An investigation into the amounts and the properties of intangible investments reported in SG&A

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Abstract

We investigate the amounts and the properties of outlays reported in the selling, general, and administrative (SG&A) category of expenses that have the nature of intangible investments, but are not research and development (R&D) and advertising expenses. We propose a new method to distinguish such investments from the other outlays reported in the SG&A category that support or maintain current operations. We validate our method by showing that the investment outlays we identify are associated positively with future earnings growth and negatively with earnings quality. However, the maintenance outlays do not bear similar associations. These SG&A investments are economically important because they exceed R&D by three times on average and are the fastest growing category of U.S. firms' operating investments. Their risk-return tradeoffs lie between those of capital expenditures and R&D outlays.

Keywords: SG&A; Intangible investments; R&D; Organizational capital; Earnings quality; Risk-return tradeoffs; Fundamental analysis

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1. Introduction

An intangible investment is an outlay that lacks physical substance but is intended to produce a benefit in a future period (Corrado and Hulten 2010). In this study, we propose a new method to estimate the amount of intangible investments reported in the selling, general, and administrative (SG&A) category of expenses, other than those spent on research and development (R&D) and advertising activities. We examine what we call MainSG&A investments to determine whether their future benefits and the uncertainty of their future benefits differ from the similar properties of investments made in property, plant, and equipment [capital expenditures (CAPEX)], acquired intangibles, R&D, and advertising (Kothari et al. 2002; Shi 2003). Our study should interest researchers who examine earnings quality and estimate a firm's future performance and risk by analyzing financial statements (Ou and Penman 1989; Abarbanell and Bushee 1997; Ittner 2008; Lev 2008; Penman 2009).

Prior literature provides three reasons for examining MainSG&A investments (Lev and Radhakrishnan 2005; Corrado and Hulten 2010; Banker et al. 2011; Eisfeldt and Papanikolaou 2013; Falato et al. 2013). First, the aggregate intangible investments amounting to $ 1.2 trillion in the U.S. economy now exceed aggregate investments in tangible assets. Second, a majority of these investments are made in areas other than R&D and advertising (such as organizational competency, customer relations, computerized data and software, and human capital). Third, these investments are typically reported in the SG&A category of expenses. The need for a new measure arises because not all of the outlays reported in the SG&A category have an investment nature. Many of the SG&A outlays (SG&As) such as shop rents, customer delivery costs, and sales commissions merely support the current operations (Donelson et al. 2011; Matějka 2012). Realizing this possibility, Banker et al.

(2011) propose an innovative method to estimate the stock value of intangible capital. They add the remaining benefits from the past successful SG&As to obtain the current stock of successful managerial efforts. Their measure, however, presents an incomplete picture of ex ante risky investments, because it excludes the outlays that were intended to, but did not, produce future benefits. Using only successful investments would annul any inquiry into the initial riskiness of operating investments. Furthermore, their measure includes past R&D and advertising outlays and, hence, cannot be used to compare the properties of MainSG&A investments with those of R&D and advertising outlays.

We propose a new method to distinguish the investment component of MainSG&As from its maintenance component. We first subtract R&D and advertising outlays from SG&A because Compustat includes them in the SG&A category even when they are separately reported. We divide the remaining SG&As (that is, MainSG&As) into maintenance and investment outlays based on the argument that firms rationally invest each outlay to produce either a current or a future benefit (Fisher 1930; Dichev and Tang 2008; Banker et al. 2011). We add structure to this idea by categorizing MainSG&As matched with current revenues, in a regression estimated by industry and year, as maintenance outlays (Dichev and Tang 2008). This approach is similar to prior studies that estimate the predicted value of a variable using its economic determinants (e.g., Jones 1991; Core et al. 1999; Dechow and Dichev 2002; Kothari, Leone, and Wasley 2005; Roychowdhury 2006; Banker et al. 2011). We include a dummy variable in our estimating regression representing a decline in sales to control for sticky SG&A costs (Anderson et al. 2003). We also include a dummy variable to account for losses that often precede significant corporate events (Pinnuck and Lillis 2007). Exclusion of these dummy variables from the regressions makes no significant difference to our main conclusions.

We treat MainSG&As that do not produce current benefits as outlays that were rationally advanced in expectation of future benefits (Dichev and Tang 2008). These outlays should not include outlays that were spent on unused physical assets (such as the head office buildings, warehouses, computers, and delivery trucks) because they are capitalized and reported in the asset accounts. These outlays also should not include one-off special items, such as impairment expenses and restructuring charges, because they are included in the other expense category. In summary, these outlays lack physical substance, are not R&D and advertising, and are immediately expensed, but they were likely advanced in expectation of future benefits. Hence, they should represent the risky, intangible investment component of MainSG&As.[1]

We admit that, similar to many empirical proxies in the literature that are obtained using a regression approach, our measure is not without limitations. For example, the measure provides an estimate of the dollar amounts of investments but does not pinpoint the activities that entail these outlays.[2] But the same criticism applies to CAPEX (that includes land, building, and equipment), R&D [which includes both research and development outlays that have different economic properties (Amir et al. 2007)], the total SG&A measure, and the stock SG&A measure (Banker et al. 2011), widely examined in literature. Also, our measure might include bad investments that in the end produce no benefits. But, an ex-post bad investment merely shows the negative outcome of an ex-ante risky decision. Further, our measure might include managers' discretionary expenditures to build empires and large head offices (Chen et al. 2012). The total SG&A measure suffers from the same limitation. Yet, dividing MainSG&As into maintenance and investment categories might have

[1] Thus, our method differs from Banker et al. (2011) in one principal respect when separating the maintenance and the investment components of SG&As. They directly identify past successful investments. We first identify maintenance components and treat the remaining outlays as risky investments.
[2] For example, Proctor and Gamble reported SG&A expenses of $26.42 billion for the fiscal year 2012 but provided no details other than the R&D and the advertising expenses.

no merit. Also, the maintenance outlays might produce benefits in both current and future periods. In that case, both maintenance and investment categories should be equally associated with future revenues.

Despite these concerns, we find that the investment component of MainSG&A is strongly and positively associated with future earnings growth, but not the maintenance component. The maintenance category contributes 61% to MainSG&As, on average, indicating that most of the MainSG&As support current, not future operations. This finding suggests that using MainSG&A as a proxy for investments might lead to erroneous conclusions for firms with large maintenance components. Consistent with this idea, we find that MainSG&As bear no significantly correlation with future earnings growth for firms with a high proportion of maintenance outlays. We find opposite results for firms with a high proportion of investment outlays. Thus, our measure appears to be a distinctive improvement over the total SG&A measure. We also find that the proportion of investment MainSG&As in SG&A differs systematically across industries and it has increased over time. These findings cast doubts on the practice of treating a constant, ad hoc percentage of SG&A as investment outlays for all firms and years [e.g., two-thirds (Eisfeldt and Papanikolaou 2013; Falato et al. 2013)].

Srivastava (2014) finds dramatic decline in U.S. firms' reporting quality over time and attributes this trend to increasing SG&As and the negative association between SG&A and earnings quality. We reexamine this finding by separately examining the maintenance and investment components of MainSG&As. Consistent with Srivastava (2014), we measure earnings quality by earnings volatility (Dichev and Tang 2009), matching [association between revenues and current expenses (Dichev and Tang 2008)], and relevance [association between contemporaneous stock returns and earnings (Easton and Harris, 1991; Lev and Zarowin, 1999)]. All three measures of earnings quality are negatively associated with investment MainSG&As but are positively associated with maintenance MainSGAs. In addition, the investment (maintenance) components of MainSG&As are positively (negatively) correlated with special items, which are associated with lower earnings quality (Donelson et al. 2011; Givoly and Hayn 2000). Because special items often represent ex-post write-offs or restructuring charges related to bad projects (Donelson et al. 2011), our findings indicate that firms are more likely to go wrong with projects involving investment MainSG&As than with projects principally requiring maintenance MainSG&As.

We compare the amounts of investment MainSG&As with the amounts of the other operating investments, namely, CAPEX, advertising, R&D, and acquired intangibles. We deflate all variables by total assets. We find that CAPEX is the largest category of the operating investments, but it has declined over the past 40 years, as have advertising expenses and maintenance MainSG&As. In contrast, R&D, investment MainSG&As, and acquired intangibles have increased. Advertising is a relatively small category, and most firms report no advertising expenses (Lev and Sougiannis (1996). Investment MainSG&As exceeds R&D by three times on average and are the fastest growing category of the operating investments. This result is consistent with Corrado et al. (2005), who estimate the total intangible investments in the U.S. economy at approximately three times higher than just the innovation outlays. We also find that the sum total of intangible investments exceeds CAPEX beginning from the late 1990s. Our results suggest that an inquiry into intangible investments is incomplete without considering the investment MainSG&As.

We examine whether the future benefits and the uncertainty of future benefits of investment MainSG&As differ from those of the other operating investments (Sougiannis 1994; Lev and Sougiannis 1996; Kothari et al. 2002). There are several reasons to expect such differences. Based on the prior literature, we expect the benefits from CAPEX to be highly certain. The output from advertising should be less certain but short-lived. The output from R&D should be most uncertain. But when successful, R&D should produce the greatest benefits over long horizons. This is because successful R&D leads to knowhow, which unlike physical assets, does not erode with use, is typically protected by patents, and can be simultaneously applied to multiple economic activities (Romer 1986; Lev 2001). This concept, in conjunction with the high fixed but low variable costs associated with intangible-intensive products, should result in the greatest operating leverage, potential profitability, and risks (Kaplan et al. 1990; Novy Marx 2011, 2013).

Nevertheless, the future benefits and the uncertainty of future benefits of investment MainSG&As, such as in reputational and relational capital, proprietary management and logistics systems, strategy and organizational competency, and manpower recruitment and training, remains empirically unexamined. On one hand, the benefits from these activities should be more certain than for R&D. On the other hand, to the extent that these investments create organizational knowledge that can be lost or pared with employee mobility, the benefits from these investments should be more transitory than R&D (Romer 1986; Jovanovic and Nyarko 1995; Bloom et al. 2013).

First, we examine whether the association of investments with future earnings growth differs for the different categories of intangible investments. We follow Sougiannis (1994) and Lev and Sougiannis (1996) who find a strong association between R&D and future earnings growth. We measure future earnings growth by the difference between the next three years' average of earnings and the current year's level. We use an additional measure of Tobin's q which represents the ratio of firms' market value (inclusive of growth options) compared with the value of assets-in-place (Hayashi 1982). We find that, all else held equal, R&D is positively associated with future earnings growth, more strongly than for investment MainSG&As, which in turn, are more strongly associated with future earnings growth than are advertising and CAPEX.

Second, we examine whether the association of investment MainSG&A with the uncertainty of future earnings differs from similar associations for the other operating investments. Arguably, this test distinguishes between the risks of different types of operating investments. We measure the uncertainty of future earnings by the standard deviation of the current and the next three years' earnings (Kothari et al. 2002). We use an additional measure of the stock-return volatility that cannot be explained by multi-factor models (Pástor and Veronesi 2003; Zhang 2010). We find that, all else being equal, R&D has the highest uncertainty of future benefits followed by investment MainSG&As, advertising, and capital expenditures.

We contribute to the progress in literature by proposing a new method to estimate the initial, risky component of intangible investments reported in SG&As, other than R&D and advertising expenses. We show that the investment outlays we identify are associated positively with future earnings growth and negatively with earnings quality, but not the remaining outlays, establishing the validity of our method. Furthermore, the investment component in SG&As varies widely across industries and years. Our method is far from perfect, but it is a distinct improvement over the three alternatives of altogether ignoring SG&As, using total SG&As, or using an ad hoc, uniform fraction of SG&As as a proxy for investments in all industries and years. We appeal to Corrado et al. (2006), who call for improved methods for estimating intangible investments, and to British economist John Maynard Keynes, who said, "It is better to be roughly right than precisely wrong." Using our method, we show that investment MainSG&As constitute not only an important category, but are also the fastest growing category, of operating investments. Our findings clearly suggest that an enquiry into intangible investments is incomplete without considering the investment MainSG&As.

Our study should interest investors and researchers who examine earnings quality or estimate a firm's future performance and risk by analyzing financial statements (Ou and Penman 1989;

Penman 2009). We extend studies that examine the risk-return tradeoffs and mean-variance effects of R&D and capex (Kothari et al. 2002; Shi 2003) by showing that in most respects, the properties of investment MainSG&As differ from those of R&D and CAPEX, although they lie somewhere between these outlays. Prior studies reason that intangible investments increase a firm's operating leverage causing both higher future benefits and higher uncertainty of future benefits (Romer 1986; Novy Marx 2011). We find results consistent with the idea that the operating leverage-enhancing effects are greater for investments made in patent-protected innovations than in organizational knowledge whose benefits can be pared with employee mobility. We also extend Srivastava (2014) by showing that that the negative association between SG&A and earnings quality arises from the investment component of SG&A, not from the maintenance component.

Further, given the growing importance of the investments that are reported in the SG&As, our study underscores the importance of a renewed look at their disclosures. Our results indicate that because the uncertainty of benefits from investment MainSG&As lies in between those of other investments, and investments such as advertising, R&D, acquired intangibles, and CAPEX are separately disclosed, there is little reason that MainSG&A should not also be separately disclosed (Garten 2001; Lev 2008). Arguably, given the increasing importance of MainSG&A investments, the financial statements would be more informative to investors if these investments were separately reported instead of being included with the maintenance components (Morricone and Oriani 2009; Merkley 2013).[3]

The rest of the paper is organized as follows. Section 2 is a summary of the literature that motivates the hypotheses. In Section 3, we describe the measurement of the variables. In Section

[3] Garten (2001) discusses the proprietary costs, the potential litigation, and the need for an innovative format for disclosures related to intangible investments. Lev (2008) offers the three categories of brand development, information technology, and human resources.

4, we present results of the correlational and the validity tests. Section 4 presents the tests of the hypothesis, and Section 5 concludes the study.

2. Prior studies and the motivation for the hypotheses

In this section, we discuss prior literature and motivate the hypotheses.

2.1. Intangible investments

Intangible investments create assets that lack a physical substance but are likely to produce future benefits. Corrado et al. (2005) categorize intangible investments into three groups: computerized information (computer programs and computerized databases), innovation (scientific R&D and nonscientific discovery and development), and economic competencies (knowledge embedded in firm-specific human and structural resources, such as brand names). Lev (2001) uses a similar three-category classification: innovation-related, human resources, and organizational competencies.

In addition to physical substance, other important economic distinctions exist between tangible and intangible investments. First, tangible assets such as land, buildings, and equipment are typically standardized and have alternative uses to other firms. Thus, they are typically separable and sellable on a standalone basis if the original venture fails. In contrast, intangible assets are specific to their context. Hence, they command smaller secondary market values than CAPEX if the original venture fails (Webster 1999). Second, while firms possess control rights over most tangible assets, they often lack control rights over intangible assets, such as organizational strategy and employees' knowledge (Cockburn and Griliches 1988). Third, tangible assets can be used only in one place at a time. In contrast, intangible assets often represent the "non-rival" goods of production (Romer 1985; Jones and Romer 2010) because they can be used simultaneously in multiple places to produce multiple revenue streams (e.g., process know-how or brands). Fourth, except for land, tangible assets erode with use. However, intangible assets might get impaired with time but do not erode with use. Thus, intangible investments usually have a high fixed and low variable cost nature and can produce large growth if successful (Kaplan et al. 1990; Baumol and Swanson 2003).

At least four factors explain why an inquiry into the firms' intangible investments should interest finance and accounting researchers. First, a stream of organization and strategy literature propounds the capability-based or resource-based view of the firm (Dosi et al. 2000; Barney 2001). Based on this view, a firm's sustainable profitability is determined by its intangible investments (Lippman and Rumelt 1982). Second, holding the total investments constant, the amount and the uncertainty of benefits from intangible investments determine the amount of securitizable assets available to a firm's lenders and the likelihood of the firm's bankruptcy. As a result, the proportion of intangible investments in a firm's production function likely determines its borrowing capacity and capital structure (Frank and Goyal 2008). Third, compared with material-intensive firms that are characterized by assets-in-place, intangible-intensive firms are characterized by growth options whose values cannot be fully captured in financial statements (Smith and Watts 1992; Rowchowdhury and Watts 2007; Skinner 2008). Thus, the accounting treatment of intangible investments, particularly their capitalization versus expensing, affects a firm's reported earnings and assets as well as the attributes of its financial reporting (Lev and Sougiannis 1996; Dichev and Tang 2008; Srivastava 2014). Fourth, intangible investments affect analysts' coverage and the contribution they make to a firm's informational environment (Barth et al. 2001; Amir et al. 2003).

2.1.1. The increasing importance of intangible investments

Apte et al. (2008, p. 15) divide the US economy into two distinct domains. The first is the material domain "involved in the transformation of matter and energy from one form into another."

The second is the knowledge domain involved "in transforming information from one pattern into another." Apte et al. (2008) show that the share of U.S. gross domestic product (GDP) in the material domain declined from 71% in 1958 to 37% in 1997. Correspondingly, the economic share of the knowledge domain increased. Further, Corrado et al. (2005) measure U.S. firms' aggregate intangible investments using a macro-level input-output function. They find that the intangible investments of U.S. firms in 2000 amounted to $1.2 trillion: $155 billion for computerized information, $425 billion for innovation, and $640 billion for economic competencies. These investments constituted 13% of the US GDP in that year. Their findings also indicate that the intangible investments in avenues other than innovation significantly exceed innovation outlays.

2.2. Different proxies of intangible investments

For the reasons discussed in Subsection 2.1, an investigation into the amounts and the trends of intangible investments, and the effects of these investments on the growth and the uncertainty of future earnings should interest investors and financial accounting researchers (Penman 2009). A vast body of literature examines R&D.[4] But R&D as defined in Statement of Financial Accounting Standard (SFAS) No. 2 [Financial Accounting Standards Board (FASB) 1974] represents just a narrow subset of activities that firms perform to build intangible capital.[5] Thus, an inquiry into intangible investments is likely to be incomplete without considering

[4] For example, the literature shows that R&D has increased across time (Brown et al. 2009) and that it is value relevant because it is associated with market value and future earnings (Sougiannis 1994). The literature also shows that R&D has higher uncertainty of future benefits than the Capex (Kothari et al. 2002); increases the heterogeneity of factors that reduce the "commonality" of earnings (Brown and Kimbrough 2011); affects the analysts' costs, incentives, and efforts to cover firms (Barth et al. 2001); and increases the contributions that analysts make to improve a firm's informational environment (Amir et al. 2003).

[5] As defined by the FASB (1074), research is "planned search or critical investigation aimed at discovery of new knowledge with the hope that such knowledge will be useful in developing a new product or service (hereinafter 'product') or a new process or technique (hereinafter 'process') or in bringing about a significant improvement to an existing product or process." Development is "the translation of research findings or other knowledge into a plan or design for a new product or process or for a significant improvement to an existing product or process whether intended for sale or use. It includes the conceptual formulation, design, and testing of product alternatives, construction of prototypes, and operation of pilot plants."

intangible investments other than R&D. However, the other in-house intangible investments are not easy to determine because they are not separately reported in the firms' financial statements. The literature overcomes this limitation by indirectly measuring these investments. For example, Simon and Sullivan (1993) and Mizik and Jacobsen (2003) estimate brand value by capitalizing advertising outlays. Nevertheless, the benefits of advertising outlays are short lived and most firms do not report any advertising expenses. Other studies examine the narrow categories of information technology (IT) expenditures using proprietary databases (e.g., Bharadwaj et al. 1999).

Other studies use expenses reported in the SG&A category as a proxy for investments (e.g., Lev and Radhakrishnan 2005; Eisfeldt and Papanikolaou 2013). However, not all of the SG&A expenses have an investment nature. Many of the SG&A outlays such as head office rents, customer delivery costs, and sales commissions support current operations and are not intended to produce future benefits (Donelson et al. 2011; Matějka 2012). Realizing this limitation, Banker et al. (2011) estimate a stock value of total intangible capital from the past successful SG&A expenses. Their ex-post measure, however, cannot be used as a proxy for initial, risky, periodic flows of SG&A investments, because it excludes SG&A outlays that were intended to produce future benefits but did not produce benefits in the end. Furthermore, this measure includes R&D and advertising outlays. Accordingly, we propose a new method to estimate the initial amount of investments reported in the SG&A category, other than R&D and advertising.

2.3. Motivation for H1: The relative future benefits of different types of operating investments

Sougiannis (1994) and Lev and Sougiannis (1996) show that R&D has an investment nature because it is positively associated with the future earnings.[6] Further, Ittner and Larcker (1998), Brynjolfsson and Hitt (2000), and the studies that use the comprehensive SG&A outlays

[6] Lev and Sougiannis (1996) also examine advertising expenses. They find that advertising expenses form a very small component of firms' NRD investments and their benefits are short lived.

as a proxy for intangible investments conclude that the intangible investments create future benefits. Not many studies, however, distinguish SG&As from other investments or examine whether the association of investment MainSG&As with the future benefits differs from those of the R&D, advertising, or the capex outlays. Some of the reasons for expecting such differences are discussed in Subsection 2.1. Additional reasons are as follows. To a large extent, CAPEX is spent on assets that produce well-established products or makes up for the annual depreciation of property, plant, and equipment. Hence, it should have the most certain benefits. However, physical assets (except land) erode with use and can be used for only one activity at a place and time. In contrast, R&D has the least certain benefits, but, when successful, it might produce the highest benefits over the long horizons because of its scalability, patent protection, and non-erosive properties (Romer 1986). The output from advertising is relatively certain but not long-lived.

However, the relative benefits of investments reported in the SG&A category, such as in reputational and relational capital, proprietary management and logistics systems, strategy and organizational competency, and human capital, in most respects remain largely empirically unexamined. On one hand, to the extent that these investments are successful and produce knowledge and relationships, which can be leveraged to produce and support multiple revenue streams without erosion or excludability (Romer 1986), they should produce more benefits over long horizons than do physical investments. On the other hand, to the extent that organizational knowledge or competencies can be lost, and their competitive advantages can be pared, with the mobility of labor (Jovanovic and Nyarko 1995), their long-term benefits should be lower than R&D whose benefits are typocally protected by patents.

We examine the relative future benefits of investment MainSG&As by using Tobin's q and the increases in the future earnings as proxies for the future benefits:

H1: All else being equal, the future benefits of the MainSG&A investments differs from those of the R&D, advertising, and CAPEX outlays.

2.4. Motivation for H2: The relative risks of the three types of operating investments

A majority of the R&D outlays are expensed as incurred, but CAPEX is capitalized and reported as assets. Kothari et al. (2002) cite paragraphs 49 and 50 of SFAS No. 2 to summarize the FASB's rationale for an immediate expensing of the R&D outlays: "[T]here is often a high degree of uncertainty about whether research and development expenditures will provide any future benefits." Kothari et al. (2002) test this claim by estimating the marginal effects of CAPEX and R&D outlays on the uncertainty of future earnings (in this study, also referred to as risks). As they expected, they find that the uncertainty of the future benefits from R&D is significantly higher than that of CAPEX.

The uncertainty of future benefits of an investment is a result of two effects (Hayek 1945). The first is that the investment might not produce an output. Second, the output from the investment might not get sold. Consequently, the risks of R&D and CAPEX outlays likely differ for the following reasons. The likelihood of a successful output being produced from an R&D activity is typically lower than the likelihood of output from CAPEX. Further, the products that result from R&D investments are typically novel and unique. As such, the demand for these new products is likely to more uncertain than for the established products. Further, if the venture fails, then at least part of CAPEX can be salvaged in the secondary market because physical assets have alternative uses to other firms. In contrast, an R&D investment has little recovery value if it is unsuccessful, R&D knowledge is context specific, and R&D knowledge becomes obsolete because of technological developments. As expected, prior studies find that the uncertainty of future benefits from R&D is higher than that of CAPEX (Kothari et al. 2002; Shi 2003).

To our knowledge, no prior study has systematically examined whether the uncertainty of future benefits from the MainSG&A investments is similar to, or different from, the uncertainty of future benefits from CAPEX or R&D outlays.[7] Plausibly, the uncertainty of the MainSG&A investments differs from the other two types of operating investments for the following reasons. Firms typically invest in the hiring and training of sales and marketing employees, brand development, company websites, and logistics and expert information systems only after they have developed the products, installed the PP&E, and are ready to offer their goods and services to customers. Consequently, firms usually make their MainSG&A investments relatively closer to sales transactions when they can more reliably predict the product demand. Moreover, firms make discretionary investments, such as investing in customer relationships, hiring high-profile managers, and installing enterprise resource planning systems only after their products find initial success. Thus, for the reasons of demand uncertainty, the MainSG&A investments could be less risky than the R&D outlays.

Nevertheless, the benefits from the investment MainSG&As are likely to be more uncertain than the outputs from the standardized plant and machinery that typically come with elaborate performance guarantees. Further, in contrast to CAPEX that commands significant secondary market values, the SG&A investments are likely to be context specific with little utility to an external buyer if the venture fails. Also, to the extent that SG&A investments result in knowledge residing with employees, the value of those investments can be easily lost with the mobility of labor.

[7] Kothari et al. (2002) examine advertising expenses in addition to R&D.

Whether the uncertainty of future benefits from SG&A intangible investments is different than those of CAPEX or R&D outlays remains an empirical question. We examine this question in the following hypothesis:

H2: All else being equal, the uncertainty of future benefits of MainSG&A investments differs from those of CAPEX or R&D outlays.

3. Measurement of variables

In this section, we describe the measurement of the key variables Consistent with Srivastava (2014), we use 132,504 firm-year observations from 1970 to 2009. Each observation requires data on assets, revenues, and earnings for the current year and the next three years; the share price data for the current year, and the asset data for the prior year. Thus, to examine the observations over a 40-year period from 1970 to 2009, we use data from Compustat for 1969 to 2012. We exclude all finance firms, because the traditional cost classifications of core costs into costs of goods sold (COGS) and SG&A do not apply to finance firms. In addition, we exclude the category of the "almost nothing" industry, as interpreting its results in an industry context is difficult.

3.1. The flow versus the stock measures of intangible investments

Many prior studies use a perpetual inventory method to examine intangible investments (e.g., Brown and Kimbrough 2011). This method relies on a running total of the investments made in the past three to five years, and this total is reduced each year by assuming a straight-line amortization. This method is particularly useful for measuring the stock value of investments, particularly those that were successful and remain useful. It requires assumptions about the proportion of investment outlays in total outlays, the useful lives of operating investments, as well as their amortization schedules.

Our study differs from studies that examine the stock values of past successful investments because we consider the amounts and the properties of initial, risky investments that in the end may or may not produce future benefits. Our study is agnostic about the length of the period over which these investment produce benefits and the likelihood of their success—these assumptions are necessary for implementing a perpetual inventory model. Making ex-ante assumptions about the risks and the future benefits of an investment would annul the inquiry in this study.

3.2. Measurement of the investment component of MainSG&As

We define the intangible investment component of MainSG&As as the outlays that are not R&D or advertising, do not create physical assets, and are intended to produce future benefits but are immediately expensed and reported in the SG&A category of expenses.[8]

We first subtract R&D and advertising expenses from SG&A because Compustat includes them in the SG&A category even when they are separately reported. We divide the remaining MainSG&As into two categories based on the argument that firms rationally invest each outlay to produce benefits in either a current or a future period (Fisher 1930; Dichev and Tang 2008). We define maintenance outlays as those that support current operations and expect them to vary proportionately with current revenues (Dichev and Tang 2008; Donelson et al. 2011). We estimate these outlays similar to studies that measure the predicted value of an economic variable by estimating an industry regression (e.g., Jones 1991; Core et al. 1999; Roychowdhury 2006; Banker et al. 2011). We estimate the following parsimonious regression by industry and year:

$$MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}, \quad (1)$$

[8] This category does not include the depreciation expense for the assets related to the SG&A activities, which is included in the Compustat data item DP. This category also does not include the impairment expenses or the special items that are reported in other cost categories (Compustat data item SI).

where i = firm, *Ind* = Industry, and t = year. *MainSG&As* and the *Revenues* (Compustat SALES) are deflated by the average of the beginning and the ending total assets for the year (Compustat AT). The industry is defined by using the Fama and French 48-industry classification (Fama and French, 1997). We control for the stickiness of MainSG&As by adding a dummy variable (*Dummy_Revenue_Decrease*) that takes the value of one if the revenues decline during the year and zero otherwise (Anderson et al. 2003). We include a dummy variable for accounting loss (*Dummy_Loss*) in the regression, because losses often accompany significant corporate events (Pinnuck and Lillis 2007). We do not add past revenues to this equation because the U.S. Generally Accepted Accounting Principles (GAAP) do not permit the recognition of expenses after the recognition of corresponding revenues. Consistent with this idea, Dichev and Tang (2008, p. 1,437) find that the association between expenses and past revenues is economically insignificant. Nevertheless, the addition of past revenues in the above equation makes no difference to the conclusion of this study (results not tabulated).

The sole aim of equation (1) is to identify the portion of MainSG&As that is associated with current revenues (Dichev and Tang 2008). Accordingly, we measure the maintenance *MainSG&As* with the following equation:

$$Mainten\widehat{anceM}ainSG\&As_{i,t} = \hat{\beta}_{1,Ind,t} \times Revenues_{i,t} \tag{2}$$

This category is also interpretable in another way. If the firms were allowed to capitalize all of the MainSG&As and then report them as expenses matched with current revenues, then this category represents the outlays that were both incurred and expensed in the same year (Ohlson 2006).

We do not add *Dummy_Revenue_Decrease* to equation (2) to allow for the possibility that the stickiness of the SG&A expenses partially results from the investments reported in the SG&A category that do not fluctuate with current revenues but are essential for a firm's long-term performance (Lippman and Rumelt 1982; Mizik and Jacobson 2003). We also do not add *Dummy_Loss* to equation (2) to allow for the possibility that firms often change their cost patterns following losses with an aim to produce higher future earnings. In any case, the exclusion of these two terms from equation (1) or their inclusion in equation (2) makes no significant differences to the conclusions of the study (results not tabulated).

Further, we do not add the intercept to equation (2) to allow for the possibility that the firms spend relatively constant intangible outlays, such as IT expenditures, which do not produce immediate benefits, and thus, do not vary with current revenues, but they are required for firm's competitiveness, survival, and long-term profitability. In fact, intercept is a good approximation of an industry's average MainSG&As that are unrelated to current revenues, and it likely represents the average investment MainSG&A in that industry, an amount we use for our industry-based tests.

We measure the investment category of the MainSG&As by subtracting the maintenance category from the reported MainSG&As as follows:

$$Inves\widehat{tment}\&As_{i,t} = MainSG\&As_{i,t} - Maintenan\widehat{ceM}ainSG\&As_{i,t} \quad (3)$$

Equation (3) might include outlays that do not represent investments, For example, the chief executive officer's empire-building costs, the fixed costs of doing business that are included in the intercept, and the sticky costs. The inclusion of such outlays should bias against our finding an association between our measure and future benefits. However, the total SG&A measure used widely in the literature should also suffer from the same limitation. Further, our measure might not be an improvement over the total-SG&A measure used by prior studies, dividing the MainSG&As into their investment and maintenance components might have no merit, and the maintenance component might produce benefits in both current and future periods. In that case, both investment and maintenance categories we identify should be equally associated or unassociated with future benefits. In addition, the measured investment component for a particular firm-year might be negative. Yet, we retain the observations with negative amounts to potentially represent a firm's underinvestment in that year given the investment levels predicted by industry models. The exclusion of observations with negative amounts makes no significant difference to the main conclusions of this study.

3.3. Measurement of other operating investments

We measure CAPEX, advertising, and R&D outlays by their raw initial values; that is, by the CAPEX, XAD, and XRD data items in Compustat, respectively. The US GAAP allows the capitalization of a few select intangible investments, mainly representing the purchased intangibles.[9] We measure this category by adding the amortization expense to the changes in the capitalized intangible asset account.[10]

3.4. Future benefits

We use two proxies for the future benefits. The first proxy is the increase in the average of the next three years' earnings (Compustat IB scaled by average of the beginning and ending total assets during the year) from the current year. We use a future period of three years to be consistent

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[9] The US GAAP allows the capitalization of purchased intangibles and certain in-house intangible investments. For example, firms are allowed to capitalize legal expenses related to patent filing. Securities and Exchange Commission Rule 4-10(c) of Regulation S-X (1975) permits oil and gas firms to capitalize exploration costs under "full cost accounting." The Statement of Position (SOP) 00-2 [American Institute of Certified Public Accountants (AICPA) 2000] permits the producers of motion pictures to capitalize the costs of producing a film and bringing that film to market. The SFAS No. 50 (FASB 1981) permits music firms to capitalize the costs of recording and advance royalties paid to artists. And SFAS No. 86 (AICPA 1985) permits firms to capitalize the costs of creating software after its technological feasibility has been established.

[10] We use the following formula: [Capitalized Intangible $\text{Assets}_{\text{End of year},t}$(Compustat INTAN and INTANO) – Capitalized Intangible $\text{Assets}_{\text{End of year},t-1}$ + Amortization_t(Compustat AM)] – [$\text{Goodwill}_{\text{End of year},t}$(Compustat GDWL) − $\text{Goodwill}_{\text{End of year},t-1}$ + Goodwill Amortization_t(Compustat GDWLAM)]. We replace all negative or missing values with zero. We exclude goodwill from the analysis because it is not clear what asset class it represents. The inclusion of goodwill makes no significant differences to the conclusions of this study.

with the measurement of the uncertainty of future benefits described in the next subsection.[11] We find similar results using the average of next three years' cash flow from operations [earnings – accruals (formula described in the Appendix) scaled by average total assets; results not tabulated]. This measure should not be affected by the accounting treatment of intangible investments. The second proxy is Tobin's q, which increases with the market's expectation of future benefits from current investments.[12]

3.5. The uncertainty of future benefits

We use two proxies for the uncertainty of future benefits. The first is the standard deviation of earnings (Compustat IB, deflated by total assets) measured over a four-year period (the current year and the next three years). This measurement is consistent with Kothari et al. (2002). The second is idiosyncratic stock return volatility (*IV*), representing the stock return volatility that cannot be explained by multi-factor models. This is a market-based measure of investors' uncertainty about future firm-specific performance (Zhang 2010). To calculate it, we first estimate the Fama and French three-factor model (Fama and French 1993) for each firm-month using the daily stock price data from the Center for Research in Security Prices (Ang et al. 2006):

$$R_{d,m,t,i} = \alpha_{i,m,t} + \beta_{1,i,m,t} \times (Rm_{d,m,t} - Rf_{d,m,t}) + \beta_{2,i,m,t} \times SMB_{d,m,t} + \beta_{3,i,m,t} \times HML_{d,m,t} + \varepsilon_{d,m,t,i}\,. \qquad (4)$$

The above variables are defined in the Appendix. We calculate the idiosyncratic volatility using the residuals from equation (4) for each of the firm-months.

$$IV_{m,t,i} = Variance\,(\varepsilon_{d,m,t,i})\,. \qquad (5)$$

[11] Earnings (Compustat IB) are scaled by the average total assets. This measurement describes the need for five years of time-series data for each firm-year observation. We need earnings data from the current year and the next three years. In addition, we need the asset data in the year before the prior year, the current year, and the next three years to calculate the average assets for scaling purposes.
[12] Measured as [Market value of equity (Price {PRCC_F} × Number of shares outstanding {CSHO}) + Total Liabilities (Total Assets – Shareholder Equity {CEQ})] / Total Assets.

Next, we average the 12 monthly volatilities to obtain a measure of the idiosyncratic volatility.

3.6. Measures of earnings quality

We use earnings volatility, relevance, and matching as measures of earnings consistent with Srivastava (2014). The measurement of earnings volatility is defined in Subsection 3.5. In addition, consistent with Easton and Harris (1991, Table 3, p. 31), we estimate the following regression on an annual cross-sectional basis for each industry-year:

$$Ret_{i,t} = \beta_{1,t} + \beta_{2,t} \times \Delta Earnings_{i,t} + \beta_{3,t} \times Earnings_{i,t} + \varepsilon_{i,t} \quad (6)$$

The variables are defined in the Appendix. We measure the "relevance" of earnings by the adjusted R-square of equation (6).

We measure matching by estimating equation (7) on an annual cross-sectional basis for each industry-year (Dichev and Tang 2008).

$$Revenues_{i,t} = \beta_{1,t} + \beta_{2,t} \times TotalExpenses_{i,t-1} + \beta_{3,t} \times TotalExpenses_{i,t} + \beta_{4,t} \times TotalExpenses_{i,t+1} + \varepsilon_{i,t} \quad (7)$$

Matching is measured by the regression coefficient on the contemporaneous expenses (β_3).

4. Industry parameters, time-series trends, and correlational tests

In this section, we provide the descriptive statistics of variables calculated using methods described in Section 3. We conduct correlational tests using industry parameters. We also validate our measure of investment MainSG&As.

4.1. Estimating equation (1) and results by industry

We estimate equation (1) by industry and year. We then calculate the average of the estimated regression parameters by industry and present them along with their statistical significance (Fama and MacBeth 1973) in Table 1. We find that the intercept is economically significant and positive for most industries. This result indicates that in most industries, firms spend at least some constant amounts of MainSG&As that do not fluctuate with revenues (for example, IT). The coefficient on revenues is significant and positive in almost all industries (38 out of 43). This result is consistent with the idea that MainSG&As are highly correlated with current revenues and a large portion of MainSG&As supports current operations. (Results discussed later confirm this idea). The coefficient on *Dummy_Loss* is significant and positive for most industries. This result suggests that firms increase MainSG&As or have a greater proportion of MainSG&As that are unrelated to current revenues in loss years. We do not find consistent patterns on the coefficient on *Dummy_Revenue_Decrease*.

[Insert Table 1 near here]

4.2. Operating investments by industry

We estimate the various categories of operating investments as well as the disaggregated components of MainSG&As, by firm-year, using methods described in Section 2. We then average them by industry-years, and further calculate their averages by industry. All values, deflated by average assets, are presented in Table 2. The top (bottom) five industries for each attribute are highlighted in bold (bold italic) letters. The five industries with the highest maintenance MainSG&As are candy and soda, printing and publishing, consumer goods, measuring and control equipment, and wholesale. Three out of these five industries also spend the highest amounts on advertisements, indicating that a significant portion of their MainSG&As support sales and marketing.

[Insert Table 2 near here]

Industries with the highest investment MainSG&As are recreation, medical equipment, precious metals, electronic equipment, and measuring and control equipment. The last two of these five industries appear to be high-technology industries but are not among the largest R&D spenders. This finding is consistent with the idea that some firms strategically disclose their innovation expenses in SG&As but not as R&D (Koh and Reeb 2015). The high investment MainSG&As of precious metals could reflect exploration or development expenses that are expensed via the SG&A category. Industries with the highest capitalized intangibles are candy & soda, printing and publishing, communication, and wholesale, likely, reflecting acquired brands, in-process R&D, and copyrights. Industries with the highest R&D are medical equipment, pharmaceutical products, personal services, business services, and computers, which is consistent with intuition. The highest CAPEX is made by such old-economy industries as non-metallic and industrial, coal, petroleum and natural gas, and business supplies.

Investment MainSG&As exceed R&D for almost all industries, and advertising appears to be a relatively small category of firms' intangible investments. This indicates that an inquiry into intangible investment is incomplete when focused only on R&D and advertising. Nevertheless, for most industries, the maintenance component of MainSG&As exceeds the investment component. Thus, using total MainSG&As as a proxy for investments could also lead to erroneous conclusions. (We later test this proposition.)

4.3. Descriptive statistics

Panel A of Table 3 presents the descriptive statistics for various outlays examined in this study. Results show that CAPEX is the largest category of intangible investments, consumption MainSG&As are significantly larger than investment MainSG&As, a median firm reports no R&D or advertising outlay, and capitalized intangibles are not economically significant even at the 75th percentile level. Notably, at the 25th percentile level, investment MainSG&As are negative. Untabulated results show that investment MainSG&As turn positive only at the 36th percentile, indicating that approximately one-third of the observations have negative values. These negative values arise because the residual from equation (1) is negative for approximately 50% of observations, by construction, and the intercept and the two dummy terms are not large enough to make up for many large negative residuals. We interpret these negative values as underinvestment compared with the prediction of the industry model. Our hypotheses tests are based on the cross-sectional variation in investment amounts. Therefore, negative values should not affect our inferences. However, some may argue that the negative amounts might make investment MainSG&As noncomparable to other investments. Thus, we repeat our hypotheses tests after dropping observations with negative investment MainSG&As and find even stronger support for our hypotheses. (Results discussed latter.) In Panel B of Table 3, we present descriptive statistics for a truncated sample with positive investment MainSG&As and find similar results on most outlays. The main difference is that investment MainSG&A exceeds maintenance MainSG&A, on average. This result shows that in sample formed after dropping observations with negative investment MainSG&As, the economic importance of investment MainSG&As appears even larger.

[Insert Table 3 near here]

4.4. Time-series trends in operating investments

Table 4 presents the annual averages from 1970 to 2009 of various operating investments as well as in the maintenance component of MainSG&As, all scaled by average assets. Figure 1 shows the relative proportions of four disaggregated components of SG&A components—the three investments (R&D, advertising, and investment MainSG&As) and the maintenance component—for the eight progressive five-year intervals from 1970–1974 to 2005–2009. Figure 2 shows the amounts of five investment outlays (R&D, advertising, the investment component of MainSG&As,

CAPEX, and acquired intangibles) for the same eight five-year intervals. Figure 3 shows their relative proportions.

[Insert Table 4, Figure 1, Figure 2, and Figure 3 near here]

Both the tables and the figures show that CAPEX is the largest investment category. However, CAPEX has declined and intangible investments have increased over time. Results also indicate that more and more MainSG&As consist of investment outlays and less of maintenance outlays. Notably, the maintenance component of MainSG&As exceeds the investment component until the late 1990s. The trend reverses thereafter. Investment MainSG&As are more than three times higher than R&D in most recent years. Also, the sum total of intangible investments exceeds CAPEX beginning from the late 1990s. These results are consistent with macroeconomic studies (Corrado et al. 2005) showing that the intangible investments in U.S. economy now exceed tangible investments and that the total amount of intangible investments is approximately three times more than the amounts spent just on innovation.

We estimate the annual rates of change in the operating investment amounts by estimating the following regression using the 40 annual cross-sectional averages (*AverageAnnualOutlays*) from 1970 to 2009:

$$AverageAnnualOutlays_t = \gamma_1 + \gamma_2 \times t + \varepsilon_t \tag{8}$$

We measure the annual rate of change by the coefficient (γ_2) on t, which represents the fiscal year (Dichev and Tang 2008). We multiply γ_2 by 1,000 for expositional reasons. A positive (negative) γ_2 indicates a trend of growth (decline). The last rows of Panel C of Table 2show the trends of the amounts invested in each category. CAPEX, advertising, and the consumption component of MainSG&As exhibit declining trends (all significant at p-value <0.01). In contrast, R&D, acquired intangibles, and investment MainSG&As exhibit positive trends. The trend rate of the investment component of MainSG&As is higher than that of the R&D (difference significant at a p-value <0.03, not tabulated). These results show that during our study period of 1970 to 2009, the investment component of MainSG&As is both the largest and the fastest growing category of intangible investments. These results support the idea that any analysis of firms' operating investments is increasingly incomplete without considering the investment component of MainSG&As.

4.5. Validity tests and correlational analysis

We categorize all firm-years observations into 1,720 industry-year groups (43 industries × 40 years). Within each group, we calculate the average values of R&D, advertising, capex, the investment and the consumption components of MainSG&As and the proxies of future benefits (increase in future earnings and Tobin's q). Table 5 shows the correlations among these variables. We find that the investment MainSG&As is strongly correlated with future earnings growth (correlation coefficient of 0.472, significant at p-value <0.01). In contrast, maintenance MainSG&As are negatively correlated with future earnings growth (correlation coefficient of −0.365, significant at p-value <0.01). The difference in the correlation with future earnings for the maintenance and the investment components of MainSG&As is statistically significant (p-value <0.01, calculated using Hotelling's t-test for correlated correlations, not tabulated). We find similar results using Tobin's q, a market based measure of expected future benefits. This finding validates our premise of dividing the MainSG&As into the maintenance and investment categories, and provides strong evidence that our measure improves upon the total SG&A–based measure of intangible investments used in prior literature.

[Insert Table 5 near here]

Other correlations provide additional insights. The investment component of MainSG&As is positively correlated and uncorrelated, respectively, with R&D and advertising expenses. In contrast, the maintenance component of MainSG&As is uncorrelated and positively correlated, respectively, with R&D and advertising expenses. These results are consistent with the idea that firms with greater innovation activities also have higher investment MainSG&As and the firms with greater marketing and advertising activities have higher consumption MainSG&As. Both the maintenance and investment components of MainSG&As are negatively correlated with CAPEX. In addition, R&D is most strongly correlated with future benefits among all investment categories.

4.6. Correlation between SG&A outlays and earnings quality

Table 6 presents the correlation between different outlays and the measures of earnings quality. In particular, we reexamine the Srivastava (2014) finding that SG&A is negatively associated with measures of earnings quality by disaggregating MainSG&As into its investment and maintenance components. We find that investment MainSG&As are positively associated with earnings volatility (correlation coefficient of 0.176) and negatively with relevance (−0.075) and matching (−0.144). All of these correlations are significant at p-value <0.01. In contrast, maintenance MainSG&As are negatively associated with earnings volatility (−0.062), uncorrelated with relevance (0.021), and positively correlated with matching (0.100). These results explain the nuance behind the Srivastava (2014) finding of negative correlation between SG&A and earnings quality. His finding reflects the accounting and economic characteristics of investment outlays reported in SG&A. In addition, investment (maintenance) MainSG&As are positively (negatively) associated with special items, which prior studies find, lower earnings quality (Donelson et al. 2011; Givoly and Hayn 2000). These results also indicate that the nature of projects associated with the investment and the maintenance outlays fundamentally differ such that the firms are more likely to go wrong with the projects involving investment MainSG&As than with the projects involving maintenance

MainSG&As. [This argument assumes that special items represent ex post write-offs or restructuring charges (Donelson et al. 2011).]

[Insert Table 6 near here]

4.7. Differences in characteristics of firms with predominant investment versus maintenance MainSG&As

Results in Subsections 4.5 and 4.6 show that the investment and the maintenance components of MainSG&As have different economic characteristics. These results indicate that using MainSG&As as proxy for investments can lead to erroneous conclusions for firms with predominant maintenance MainSG&As. To test this idea, we calculate *Maintenance Proportion* on a firm-year basis by dividing maintenance MainSG&As by MainSG&As. All industry-years observations are divided into five quintiles based on the Maintenance Proportion. We calculate the correlations between MainSG&As and measures of earnings quality for each of these five groups and present them in Table 7. We find that, for firms with predominant maintenance MainSG&As, the MainSG&As are not correlated with either future earnings or any measure of earnings quality. In contrast, for firms with a predominance of investment MainSG&As, the MainSG&As are strongly positively correlated with future earnings and negatively correlated with the three measures of earnings quality. We examine the differences in the correlations of the two groups (*z*-scores using Fisher's *r* to *z* transformation) and find all of them to be statistically significant.

[Insert Table 7 near here]

Based on the results presented in Subsections 4.5–4.7, we conclude that investment MainSG&A is a better proxy for intangible investments than the two alternatives of using total MainSG&As or ignoring them altogether. In addition, the wide variance of the investment component of MainSG&As across industries and its steady increase over time casts doubts on the practice in the literature of considering an ad hoc constant percentage of SG&As to be investments.

5. Tests of hypotheses

This section describes the tests of hypotheses.

5.1. H2: The relative associations of the future benefits with operating investments

We test H1 by examining the relative extents to which the various categories of operating investments are associated with the future benefits by estimating the following pooled regression:

$$FutureBenefits_{i,t} = \alpha + \gamma_1 \times R\&D_{i,t} + \gamma_2 \times Advertising_{i,t} + \gamma_3 \times MainSG\&AInvestments_{i,t}$$
$$+ \gamma_4 \times CAPEX_{i,t} + \gamma_5 \times CapitalizedIntangibleInvestments_{i,t} + \Sigma\beta_s \times Controls_{i,t} + \varepsilon_{i,t}, \quad (9)$$

where *FutureBenefits* is measured by either $ChangeInEarnings_{t\ to\ average\ (t+1,\ t+2,\ t+3)}$ or $Tobin'sQ_t$, as discussed in Subsection 3.4.

Equation (9) is similar to the regression used by Kothari et al. (2002) to examine the relative risks of CAPEX and R&D, but it also includes two additional proxies of operating investments: the investment MainSG&As and capitalized intangibles. We control for firm size (log of market value of equity) and current earnings growth. We also control for Loss and financial leverage (*Leverage*).[13]

Table 8 presents the results of equation (7). The *t*-statistics are reported by clustering errors by firms and year. We find that all types of investments are positively associated with the future earnings, except for advertising and capitalized intangibles. Tobin's q is positively associated with all investments except CAPEX and capitalized intangibles. In both regressions, the highest coefficient is on R&D (0.571 for the future earnings and 7.97 for Tobin's q) followed by the

[13] Financial leverage is measured by total debt [DLTT + DLC]/market value of equity [log of market value of equity {stock prices measured at the end of fiscal year (Compustat PRCC_F)} × {common shares outstanding (Compustat CSHO)}]).

coefficients on investment MainSG&As (0.371 and 1.868, respectively) and CAPEX (0.124, 0.068, and −0.527, respectively). More importantly, the *F*-tests show that in each regression, the coefficients on MainSG&As are significantly different from both CAPEX and R&D. These results are consistent with the idea that, on average, the R&D outlays produce the highest future benefits followed by investment MainSG&As, advertising, capitalized intangibles, and CAPEX in the order. The economic significance of regression coefficients can be understood by multiplying them by 3 (because we subtract the average of the next three years earnings from the current earnings), which gives 1.731 and 1.191, respectively, for R&D and investment MainSG&As. Numbers exceeding one indicate that, on average, R&D and investment MainSG&As produce benefits more than their initial investments.

[Insert Table 8 near here]

We also estimate equation (9) by including maintenance MainSG&As (results not tabulated). We find that the coefficients on maintenance MainSG&As are significantly smaller than those on investment MainSG&As, validating our reason for separating MainSG&As into their maintenance and investment components.

5.2. H2: The relative association of the uncertainties of future benefits with operating investments

We examine the relative associations of the three operating investments with the two measures of the uncertainty of future benefits by estimating the following pooled regression:

$$\begin{aligned} UncertaintyOfFutureBenefits_{i,t} &= \alpha + \gamma_1 \times R\&D_{i,t} + \gamma_2 \times Advertising_{i,t} \\ &+ \gamma_3 \times MainSG\&AInvestments_{i,t} + \gamma_4 \times CAPEX_{i,t} \\ &+ \gamma_5 \times CapitalizedIntangibleInvestments_{i,t} + \Sigma\beta_s \times Controls_{i,t} + \varepsilon_{i,t} \qquad (10) \end{aligned}$$

where *UncertaintyOfFutureBenefits* is measured by either idiosyncratic stock-return volatility or the future earnings volatility as discussed in Subsection 3.5.

Consistent with Kothari et al. (2002) and Wei and Zhang (2006), we control for the firm's size, growth, and leverage. We also control for current earnings growth and losses. Table 9 shows that in both regressions, only the coefficients on R&D, investment MainSG&As, and capitalized intangibles are significantly positive. The coefficients on advertising and CAPEX are either insignificant or negative. As expected, the highest coefficients are on R&D (0.465 and 1.678, respectively, both significant at *p*-value <0.01). The next highest coefficients are on investment MainSG&As (0.086 and 0.465, respectively, both significant at *p*-value <0.01). *F*-tests show that the coefficients on the R&D outlays are significantly higher than those on the investment MainSG&As, which in turn are higher than the coefficients on CAPEX (*p*-values <0.01).[14] These *F*-test results are consistent with the proposition that the future benefits of the investment MainSG&As are more uncertain than for CAPEX outlays but are less uncertain than for R&D outlays.

[Insert Table 9 near here]

5.3. Additional tests after dropping observations with negative MainSG&As

We conduct additional tests of H1 and H2 by dropping observations with negative MainSG&As. Results presented in Table 10 show similar patterns as discussed in Subsections 5.1 and 5.2.

[Insert Table 10 near here]

6. Concluding remarks

Prior literature finds a dramatic increase in the U.S. firms' intangible investments over time and hints that a majority of these investments are made in avenues other than R&D and advertising and are reported in SG&A. We propose a new method to ascertain the initial amounts of non-R&D

[14] See Kothari et al. (2002, p. 360) for the reasoning on why a higher regression coefficient implies a higher uncertainty of future benefits.

and non-advertising investment outlays reported in SG&A. We first deduct R&D and advertising outlays and then divide the remaining SG&As into maintenance and investment components. The maintenance category contains outlays that vary with cotemporaneous revenues. The remaining outlays are referred to as investments, based on the premise that firms rationally incur an outlay to produce either a current or a future benefit.

We validate our method by showing that the investment outlays we identify are strongly associated with future earnings growth, but not the maintenance outlays. Also, the negative association between SG&A and earnings quality arises from the investment, not maintenance, component of SG&As. We find that using SG&As as a proxy for investments leads to erroneous conclusions for firms with a large proportion of maintenance outlays.

Using our measure, we find that SG&A intangible investments are the fastest growing category of the firms' operating investments and that their amounts exceed the R&D outlays by three times on average. Further, the benefits and the uncertainty of future benefits, or the mean-variance effects, of these investments are higher (lower) than those of CAPEX (R&D). Our results are consistent with the idea that the operating leverage-enhancing effect of intangible investments is greater for outlays that create innovative products protected by patents than for investments that create organizational knowledge and competencies and can be lost with employee mobility.

Also, our findings suggest that because investments reported in SG&A form an increasingly important component of firms' operating investments, and because R&D, advertising, and CAPEX outlays are separately disclosed, financial statements would be more informative if SG&A investments were separately disclosed instead of being reported along with maintenance SG&As.

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Appendix
Definition and measurement of variables

Compustat Annual		
Average Total Assets	=	The average of the beginning and ending total assets (Compustat AT) for the year.
Revenues	=	Revenue (Compustat SALE) scaled by the average total assets.
Earnings	=	Income before extraordinary items (Compustat IB) scaled by the Average Total Assets.
TotalExpenses	=	Revenues − Earnings
R&D	=	R&D outlays (Compustat XRD) scaled by the Average Total Assets
Advertising	=	Advertising expenses (Compustat XAD) scaled by the Average Total Assets
CAPEX (capital expenditures)	=	Compustat CAPX: “cash outflow or the funds used for additions to the company's property, plant and equipment, excluding amounts arising from acquisitions” scaled by the Average Total Assets.
SG&A (selling, general, and administrative expenses)	=	Compustat XSGA: “all commercial expenses of operation (i.e., expenses not directly related to product production) incurred in the regular course of business pertaining to the securing of operating income.” It includes immediately expensed costs in activities such as R&D, marketing, advertising, training, and sales promotion, but excludes costs classified as cost of sales (Compustat COGS). This item excludes depreciation allocated to the SG&A category. This item is scaled by the Average Total Assets.
MainSG&As	=	*SG&A – R&D – Advertising.*
CapitalizedIntangibleInvestments (the capitalized component of intangible investments)	=	Intangible investments that are capitalized other than goodwill. Measured by (Capitalized Intangible Assets$_{\text{End of year},t}$[Compustat INTAN and INTANO] – Capitalized Intangible Assets$_{\text{End of year},t-1}$ + Amortization$_t$ [AM]) – (Goodwill$_{\text{End of year},t}$[GDWL] − Goodwill$_{\text{End of year},t-1}$ + Goodwill Amortization$_t$[GDWLAM]) scaled by the Average Total Assets.
Market Value of Equity	=	End-of-year share price (Compustat PRCC_F) × Number of shares outstanding (CSHO).
LogSize	=	Log of the market value of equity.
Tobin’sQ	=	Tobin’s q [Market value of equity (Price {PRCC_F} × Number of shares outstanding {CSHO}) +Total Liabilities (total assets – shareholder equity {CEQ})] / Total Assets.
Leverage	=	(Total debt [Compustat DLTT + DLC]/market value of equity).
Accruals	=	[Change in Current Assets (Compustat ACT) – Change in Cash (CHE) – Change in Current Liabilities (LCT) – Change in Tax Payable (TXP) – Depreciation and Amortization (DP)] scaled by the Average Total Assets.
CurrentEarningsGrowth	=	Change in the current year’s Earnings from the previous year.
ChangeInEarnings$_{t \text{ to average } (t+1,\, t+2,\, t+3)}$	=	Change in future earnings, measured by average of the next three year’s Earnings − Earnings.
FutureEarningsVolatility	=	Standard deviation of Earnings for the rolling four-year windows: years t through t+3.
Loss	=	Dummy variable that takes the value of one if Earnings are negative and zero otherwise.
SpecialItems	=	−1 × SPI, scaled by average Total Assets for the year

Appendix continued

Definition and measurement of variable

Annual Rate of Change	=	We estimate the following regression by using the 40 cross-sectional annual averages from 1970 to 2009: $AverageVariable_t = \gamma_1 + \gamma_2 \times t + \varepsilon_t$ We measure the Annual Rate of Change by the coefficient (γ_2) on *t*, which represents the fiscal year. We multiply γ_2 by 1,000 for expositional reasons.
MaintenanceMainSG&A (the maintenance component of MainSG&As)	=	MainSG&As that support current operations. We first estimate the following regression by industry and year: $MainSG\&A_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t}$ $+ \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Loss_{i,t} + \varepsilon_{i,t}$ where *Dummy_Revenue_Decrease* is a dummy variable if the revenues decline during the year and zero otherwise, *Dummy_Loss* is a dummy variable for accounting loss, *i* = firm, *Ind* = Industry, and *t* = year. The industry is defined by using the Fama and French 48-industry classification (Fama and French 1997). We then calculate the *Maintenance* component of the MainSG&As outlays as follows: $\widehat{MaintenanceMainSG\&A}_{i,t} = \hat{\beta}_{1,Ind,t} \times Revenues_{i,t}$
InvestmentMainSG&A (investment component of MainSG&A)	=	$MainSG\&A_{i,t} - \widehat{MaintenanceMainSG\&A}_{i,t}$
Matching	=	We estimate the following regression on a cross-sectional basis for each industry-year: $Revenues_{i,t} = \beta_{1,t} + \beta_{2,t} \times TotalExpenses_{i,t-1}$ $+ \beta_{3,t} \times TotalExpenses_{i,t} + \beta_{4,t} \times TotalExpenses_{i,t+1} + \varepsilon_{i,t}$ Matching is measured by the regression coefficient on the contemporaneous expenses (β_3).
Relevance	=	Consistent with Easton and Harris (1991, Table 3, p. 31), we estimate the following regression for each industry-year: $Ret_{i,t} = \beta_{1,t} + \beta_{2,t} \times \Delta Earnings_{i,t} + \beta_{3,t} \times Earnings_{i,t} + \varepsilon_{i,t}$ where *Ret* is [(End-of-Year Share Price {PRCC_F}/ Adjustment Factor {AJEX} + Dividend per Share {DVPSP_F}/ Adjustment Factor – Beginning-of-Year Share Price/ Beginning-of-Year Adjustment Factor) / (Beginning-of-Year Share Price/ Beginning-of-Year Adjustment Factor)]. We measure relevance of earnings by the adjusted *R*-square of the regression.
CRSP		
Daily Stock Return (R)	=	CRSP RET
IV (IdiosyncraticVolatility)	=	We first estimate the following regression on a firm-month basis. $R_{d,m,t,i} = \alpha_{i,m,t} + \beta_{1,i,m,t} \times (Rm_{d,m,t} - Rf_{d,m,t}) + \beta_{2,i,m,t} \times SMB_{d,m,t} + \beta_{3,i,m,t} \times HML_{d,m,t} + \varepsilon_{d,m,t,i}$ where *R* = Daily stock return (CRSP RET) *Rm* = Daily return on value-weighted market portfolio (CRSP VWRETD) *Rf* = Risk-free rate (CRSP RF); *SMB*, *HML* = Daily Fama-French factors *d* = day on which the stock was traded; *m* = month; *y* = fiscal year, and *i* = each firm. We then calculate the idiosyncratic volatility by using the residuals from the above equation for each of the firm months as follows: $IV_{m,t,i} = Variance\ (\varepsilon_{d,m,t,i})$. We then average the 12 monthly volatilities to obtain a measure of the idiosyncratic volatility (*IV*).

All continuous variables are winsorized at the 1st and 99th percentiles. All missing values are replaced by zero.

Figure 1
The relative proportions of various cost components in SG&As*

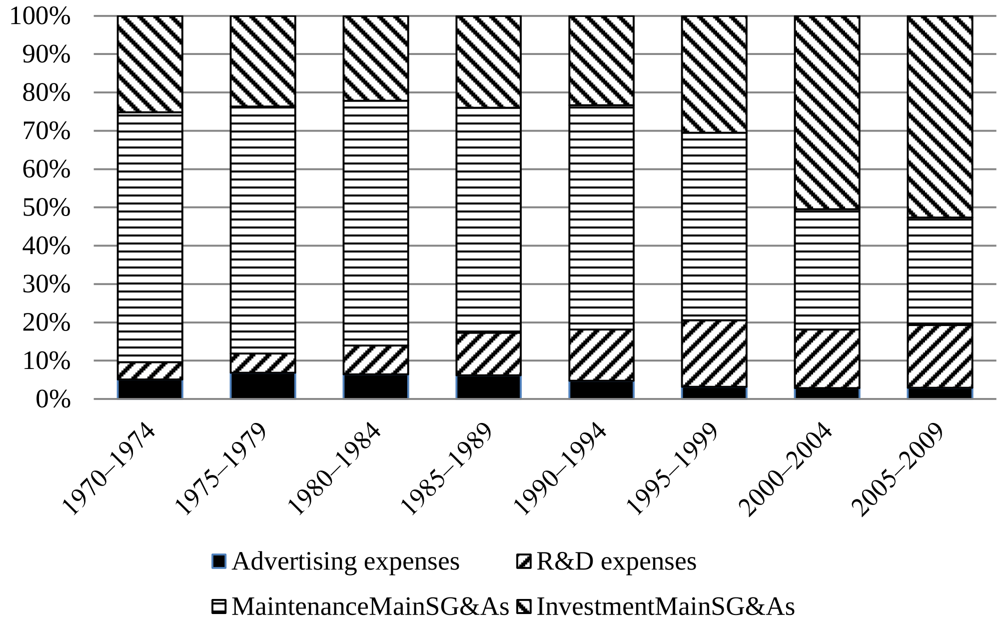
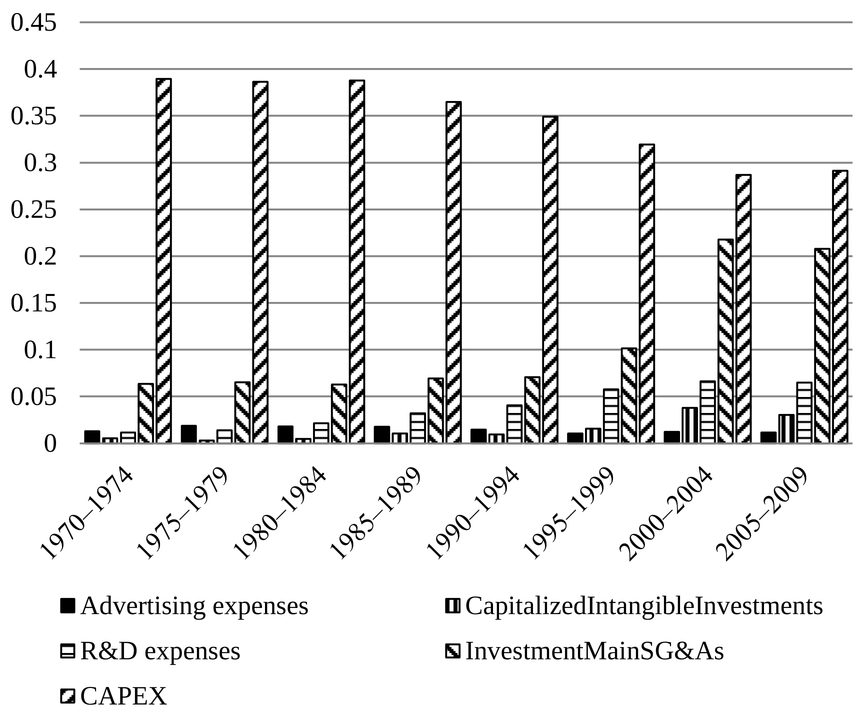
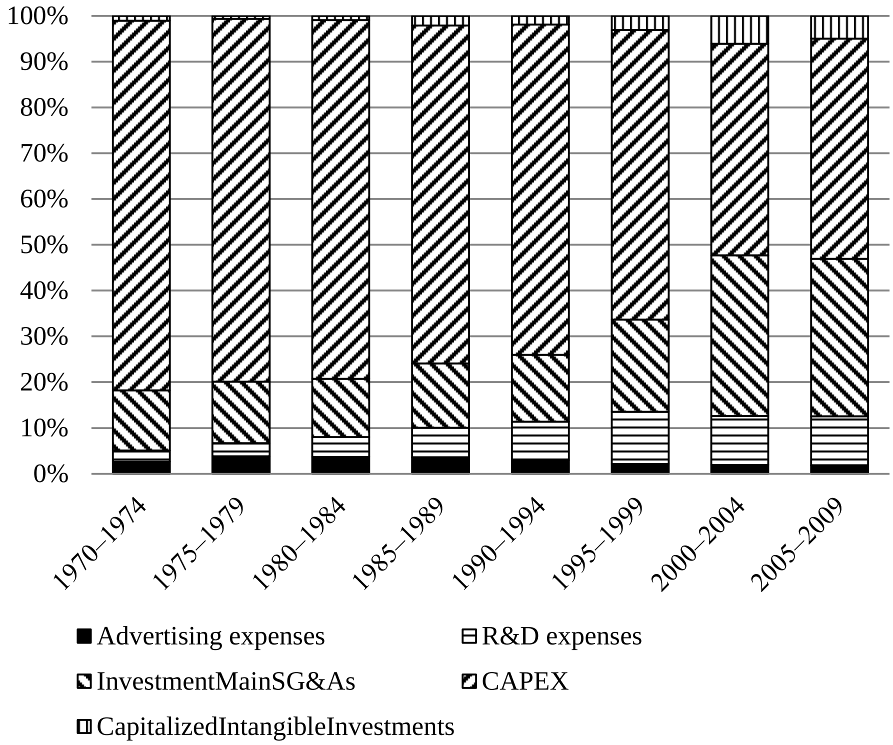


Figure 2
The amounts of operating investments and expenditures (scaled by total assets)*



*All variables are defined in the Appendix.

Figure 3
The relative proportions of operating investments*



*All variables are defined in the Appendix.

TABLE 1
The average of regression coefficients by Fama-French 48-industry classification*

All of the firm-year observations from 1970 to 2009 are classified by the Fama–French 48-industry method. Four industries representing the finance firms and one "almost nothing" category are excluded. The following regression is estimated on industry-year basis: $MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}$, where i = firm, Ind = industry, nd t = year. All variables are defined in the Appendix. The table presents the average of estimated regression parameters by industry. ***, **, and * indicate statistical significance (Fama and MacBeth 1973) at the 1%, 5%, and 10% level, respectively.

Industry	Intercept (α)	*Revenue* (β_1)	*Dummy Revenue Decrease* (β_2)	*Dummy Loss* (β_3)
Agriculture	0.042***	0.115***	–0.089	0.114
Food products	0.196***	0.060***	–0.049**	0.136***
Candy and soda	–0.074	0.282***	–0.022	0.125***
Beer and liquor	0.083***	0.114***	–0.036***	0.045*
Tobacco products	0.025	0.129***	–0.015	0.047
Recreation	0.267***	0.031	–0.157***	0.302***
Entertainment	0.023	0.115***	–0.003	0.209***
Printing and publishing	0.040*	0.253***	–0.016	0.083***
Consumer gods	–0.013	0.223***	–0.010	0.141***
Apparel	0.046**	0.176***	0.001	0.076***
Health care	–0.048**	0.200***	–0.011	0.145***
Medical equipment	0.178***	0.134***	–0.069***	0.204***
Pharmaceutical products	0.000	0.274***	–0.030**	0.136***
Chemicals	0.048**	0.131***	–0.034**	0.189***
Rubber and plastic products	0.137**	0.071**	–0.036	0.107***
Textiles	–0.002	0.127***	0.009	0.020**
Construction materials	0.024	0.132***	0.014	0.077***
Construction	0.029***	0.068***	–0.007	0.077***
Steel works etc.	0.035	0.063***	–0.012	0.086***
Fabricated products	0.068***	0.083***	–0.004	0.018
Machinery	0.132***	0.086***	–0.036*	0.209***
Electrical equipment	0.060**	0.138***	–0.029	0.121***
Automobiles and trucks	0.064**	0.068***	0.005	0.083***
Aircraft	0.049	0.065	–0.077	0.210**
Shipbuilding, railroad equipment	0.062***	0.059***	–0.018	0.017
Defense	0.189	–0.021	–0.119	0.051
Precious metals	0.080***	0.010	–0.019	0.058**
Non-metallic and industrial	0.026	0.075***	–0.047*	0.148***
Coal	0.004	0.065**	–0.011	0.023*
Petroleum and natural gas	0.044***	0.059***	–0.012	0.157***
Utilities	0.002***	0.002	0.006*	0.037***
Communication	–0.036***	0.216***	0.038**	0.151***
Personal services	–0.049***	0.254***	0.040**	0.103***
Business services	0.071***	0.162***	0.001	0.192***
Computers	0.076***	0.166***	–0.040**	0.211***
Electronic equipment	0.042**	0.157***	–0.009	0.141***
Measuring and control	0.085**	0.166***	–0.014	0.138***
Business supplies	–0.071***	0.210***	0.022*	0.045***
Shipping containers	0.411	–0.284	–0.054	0.075
Transportation	–0.010	0.085***	–0.017	0.064***
Wholesale	0.273***	0.033***	–0.076***	0.209***
Retail	0.202***	0.121***	–0.006	0.140***
Restaurants, hotels, motels	–0.036	0.115***	0.017	0.136***

TABLE 2

The amount of operating investments by Fama and French 48-industry classification

All of the firm-year observations from 1970 to 2009 are classified by the Fama and French 48-industry method. Four industries representing the finance firms and one “almost nothing” category are excluded. The following regression is estimated on industry-year basis: $MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}$, where i = firm, Ind = industry, and t = year. All variables are defined in the Appendix. *MaintenanceMainSG&A* is calculated on a firm-year basis by $\beta_{1,Ind,t} \times Revenues_{i,t}$. *InvestmentMainSG&A* is calculated by subtracting *MaintenanceMainSG&A* from *MainSG&A*. *R&D*, *Advertising*, *CAPEX*, and *CapitalizedIntangibleInvestments* are estimated on a firm year basis using methods described in the Appendix. All of these variables are averaged by industry years. The overall average industry attribute is calculated by averaging all of its annual attributes. The top (bottom) five industries for each attribute are highlighted in bold (bold italic) letters.

		Reported in SG&A				Capitalized	
Industry	**SG&A**	***ConsumptionMain SG&A***	***Advertising***	***R&D***	***InvestmentMain SG&A***	***CapitalizedIntangible Investm***	***CAPEX***
Agriculture	0.158	0.095	0.005	0.018	0.051	0.014	0.384
Food products	0.353	0.111	0.032	0.007	0.206	0.015	0.363
Candy and soda	0.424	**0.336**	**0.044**	***0.001***	0.043	**0.043**	0.360
Beer and liquor	0.259	0.122	**0.058**	0.006	0.075	0.019	0.367
Tobacco products	0.225	0.139	0.029	0.003	0.054	0.025	0.214
Recreation	**0.447**	0.063	**0.051**	0.041	**0.318**	0.014	0.185
Entertainment	0.229	0.103	0.019	0.007	0.127	0.019	0.484
Printing and publishing	0.363	**0.276**	0.028	0.007	0.053	**0.035**	0.228
Consumer gods	0.421	**0.325**	**0.060**	0.021	***0.016***	0.014	0.245
Apparel	0.391	**0.299**	0.029	0.003	0.064	0.014	***0.168***
Health care	0.264	0.221	0.004	0.014	0.028	0.030	0.315
Medical equipment	**0.528**	0.151	0.010	**0.116**	**0.272**	0.028	***0.179***
Pharmaceutical products	0.378	0.190	0.014	**0.245**	0.080	**0.035**	***0.180***
Chemicals	0.294	0.157	0.011	0.039	0.097	0.016	0.364
Rubber and plastic	0.271	0.127	0.007	0.016	0.124	0.011	0.347
Textiles	0.194	0.168	0.006	0.006	***0.014***	***0.004***	0.344
Construction materials	0.233	0.168	0.007	0.009	0.050	0.007	0.370
Construction	0.154	0.099	0.005	***0.002***	0.049	0.006	***0.179***
Steel works etc.	***0.135***	0.076	0.002	0.008	0.053	0.007	0.411
Fabricated products	0.194	0.098	0.004	0.008	0.085	0.008	0.348
Machinery	0.328	0.119	0.009	0.041	0.171	0.011	0.245
Electrical equipment	0.336	0.172	0.009	0.055	0.110	0.014	0.235
Automobiles and trucks	0.224	0.109	0.007	0.030	0.082	0.010	0.285
Aircraft	0.209	0.087	0.002	0.036	0.085	0.014	0.237
Shipbuilding, railroad	***0.146***	***0.061***	0.006	0.010	0.069	0.006	0.332
Defense	0.208	***0.021***	0.012	0.027	0.171	0.010	0.259
Precious metals	0.238	***0.024***	***0.001***	0.006	**0.222**	***0.003***	**0.547**
Non-metallic and	***0.070***	0.063	***0.000***	***0.001***	***0.005***	***0.002***	**0.552**
Coal	***0.130***	***0.034***	***0.001***	0.005	0.104	0.008	**0.638**
Petroleum and natural gas	***0.004***	***0.001***	***0.000***	***0.000***	***0.003***	***0.005***	**0.763**
Utilities	0.202	0.162	0.010	0.012	0.030	***0.003***	0.411
Communication	**0.468**	0.225	0.014	0.072	0.186	**0.052**	0.186
Personal services	**0.479**	0.213	0.012	**0.110**	0.160	0.025	***0.164***
Business services	0.352	0.191	0.006	**0.087**	0.081	0.033	0.218
Computers	0.439	0.205	0.008	**0.102**	0.133	0.019	0.198
Electronic equipment	0.384	0.068	0.008	0.007	**0.309**	0.017	0.191
Measuring and control	**0.576**	**0.309**	**0.048**	0.003	**0.221**	0.018	0.312
Business supplies	0.202	0.172	0.032	***0.001***	***0.004***	0.006	**0.594**
Shipping containers	0.158	0.095	0.005	0.018	0.051	0.014	0.384
Transportation	0.353	0.111	0.032	0.007	0.206	0.015	0.363
Wholesale	0.424	**0.336**	**0.044**	***0.001***	0.043	**0.043**	0.360
Retail	0.259	0.122	**0.058**	0.006	0.075	0.019	0.367
Restaurants, hotels,	0.225	0.139	0.029	0.003	0.054	0.025	0.214

TABLE 3
Descriptive statistics

All of the firm-year observations from 1970 to 2009 are classified by the Fama and French 48-industry method. Four industries representing the finance firms and one "almost nothing" category are excluded. The following regression is estimated on industry-year basis: $MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}$, where *i* = firm, *Ind* = industry, and *t* = year. All variables are defined in the Appendix. *MaintenanceMainSG&A* is calculated on a firm-year basis by $\beta_{1,Ind,t} \times Revenues_{i,t}$. *InvestmentMainSG&A* is calculated by subtracting *MaintenanceMainSG&A* from *MainSG&A*. *R&D*, *Advertising*, *CAPEX*, and *CapitalizedIntangibleInvestments* are estimated on a firm year basis using methods described in the Appendix. Descriptive statistics are calculated by pooling all firm year observations. Panel A present results with all observations. Panel B present results of a truncated sample with only positive *InvestmentMainSG&As*.

Panel A: All observations

N=154,760 firm years			Outlays	Mean	Standard deviation	First quartile	Median	Third quartile
Reported in SG&A			*MaintenanceMainSG&As*	0.157	0.230	0.038	0.127	0.242
Reported in SG&A	Intangible investments	Expensed	*InvestmentMainSG&As*	0.117	0.538	−0.029	0.041	0.171
Reported in SG&A	Intangible investments	Expensed	*Advertising*	0.043	0.112	0	0	0.034
Reported in SG&A	Intangible investments	Expensed	*R&D*	0.014	0.047	0	0	0.008
	Intangible investments	Capitalized	*CapitalizedIntangibleInvestments*	0.017	0.092	0	0	0.001
		Capitalized	*CAPEX*	0.339	0.251	0.136	0.279	0.501

Panel B: Observations with positive *InvestmentMainSG&As*

N=98,374 firm years			Outlays	Mean	Standard deviation	First quartile	Median	Third quartile
Reported in SG&A			*MaintenanceMainSG&As*	0.126	0.238	0.021	0.076	0.107
Reported in SG&A	Intangible investments	Expensed	*InvestmentMainSG&As*	0.246	0.631	0.052	0.092	0.125
Reported in SG&A	Intangible investments	Expensed	*Advertising*	0.042	0.102	0	0	0
Reported in SG&A	Intangible investments	Expensed	*R&D*	0.016	0.051	0	0	0
	Intangible investments	Capitalized	*CapitalizedIntangibleInvestments*	0.017	0.092	0	0	0
		Capitalized	*CAPEX*	0.311	0.237	0.125	0.199	0.251

TABLE 4

Trend in various categories of operating investments from 1970 to 2009

All of the firm-year observations from 1970 to 2009 are classified by the Fama and French 48-industry method. Four industries representing the finance firms and one "almost nothing" category are excluded. The following regression is estimated on industry-year basis: $MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}$, where i = firm, Ind = industry, and t = year. All variables are defined in the Appendix. *MaintenanceMainSG&A* is calculated on a firm-year basis by $\beta_{1,Ind,t} \times Revenues_{i,t}$. *InvestmentMainSG&A* is calculated by subtracting *MaintenanceMainSG&A* from *MainSG&A*. *R&D*, *Advertising*, *CAPEX*, and *CapitalizedIntangibleInvestments* are estimated on a firm year basis using methods described in the Appendix. All of these variables are averaged by year. The trend rate is measured by $\gamma_2 \times 1{,}000$ where γ_2 is obtained from the following regression estimated by using 40 annual observations from 1970 to 2009: $Attribute_t = \gamma_1 + \gamma_2 \times t + \varepsilon_t$. All trend rates are significant at p-values < 0.01.

		Reported in SG&A				Capitalized	
Year	**SG&A**	***Consumption Main SG&As***	***Advertising***	***R&D***	***InvestmentMainSG&As***	***Capitalized Intangible Investment***	***CAPEX***
1970	0.243	0.174	0.002	0.008	0.058	0.006	0.405
1971	0.247	0.167	0.008	0.011	0.061	0.006	0.397
1972	0.250	0.160	0.016	0.013	0.062	0.005	0.389
1973	0.257	0.158	0.019	0.013	0.068	0.005	0.380
1974	0.261	0.163	0.019	0.013	0.068	0.003	0.376
1975	0.259	0.164	0.018	0.013	0.066	0.002	0.385
1976	0.274	0.176	0.019	0.014	0.066	0.003	0.384
1977	0.276	0.181	0.019	0.014	0.064	0.003	0.386
1978	0.278	0.180	0.019	0.014	0.065	0.004	0.389
1979	0.282	0.184	0.019	0.015	0.065	0.004	0.388
1980	0.282	0.190	0.018	0.016	0.059	0.003	0.386
1981	0.285	0.185	0.019	0.019	0.065	0.004	0.390
1982	0.287	0.180	0.018	0.022	0.071	0.004	0.392
1983	0.271	0.178	0.018	0.023	0.056	0.005	0.388
1984	0.278	0.174	0.018	0.027	0.063	0.007	0.383
1985	0.278	0.169	0.018	0.028	0.067	0.011	0.379
1986	0.275	0.160	0.018	0.029	0.074	0.014	0.371
1987	0.279	0.172	0.018	0.031	0.063	0.014	0.362
1988	0.288	0.161	0.018	0.034	0.081	0.005	0.354
1989	0.290	0.183	0.017	0.036	0.062	0.008	0.358
1990	0.294	0.181	0.017	0.037	0.068	0.009	0.361
1991	0.294	0.185	0.016	0.036	0.064	0.008	0.358
1992	0.293	0.170	0.015	0.038	0.077	0.008	0.350
1993	0.292	0.174	0.015	0.042	0.071	0.010	0.341
1994	0.300	0.179	0.010	0.049	0.075	0.011	0.336
1995	0.295	0.165	0.010	0.050	0.083	0.012	0.332
1996	0.307	0.190	0.010	0.053	0.069	0.014	0.325
1997	0.315	0.167	0.011	0.058	0.097	0.014	0.316
1998	0.326	0.154	0.011	0.066	0.119	0.019	0.317
1999	0.322	0.139	0.011	0.062	0.139	0.020	0.308
2000	0.330	0.140	0.013	0.062	0.140	0.035	0.296
2001	0.356	0.146	0.012	0.066	0.164	0.062	0.294
2002	0.401	0.111	0.011	0.070	0.256	0.034	0.294
2003	0.422	0.143	0.012	0.065	0.253	0.026	0.281
2004	0.440	0.136	0.012	0.068	0.277	0.031	0.270
2005	0.399	0.118	0.012	0.065	0.248	0.034	0.271
2006	0.376	0.138	0.012	0.066	0.197	0.035	0.277
2007	0.347	0.077	0.011	0.065	0.224	0.034	0.285
2008	0.343	0.073	0.011	0.067	0.226	0.026	0.310
2009	0.331	0.150	0.010	0.061	0.145	0.022	0.312
Trend rate	*0.003*	*-0.001*	*0.000*	*0.002*	*0.005*	*0.001*	*-0.003*
***t*-statistic**	***9.609***	***–5.121***	***–3.158***	***26.444***	***7.618***	***7.694***	***–16.129***

TABLE 5
Correlation between operating investments and future benefits

All of the firm-year observations from 1970 to 2009 are classified by the Fama and French 48-industry method. Four industries representing the finance firms and one "almost nothing" category are excluded. The following regression is estimated on industry-year basis: $MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}$, where i = firm, *Ind* = industry, and t = year. All variables are defined in the Appendix. *MaintenanceMainSG&A* is calculated on a firm-year basis by $\beta_{1,Ind,t} \times Revenues_{i,t}$. *InvestmentMainSG&A* is calculated by subtracting *MaintenanceMainSG&A* from *MainSG&A*. *R&D*, *Advertising*, *CAPEX*, increase in future earnings, and *Tobin'sQ* are estimated on a firm year basis using methods described in the Appendix. All of these variables are averaged by industry and year yielding 1,720 industry-year observations (43 industries × 40 years). This table presents the correlations among the average industry-year attributes. ***, **, and * indicate statistical significance (two-sided) at the 1%, 5%, and 10% level, respectively.

Correlation between operating investments and future benefits and uncertainty of future benefits

	N= 1,720 industry years	Pearson Correlation						
		Operating investments					Proxies of future earnings growth	
		R&D	*Advertising*	*CAPEX*	*Investment MainSG&As*	*Maintenance MainSG&As*	Increase in future earnings	*Tobin'sQ*
Spearman Rank Correlation	*R&D*		–0.088***	–0.457***	0.082***	0.022	0.227***	0.596***
	Advertising	0.082***		–0.203***	–0.014	0.165***	–0.044*	0.005
	CAPEX	–0.554***	–0.315***		–0.125***	–0.072***	–0.110***	–0.260***
	Investment MainSG&As	0.227***	0.120***	–0.344***		–0.939***	0.472***	0.175***
	Maintenance MainSG&As	0.156***	0.428***	–0.238***	–0.506***		–0.365***	–0.035
	Increase in future earnings	0.113***	–0.056**	–0.079***	0.229***	–0.139***		0.340***
	Tobin'sQ	0.366***	0.086***	–0.261***	0.280***	0.043*	0.173***	

TABLE 6

Correlation between operating investments and measures of earnings quality

All of the firm-year observations from 1970 to 2009 are classified by the Fama and French 48-industry method. Four industries representing the finance firms and one “almost nothing” category are excluded. The following regression is estimated on industry-year basis: $MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}$, where i = firm, *Ind* = industry, and t = year. All variables are defined in the Appendix. *MaintenanceMainSG&A* is calculated on a firm-year basis by $\beta_{1,Ind,t} \times Revenues_{i,t}$. *InvestmentMainSG&A* is calculated by subtracting *MaintenanceMainSG&A* from *MainSG&A*. *R&D*, *Advertising*, *CAPEX*, *EarningsVolatility*, and *SpecialItems* are estimated on a firm year basis using methods described in the Appendix. All of these variables are averaged by industry and year yielding 1,720 industry-year observations (43 industries × 40 years). *Relevance* and *Matching* are estimated on an industry-year using methods described in the Appendix. This table presents the correlations among the average industry-year attributes. ***, **, and * indicate statistical significance (two-sided) at the 1%, 5%, and 10% level, respectively.

	Pearson Correlation								
N= 1,720 industry years	Operating Investments					Measures of earnings quality			
Spearman Rank_Correlation	*R&D*	*Advertising*	*CAPEX*	*Investment MainSG&As*	*Maintenance MainSG&As*	*Earnings volatility*	*Relevance*	*Matching*	*Special Items*
R&D		–0.084***	–0.458***	0.077***	0.028	0.562***	–0.188***	–0.245***	0.229***
Advertising	0.089***		–0.201***	–0.004	0.154***	–0.157***	0.051**	0.127***	–0.044*
CAPEX	–0.554***	–0.312***		–0.124***	–0.074***	–0.202***	0.029	–0.018	–0.167***
Investment MainSG&As	0.226***	0.129***	–0.349***		–0.939***	0.176***	–0.075***	–0.144***	0.154***
Maintenance MainSG&As	0.158***	0.420***	–0.234***	–0.501***		–0.062**	0.021	0.100***	–0.117***
Earnings volatility	0.386***	–0.090***	–0.262***	0.266***	–0.027		–0.284***	–0.453***	0.270***
Relevance	–0.115***	0.039	0.071***	–0.150***	0.041*	–0.338***		0.183***	–0.084***
Matching	–0.111***	0.080***	0.039	–0.180***	0.100***	–0.422***	0.204***		–0.126***
SpecialItems	0.210***	–0.013	–0.233***	0.106***	0.044*	0.437***	–0.119***	–0.249***	

TABLE 7
Differences between properties of MainSG&As based on the relative proportion of consumption and investment components

All of the firm-year observations from 1970 to 2009 are classified by the Fama and French 48-industry method. Four industries representing the finance firms and one "almost nothing" category are excluded. The following regression is estimated on industry-year basis: $MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}$, where i = firm, *Ind* = industry, and t = year. All variables are defined in the Appendix. *MaintenanceMainSG&A* is calculated on a firm-year basis by $\beta_{1,Ind,t} \times Revenues_{i,t}$. *InvestmentMainSG&A* is calculated by subtracting *MaintenanceMainSG&A* from *MainSG&A*. *R&D*, *Advertising*, *CAPEX*, *EarningsVolatility*, and *SpecialItems* are estimated on a firm year basis using methods described in the Appendix. All of these variables are averaged by industry and year yielding 1,720 industry-year observations (43 industries × 40 years). *Relevance* and *Matching* are estimated on an industry-year using methods described in the Appendix. The *Maintenance Proportion* is calculated on a firm-year basis by dividing *MaintenanceMainSG&A* by *MainSG&A*. All industry-year observations are sorted into five groups from lowest to highest *Maintenance Proportion*. This table presents the correlations between *MainSG&As* and the average industry-year attributes for each of the ordered five groups. The significance of difference between correlations of the highest and the lowest *Maintenance Proportion* categories are from z-scores using Fisher's r to z transformation. ***, **, and * indicate statistical significance (two-sided) at the 1%, 5%, and 10% level, respectively.

Quintile categories by *Maintenance Proportion*	Increase in future earnings	*Future Earnings Volatility*	*Relevance*	*Matching*	*SpecialItems*
1 (lowest *Maintenance Proportion*)	0.630***	0.108**	–0.193***	–0.224***	0.123**
2	0.424***	0.182***	–0.196***	–0.160***	0.195***
3	0.092*	0.001	–0.164***	–0.141***	0.122**
4	0.058	0.080	–0.098*	–0.014	0.132**
5 (highest *Maintenance Proportion*)	0.019	0.075	–0.065	–0.029	0.085
Difference (1−5)	0.611***	0.033	–0.128*	–0.195**	0.038**

TABLE 8
Future benefits of various categories of operating investments

All of the firm-year observations from 1970 to 2009 are classified by the Fama and French 48-industry method. Four industries representing the finance firms and one "almost nothing" category are excluded. The following regression is estimated on industry-year basis: $MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}$, where i = firm, Ind = industry, and t = year. All variables are defined in the Appendix. *MaintenanceMainSG&A* is calculated on a firm-year basis by $\beta_{1,Ind,t} \times Revenues_{i,t}$. *InvestmentMainSG&A* is calculated by subtracting *MaintenanceMainSG&A* from *MainSG&A*. *R&D*, *Advertising*, *CapitalizedIntangibleInvestments*, *CAPEX*, increase in future earnings, *Tobin'sQ*, and control variables are estimated on a firm year basis using methods described in the Appendix. We estimate the following regression to examine the future benefits of various categories of operating investments. $DependentVariable_{i,t} = \alpha + \gamma_1 \times R\&D_{i,t} + \gamma_2 \times Advertising_{i,t} + \gamma_3 \times MainSG\&AInvestments_{i,t} + \gamma_4 \times CAPEX_{i,t} + \gamma_5 \times CapitalizedIntangibleInvestments_{i,t} + \Sigma\beta_s \times Controls_{i,t} + \varepsilon_{i,t}$. t-statistics are calculated by clustering standard errors by industry and year.

	Dependent variable					
	Tobin'sQ			Increase in future earnings		
	Estimate	*t*-statistics	*p*-value	Estimate	*t*-statistics	*p*-value
Intercept	0.897	11.000	<0.01	–0.152	–12.350	<0.01
R&D	7.968	21.890	<0.01	0.571	9.370	<0.01
Advertising	1.099	2.890	0.01	0.048	0.740	0.47
MainSG&AInvestments	1.868	33.680	<0.01	0.371	25.430	<0.01
CAPEX	–0.293	–2.940	0.01	0.126	11.030	<0.01
CapitalizedIntangibleInvestments	0.103	0.830	0.41	0.034	1.280	0.21
CurrentEarningsGrowth	0.002	1.710	0.10	0.000	3.500	<0.01
LossDummy	0.557	8.250	<0.01	0.073	9.330	<0.01
FinancialLeverage	–0.068	–7.350	<0.01	0.012	9.330	<0.01
LogSize×1,000	0.123	6.810	<0.01	0.006	4.750	<0.01
N			154,760			154,760
F-value			8,961			7,843.80
Probability			<0.001			<0.001
Adjusted *R*-squared			36.70%			33.64%
F-Tests						
Null ($\gamma_1 = \gamma_3$) rejected at *p*-value			<0.01			<0.01
Null ($\gamma_3 = \gamma_4$) rejected at *p*-value			<0.01			<0.01

TABLE 9
The uncertainty of future benefits of operating investments

All of the firm-year observations from 1970 to 2009 are classified by the Fama and French 48-industry method. Four industries representing the finance firms and one “almost nothing” category are excluded. The following regression is estimated on industry-year basis: $MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}$, where i = firm, Ind = industry, and t = year. All variables are defined in the Appendix. *MaintenanceMainSG&A* is calculated on a firm-year basis by $\beta_{1,Ind,t} \times Revenues_{i,t}$. *InvestmentMainSG&A* is calculated by subtracting *MaintenanceMainSG&A* from *MainSG&A*. *R&D*, *Advertising*, *CapitalizedIntangibleInvestments*, *CAPEX*, *FutureEarningsVolatility*, *IdiosyncraticVolatility*, and control variables are estimated on a firm year basis using methods described in the Appendix. R&D, Advertising, CAPEX, CapitalizedIntangibleInvestments, future earnings volatility, and idiosyncratic stock return volatility are estimated on a firm year basis using methods described in Appendix. We estimate the following regression to examine the uncertainty of future benefits of various categories of operating investments. $DependentVariable_{i,t} = \alpha + \gamma_1 \times R\&D_{i,t} + \gamma_2 \times Advertising_{i,t} + \gamma_3 \times MainSG\&AInvestments_{i,t} + \gamma_4 \times CAPEX_{i,t} + \gamma_5 \times CapitalizedIntangibleInvestments_{i,t} + \Sigma\beta_s \times Controls_{i,t} + \varepsilon_{i,t}$. t-statistics are calculated by clustering standard errors by industry and year.

	Dependent variable					
	FutureEarningsVolatility			***IdiosyncraticVolatility***		
	Estimate	***t*-statistics**	***p*-value**	**Estimate**	***t*-statistics**	***p*-value**
Intercept	0.095	8.130	<0.01	2.083	11.700	<0.01
R&D	0.465	27.230	<0.01	1.678	7.870	<0.01
Advertising	0.036	1.600	0.12	–0.349	–1.910	0.06
MainSG&AInvestments	0.086	19.420	<0.01	0.287	4.480	<0.01
CAPEX	–0.005	–0.950	0.35	–0.449	–5.600	<0.01
CapitalizedIntangibleInvestments	0.096	8.600	<0.01	0.715	3.510	<0.01
CurrentEarningsGrowth	0.000	0.730	0.31	0.030	0.880	0.38
LossDummy	0.099	21.900	<0.01	0.986	12.340	<0.01
FinancialLeverage	–0.003	–4.830	<0.01	0.069	5.160	<0.01
LogSize×1,000	–0.012	–7.490	<0.01	–0.200	–7.350	<0.01
N			154,760			130,433
F-value			8,799			5,655
Probability			<0.001			<0.001
Adjusted *R*-squared			36.24%			36.70%
F-Tests						
Null ($\gamma_1 = \gamma_3$) rejected at *p*-value			<0.01			<0.01
Null ($\gamma_3 = \gamma_4$) rejected at *p*-value			<0.01			<0.01

TABLE 10

The future benefits and the uncertainty of future benefits of operating investments, retaining only positive investments

All of the firm-year observations from 1970 to 2009 are classified by the Fama and French 48-industry method. Four industries representing the finance firms and one "almost nothing" category are excluded. The following regression is estimated on industry-year basis: $MainSG\&As_{i,t} = \alpha_{Ind,t} + \beta_{1,Ind,t} \times Revenues_{i,t} + \beta_{2,Ind,t} \times Dummy\_Revenue\_Decrease_{i,t} + \beta_{3,Ind,t} \times Dummy\_Loss_{i,t} + \varepsilon_{i,t}$, where *i* = firm, *Ind* = industry, and *t* = year. All variables are defined in the Appendix. *MaintenanceMainSG&A* is calculated on a firm-year basis by $\beta_{1,Ind,t} \times Revenues_{i,t}$. *InvestmentMainSG&A* is calculated by subtracting *MaintenanceMainSG&A* from *MainSG&A*. *R&D*, *Advertising*, *CapitalizedIntangibleInvestments*, *CAPEX*, *FutureEarningsVolatility*, *IdiosyncraticVolatility*, and control variables are estimated on a firm year basis using methods described in the Appendix. R&D, Advertising, CAPEX, CapitalizedIntangibleInvestments, future earnings volatility, and idiosyncratic stock return volatility are estimated on a firm year basis using methods described in Appendix. We estimate the following regression to examine the future benefits and the uncertainty of future benefits of various categories of operating investments, using the observations with non-negative values of *MainSG&AInvestments*. $DependentVariable_{i,t} = \alpha + \gamma_1 \times R\&D_{i,t} + \gamma_2 \times Advertising_{i,t} + \gamma_3 \times MainSG\&AInvestments_{i,t} + \gamma_4 \times CAPEX_{i,t} + \gamma_5 \times CapitalizedIntangibleInvestments_{i,t} + \Sigma\beta_s \times Controls_{i,t} + \varepsilon_{i,t}$. *t*-statistics are calculated by clustering standard errors by industry and year.

	Dependent variable					
	Increase in future earnings			***FutureEarningsVolatility***		
	Estimate	***t*-statistics**	***p*-value**	**Estimate**	***t*-statistics**	***p*-value**
Intercept	–0.211	–48.960	<0.01	0.0830	55.93	<0.01
R&D	0.454	11.920	<0.01	0.4650	86.49	<0.01
Advertising	–0.001	–0.010	0.99	0.0300	3.00	<0.01
MainSG&AInvestments	0.421	38.110	<0.01	0.0940	112.37	<0.01
CAPEX	0.135	20.910	<0.01	0.0080	3.75	<0.01
CapitalizedIntangibleInvestments	0.029	0.870	0.38	0.1150	20.80	<0.01
CurrentEarningsGrowth	0.000	0.460	0.65	0.0000	–1.58	0.115
LossDummy	0.084	23.250	<0.01	0.1090	93.78	<0.01
FinancialLeverage	0.013	11.990	<0.01	–0.0040	–13.13	<0.01
LogSize×1,000	0.008	13.240	<0.01	–0.0130	–54.34	<0.01
N			98,374			98,374
F-value			7,733			6,447
Probability			<0.001			<0.001
Adjusted *R*-squared			41.56%			37.10%
F-Tests						
Null ($\gamma_1 = \gamma_3$) rejected at *p*-value			<0.01			<0.01
Null ($\gamma_3 = \gamma_4$) rejected at *p*-value			<0.01			<0.01