term of discretionary accruals and crisis dummy variable on the bid-ask spread, signifying that higher financial reporting quality impacts liquidity positively during crisis period. Interestingly, the authors report that financial reporting quality does not affect liquidity under ordinary economic conditions. Further, when discretionary accruals are calculated using other models, such as Jones model, Modified Jones model, etc., the results remain the same. The authors also test this finding exclusively for financial firms and non-financial firms and report that both groups of firms exhibited similar liquidity behavior towards financial reporting quality during the global financial crisis. (Lin, Jiang, Tang and He 2014.)

Huang, Zhang, Deis & Moffitt (2009), in their paper, try to identify the impact of artificial income smoothing and real income smoothing by using discretionary accruals and notional amount of outstanding derivatives as proxies for artificial and real income smoothing, respectively. Their sample includes 477 non-financial firms from the United States during the period 1994 - 1996. The derivatives-related data was obtained from the 1997 Interest Rate and Currency Derivatives Edition of "Database of Users of Derivatives", published by Swaps Monitor Publications, Inc. In order to control for endogeneity, the authors employ a two-stage least squares regression and find that the level of artificial smoothing i.e. the absolute value of discretionary variables lagged by

total assets, is inversely proportional to firm value estimated using industry-adjusted Tobin's Q. They also find that the extent of derivatives usage is directly proportional to firm value. These results are statistically significant and in line with their alternative hypothesis. Consistent with various other studies on the relationship between artificial and real income smoothing, Huang et al. (2009) observe a negative significant relationship between the two techniques. Another important finding of the paper is the intermediary effect of corporate governance on the relationship between smoothing devices and firm value. Huang et al. (2009) report that the value-increasing effect of derivative usage is lower in well-governed firms and the value-decreasing effect of artificial income smoothing is higher in poorly governed firms. They use various indicators of corporate governance quality, such as the percentage of outsiders on the board of directors and the audit committee, and the financial expertise and meeting frequency of the audit committee, among other variables. (Huang, Zhang, Deis & Moffitt 2009.)

Bao and Bao (2004), similar to Huang et al. (2009), argue that income smoothing can be done artificially or through real economic changes in the cash flows. They use a sample of non-financial firms between 1988 and 2000, with a total of 12,651 firm-year observations and divide them between smoothers and non-smoothers to determine the impact of smoothing activities on firm value proxied by Price-to-Earnings multiple. Notably, the authors distinguish between smoothers and non-smoothers by using variation in earnings from one period to another, instead of using derivatives-based hedging as a proxy for income smoothers. They further divide their sample between smoothers with high quality earnings, smoothers with low quality earnings, non-smoothers with high quality earnings and non-smoothers with low quality earnings. The regression results show that income smoothing does not result in higher firm value without taking into consideration the impact of earnings quality. On the other hand, firms with higher quality earnings hold higher P/E multiples even when smoothing activities are not accounted for. However, smoothing firms with high quality earnings are reported to have higher P/E multiples than non-smoothing firms with low quality earnings. (Bao & Bao 2004.)

Allayannis and Weston (2001), in one of the earliest studies aiming to determine the potential impact of using currency derivatives on firm value, find positive significant results supporting their hypothesis. They use sample of 720 large non-financial firms (excluding public utilities) from the United States between 1990 and 1995, a period when reporting the gross notional amount of derivatives was required of publicly listed firms in the country. In their univariate analyses, the authors divide their sample into firms with foreign sales operations and firms without it, and compare the mean Tobin Q value (proxy for firm value) between hedgers and non-hedgers. The results for both sub-samples indicate that hedgers of foreign currency risk have a higher mean and median Tobin Q value than non-hedgers. In order to control for the impact of other firm-specific characteristics, they perform multivariate analyses including control variables for size, profitability, leverage, investment opportunities, access to financial markets, credit quality, industry, etc. In the sub-sample of firms that have foreign operations, the regression analysis leads to a positive and significant coefficient on the hedging decision binary variable, suggesting that regardless of the impact of firm-specific factors on firm value, the decision to hedge foreign currency risk influences firm value positively. However, the sub-sample of firms with no foreign operations, a positive but statistically insignificant impact of hedging on firm value is observed. In order to test for reverse causality, the authors perform a time series analysis as well as an event study on the sample of firms, determining whether the decision to hedge in a specific period or the change in hedging policy lead to positive change in firm value. Consistent with their panel regression results, they find consistent evidence of the positive and statistically significant effect of currency hedging using derivatives on the market value of firm in these robustness tests. (Allayannis & Weston 2001.)

Following a similar approach as Allayannis and Weston (2001), Clark and Mefteh (2010) attempt to determine the impact of using foreign currency derivatives to hedge exposure risk to Euro for the largest publicly listed French firms in the year 2004 on their market value. Their final sample includes 176 non-financial listed firms. Of the 176 firms, 58.52 % of the firms are reported to have used currency derivatives in 2004, which is higher than the 37 % usage reported by Allayannis et al. (2001). Clark and Mefteh (2010) use the notional amount of currency derivatives scaled by total assets as the primary

independent variable in their regression analyses and Tobin's Q as the dependent variable. Their results indicate that the extent of hedging is positively and significantly related to firm value for firms with higher than median size of total assets. Further, the authors focus on the intermediary value creating effect of the amount currency exposure as well as the exposure direction (appreciation or depreciation). They find that this positive effect of currency derivatives usage is stronger for firms that are relatively more exposed to fluctuations in Euro and weaker for firms with lower exposure. In addition, the effect is approximately six times higher for firms that are vulnerable to depreciation in Euro than for firms that are exposed to appreciation in the currency. (Clark & Mefteh 2010.)

In a more recent publication, Panaretou (2014) report similar results as Huang et al. (2009) using a sample of large non-financial firms belonging to FTSE 350 from the United Kingdom during the period 2003 - 2010; the sample used in the study covers 1372 firm-year observations. According to the descriptive statistics presented in the paper, 86.88 % of the firms use derivatives to hedge at least one type of risk during the sample period. For the multiple regression analysis, the author employs various models in the regression analysis, all using Tobin's Q as the dependent variable, but different hedging-related variables. The two main groups of regression models separate the impact of the decision to use derivatives from the impact of the extent of derivatives usage (measured by the ratio of notional-value of derivatives to total assets) on firm value. The study also includes regressions that isolate the type of risk hedged using derivatives i.e. currency derivative, interest derivatives and commodity derivatives. Results of the regression comprising all types of hedging instruments indicate no significant impact of the decision to hedge on the firm value, but a positive impact of the extent of hedging. However, the regression using only currency risk hedgers shows a positive and significant impact of the decision to hedge as well as the extent thereof on firm value, whereas no statistically significant impact of commodity risk hedging is observed in the respective regression. The model including interest rate hedgers indicates an insignificant impact of the decision to hedge, but a positive and significant impact of the extent of hedging.
Panaretou (2014) also tests for the impact of the financial crisis on firm value as well as on the hedging premium during the crisis period. The results of the analysis covering the whole sample period (2003 - 2010), but using binary variables concerning crisis period

and the interaction of the same with extent of hedging variable, indicate no statistically significant impact of currency and interest rate hedging on firm value, but a negative and significant impact of the financial crisis on firm value. However, when the regressions are done only using the sub-samples during the financial crisis period, a positive but lower hedging premium is observed for currency hedgers between 2007 and 2008, but a negative hedging premium is observed for interest rate hedgers. Further, in an attempt to identify the impact of operational risk management on firm value, the author reports statistically insignificant impact of corporate operational risk management activities on Tobin's Q during the sample period 2003 - 2010. (Panaretou 2014.)

Contrary to studies on the value-creating characteristic of derivatives usage in firms belonging to one specific country, Bartram, Brown and Conrad (2011) use a large sample of 6,888 non-financial firms from 47 countries in their extensive study on the subject. Their sample represents 76.8 % of the global market capitalization of non-financial firms in the year 2001. 60.5 % of the firms in the sample use at least one type of derivatives, with FX derivatives being most commonly used (45.5 %). The authors use propensity matching technique to control for endogeneity and employ time-series analysis to identify the impact of using derivatives on abnormal stock return as well as firm value measured by Tobin's Q. During the study's sample period of 1998 - 2003, the positive impact of hedging is only statistically significant in the year 2001, which is associated with a major global economic slowdown. On the other hand, derivative users exhibit higher alphas in each annual period except 1998, with the highest difference being observed in the year 2000. This result implies that firms are hedging downside risk by using financial derivatives. (Bartram, Brown and Conrad 2011.)

Jin and Jorion (2006) explore the relationship between hedging with derivatives and firm value using a sample of oil and gas firms from the United States during the years 1998 and 2001. They state that an investor in an oil and gas firm is able to identify the price risk associated with it and hedge it themselves, making this market condition closer to that hypothesized by Modigliani and Miller capital market theory. However, they still observe significant variation in the extent of hedging undertaken by the 119 firms included in the sample. The authors mention that given the relatively small size of the sample firms, the impact of derivatives-based hedging is unclear due to the fixed costs

associated with establishing the corporate risk management programme, justifying the importance of their sample selection decision. The descriptive statistics in the paper report that 92 of the 119 firms use derivatives for hedging at least once during the 3-year sample period. Univariate analysis of the research suggests no statistically significant differences in firm values between hedgers and non-hedgers. Using various calculations of Tobin's Q and a binary hedging variable indicating usage vs. non-usage of derivatives in their regressions, the authors report a generally statistically insignificant impact of hedging on firm value, with one regression model resulting in a negative and statistically significant effect of hedging on firm value. Jin and Jorion (2006) conclude that the hedging premium related to derivatives usage is unclear, but it may depend on the risk a firm is exposed to. (Jin & Jorion 2006.)

Carter, Rogers and Simkins (2006), similar to Jin and Jorion (2006), use a sample of firms belonging to a specific sector in order to identify whether hedging fuel price risk leads to market value creation. Using a sample of 28 listed passenger airline firms from the United States during 1992 - 2003 with 251 firm-value observations, the authors perform OLS regressions with Tobin's Q as the dependent variable and a binary hedging variable as well as a continuous hedging variable, separately. The results of their pooled-OLS regression indicate that for the firms in the sample, the decision to hedge does not lead to a higher firm value, but a higher extent of hedging does. They report a hedging premium of approx. 10.2 % for a firm that hedges the sample average of 29.4 % of the upcoming year's fuel requirements. This additional market value derived from hedging is greater than the one observed by Allayannis and Weston (2001), which was approx. 5 %. Carter et al. (2006) also perform robustness tests by using random effects, fixed effects, and time-series feasible generalized least squares models, all of which lead to positive and significant results for their hypothesis that hedging fuel price risk creates value for airline companies. Further, the authors test whether their results are driven by reverse causality, by analyzing whether changes in hedging policy (binary variable movement from 0 to 1 and vice versa as well as a change in the continuous variable) lead to a change in firm value. The results of this regression lead to results rejecting the reverse causality hypothesis, and confirm the observation of hedging premium in the airline companies included in the sample. (Carter, Rogers and Simkins 2006.)

Nelson, Moffitt and Affleck-Graves (2005) use a relatively large sample of 5770 non-financial publicly listed US firms to evaluate the impact of hedging on the stock returns of firms during the years 1995 - 2000. Their sample included firms from all sectors except financial and utilities, and comprised of 1308 firms that hedged using at least one type of derivative during the sample period. This hedger-to-non-hedger proportion of 21.6 % is significantly lower than the one observed in most research papers on the subject. A major portion of these hedgers is observed to be large firms. The authors use abnormal stock returns as the primary variable to identify the differences in the market value of equity between hedgers and non-hedgers and calculate it by using the Fama and French four-factor method. The study reports that hedgers outperformed non-hedgers by 4.3 % annually during the sample period, but this result is driven exclusively by large firms that hedged currency risk. When the authors use sub-samples of firms that either use currency derivatives, interest rate derivatives or commodity derivatives exclusively, they find that that the currency hedgers experienced abnormal returns equal to 11.22 % annually, the result being statistically significant. However, the results for the other two sub-samples are statistically insignificant, with the exclusive commodity risk hedgers experiencing negative abnormal returns. The authors also performed robustness tests by comparing mean Tobin Q values for hedgers of different types of risks and non-hedgers, and affirm that large currency hedgers had higher firm value relative to non-hedgers, but find significant lower values of Tobin Q for smaller firms that hedged currency risk as well as firms that hedged interest rate or commodity risk. (Nelson, Moffitt and Affleck-Graves 2005.)

Toerien & Lambrechts (2016), using a sample of the 40 largest non-financial firms listed on the Johannesburg Stock Exchange, attempt to find the importance of firm value in in corporate derivative-hedging activities. The authors choose to analyze the impact of hedging on the firms' Tobin's Q, Return on Assets, Stock price, among other indicators of firm value, during the period 2008 - 2012, which included the years when the effect of the global financial crisis was the largest. The results of the univariate analysis on 203 firm-year observations indicated a statistically significant positive relationship between the magnitude of the net derivative position and the firm value variable. However, when the authors perform a maximum likelihood estimate auto-regressive analysis, the results

are different - no statistically significant relationship is identified between the hedging variable and the firm value variables, except for the dependent variable that calculated the difference between the market value of equity and the capital contributed by the shareholders. However, the authors find no conclusive evidence that hedging with derivatives adds value to the sample firms. They state that the results may be different from those achieved by other studies on the subject that used a sample of firms from developed nations due to structural differences in the economies, differences in market information asymmetry and in investor attitudes. (Toerien & Lambrechts 2016.) Table 1 provides a summary of discussed literature on the relationship between hedging and firm value.

Table 1. Summary of Literature on Hedging and Firm Performance

Paper	Period	Hedging variable type	Firm performance measure	Result
Huang, Zhang, Deis & Moffitt (2009)	1994-1996	Continuous variable	Industry-adjusted Tobin's Q	• Hedging is directly proportional to Tobin's Q • Value-relevance of hedging is decreases with corporate governance quality
Allayannis & Weston (2001)	1990-1995	Binary variable	Tobin's Q	• Foreign currency risk hedging increases Tobin's Q
Clark & Mefteh (2010)	2004	Continuous variable	Tobin's Q	• Hedging increases Tobin's Q for firms with higher than median total assets
Panaretou (2014)	2003-2010	Binary variable & Continuous variable	Tobin's Q	• Decision to hedge does not increase Tobin's Q • Extent of hedging increases Tobin's Q • Decision to hedge foreign currency risk increases Tobin's Q
Bartram, Brown & Conrad (2011)	1998-2003	Binary variable	Tobin's Q & Abnormal Stock Return	• Hedgers have higher Tobin's Q during the year representing the crisis • Hedgers have higher alphas in all years except 1998 • Firms hedge downside risk by using financial derivatives
Jin & Jorion (2006)	1998-2001	Binary variable	Tobin's Q	• Hedging does not impact Tobin's Q for oil and gas firms
Carter, Rogers and Simkins (2006)	1992-2003	Binary variable & Continuous variable	Tobin's Q	• The decision to hedge fuel price risk does not increase Tobin's Q for airlines • Extent of fuel price hedging increases Tobin's Q for airlines
Nelson, Moffitt and Affleck-Graves (2005)	1995-2000	Binary variable	Abnormal Stock Return	• Hedgers have higher abnormal stock returns
Toerien & Lambrechts (2016)	2008-2012	Continuous variable	Tobin's Q, Stock Return, Return on Assets	• Hedging has no impact on firm value and performance on firms listed on Johannesburg Stock Exchange

Artificial Income Smoothing, Hedging, and Corporate Governance

Various research papers have been dedicated to finding the relationship between artificial and real income smoothing, but have led to mixed results. Attia (2012) uses a sample of 504 non-financial US firms between 1993 and 2004 to investigate the relationship. As a measure of artificial income smoothing, the ratio of the standard deviation of net income before abnormal accruals and extraordinary items to the standard deviation of abnormal accruals. Real income smoothing is measured by the ratio of notional amount of derivatives outstanding to total assets. The author hypothesizes that the two smoothing devices have a substitutional relationship and that corporate governance quality affects artificial smoothing negatively, but impacts real income smoothing positively. By employing a simultaneous equations regression model, the author finds contrary to the hypothesis that the two smoothing devices have a complimentary relationship, providing several explanations for the result. First, the paper suggests that the two techniques fill in the gaps to reach an efficient risk management strategy. Second, it is suggested that hedging with derivatives may be used to compensate for opportunistic earnings management. Third, the author states that the result may be due to the discretionary accruals calculation bias - the differing impacts of long vs. short-term discretionary accruals. The study further finds that the level of derivatives usage increases in firms with a high quality of corporate governance practices, whereas the level of artificial income smoothing decreases in these firms. (Attia 2012.)

Barton (2001), in an influential study on the relationship between earnings management and derivatives usage, finds different results from Attia (2012). The author uses a sample of 304 non-financial unregulated Fortune 500 firms during 1994 - 1996 in the analysis and finds that 218 firms out of the sample used derivatives for hedging purposes, and 86 firms were non-hedgers. As a proxy for earnings management, the absolute value of discretionary accruals measured by Jones model is used, while the ratio of notional outstanding currency and interest-rate derivatives to lagged total assets is used to measure derivatives hedging. Although the author reports a positive correlation between the two smoothing devices, the simultaneous equations regression results in a negative and statistically significant relationship, albeit at a margin. The regression also includes

control variables for underinvestment costs, debt financing costs, tax convexity, and management compensation structure. Barton (2001) concludes that discretionary accruals and derivatives are used as partial substitutes to achieve a desirable volatility in the firm earnings, which helps managers gain value for private gains while also avoiding additional interest and tax related costs. (Barton 1991.)

Choi, Mao & Upadhyay (2015), following Barton (1991), perform a similar study on the subject using a sample of 404 S&P 500 non-financial firms during 1996 - 2006. They hypothesize that due to the introduction of FAS 133 accounting standard in 1998, the relationship between the use of discretionary accruals and derivatives may have changed. According to them, the new accounting standard made it obligatory for firms to report the fair market value of their outstanding derivatives and also to recognize the ineffective part of cash flow hedges immediately. This effect, in turn, may have led to management belief that derivatives-based hedging had become inefficient. To validate their theory, the authors use a simultaneous equations regression model similar to that used by Barton (1991), and find consistent with their hypothesis a complementary relationship between artificial income smoothing and derivatives-based income smoothing. They further perform robustness tests on their results by using a binary variable to indicate derivatives usage in their simultaneous equations model. The reasoning behind this arises from the fact that after the introduction of FAS 133, some firms reported notional values of outstanding derivatives while most firms reported their fair values. To overcome this inconsistency, the binary variable was used to indicate derivatives usage. This robustness test led to similar results in line with the authors' hypothesis that the two income smoothing techniques became complementary in nature after the introduction of FAS 133. (Choi, Mao & Upadhyay 2015.)

Pincus & Rajgopal (2002), using a narrowed down sample of approx. 140 oil and gas firms from the United States during 1993 - 1996, propose that these can hedge the risk of movements in oil prices, but cannot hedge the risk inherent in drilling operations. They hypothesize that, after managers of oil and gas firms have hedged the financial risk due to unfavorable movements in oil prices, they trade-off the operational risk by using discretionary accruals management. The results of their analysis indicate that this is

indeed the case, i.e., they report a sequential decision making process of managers whereby the extent of accruals management is dependent on the level of derivatives usage. This result differs from that of Barton (1991) in that Barton (1991) finds a two-way substitutional relationship between the two smoothing devices, but Pincus et al. (2002) only find a one-way marginally substitutional relationship between hedging using derivatives and managing discretionary accruals. (Pincus & Rajgopal 2002.)

3.3. Research Objectives and Hypotheses formation

As can be concluded from the previous literature discussed above, mixed results have been reported on the relationship between derivatives hedging and firm performance, whereas the relationship between earnings management and firm performance has been widely reported to be negative. This study extends this literature by analyzing the impact of using derivatives to hedge financial risk (real income smoothing) and discretionary accruals (earnings management) simultaneously on the compounded monthly stock returns of a sample of non-financial firms.

There are several ways in which this study is unique, the first being the use of stock returns as a measure of firm performance. Previous research on the impact of artificial and real income smoothing on firm performance has mostly employed Tobin's Q as a measure of market performance. However, Bartlett & Partnoy (2018) state that simple Tobin's q poses measurement errors due to substitution of market value of debt with book value of debt and an inaccurate proxy for replacement value of assets (book value of assets). Further, Tobin Q's original version as well carries the unanswered question of why the market value of a firm should be scaled by the replacement cost thereof. In addition, the relationship between Tobin's Q measures and the respective firms' stock returns has been reported as inverse, implying a difference between firm's estimated market value and the firm's performance in the stock market. Thus, stock returns are a better alternate to Tobin's Q as a measure of firm performance as they are a direct measure of a firm's relative position in the market. (Bartlett & Partnoy 2018.) This study uses compounded monthly stock returns as a measure of firm performance in the market. This

measure provides a more accurate representation of a firm's stock market performance because it takes into account the volatility of stock prices throughout the year, unlike holding period return. Further, this measure is based on geometric mean, which also takes into consideration the compounding from one period to the next.

Secondly, this study evaluates the impact of derivatives use on stock returns while accounting for the effect of artificial income smoothing - an intermediated relationship that has not been researched extensively, although the negative impact of earnings management has been widely reported by many previous papers, some of which have been discussed earlier in this main chapter. Further, literature has shown mixed results on the direction of relationship between discretionary accruals and the extent of derivatives usage, which increases the importance of including both measures when analyzing the impact of income smoothing on firm performance in order to avoid omitted variable bias and potential endogeneity.

Thirdly, an important contribution of this study is the investigation of the impact of hedging and earnings management during a period that includes the years 2008 - 2009, the period representing the global financial crisis. Although the financial sector was most affected by the crisis, non-financial sectors around the world also experienced the impacts up to a great extent. (Clarke 2010; Kirkpatrick 2009.) During the crisis, uncertainty and risk related to the reliability of public corporate information, were higher than before (Lin, Jiang, Tang & He 2014). Kirkpatrick (2009), in an article discussing the relevance of corporate governance during the financial crisis, concluded that the quality of corporate governance and risk management in a non-financial firm is a significant determinant of firm performance in chaotic times. Several other papers have studied the impact of corporate governance quality on firm performance during the financial crisis of the late 2000s, but only a few have focused directly on the issues of earnings management and hedging while taking into consideration the intermediary impact of corporate governance. This study uses the proportion of strictly independent board members on the sample firms' boards as a measure of corporate governance quality and tests the intermediary effect on the impact of artificial and real income smoothing on firm performance.

Based on the study objectives stated above and the previous literature discussed in the previous sections of this chapter, the null research hypotheses are as follows:

H0a: Real income smoothing, as proxied by the decision to use financial derivatives for hedging, does not have an impact firm performance, as measured by compounded monthly stock return.

H0b: The magnitude of artificial income smoothing, as proxied by the absolute amount of discretionary accruals, does not have an impact firm performance, as measured by compounded monthly stock return.

In contradiction to the above stated null hypothesis, various alternative hypotheses can be formed on the basis of studies that report a statistically significant impact of hedging and earnings management on firm performance. Allayannis & Weston (2001) and Panaretou (2014) report a positive impact of the decision to use foreign currency derivatives on firm performance as measured by Tobin's Q, and Tang and Chang (2015) observe a negative impact of discretionary accruals on Tobin's Q. In support of these results, alternative hypotheses could be stated as below.

H1a: The decision to use financial derivatives for hedging has a positive impact on firm performance.

H1b: The magnitude of discretionary accruals has a negative impact on firm performance.

However, in line with Bartram, Brown and Conrad (2011), who report a positive relationship between hedging using derivatives and firm performance during the late 1990's and early 2000's crisis period in the United States, it is expected that the decision to use financial derivatives for hedging has no impact on firm performance in the pre-crisis period (2005 - 2007), but a positive impact during the crisis period (2008 - 2009).

H2: Hedging using financial derivatives is more valuable during crisis period than in the pre-crisis period.

Huang et al. (2009) find results consistent with their theory that the positive impact of derivatives usage is higher for firms with lower quality of corporate governance, while the negative effect of earnings management is also stronger. To extend the literature on this subject, an aligned hypothesis is stated below and tested empirically.

H3: During the sample period (2005 - 2009), sample firms with below-median percentage of independent board members experience a higher hedging premium, but a stronger value erosion from earnings management.

The data and empirical methodology used to test these hypotheses are described the next chapter.

4. DATA AND METHODOLOGY

This chapter describes the data used in this study and the research methods applied in order to validate the hypotheses formed in the previous section. The purpose of the study is to investigate the impact of real income smoothing and artificial income smoothing on firm performance during the global financial crisis of 2008−2009.

4.1. Data and Sample

This study uses a sample of firms that were a part of the S&P 500 index at the end of year 2005. The U.S. stock market is the largest in the world and the constituents of S&P 500 make up approx. 80 % of the U.S. market capitalization, which enhances the applicability of the results achieved in the research. Furthermore, firm-specific data is widely available on the S&P 500 firms. Following previous studies on the subject (Huang et al. 2009; Allayannis & Weston 2001), financial firms and public utilities are excluded from the sample; financial firms being market makers in derivatives and public utility firms being heavily regulated may result in biased results. Due to the primary objective of studying the impact of derivatives usage and earnings management on stock performance during the financial crisis, data on this sample is collected for the period 2004−2009. This period of 6 years allows for a comparison of results between the pre-crisis period (2005−2007) and the crisis period (2008−2009). During the crisis period, the stock market experienced a free-fall, with impacts spilling over the global stock market. Firms with missing data points on important variables are excluded from the sample, along with firms that were delisted from the constituent index during the sample period. The final sample includes 297 firms and 1782 firm-year observations.

Derivatives usage is one of the main variables of interest in this study, and is represented by a dummy variable indicating use of financial derivatives to hedge foreign currency exchange risk, interest rate risk or commodity price risk. During the sample period, publicly listed firms were not obliged to report the notional amount or the fair value of outstanding derivative contracts in their 10-k filings, which is why the firms' decision to

use derivatives is used in this study instead. This information is collected manually for the sample firms from their 10-k filings with the Security and Exchange Commission. Stock price data used to calculate the compounded monthly returns is gathered from Thomson Reuters *Datastream* database, while other firm-specific data is gathered from the *Worldscope* database. The research also uses corporate governance variables, such as the proportion of independent board members during a specific year, and this information is accessed through the *Institutional Shareholders Services*.

Although the primary dependent variable in this research is the compounded monthly stock return, the main analyses are also done using Tobin's Q as the dependent variable. All dependent variables, independent variables and control variables used in the study are described below.

Stock Return: This is the primary dependent variable and refers to the compounded monthly stock return for a firm during a year. The formula for calculating the compounded return is as follows:

$$(3) \quad (\prod_{i=1}^{n} x_i)^{\frac{1}{n}} = \sqrt[n]{x_1 x_{2\ldots} x_n}$$

where:

$x_1, x_{2\ldots}$ = Stock returns for each period

n = Number of periods

The compounded return is the geometric average of the monthly returns during the year, implicating that the number of periods equals 12.

Tobin's Q: Tobin's Q is a widely used proxy for a firm's market value and performance. This research uses the modification of Tobin's Q that is calculated as the sum of a firm's market capitalization and the book value of debt, divided by the book value of total assets. Due to high skewness in the respective data points, the natural logarithm of this variable is used in the regressions, which also makes the interpretation of results more intuitive.

Hedger: Dummy variable indicating whether a firm used derivatives to hedge financial risk during a specific year or not. The variable equals 1 if the firm explicitly discloses in its 10-k report that derivatives were used during the financial year or if the reported notional/fair value of outstanding derivatives is non-zero. Consequently, if derivatives usage for a year is found to be null, the variable holds a value of 0 for the specific year. As mentioned earlier, if no clear information is found, the firm is removed from the research sample in order to avoid misrepresentation.

Discretionary Accruals (D. Accruals): Discretionary Accruals is the second important independent variable in the study, proxying for earnings management during a year. High earnings management is connected to lower firm performance, and literature has shown a significant relationship between discretionary accruals and derivatives usage, although the direction of this relationship is an currently an open research question. (Lin et al. 2014; Barton 2001; Pincus & Rajgopal 2002.) Following Huang et al. (2009), the absolute value of the discretionary accruals, calculated using the Modified Jones Model, which has been explained in the section 2.2. is used in this study.

Total Assets: Total assets refers to the book value of total assets of a firm at the end of a specific year. Scientific literature on the relationship between firm size and firm value/performance has shown mixed results achieved using varied sample of firms and periods. Further, larger firms are more likely to use derivatives as hedging instruments. (Allayannis & Weston 2001; Jin & Jorion 2006.) As a control variable, the natural logarithm of Total Assets of a firm at the end of the year is used.

Return on Assets: Based on previous literature, profitability has a positive relationship with firm performance (Allayannis & Weston 2009; Panaretou 2014). Return on Assets is often used as a measure of profitability and is calculated as net income during a year divided by average total assets, transformed into percentage form.

Return on Equity: As an alternative measure of profitability, return on equity is used in certain regression models. It is calculated as net income during the year divided by average total equity, transformed into percentage form.

Leverage: Based on similar previous studies, leverage is calculated as the ratio of long-term debt to total equity at the end of the year. Capital structure of a firm is likely to have a negative impact on firm value, and based on theoretical literature, firms with high leverage are more likely to use derivatives in order to lower their financial debt costs (Huang et al. 2009).

Geographical Diversification (Foreign Sales): Following Panaretou (2014), as a proxy for geographical diversification, the ratio of foreign sales to total sales of a firm during the year is used to control for the impact of exposure to foreign currency and economic exposure on the decision to use financial derivatives, as well as the performance in the stock market. (Allayannis & Weston 2001; Panaretou 2014.)

Capital Expenditure to Sales ratio (Capex-to-Sales): The ratio of a firm's capital expenditure during the year to its net sales is used to control for the relationship between hedging using derivatives and investment opportunities (Allayannis & Weston 2001).

Dividend Payer: Firms with low access to financing are more likely to invest in projects with relatively high net present value. To proxy for access to financing from the capital markets, a dummy variable indicating dividend payment during the year is used. If a firm paid dividends during the year, the variable is coded as 1, and 0 otherwise. A dividend paying firm is less probable to be financially constrained. (Allayannis & Weston 2001; Jin & Jorion 2006.)

Board independence: Huang et al. 2009 find a significant intermediary effect of corporate governance on the relationship between hedging using derivatives and firm value. This variable represents the percentage of strictly independent board members of a firm at the end of the year.

Descriptive Statistics

Table 2 shows the proportion of firms in the sample that used financial derivatives in each year during the period 2004 - 2009. The number of firms that hedged financial risk by

using derivatives increased steadily during 2005 - 2009, with the number dropping slightly in 2005 compared to 2004. The minimum proportion of hedgers can be observed in the year 2005 at approx. 87 % and the highest in the year 2009 at 90 %. This ratio of hedgers to non-hedgers is relatively higher than the one reported by studies done using a sample period starting from year 1990s (Allayannis & Weston (2001)), but more aligned with the derivative usage of 86.88 % observed by Pararetou (2014) in FTSE 350 firms during the years 2003 - 2010.

Table 2. Proportion of Hedgers during the Sample Period

	YEAR					
	2004	**2005**	**2006**	**2007**	**2008**	**2009**
Non-Hedgers	37	40	36	33	30	29
(%)	**12.50**	**13.47**	**12.12**	**11.11**	**10.10**	**9.76**
Hedgers	259	257	261	264	267	268
(%)	**87.50**	**86.53**	**87.88**	**88.89**	**89.90**	**90.24**
Total	296	297	297	297	297	297

Table 3 shows the summary statistics for all the variables used in the research analyses for the whole sample period, the pre-crisis period and the crisis period, separately. The mean compounded monthly stock return during the pre-crisis period is 0.36 %, while the return during the crisis period is -0.73 %, with the standard deviation during the crisis being relatively high at 5.13. This shows that the variation in firms' performance increased during the economic downturn, which is an interesting phenomenon to be explored. The compounded monthly return on the S&P 500 index during the pre-crisis period is approx. similar to the one observed by the sample firms, but in the crisis period, the index experienced a compounded monthly return of -1.09 %, which is 39 basis points lower than the return on the sample firms. This may be due to the fact that financial firms, which suffered a greater impact of the financial crisis, have been removed from the sample. Tobin's Q, an alternative measure of firm value and performance, also shows similar characteristics as the stock return measure. The mean Tobin's Q during the pre-crisis period is 2.28 and during the crisis period is 1.67, indicating that sample firms experienced a drop in market valuation during the global financial crisis.

The measure of earnings management, discretionary accruals, has a maximum value of 0.93 during the pre-crisis period, whereas the maximum value during the crisis period is observed to be 0.46. This observation is consistent with the results depicted by Arthur, Tang & Lin (2015), which indicated that the level of earnings management by firms decreased during the crisis period. The mean leverage ratio of firms decreased slightly during the crisis period from 0.70 to 0.68, indicating lower access to financing as well as potentially lower risk taking behaviour by corporations. Average profitability of firms dropped significantly when looking at the return on assets and return on equity values. The mean return on assets dropped from 7.97 % in the pre-crisis period to 4.53 % in the crisis period, while the mean return on equity dropped from 0.23 % to -0.06 %. The level of foreign sales during the crisis period is seen to be higher than in the pre-crisis period, meaning that firms took a measure to reduce the impact of the financial crisis, which was majorly observed in the U.S., by increasing their exposure to international markets. The percentage of independent board members on the sample firms' boards increased during the crisis period based on the median values, being 44.4 % in the pre-crisis period and 53.8 % in the crisis period. The improved corporate governance during the crisis may be an indication of the effort by corporates to reduce agency costs and increase market confidence during the uncertain economic circumstances.

Table 3. Summary Statistics

Whole Sample

	N	Mean	Median	min	max	St. Dev
Ln (Total Assets)	1782	16.11	16.02	12.69	20.50	1.16
Avg. Monthly Stock Return (%)	1780	0.18	0.55	-10.21	8.37	3.25
Avg. Monthly SP500 Return (%)	1782	0.06	0.60	-3.97	1.78	1.87
Tobin's Q	1781	2.07	1.74	0.46	10.76	1.16
Hedger	1781	0.88	1.00	0	1	0.32
Discretionary Accruals	1479	0.04	0.03	0.00	0.93	0.06
Leverage	1782	0.69	0.38	-103.62	88.35	4.07
Capex-to-Sales	1779	0.07	0.04	0.00	2.01	0.12
Return on Equity (%)	1479	0.11	0.17	-52.30	34.21	1.91
Return on Assets (%)	1479	6.60	7.14	-68.62	33.24	8.98
Foreign Sales (%)	1680	36.10	37.47	0.00	138.28	24.77
Dividend Payment	1777	0.73	1.00	0	1	0.44
Board Independence (%)	1501	44.17	50.00	0.00	94.12	26.78

Before Crisis

	N	Mean	Median	min	max	St. Dev
Ln (Total Assets)	1188	16.06	15.97	13.14	20.49	1.15
Avg. Monthly Stock Return (%)	1186	0.65	0.72	-9.98	12.55	2.22
Avg. Monthly SP500 Return (%)	1188	0.64	0.60	0.29	1.07	0.29
Tobin's Q	1187	2.28	1.91	0.67	10.76	1.27
Hedger	1187	0.88	1.00	0	1	0.33
Discretionary Accruals	888	0.04	0.03	0.00	0.93	0.06
Leverage	1188	0.70	0.35	-12.60	88.35	3.25
Capex-to-Sales	1187	0.07	0.04	0.00	2.01	0.12
Return on Equity (%)	888	0.23	0.18	-2.39	34.21	1.20
Return on Assets (%)	888	7.97	8.01	-68.62	33.24	7.56
Foreign Sales (%)	1112	35.27	35.72	0.00	138.28	24.41
Dividend Payment	1186	0.73	1.00	0	1	0.44
Board Independence (%)	972	38.87	44.44	0.00	94.12	29.12

Crisis Period

	N	Mean	Median	min	max	St. Dev
Ln (Total Assets)	594	16.19	16.13	12.69	20.50	1.17
Avg. Monthly Stock Return (%)	594	-0.73	-0.41	-21.61	27.66	5.13
Avg. Monthly SP500 Return (%)	594	-1.09	-1.09	-3.97	1.78	2.88
Tobin's Q	594	1.67	1.46	0.46	7.04	0.78
Hedger	594	0.90	1.00	0	1	0.30
Discretionary Accruals	591	0.05	0.03	0.00	0.46	0.06
Leverage	594	0.68	0.47	-103.62	46.39	5.35
Capex-to-Sales	592	0.07	0.04	0.00	1.45	0.12
Return on Equity (%)	591	-0.06	0.14	-52.30	6.93	2.62
Return on Assets (%)	591	4.53	6.01	-64.62	33.16	10.44
Foreign Sales (%)	568	37.73	40.58	0.00	100.00	25.38
Dividend Payment	591	0.73	1.00	0	1	0.44
Board Independence (%)	529	53.91	53.85	0.00	92.86	18.20

4.2. Research Methodology

This section describes the empirical methods used to analyze the data and evaluate the validity of the research hypotheses. This study utilizes various types of analyses, including correlation analysis, univariate analysis, and multivariate analysis. While correlation analysis provides a simple direction and strength of relationship between all the variables mentioned earlier, univariate analysis provides a better understanding of the mean differences in market performance of firms that use financial derivatives and firms that do not, and firms that use higher than mean amount of discretionary accruals and firms that use below than mean amount of discretionary accruals. In order to extend the research to include both the independent variables - the decision to hedge and the magnitude of discretionary accruals, as well as include control variables that affect firm performance and/or artificial and real income smoothing, multivariate regression analyses are performed.

4.2.1. Test of Multicollinearity

In order to avoid obtaining biased estimates from the regression models used in this study, a test of multicollinearity among the independent variables involved is done following Panaretou (2014), by using the Variance Inflation Factor (VIF) test. Woolridge (2012: 97-98) states that a VIF value above 10 is considered to be the threshold for considering the multicollinearity present an estimation problem. As can be observed from Table 4 below, the maximum VIF value observed i.e. 1.40 is for the variables representing the level of discretionary accruals and the return on assets. It can therefore be concluded that multicollinearity is not a problem in this research.

Table 4. Test of Multicollinearity using Variance Inflation Factor (VIF)

	VIF	1/VIF
Ln(assets)	1.14	.87
Dividend Dummy	1.14	.88
D. Accruals	1.40	.71
Hedger	1.05	.95
Capex-to-Sales	1.02	.98
Leverage	1.02	.98
Return on Assets	1.40	.71
Foreign Sales	1.06	.95
Mean VIF	1.15	

4.2.2. Hausman Test

Previous studies investigating the impact of income smoothing on firm performance have used various types of regression models, but the most commonly used models are Pooled Ordinary Least Squares (Pooled OLS), Random Generalized Least Squares and Fixed Effects Generalized Least Squares (FEGLS). Bartlett & Partnoy (2018) mention that a fixed-effects estimation model produces the most accurate results when the dependent variable is a measure based on stock returns. Further, using a fixed-effects model also helps in avoiding omitted bias, and thus also endogeneity problem. However, in order to formally choose between the random-effects model and the fixed-effects model, Hausman test is performed. According to Woolridge (2012: 290), Hausman test simply tests for the statistically significant differences in the estimates on the time variant independent variables. The null hypothesis in the Hausman test is that the coefficients obtained from the random-effects model are consistent. In case the p-value from the test is less than 0.05, this null hypothesis can be rejected, implying that fixed-effects model is the appropriate model to use with the data. (Woolridge 2012.) The results from the Hausman test, presented below in Table 5, reject the null hypothesis of consistent random-effects model's coefficients at a very high level of statistical significance. Thus, fixed-effects model is considered to be the correct regression model for the purpose of this study. Due to the fact that Pooled OLS model is used extensively in addition to either

random-effects model or fixed-effects model in previous similar research, this study also uses Pooled OLS in the main regressions in addition to the fixed-effects model.

Table 5. Hausman Test for Fixed-effects vs. Random-effects Model

	Fixed effects	Random effects	Difference	Standard Error
Hedger	0.728	0.169	0.560	0.539
D. Accruals	0.718	0.541	0.176	1.41
Ln (assets)	-1.382	0.051	-1.433	0.395
Return on Assets	0.070	0.066	0.002	0.014
Leverage	-0.099	-0.074	-0.025	0.013
Foreign Sales	0.010	0.000	0.010	0.013
Capex-to-Sales	-5.788	0.328	-6.116	1.634
Dividend Payer	-1.652	-0.328	-1.324	0.570
Test: Ho: difference in coefficients not systematic				
Prob>chi2: 0.000				

4.2.3. Regression Models

To identify the impact of artificial and real income smoothing devices on firm performance, several regression models are estimated based on previous literature using the collected data on 297 non-financial firms listed on the S&P 500 index during the period between 2005 and 2009. The regression models are performed on the whole sample of firms during the whole period of 5 years, or on various sub-samples formed on the basis of research hypotheses and previous studies, depending on the substance of interest. Furthermore, in cases where Pooled OLS method is used*, industry and year dummies* are included in the regression models in order to control for industry-specific and time-specific effects, whereas only year dummy variables are included in fixed-effects regressions, as required. Most of the regressions estimated in this study as discussed below include control variables that have been used trying to investigate similar relationships in the past. These variables, as described in the previous sections, are related to *firm size, profitability, leverage, capital expenditure, geographical diversification, and dividend payment.*

The first regression model aims to analyze the impact of using financial derivatives on compounded monthly stock returns of sample firms. It includes the above mentioned

control variables (contemporaneous) and is performed on the sample firms for the pre-crisis period (2005 - 2007), crisis period (2008 - 2009) and the whole period (2005 - 2009). To identify whether larger firms derive a larger benefit from using financial derivatives due to lower cost of establishing risk management practices, the regression is further done on a sub-sample of firms with above-median amount of total assets during a given year.

$$(4)\quad Stock\ Return = \beta_0 + \beta_1 Hedger + \beta_2 Total\ Assets + \beta_3 Return\ on\ Assets + \beta_4 Leverage + \beta_5 Foreign\ Sales + \beta_6 Capex\text{–}to\text{–}Sales + \beta_7 Dividend\ Payer$$

Next, the measure of earnings management, the absolute amount of discretionary accruals, is added to the first regression model. This model is also run on the sample firms for all three periods, and also separately on the sub-sample of firms with above-median total assets. Further, to investigate the impact of corporate governance on the relationship between income smoothing devices and firm performance, the regression is run separately on firms with below-median percentage of independent board members and firms with above-median percentage of independent board members.

$$(5)\quad Stock\ Return = \beta_0 + \beta_1 Hedger + \beta_2 Discretionary\ Accruals + \beta_3 Total\ Assets + \beta_4 Return\ on\ Assets + \beta_5 Leverage + \beta_6 Foreign\ Sales + \beta_7 Capex\text{–}to\text{–}Sales + \beta_8 Dividend\ Payer$$

Toerien & Lambrechts (2016), in their study aiming to investigate the impact of derivatives hedging on firm performance, observe different coefficients when using return on assets and return on equity as measures of firm performance. In order to evaluate whether the measure of profitability in this study has an impact on the results obtained by the (5) regression model, which is of primary concern, the regression is also done using return on equity instead of return on assets, as presented in the model below.

$$(6)\quad Stock\ Return = \beta_0 + \beta_1 Hedger + \beta_2 Discretionary\ Accruals + \beta_3 Total\ Assets + \beta_4 Return\ on\ Equity + \beta_5 Leverage + \beta_6 Foreign\ Sales + \beta_7 Capex\text{–}to\text{–}Sales + \beta_8 Dividend\ Payer$$

The results from the correlation, univariate and multivariate analyses are presented and discussed in the following chapter.

5. EMPIRICAL RESULTS

This chapter presents the results obtained from the different analyses performed using the data and methodology described in earlier chapters. The chapter is divided into three sub-sections discussing the results from the correlation analysis, univariate analyses, and multivariate analyses, in the respective order.

5.1. Correlation Analysis

Table 6 displays the correlation coefficients from the correlation analysis between the main independent and control variables used in the study. In addition, the correlation between the firm performance measure used in this study, compounded monthly stock returns during the year, and Tobin's Q, a measure widely used in similar studies, is reported. The coefficient for this relationship is positive and statistically significant, validating the use of an alternative measure of firm performance. The correlation between Stock Return and Hedger is observed to be positive, but low in magnitude and statistical significance, but interestingly, the correlation between Tobin's Q and Hedger is negative and statistical significant. The latter result may be due to the inherent conceptual and computation error in the use of simple Tobin's Q, as explained in the previous chapters. The coefficient of correlation between Discretionary Accruals (D. Accruals) and Stock Return is negative and significant at the 5 % level, which is in line with the primary alternative hypothesis of this study. The relationship between firm size and firm performance has been a subject of debate. Indeed, the relationship between Assets and Stock return is positive and statistically insignificant, but between Assets and Tobin's Q is negative and statistically significant. Leverage and Stock Return are negatively correlated, and so are Dividend Payer and Stock Return (although statistically insignificant). The measure of profitability, Return on Assets, is positively and statistically significantly correlated to Stock Return, as expected.

Hedger is positively correlated to Assets, implying that larger firms are more likely to use financial derivatives, which is contradicting the theory of financial distress, but in line

with the theory that larger firms have lower costs of setting up risk management practices. The relationship between Leverage and Hedger is positive but insignificant. Based on the coefficient reported, firms with higher level of foreign sales are more likely to be hedgers. The correlation between Discretionary Accruals and Assets is found to be negative. All independent and control variables have a relatively low level of correlation among each other, providing a reliable basis for extending the analysis.

Table 6. Correlation Matrix

Variables	Stock Return	Ln (Tobin Q)	Hedger	D. Accruals	Ln (Assets)	Leverage	Return on Assets	Foreign Sales	Dividend Payer
Stock Return	1.000								
Ln (Tobin's Q)	0.324*	1.000							
Hedger	0.004	-0.088*	1.000						
D. Accruals	-0.094*	-0.065*	-0.016	1.000					
Ln (Assets)	0.018	-0.177*	0.134*	-0.116*	1.000				
Leverage	-0.126*	-0.060*	0.025	0.015	-0.038	1.000			
Return on Assets	0.153*	0.580*	-0.066*	-0.508*	0.056*	-0.084*	1.000		
Foreign Sales	0.022	0.267*	0.119*	0.041	-0.043	-0.079*	0.102*	1.000	
Dividend Payer	-0.020	-0.108*	0.069*	-0.182*	0.304*	-0.007	0.131*	-0.085*	1.000

* shows significance at the .05 level

5.2. Univariate Analysis

Univariate analysis is done on the sample firms separately for determining the differences in mean Stock Return between Hedgers and Non-hedgers, and between firms with Low and High Discretionary Accruals during the three different estimate periods - Pre-crisis period, Crisis period and the whole period. Table 7 provides the results of the two univariate analyses in separate panels.

Table 7. Univariate Analysis

Panel A. Hedger vs. Non-hedger	Whole Period		Before Crisis		Crisis Period			
Stock Return	**All firms**		**All firms**		**All firms**		**Small firms**	
	N	Mean	N	Mean	N	Mean	N	Mean
Non-hedger	168	-.038	109	.306	59	-.673	37	-.851
Hedger	1317	.013	782	.499	535	-.699	260	-.498
Difference		-.051		-.193		.026		-.352
t-stat		-.15		-.85		.05		-.35
p-value		.869		.393		.971		-.713

Panel B. Low vs. High Discretionary Accruals	Whole Period		Before Crisis		Crisis Period			
Stock Return	**All firms**		**All firms**		**All firms**		**Small firms**	
	N	Mean	N	Mean	N	Mean	N	Mean
Low Discretionary Accruals	1005	.033	592	.515	413	-.659	194	-.652
High Discretionary Accruals	480	-.048	299	.397	181	-.781	103	-.337
Difference		.081		.119		.122		-.315
t-stat		.4		.75		.25		-.45
p-value		.696		.448		.789		.636

Panel A of Table 7 presents the results of the mean differences in Stock Return observed by to sub-samples of firms - firms that used financial derivatives during the period, and firms that did not. The results for the period 2005 - 2009 indicate that hedgers experienced a higher mean compounded monthly stock return than non-hedgers, the mean difference between the two sub-samples being .051 %. The result is similar for the period before the crisis with a difference between the samples' mean of .193. However, during the crisis period, the result is opposite i.e. hedgers experienced a lower compounded monthly stock return than non-hedgers, which is contradictory to the research hypothesis. However, when comparing the means during the same period for firms that are relatively small in size (below-median amount of total assets), hedgers appear to have performed better than non-hedgers. This observation is consistent with the theory of financial distress that proposes higher hedging premiums for small firms.

The mean differences in Stock Return for firms with low (below-mean) discretionary accruals and high (above-mean) discretionary accruals are presented in Panel B of Table 7. During the whole sample period of 2005 - 2009, firms that used a lower level of artificial income smoothing through accrual management observed a higher compounded monthly stock return during the years than firms that were more aggressive artificial income smoothers. The mean differences in the stock returns is reported to be .081.

Similarly, firms with lower level of discretionary accruals performed better by a difference in the stock returns of .119 during the pre-crisis period and .122 during the crisis period. However, when comparing the means for firms of below-median size in terms of total assets, firms with higher level of discretionary accruals are reported to be better performers during the crisis period. It is important to note that the results of this univariate analysis are not statistically significant and similar results are observed for the differences in median tests. The potential relationships should be tested further by using more sophisticated empirical research techniques, as is done in this study through multivariate regression models.

5.3. Multivariate Analysis

This section reports the results of the multivariate regression analyses performed on the sample data in order to identify the impact of artificial and real income smoothing on firm performance. Various regressions are run using different subsets of data concerning specific types of firms and particular time periods.

5.3.1. Hedging and Firm Performance

Table 8 reports the results from the regressions aiming to identify the impact of using derivatives on compounded monthly stock returns of sample firms during the pre-crisis period (2005 - 2007), crisis period (2008 - 2009) and the whole period (2005 - 2009). The main variable of interest in the six regression models reported is Hedger, which is the binary variable indicating whether a firm used financial derivatives or not. The table reports the regression results using Pooled OLS as well as Fixed-effects model.

Hedging: The regressions on sample firms for the whole period result in a positive but statistically insignificant coefficient on Hedger. The coefficient obtained by employing Pooled OLS is comparatively smaller (0.167) than the one by Fixed-effects model (0.730). In the pre-crisis period, Pooled OLS leads to a positive coefficient (0.041), whereas Fixed-effects model leads to a negative coefficient (-0.737), although the

coefficients are not statistically significant. In the crisis period, both models result in positive coefficients, but Fixed-effects estimation provides a higher and statistically significant coefficient of 3.489, implying that firms that used financial derivatives during the crisis period experienced, on average, a compounded monthly stock return 3.5 percentage points higher than firms that did not use financial derivatives. This result concerning a positive hedging premium is consistent with *Hypothesis 1a* and also with previous studies, such as Nelson et al. (2005) and Bartram et al. (2011).

Firm Size: The regressions for the whole period result in opposite coefficients for the measure of size, natural logarithm of the amount of total assets. While the Pooled OLS regression leads to a positive coefficient, the Fixed-effects model leads to a negative and statistically significant coefficient of -1.379. The results in the pre-crisis and crisis period are strikingly opposite to each other regardless of the type of regression model. For the pre-crisis period, positive and significant coefficients of 0.203 and 1.882 are obtained from the Pooled OLS and Fixed-effects model respectively, whereas in the crisis period, negative and significant coefficients of -0.172 and -.6.625 are observed.

Profitability: The regression coefficients for Return on Assets, the measure of profitability used in the models, are all positive and largely statistically significant at the 5 % level for all different regression periods. This result is in line with the expectations and similar to what has been reported by other studies (Panaretou 2014; Allayannis & Weston 2001) in the past. It is important to note that during the pre-crisis period, the coefficients are on average, larger than during the crisis period, ranging from 0.046 to 0.076.

Leverage: As found in similar previous literature (Huang et al. 2009; Panaretou 2014), the regressions lead to negative and mostly statistically significant coefficients on the ratio of long-term debt to total equity. The coefficients observed during the crisis period are lower and of larger statistical significance and during the pre-crisis period. The Fixed-effects model leads to a coefficient of -0.113 during the crisis period, while the Pooled OLS model to a coefficient of -0.063.

Geographical Diversification: During the pre-crisis period, a positive but statistically insignificant coefficient is obtained for the measure of geographical diversification, whereas in the crisis period, the coefficient using Pooled OLS method is negative. Panaretou (2014) also reports insignificant relationship between the level of foreign sales and Tobin's Q for listed firms in the United Kingdom

Capital Expenditure: During the pre-crisis period, the ratio of capital expenditures to net sales is observed to be negatively related to firm performance using the Pooled OLS method, but positively related using the Fixed-effects model. Mixed results have been observed by previous studies, such as Carter & Simkins (2006). Such relationships are also observed for the crisis period as well as the whole sample period in this study, but the coefficient obtained using the Fixed-effects model during the whole period is -0.580 and statistically significant.

Dividend Payment: During the pre-crisis period, negative yet statistically insignificant coefficients are observed on the binary variable indicating whether a firm paid dividends during the year or not. However, during the crisis period, the Fixed-effects model provides a negative and statistically significant coefficient of -4.292. This negative relationship between firm performance and dividend payment is also reported by Allayannis & Weston (2001).

Table 8. Hedging and Firm Performance

	Before Crisis		Crisis Period		Whole Period	
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Stock Return	Pooled OLS	Fixed-effects	Pooled OLS	Fixed-effects	Pooled OLS	Fixed-effects
Constant	-2.708***	-29.615***	-1.969	126.777***	-0.127	22.831***
	(-2.756)	(-3.582)	(0.973)	(3.577)	(-0.124)	(2.976)
Hedger	0.041	-0.737	0.248	3.489*	0.167	0.730
	(0.156)	(-1.242)	(0.540)	(1.944)	(0.648)	(1.641)
Ln(assets)	0.203***	1.882***	-0.172	-6.625***	0.036	-1.379***
	(3.230)	(3.755)	(-1.536)	(-3.537)	(0.559)	(-2.826)
Return on Assets	0.073***	0.076***	0.046***	0.058*	0.062***	0.064***
	(5.790)	(3.915)	(3.094)	(1.828)	(5.302)	(3.515)
Leverage	-0.053*	-0.050	-0.063***	-0.113***	-0.074***	-0.099***
	(-1.653)	(-1.147)	(-4.284)	(-3.652)	(-3.548)	(-7.522)
Foreign Sales	0.003	0.019	-0.001	0.044	0.001	0.010
	(0.708)	(1.247)	(-0.128)	(0.856)	(0.286)	(0.975)
Capex-to-Sales	-1.071*	-0.616	1.028	-3.725	0.063	-5.804**
	(-1.704)	(-0.306)	(0.685)	(-0.717)	(0.031)	(-1.988)
Dividend Payer	-0.393*	-0.786	-0.185	-4.292**	-0.421*	-1.649**
	(-1.766)	(-1.001)	(-0.523)	(-2.347)	(-1.778)	(-2.218)
Observations	835	835	567	567	1,402	1,402
R-squared	0.171	0.108	0.660	0.717	0.504	0.532
Number of firms		284		287		290

*,**, and *** denote statistical significance at the 10 %, 5 % and 1 % levels, respectively. Robust t-stats reported in parentheses.

5.3.2. Hedging and Firm Performance in Large Firms

Table 9 shows the results for the same regressions as above performed on the sample of firms that have above-median amount of total assets, representing relatively large firms in the sample.

Hedger: The resulting coefficients on Hedger are largely statistically insignificant, except for the positive and highly statistically significant coefficient observed for the sample firms during the crisis period. The result is in line with Hypothesis 1a, in that it indicates a hedging premium during the time of the global financial crisis, but not during the period following the crisis. Further, the coefficient of 5.426 is larger than the one observed when

all the firms in the sample are used in the regression analysis. This result suggests that larger firms derive higher benefits from hedging using financial derivatives owing to economies of scale and lower initial costs of establishing risk management frameworks. Clark & Mefteh (2010) report a similar result concerning a higher hedging premium for larger firms. Nelson et al. (2005) also find that the abnormal stock return from hedging using financial derivatives is mostly concentrated in large firms in the United States during the period 1995-1999.

Firm Size: The regressions for the pre-crisis period using the sample of large firms lead to a negative and statistically insignificant coefficient on the measure of firm size use the Pooled OLS method, but a positive and significant coefficient of 1.682 using the Fixed-effects method. This coefficient is slightly larger than the one observed for the estimation sample of all firms. However, for the period representing the crisis, a negative coefficient of low statistical significance is observed, whereas a negative coefficient of -1.482 (5 % significance level) is obtained with the regression on the whole sample period. Clearly, the relationship between firm size and firm performance is dependent on various factors, providing mixed results in most studies.

Profitability: The coefficients resulting from the respective regressions on Return on Assets are of the same magnitude and direction as obtained from the first set of regressions. However, the coefficients from the Fixed-effects model are of lower significance than observed previously, implying that for larger firms, profitability alone may not be as important determinant of market performance. This result is opposite to the one reported by Clark & Mefteh (2010).

Leverage: The impact of leverage on firm performance for larger firms in the sample is observed to be relatively similar as on the whole sample for firms i.e. negative. However, for the subset of larger firms, the relationship is seen to be of low statistical significance.

Geographical Diversification: While for the whole sample of firms no significant relationship is found between the level of foreign sales and firm performance, a positive relationship is found between the variables on the sample of large firms during the pre-crisis period.

Based on the results of these regressions, capital expenditure and dividend payment do not have an impact on firm performance for large firms. Previous studies, such as Allayannis & Weston (2001) and Panaretou (2014) also find no statistically significant impact of investment opportunities and dividend payment on firm performance.

Table 9. Hedging and Firm Performance - Firms with Total Assets > median value of Total Assets

	Before Crisis		**Crisis Period**		**Whole Period**	
	(1)	(2)	(3)	(4)	(5)	(6)
Stock Return	Pooled OLS	Fixed-effects	Pooled OLS	Fixed-effects	Pooled OLS	Fixed-effects
Constant	1.397	-29.421***	-0.448	109.197*	2.466	24.289**
	(0.758)	(-3.503)	(-0.121)	(1.695)	(1.348)	(1.983)
Hedger	0.247	-0.254	-0.156	5.426***	-0.063	0.507
	(0.714)	(-0.491)	(-0.199)	(2.788)	(-0.157)	(0.882)
Ln(assets)	-0.065	1.682***	-0.247	-7.229*	-0.115	-1.482**
	(-0.587)	(3.437)	(-1.139)	(-1.886)	(-1.089)	(-2.017)
Return on Assets	0.071***	0.039	0.064**	0.098	0.073***	0.078*
	(2.819)	(1.173)	(2.051)	(1.175)	(3.474)	(1.807)
Leverage	-0.059	-0.146	-0.109***	-0.168***	-0.096***	-0.117***
	(-0.793)	(-1.573)	(-5.369)	(-5.969)	(-4.674)	(-12.152)
Foreign Sales	-0.002	0.035**	-0.002	0.126	-0.003	0.016
	(-0.499)	(2.408)	(-0.277)	(1.033)	(-0.780)	(1.559)
Capex-to-Sales	-1.198*	1.354	2.686	-6.117	0.259	-3.513
	(-1.735)	(1.464)	(0.499)	(-0.796)	(0.119)	(-1.523)
Dividend Payer	-0.227	0.312	0.084	0.700	-0.167	0.276
	(-0.657)	(0.555)	(0.107)	(0.263)	(-0.396)	(0.485)
Observations	429	429	291	291	720	720
R-squared	0.173	0.061	0.584	0.636	0.502	0.541
Number of firms		157		152		169

*,**, and *** denote statistical significance at the 10 %, 5 % and 1 % levels, respectively. Robust t-stats reported in parentheses.

5.3.3. Hedging, Discretionary Accruals, and Firm Performance

The regressions from Table 10 and Table 11 aim to identify the impact of artificial and real income smoothing on firm performance using two different control variables concerning firm profitability (refer to section 4.2.3.).

Regressions using *Return on Assets* as a Control Variable for Firm Profitability

As mentioned earlier, previous studies have reported a significant relationship between discretionary accruals and firm performance (Tang & Chang 2014) as well mixed results on the relationship between discretionary accruals and usage of financial derivatives (Barton 2001). Therefore, this study builds on these empirical findings along with the theoretical literature on the simultaneous impacts of artificial and real income smoothing.

Hedging: The Pooled OLS regression for the pre-crisis period leads to a positive but statistically insignificant coefficient on Hedger, whereas the Fixed-effects model to a negative and insignificant coefficient. However, for the crisis period, both models result in a positive coefficient with the result from the Fixed-effects model being statistically significant at the 5 % level. The coefficient of 3.702 implies a 3.7 percentage points higher compounded monthly stock return for hedgers during the crisis year. Based on these results, Hypothesis 2 can be accepted, suggesting than hedging has a positive and significant impact on firm performance during the crisis period, but not during the pre-crisis period. The result is in line with Bartram et al. (2011), who find that firms hedge downside risk using financial derivatives. The regressions for the whole sample period result in positive but statistically insignificant coefficients.

Discretionary Accruals: While the coefficients obtained from the regressions concerning the pre-crisis period are positive and statistically insignificant, the coefficients from the crisis period regressions are negative, with a coefficient of -6.506 from the Fixed-effects model. The regressions for the whole sample period lead to positive yet statistically insignificant results for the relationship between artificial income smoothing and firm performance.

Firm size: The regressions for the pre-crisis period result in positive and statistically significant coefficients on the measure of firm size, whereas negative and statistically significant coefficient is observed on the respective variable for the crisis period using the Fixed-effects model. Similar result is obtained from the Fixed-effects model for the whole sample period.

Profitability: The regressions for all periods largely result in positive and statistically significant coefficients on the measure of profitability - Return on Assets, except for the Fixed-effects regression for the crisis period.

Leverage: For the pre-crisis period, a positive but statistically insignificant coefficient is observed using both regression models. However, for the crisis period of 2008-2009, a negative and statistically significant relationship is found between the ratio of long-term debt to total equity and firm performance. A similar relationship is suggested by the regressions for the period 2005-2009.

While no statistically significant relationship is found between dividend payment and firm performance during the pre-crisis period, a negative and statistically significant relationship is suggested by the Fixed-effects model for the crisis period, a result that is in line with the results reported by previous similar studies. Based on these regressions, geographical diversification and the level of capital expenditure are observed to have no statistically significant impact on firm performance during any of the sample periods.

Using *Return on Equity* as a Control Variable for Firm Profitability

In order to test Hypothesis 6, similar regressions with a different measure of profitability are performed. Instead of Return on Assets as a control variable, Return on Equity is used. The results from these regressions are presented in Table 11.

Hedging: The regressions of firm performance on hedging variable and discretionary accruals using Return on Equity as a control variable for profitability lead to a positive and statistically significant coefficient of 4.374 on Hedger for the crisis period using the Fixed-effects model. For the other sample periods, the results are not statistically significant, similar to the previous regressions.

Discretionary Accruals: While the previous regressions resulted in negative yet statistically insignificant coefficients on the measure of artificial income smoothing, the

regressions with Return on Equity as an independent variable result in a negative and largely statistically significant coefficient for all periods. This result is consistent with the one reported by Tang & Chang (2014) and allows for the rejection of null hypothesis Hypothesis 0b, in turn for the acceptance of Hypothesis 1b.

The results concerning the control variables obtained from these regressions are similar to the ones observed from the regressions employing Return on Assets as the measure of profitability. Mixed results are observed for the relationship between firm size and firm performance, whereas a negative impact of leverage and dividend payment is seen on firm performance for crisis period regressions.

Table 10. Hedging, Discretionary Accruals, and Firm Performance (Return on Assets as the measure of firm profitability)

	Before Crisis		**Crisis Period**		**Whole Period**	
	(1)	(2)	(3)	(4)	(5)	(6)
Stock Returns	Pooled OLS	Fixed-effects	Pooled OLS	Fixed-effects	Pooled OLS	Fixed-effects
Constant	-2.893***	-29.499***	-1.872	99.766***	-0.212	22.835***
	(-2.835)	(-3.555)	(-1.041)	(3.233)	(-0.201)	(2.980)
Hedger	0.053	-0.731	0.245	3.702**	0.172	0.729
	(0.202)	(-1.233)	(0.531)	(2.036)	(0.669)	(1.636)
D. Accruals	1.089	0.607	-0.891	-6.442	0.609	0.718
	(0.696)	(0.234)	(-0.332)	(-1.207)	(0.415)	(0.357)
Ln(assets)	0.209***	1.871***	-0.172	-6.506***	0.038	-1.383***
	(3.274)	(3.717)	(-1.533)	(-3.403)	(0.587)	(-2.837)
Return on Assets	0.077***	0.079***	0.042**	0.021	0.065***	0.068***
	(5.503)	(2.840)	(2.328)	(0.494)	(4.922)	(3.127)
Leverage	-0.052	-0.051	-0.063***	-0.117***	-0.073***	-0.099***
	(-1.626)	(-1.147)	(-4.241)	(-3.753)	(-3.516)	(-7.503)
Foreign Sales	0.002	0.019	-0.001	0.040	0.001	0.010
	(0.648)	(1.237)	(-0.123)	(0.801)	(0.265)	(0.990)
Capex-to-Sales	-1.070*	-0.617	1.055	-3.650	0.057	-5.788**
	(-1.683)	(-0.306)	(0.705)	(-0.706)	(0.028)	(-1.986)
Dividend Payer	-0.384*	-0.776	-0.191	-4.241**	-0.416*	-1.652**
	(-1.724)	(-0.991)	(-0.540)	(-2.255)	(-1.761)	(-2.225)
Observations	835	835	567	567	1,402	1,402
R-squared	0.171	0.108	0.660	0.719	0.504	0.532
Number of firms		284		287		290

*,**, and *** denote statistical significance at the 10 %, 5 % and 1 % levels, respectively. Robust t-stats reported in parentheses.

Table 11. Hedging, Discretionary Accruals, and Firm Performance (Return on Equity as the measure of firm profitability)

	Before Crisis		Crisis Period		Whole Period	
	(1)	(2)	(3)	(4)	(5)	(6)
Stock Returns	Pooled OLS	Fixed-effects	Pooled OLS	Fixed-effects	Pooled OLS	Fixed-effects
Constant	-1.271	-29.042***	-1.782	117.782***	0.698	20.053***
	(-1.271)	(-3.635)	(-0.837)	(3.370)	(0.682)	(2.777)
Hedger	-0.087	-0.722	0.233	4.374**	0.037	0.655
	(-0.328)	(-1.173)	(0.423)	(2.257)	(0.139)	(1.464)
D. Accruals	-2.753*	-4.140**	-7.138***	-10.989**	-3.967***	-4.206**
	(-1.765)	(-2.150)	(-2.708)	(-2.338)	(-2.801)	(-2.407)
Ln(assets)	0.154**	1.890***	-0.154	-7.531***	0.021	-1.159**
	(2.372)	(3.907)	(-1.158)	(-3.462)	(0.324)	(-2.531)
Return on Equity	0.062*	0.009	0.016	0.092	0.028	0.024
	(1.781)	(0.214)	(0.527)	(0.319)	(1.128)	(0.866)
Leverage	-0.070*	-0.050	-0.095***	-0.186***	-0.083***	-0.106***
	(-1.876)	(-1.009)	(-5.198)	(-3.521)	(-4.098)	(-7.623)
Foreign Sales	0.006*	0.019	0.001	0.050	0.004	0.009
	(1.663)	(1.207)	(0.107)	(0.896)	(1.181)	(0.948)
Capex-to-Sales	-1.467**	-1.003	2.525	-7.223	-0.116	-6.224**
	(-2.445)	(-0.507)	(0.489)	(-0.824)	(-0.057)	(-2.081)
Dividend Payer	-0.250	-0.653	-0.339	-6.835**	-0.302	-1.552**
	(-1.114)	(-0.808)	(-0.761)	(-2.191)	(-1.279)	(-2.086)
Observations	835	835	567	567	1,402	1,402
R-squared	0.125	0.085	0.592	0.666	0.489	0.525
Number of firms		284		287		290

*,**, and *** denote statistical significance at the 10 %, 5 % and 1 % levels, respectively. Robust t-stats reported in parentheses.

5.3.4. Hedging, Discretionary Accruals, and Firm Performance - Firms with Total assets > median value of Total Assets

This section presents the main results from the regressions of firm performance on hedging, artificial income smoothing, and control variables for a sample of large firms, defined as firms with total asset size more than the median value during a given year. These can be seen from Table 12.

Hedging: The results concerning the impact of using financial derivatives on firm performance are relatively similar to the ones observed for the whole sample, except that the coefficient on the variable is higher (5.865) and more statistically significant (at the 1 % level) during the crisis period. As can be seen, the coefficient is only statistically significant for the fixed-effects regression performed on the sample for the crisis period, with other coefficients being of low statistical significance. This result confirms that larger firms have higher benefits of using financial derivatives during the time of uncertainty, consistent with the results reported by Clark & Mefteh (2010) and Nelson et al. (2005).

Discretionary Accruals: To recall, no statistically significant relationship was found between artificial income and firm performance based on the regressions of firm performance on hedging, discretionary accruals and control variables including Return on Assets as the measure of profitability, although a negative and significant relationship was observed with the same regressions for the crisis period employing Return on Equity. However, these regressions performed on a sample of large firms resulted in a negative and statistically significant coefficient on the measure of artificial income i.e. the absolute amount of discretionary accruals, for the crisis period. This result suggests that larger firms experience larger gains from real income smoothing but also larger negative consequences of artificial income smoothing.

The regression results concerning the control variables are similar to the ones observed earlier, with leverage having a negative impact on compounded monthly stock return, but other variables only having coefficients of low statistical significance.

Table 12. Hedging, Discretionary Accruals, and Firm Performance - Firms with Total Assets > median value of Total Assets

	Before Crisis		Crisis Period		Whole Period	
	(1)	(2)	(3)	(4)	(5)	(6)
Stock Return	Pooled OLS	Fixed-effects	Pooled OLS	Fixed-effects	Pooled OLS	Fixed-effects
Constant	1.361	-29.136***	0.023	99.114	2.513	24.035*
	(0.723)	(-3.050)	(0.006)	(1.522)	(1.360)	(1.949)
Hedger	0.248	-0.183	-0.210	5.865***	-0.066	0.503
	(0.716)	(-0.388)	(-0.263)	(2.881)	(-0.165)	(0.876)
D. Accruals	0.187	8.309*	-4.679	-15.119**	-0.305	-2.174
	(0.079)	(1.713)	(-1.091)	(-2.205)	(-0.139)	(-0.699)
Ln(assets)	-0.064	1.626***	-0.251	-6.568*	-0.117	-1.457*
	(-0.570)	(2.960)	(-1.148)	(-1.696)	(-1.098)	(-1.974)
Return on Assets	0.072***	0.057	0.048	0.010	0.072***	0.069
	(2.736)	(1.515)	(1.399)	(0.122)	(3.246)	(1.544)
Leverage	-0.059	-0.156	-0.108***	-0.178***	-0.096***	-0.117***
	(-0.789)	(-1.370)	(-5.369)	(-6.332)	(-4.670)	(-12.429)
Foreign Sales	-0.002	0.036**	-0.001	0.109	-0.003	0.015
	(-0.498)	(2.548)	(-0.139)	(0.931)	(-0.773)	(1.503)
Capex-to-Sales	-1.200*	1.223	2.865	-5.918	0.266	-3.528
	(-1.728)	(1.243)	(0.534)	(-0.780)	(0.122)	(-1.525)
Dividend Payer	-0.225	0.470	0.037	0.990	-0.169	0.288
	(-0.652)	(0.696)	(0.047)	(0.367)	(-0.403)	(0.488)
Observations	429	429	291	291	720	720
R-squared	0.173	0.080	0.586	0.645	0.502	0.541
Number of firms		157		152		169

*,**, and *** denote statistical significance at the 10 %, 5 % and 1 % levels, respectively. Robust t-stats reported in parentheses.

5.3.5. Hedging, Discretionary Accruals, and Firm Performance - The role of Corporate Governance

Table 13 presents the results concerning the role of corporate governance in the market value gained / lost from artificial and real income smoothing devices. As mentioned earlier, this study uses the percentage of independent board members in a firm as the measure of the quality of corporate governance, as done on various previous studies (Huang et al. 2009).

Based on the results presented in Table 11, the impact of using financial derivatives during the pre-crisis period on firm performance is negative for firms with above-median proportion of independent board members. The coefficient on Hedger for this sample during the pre-crisis period is -1.517. This result implies that firms with higher quality of corporate governance practices are penalized for the use of financial derivatives, a result that is in line with Huang et al. (2009). The reasoning behind this may be that the increased transparency from hedging is more useful in firms with lower protection for investors. However, during the crisis period, opposite results are observed, in that firms with above-median proportion of independent board member have a higher positive coefficient on Hedger that is statistically significant at the 1 % level. This may be in line with the logic that well-governed firms are expected to use financial derivatives effectively and for hedging purposes only, reducing the overall cost of risk management activities over time.

Another interesting finding is the observed negative relationship between the absolute amount of discretionary accruals and firm performance for the firms with below-median independent boards. This result is consistent with the proposition of Huang et al. (2009), suggesting that firms where board members have control on management practices, artificial income smoothing has lower negative impacts, whereas firms that are more vulnerable to agency conflicts suffer higher consequences of reducing the quality of reported earnings via discretionary accruals.

Taking into consideration these results, Hypothesis 6 can be partially accepted, due to the proposed higher negative impact of artificial found on firm performance for firms with lower quality of corporate governance during the crisis period, but lower hedging premium observed for firms with higher quality corporate governance.

Table 13. Hedging, Discretionary Accruals, and Firm Performance - Firms with below-median and above-median proportion of independent board members

	Before Crisis		Crisis Period		Whole Period	
	(1)	(2)	(3)	(4)	(5)	(6)
Stock Returns	Below median	Above median	Below median	Above median	Below median	Above median
Constant	-30.027**	-32.694	151.523	114.761**	8.324	51.114***
	(-2.471)	(-1.594)	(1.365)	(2.468)	(0.625)	(3.454)
Hedger	0.424	-1.517***	0.527	7.083***	1.140**	1.429
	(0.906)	(-3.456)	(0.609)	(4.320)	(2.436)	(1.548)
D. Accruals	4.103	-0.905	-20.177***	-5.882	-3.916	-0.125
	(0.829)	(-0.165)	(-3.090)	(-0.527)	(-0.895)	(-0.031)
Ln(assets)	1.866**	2.136*	-10.002	-7.463**	-0.569	-3.169***
	(2.577)	(1.695)	(-1.445)	(-2.538)	(-0.677)	(-3.380)
Return on Assets	0.019	0.055	0.024	0.045	0.046	0.091**
	(0.326)	(1.164)	(0.274)	(0.529)	(1.066)	(2.165)
Leverage	-0.270***	-0.057	-0.151***	-0.290***	-0.130***	-0.133**
	(-13.052)	(-1.227)	(-6.663)	(-3.016)	(-4.120)	(-2.403)
Foreign Sales	0.026	0.053*	0.169	0.069	0.005	0.026
	(1.066)	(1.708)	(1.494)	(0.975)	(0.187)	(1.158)
Capex-to-Sales	-2.085	-2.248	2.151	-20.940*	2.360	-10.304**
	(-0.512)	(-0.924)	(1.593)	(-1.850)	(0.748)	(-2.600)
Dividend Payer	-0.238	-2.062	-2.881***	-7.618	-0.044	-1.932
	(-0.137)	(-0.952)	(-3.512)	(-1.642)	(-0.034)	(-1.123)
Observations	361	297	175	273	536	570
R-squared	0.196	0.173	0.752	0.733	0.590	0.580
Number of firms	195	162	115	167	212	200

*,**, and *** denote statistical significance at the 10 %, 5 % and 1 % levels, respectively. Robust t-stats reported in parentheses.

5.4. Potential Impacts of Endogeneity

This study uses Pooled OLS as well as Firm Fixed-effects regression methodology to identify the impact of artificial and real income smoothing on firm performance. Based on Bartlett & Partnoy (2018), fixed-effects model provides more reliable results in studies using a dependent measure based on stock returns since it avoids the influence of firm-specific factors on the relationship between other independent variables and the dependent variable. However, studies in the field of risk management practices and their

impact on firm performance are vulnerable to endogeneity bias due to the potential influence of a wide variety of unobserved and observed factors, whether micro-economic or macro-economic, as well as the probability of reverse causality. In order to avoid endogeneity bias, Huang et al. use a two-state simultaneous equations model. Finding an appropriate instrumental variable is challenging, with a sub-optimal instrumental variable leading to significantly biased results. On the other hand, Bartram et al. (2011) use a propensity score matching method to reduce the impact of endogeneity in the regressions using a large sample of non-financial firms from 47 countries. Due to a relatively small sample of approx. 297 individual firms, propensity scoring technique could not be used in the study. Therefore, despite of having moderately sized sample and using a panel data structure concerning 5 annual periods, the results presented in the previous chapter may be affected by endogeneity bias.

6. CONCLUSIONS

Along with the development of financial markets in the United States, the use of financial derivatives has also increased. Various studies on the impact of hedging financial risk using derivatives report a statistically significant relationship between the two. However, whether hedging has a positive or a negative impact on firm performance is observed to be dependent on various factors based on the mixed results (Allayannis & Weston 2001; Jin & Jorion 2006). On the other hand, artificial income smoothing has been shown to affect firm performance negatively (Tang and Chang 2014). In addition, previous literature suggests a relationship between artificial income smoothing using discretionary accruals and real income smoothing.

The main aim of this thesis is to identify the impact of income smoothing on firm performance. This study uses a sample of 297 non-financial firms listed on the S&P 500 index in the United States of America during 2005-2009. It extends the existing literature in three key ways - by using a novel measure of firm performance - compounded monthly stock returns as a measure of firm performance, employing measures of artificial and real income smoothing together, and providing a comparison of results between an economically stable period (2005-2007) and a period of economic and financial uncertainty (2008-2009). Further, the role of corporate governance is explored by segregating the sample into two categories based on the quality of corporate governance, measured by the proportion of independent board members in a firm. While real income smoothing is measure by a binary variable indicating whether a firm used financial derivatives in a given year or not, artificial income smoothing is measure by the absolute amount of discretionary accruals during the year. In addition to the correlation and univariate analyses, multi-variate regression analysis is performed using Pooled OLS and Firm-Fixed-effects model with robust standard errors. Control variables concerning firm size, profitability, capital structure, geographical diversification, dividend policy, etc. are included in all regressions to avoid biased results.

Results from the various analyses discussed in earlier chapters provide support for the hypothesis that income smoothing has a statistically significant impact on firm

performance and allows for the rejection of the null hypotheses of no significant impact of the real and artificial income smoothing devices on the measure of firm performance. However, the impact of income smoothing is only observed for the period representing the global financial crisis. Specifically, using financial derivatives has a positive impact on compounded monthly stock return, whereas the magnitude of discretionary accruals has a negative effect on compounded monthly stock return during the period 2008-2009, but not during the period leading up to the crisis (2005-2007). These relationships are found to be stronger for firms that are relatively larger in size, consistent with the theory that large firms have reduced costs of setting up risk management practices due to economies of scale, but scrutinized more for reporting lower-quality earnings. Further, firms with more independent boards are found to experience negative consequences of using financial derivatives during the pre-crisis period, but found to derive positive market value from the same during the crisis period. On the other hand, firms with less independent boards suffer more severe negative consequences of using artificial income smoothing devices during the crisis period. These results suggest a change in investor perception of income smoothing techniques during different economic cycles.

Although the findings of this study may potentially suffer from endogeneity bias, which is widely reported to be present in similar research in the past, they are of high academic and practical significance. The results suggest that the influence of artificial and real income smoothing on firm performance is dependent on various factors, including the time-period of the data, relative size of the sample firms, corporate governance practices, as well as the measure of firm performance and income smoothing being used. Corporations may derive market value from employing the suitable income smoothing technique and thereby increasing investor confidence. Further research on the subject is recommended to use a larger sample of firms from different countries as well as a longer sample period with several economic cycles, allowing for more sophisticated quantitative analysis methodologies to be used.

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