INNOVATION FOCUSED STRATEGY AND EARNINGS MANAGEMENT

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by

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CHAPTER 1

INTRODUCTION

1.1 Overview

Innovation is widely considered the lifeblood of corporate survival and growth (Zahra and Covin 1994). Ittner and Larcker (2001) define an innovative firm as one that focuses on being first-to-market with a variety of original products or services.¹ Most early empirical studies examining innovation are derived from the classic discussion provided by Schumpeter (1942).² Schumpeter outlines that new technology is successful innovation through combined investment decisions. These combined investment decisions occur at firms that create unique ideas as well as at firms that adopt these new ideas and therefore increase the extent to which they are used (Matolcsy and Wyatt 2008). Firms that are regarded as innovative might be innovative in several different areas. Extant literature often categorizes innovations into broad categories such as process, product, or business model innovations (e.g. see Nicholas 2008). While innovation is a complex construct, for purposes of this thesis, an innovative firm is one that follows product innovations.

The purpose of this thesis is to investigate and understand the extent to which firms with strategy focused on innovation engage in earnings management. Earnings management

¹ Ittner and Larcker (2001) note that innovative firms may also be referred to as “prospector” or “build” firms in the literature. Conversely, firms that follow a cost leadership strategy might also be termed “defender” or “harvest” firms.
is the manipulation of profits or income to meet a specific target or earnings threshold. Earnings can be manipulated using accounting accruals and real activities (e.g., reduction in research and development spending). Accrual-based activity earnings management has no direct effect on cash flows, while real activity-based earnings management will affect firm cash flows and occasionally accruals.

In addition to testing the association between innovative strategy and earnings management, I also explore the relationship between firm innovation strategy and earnings informativeness. Earnings informativeness is defined as the usefulness of earnings in making judgments about the future of a firm (e.g. the usefulness of earnings in predicting market returns). While there are many variations in how it is measured, I measure earnings informativeness by drawing on the equation used by Warfield et al. (1995) and Jung and Kwon (2002).

The important research questions to be resolved in this study are as follows: (1) Is innovation strategy associated with the extent of earnings management at that firm? (2) Is an innovation focused strategy associated with the informativeness of earnings?

1.2 Relationship Between Innovation Strategy and Earnings Management

This dissertation advances the knowledge regarding the extent to which innovative firms participate in earnings manipulation. This should be of special interest to investors and

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3 The existence of earnings management is well documented in the literature. See, for example, Hayn (1995); Burgstahler and Dichev (1997); and Degeorge, Patel, and Zeckhauser (1999) and Das et al. (2009).
4 See Cohen and Zarowin (2010).
other stakeholders as an innovative strategy could provide several competitive advantages: (1) providing new products or new product lines that enthuse the customer; (2) keeping ahead of competitors in a given industry; and (3) entering into new market segments or developing new businesses (Bowonder et al. 2010).

There are two competing hypotheses regarding the relationship between firms that have adopted an innovation focused strategy and earnings management. First, firms focusing on innovation are less likely to manage earnings since innovative firms are sometimes in a startup or growth phase and would place less emphasis on profitability than in later phases of the corporate life cycle (Anderson and Zeithaml 1984; Miller and Friesen 1984; Quinn and Cameron 1983). With this reduced emphasis on profitability, there would be less pressure to manage earnings during these early organizational phases.

On the other hand, firms focusing on innovation might be more likely to manage earnings. To begin with, an innovative firm’s investment in new products, processes or business models is inherently risky and uncertain (Choi and Ahn 2010), and management may have more pressure from the market to smooth earnings in order to reduce these large aberrations in income. Additionally, innovative firms may be in need of large pools of capital to support new research projects (Choi and Ahn 2010). The need for capital may place pressure on management to inflate earnings in order to receive the desired funding from investors. More generally, firms that have an innovative strategy generally invest more capital in research and development than firms without an innovative strategy and therefore will face these same fundraising pressures. Additionally, prior literature has clearly demonstrated that research and development expenses provide an opportunity for earnings to
be managed as this is an area that can be manipulated to influence earnings overall (Cohen et al., 2008; Bartov, 1993; Bens et al., 2002; Bens et al., 2003).

Seminal studies regarding earnings management by Hayn (1995) and Burgstahler and Dichev (1997) showed that firms are more likely to manipulate earnings around zero. Since firms with a focus on innovation will sometimes be in a startup or growth phase and may therefore have negative earnings, earnings management could be less prevalent among these firms than firms that do not focus on innovation. On the other hand, since one way firms often manage earnings is through a reduction in research and development expenses (Baber et al. 1991 and Bushee 1998), innovative firms might be more likely to manage earnings since innovative firms often have high research and development expenses (Holthausen et al. 1995) that could easily be temporarily curtailed as a means of earnings management.

Some limited empirical evidence exists regarding firms use of opportunistic reductions of research and development expenditures to manage earnings (Garcia and Young, 2009; Cheng, 2004). Additionally, some characteristics and attributes of firms with an innovation strategy suggest a relationship between their strategy and earnings management. Ignacio et al. (2010) suggests twelve different attributes of and requirements of management in an innovative firm. Three of these attributes that are likely to lead to an increase in earnings management are portfolio management, project management and resources.

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5 See section 2.4.5 for a further review of related empirical evidence.
6 See section 2.3 for a review of attributes of innovative firms that lead to an increase in earnings management.
1.3 Hypothesis and Research Design

I first hypothesize that there is an association between a strategy focused on innovation and the level of earnings management. In other words, when a firm has placed a significant amount of resources toward innovation, I hypothesize that innovation strategy will affect earnings, either by means of accrual-based earnings management activities or real earnings management activities.

I test the first hypothesis by employing the methodology used in Murphy (2001). I regress the fourth quarter net income on a dummy variable for high net income through the first three quarters of the annual period, a dummy variable indicating if the firm has high research and development expenses and an interaction term of high net income through the first three quarters of the annual period and the innovative company dummy. I also test this hypothesis using real activity and accrual based models (Cohen et al. 2008).

The second hypothesis claims that innovation strategy will be associated with how informative firms’ earnings are. I posit that a focus on innovation is related to the informativeness of earnings. I test the second hypothesis following Warfield et al. (1995), Jung and Kwon (2002), and Francis and Schipper (1999) by interacting the earnings response coefficient with a dummy variable indicating whether the firm has high research and development expenses relative to other firms in that industry.

In the development of the hypotheses for this study, I adapted the specific framework introduced by Brickley et al. (1995). In this framework, based on the business environment regarding technology, market forces and regulation, each specific firm determines their
business strategy. As a result of the business strategy chosen, certain performance systems are established. These performance systems lead to strategic business decisions with a resulting firm value created. Prior studies have identified several industries that are research and development intensive (Collins et al. 1997, Dechow and Sloan 1991, Francis and Schipper 1999, and Lev and Sougiannis 1996). For this study, the sample consists of firms from these industries that are known to be research and development (R&D) intensive such as machinery, transportation equipment and communications.

1.4 Contribution

Previous research examines the relationship between research and development expenditures and meeting earnings forecasts and targets (Garcia and Young 2009) while other research studies the impact income smoothing has on earnings informativeness (Tucker and Zarowin 2006). This dissertation is distinct in that it examines the relationship between firm innovation focused strategy, earnings informativeness and earnings management. The results of this paper will contribute to the literature by assisting in answering questions regarding the impact that an overall innovative firm strategy has on earnings management and the informativeness of earnings.

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7 Other related studies include Mizik (2010) which assesses the total financial consequences of cutting marketing and research and development spending to inflate earnings and finds that myopia has a long-term net negative impact on firm value. Further, Das et al. (2009) show that several factors, including changes in research and development expenditures, may indicate earnings management. However, neither study examines firms with an overall innovation strategy.
1.5 Implications

Regulators, investors and executives should all be aware of the implications that the choice of a corporate strategy has in a variety of ways. Each of these groups of stakeholders can be severely affected by how an innovative strategy at a particular firm is related to the information contained in their earnings and the extent to which those firms are managing earnings.

As regulators, such as the SEC, are charged with the task of identifying and investigating improper accounting practices, the results of this thesis may aid regulators in understanding the motivation or reasons why firms with a focus on innovation may be more (less) likely to engage in earnings management. As accounting frauds have increased in recent years, this area is certain to be of importance to many regulators.

Investors also should understand the impact of a firm’s participation in earnings management. Warren Buffett has asked other investors to support him and the SEC in their “efforts to get corporate America to deliver a straight story to its owners (1998).” Investors should have a keen interest in the extent to which firms participate in earnings management because of the effect that it has on their earnings potential and their current equity investment value. Understanding the relationship between firm strategy and earnings management will aid investors in their financial goals.

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8 According to a worldwide survey conducted by PricewaterhouseCoopers (PwC), 43% of corporate and 56% of financial services victims reported an increase in fraud over the last ten years. The same survey states that there was an even sharper increase in the fraud committed by middle managers, from 26% in 2007 to 42% in 2009 (Economist 2009).
Lastly, executives should also understand the impact that an innovative strategy many have on the distortion of earnings. Executives that wish to provide a true picture of the financial position of their firm should understand how their choice of corporate strategy can affect how earnings are defined in their financial statements.  

1.6 Organization of the Study

The remainder of this study is organized as follows. Chapter 2 contains a discussion of the literature regarding strategy, innovation, informativeness of earnings and earnings management. Chapter 3 provides the hypotheses and research design. Results and discussion regarding the proposed tests are included in Chapter 4. Chapter 5 concludes and provides avenues for future research.

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Demers and Wang (2010) demonstrate that the impact of strategy and other factors on earnings and how it is determined is clearly on the minds of CEOs in their finding that younger managers engage less in earnings management when compared to their more experienced counterparts.
CHAPTER 2

RELATED PRIOR RESEARCH

2.1 Overview

This chapter will provide a discussion of relevant prior research on innovation, earnings management and informativeness of earnings. Section 2.2 discusses innovation and its process. Section 2.3 discusses the characteristics and attributes of innovative firms. Section 2.4 defines earnings management, discusses reasons for managing earnings, expectations regarding and thresholds in earnings management and provides some limited empirical evidence of innovation and earnings management. Finally, section 2.5 discusses the informativeness of earnings and its relationship to innovation in the extent literature.

2.2 Innovation and its Process

Ittner and Larcker (2001) develop an integrated structure of the various managerial accounting research studies over the last several years. Once a firm has made decisions regarding their internal objectives, it must determine strategies to meet those internal objectives. There are two basic types of business strategies: cost leadership or differentiation (Porter 1985, Ittner and Larcker 2001, Langfield-Smith 1997). Firms adopting a cost leadership strategy focus on being the least expensive producer or retailer of a product or

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10 Ittner and Larcker review the six basic steps of a value-based management structure which are: (1) choose an internal objective; (2) select strategies consistent with the objective; (3) identify the specific variables that will create value within the strategies; (4) develop action plans and select appropriate performance measures; (5) evaluate success of the action plans; and (6) assess the ongoing validity of the objectives, strategies and plans.
service. On the other hand, firms pursuing a differentiation strategy, attempt to be the first or only firm in the market with a unique product or service that other firms do not provide. Many prior studies refer to firms with a differentiation strategy, a growth strategy or an innovation strategy synonymously (Ittner and Larcker 2001). Firms innovate for several reasons including the extension of their existing product range, increasing sales and market share or to cut costs (Guan et al. 2009).

Chaney et al. (1991) outlined the basic evaluation process of innovation and its impact on the firm value creation. Figure 2 demonstrates that an innovative idea can impact firm earnings and subsequently firm value. Once an idea or innovation is conceived, the feasibility of that innovation is assessed. If the innovation is considered feasible, the idea is moved to the testing stage. If the innovation that was initially conceived fails either the feasibility assessment or the testing, the idea is discontinued. The innovation passing both hurdles is implemented and information about its implementation is made public. Firms could disclose information about their new innovations at any steps in the process (i.e., feasibility assessment, innovation testing, or innovation implementation). Firm innovations could affect the future earnings of the firm.

11 Common examples of cost leadership firms include Home Depot and Lowe’s (building products), Texas Instruments (consumer electronics), and Emerson Electric (electric motors). On the other hand, often cited examples of firms that have a product differentiation strategy might include Hewlett-Packard (electronics), Johnson & Johnson (pharmaceuticals), and Coca-Cola (soft drinks) (Horngren et al. 2009). Prior literature often uses the ratio of book value to market value to distinguish between cost leadership firms or value firms and differentiation firms or growth firms (e.g. Fama and French 1998).

12 Guan et al. (2009) identified 13 key innovation objectives which are: (1) develop radically innovative products; (2) introduce niche products or technology; (3) improve production processes for existing products; (4) replace products being phased out; (5) maintain or increase market share; (6) exploit new domestic markets; (7) exploit new international markets; (8) improve product quality; (9) improve existing technology to reduce reliance on imported equipment/know-how; (10) reduce consumption of raw materials; (11) reduce energy consumption; (12) improve working conditions; and (13) reduce production costs.
According to Chaney et al. (1991), innovation is the basis for all economic growth and development. They outline three primary areas of innovation research: (1) the efficiency of innovation investment; (2) the Schumpeterian hypothesis; and (3) the social benefits of innovation.

First, the literature examines whether a competitive marketplace effectively and efficiently invests in new process, product, and business model development. For example, Matolcsy and Wyatt (2008) determine how technological innovations drive the market value of the firm through earnings growth. This study uses three factors to determine the level of innovation: the success of prior technology investments, the complexity of technology and the development period of the technology. The results show that when the three factors that facilitate innovation are present alongside earnings growth, the market value of equity is greatly enhanced. At the firm level, Inderst and Klein (2007) show how managers have a tendency to overinvest in their own projects during the corporate budgeting process due to their own biases.

Second, prior studies examine the “Schumpeterian hypothesis” and whether a monopoly (or near monopoly) is necessary to foster innovation (see Boldrin and Levin 2009). Smythe (2010) characterizes the Schumpeterian hypothesis as the idea that highly concentrated industries are more conducive to rapid technological innovation than less concentrated industries. For example, a study by Gayle (2003) conducts an empirical examination of the Schumpeterian hypothesis by using citation-weighted patent count to measure innovative output.
Finally, other research explores the role government has in fostering innovation and the social benefits of innovation. Social benefits of innovation are product inventions or process and business model developments that have value to society. For instance, innovations in the pharmaceutical industry have contributed to societal health while innovations in the high-tech industry have increased society’s access to information. A recent example of this type of research is Wagner (2010) where the author explores the link between innovation with high social benefits and corporate social performance and the role that family firms play in this link. Wagner (2010) finds that family firms moderate the link between innovation and high social benefits and corporate social performance.

There are other important studies regarding innovation that do not fall precisely in the three areas of innovation of Chaney et al. (1991). For example, some prior research has examined the relationship between innovation and various factors such as firm ownership, diversification, firm value, and managerial compensation. Francis and Smith (1995), for example, examine the relationship between ownership structure and innovation. They find that firms held by a large number of investors are less innovative than firms held by just a few shareholders, regardless of whether those shareholders were from management or outside the firm. Francis and Smith (1995) use three factors to proxy for innovation: the

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13 Mazzoleni and Nelson (1998) discuss four theories regarding patents and the social benefits of innovation. Mazzoleni and Nelson (1998) focus heavily on patents as they are one of the principal methods that governments use to foster innovation. The four theories discussed by Mazzoleni and Nelson (1998) are: (1) the anticipation of patent protection provides motivation for invention of products or processes that enhance society (e.g. Bell telephone patents enabled AT&T to have a near monopoly on telephone service for many years); (2) patents encourage needed investment to develop and commercialize innovation with social benefits; (3) patents are society’s award to individuals who disclose their inventions; and (4) patents enable an orderly exploration of a broad prospect.
number of patents, the amount of research and development expenditures versus acquisition expenditures and the timing of long-term investment.

Further, some research examines the relationship between innovation and managerial compensation plans and incentives. Holthausen et al. (1995) examine the effect of compensation plans on the level of firm innovation. The authors explore whether pay structure affects the level of innovative activity of divisional managers. This study finds that long-term performance based compensation has a positive impact on innovation. However, the relationship between compensation and innovation is found when firms use accounting metrics for measuring long-term performance.

Lastly, there are a limited number of studies that examine both innovation and earnings management. Garcia and Young (2009) examine research and development expenses and their relationship with earnings forecasts, Mizik (2010) explores the effect of manipulating marketing, research and development expenses, and Das et al. (2009) determines if an examination of research and development expenses indicate earnings management.\textsuperscript{14} While the present study does not fall into one of the three categories outlined by Chaney et al. (1991), it does extend other prior research by examining whether innovation, due to its effect on earnings as documented in Figure 2, has an influence on management decision to manage earnings.

\textsuperscript{14} See section 2.4.5 for a more detailed discussion of innovation and earnings management.
2.3 Characteristics and Attributes of Innovative Firms

Some characteristics and attributes of firms with an innovation strategy suggest a relationship between their strategy and earnings management. Ignacio et al. (2010) discuss several components of and requirements of management at an innovative firm. Three of these areas - portfolio management, project management and resources - may impact the extent of earnings management.

Ignacio et al. (2010) outlines portfolio management as the area which contains research and development technology, products, and projects. In this area, management must decide how to balance the use of research and development (R&D) technology, products, and projects to coincide best with the needs of the organization and what combination of these items will produce the desired value. The use of these R&D resources or the opportunistic use of these resources can, as discussed above, provide a means for an increase in earnings management.

A second area that Ignacio et al. (2010) points to is project management. These authors concede that management of innovative projects, due to its inherent nature, faces high levels of risk and uncertainty. Because of the high risk involved in management of these innovative projects, the earnings patterns at these companies may be more volatile and, therefore, there might be more pressure to smooth, or manage earnings.

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15 The components and requirements discussed by Ignacio et al. (2010) are: (1) the strategy of innovation; (2) portfolio management; (3) project management; (4) leadership and organizational culture; (5) human resources; (6) external relations; (7) organizational design; (8) innovation processes; (9) performance measures; (10) marketing; (11) resources; (12) knowledge and intellectual property management and (13) technology.
Lastly, resources may have an effect on the earnings management at an innovative company. Managing resources in order to encourage innovation translates into providing capital and time to support novel projects. Often, raising capital is dependent on investor belief in the financial performance of the firm. Consequently, there may be additional pressure to manage earnings to show that the firm is thriving and financially successful.

2.4 Earnings Management

2.4.1 Earnings Management to Meet Earnings Benchmarks

The existence of earnings management is clearly demonstrated in the literature.\(^\text{16}\) As described earlier, earnings management is the manipulation of profits or income by management of a firm in order to meet a specific target or earnings threshold. A more detailed and comprehensive definition of earnings management is given by Healy and Wahlen (1999) as follows:

Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers.

Earnings management is occasionally termed cooking the books,\(^\text{17}\) income smoothing,\(^\text{18}\) creative accounting,\(^\text{19}\) accounting engineering,\(^\text{20}\) cookie-jar accounting,\(^\text{21}\) or

\(^{16}\) See, for example, Hayn (1995); Burgstahler and Dichev (1997); and Degeorge, Patel, and Zeckhauser (1999) and Das et al. (2009).

\(^{17}\) See Karpoff et al. (2008).
ironically has even been termed innovative accounting. The two most well-known recent accounting scandals involving earnings management occurred at Enron and WorldCom and resulted in significant regulatory reform including the well-known Sarbanes-Oxley Act (SOX) in 2002 (Cohen et al. 2008). The reason for this major regulatory reform was likely due to the magnitude and frequency of earnings management. For example, in the quarter of a stock acquisition, acquiring firms manage earnings to the extent that unexpected accruals amount to 25-50 percent of typical asset returns (Healy and Whalen 1999).

While earnings management is often viewed in a negative light, there is evidence that investors and other stakeholders expect some level of earnings management. Dechow and Skinner (2000) surmise that practitioners and regulators believe earnings management is both pervasive and problematic. Graham et al. (2005) suggest that an underlying premise among firms and their investors is that every company manages earnings. Barth et al. (1999) find that investors prefer (and reward) a smooth earnings path and view smooth and assumedly managed earnings to more volatile earnings.

Instead of categorizing firms into dichotomous groups of those that manage earnings and those that do not, Dechow and Skinner (2000) classify earning management approaches into four groups beginning with the least aggressive use of accounting accruals: (1)

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18 See Murphy (2001).
19 See Dechow and Skinner (2000).
20 See Diana and Madalina (2008).
21 Arthur Levitt, the chairman of the SEC from 1993-2001, is known for using this phrase in his 1998 speech at New York University (NYU).
22 See speech by Paul O’Neill, former United States Treasury Secretary, to the University of Chicago Graduate School of Business on October 22, 2002.
conservative accounting; (2) neutral earnings; (3) aggressive accounting; and (4) fraudulent accounting.

Management is motivated to manage earnings for a variety of reasons. Graham et al. (2005) provides several reasons for earnings management to meet certain benchmarks. The dominant reason relates to stock price. Skinner and Sloan (2002), for example, document that there are severe negative price reactions when growth firms do not meet earnings expectations. Burgstahler and Dichev (1997) document that managers avoid reporting earnings decreases and losses to decrease costs imposed in transactions with shareholders. Based on prospect theory, managers may be highly motivated to avoid reporting a loss since the largest gains in utility occur when moving from an absolute loss to a gain (Burgstahler and Dichev 1997). Major consequences for missing earnings targets are an increase in uncertainty about future prospects and the perception that missing targets may be a sign of previously unknown problems at the firm.

Despite its short term benefit, earnings management has future and long-term consequences. Earnings management using real activities, such as delaying R&D expenditures, could have a negative impact on future performance (Mizik 2010). Degeorge et al. (1999) find that the future performance of firms suspect for boosting earnings across a threshold is poorer than other firms. Additionally, aggressive earnings management leading to accounting scandals results in harsh consequences such as a significant drop in the value of equity ownership, and severe penalties such as fines and sanctions imposed by the

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23 As outlined in Kahneman and Tversky (1979).
24 Still other important motivations exist for manipulation of earnings such as stakeholder motivations, employee bonuses, career concerns and bond covenants (Lapointe et al. 2006; Degeorge et al. 1999).
25 See Graham et al. (2005) for further discussion regarding the motivation behind earnings management.
Securities and Exchange Commission, jail or probation time and job loss (Karpoff et al. 2008).

A common reason to manage earnings is to achieve a smoother earnings path.  

Earnings smoothing, or a reduction of variability in reported earnings, is preferred by investors (Barth et al. 1999) as evidenced by firms that smooth earnings being consistently priced at a premium (DeAngelo et al. 1996). In fact, analysts reward firms that engage in more aggressive earnings smoothing with higher Financial Analysts’ Federation (FAF) disclosure scores (Shaw 2003).

However, there are other reasons why firms smooth earnings. For example, managers at firms that have their bonuses based on internal standards will manage earnings to meet but not exceed budgeted performance thus achieving a smooth pattern of earnings (Murphy 2001). Smoother earnings reduce the probability that firms will violate debt covenants because, as part of a smoothing strategy, firms will manipulate earnings to meet the thresholds outlined in the debt covenants (Blasco and Pelegrin 2006). Smoother earnings lead to an improvement in initial public offerings, stock financed acquisitions and the overall financial conditions of many other operations as firms that that have shown to have a

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26 Earnings smoothing, can be classified as natural, real or artificial (Lapointe-Antunes et al. 2006). Natural smoothing occurs when the income-generating process innately produces smooth earnings such as with public utilities since public utilities often have a steady stream of income from a consistent customer base; real smoothing utilizes operating decisions to smooth income (i.e. real activities); and artificial smoothing occurs when the accounting component (i.e. accruals) is managed to smooth earnings (Lapointe-Antunes et al. 2006).

27 Matsuura (2008) likened smooth earnings to a smooth car ride that is not only comfortable, but it also reassures the passenger about the driver’s expertise.

28 The Financial Analysts’ Federation (FAF) reports rate firm disclosure on three dimensions: (1) annual published information; (2) quarterly and other published information; and (3) analyst relations and related aspects.
consistent pattern of earnings are priced and valued by investors at a premium (Blasco and Pelegrin 2006).

In order to achieve a smoother earnings path, managers often distort or manage reported earnings. For example, in periods of high earnings, managers will dampen reported earnings in order to “preserve” earnings for use in future periods (Kirschenheiter and Melumad 2002). In periods of low earnings, managers will smooth earnings by inflating reported earnings. However, in periods of sufficiently bad news, managers will tend to take a “big bath” (Christensen et al. 2008) or underreport earnings to the greatest degree in order to report higher future earnings (Kirschenheiter and Melumad 2002). To achieving this smooth earnings outcome, managers use complementarily both real activity and accrual accounting earnings management (Matsuura 2008).

2.4.2 Earnings Management to Meet Important Thresholds

Initially, earnings management research focused on the existence of earnings management. Hayn (1995) shows that, since shareholders have the right to discontinue operations that are not profitable, the information content of losses is lower than the information content of earnings. Burgstahler and Dichev (1997) interpret the finding of Hayn (1995) as evidence that firms manage earnings to try to avoid reporting losses. Specifically, Burgstahler and Dichev (1997) highlight that “there is a concentration of cases just above zero, while there are fewer than expected cases of small losses… [the] results suggest that firms whose earnings are expected to fall just below the zero earnings point engage in
earnings manipulations to help them cross the ‘red line’ for the year.” This discontinuity has often been termed in the accounting literature as an earnings kink. Several papers extend these initial studies. For example, Guttman et al. (2006) present a rational model of earnings management where managers trade off the benefits and costs of boosting the stock price and show that there are kinks and discontinuities in the “smooth” distribution of reported earnings.

When considering earnings, there are several earnings thresholds firms try to meet or exceed. Academic research documents three earnings thresholds: (1) loss avoidance; (2) performance compared to the prior comparable period; and (3) analyst earnings projections (Degeorge et al. 1999). Similarly, there are four major metrics that are considered by firm executives to be important thresholds: (1) same quarter last year; (2) analyst consensus estimate; (3) loss avoidance; and (4) previous quarter earnings per share (Graham et al. 2005). Burgstahler and Dichev (1997) provide evidence of prior period earnings as a benchmark as many firms publicize lengthy consecutive periods of earnings increases. Since management bonus contracts often use these earnings thresholds, bonus contracts often influence the extent of earnings management (Carter et al. 2009; Murphy 2001).

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29 Dechow et al. (2003) investigates whether discretionary accruals are the primary driver of the earnings discontinuity and terms it an earnings “kink.”

30 Prior research demonstrates that firms manage earnings to avoid losses for both earnings and earnings before extraordinary items (Burgstahler and Dichev 1997).

31 In order of importance to management, Graham et al. (2005) find that same prior period earnings was most important (85%), even though more than half of management also found the other measures important with analyst consensus earnings estimate next (74%) and loss avoidance (65%) and prior earnings per share (54%) of lesser importance.
2.4.3 Accrual Versus Real Activity Earnings Management

Accounting research has documented two approaches for managing earnings: accrual-based and real activity-based earnings management (Cohen and Zarowin 2010).\(^{32}\) Cash flows from operations and changes in working capital are two components of earnings (Burgstahler and Dichev 1997). Accrual-based earnings management has no direct effect on cash flows, while real activity-based earnings management affects cash flows and occasionally the accruals (Cohen and Zarowin 2010).

Roychowdhury (2006) cites some examples of accrual manipulation as underestimating future bad debts and inaccurately delaying the write-off of certain assets. Other examples of accrual manipulation might include an underestimation of accrued liabilities, a minimization of retirement obligations, or a misrepresentation of legal contingencies. On the other hand, Roychowdhury (2006) defines real activities manipulation as actions taken by management that differ from standard business practices in order to meet specific pre-defined earnings or income levels. The most often cited examples of real activities manipulation are reductions in research and development spending (Dechow and Sloan 1991). Other examples of real activities manipulation might include price discounts and channel stuffing as well as overproduction in order to spread fixed costs over more inventory items.

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\(^{32}\) See section 3.3 for a discussion of how accrual-based and real activity earnings management is measured in the literature.
2.4.4 Innovation and Earnings Management

Some limited empirical evidence exists regarding the relationship between firms adopting innovation focused strategies and their likelihood to manage earnings. For example, Garcia and Young (2009) establish a link between managers curtailing research and development in response to target driven earnings pressures. The study uses a large sample of research and development (R&D) active United Kingdom firms. The results suggest that these R&D active firms are more likely to manage earnings to meet certain earnings targets by limiting R&D expenses. Several other studies in the literature have also shown that managers reduce R&D spending to increase short-term performance (see for example, Cheng 2004).

Other related studies include Mizik (2010) which assesses the total financial consequences of cutting marketing as well as research and development spending to inflate earnings. Mizik (2010) contrasts the reduction of these discretionary expenses to inflate earnings or myopic management with accounting accruals-based earnings inflation. Using a sample of 6642 firms from the Compustat database, Mizik (2010) finds that myopia has a long-term net negative impact on firm value. She shows that myopic management, and not accrual-based manipulation, has the greater negative impact on future financial performance. Finally, Das et al. (2009) investigate whether the pattern of quarterly earnings changes can provide an indication of earnings management. They find that reversals of year to date earnings patterns in the fourth quarter occur more frequently than should be expected if the

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33 The criteria Garcia and Young (2009) use for research and development (R&D) active firms are non-financial firms with at least three consecutive years of non-zero R&D expenditure over a 13 year period.

34 Garcia and Young (2009) focus their tests exclusively on United Kingdom firms that expense all research and development as incurred.
earnings reversals occurred purely by chance. Several factors that were prevalent among firms with earnings reversals, including changes in research and development expenditures, were indicative of earnings management.  

Neither of these prior studies, however, examines firms with an overall innovation strategy. This dissertation is distinct in that it examines the relationship between firm innovation focused strategy and earnings informativeness and earnings management. The present study draws upon data regarding the views of external observers of the firm and the level to which certain firms are perceived to be innovative.

This paper will contribute to the literature by providing evidence on the impact of firm innovation strategy on earnings management and the informativeness of earnings. For this study, the sample consists of firms from industries that are known to be research and development (R&D) intensive such as machinery, transportation equipment and communications.

2.5 Informativeness of Earnings and Innovation

Broadly speaking, informativeness of earnings can be defined as the information contained in earnings that can explain equity returns (Warfield et al. 1995). Beaver (1968) proposes that a firm’s earnings report has information content if it leads to a change in investor’s assessments of the probability distribution of future returns or prices such that

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35 Other factors Das et al. (2009) find are prevalent among firms with earnings reversals include the size and direction of discretionary accruals, the reversal of subsequent accruals, the use of special items in the income statement, and the effective tax rate.
there is a change in the equilibrium value of the current market price. However, Beaver (1968) modifies and extends his own definition of earnings informativeness by conceding that not only must there be a change in expectations but the change must be sufficiently large to induce a change in the decision maker’s behavior. Initially, Ball and Brown (1968) instigate what becomes one of the most heavily explored areas of accounting research with their investigation regarding the usefulness of earnings to investors. This investigation of the usefulness of earnings is often characterized as an exploration into the return-earnings relationship (Lipe 1990). While there are several ways to operationalize the definition of earnings informativeness, prior studies often utilize the earnings response coefficient to measure the information content of earnings (Lipe 1990).  

Lev (1989) notes a pervasive lack of explanatory power of earnings in prior studies. He proposes three explanations for this low explanatory power. First, he hypothesizes that this low explanatory is due to the poor modeling in these studies. The second explanation given by Lev (1989) for the low explanatory power is market inefficiency or investor irrationality. Last, and probably most importantly, Lev (1989) explains that the weak relationship between returns and earnings is likely due to the short time window. Easton et al. (1992) provide evidence regarding this third explanation. They show that the longer the interval of aggregated earnings, the higher the correlation between earnings and returns.

Several factors complicate and alter the basic returns-earnings relationship and thus affect the informativeness of earnings. Firms that belong to a particularly volatile industry exhibit lower earnings informativeness (Murphy 2001). Firms with losses exhibit

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36 For additional discussion regarding the measurement of the informativeness of earnings, see section 3.4.
significantly less earnings informativeness than firms with profits (Hayn 1995). Further, when the ratio of earnings-to-book value is low, earnings have less power in explaining equity returns (Burgstahler and Dichev 1997). Similarly, when bond ratings for a firm decrease, earnings informativeness correspondingly decreases (Plummer and Tse 1999).

Further, in certain settings, the relation between earnings informativeness and insider ownership is non-linear; the informativeness of earnings improves as managerial ownership increases, but when the ownership by managers is too high the relationship reverses. (Sanchez-Ballesta and Garcia-Meca 2007).

Several prior studies provide insight into the relationship between equity returns and earnings and other financial information in high-technology, high-innovation industries. In the telecommunication and electronics industry, both financial and non-financial information is value-relevant (Junttila et al. 2005). Further, some evidence indicates that balance sheet information explains more price variability in low-technology industries than in high-technology industries (Francis and Schipper 1999). As an example of relevant financial information, when earnings of Internet firms are decomposed into different components, gross profits are positively related to stock prices (Trueman et al. 2000). Additionally, among Internet firms, research and development expenses, an indicator of innovation, are value relevant (Demers and Lev 2001).

I add to the literature regarding earnings informativeness in two ways. I demonstrate what effect a management style focused on innovation has on the informativeness of earnings. This focus will aid in understanding whether changes in earnings at a firm with an innovation focused strategy will translate into a change in that firm’s equity value. More
specifically, I answer the question regarding the extent of earnings informativeness of firms that have a management style focused on innovation.
CHAPTER 3

RESEARCH DESIGN AND HYPOTHESES

3.1 Hypothesis Development

There are two competing hypotheses regarding the relationship between firms that have adopted an innovation focused strategy and the extent to which earnings are manipulated. On one hand, firms focusing on innovation might be less likely to manage earnings due to the following reasons. First, innovative firms are sometimes in a startup or growth phase and may place less emphasis on profitability than other firms in the later phases of the corporate life cycle (Anderson and Zeithaml 1984; Miller and Friesen 1984; Quinn and Cameron 1983). With this reduced emphasis on profitability, there would be less pressure to manage earnings during these early organizational phases. Prior research has shown that reporting a profit is one of several earnings thresholds (see Hayn 1995 and Burgstahler and Dichev 1997). Since firms with a focus on innovation sometimes have negative earnings due to their startup nature, earnings management could be less prevalent among innovative firms than other firms.

Furthermore, the motivation to manage earnings often stems from a need to raise capital. If an innovative firm already has available sources of funding for future projects, either through venture capital or other profitable product lines, there would be less pressure to manage earnings (Graham et al. 2005). Since not all innovative firms have ready access to needed capital, this reduction in pressure to manage earnings may be trivial.

37 See section 2.4.3 for a discussion of earnings thresholds.
On the other hand, firms focusing on innovation might be more likely to manage earnings. Figure 2, adapted from Chaney et al. (1991), outlines several areas from conception of a new innovation to the public release of the innovation where results from feasibility studies of new ideas, testing of new innovations and sales of new products or ideas in the marketplace could influence earnings, analyst earnings forecasts and other financial forecasts.

Profitability from innovative projects fluctuates widely due to the risky nature of taking new ideas through to completion as a successful product in the marketplace (see Marion and Friar 2012). For example, Stevens and Burley (1997) estimate that, on average, for every 100 exploratory projects where research and development expense is incurred, only one successful product results.\(^{38}\) Since an innovative firm’s investment in new products and processes is inherently risky, management may have more pressure from the market to smooth earnings in order to reduce any aberrations in income as a result of research and development expenses from failed projects and profits from successful projects.

Additionally, innovative firms may be in need of large pools of capital to support new research projects. The need for capital may place pressure on management to inflate earnings to meet analysts’ expectations in order to receive the desired funding from investors (Fuller and Jensen 2010). More generally, all firms that have an innovative strategy generally invest more capital in research and development, and therefore, will face these same fundraising pressures (Garcia and Young 2009). Prior literature has clearly demonstrated that research

\(^{38}\) Stevens and Burley (1997) suggest that, on average, for every 3,000 raw ideas, there are 100 exploratory projects, 10 well-developed projects, 2 full-fledged product launches and 1 successful product.
and development expenses have often been used by management as an area that can be manipulated to influence earnings overall (Cohen et al., 2008; Bartov, 1993; Bens et al., 2002; Bens et al., 2003).

Lastly, as previously documented, growth firms are more likely to experience severe price reactions when they do not meet earnings expectations (Skinner and Sloan 2002). Therefore, growth or innovative firms are more likely to manage earnings in order to meet the expectations of the market, and thus, avoid the potentially severe price reactions that might otherwise occur. Figure 1 summarizes the theoretical framework regarding innovation strategy and earnings management.

While innovative firms may have less pressure to manage earnings due to their earlier stage in the corporate life cycle, I believe that this and other factors that may influence innovative firms to reduce earnings management are more than offset by the several factors these firms face that influence them to increase earnings management. For example, the need that innovative firms have for capital to be used in research and development and the need these firms have to maintain attractive earnings patterns in order to be a strong investment opportunity are factors that heavily impact innovative firms and outweigh other factors that may lessen the extent these firms manage their earnings.

While there are two competing hypotheses regarding the relationship between firms that have adopted an innovation focused strategy and the extent to which earnings are manipulated, I believe that the reasons given above for increased earnings management at innovative firms outweigh the factors that suggest a reduced incentive. I believe this to be
true especially since the two reasons for a reduced incentive to manage earnings, an early firm life cycle and available sources of capital, are not likely present with all innovative firms. Thus,

**H1** Earnings management is more prevalent among firms with an innovation focused strategy than among the control firms.

For H1, I examine two earnings management approaches. First, I examine the use of real activities by firms with an innovation strategy. One of the methods that firms use to manage earnings through real activities is by reducing discretionary expenditures such as research and development expenses (Cardinal and Opler 1995) as well as advertising and marketing expenses (Mizik 2010). Other real activities that might be used to manipulate income include certain special items (Das et al. 2009), the delay of new product introductions (Graham et al. 2005) and offering certain customer incentives to boost product sales (Graham et al. 2005).

I also explore the extent to which firms with an innovation focused strategy use discretionary accruals to manage earnings. Burgstahler and Dichev (1997) initially explore overall earnings management to document its existence. However, they also concede that in addition to real activity management, firms also use accruals to manage earnings.

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39 Some special items could be used to manipulate income through accruals (i.e. write-downs of assets), some special items may be examples of real activity manipulation (i.e. non-recurring profit or loss on the sale of assets, investments, securities, among others) while others may be examples of either accrual or real activity manipulation (i.e. any significant nonrecurring items). See Appendix A for a complete list of special items.
The second hypothesis claims that innovation strategies are associated with the informativeness of earnings. There are several economic theories such as signaling theory, competitive advantage, knowledge spillover, and related theories of the economics of innovation and Schumpeterian growth to discuss reasons why innovation may impact the informativeness of its earnings.

Firms that are more innovative likely possess a competitive advantage over other less innovative firms in the same industry due to their technological or intellectual advancements. These additional technological or intellectual advancements may be unknown to investors or not completely understood by investors and may thereby create an information gap between firm management and investors. Some research suggests that the information gap between management of a firm and investors may be larger for innovative firms. For example, Sood and Tellis (2009) argue that innovative projects often occur over long periods of time. Sood and Tellis (2009) show that initial stock market reactions to announcement of these long-term projects do not completely incorporate the initial information received regarding long-term innovative projects. However, Sood and Tellis (2009) do not demonstrate whether initial stock market reactions completely incorporate earnings information related to innovative project announcements.

The theory of knowledge spillover suggests that technological innovations spur other related innovations (Doring and Schnellenbach 2006). If this occurs internally at an innovative firm, earnings may be more informative as sharp increases in earnings at an innovative firm due to one successful innovation may signal additional future successful innovations that could dramatically increase firm value of the long term. In addition, the
related theories of the economics of innovation and the Schumpeterian growth theory suggest
that innovation is the true source of economic value. Earnings increases at innovative firms
may confirm to investors that a firm possesses this true additional future economic value that
will increase more rapidly than less innovative firms that do not possess this real economic
value.

Very little prior research has explored the relationship between an innovative firm
strategy and its effect on earnings informativeness. Some studies peripherally suggest that an
innovation focused strategy might increase earnings informativeness. Matolcsy and Wyatt
(2008) study how technological innovation conditions underlying the firm’s investments
drive earnings growth and the market value of equity. Matolcsy and Wyatt (2008) find that
the interactions of current earnings with each of the three technology conditions of success
rate, technology complexity, and technology development period, are associated with market
value. Further, Francis and Schipper (1999) examine the relevance of earnings between
high- and low-technology firms, but find no consistent differences. Finally, Junntila et al.
(2005) examine value relevance in a technology-intensive environment or an environment
high in innovation. Their paper explores the stock market response to two items: financial
analysts’ perceptions of the firm and accounting earnings. Using both price and return
models\(^{40}\) to analyze a sample of all Finnish firms listed in the Helsinki Stock Exchange
(HEX), they find that earnings figures, and especially earnings levels, have value relevance
in this environment.

\(^{40}\) As suggested in Kothari and Zimmerman (1995).
On the other hand, I argue that other economic theories suggest that earnings at innovative firms may be less informative. For example, signaling theory suggests that firms send information or signals to the market regarding their future performance (Hao and Yao 2010). While earnings are an important signal to investors of firm value, an innovative firm may transmit other information to the market that is more indicative of firm value. Innovative firms may communicate to the market information about new technology, new processes or new products that may shape current firm value more dramatically than earnings releases. Therefore, earnings information may be less useful to investors than it would be for less innovative firms.

Second, while the occurrence of knowledge spillover within a firm may increase the informativeness of earnings for innovative firms, if knowledge spillover occurs externally, I argue it may have the opposite effect. If the synergy of knowledge creation spills over to other competitors that are less innovative, this may reduce the future benefit of the new innovation and reduce the informativeness of earnings.

Certain studies suggest that an innovation focused strategy decreases earnings informativeness. Gu (2005) for example, examines the relationship between one indicator of innovation, patent citation impact, and future earnings. While Gu (2005) does find a positive association between patent citation impact and future earnings, he concedes that this impact on earnings does not fully extend to the firm’s stock price.

Finally, while there are some factors that suggest that earnings at firms with an innovative strategy may be more informative than earnings at other firms, I believe there is
one factor that heavily influences earnings informativeness. I believe that because investors are evaluating innovative firms primarily on the future or the potential of these firms (Chaney et al. 1991), the earnings of innovative firms are less relevant than they might be for a utility firm which is more likely to produce consistent earnings patterns. Since the information content of earnings is inherently historical in nature, investors are more interested in other signals released by innovative firms such as information regarding new products that will provide information about the future of a firm.

Therefore, I hypothesize that earnings have a negative relationship with the adoption of an innovation focused strategy:

**H2** Earnings at a firm with an innovation focused strategy are less informative than earnings at other firms.

### 3.2 Measurement of Innovation

Several previous papers use different approaches to measure innovation (see Table 1). Some commonly used proxies for innovation include research and development expenses (e.g., Cardinal and Opler 1995; Ittner et al 1997), number of patents (e.g., Francis and Smith 1995; Holthausen et al. 1995) and new product releases (Cardinal and Opler 1995; Ittner et al. 1997). Less commonly used proxies for innovation include the number of innovation-related press releases (Koku 2010), revenue and income from acquisitions (Francis and Smith 1995), and the ratio of capital expenditures to sales (Francis and Smith 1995). Closely related measures of innovation include Ittner et al. (1997) measures of firm growth and firm
efficiency measured using market to book value and the number of employees to sales, respectively.

For this study, I use research and development expenses to proxy for innovation as it is frequently employed by many prior studies (e.g., Cardinal and Opler 1995; Ittner et al 1997). I utilize a dummy variable indicating high and low levels of research and development expenses for each firm-year that indicates whether the firm’s three year average level of research and development spending for the preceding three years is above or below the median value of research and development expenses for each industry.

3.3 Measurement of Earnings Management

Prior research has examined income smoothing as evidence for earnings management (Matsuura 2008; Shaw 2003). Using quarterly data, Murphy (2001) examined the proportion of net income derived from the fourth quarter relative to the proportion of net income derived from the first three quarters of the fiscal year. When income in the first three quarters of the year is low (high) relative to the prior year, managers may increase (decrease) revenues and postpone (accelerate) expenses in order to smooth income. In other words, if a firm has poor (good) performance in the first three quarters of the current year (i.e., the income in the first three quarters of the current year is lower (higher) than the income in the first three quarters of the prior year), the firm will be more motivated to inflate (decrease) income in the fourth quarter.
Prior research has utilized several approaches to determine the level of earnings management. These approaches can be divided into two groups: real activity-based earnings management and accrual-based earnings management.

Roychowdhury (2006) develops empirical methods to detect real activity-based earnings management. His measures include several areas of business activity including cash flow from operations (CFO), production costs, and discretionary expenses. Roychowdhury (2006) argues that these variables capture the effect of real operations better than accruals. Then, these three measures are used to detect real activities manipulation around the zero earnings and annual analyst forecasts thresholds. Other subsequent studies using his proxies for real-activity earnings management include Cohen et al. (2008).

The most commonly used measure to identify earnings management is discretionary accruals. Discretionary accruals are normally identified using the modified Jones’ model (1991) as described in Dechow et al. (1995) and Kothari et al. (2005). The original Jones model estimates accruals as a function of a change in revenue and a change in property, plant and equipment. As suggested by Cohen et al. (2008), discretionary accruals are computed as the difference between the actual and predicted values of total assets. Since a higher than predicted level of discretionary accruals is an indicator that a firm might have engaged in

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41 A recent study by Stubben (2010) finds that discretionary revenues can also be used to determine the level of earnings management a firm has engaged in. In fact, his study finds that revenue models are more likely than accrual models to indicate a combination of revenue and expense manipulation. Additionally, Dechow et al. (2012) develop a new approach for detecting earnings management that improves test power and specification. This new approach utilizes the information contained in the reversals of accruals to improve the power of testing for earnings by over 40%.

42 Dechow et al. (1995) find the modified Jones model to exhibit the most power in detecting earnings management.
earnings management, this model computes discretionary accruals as the difference between the actual and the predicted value of total accruals.

3.4 Measurement of the Informativeness of Earnings

While the informativeness of earnings is usually measured as the association between either market returns and accounting earnings or market price and accounting earnings, there are several ways that this relationship is examined. Lev (1989) summarizes 19 different investigations into the link between returns and earnings. Nearly all of the 19 studies measure returns and earnings with unique proxies. For example, Hagerman et al. (1984) limited their examination to a five day earnings announcement window and proxied for returns using residual returns and for earnings using quarterly earnings per share. On the other hand, Beaver et al. (1982) explored annual data and proxied for returns using raw returns and for earnings using net income.43

Jung and Kwon (2002) study the relationship between holdings by the owner44 and earnings informativeness by regressing returns on earnings and the interaction between earnings and a dummy variable for higher than the median percentage of stock holdings by the owner. Similarly, Warfield et al. (1995) test for the effect of managerial ownership on earnings informativeness. Again, a regression model is used with returns regressed on

43 Of the 19 studies listed in Lev (1989), returns are proxied with only four distinct variables while earnings are proxied using 11 unique variables. The most common proxy for returns is residual returns, while the most common proxy for earnings was earnings per share.

44 Jung and Kwon examine both the owner and the largest shareholder impact on earnings informativeness. The dominant owner is typically a founder or their immediate family that is the largest shareholder but usually less than a majority owner.
earnings and an interaction between earnings and a variable containing the percentage of managerial ownership. Tucker and Zarowin (2006) expanded upon these more parsimonious models. Their exploration of the impact that income smoothing has on earnings informativeness uses a unique approach termed the future earnings response coefficient (FERC). The FERC investigates the association between current-year stock returns and future earnings for firms with different degrees of smoothing.

Francis and Schipper (1999) examine informativeness using several models including one that investigates the ability of earnings to explain returns as well as another that examines the ability of book values and earnings to explain equity values. Murphy (2001) measures informativeness using year-to-year earnings volatility by computing the standard deviation of the difference between earnings in the current year and earnings in the prior year.

3.5 Research Methodology

I use three approaches to test the first hypothesis (H1) and examine the relationship between innovation focused strategies and earnings management. First, I adapt the approach from Murphy (2001) who used quarterly data to identify firms smoothing income in the fourth quarter. I employ the following empirical model:

45 Both Jung and Kwon (2002) and Warfield et al (1995) deflate earnings by price or the price per share at the end of the prior period.
where, for each firm $i$ and year $t$:

\[ Qtr4_{it} = \beta_1 + \beta_2 \text{GoodYTD}_{it} + \beta_3 \text{INNOV}_{it} + \beta_4 \text{GoodYTD}_{it} \times \text{INNOV}_{it} + \beta_5 \text{AGE}_{it} + \beta_6 \text{MTB}_{it} + \beta_7 \text{FIN}_{it} + \beta_8 \text{UTIL}_{it} + \epsilon_{it} \]

$Qtr4$ = percent of annual net income (annual Compustat data item 172) derived from the fourth quarter;

$\text{GoodYTD}$ is a dummy variable equal to one if the net income (annual Compustat data item 172) through the first three quarters in year $t$ exceeds the net income through the first three quarters in year $t-1$ (i.e., good year to date); otherwise, it is equal to zero;

$\text{INNOV}$ is a dummy variable equal to one if the three year mean of research and development spending in years $t-3$, $t-2$, and $t-1$ (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero;

$\text{AGE}$ is the number of years since the initial public offering of the firm.

$\text{MTB}$ is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ);

$\text{FIN}$ is a dummy variable equal to one if the firm is in the financial and insurance industries (i.e., SIC is between 6000 and 6999); otherwise, it is equal to zero;

$\text{UTIL}$ is a dummy variable equal to one if the firm is in the utility industries (i.e., SIC is between 4900 and 4999); otherwise, it is equal to zero.
The above model examines whether firms with innovation focused strategies smooth earnings by artificially inflating or reducing the fourth quarter income once the income through the first three quarters of the year is known.

Absent of earnings management and seasonal fluctuations in business activity, the dependent variable, $Qtr4$, would be expected to approximate one-quarter of a firm’s annual net income as $Qtr4$ is the share of annual net income earned during the fourth quarter. Prior literature has shown that due to income smoothing, $\text{GoodYTD}$ has a downward effect on the fourth quarter’s earnings as firms exceeding their targets in the first three quarters may adjust their fourth-quarter accruals downward to “save” for the future (Das et al. 2009; Murphy 2001).

As stated earlier, I hypothesize that a firm with an innovation-focused strategy will manage earnings more than other firms due to a larger pool of marketing, research and development expenses that can potentially be used to manage earnings at these firms (Mizik 2010; Das et al 2009). Consistent with H1, I expect that for observations with annual net income, the coefficient of $\text{GoodYTD*INNOV}$ will be negative, suggesting that, compared to the control group, innovative firms smooth earnings more by decreasing earnings during the fourth quarter (possibly through increased discretionary expenses) when income in the first three quarters of the current fiscal year is higher than that of prior year.\hspace{1em}\text{46} Conversely, for firms with annual net income, innovative firms may also smooth earnings by increasing earnings in the fourth quarter when income in the first three quarters of the current fiscal year

\hspace{1em}\text{46} For H1, I do not make a prediction regarding the innovation variable as I do not analyze the effect of innovation on overall profitability.
is lower than that of the prior year.\textsuperscript{47} The average fourth quarter share of income for an innovative firm with high year-to-date net income could be obtained by summing the coefficients for the intercept, the interaction term and both the dummy variable for innovation and the dummy for high year-to-date earnings.

The second method I use to test the extent to which firms with an innovation focused strategy engage in earnings management is a real activities measure computed using three measures of abnormal activity based on Cohen et al. (2008). Abnormal activity is one of three measures of abnormal activity: (1) abnormal cash flow from operations; (2) abnormal production costs; and (3) abnormal discretionary expenses, each measured as deviations from the predicted values in corresponding industry year regressions. Discretionary expenses are defined as the sum of (1) advertising expenses, (2) R&D expenses, and (3) selling, general and administrative (SG&A) expenses.

As in Cohen et al. (2008) I generate the normal levels of cash flow from operations, production costs, and discretionary expenses. I first estimate normal cash flow from operations ($CFO$) as follows:

\begin{equation}
(2) \quad CFO_{it} = \beta_1 \left( \frac{1}{Assets_{it-1}} \right) + \beta_2 Sales_{it} + \beta_3 \Delta Sales_{it} + \epsilon_{it}.
\end{equation}

I estimate the normal level of production costs ($Prod$) as:

\begin{equation}
(3) \quad Prod_{it} = \beta_1 \left( \frac{1}{Assets_{it-1}} \right) + \beta_2 Sales_{it} + \beta_3 \Delta Sales_{it} + \beta_3 \Delta Sales_{it,t-1} + \epsilon_{it}.
\end{equation}

\textsuperscript{47}This could be accomplished by curtailing marketing, research and development expenses in the fourth quarter of the current fiscal year.
Finally, I model the normal level of discretionary expenses ($DiscExp$) as:

\[
(4) \quad DiscExp_{it} = \beta_1 \left( \frac{1}{Assets_{it-1}} \right) + \beta_2 Sales_{it-1} + \varepsilon_{it}.
\]

In the above equation, $CFO$ is cash flow from operations (annual Compustat data item 308 – annual Compustat data item 124) as reported in the statement of cash flows, scaled by total assets (annual Compustat data item 6); $Sales$ is net sales (annual Compustat data item 12) scaled by total assets; $Prod$ represents the production costs, defined as the sum of Cost of Goods Sold (annual Compustat data item 41) and change in inventory (annual Compustat data item 3) scaled by total assets and $DiscExp$ represents the discretionary expenditures, defined as the sum of advertising expenses (annual Compustat data item 45), R&D expenses (annual Compustat data item 46), and selling, general and administrative expenses (annual Compustat data item 189) scaled by total assets. The abnormal CFO, abnormal production costs, and abnormal discretionary expenses are computed as the difference between the actual values and the normal levels predicted from Equations (2), (3), and (4). I then use these three variables as proxies for real earnings management in the following equation:

\[
(5) \quad Abnormal\ Activity = \beta_0 + \beta_1 INNOV_i + \beta_2 Big_{it} + \beta_3 \Delta GDP_t + \\
\beta_4 MKTVAL_{it} + \beta_5 Bonus_{it} + \beta_6 Ex\_Option_{it} + \beta_7 Un\_Option_{it} + \\
\beta_8 Gt\_Option_{it} + \beta_9 Owner_{it} + \beta_{10} AGE_{it} + \beta_{11} MTB_{it} + \beta_n Industry_i + \\
\beta_n Year_t + \varepsilon_i
\]

where for each firm $i$ and year $t$: 
Abnormal Activity is one of three measures of abnormal activity: (1) abnormal cash flow from operations, (2) abnormal production costs; and (3) abnormal discretionary expenses (as shown in Equations (2), (3) and (4));

INNOV is a dummy variable equal to one if the three year mean of research and development spending in years $t-3$, $t-2$, and $t-1$ (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.

$\text{Big} = $ a dummy variable equal to 1 if the auditor is a Big 4 audit firm;

$\Delta GDP = $ the change in gross domestic product (Compustat mnemonic GDP);

$\text{MKTVAL} = $ the market value of equity (Compustat mnemonic MKVALM);

$\text{Bonus} = $ the average bonus compensation as a proportion of total compensation received by the CEO and the CFO of a firm;

$\text{Ex\_Option} = $ exercisable options and is the number of unexercised options that the executives held at year-end that were vested scaled by total outstanding shares of the firm;

$\text{Un\_Option} = $ unexercisable options defined as the number of unexercised options (excluding option grants in the current period) that the executives held at year-end that have not vested scaled by total outstanding shares of the firm;

$\text{Gt\_Option} = $ new option grants made during the current period scaled by total outstanding shares of the firm;
$Owner = \text{the sum of restricted stock grants in the current period and the aggregate number of shares held by the executives at year-end (excluding stock options) scaled by total outstanding shares of the firm;}$

$AGE = \text{number of years since the initial public offering of the firm;}$

$MTB = \text{market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ);}$

$Industry = \text{dummy variables to indicate two-digit SIC code categories}^{48}; \text{and}$

$Year = \text{dummy variables to control for year effects.}$

As indicated by Cohen et al. (2008), for given sales levels, firms that manage earnings upward are likely to have unusually low cash flow from operations, unusually low discretionary expenses, or unusually high production costs. Therefore, consistent with H1, I expect that the coefficient of $INNOV$ in Equation (5) will be negative for abnormal cash flow and abnormal discretionary expense and I expect the coefficient of $INNOV$ in Equation (5) to be positive for abnormal production costs. This will suggest that innovative firms manage earnings by manipulating these real activities more than other firms in periods when a change in these income statement items will increase the likelihood of receiving favorable terms of financing or to meet analysts’ earnings targets.

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$^{48}$ Depending on the sample size of the database used, the number of industries used may be modified to preserve the integrity of the statistical tests.
The third method that I use to test the extent to which firms with an innovation focused strategy engage in earnings management is an accrual based measure computed using discretionary accruals. I begin with the well-known Jones model for computing discretionary accruals as suggested by Cohen et al. (2008). In this modified Jones model, discretionary accruals are computed as the difference between the actual and predicted values of total accruals as follows:

\[
(6) \quad TA_{it} = \beta_0 + \beta_1 \left( \frac{1}{Assets_{it-1}} \right) + \beta_2 \Delta Sales_{it} + \beta_3 PPE_{it} + \epsilon_{it}
\]

where for each firm \(i\) and year \(t\):

\(TA = \) total accruals scaled by lagged total assets (annual Compustat data item 6)

where total accruals is earnings before extraordinary items and discontinued operations (annual Compustat data item 123) less cash flows from operations (annual Compustat data item 308 - annual Compustat data item 124);

\(\Delta Sales = \) change in sales (annual Compustat data item 12) scaled by lagged total assets; and

\(PPE = \) net property, plant, and equipment (annual Compustat data item 7) scaled by lagged total assets.

Then, following Cohen et al. (2008) the coefficient estimates obtained in Equation (6) are used to estimate the firm-specific normal accruals (\(NA_{it}\)) for the sample firms:
(7) \( NA_{it} = \beta_0 + \beta_1 \left( \frac{1}{Assets_{it-1}} \right) + \beta_2 (\Delta Sales_{it} - \Delta AR_{it}) + \beta_3 PPE_{it} \)

where for each firm \( i \) and year \( t \):

\( NA \) = normal accruals;

\( \Delta Sales \) = change in sales (annual Compustat data item 7) scaled by lagged total assets;

\( \Delta AR \) = change in accounts receivable (annual Compustat data item 2) scaled by lagged total assets; and

\( PPE \) = net property, plant, and equipment (annual Compustat data item 7) scaled by lagged total assets.

Discretionary accruals (DA) are computed as the difference between total accruals and the fitted normal accruals, defined as \( DA_{it} = (TA_{it}/ASSETS_{it-1}) - NA_{it} \). I then use the measure of discretionary accruals to further test the effect that an innovative strategy has on extent of earnings management by employing the following model:

(8) \( Accruals = \beta_0 + \beta_1 InNOV_{it} + \beta_2 Big_{it} + \beta_3 \Delta GDP_t + \beta_4 MKTVAl_{it} + \beta_5 Bonus_{it} + \beta_6 Ex_{Option}_{it} + \beta_7 Un_{Option}_{it} + \beta_8 Gt_{Option}_{it} + \beta_9 Owner_{it} + \beta_{10} AGE_{it} + \beta_{11} MTB_{it} + \beta_n Industry_i + \beta_n Year_t + \epsilon_i \)

where for each firm \( i \) and year \( t \):
Accruals = discretionary accruals including the absolute value of discretionary accruals, positive discretionary accruals, and negative discretionary accruals; and

All other variables are defined as above.

I expect that the coefficient of INNOV in Equation (8) will be positive when positive discretionary accruals are the dependent variable in the model and negative when negative discretionary accruals are the dependent variable in the model. However, when the absolute value of discretionary accruals is the dependent variable I do not predict a specific direction, but that the variable INNOV will have a significant effect in the model. Each of the foregoing predictions would suggest that accrual based earnings management is more prevalent among firms with an innovation focused strategy.

I test hypothesis two, or the relationship between innovation focused strategy and earnings informativeness, using the following regression suggested by Warfield et al. (1995) and Jung and Kwon (2002):

\[ R_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 E_{it} \times INNOV_{it} + \beta_4 AGE_{it} + \beta_5 \text{MTB}_{it} + \varepsilon_{it} \]

where, for each firm \( i \) and year \( t \):

\( R = \) stock return for the 12-month period to the fiscal year end;\(^{49}\)

\(^{49}\) For sensitivity analysis, I also use the stock return over the twelve-month period extending from nine months prior to the fiscal year-end through three months following the fiscal year end (see Warfield et al. 1995).
\[ E = \text{earnings per share before extraordinary items (annual Compustat data item 58) scaled by stock price; and} \]

\[ \text{INNOV} \text{is a dummy variable equal to one if the three year mean of research and development spending in years } t-3, t-2, \text{ and } t-1 \text{ (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero;} \]

\[ AGE \text{ is the number of years since the initial public offering of the firm;} \]

\[ MTB \text{ is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).} \]

Consistent with H2, if earnings at a firm with an innovative strategy are less informative, the coefficient of \text{INNOV} interacted with earnings term in Equation (9) will be negative.

I also test hypothesis two regarding an innovation strategy and earnings informativeness using the model employed by Francis and Schipper (1999) as follows:

\[
(10) \quad \text{Price}_{it} = \beta_0 + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 \text{INNOV}_{it} + \beta_4 BV_{it} \ast \text{INNOV}_{it} + \beta_5 E_{it} \ast \text{INNOV}_{it} + \beta_6 E_{it} \ast AGE_{it} + \beta_7 E_{it} \ast MTB_{it} + \varepsilon_i
\]

where, for each firm \( i \) and year \( t \):

\[ 50 \text{ As in Warfield et al. (1995) I include } MTB \text{ as a control for growth (see also Hwang and Lee 2012). As a second control for growth, I also include } AGE \text{ as a control for growth as firm age has been shown to have an effect on the variability and therefore the informativeness of earnings (Dasgupta et al. 2010).} \]
\( Price = \) stock price of the firm at the end of the fiscal year;

\( BV = \) book value per share of the firm at the end of the fiscal year;

\( Income = \) earnings before extraordinary items (annual Compustat data item 58) scaled by market value of equity at the beginning of year \( t \); and

\( INNOV \) is a dummy variable equal to one if the three year mean of research and development spending in years \( t-3 \), \( t-2 \), and \( t-1 \) (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero;

\( AGE \) is the number of years since the initial public offering of the firm;\(^{51}\)

\( MTB \) is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).

This model examines the ability of book values and earnings to explain equity values. Consistent with H2, if earnings at a firm with an innovative strategy are more informative, the coefficient of \( INNOV \) interacted with earnings in Equation (10) will also be negative.

\(^{51}\) Consistent with Equation (9), I include \( MTB \) as a control for growth (see also Hwang and Lee 2012). As a second control for growth, I also include \( AGE \) as a control for growth as firm age has been shown to have an effect on the variability and therefore the informativeness of earnings (Dasgupta et al. 2010).
CHAPTER 4

EMPIRICAL RESULTS

4.1 Overview

This chapter provides the results of the findings for the hypotheses and their corresponding models that test these proposals. The principal focus of the tests focus on the effect that a business strategy focused on innovation has on the level of earnings management that occurs at a given firm. I also discuss the findings regarding the relationship between an innovation focused strategy and how informative earnings are to the market value of a firm.

The balance of Chapter 4 is divided into five sections with their corresponding tables located at the end of the dissertation. Section 4.2 discusses the sources from which the data is provided and how the final sample of observations is reached. Section 4.3 includes analysis regarding tests using quarterly data and the effect of an innovation focused strategy on earnings smoothing. Section 4.4 discusses how a firm strategy focused on innovation influences earnings management using both accruals and real activities to manipulate accounting profits. Also included as part of the analysis in section 4.5, is a discussion of the results of tests regarding the relationship that an innovation focused strategy has on the informativeness of earnings. Lastly, in section 4.6, I review the results of several diagnostic tests and their impact on the interpretation of the results that are obtained.
4.2 Data Sources and Sample Selection

For this study I focus on firms that are in industries that are known to be research and development (R&D) intensive. Table 2 summarizes the sample selection procedures for the three data samples used in this study, the quarterly data sample, the earnings management data sample and the earnings informativeness data sample.

For each of the three data samples, I begin with all available Compustat observations from 1991 to 2010. I then reduce the earnings management data sample and the earnings informativeness data sample to those industries that are considered to be innovative.\textsuperscript{52} Cao and Laksmana (2010) note that eight industries have been identified by prior studies as R&D intensive, intangible-intensive or high-tech industries.\textsuperscript{53} Therefore, I limit these two samples to observations within these eight innovative industries. This reduces each sample by more than 63%. Then, for all three data sets, I eliminate observations with any missing Compustat data.\textsuperscript{54}

Next, as in Murphy et al. (2001), I eliminate from the quarterly data set observations with fourth-quarter income shares (i.e., 4\textsuperscript{th} quarter income/total annual income) less than zero or exceeding unity. This aids in eliminating extreme observations that are not representative

\textsuperscript{52} I do not reduce the quarterly data sample to these eight industries in order to preserve a reasonable final sample size.

\textsuperscript{53} These industries and corresponding two-digit SIC codes are: (1) chemical and allied products - 28; (2) machinery - 35; (3) electric and electric supplies - 36; (4) transportation equipment - 37; (5) measuring and photographic goods - 38; (6) communications - 48; (7) business service - 73; and (8) engineering, accounting and related service - 87. These industries were identified as R&D intensive, intangible-intensive or high-tech industries by Collins et al. (1997), Dechow and Sloan (1991), Francis and Schipper (1999), and Lev and Sougiannis (1996). For a more comprehensive listing of all three-digit SIC codes identified by these studies, see Appendix B.

\textsuperscript{54} This has the largest effect on the quarterly data sample due to numerous observations with missing information regarding quarterly earnings.
of the majority of the observations in the sample. Lastly, for the earnings management data set, I merge the remaining data with the ExecuComp executive ownership data and eliminate any observations that have missing data due to the addition of this information. These criteria result in a final sample size of 16,049 for the quarterly data set, 5,076 for the earnings management data set, and 15,323 for the earnings informativeness data set.\textsuperscript{55}

Research and development expenses (annual data item 46) from the Compustat database will be used as a proxy for innovation in a sample consisting of firms that are part of R&D intensive industries. In order to operationalize research and development expenses as a proxy for innovation, I compute the median value of research and development expenses scaled by total assets for each industry or 2 digit SIC code. Using this information, I then create a dummy variable indicating high and low levels of research and development expenses for each firm-year that indicates whether the firm’s three year average level of research and development spending for the prior three years is above or below this median value for their industry.

Therefore, firms with high levels of research and development expenses are considered innovative and the dummy variable is equal to one and counterpart firms are considered not innovative and the dummy variable is equal to zero. Other data items are obtained from the Compustat annual database, Execucomp or publicly available sources.

\textsuperscript{55} The final data sets for the quarterly data, the earnings management data and the earnings informativeness data have a range smaller than the initial 20 year period from 1991 to 2010 due to the eliminated observations discussed in this section. See Tables 3-10 for the years from which the final sample is composed.
4.3 Quarterly Data Results

Table 3 presents the descriptive statistics and correlations for each of the variables used in the quarterly data analysis tests regarding income smoothing. Panels A and B present descriptive statistics and correlations for observations with annual net income, while Panels C and D present descriptive statistics and correlations for observations with annual net loss.

In Panel A of Table 3, the dependent variable, $Qtr4$, has a mean (median) value of 0.327 (0.290) and a standard deviation of 0.181. If earnings were distributed evenly across the four quarters of the year, the expected value of $Qtr4$ would be 0.25. Therefore, on average, the observations in the sample have 31% higher earnings than would be expected if earnings were distributed evenly throughout the fiscal year.

Similarly, the variable, $GoodYTD$, has a mean (median) value of 0.725 (1.000) and a standard deviation of 0.447. If earnings were consistent from one year to the next (no growth in earnings from the prior year), the expected value of $GoodYTD$ would be 0.50, indicating that it is equally likely that earnings through the first three quarters of the year would be higher or lower than the first three quarters of the previous year. Therefore, on average, the observations in the sample have a 45% higher rate of increases in earnings through the first three quarters than would be expected if earnings were consistent from one year to the next.

In Panel B of Table 3, both the $AGE$ variable and $MTB$ variable have significant Spearman correlations (Pearson only $AGE$ variable correlation is significant) to the $INNOV$ test variable. The Spearman (Pearson) correlation between the test variable $INNOV$ and the
control variables $AGE$ is negative at -0.075 (-0.064) while the test variable’s correlation with $MTB$ is positive at 0.129 (0.008).

The descriptive statistics and correlations for observations with annual net loss as shown in Panels C and D of Table 3 are similar to those with annual net income with only a few exceptions. The mean (median) value for $GoodYTD$ is much lower at 0.390 (0.000) indicating that loss firms typically perform better in the first three quarters of the prior period than the current period. Also, the mean (median) value for $INNOV$ is much higher at 0.400 (0.3000) indicating that there are more innovative firms on average that have a net loss for the period.

Table 4 presents the coefficients of OLS regressions of fourth-quarter shares of net income on year-to-date income (relative to the prior year) including interactions for innovative firm strategy. In order to mitigate the influence of outliers, all continuous variables have been winsorized at the 1% and 99% levels. Panel A presents results for observations with annual net income while Panel B presents results for observations with annual net loss.

The first column of Table 4, Panel A presents the regression results of Equation (1) excluding the control variables for industry and growth while the second column presents the regression results for the entire model. In both cases, the coefficients for $GoodYTD$ are negative and significant indicating that firms smooth earnings by decreasing earnings in the fourth quarter of their fiscal year if earnings through the first three quarters of the fiscal year
exceed earnings through the first three quarters of the prior year. This result for the variable \textit{GoodYTD} is consistent with Murphy (2001).

In both regressions, the coefficients for \textit{INNOV} are positive and consistent indicating that firms that are more innovative have higher earnings during the fourth quarter of their fiscal year when compared to firms that are less innovative. Similarly, the coefficients of the interactive variable of \textit{GoodYTD} and \textit{INNOV} are negative as was hypothesized but not significant.\footnote{I also test Equation (1) using a modified proxy for innovation where the three year mean of research and development spending is drawn from the years \textit{t-1}, \textit{t}, and \textit{t+1}. In this case, the coefficient on the interaction variable is negative and significant and therefore strongly supports H1.}

Figure 3 provides a graphical representation of the predicted fourth-quarter net income as a percentage of annual net income based on the regression coefficients from Table 4, Panel A, column 2. Figure 3 illustrates that firms that do not have an innovative strategy realize 37.6\% of their net income in the fourth quarter when their year-to-date ("YTD") net income through the first three quarters of the fiscal year is lower ("Low YTD") than the same period of the prior fiscal year. However, when YTD net income through the first three quarters of the fiscal year is higher ("Good YTD") than the same period of the prior fiscal year, the fourth quarter income share is only 33.6\% (i.e. 37.6 - 4.0\%). Among firms with an innovative strategy, Figure 3 demonstrates that when Low YTD is present, the fourth quarter income share rises to 41.2\% (37.6 + 3.6\%), but firms realize only 36.2\% (37.6 - 4.0 + 3.6 - 1.0\%) of their income when Good YTD occurs.

As in Panel A, the first column of Table 4, Panel B presents the regression results of Equation (1) excluding the control variables for industry and growth while the second
column presents the regression results for the entire model. In each regression, the coefficients for GoodYTD are not significant. However, in both regressions, the coefficients for INNOV are negative and significant indicating that firms that are innovative but that have an annual net loss experience a fourth quarter that makes up a smaller share of their annual net loss than less innovative firms. The coefficients of the interactive variable of GoodYTD and INNOV are positive and significant indicating that firms with an annual net loss that are innovative have a fourth quarter income share that is larger than less innovative firms when their income through the first three quarters of the year is higher than the previous period. In other words, innovative firms that have a net loss for the year, but that have a stronger performance through the first three quarters of the year when compared to the prior period will use the fourth quarter to smooth their annual net loss for the year.

Similar to Figure 3, Figure 4 provides a graphical representation of the predicted fourth-quarter net income as a percentage of annual net income based on the regression coefficients from Table 4, Panel B, column 2.

As a sensitivity test, I modify Equation (1) by replacing INNOV with an alternative measure of innovation.57 This alternative measure is computed as the three year mean of research and development spending in years $t-3$, $t-2$ and $t-1$ scaled by total assets. Untabulated results for Equation (1) with this alternative proxy for innovation are essentially unchanged. For observations with annual net income, while the absolute value of the coefficient of the interactive variable of GoodYTD and INNOV increases to 0.035, it remains

57 In untabulated results for observations with net income, I also include as a control variable the previous year’s fourth quarter percent of annual net income (annual Compustat data item 172). While this control variable is positive and significant, the effect on the dependent variable is negligible (0.07%). Including this control variable only decreases the sample size by two observations.
negative and is not significant. For observations with an annual net loss, using this alternative proxy does not change the magnitude or direction of the coefficients, however the strength of the model increases. The variables GoodYTD and INNOV both become significant at the 5% and 1% levels, respectively.

4.4 Earnings Management

Table 5 presents the descriptive statistics and correlations for each of the variables used in the earnings management data for tests regarding both accrual based earnings management and real activity management. Panel A of Table 5, which provides descriptive statistics, shows that while the mean (median) value for DA (discretionary accruals or the difference between total accruals and fitted normal accruals) is near zero at 0.002 (0.013), the mean (median) value for ABSDA (the absolute value of the difference between total accruals and fitted normal accruals) is 0.085 (0.049). Since the ABSDA variable captures the discretionary accruals regardless of the direction of the accrual, the mean (median) value of ABSDA is more than 46 (3) times larger than the mean (median) value of DA. It should also be noted that both the 25th and 75th percentiles of the dependent variables in the real activity management equations take on relatively larger absolute values than the accrual based proxies in most cases.

Panels B through H of Table 5 provide descriptive statistics for subsets of the earnings management data set. Panel B contains all observations where the dummy variable INNOV is equal to one, while Panel C contains all observations where the dummy variable
INNOV is equal to zero. Panels D through H contain the observations for each of the quintiles of the three year mean of research and development spending in years $t-3$, $t-2$ and $t-1$, with Panel H containing the firms with the highest levels of research and development expenses or the highest levels of innovation. Panel B shows that firms with high innovation have a lower mean of $AbCFO$ at -0.338, a lower mean of $AbPROD$ at -0.156 and a higher mean of $AbDISCEXP$ at 0.096 than the entire earnings management sample. Further, Panel B reveals that firms with high innovation have more total or absolute discretionary accruals ($ABSDA$) at 0.133 and more negative discretionary accruals ($DA$) at -0.045 than the entire earnings management sample. Panels D through H reveal similar characteristics about firms with high levels of research and development expenses.

In Panel I of Table 5, again both the $AGE$ variable and $MTB$ variable have significant Spearman (insignificant Pearson) correlations to the INNOV test variable. The Spearman (Pearson) correlation between the test variable INNOV and the control variables $AGE$ is negative at -0.028 (-0.022) while the test variable’s correlation with $MTB$ is positive at 0.101 (negative at -0.007).\(^{58}\)

### 4.4.1 Real Activity Earnings Management Results

Table 6 presents the coefficients of OLS regressions of innovative strategy and determinants of real earnings management. In order to mitigate the influence of outliers, all

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\(^{58}\) As explained in this paragraph, while the Spearman correlations are significant between INNOV and both control variables, $AGE$ and $MTB$, the Pearson correlations are not significant in either case. This likely provides an explanation for the conflicting signs between the INNOV and $MTB$ variables for the Spearman and Pearson correlations.
continuous variables have been winsorized at the 1% and 99% levels. The first two columns present the coefficients and t-statistics for Equation (5) with AbCFO as the dependent variable while columns three and four provide results with AbPROD as the dependent variable whereas columns five and six present results with AbDISCEXP as the dependent variable.

Results indicate that among more innovative firms, income decreasing real activity earnings management is present for both the AbPROD and the AbDISCEXP equations. The dummy variable, INNOV, is negative and significant for AbPROD and positive and significant for AbDISCEXP. The results also suggest that less innovative firms are more likely to manage production expenses upward and discretionary expenses downward than their more innovative counterparts. These results are consistent with the descriptive results in Table 5, Panels B to H. In other words, while firms may manage production expenses upward and discretionary expenses downward to inflate earnings, the results indicate that these practices occur to a lesser extent among more innovative firms. Finally, the coefficient of INNOV is positive, but not significant, in the AbCFO regression.

I perform two additional tests for sensitivity. First, I recompute the regression results for Equation (5) by replacing INNOV with an alternative measure of innovation. This alternative measure is computed as the three year mean of research and development spending in years t-3, t-2 and t-1 scaled by total assets. Untabulated results for Equation (5) with this alternative proxy for innovation indicate that in the AbCFO regression, the INNOV variable becomes significant at 1%, while significance is maintained for the INNOV variable in the AbPROD and AbDISCEXP regressions.
I also recompute the regression results for Equation (5) using a larger sample of firms by not including the observations that are missing data regarding executive ownership. To accomplish this, I compute regression results for Equation (5) without the variables that derive information from the Execucomp executive ownership database.\textsuperscript{59} This increases the sample size by 359\% to 23,280. Untabulated results for the AbPROD and AbDISCEXP regressions provide similar results for the coefficient of the INNOV variable. However, for the AbCFO regression the coefficient of the INNOV variable becomes negative and significant at the 1\% level.

4.4.2 Accrual Based Earnings Management Results

Table 7 presents the coefficients of OLS regressions of innovative strategy and determinants of accrual based earnings management. In order to mitigate the influence of outliers, all continuous variables have been winsorized at the 1\% and 99\% levels. The first column presents the coefficients and t-statistics for Equation (8) with ABSDA (the absolute value of the difference between total accruals and fitted normal accruals) as the dependent variable. The second and third columns present regression results with Positive DA and Negative DA as the dependent variables.

Overall, results indicate that among more innovative firms, accrual-based earnings management is significantly higher than that among less innovative firms. The coefficient (t-statistic) on INNOV in Equation (8) where ABSDA is the dependent variable is 0.019 (4.83).

\textsuperscript{59} These variables are Ex_Option, Un_Option, Gt_Option and Owner.
This suggests that more innovative firms use discretionary accruals to manage earnings more than their less innovative counterparts. Furthermore, the coefficient (t-statistic) on \textit{INNOV} in Equation (8) where \textit{Positive DA} and \textit{Negative DA} are the dependent variables are 0.018 (4.07) and -0.016 (-2.94), respectively. These results are consistent with that in the ABSDA regression; more innovative firms are more likely to use both positive and negative discretionary accruals to manage earnings than less innovative firms.

These results, for all three dependent variables, when considered together, provide strong support for the notion that innovative firms use accruals to manage earnings upward more than firms that are not pursuing an innovative firm strategy.

For sensitivity analysis, I recompute the regression results of Equation (6) by replacing \textit{INNOV} with an alternative measure of innovation. This alternative measure is computed as the three year mean of research and development spending in years \(t-3, t-2\) and \(t-1\) scaled by total assets. Untabulated results for Equation (6) with this alternative proxy for innovation are largely unchanged and lead to similar conclusions. Results with this alternative measure of innovation also provide strong support for the idea that innovative firms use accruals to manage earnings upward more than other firms as the overall strength of the model increases for all three measures of \textit{Accruals}.\(^{60}\)

I also recompute the regression results for Equation (6) using a larger sample of firms by not including the observations that are missing data regarding executive ownership. To accomplish this, I compute regression results for Equation (6) without the variables that

\(^{60}\) The adjusted r-square value for \textit{ABSDA}, \textit{Positive DA} and \textit{Negative DA} increase to 0.125, 0.166, and 0.108, respectively.
derive information from the Execucomp executive ownership database. Untabulated results with this larger sample for the ABSDA, PositiveDA and NegativeDA regressions provide similar results for the coefficient of the INNOV variable.

4.5 Earnings Informativeness Results

Table 8 presents the descriptive statistics and correlations for each of the variables used in the earnings informativeness data set for tests regarding both equity returns and equity valuation. Panel A of Table 8, which provides descriptive statistics, shows that the median value for both R (returns) and E (earnings) are near zero at -0.062 and 0.040, respectively. Further, the median Price and BV (book value) are 7.370 and 2.719, respectively, for a median market-to-book value of 2.71.

Again, both the AGE variable and MTB variable have significant Spearman correlations (Pearson only AGE variable correlation is significant) to the INNOV test variable. The Spearman (Pearson) correlation between the test variable INNOV and the control variables AGE is negative at -0.082 (-0.083) while the test variable’s correlation with MTB is positive at 0.040 (0.000).

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61 These variables are Ex_Option, Un_Option, Gt_Option and Owner.
4.5.1 Equity Returns Results

Table 9 presents the coefficients of OLS regressions analyzing the returns-earnings relationship for firms included in the earnings informativeness sample, including interactions for innovative firm strategy.

The first column of Panel A of Table 9 presents the regression results of Equation (9) without the control for the INNOV variable \(^{62}\) while the second column presents the results for the full model. In both cases, the coefficients (t-statistics) for the interaction variable \((E^*INNOV)\) are negative and significant at \(-1.020 (-4.69)\) and \(-1.020 (-4.67)\), respectively. This suggests that the earnings at firms that pursue an innovative strategy are less informative in explaining the returns than their less innovative counterparts. The control variables, \(AGE\) and \(MTB\), do not have a significant effect on the returns of the firms, with \(AGE\) and \(MTB\) coefficients (t-statistics) of \(-0.030 (-1.06)\) and \(-0.002 (-0.59)\), respectively for the full model. \(^{63}\)

To ensure that the results are not sensitive to extreme observations, I compute the results of Equation (9) with the sample winsorized at 1% and 99% levels, as well as with the sample trimmed at 1% and 99% levels. Panel B presents the results of Equation (9) with the sample winsorized at 1% and 99% levels. For both the reduced and full model, the coefficients (t-statistics) for the interaction variable \((E^*INNOV)\) are negative and significant as in the unmodified sample at \(-0.028 (-4.67)\) and \(-0.028 (-4.69)\), respectively. However, the

\(^{62}\) As presented in Warfield et al. (1995).

\(^{63}\) In untabulated results, I compute Equation (9) with the control variables \(AGE\) and \(MTB\) replaced by the interaction variables \(E^*AGE\) and \(E^*MTB\) as in Warfield et al. (1995). However, I do not present or analyze these results as they are distorted due to extremely high multicollinearity. The largest VIF (Variance Inflation Factor) for these results was 110.9.
coefficients on the earnings variable \((E)\) are negative and significant, which is inconsistent with prior literature.\(^{64}\)

Results obtained for Equation (9) by trimming the sample at 1% and 99% are more consistent with the unmodified sample. Panel C of Equation (9) presents these results and indicates that for both the reduced and full model, the coefficients (t-statistics) for the interaction variable \((E*INNOV)\) are negative and significant at -0.374 (-4.21) and -0.541 (-5.34), respectively.

I also recompute the regression results of Equation (9) using a modified stock return as suggested by Warfield et al. (1995). The modified stock return is computed over a twelve-month period extending from nine months prior to the fiscal year-end through three months following the fiscal year end. As in Table 9, the first column of Table 10 presents the results of Equation (9) utilizing this alternate measure of returns without the control for the \(INNOV\) variable while the second column presents the results for the full model. Again, in both cases, the coefficients (t-statistics) for the interaction variable \((E*INNOV)\) are negative and still significant at -2.799 (-1.76) and -2.799 (-1.76), respectively. These results confirm the idea that among innovative firms, earnings are less informative in explaining returns.

As further sensitivity analysis, I recompute the regression results of Equation (9) by replacing \(INNOV\) with an alternative measure of innovation. This alternative measure is computed as the three year mean of research and development spending in years \(t-3\), \(t-2\) and \(t-1\) scaled by total assets. Untabulated results for Equation (9) with this alternative proxy for

\(^{64}\) See, for example, Warfield et al. (1995).
innovation indicate similar findings with the exception of a lack of significance in the coefficient for this alternative measure of innovation variable.

4.5.2 Equity Valuation Results

Table 11 presents the OLS regressions for analyzing the relationship between accounting measures and firm value.

The first column of Panel A of Table 11 presents the regression results of Equation (10) with the absence of the $INNOV$ variable while the second column presents the results for the full model. In both cases, the coefficients of the interactive variable of earnings and innovation are negative, but not significant. The coefficient (t-statistic) for the interaction variable is -3.411 (-0.47) for the full model. The interactive variable of book value per share and innovation is positive and significant effect in both the reduced and full model with coefficients (t-statistics) of 2.936 (33.83) and 2.941 (33.86), respectively.
To ensure that the results are not sensitive to extreme observations, I compute the results of Equation (10) with the sample winsorized at 1% and 99% levels, as well as with the sample trimmed at 1% and 99% levels. Panel B presents the results of Equation (10) with the sample winsorized at 1% and 99% levels. For both the reduced and full model, the coefficients (t-statistics) for the interaction variable ($E*INNOV$) are negative but remain insignificant as in the unmodified sample at -1.543 (-1.44) and -1.378 (-1.27), respectively.

Results obtained for Equation (10) by trimming the sample at 1% and 99% provide some evidence that innovative firms’ earnings are less informative. Panel C of Table 11 presents these results and indicates that for both the reduced and full model, the coefficients (t-statistics) for the interaction variable ($E*INNOV$) are negative and significant at -4.983 (-6.20) and -5.914 (-5.73), respectively. Results for the trimmed sample also indicate that the book value of innovative firms is more informative in explaining stock price than it is at less innovative firms. The coefficients (t-statistics) for the interaction variable ($BV*INNOV$) are negative and significant at 0.422 (2.82) and 0.467 (2.68), respectively.

As an added sensitivity analysis, I also recompute the regression results of Equation (10) by replacing INNOV with an alternative measure of innovation. This alternative measure is computed as the three year mean of research and development spending in years $t-3$, $t-2$ and $t-1$ scaled by total assets. Untabulated results for Equation (10) with this alternative proxy for innovation indicate that results for the model are weaker. The adjusted $r$-squared value drops to 0.365 and both the $INNOV$ and interactive variable ($INNOV*BV$) lose significance.
4.6 Diagnostic Analysis

Table 12 summarizes the results of all diagnostic tests for regression results shown in Tables 4, 6, 7, 9, 10 and 11. The first column provides the results of the tests for multicollinearity and shows the largest variance inflation factor (VIF) for all independent variables (excluding industry and annual dummies) for each model. For all models, the largest VIF value is 5.817 indicating that the likelihood of multicollinearity in all models is low. Many of the values shown in table 12 that represent the largest VIF for a given model are due to the variable ChgGDP and its multicollinear relationship with the annual dummies included in those models.

Values in the second column of Table 12 provide the Durbin-Watson test statistic $d$, which measures the level of autocorrelation. The values for all models except the second test for earnings informativeness have a Durbin-Watson value close to 2, indicating that autocorrelation is low and that the observations are likely independent. The low Durbin-Watson value shown for the second test for earnings informativeness is expected since stock prices are inherently not independent observations.

The final column of Table 12 contains values that represent the probability of the null hypothesis that errors are homoscedastic. In nearly all models, the results indicate that the null hypothesis must be rejected and that the heteroscedasticity is present. Therefore, to

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65 O’Brien (2007) indicates that a variance inflation factor (VIF) less than 10 indicates a low level of multicollinearity.
66 Li et al. (2006) utilizes a rule of thumb that Durbin-Watson statistics between 1.5 and 2.5 indicate independence.
correct for heteroscedasticity, the t-statistics and corresponding significance levels for Tables 4, 6, 7, 9, 10 and 11 are all computed using heteroscedasticity-consistent standard errors.
CHAPTER 5
CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH

5.1 Introduction

The purpose of this thesis is to examine the degree to which firms that have a strategy focused on innovation participate in earnings management. I measure the degree to which firms engage in earnings management using proxies for income smoothing, manipulation of accruals and manipulation of real activities. Prior research clearly describes and demonstrates the existence of earnings management. The focus of this dissertation lies in finding whether an innovation focused firm strategy is associated with the extent of earnings management.

As a part of this dissertation, I also examine the relationship between firm innovation strategy and earnings informativeness. I study whether an innovation-based firm strategy affects the information content of earnings and determines equity prices and market returns. While prior research has extensively explored the relationship between earnings and returns, I focus on examining this relationship for firms in R&D intensive industries that are likely to choose an innovation strategy.

The results of this dissertation will contribute to the literature by broadening our understanding of the relationship between a firm with an overall strategy focused on innovation and the extent of earnings management. While the expected outcome of an innovation strategy is normally increased firm value due to marketable new products or

67 See, for example, Hayn (1995); Burgstahler and Dichev (1997); and Degeorge, Patel, and Zeckhauser (1999) and Das et al. (2009).
68 See, for example, Lev (1989), Lipe (1990) and Francis and Schipper (1999).
services, investors and other stakeholders should also be aware that an innovation focused strategy could also lead to changes in how earnings is measured. I add to the literature by analyzing the effect of an innovation focused strategy on earnings in two areas – earnings management and earnings informativeness. The results of this dissertation should be of interest to managers, investors, regulators and other stakeholders with interests in innovative firms or firms that are in industries with high levels of technology and research.

5.2 Summary and Conclusions

Several conclusions can be drawn from the results. I used three unique measures to test the relationship between earnings management and an innovative firm strategy. First, I tested whether firms with an innovative strategy are engaged in income smoothing by comparing the income in the fourth quarter with the income in the first three quarters of the year. This test provided mixed results. I did not find a significant difference in income smoothing between the two groups examined for firms with annual net income. However, I did find that innovative firms smooth earnings more for firms with an annual net loss.

Second, I tested the relationship between real activity-based earnings management and an innovative firm strategy and identified the types of real activities used to manage earnings. Contrary to H1, the results suggest that firms with an innovative strategy, on average, are less likely to use real activities to manage earnings. More specifically, more innovative firms are less likely to use production expenses and discretionary expenses to manage earnings than less innovative firms. This may be due to the impact of myopic
management. As discussed earlier, Mizik (2010) finds that myopic management, or the practice of cutting marketing and research and development spending to inflate earnings, has a greater impact of future performance than other forms of earnings inflation.

Third, I tested the relationship between accrual-based earnings management and an innovative firm strategy. I use the absolute value of discretionary accruals, positive accruals and negative accruals to test the relationship. In all three cases, I find that firms with an innovative strategy use accruals to manage earnings more than their less innovative counterparts. Overall, more innovative firms have higher total discretionary accruals in absolute terms and higher positive discretionary accruals. Additionally, more innovative firms also exhibit more (greater) negative discretionary accruals.

In summary, I find that, consistent with H1, firms with an innovative firm strategy manage earnings using accounting accruals more than less innovative firms. In contrast, I find that more innovative firms are less likely to use real activities to manage earnings than less innovative firms since myopic management often leads to poor future performance.\(^{69}\)

Conclusions regarding the relationship between an innovative firm strategy and its effect on the informativeness of earnings can be drawn from the two tests that I perform in this dissertation.

I used two unique measures to analyze the relationship between an innovative firm strategy and earnings informativeness. First, I measure the relationship by examining the

\(^{69}\) See Mizik (2010).
effect of earnings on returns. I find that earnings of more innovative firms are less informative than earnings of firms that are less innovative.

Second, I measure the effect that an innovative firm strategy has on earnings informativeness by examining the effect of book value and earnings on stock price. Here the results regarding the informativeness of earnings among innovative firms are not conclusive. However, when controlling for the higher stock prices of innovative firms, I do find that the book value of innovative firms is more informative about stock prices than the book value of less innovative firms.

Due to the mixed results between the two tests that I perform to examine the relationship between an innovative firm strategy and earnings informativeness, I cannot decisively conclude that earnings at innovative firms are less informative than firms that do not have an innovative management approach. Further testing should be completed before a determination can be made that this is the case.

5.3 Limitations

There are several limitations to the analysis I perform in this dissertation. The models that were used to estimate the relationship between earnings, accruals and other financial activities could be mis-specified. Many of the control variables that were used in all equations for this study were drawn from prior accounting literature. Still, there may be omitted variables, an erroneous relationship assumed in the model or possible endogeneity that is affecting the results.
Finally, as shown in Table 2, a large number of observations were eliminated from the sample used in this study due to missing data from the commercial databases. As mentioned in my analysis of the data in Chapter 4 of this dissertation, this makes a sizable impact on the final sample size for all three data sets. Such a dramatic reduction in sample size could affect the results, reducing the generalizability of the results to other samples.

5.4 Future Research

Limitations discussed in the prior section provide possible ideas for future research in the area of innovation and earnings management. As mentioned, the techniques regarding the analysis of earnings management from Stubben (2010) and Dechow et al. (2012) could be used to more effectively test the relationship between an innovative firm strategy and the extent of earnings management.

This study concentrates on only an innovation strategy. There are a wide range of other firm strategies that have not been examined in this study. Ittner and Larcker (2001) clarify that firm strategies need not be located only on a continuum between firms following

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70 In the case of the quarterly data set, elimination of missing observations in the Compustat database reduces the sample size by more than 95%. Some of this reduction is due to missing information for the control variables AGE and MTB. Untabulated results indicate that elimination of these control variables in the quarterly data set increases the sample size to 24,134 with similar results. In the earnings management data set, some of the reduction is due to the inclusion of control variables regarding executive ownership. As previously indicated, exclusion of these variables increases the sample size to 23,280. In the earnings informativeness data set, I also recompute results excluding observations that are missing information for the AGE and MTB control variables. This increases the sample size to 24,354. However, untabulated results indicate that much of the significance in the model is not present without these control variables. Much of the overall reduction in sample size is due to observations from the Compustat commercial database that contain very little information (i.e. only the company name and fiscal year).
a “cost leadership” and firms following an “innovation strategy”.71 Firm strategies can also include higher quality, differentiation through image, superior customer service, a focus on a particular market niche, being flexible in responding to customer demands or mimicking innovations of competitors. Future research could examine the effect of any of these other firm strategies on the extent of earnings management.

While the preceding analysis does discuss and consider the impact of specific earnings thresholds on how earnings are managed, I do not attempt to parse out the specific impact of the various earnings thresholds that are considered by firms. Firms are influence by various earnings thresholds such as loss avoidance, performance compared to the prior period and analysts forecasts.72 Future research could analyze which earnings thresholds are of highest interest to firms that follow an innovative firm strategy by utilizing many of the tests from Dechow et al. (2003), Burgstahler and Dichev (1997) and related literature.

71 Ittner and Larcker (2001) acknowledge that a cost leadership firm could be referred to as a “defender” or “harvest” firm while an innovative firm might also be termed a “prospector” or a “build” firm.
72 See section 2.4.2 for a discussion regarding earnings thresholds.
Reference List


Appendix A: List of Special Items from Compustat

(Mnemonic: SPI) Special items represents unusual or nonrecurring items presented above taxes by the company.

Special items (when reported above taxes) include:

1. Adjustments applicable to prior years (except recurring prior year income tax adjustments)
2. After-tax adjustments to net income for the purchase portion of net income of partly pooled companies when the adjustment is carried over to retained earnings
3. Any significant nonrecurring items
4. Current year's results of discontinued operations and operations to be discontinued
5. Flood, fire, and other natural disaster losses
6. Impairment of goodwill/unamortized intangibles
7. Interest on tax settlements (when reported separately from other interest expense)
8. Inventory writedowns when reported separately or called "nonrecurring"
9. Nonrecurring profit or loss on the sale of assets, investments, securities, among others
10. Profit or loss on the repurchase of debentures
11. Purchased research and development
12. Relocation and moving expense
13. Reserve for litigation
14. Restructuring charges (includes closing and exit costs)
15. Severance pay when reported separately on the Income Statement
16. Special allowances for facilities under construction
17. Transfers from reserves provided for in prior years
18. Write-down of assets
19. Write-downs or write-offs of receivables, intangibles, among others
20. Write-offs of capitalized computer software costs
21. Year 2000 expenses
Appendix B: List of Research and Development Intensive Industries.

The following list includes the 3-digit Standard Industrial Classification (SIC) Codes identified as research and development intensive by Collins et al. (1997), Dechow and Sloan (1991), Francis and Schipper (1999), and Lev and Sougiannis (1996):

280 Chemicals And Allied Products 374 Railroad Equipment
281 Industrial Inorganic Chemicals 375 Motorcycles, Bicycles and Parts
282 Plastics Materials and Synthetic 376 Guided Missiles, Space Vehicles, Parts
283 Drugs 379 Misc. Transportation Equipment
284 Soaps, Cleaners and Toilet Goods 380 Instruments & Related Products
285 Paints and Allied Products 381 Search and Navigation Equipment
286 Industrial Organic Chemicals 382 Measuring and Controlling Devices
287 Agricultural Chemicals 384 Medical Instruments & Supplies
289 Misc. Chemical Products 385 Ophthalmic Goods
350 Industrial Machinery & Equipment 386 Photographic Equipment and Supplies
351 Engines and Turbines 387 Watches, Clocks, Watchcases & Parts
352 Farm and Garden Machinery 480 Communications
353 Construction and Related Machinery 481 Telephone Communication
354 Metalworking Machinery 482 Telegraph and Other Communications
355 Special Industry Machinery 483 Radio and Television Broadcasting
356 General Industrial Machinery 484 Cable and Other Pay Television Services
357 Computer and Office Equipment 489 Communications Services, Nec
358 Refrigeration and Service Machinery 730 Business Services
359 Industrial Machinery, Nec 731 Advertising
360 Electronic & Other Electric Equipment 732 Credit Reporting and Collection
361 Electric Distribution Equipment 733 Mailing, Reproduction, Stenographic
362 Electrical Industrial Apparatus 734 Services to Buildings
363 Household Appliances 735 Misc. Equipment Rental and Leasing
364 Electric Lighting and Wiring Equipment 736 Personnel Supply Services
365 Household Audio & Video Equipment 737 Computer and Data Processing Services
366 Communications Equipment 738 Misc. Business Services
367 Electronic Components and Accessories 870 Engineering & Management Services
369 Misc. Electrical Equipment & Supplies 871 Engineering, Architectural Services
370 Transportation Equipment 872 Accounting, Auditing & Bookkeeping
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Figure 1: Theoretical Framework Underlying Innovation Strategy and Earnings Management

**Motivation**

- Increased motivation to manage earnings due to:
  - More uncertainty in payoffs to innovative projects;
  - Innovative firms are likely to experience more severe price reactions;
  - New projects that require additional funding from investors.

- Decreased motivation to manage earnings due to:
  - Reduced profit motive due to startup phase;
  - Reduced capital requirements due to previously secured funding.

**Means**

- Increased means available to manage earnings due to:
  - Increased ability to manage earnings through changes in advertising, research and development expenses.

**Result**

- Increased earnings management
- Decreased earnings management
FIGURE 2: Innovation Evaluation Process
(Adapted from Chaney et al. 1991)

Note: While the figure shows that a public release of innovation after successful testing in addition to earnings, earnings forecasts and other financial forecasts all may affect stock price, in reality, a public release about innovation at any stage could have an effect on stock price.
**Figure 3:** Predicted fourth-quarter net income as a percentage of annual net income, based on regression coefficients from Table 4, Panel A, column 2 (Adapted from Murphy, 2001).
Figure 4: Predicted fourth-quarter net income as a percentage of annual net income, based on regression coefficients from Table 4, Panel B, column 2 (Adapted from Murphy, 2001).
<table>
<thead>
<tr>
<th>Study</th>
<th>Variable</th>
<th>Description of variable</th>
<th>Availability of data/source of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Francis and Smith (1995)</td>
<td>Innovation</td>
<td>Revenue and income from acquisitions</td>
<td>Compustat and Moody's Industrial Manuals</td>
</tr>
<tr>
<td>Francis and Smith (1995)</td>
<td>Innovation</td>
<td>Capital expenditures to sales</td>
<td>Compustat</td>
</tr>
<tr>
<td>Holthausen et al. (1995)</td>
<td>Innovation</td>
<td>Number of patents</td>
<td>Chi Research database</td>
</tr>
<tr>
<td>Ittner et al. (1997)</td>
<td>Innovation</td>
<td>Research and development expenses to sales</td>
<td>Compustat</td>
</tr>
<tr>
<td>Ittner et al. (1997)</td>
<td>Innovation</td>
<td>Number of new products</td>
<td>F&amp;S Index Plus database</td>
</tr>
<tr>
<td>BusinessWeek</td>
<td>Innovation</td>
<td>Ranking of innovative firms</td>
<td>Various BusinessWeek articles</td>
</tr>
<tr>
<td>Cardinal and Opler (1995)</td>
<td>Investment in innovation</td>
<td>Log of research and development expenses</td>
<td>Compustat</td>
</tr>
<tr>
<td>Ittner et al. (1997)</td>
<td>Firm growth and investment</td>
<td>Market to book value</td>
<td>Compustat</td>
</tr>
<tr>
<td>Ittner et al. (1997)</td>
<td>Efficiency of organization</td>
<td>Employees to sales</td>
<td>Compustat</td>
</tr>
</tbody>
</table>
Table 2 - Innovation Strategy Sample Selection Procedures

<table>
<thead>
<tr>
<th>Selection Procedure</th>
<th>Quarterly Data</th>
<th>Earnings Management Data</th>
<th>Earnings Informativeness Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of firm year observations</td>
<td>638,684</td>
<td>203,560</td>
<td>203,560</td>
</tr>
<tr>
<td>Less: Missing Compustat data</td>
<td>(618,629)</td>
<td>(180,280)</td>
<td>(188,237)</td>
</tr>
<tr>
<td>Extreme fourth-quarter income $^1$</td>
<td>(4,006)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Missing data on ExecuComp executive ownership</td>
<td>---</td>
<td>(18,204)</td>
<td>---</td>
</tr>
<tr>
<td>Final sample</td>
<td>16,049$^2$</td>
<td>5,076</td>
<td>15,323</td>
</tr>
</tbody>
</table>

$^1$ Consistent with prior literature, I eliminate observations with fourth-quarter income shares less than zero or exceeding unity.

$^2$ In Tables 3 & 4, I split this final sample into two groups, observations with annual net income and annual net loss for ease of interpretation, with sample sizes of 7,750 and 8,299, respectively.
Table 3  Descriptive statistics for quarterly data set for the period from 1998-2010

Panel A: Descriptive statistics for observations with annual net income (Sample size is 7,750)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
<th>25th Pctl.</th>
<th>75th Pctl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qtr4</td>
<td>0.327</td>
<td>0.290</td>
<td>0.181</td>
<td>0.224</td>
<td>0.391</td>
</tr>
<tr>
<td>GoodYTD</td>
<td>0.725</td>
<td>1.000</td>
<td>0.447</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>INNOV</td>
<td>0.105</td>
<td>0.000</td>
<td>0.307</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>FIN</td>
<td>0.122</td>
<td>0.000</td>
<td>0.327</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>UTIL</td>
<td>0.001</td>
<td>0.000</td>
<td>0.038</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>AGE</td>
<td>16.63</td>
<td>16.00</td>
<td>4.931</td>
<td>14.00</td>
<td>19.00</td>
</tr>
<tr>
<td>MTB</td>
<td>4.344</td>
<td>2.454</td>
<td>79.03</td>
<td>1.505</td>
<td>4.045</td>
</tr>
</tbody>
</table>

Panel B: Spearman/Pearson correlations for observations with annual net income

<table>
<thead>
<tr>
<th>Variable</th>
<th>Qtr4</th>
<th>GoodYTD</th>
<th>INNOV</th>
<th>FIN</th>
<th>UTIL</th>
<th>AGE</th>
<th>MTB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qtr4</td>
<td>---</td>
<td>-0.090</td>
<td>0.059</td>
<td>-0.076</td>
<td>0.012</td>
<td>-0.042</td>
<td>0.001</td>
</tr>
<tr>
<td>GoodYTD</td>
<td>-0.069</td>
<td>---</td>
<td>0.053</td>
<td>-0.027</td>
<td>0.016</td>
<td>-0.020</td>
<td>0.015</td>
</tr>
<tr>
<td>INNOV</td>
<td>0.055</td>
<td>0.053</td>
<td>---</td>
<td>-0.066</td>
<td>-0.013</td>
<td>-0.064</td>
<td>0.008</td>
</tr>
<tr>
<td>FIN</td>
<td>-0.087</td>
<td>-0.027</td>
<td>-0.066</td>
<td>---</td>
<td>-0.014</td>
<td>0.004</td>
<td>-0.007</td>
</tr>
<tr>
<td>UTIL</td>
<td>0.016</td>
<td>0.016</td>
<td>-0.013</td>
<td>-0.014</td>
<td>---</td>
<td>0.009</td>
<td>-0.001</td>
</tr>
<tr>
<td>AGE</td>
<td>-0.053</td>
<td>-0.025</td>
<td>-0.075</td>
<td>0.022</td>
<td>0.018</td>
<td>---</td>
<td>0.006</td>
</tr>
<tr>
<td>MTB</td>
<td>0.120</td>
<td>0.170</td>
<td>0.129</td>
<td>-0.193</td>
<td>-0.010</td>
<td>-0.033</td>
<td>---</td>
</tr>
</tbody>
</table>

Spearman is on the bottom left, Pearson is on top right.
Bold text indicates significance at the 0.1 level or better.

Variable definitions:

- **Qtr4** is the percent of annual net income (annual Compustat data item 172) derived from the fourth quarter.
- **GoodYTD** is a dummy variable equal to one if the net income (annual Compustat data item 172) through the first three quarters in year $t$ exceeds the net income through the first three quarters in year $t-1$ (i.e., good year to date); otherwise, it is equal to zero.
- **INNOV** is a dummy variable equal to one if the three year mean of research and development spending in years $t-3$, $t-2$, and $t-1$ (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.
- **FIN** is a dummy variable equal to one if the firm is in the financial and insurance industries (i.e., SIC is between 6000 and 6999); otherwise, it is equal to zero.
- **UTIL** is a dummy variable equal to one if the firm is in the utility industries (i.e., SIC is between 4900 and 4999); otherwise, it is equal to zero.
- **AGE** is the number of years since the initial public offering of the firm.
- **MTB** is the market value of the firm (Compustat data item MKVALT) divided by book value of the firm (Compustat data item CEQ).
Table 3 (continued)

Panel C: Descriptive statistics for observations with annual net loss (Sample size is 8,299)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
<th>25th Pctl.</th>
<th>75th Pctl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qtr4</td>
<td>0.334</td>
<td>0.279</td>
<td>0.212</td>
<td>0.196</td>
<td>0.422</td>
</tr>
<tr>
<td>GoodYTD</td>
<td>0.390</td>
<td>0.000</td>
<td>0.488</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>INNOV</td>
<td>0.400</td>
<td>0.000</td>
<td>0.490</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>FIN</td>
<td>0.295</td>
<td>0.000</td>
<td>0.169</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>UTIL</td>
<td>0.004</td>
<td>0.000</td>
<td>0.061</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>AGE</td>
<td>15.28</td>
<td>15.00</td>
<td>4.592</td>
<td>12.00</td>
<td>18.00</td>
</tr>
<tr>
<td>MTB</td>
<td>4.803</td>
<td>1.805</td>
<td>112.25</td>
<td>0.622</td>
<td>4.546</td>
</tr>
</tbody>
</table>

Panel D: Spearman/Pearson correlations for observations with annual net loss

<table>
<thead>
<tr>
<th>Variable</th>
<th>Qtr4</th>
<th>GoodYTD</th>
<th>INNOV</th>
<th>FIN</th>
<th>UTIL</th>
<th>AGE</th>
<th>MTB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qtr4</td>
<td>---</td>
<td>0.016</td>
<td>-0.129</td>
<td>0.044</td>
<td>0.002</td>
<td>0.078</td>
<td>-0.010</td>
</tr>
<tr>
<td>GoodYTD</td>
<td>0.011</td>
<td>---</td>
<td>0.092</td>
<td>-0.021</td>
<td>0.004</td>
<td>-0.032</td>
<td>0.003</td>
</tr>
<tr>
<td>INNOV</td>
<td>-0.102</td>
<td>0.092</td>
<td>---</td>
<td>-0.020</td>
<td>-0.042</td>
<td>-0.062</td>
<td>-0.008</td>
</tr>
<tr>
<td>FIN</td>
<td>0.026</td>
<td>-0.021</td>
<td>-0.020</td>
<td>---</td>
<td>-0.011</td>
<td>-0.010</td>
<td>-0.003</td>
</tr>
<tr>
<td>UTIL</td>
<td>0.001</td>
<td>0.004</td>
<td>-0.042</td>
<td>-0.011</td>
<td>---</td>
<td>0.024</td>
<td>-0.014</td>
</tr>
<tr>
<td>AGE</td>
<td>0.099</td>
<td>-0.040</td>
<td>-0.076</td>
<td>-0.020</td>
<td>0.028</td>
<td>---</td>
<td>-0.007</td>
</tr>
<tr>
<td>MTB</td>
<td>-0.053</td>
<td>0.005</td>
<td>0.104</td>
<td>-0.078</td>
<td>-0.026</td>
<td>-0.035</td>
<td>---</td>
</tr>
</tbody>
</table>

Spearman is on the bottom left, Pearson is on top right.
Bold text indicates significance at the 0.1 level or better.

Variable definitions:

- **Qtr4** is the percent of annual net income (annual Compustat data item 172) derived from the fourth quarter.
- **GoodYTD** is a dummy variable equal to one if the net income (annual Compustat data item 172) through the first three quarters in year \( t \) exceeds the net income through the first three quarters in year \( t-1 \) (i.e., good year to date); otherwise, it is equal to zero.
- **INNOV** is a dummy variable equal to one if the three year mean of research and development spending in years \( t-3, t-2, \) and \( t-1 \) (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.
- **FIN** is a dummy variable equal to one if the firm is in the financial and insurance industries (i.e., SIC is between 6000 and 6999); otherwise, it is equal to zero.
- **UTIL** is a dummy variable equal to one if the firm is in the utility industries (i.e., SIC is between 4900 and 4999); otherwise, it is equal to zero.
- **AGE** is the number of years since the initial public offering of the firm.
- **MTB** is the market value of the firm (Compustat data item MKVALT) divided by book value of the firm (Compustat data item CEQ).
Table 4 Coefficients of OLS regressions of fourth-quarter share of net income on year-to-date income (relative to prior year), with interactions for innovative firm strategy from 1998 to 2010.

Panel A: Observations with annual net income

\[ Qtr4_{it} = \beta_1 + \beta_2 \text{GoodYTD}_{it} + \beta_3 \text{INNOV}_{it} + \beta_4 \text{GoodYTD}_{it} \times \text{INNOV}_{it} + \beta_5 \text{AGE}_{it} + \beta_6 \text{MTB}_{it} + \beta_7 \text{FIN}_{it} + \beta_8 \text{UTIL}_{it} + \varepsilon_{it} \]  

Independent variables | Coefficient (t-statistic) | Coefficient (t-statistic)
--- | --- | ---
Intercept | 0.350 | 0.376
(77.34)** | (42.49)**
GoodYTD | -0.037 | -0.040
(-7.23)** | (-7.91)**
INNOV | 0.042 | 0.036
(2.30)** | (1.98)**
GoodYTD * INNOV | -0.006 | -0.010
(-0.30) | (-0.50)
FIN | -0.038 |
(7.17)**
UTIL | 0.066 | (1.27)
AGE | -0.002 | (-3.90)**
MTB | 0.003 | (4.94)**

# of observations | 7,750 | 7,750
Adjusted R^2 | 0.012 | 0.022

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

1Continuous variables have been winsorized at the 1% and 99% levels to ensure results are not sensitive to extreme observations.

Variable definitions:
- \( Qtr4 \) is the percent of annual net income (annual Compustat data item 172) derived from the fourth quarter.
- \( \text{GoodYTD} \) is a dummy variable equal to one if the net income (annual Compustat data item 172) through the first three quarters in year \( t \) exceeds the net income through the first three quarters in year \( t-1 \) (i.e., good year to date); otherwise, it is equal to zero.
- \( \text{INNOV} \) is a dummy variable equal to one if the three year mean of research and development spending in years \( t-3, t-2, \) and \( t-1 \) (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.
- \( \text{FIN} \) is a dummy variable equal to one if the firm is in the financial and insurance industries (i.e., SIC is between 6000 and 6999); otherwise, it is equal to zero.
- \( \text{UTIL} \) is a dummy variable equal to one if the firm is in the utility industries (i.e., SIC is between 4900 and 4999); otherwise it is equal to zero.
- \( \text{AGE} \) is the number of years since the initial public offering of the firm.
- \( \text{MTB} \) is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).
Table 4 (continued)

Panel B: Observations with annual net loss

\[
Qtr4_{it} = \beta_1 + \beta_2 \text{GoodYTD}_{it} + \beta_3 \text{INNOV}_{it} + \beta_4 \text{GoodYTD}_{it} \times \text{INNOV}_{it} + \beta_5 \text{AGE}_{it} + \beta_6 \text{MTB}_{it} + \beta_7 \text{FIN}_{it} + \beta_8 \text{UTIL}_{it} + \epsilon_{it} \tag{1}
\]

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.355 (87.14)***</td>
<td>0.300 (33.25)***</td>
</tr>
<tr>
<td>GoodYTD</td>
<td>0.004 (0.56)</td>
<td>0.006 (0.86)</td>
</tr>
<tr>
<td>INNOV</td>
<td>-0.065 (-11.67)***</td>
<td>-0.061 (-11.04)***</td>
</tr>
<tr>
<td>GoodYTD \times INNOV</td>
<td>0.020 (2.15)***</td>
<td>0.017 (1.91)*</td>
</tr>
<tr>
<td>FIN</td>
<td></td>
<td>0.052 (3.24)***</td>
</tr>
<tr>
<td>UTIL</td>
<td>-0.018 (-0.48)</td>
<td></td>
</tr>
<tr>
<td>AGE</td>
<td>0.004 (6.64)***</td>
<td></td>
</tr>
<tr>
<td>MTB</td>
<td></td>
<td>0.000 (-3.32)***</td>
</tr>
</tbody>
</table>

# of observations: 8,299

Adjusted \(R^2\): 0.018

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

### Variable definitions:

1. Continuous variables have been winsorized at the 1% and 99% levels to ensure results are not sensitive to extreme observations.

#### Qtr4

- The percent of annual net income (annual Compustat data item 172) derived from the fourth quarter.

#### GoodYTD

- A dummy variable equal to one if the net income (annual Compustat data item 172) through the first three quarters in year \(t\) exceeds the net income through the first three quarters in year \(t-1\) (i.e., good year to date); otherwise, it is equal to zero.

#### INNOV

- A dummy variable equal to one if the three year mean of research and development spending in years \(t-3, t-2,\) and \(t-1\) (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.

#### FIN

- A dummy variable equal to one if the firm is in the financial and insurance industries (i.e., SIC is between 6000 and 6999); otherwise, it is equal to zero.

#### UTIL

- A dummy variable equal to one if the firm is in the utility industries (i.e., SIC is between 4900 and 4999); otherwise, it is equal to zero.

#### AGE

- The number of years since the initial public offering of the firm.

#### MTB

- The market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).
Table 5 Descriptive statistics for earnings management data set for the period from 1994-2010

Panel A: Descriptive statistics (Sample size is 5,076)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
<th>25th Pctl.</th>
<th>75th Pctl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AbCFO</td>
<td>-0.313</td>
<td>-0.256</td>
<td>0.328</td>
<td>-0.430</td>
<td>-0.128</td>
</tr>
<tr>
<td>AbPROD</td>
<td>0.022</td>
<td>-0.017</td>
<td>0.387</td>
<td>-0.166</td>
<td>0.156</td>
</tr>
<tr>
<td>AbDISCEXP</td>
<td>-0.269</td>
<td>-0.198</td>
<td>0.551</td>
<td>-0.453</td>
<td>0.008</td>
</tr>
<tr>
<td>ABSDA</td>
<td>0.085</td>
<td>0.049</td>
<td>0.210</td>
<td>0.023</td>
<td>0.098</td>
</tr>
<tr>
<td>DA</td>
<td>0.002</td>
<td>0.013</td>
<td>0.226</td>
<td>-0.038</td>
<td>0.057</td>
</tr>
<tr>
<td>INNOV</td>
<td>0.172</td>
<td>0.000</td>
<td>0.377</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Big</td>
<td>0.935</td>
<td>1.000</td>
<td>0.247</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>ChgGDP</td>
<td>259.8</td>
<td>338.4</td>
<td>234.7</td>
<td>197.4</td>
<td>408.2</td>
</tr>
<tr>
<td>MKTVAL</td>
<td>3,718</td>
<td>906.9</td>
<td>12,254</td>
<td>382.3</td>
<td>2,607</td>
</tr>
<tr>
<td>Bonus</td>
<td>0.243</td>
<td>0.220</td>
<td>0.295</td>
<td>0.008</td>
<td>0.405</td>
</tr>
<tr>
<td>Ex_Option</td>
<td>34.63</td>
<td>13.82</td>
<td>200.3</td>
<td>6.548</td>
<td>26.65</td>
</tr>
<tr>
<td>Un_Option</td>
<td>24.34</td>
<td>9.338</td>
<td>143.1</td>
<td>3.976</td>
<td>19.17</td>
</tr>
<tr>
<td>Gt_Option</td>
<td>16.63</td>
<td>4.053</td>
<td>146.5</td>
<td>1.299</td>
<td>10.25</td>
</tr>
<tr>
<td>Owner</td>
<td>84.77</td>
<td>9.252</td>
<td>1,006</td>
<td>2.800</td>
<td>35.28</td>
</tr>
<tr>
<td>AGE</td>
<td>18.04</td>
<td>18.00</td>
<td>5.568</td>
<td>14.00</td>
<td>21.00</td>
</tr>
<tr>
<td>MTB</td>
<td>4.701</td>
<td>2.602</td>
<td>97.17</td>
<td>1.620</td>
<td>4.255</td>
</tr>
</tbody>
</table>
Table 5 (continued)

Panel B: Descriptive statistics, low innovation (Sample size is 4,376)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
<th>25th Pctl.</th>
<th>75th Pctl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AbCFO</td>
<td>-0.309</td>
<td>-0.249</td>
<td>0.336</td>
<td>-0.427</td>
<td>-0.121</td>
</tr>
<tr>
<td>AbPROD</td>
<td>0.051</td>
<td>-0.001</td>
<td>0.393</td>
<td>-0.143</td>
<td>0.182</td>
</tr>
<tr>
<td>AbDISCEXP</td>
<td>-0.327</td>
<td>-0.242</td>
<td>0.546</td>
<td>-0.503</td>
<td>-0.047</td>
</tr>
<tr>
<td>ABSDA</td>
<td>0.077</td>
<td>0.047</td>
<td>0.137</td>
<td>0.022</td>
<td>0.092</td>
</tr>
<tr>
<td>DA</td>
<td>0.009</td>
<td>0.016</td>
<td>0.157</td>
<td>-0.032</td>
<td>0.058</td>
</tr>
<tr>
<td>INNOV</td>
<td>0.077</td>
<td>0.000</td>
<td>0.266</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Big</td>
<td>0.936</td>
<td>1.000</td>
<td>0.245</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>ChgGDP</td>
<td>259.2</td>
<td>338.4</td>
<td>234.1</td>
<td>199.9</td>
<td>406.5</td>
</tr>
<tr>
<td>MKTVAL</td>
<td>4,038</td>
<td>984.7</td>
<td>12,935</td>
<td>427.0</td>
<td>2,842</td>
</tr>
<tr>
<td>Bonus</td>
<td>0.249</td>
<td>0.232</td>
<td>0.308</td>
<td>0.008</td>
<td>0.413</td>
</tr>
<tr>
<td>Ex_Option</td>
<td>32.02</td>
<td>13.06</td>
<td>198.3</td>
<td>6.270</td>
<td>25.35</td>
</tr>
<tr>
<td>Un_Option</td>
<td>20.29</td>
<td>8.576</td>
<td>111.6</td>
<td>3.582</td>
<td>17.43</td>
</tr>
<tr>
<td>Gt_Option</td>
<td>13.45</td>
<td>3.659</td>
<td>118.3</td>
<td>1.139</td>
<td>8.81</td>
</tr>
<tr>
<td>Owner</td>
<td>70.14</td>
<td>9.267</td>
<td>726</td>
<td>2.805</td>
<td>36.01</td>
</tr>
<tr>
<td>AGE</td>
<td>18.08</td>
<td>18.00</td>
<td>5.665</td>
<td>14.00</td>
<td>21.00</td>
</tr>
<tr>
<td>MTB</td>
<td>5.044</td>
<td>2.560</td>
<td>103.33</td>
<td>1.620</td>
<td>4.166</td>
</tr>
</tbody>
</table>
Table 5 (continued)

Panel C: Descriptive statistics, high innovation (Sample size is 700)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
<th>25th Pctl.</th>
<th>75th Pctl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AbCFO</td>
<td>-0.338</td>
<td>-0.299</td>
<td>0.268</td>
<td>-0.441</td>
<td>-0.187</td>
</tr>
<tr>
<td>AbPROD</td>
<td>-0.156</td>
<td>-0.141</td>
<td>0.290</td>
<td>-0.342</td>
<td>0.004</td>
</tr>
<tr>
<td>AbDISCEXP</td>
<td>0.096</td>
<td>0.100</td>
<td>0.423</td>
<td>-0.075</td>
<td>0.240</td>
</tr>
<tr>
<td>ABSDA</td>
<td>0.133</td>
<td>0.070</td>
<td>0.447</td>
<td>-0.032</td>
<td>0.143</td>
</tr>
<tr>
<td>DA</td>
<td>-0.045</td>
<td>-0.016</td>
<td>0.464</td>
<td>-0.090</td>
<td>0.051</td>
</tr>
<tr>
<td>INNOV</td>
<td>0.766</td>
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<td>0.260</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>ChgGDP</td>
<td>263.6</td>
<td>320.2</td>
<td>238.5</td>
<td>181.1</td>
<td>416.4</td>
</tr>
<tr>
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<td>6,199</td>
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<td>1,374</td>
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<td>0.195</td>
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<td>0.349</td>
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<tr>
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<td>212.1</td>
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<td>35.32</td>
</tr>
<tr>
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<td>264.4</td>
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<td>27.89</td>
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</table>
Table 5 (continued)

Panel D: Descriptive statistics, quintile 1 (Sample size is 1,015)

<table>
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<th>Standard deviation</th>
<th>25th Pctl.</th>
<th>75th Pctl.</th>
</tr>
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<tbody>
<tr>
<td>AbCFO</td>
<td>-0.452</td>
<td>-0.373</td>
<td>0.529</td>
<td>-0.588</td>
<td>-0.158</td>
</tr>
<tr>
<td>AbPROD</td>
<td>0.155</td>
<td>0.063</td>
<td>0.606</td>
<td>-0.084</td>
<td>0.281</td>
</tr>
<tr>
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<td>-0.513</td>
<td>0.849</td>
<td>-0.809</td>
<td>-0.243</td>
</tr>
<tr>
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<td>0.114</td>
<td>0.024</td>
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</tr>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
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<td>0.240</td>
<td>1.000</td>
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</tr>
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<td>320.2</td>
<td>238.9</td>
<td>181.1</td>
<td>402.5</td>
</tr>
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<td>8,688</td>
<td>372.7</td>
<td>2,231</td>
</tr>
<tr>
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<td>0.316</td>
<td>0.009</td>
<td>0.409</td>
</tr>
<tr>
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<td>89.3</td>
<td>5.409</td>
<td>26.04</td>
</tr>
<tr>
<td>Un_Option</td>
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<td>8.237</td>
<td>175.4</td>
<td>3.238</td>
<td>18.30</td>
</tr>
<tr>
<td>Gt_Option</td>
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<td>3.247</td>
<td>139.0</td>
<td>0.895</td>
<td>9.18</td>
</tr>
<tr>
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<td>13.139</td>
<td>230</td>
<td>4.813</td>
<td>75.09</td>
</tr>
<tr>
<td>AGE</td>
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<td>16.00</td>
<td>6.157</td>
<td>14.00</td>
<td>20.00</td>
</tr>
<tr>
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<td>2.067</td>
<td>23.64</td>
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<td>3.738</td>
</tr>
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</table>

1 Quintile 1 contains the firms with the lowest levels of innovation. Conversely, quintile 5 contains the firms with the highest levels of innovation.
Table 5 (continued)

**Panel E: Descriptive statistics, quintile 2 (Sample size is 1,015)**

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Median</th>
<th>Standard deviation</th>
<th>25th Pctl.</th>
<th>75th Pctl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AbCFO</td>
<td>-0.353</td>
<td>-0.295</td>
<td>0.253</td>
<td>-0.482</td>
<td>-0.193</td>
</tr>
<tr>
<td>AbPROD</td>
<td>0.171</td>
<td>0.131</td>
<td>0.347</td>
<td>-0.025</td>
<td>0.321</td>
</tr>
<tr>
<td>AbDISCEXP</td>
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<td>-0.404</td>
<td>0.391</td>
<td>-0.622</td>
<td>-0.237</td>
</tr>
<tr>
<td>ABSDA</td>
<td>0.064</td>
<td>0.041</td>
<td>0.088</td>
<td>0.020</td>
<td>0.079</td>
</tr>
<tr>
<td>DA</td>
<td>0.012</td>
<td>0.016</td>
<td>0.108</td>
<td>-0.025</td>
<td>0.051</td>
</tr>
<tr>
<td>INNOV</td>
<td>0.005</td>
<td>0.000</td>
<td>0.070</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Big</td>
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<td>0.273</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>ChgGDP</td>
<td>259.8</td>
<td>338.4</td>
<td>236.6</td>
<td>199.9</td>
<td>408.2</td>
</tr>
<tr>
<td>MKTVAL</td>
<td>3,832</td>
<td>1,038.4</td>
<td>13,605</td>
<td>468.1</td>
<td>2,886</td>
</tr>
<tr>
<td>Bonus</td>
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<td>0.224</td>
<td>0.222</td>
<td>0.002</td>
<td>0.436</td>
</tr>
<tr>
<td>Ex_Option</td>
<td>33.96</td>
<td>10.41</td>
<td>150.5</td>
<td>5.155</td>
<td>21.17</td>
</tr>
<tr>
<td>Un_Option</td>
<td>17.76</td>
<td>6.632</td>
<td>76.9</td>
<td>2.681</td>
<td>13.89</td>
</tr>
<tr>
<td>Gt_Option</td>
<td>10.20</td>
<td>2.643</td>
<td>51.3</td>
<td>0.804</td>
<td>6.37</td>
</tr>
<tr>
<td>Owner</td>
<td>61.54</td>
<td>9.367</td>
<td>290</td>
<td>3.358</td>
<td>33.60</td>
</tr>
<tr>
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<td>19.00</td>
<td>5.095</td>
<td>15.00</td>
<td>23.00</td>
</tr>
<tr>
<td>MTB</td>
<td>9.627</td>
<td>2.257</td>
<td>213.07</td>
<td>1.539</td>
<td>3.271</td>
</tr>
</tbody>
</table>

 Quintile 1 contains the firms with the lowest levels of innovation. Conversely, quintile 5 contains the firms with the highest levels of innovation.
Table 5 (continued)

Panel F: Descriptive statistics, quintile 3 (Sample size is 1,016)

<table>
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<tr>
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<th>Standard deviation</th>
<th>25th Pctl.</th>
<th>75th Pctl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AbCFO</td>
<td>-0.239</td>
<td>-0.203</td>
<td>0.231</td>
<td>-0.345</td>
<td>-0.084</td>
</tr>
<tr>
<td>AbPROD</td>
<td>0.010</td>
<td>-0.023</td>
<td>0.226</td>
<td>-0.143</td>
<td>0.113</td>
</tr>
<tr>
<td>AbDISCEXP</td>
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<td>0.283</td>
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</tr>
<tr>
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<td>0.099</td>
<td>0.020</td>
<td>0.090</td>
</tr>
<tr>
<td>DA</td>
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<td>0.010</td>
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<td>0.051</td>
</tr>
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<td>0.125</td>
<td>0.000</td>
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</tr>
<tr>
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<td>0.260</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
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<td>237.9</td>
<td>180.7</td>
<td>381.8</td>
</tr>
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<td>2,995</td>
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<td>0.000</td>
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</tr>
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<td>126.4</td>
<td>7.267</td>
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</tr>
<tr>
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<td>8.100</td>
<td>190.7</td>
<td>3.365</td>
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</tr>
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<td>3.739</td>
<td>203.7</td>
<td>1.090</td>
<td>8.11</td>
</tr>
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</tr>
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<td>5.027</td>
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<td>21.00</td>
</tr>
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<td>2.601</td>
<td>4.51</td>
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</tr>
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</table>

1 Quintile 1 contains the firms with the lowest levels of innovation. Conversely, quintile 5 contains the firms with the highest levels of innovation.
**Table 5 (continued)**

*Panel G: Descriptive statistics, quintile 4 (Sample size is 1,015)*

<table>
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<th>75th Pctl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AbCFO</td>
<td>-0.234</td>
<td>-0.203</td>
<td>0.201</td>
<td>-0.332</td>
<td>-0.108</td>
</tr>
<tr>
<td>AbPROD</td>
<td>-0.064</td>
<td>-0.081</td>
<td>0.240</td>
<td>-0.213</td>
<td>0.052</td>
</tr>
<tr>
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<td>0.275</td>
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</tr>
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<td>0.092</td>
<td>0.022</td>
<td>0.097</td>
</tr>
<tr>
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<td>0.009</td>
<td>0.120</td>
<td>-0.041</td>
<td>0.053</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
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<td>320.2</td>
<td>229.1</td>
<td>197.4</td>
<td>401.0</td>
</tr>
<tr>
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<td>0.221</td>
<td>0.213</td>
<td>0.009</td>
<td>0.409</td>
</tr>
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</table>

*1Quintile 1 contains the firms with the lowest levels of innovation. Conversely, quintile 5 contains the firms with the highest levels of innovation.*
Table 5 (continued)

Panel H: Descriptive statistics, quintile 5 (Sample size is 1,015) ¹

<table>
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<th>Standard deviation</th>
<th>25th Pctl.</th>
<th>75th Pctl.</th>
</tr>
</thead>
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<tr>
<td>AbCFO</td>
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<td>-0.261</td>
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<td>-0.397</td>
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<td>-0.159</td>
<td>0.266</td>
<td>-0.315</td>
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<td>0.094</td>
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<td>0.234</td>
</tr>
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</tr>
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</tr>
<tr>
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<td>1.000</td>
<td>0.240</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>ChgGDP</td>
<td>281.6</td>
<td>339.1</td>
<td>229.7</td>
<td>218.7</td>
<td>417.7</td>
</tr>
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<td>380.5</td>
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<td>6.857</td>
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<td>2.513</td>
<td>17.20</td>
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<td>15.00</td>
<td>20.00</td>
</tr>
<tr>
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<td>3.354</td>
<td>33.92</td>
<td>1.932</td>
<td>5.659</td>
</tr>
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</table>

¹ Quintile 1 contains the firms with the lowest levels of innovation. Conversely, quintile 5 contains the firms with the highest levels of innovation.
Table 5 (continued)
Panel I: Spearman/Pearson correlations

<table>
<thead>
<tr>
<th>Variable</th>
<th>(A)</th>
<th>(B)</th>
<th>(C)</th>
<th>(D)</th>
<th>(E)</th>
<th>(F)</th>
<th>(G)</th>
<th>(H)</th>
<th>(I)</th>
<th>(J)</th>
<th>(K)</th>
<th>(L)</th>
<th>(M)</th>
<th>(N)</th>
<th>(O)</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
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<td>-0.102</td>
<td>-0.077</td>
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<td>0.035</td>
<td>-0.013</td>
<td>0.133</td>
<td>0.043</td>
<td>-0.007</td>
<td>-0.025</td>
<td>-0.007</td>
<td>-0.004</td>
<td>-0.105</td>
<td>-0.009</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>-0.458</td>
<td>-0.808</td>
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<td>0.092</td>
<td>-0.187</td>
<td>0.028</td>
<td>0.060</td>
<td>-0.037</td>
<td>-0.005</td>
<td>0.006</td>
<td>-0.003</td>
<td>-0.012</td>
<td>-0.009</td>
<td>0.123</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>(C)</td>
<td>0.427</td>
<td>-0.721</td>
<td>0.021</td>
<td>-0.177</td>
<td>0.257</td>
<td>-0.051</td>
<td>-0.058</td>
<td>-0.001</td>
<td>-0.054</td>
<td>0.021</td>
<td>0.028</td>
<td>0.032</td>
<td>0.014</td>
<td>-0.096</td>
<td>-0.018</td>
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</tr>
<tr>
<td>(D)</td>
<td>-0.121</td>
<td>0.032</td>
<td>0.035</td>
<td>---</td>
<td>-0.654</td>
<td>0.102</td>
<td>0.009</td>
<td>0.012</td>
<td>0.010</td>
<td>0.018</td>
<td>0.027</td>
<td>0.087</td>
<td>0.082</td>
<td>0.063</td>
<td>-0.024</td>
<td>0.003</td>
</tr>
<tr>
<td>(E)</td>
<td>-0.183</td>
<td>0.118</td>
<td>-0.146</td>
<td>0.110</td>
<td>---</td>
<td>-0.062</td>
<td>-0.003</td>
<td>0.020</td>
<td>-0.029</td>
<td>0.010</td>
<td>-0.030</td>
<td>-0.081</td>
<td>-0.083</td>
<td>-0.055</td>
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<tr>
<td>(F)</td>
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<td>0.345</td>
<td>0.129</td>
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<td>---</td>
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<td>0.044</td>
<td>-0.035</td>
<td>-0.007</td>
<td>0.012</td>
<td>0.038</td>
<td>0.044</td>
<td>0.005</td>
<td>-0.022</td>
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</tr>
<tr>
<td>(G)</td>
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<td>0.018</td>
<td>-0.042</td>
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<td>-0.005</td>
<td>0.000</td>
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<td>0.095</td>
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<td>0.078</td>
<td>-0.027</td>
<td>-0.016</td>
<td>-0.006</td>
<td>-0.049</td>
<td>0.034</td>
<td>0.012</td>
</tr>
<tr>
<td>(H)</td>
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<td>0.054</td>
<td>-0.062</td>
<td>0.048</td>
<td>-0.008</td>
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<td>0.018</td>
<td>0.021</td>
<td>0.011</td>
<td>0.003</td>
<td>0.001</td>
<td>0.006</td>
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<td>0.022</td>
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<td>(I)</td>
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<td>-0.125</td>
<td>0.231</td>
<td>0.030</td>
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<td>0.100</td>
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<td>(J)</td>
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<td>0.019</td>
<td>-0.009</td>
<td>0.108</td>
<td>0.310</td>
<td>0.197</td>
<td>---</td>
<td>-0.005</td>
<td>0.183</td>
<td>0.152</td>
<td>0.002</td>
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<tr>
<td>(K)</td>
<td>-0.045</td>
<td>-0.065</td>
<td>0.191</td>
<td>0.017</td>
<td>-0.028</td>
<td>0.082</td>
<td>-0.095</td>
<td>-0.033</td>
<td>-0.353</td>
<td>-0.082</td>
<td>---</td>
<td>0.346</td>
<td>0.385</td>
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<tr>
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<td>-0.091</td>
<td>-0.095</td>
<td>0.174</td>
<td>0.133</td>
<td>-0.027</td>
<td>0.197</td>
<td>-0.027</td>
<td>0.110</td>
<td>-0.330</td>
<td>0.074</td>
<td>0.457</td>
<td>---</td>
<td>0.874</td>
<td>0.403</td>
<td>-0.023</td>
<td>-0.001</td>
</tr>
<tr>
<td>(M)</td>
<td>-0.082</td>
<td>-0.084</td>
<td>0.176</td>
<td>0.135</td>
<td>-0.039</td>
<td>0.186</td>
<td>0.029</td>
<td>0.120</td>
<td>-0.273</td>
<td>0.088</td>
<td>0.355</td>
<td>0.724</td>
<td>---</td>
<td>0.497</td>
<td>-0.024</td>
<td>0.000</td>
</tr>
<tr>
<td>(N)</td>
<td>-0.125</td>
<td>0.085</td>
<td>-0.100</td>
<td>0.083</td>
<td>0.007</td>
<td>-0.027</td>
<td>-0.114</td>
<td>0.028</td>
<td>-0.289</td>
<td>-0.072</td>
<td>0.183</td>
<td>0.141</td>
<td>0.085</td>
<td>---</td>
<td>-0.021</td>
<td>0.000</td>
</tr>
<tr>
<td>(O)</td>
<td>-0.128</td>
<td>0.156</td>
<td>-0.122</td>
<td>0.024</td>
<td>0.029</td>
<td>-0.028</td>
<td>0.021</td>
<td>0.133</td>
<td>0.028</td>
<td>0.116</td>
<td>-0.055</td>
<td>-0.013</td>
<td>-0.007</td>
<td>-0.076</td>
<td>---</td>
<td>0.000</td>
</tr>
<tr>
<td>(P)</td>
<td>0.186</td>
<td>-0.243</td>
<td>0.061</td>
<td>0.024</td>
<td>-0.007</td>
<td>0.101</td>
<td>0.071</td>
<td>0.226</td>
<td>0.411</td>
<td>0.220</td>
<td>-0.147</td>
<td>-0.019</td>
<td>-0.025</td>
<td>-0.014</td>
<td>0.030</td>
<td>---</td>
</tr>
</tbody>
</table>

---

**Spearman is on the bottom left, Pearson is on top right. Bold text indicates significance at the 0.1 level or better.**

**Column and row headings:**

(A) AbCFO is the difference between the actual values and the normal levels predicted from Equation (2).

(B) AbPROD is the difference between the actual values and the normal levels predicted from Equation (3).

(C) AbDISCEXP is the difference between the actual values and the normal levels predicted from Equation (4).

(D) ABSDA is the absolute value of the difference between total accruals and the fitted normal accruals.

(E) DA is the difference between total accruals and the fitted normal accruals.

(F) INNOV is a dummy variable equal to one if the three year mean of research and development spending in years t-3, t-2, and t-1 (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.

(G) Big is a dummy variable equal to 1 if the auditor is a Big 4 audit firm, 0 otherwise.

(H) ChgGDP is the change in gross domestic product (Compustat mnemonic GDP).

(I) MKTVAL is the market value of equity (Compustat mnemonic MKVALM).

(J) Bonus is the average bonus compensation as a proportion of total compensation received by the CEO and the CFO of a firm.

(K) Ex Option is exercisable options defined as the number of unexercised that the executives held at year-end that were vested scaled by total outstanding shares of the firm.

(L) Un Option is unexercisable options defined as the number of unexercised options (excluding option grants in the current period) that the executives held at year-end that have not vested scaled by total outstanding shares of the firm.

(M) Gt Option is new option grants made during the current period scaled by total outstanding shares of the firm.

(N) Owner is the sum of restricted stock grants in the current period and the aggregate number of shares held by the executives at year-end (excluding stock options) scaled by total outstanding shares of the firm.

(O) AGE is the number of years since the initial public offering of the firm.

(P) MTB is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).
Table 6  Innovative Strategy and Determinants of Real Earnings Management from 1994 to 2010

\[
AbDISCEXP_{it} = \beta_0 + \beta_1 INNOV_{it} + \beta_2 Big_{it} + \beta_3 \Delta GDP_{it} + \beta_4 MKTVAL_{it} + \beta_5 Bonus_{it} + \beta_6 Ex\_Option_{it} + \beta_7 Un\_Option_{it} + \beta_8 Gt\_Option_{it} + \beta_9 Owner_{it} + \beta_{10} AGE_{it} + \epsilon_{it} 
\]

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>AbCFO</th>
<th>AbPROD</th>
<th>AbDISCEXP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.361 (-11.39)**</td>
<td>0.048 (1.52)</td>
<td>-0.343 (-7.97)**</td>
</tr>
<tr>
<td>INNOV</td>
<td>0.011 (1.19)</td>
<td>-0.198 (-20.95)**</td>
<td>0.356 (28.30)**</td>
</tr>
<tr>
<td>Big</td>
<td>0.030 (1.90)*</td>
<td>0.031 (2.27)**</td>
<td>-0.099 (-5.76)**</td>
</tr>
<tr>
<td>ChgGDP</td>
<td>-0.005 (-0.16)</td>
<td>-0.006 (-0.20)</td>
<td>-0.011 (-0.25)</td>
</tr>
<tr>
<td>MKTVAL</td>
<td>0.004 (8.97)**</td>
<td>-0.002 (-3.82)**</td>
<td>0.002 (2.38)**</td>
</tr>
<tr>
<td>Bonus</td>
<td>0.096 (5.06)**</td>
<td>-0.028 (-1.33)</td>
<td>-0.143 (-4.93)**</td>
</tr>
<tr>
<td>Ex_Option</td>
<td>-0.018 (-0.17)</td>
<td>0.290 (2.72)**</td>
<td>-0.181 (-1.15)</td>
</tr>
<tr>
<td>Un_Option</td>
<td>-0.399 (-1.97)**</td>
<td>0.220 (1.33)</td>
<td>-0.440 (-1.83)*</td>
</tr>
<tr>
<td>Gt_Option</td>
<td>0.245 (0.80)</td>
<td>-0.612 (-2.53)**</td>
<td>1.920 (5.72)**</td>
</tr>
<tr>
<td>Owner</td>
<td>-0.216 (-5.41)**</td>
<td>0.197 (4.81)**</td>
<td>-0.372 (-6.24)**</td>
</tr>
<tr>
<td>AGE</td>
<td>-0.006 (-8.62)**</td>
<td>0.004 (6.41)**</td>
<td>-0.007 (-6.88)**</td>
</tr>
<tr>
<td>MTB</td>
<td>0.004 (4.72)**</td>
<td>-0.005 (-6.19)**</td>
<td>0.002 (1.15)</td>
</tr>
<tr>
<td>Industry controls</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>Year-by-year controls</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td># of observations</td>
<td>5,076</td>
<td>5,076</td>
<td>5,076</td>
</tr>
<tr>
<td>Adjusted R(^2)</td>
<td>0.139</td>
<td>0.302</td>
<td>0.245</td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

1Continuous variables (including dependent variables) have been winsorized at the 1% and 99% levels to ensure results are not sensitive to extreme observations.

2Values for this variable have been multiplied by one thousand for ease of interpretation.

Variable definitions:

- \( AbCFO \) is the difference between the actual values and the normal levels predicted from Equation (2).
- \( AbPROD \) is the difference between the actual values and the normal levels predicted from Equation (3).
- \( AbDISCEXP \) is the difference between the actual values and the normal levels predicted from Equation (4).
- \( INNOV \) is a dummy variable equal to one if the three year mean of research and development spending in years \( t-3, t-2, \) and \( t-1 \) (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.
- \( Big \) is a dummy variable equal to 1 if the auditor is a Big 4 audit firm, 0 otherwise.
- \( ChgGDP \) is the change in gross domestic product (Copmustat mnemonic GDP).
- \( MKTVAL \) is the market value of equity (Compustat mnemonic MKVALM).
- \( Bonus \) is the average bonus compensation as a proportion of total compensation received by the CEO and the CFO of a firm.
- \( Ex\_Option \) is exercisable options defined as the number of unexercised that the executives held at year-end that were vested scaled by total outstanding shares of the firm.
- \( Un\_Option \) is unexercisable options defined as the number of unexercised options (excluding option grants in the current period) that the executives held at year-end that have not vested scaled by total outstanding shares of the firm.
- \( Gt\_Option \) is new option grants made during the current period scaled by total outstanding shares of the firm.
- \( Owner \) is the sum of restricted stock grants in the current period and the aggregate number of shares held by the executives at year-end (excluding stock options) scaled by total outstanding shares of the firm.
- \( AGE \) is the number of years since the initial public offering of the firm.
- \( MTB \) is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item ...
Table 7 Innovative Strategy and Determinants of Accrual Based Earnings Management from 1994 to 2010

\[
\text{Accruals} = \beta_0 + \beta_1 \text{INNOV}_{it} + \beta_2 \text{Big}_{it} + \beta_3 \Delta \text{GDP}_t + \beta_4 \text{MKTVAL}_{it} + \beta_5 \text{Bonus}_{it}
\]

\[+ \beta_6 \text{Ex}_\text{Option}_{it} + \beta_7 \text{Un}_\text{Option}_{it} + \beta_8 \text{Gt}_\text{Option}_{it} + \beta_9 \text{Owner}_{it} + \beta_{10} \text{AGE}_{it} + \beta_{11} \text{MTB}_{it} + \beta_n \text{Industry}_{t} + \beta_n \text{Year}_{t} + \epsilon_i \]  

(8)

| Independent variables | \text{ABSDA} & \text{Positive DA} & \text{Negative DA} |
|-----------------------|-----------------|-----------------|-----------------|
|                       | Coefficient     | Coefficient     | Coefficient     |
|                       | (t-statistic)   | (t-statistic)   | (t-statistic)   |
| \text{Intercept}      | 0.159           | 0.153           | -0.135          |
|                       | (13.81)***      | (12.76)***      | (-7.35)***      |
| \text{INNOV}          | 0.019           | 0.018           | -0.016          |
|                       | (4.83)***       | (4.07)***       | (-2.94)***      |
| \text{Big}            | -0.009          | -0.011          | 0.006           |
|                       | (-1.90)*        | (-2.16)**       | (0.84)          |
| \text{ChgGDP}^2       | -0.046          | -0.010          | 0.083           |
|                       | (-4.18)***      | (-1.00)         | (4.15)***       |
| \text{MKTVAL}^2       | 0.000           | 0.000           | 0.000           |
|                       | (0.64)          | (-1.19)         | (-1.30)         |
| \text{Bonus}          | -0.018          | -0.009          | 0.030           |
|                       | (-2.68)***      | (-1.37)         | (2.74)***       |
| \text{Ex}_\text{Option}^2 | -0.054       | 0.003           | 0.076           |
|                       | (-1.27)         | (0.08)          | (1.29)          |
| \text{Un}_\text{Option}^2 | -0.014       | -0.034          | -0.070          |
|                       | (-1.19)         | (-0.38)         | (-0.79)         |
| \text{Gt}_\text{Option}^2 | 0.412        | 0.029           | -0.545          |
|                       | (3.41)***       | (0.21)          | (-3.92)***      |
| \text{Owner}^2        | 0.023           | 0.025           | 0.000           |
|                       | (1.55)          | (1.78)*         | (-0.01)         |
| \text{AGE}^2          | -0.545          | -0.471          | 0.337           |
|                       | (-2.54)**       | (-2.38)**       | (0.83)          |
| \text{MTB}^2          | 0.780           | 0.585           | -0.897          |
|                       | (2.18)**        | (1.92)*         | (-2.23)**       |

| Industry controls     | Included        | Included        | Included        |
|                       |                 |                 |                 |
|                       | (t-statistic)   | (t-statistic)   | (t-statistic)   |
| \text{Year-by-year controls} | Included     | Included        | Included        |
|                       |                 |                 |                 |
| \# of observations    | 5,076           | 2,901           | 2,175           |
| Adjusted \text{R}^2   | 0.118           | 0.163           | 0.099           |

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

1Continuous variables (including dependent variables) have been winsorized at the 1% and 99% levels to ensure results are not sensitive to extreme observations.

2Values for this variable have been multiplied by one thousand for ease of interpretation.

Variable definitions:

\text{ABSDA} is the absolute value of the difference between total accruals and the fitted normal accruals.
\text{Positive DA} is the difference between total accruals and the fitted normal accruals for all positive accruals.
\text{Negative DA} is the difference between total accruals and the fitted normal accruals for all negative accruals.
\text{INNOV} is a dummy variable equal to one if the three year mean of research and development spending in years t-3, t-2, and t-1 (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.
\text{Big} is a dummy variable equal to 1 if the auditor is a Big 4 audit firm, 0 otherwise.
\text{ChgGDP} is the change in gross domestic product (Compustat mnemonic GDP).
\text{MKTVAL} is the market value of equity (Compustat mnemonic MKVALM).
\text{Bonus} is the average bonus compensation as a proportion of total compensation received by the CEO and the CFO of a firm.
\text{Ex}_\text{Option} is exercisable options defined as the number of unexercised that the executives held at year-end that were vested scaled by total outstanding shares of the firm.
\text{Un}_\text{Option} is unexercisable options defined as the number of unexercised options (excluding option grants in the current period) that the executives held at year-end that have not vested scaled by total outstanding shares of the firm.
\text{Gt}_\text{Option} is new option grants made during the current period scaled by total outstanding shares of the firm.
\text{Owner} is the sum of restricted stock grants in the current period and the aggregate number of shares held by the executives at year-end (excluding stock options) scaled by total outstanding shares of the firm.
\text{AGE} is the number of years since the initial public offering of the firm.
\text{MTB} is the market value of the firm (Compustat data item MKVALT) divided by book value of the firm (Compustat data item CEQ).
Table 8  Descriptive statistics for earnings informativeness data set for the period from 1999-2010

Panel A: Descriptive statistics (Sample size is 15,323)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
<th>25th Pctl.</th>
<th>75th Pctl.</th>
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</thead>
<tbody>
<tr>
<td>R</td>
<td>0.734</td>
<td>-0.062</td>
<td>30.17</td>
<td>-0.444</td>
<td>0.454</td>
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<tr>
<td>E</td>
<td>0.117</td>
<td>0.040</td>
<td>27.90</td>
<td>-0.185</td>
<td>0.034</td>
</tr>
<tr>
<td>Price</td>
<td>56.13</td>
<td>7.370</td>
<td>1,044</td>
<td>2.500</td>
<td>18.38</td>
</tr>
<tr>
<td>BV</td>
<td>15.18</td>
<td>2.719</td>
<td>947.1</td>
<td>0.656</td>
<td>6.447</td>
</tr>
<tr>
<td>Income</td>
<td>-0.090</td>
<td>-0.040</td>
<td>11.13</td>
<td>-0.198</td>
<td>0.036</td>
</tr>
<tr>
<td>INNOV</td>
<td>0.285</td>
<td>0.000</td>
<td>0.452</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>AGE</td>
<td>15.34</td>
<td>15.00</td>
<td>4.990</td>
<td>12.00</td>
<td>18.00</td>
</tr>
<tr>
<td>MTB</td>
<td>3.175</td>
<td>2.246</td>
<td>115.0</td>
<td>1.080</td>
<td>4.363</td>
</tr>
</tbody>
</table>

Panel B: Spearman/Pearson correlations

<table>
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<tr>
<th>Variable</th>
<th>R</th>
<th>E</th>
<th>Price</th>
<th>BV</th>
<th>Income</th>
<th>INNOV</th>
<th>AGE</th>
<th>MTB</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
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<td>0.002</td>
<td>0.000</td>
<td>0.770</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.015</td>
</tr>
<tr>
<td>E</td>
<td>0.246</td>
<td>---</td>
<td>-0.001</td>
<td>0.000</td>
<td>0.983</td>
<td>-0.011</td>
<td>0.001</td>
<td>-0.011</td>
</tr>
<tr>
<td>Price</td>
<td>0.333</td>
<td>0.415</td>
<td>0.712</td>
<td>---</td>
<td>0.090</td>
<td>-0.001</td>
<td>0.001</td>
<td>0.007</td>
</tr>
<tr>
<td>BV</td>
<td>0.100</td>
<td>0.445</td>
<td>0.712</td>
<td>0.437</td>
<td>---</td>
<td>0.001</td>
<td>-0.004</td>
<td>0.000</td>
</tr>
<tr>
<td>Income</td>
<td>0.251</td>
<td>0.970</td>
<td>0.406</td>
<td>0.437</td>
<td>---</td>
<td>0.001</td>
<td>-0.004</td>
<td>0.000</td>
</tr>
<tr>
<td>INNOV</td>
<td>-0.060</td>
<td>-0.272</td>
<td>-0.194</td>
<td>-0.314</td>
<td>-0.267</td>
<td>---</td>
<td>-0.014</td>
<td>0.003</td>
</tr>
<tr>
<td>AGE</td>
<td>0.062</td>
<td>0.104</td>
<td>0.033</td>
<td>0.004</td>
<td>0.105</td>
<td>-0.082</td>
<td>---</td>
<td>-0.006</td>
</tr>
<tr>
<td>MTB</td>
<td>0.383</td>
<td>0.195</td>
<td>0.388</td>
<td>0.068</td>
<td>0.188</td>
<td>0.040</td>
<td>0.006</td>
<td>---</td>
</tr>
</tbody>
</table>

Spearman is on the bottom left, Pearson is on top right.
Bold text indicates significance at the 0.1 level or better.

Variable definitions:

- **R** is the stock return over the twelve-month period to the fiscal year end.
- **E** is earnings per share before extraordinary items (annual Compustat data item 58) scaled by stock price.
- **Price** is the stock price of the firm at the end of the fiscal year.
- **BV** is book value per share of the firm at the end of the fiscal year.
- **Income** is earnings before extraordinary items (annual Compustat data item 58) scaled by market value of equity at the beginning of year **t**.
- **INNOV** is a dummy variable equal to one if the three year mean of research and development spending in years **t-3, t-2, and t-1** (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.
- **AGE** is the number of years since the initial public offering of the firm.
- **MTB** is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).
Table 9 Innovative Strategy and the Returns-Earnings Relationship from 1999 to 2010.

Panel A: Final sample, unmodified

\[ R_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 INNOV_{it} + \beta_3 E_{it} \cdot INNOV_{it} + \beta_4 AGE_{it} + \beta_5 MTB_{it} + \varepsilon_i \]  \hspace{1cm} (9)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.978 (1.89)*</td>
<td>0.990 (1.70)*</td>
</tr>
<tr>
<td>(E)</td>
<td>0.859 (4.33)**</td>
<td>0.859 (4.33)**</td>
</tr>
<tr>
<td>(INNOV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(E \cdot INNOV)</td>
<td>-1.020 (-4.69)**</td>
<td>-1.020 (-4.67)**</td>
</tr>
<tr>
<td>(AGE)</td>
<td>-0.029 (-1.10)</td>
<td>-0.030 (-1.06)</td>
</tr>
<tr>
<td>(MTB)</td>
<td>-0.002 (-0.59)</td>
<td>-0.002 (-0.59)</td>
</tr>
<tr>
<td># of observations</td>
<td>15,323</td>
<td>15,323</td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td>0.624</td>
<td>0.624</td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Variable definitions:

- \(R\) is the stock return over the twelve-month period to the fiscal year end.
- \(E\) is earnings per share before extraordinary items (annual Compustat data item 58) scaled by stock price.
- \(INNOV\) is a dummy variable equal to one if the three year mean of research and development spending in years \(t-3, t-2,\) and \(t-1\) (annual Compustat data item 46) scaled by total assets (annual Compustat data item CEQ).
- \(AGE\) is the number of years since the initial public offering of the firm.
- \(MTB\) is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).
Table 9 (continued) Innovative Strategy and the Returns-Earnings Relationship from 1999 to 2010.

Panel B: Final sample, winsorized at 1% and 99% levels

\[
R_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 INNOV_{it} + \beta_3 E_{it} \times INNOV_{it} + \beta_4 AGE_{it} + \beta_5 MTB_{it} + \epsilon_i \quad (9)
\]

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.072 (2.46)**</td>
<td>0.056 (1.85)*</td>
</tr>
<tr>
<td>(E)</td>
<td>-0.259 (-4.86)*****</td>
<td>-0.249 (-4.62)*****</td>
</tr>
<tr>
<td>(INNOV)</td>
<td></td>
<td>0.046 (1.82)*</td>
</tr>
<tr>
<td>(E \times \text{INNOV})</td>
<td>-0.028 (-4.67)*****</td>
<td>-0.028 (-4.69)*****</td>
</tr>
<tr>
<td>(AGE)</td>
<td>0.008 (4.62)*****</td>
<td>0.008 (4.77)*****</td>
</tr>
<tr>
<td>(MTB)</td>
<td>0.000 (4.40)*****</td>
<td>0.000 (4.31)*****</td>
</tr>
<tr>
<td># of observations</td>
<td>15,323</td>
<td>15,323</td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td>0.017</td>
<td>0.017</td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

1Continuous variables have been winsorized at the 1% and 99% levels to ensure results are not sensitive to extreme observations.

Variable definitions:
- \(R\) is the stock return over the twelve-month period to the fiscal year end.
- \(E\) is earnings per share before extraordinary items (annual Compustat data item 58) scaled by stock price.
- \(INNOV\) is a dummy variable equal to one if the three year mean of research and development spending in years \(t-3, t-2, \text{ and } t-1\) (annual Compustat data item 46) scaled by total assets (annual Compustat data item 3).
- \(AGE\) is the number of years since the initial public offering of the firm.
- \(MTB\) is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).
Table 9 (continued) Innovative Strategy and the Returns-Earnings Relationship from 1999 to 2010.

Panel C: Final sample, trimmed at 1% and 99% levels

\[ R_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 INNOV_{it} + \beta_3 E_{it} \times INNOV_{it} + \beta_4 AGE_{it} + \beta_5 MTB_{it} + \varepsilon_i \]  

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.059 (-2.40)**</td>
<td>-0.024 (-0.97)</td>
</tr>
<tr>
<td>E</td>
<td>0.100 (1.67)*</td>
<td>0.133 (2.19)**</td>
</tr>
<tr>
<td>INNOV</td>
<td></td>
<td>-0.115 (4.82)**</td>
</tr>
<tr>
<td>E*INNOV</td>
<td>-0.374 (-4.21)**</td>
<td>-0.541 (-5.34)**</td>
</tr>
<tr>
<td>AGE</td>
<td>0.005 (3.36)**</td>
<td>0.004 (2.82)**</td>
</tr>
<tr>
<td>MTB</td>
<td>0.040 (18.61)**</td>
<td>0.041 (18.93)**</td>
</tr>
<tr>
<td># of observations</td>
<td>13,944</td>
<td>13,944</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.060</td>
<td>0.062</td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

1 Continuous variables have been trimmed at the 1% and 99% levels.

Variable definitions:

- $R$ is the stock return over the twelve-month period to the fiscal year end.
- $E$ is earnings per share before extraordinary items (annual Compustat data item 58) scaled by stock price.
- INNOV is a dummy variable equal to one if the three year mean of research and development spending in years $t-3, t-2,$ and $t-1$ (annual Compustat data item 46) scaled by total assets (annual Compustat data item 146).
- AGE is the number of years since the initial public offering of the firm.
- MTB is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).

\[ R_{alt,t} = \beta_0 + \beta_1 E_{it} + \beta_2 INNOV_{it} + \beta_3 E_{it} \times INNOV_{it} + \beta_4 AGE_{it} + \beta_5 MTB_{it} + \epsilon_i \] (9b)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.127 (2.01)**</td>
<td>1.123 (1.96)**</td>
</tr>
<tr>
<td>( E )</td>
<td>1.196 (12.95)**</td>
<td>1.196 (12.95)**</td>
</tr>
<tr>
<td>( INNOV )</td>
<td></td>
<td>0.011 (0.02)</td>
</tr>
<tr>
<td>( E \times INNOV )</td>
<td>-2.799 (-1.76)*</td>
<td>-2.799 (-1.76)*</td>
</tr>
<tr>
<td>( AGE )</td>
<td>-0.040 (-1.24)</td>
<td>-0.040 (-1.22)</td>
</tr>
<tr>
<td>( MTB )</td>
<td>0.001 (2.00)**</td>
<td>0.001 (2.00)**</td>
</tr>
<tr>
<td># of observations</td>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.881</td>
<td>0.881</td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Variable definitions:

\( R_{alt,t} \) is the stock return over the twelve-month period extending from nine months prior to the fiscal year-end through three months following the fiscal year end.

\( E \) is earnings per share before extraordinary items (annual Compustat data item 58) scaled by stock price.

\( INNOV \) is a dummy variable equal to one if the three year mean of research and development spending in years \( t-3, t-2, \) and \( t-1 \) (annual Compustat data item 46) scaled by total assets (annual Compustat data item \( AGE \)) is the number of years since the initial public offering of the firm.

\( MTB \) is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).
Table 11  Innovative Strategy and the Relationship between Accounting Measures and the Market from 1999 to 2010.

Panel A: Final sample, unmodified

\[
\text{Price}_{it} = \beta_0 + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 INNOV_{it} + \beta_4 BV_{it} \cdot INNOV_{it} + \beta_5 E_{it} \cdot INNOV_{it} \\
+ \beta_6 E_{it} \cdot AGE_{it} + \beta_7 E_{it} \cdot MTB_{it} + \varepsilon_i
\]

(10)

Independent variables | Coefficient (t-statistic) | Coefficient (t-statistic) |
--- | --- | --- |
**Intercept** | 47.084 (5.78)*** | 54.107 (5.64)*** |
**BV** | 0.071 (8.23)*** | 0.071 (8.22)*** |
**E** | 0.983 (0.30) | 0.967 (0.30) |
**INNOV** | -25.15 | -25.15 |
**BV\cdot INNOV** | 2.936 (33.83)*** | 2.941 (33.86)*** |
**E\cdot INNOV** | -2.025 (-0.28) | -3.411 (-0.47) |
**E\cdot AGE** | -0.028 (-0.33) | -0.028 (-0.32) |
**E\cdot MTB** | 0.000 (0.01) | 0.000 (0.01) |
**# of observations** | 15,323 | 15,323 |
**Adjusted R²** | 0.077 | 0.077 |

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Variable definitions:

\text{Price} is the stock price of the firm at the end of the fiscal year.
\text{BV} is book value per share of the firm at the end of the fiscal year.
\text{E} is earnings per share before extraordinary items (annual Compustat data item 58) scaled by stock price.
\text{INNOV} is a dummy variable equal to one if the three year mean of research and development spending in years \(t-3, t-2,\) and \(t-1\) (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.
\text{AGE} is the number of years since the initial public offering of the firm.
\text{MTB} is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).
\( Price_{it} = \beta_0 + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 INNOV_{it} + \beta_4 BV_{it} \ast INNOV_{it} + \beta_5 E_{it} \ast INNOV_{it} + \beta_6 E_{it} \ast AGE_{it} + \beta_7 E_{it} \ast MTB_{it} + \epsilon_i \) (10)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>4.066 (10.36)**</td>
<td>2.868 (6.11)**</td>
</tr>
<tr>
<td>( BV )</td>
<td>2.412 (32.22)**</td>
<td>2.433 (32.15)**</td>
</tr>
<tr>
<td>( E )</td>
<td>2.318 (1.12)</td>
<td>2.468 (1.19)</td>
</tr>
<tr>
<td>( INNOV )</td>
<td></td>
<td>4.23 (6.22)**</td>
</tr>
<tr>
<td>( BV \ast INNOV )</td>
<td>0.015 (1.18)</td>
<td>0.013 (1.06)</td>
</tr>
<tr>
<td>( E \ast INNOV )</td>
<td>-1.543 (-1.44)</td>
<td>-1.378 (-1.27)</td>
</tr>
<tr>
<td>( E \ast AGE )</td>
<td>-0.470 (-0.52)</td>
<td>-0.440 (-0.37)</td>
</tr>
<tr>
<td>( E \ast MTB )</td>
<td>-0.120 (-2.72)**</td>
<td>-0.084 (-2.56)**</td>
</tr>
<tr>
<td># of observations</td>
<td>15,323</td>
<td>15,323</td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.462</td>
<td>0.465</td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

1Continuous variables have been winsorized at the 1% and 99% levels to ensure results are not sensitive to extreme observations.

Variable definitions:

- **Price** is the stock price of the firm at the end of the fiscal year.
- **BV** is book value per share of the firm at the end of the fiscal year.
- **E** is earnings per share before extraordinary items (annual Compustat data item 58) scaled by stock price.
- **INNOV** is a dummy variable equal to one if the three year mean of research and development spending in years \( t-3, t-2, \) and \( t-1 \) (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.
- **AGE** is the number of years since the initial public offering of the firm.
- **MTB** is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).
Table 11 (continued) Innovative Strategy and the Relationship between Accounting Measures and the Market from 1999 to 2010.

Panel C: Final sample, trimmed at 1% and 99% levels

\[
Price_{it} = \beta_0 + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 INNOV_{it} + \beta_4 BV_{it} \times INNOV_{it} + \beta_5 E_{it} \times INNOV_{it} \\
+ \beta_6 E_{it} \times AGE_{it} + \beta_7 E_{it} \times MTB_{it} + \varepsilon_i
\]  

(10)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Dependent variable: Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient (t-statistic)</td>
</tr>
<tr>
<td>Intercept</td>
<td>6.456</td>
</tr>
<tr>
<td></td>
<td>(21.99)***</td>
</tr>
<tr>
<td>BV</td>
<td>1.623</td>
</tr>
<tr>
<td></td>
<td>(26.93)***</td>
</tr>
<tr>
<td>E</td>
<td>6.871</td>
</tr>
<tr>
<td></td>
<td>(7.46)***</td>
</tr>
<tr>
<td>INNOV</td>
<td>-0.83</td>
</tr>
<tr>
<td>BV*INNOV</td>
<td>0.422</td>
</tr>
<tr>
<td></td>
<td>(2.82)***</td>
</tr>
<tr>
<td>E*INNOV</td>
<td>-4.983</td>
</tr>
<tr>
<td></td>
<td>(-6.20)***</td>
</tr>
<tr>
<td>E*AGE</td>
<td>0.113</td>
</tr>
<tr>
<td></td>
<td>(1.57)</td>
</tr>
<tr>
<td>E*MTB</td>
<td>-0.569</td>
</tr>
<tr>
<td></td>
<td>(-2.98)***</td>
</tr>
<tr>
<td># of observations</td>
<td>13,944</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.380</td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1 percent, 5 percent and 10 percent levels, respectively.

1 Continuous variables have been trimmed at the 1% and 99% levels.

Variable definitions:

Price is the stock price of the firm at the end of the fiscal year.
BV is book value per share of the firm at the end of the fiscal year.
E is earnings per share before extraordinary items (annual Compustat data item 58) scaled by stock price.
INNOV is a dummy variable equal to one if the three year mean of research and development spending in years t-3, t-2, and t-1 (annual Compustat data item 46) scaled by total assets (annual Compustat data item 6) is above the industry median; otherwise, it is equal to zero.
AGE is the number of years since the initial public offering of the firm.
MTB is the market value of the firm (Compustat data item MKVALT) divided by the book value of the firm (Compustat data item CEQ).
### Table 12 - Innovation Strategy Diagnostic Test Results Summary

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Largest VIF</th>
<th>Durbin-Watson</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qtr4</td>
<td>4.886</td>
<td>1.96</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>AbCFO</td>
<td>5.291</td>
<td>2.003</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>AbPROD</td>
<td>5.291</td>
<td>1.996</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>AbDISCEXP</td>
<td>5.291</td>
<td>2.041</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>ABSDA</td>
<td>5.291</td>
<td>1.998</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Positive DA</td>
<td>5.003</td>
<td>1.956</td>
<td>0.0156</td>
</tr>
<tr>
<td>Negative DA</td>
<td>5.817</td>
<td>2.003</td>
<td>0.5285</td>
</tr>
<tr>
<td>R</td>
<td>1.016</td>
<td>2.006</td>
<td>0.0961</td>
</tr>
<tr>
<td>R_alt</td>
<td>1.016</td>
<td>1.999</td>
<td>0.6985</td>
</tr>
<tr>
<td>Price</td>
<td>1.030</td>
<td>1.311</td>
<td>0.8104</td>
</tr>
</tbody>
</table>

For definitions of dependent variables, see Tables 3-11.

1 Variance inflation factor, Durbin-Watson test statistic and specification values are essentially equal for both net income and net loss samples.

Explanatory definitions:

* **Largest VIF** - Values represent the maximum variance inflation factor provided for all independent variables (excluding industry and annual dummies) in the indicated regression.

* **Durbin-Watson** - Values represent the Durbin-Watson test statistic $d$ to test that the autocorrelation is zero.

* **Specification** - Values represent the probability of the null hypothesis that errors are homoscedastic.