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EXPLORING THE IMPACT OF ADVERISING ON BRAND EQUITY AND SHARHOLDER VALUE

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EXPLORING THE IMPACT OF ADVERTISING ON BRAND EQUITY AND SHAREHOLDER VALUE

by

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Dedication

This dissertation is dedicated to my parents, Mr. Soon-kyu Jeong and Ms. Kye-sun Cho, my wife, Eujeong Jeong, and my son, Victor Jeong.

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EXPLORING THE IMPACT OF ADVERTISING ON BRAND EQUITY AND SHAREHOLDER VALUE

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The primary objective of this research was to test whether advertising can contribute directly to brand equity and indirectly to shareholder value and, if it can, determine how much value advertising can deliver to brands and firms. If advertising can play a key role in developing and maintaining brand equity and shareholder value, it should be considered an investment rather than an expense.

Mainstream advertising effectiveness research has traditionally focused on the relationship between advertising and market performance measures such as sales volume and market share. Even though this approach has produced interesting findings on how advertising works or should work, its contributions to our knowledge about the role of advertising in a competitive, complicated, and ever-changing market environment has been limited.

The present research employed a conceptual framework by Srivastava and his colleagues (1998) in order to address posited relationships between advertising, R&D, brand equity, and shareholder value. Using secondary data from various industry and academic sources during a ten-year time span, simple and multiple regression analyses were performed in conjunction with path analyses to evaluate the posited relationships.

The findings of the research showed that advertising can not only work to improve market performance measures but also to develop and maintain brands. R&D was also found to positively affect brand equity by presumably enhancing a firm's intellectual market-based assets. With regard to the relative effectiveness of advertising and R&D, expenditures on R&D were more effective than expenditures on advertising in contributing to brand equity when measuring absolute effects of expenditures. When measuring changes in brand equity, however, changes in advertising were more effective than changes in R&D. Thus, R&D can be more important than advertising in contributing to the total value of brand equity, but advertising can be more effective than R&D in contributing to the marginal value of brand equity.

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CHAPTER 1: Introduction

> [I have] an emotional belief and an intellectual belief, yes advertising works, yes it builds my brands…. But there is not sufficient proof for me to get my paycheck out of it. Give me more proof so that I can make my paycheck out of it.
>
> – Retired Vice President, Marketing Firm

Mainstream advertising effectiveness research has traditionally focused on the relationship between advertising and other market performance measures such as sales growth, profits, and market share. This type of research typically is referred to as sales or market response analysis and frequently adopts a regression or logit model framework to study the relationship(s) among advertising, price, and promotional measures and purchasing behavior measures such as sales, market share, and brand choice (Rao 1986; Hanssens, Parsons, and Shultz 1990; Vakratsas and Ambler 1999).

Even though this research stream has shed some light on how advertising works or should work, its contributions to our understanding of the role of advertising in a competitive, complicated, and ever-changing market environment have been limited. For example, a group of marketing researchers in this area (Bass and Leone 1983; Clarke 1976; Srinivasan and Weir 1988) who employed market-level data to explore the long-term or carryover effects of advertising found that the duration of advertising effects depended on the data interval under study. Clarke (1976) and Assmus, Farley, and Lehmann (1984) suggested that 90 percent of advertising effects dissipate after three to fifteen months. Leone (1995) argued that the range of advertising effects should be

narrowed to six to nine months based on his study. However, Dekimpe and Hanssens (1995) concluded that the effects of advertising did not disperse within a year. These contradictory findings could be partially attributed to the different sources of data used in the studies (Vakratsas and Ambler 1999).

Another example of limitations of research in this area can be found among the studies by researchers who mainly analyzed individual brand-level data. These researchers found that advertising effects were dynamic and decreased during the product life cycle (e.g., Arora 1979; Parker and Gatignon 1995; Lodish, Abraham, Kalmenson, Livelsberger, Lubekin, Richardson, and Stevens 1995). However, Winer (1979) argued that although carryover effects of advertising decline over time, current advertising effects increase during the same period. Lodish and colleagues (Lodish et al. 1995) argued that, based on their study, short-term effects should be present before achieving the long-term effects of advertising. One study by Deighton, Henderson, and Neslin (1994) showed that the short-term effects of advertising disperse fast and short-term promotional effects were larger than the advertising effects.

In general, sales or market response research has made it more difficult to answer a long-standing question: "Is advertising an investment or an expense?" (Mergy and Lade 2001). Many academic researchers have argued that advertising should be treated as an investment because of its role in improving the long-term market performance of a firm (Chauvin and Hirschey 1993; Dean 1966; Dekimpe and Hanssens 1995; Graham and Frankenberger 2000; Hirschey and Weygandt 1985; Hula 1988). According to Robinson (1986), even though the duration of advertising effects is variable and difficult to

determine, it is long enough to meet the conditions required to be considered an investment because there is a positive effect of advertising on the market value of the firm (Chauvin and Hirschey 1993).

Simultaneously though, under pressure to produce immediate profits, managers still tend to view advertising as an expense and reduce advertising budgets in times of downturn, even though they recognize that advertising can be treated as an investment (Dean 1966; Hirschey and Weygandt 1985). One of the top marketing managers at a leading financial service firm mentioned that his company usually cuts advertising budgets first when it is having a problem in generating profits (Kuykendall, Gjertsen, and Raab 2002). In addition, IBM, one of the most famous and dominant high-tech advertisers in the world, has cut global ad spending 20 percent since 1999 as it wrestled with slowing growth and profit pressures (*AdAge* 2004). Therefore, the first step toward bridging what might be termed a gap between theory and practice is examining the long term and actual value of advertising from a perspective different from that of market performance.

The present research has four primary objectives. First, this research will explore the ultimate value of advertising, not only within the domain of marketing itself but also from a financial perspective. Such research is necessary because the role of advertising in a marketing context has been incompletely conceptualized. Since marketing activities may not only contribute to achieving traditional objectives such as increasing sales or market share but also to enhancing value for brands and firms, questions need to be asked from the standpoint of the long-term wealth of firms as well as from the viewpoint of

short-term market performance. Second, this research will empirically examine how much value advertising creates for brands as well as firms. The research will use secondary data acquired from various sources to examine the relationships among advertising, brand equity, and shareholder value. Third, this research will explore whether advertising should be treated as an investment from a managerial point of view in conjunction with research and development (R&D) expenditures. Finally, the present research will examine how other variables in a marketing context, such as sales, could affect the relationships among advertising, brand equity, and shareholder value.

SUMMARY

In sum, even though the traditional market or sales response analysis has found some important insights on how advertising works, there are still areas where studies need to be done to further knowledge about the effects of advertising in business organizations. In spite of what has been suggested in academia, many practitioners still consider advertising to be an expense rather an investment. They do not even seem to hesitate to cut advertising budgets when they are under pressure for profits or facing economic downturns. Therefore, in order to bridge the gap between theory and practice, the present research attempts an alternative way to evaluate the role of advertising in business organizations and shows what advertising can do for brands and firms.

The following chapter, Chapter 2, discusses traditional advertising effectiveness research findings and elaborates the controversial issue of whether advertising is an investment. Based on the review of literature, selected research questions and hypotheses

are proposed. Chapter 3 presents the research methodology and the operationalization of variables employed in the present research. Chapter 4 discusses the data analysis and presents the research results. In Chapter 5, the implications, limitations, and contributions of the research will be set forth.

CHAPTER 2: Literature Review

Chapter 2 first discusses the term "advertising" and examines the extant findings regarding conventional advertising effectiveness research. Based on this discussion, the issue of whether advertising is an investment or an expense is raised. It then suggests the conceptual framework for research that attempts to investigate advertising, market-based assets, and shareholder value in the context of the value of advertising in business organizations.

BACKGROUND

The term "advertising" can be simply defined as "the nonpersonal communication of information usually paid for and usually persuasive in nature about products, services, or ideas by identified sponsors through the various media" (Arens 2002, p. 7). There are three criteria in this definition. First, advertising must be paid for by identified clients or sponsors. If an advertisement is created and placed in the media, the costs of creation and time or space in the media must be paid. This is a major area in which advertising is different from public relations. "Identified sponsors" means whoever is putting out the advertisement tells the audience who they are in order to prevent the audience from misunderstanding the advertised message (O'Guinn, Allen, and Semenik 1998).

Second, advertising must be delivered to the audience by the various media. These media are the nonpersonal channels of communication that people use. They include newspapers, magazines, radio, television, billboards, and so forth. This criterion

emphasizes the nonpersonal communication aspect of advertising, which differentiates it from other types of personal communications (Arens 2002). Third, advertising must attempt to persuade. The fundamental purpose of advertising is to identify and differentiate one product or service from another in order to persuade potential buyers to purchase that product or service (Hovland and Wilcox 1989; O'Guinn, et al. 1998).

Advertising effectiveness research is conventionally divided into two types. One type focuses on behavioral responses to advertising. The other is a marketing manager's perspective on advertising as a strategic option. While the behavioral perspective of advertising effectiveness research usually concerns how people perceive, process, respond to, and use advertising in making purchasing decisions for a product or service, the managerial perspective on advertising effectiveness research probes how managers can strategically use advertising to communicate the value of products or services to potential buyers.

However, these two seemingly different areas of research are closely related and actually must be coordinated to maximize firms' market performance, which is conventionally operationalized as firm sales or profits. Better understanding of potential buyers is the first step in developing advertising strategies, and advertising strategies developed by managers can influence buyers' behavior in the market. Even though these two areas of study are essential to understand how advertising functions in business organizations, the interest of the present research lies in how much advertising can do to create value for brands and firms from the managers' point of view.

RESEARCH ON ADVERTISING EFFECTIVENESS

Since the first formal advertising model, AIDA (Attention-Interest-Desire-Action) was introduced by E. St. Elmo Lewis in 1898 (Strong 1925), the effectiveness of advertising has been an issue in marketing (Borden 1952). Marketing managers have shown tremendous interest in forecasting sales, and in response, academic researchers, mainly economists or statisticians, examined the role of advertising in forecasting sales by adopting econometric methods such as single equation models with cross-sectional data or simultaneous equation models with time-series data (Telser 1962; Palda 1964; Quandt 1964; Bass 1969). For example, Telser (1964) used simultaneous equation models with time-series data from three different cigarette brands marketed in the United States to explore the relationship between advertising and sales.

Because this research primarily focuses on market or sales response to advertising, it has been referred to as market or sales response analysis (Vakratsas and Ambler 1999). During the 1960s, researchers tried various statistical models to find the one best able to explain advertising-sales relationships, but they could not come to a general consensus. Those studies seemed to bring up more questions than answers in that they showed that advertising-sales relationships could be influenced by other marketing activities of the firm and/or competitors as well as exogenous variables such as population and income (Telser 1962; Palda 1964; Quandt 1964). In Telser's (1962) study, he found that there were different levels of return on advertising depending on the cigarette brand and when data were collected (Telser 1962). He suggested that managers should consider other variables, such as the economic condition and the level of

competition in the market when estimating the effect of advertising on sales (Telser 1962, 1964). Quandt (1964) also argued in his study employing both cross-sectional and time-series models that economic variables such as disposable income and geographic-demographic variables such as education should be considered exogenous variables that can affect the relationship between advertising and sales.

In spite of the lack of the agreement on statistical methods and the prevalence of unreliable data in the econometric analyses of the 1960s (Quandt 1964), marketing efforts in business organizations were intuitively believed to influence market performance measures. Consequently, the market response analysis approach has been continuously used by many academic researchers. Since the 1970s, with more reliable data and improved statistical programs, this research stream has diversified and begun to look at other marketing mix variables, such as sales promotion measures, and other market performance variables, such as market share (Bass and Clarke 1972; Rao and Miller 1975). Compared with studies done before the 1970s, as marketing managers in business organizations faced more specific issues such as ROI (return on investment) on marketing variables and needed to manage them strategically, more marketing researchers were involved in doing research with the market response analysis approach (Assmus et al. 1984; Leone and Shultz 1990; Lodish et al. 1995; Sethuraman and Tellis 1991; McDonald 1992; Parker and Gatignon 1996).

The market response analysis approach generally relates advertising as well as price and promotional measures directly to market performance measures such as sales, market share, and brand choice (Vakratsas and Ambler 1999). Some studies adopting

market response models, in the quest to understand advertising effectiveness, dealt with market-level data such as brand advertising expenditures and brand sales or market share (Bass and Clarke 1972; Rao 1975; Blattberg and Jeuland 1981; Hanssens et al. 1990). Others examined individual-level data such as the number of exposures for an individual and individual brand choice (Tellis 1988; Pedrick and Zufryden 1991; Deighton et al. 1994).

Like the earlier studies, these studies resulted in questionable and conflicting findings even though they revealed more advanced and in-depth knowledge about the role of marketing efforts. For example, Leone (1995) suggested that advertising's effects on sales would disperse after six to nine months instead of earlier estimates (Assmus, Farley, and Lehmann 1984) of three to fifteen months. In contrast, Winer (1979) suggested that even though carryover effects would decline over time, current advertising effects would increase during the same period. Dekimpe and Hanssens (1995) argued that the effects of advertising did not dissipate within a year. One study employing a meta-analysis of 389 real world split cable TV advertising experiments by Lodish and colleagues (Lodish, Abraham, Kalmenson, Livelsberger, Lubekin, Richardson, and Stevens 1995) revealed that increased advertising weight increased the sales of established brands in only 33 percent of the cases investigated (55 percent for new brands). According to Vakratsas and Amber (1999), it is generally believed that the effects of advertising on sales are low, with elasticities typically in the range of 0 to .2, and that the effects of short-term promotions are larger than those of advertising (Deighton et al. 1994; Tellis 1988). The results of these studies appear to be largely

dependent on the product or product category investigated or the data used in the research (Vakratsas and Amber 1999).

However, even though, to some extent, the traditional view of the role of advertising in market (sales) response analysis has contributed to explaining the relationship between advertising and sales within business organizations, there is still no consensus regarding the relationship between advertising and sales. Because other marketing variables such as sales promotion can affect the advertising-sales relationship (Neslin 2002), the results of studies done by marketing researchers are not consistent enough to draw a clear conclusion about this relationship (Vakratsas and Amber 1999).

IS ADVERTISING AN INVESTMENT?

A key research issue for more than 40 years has been whether advertising is an investment or an expense (Dean 1966). Researchers from disciplines such as economics, management, finance, and accounting have explored this issue (Chauvin and Hirschey 1993; Dean 1966; Dekimpe and Hanssens 1995; Hirschey and Weygandt 1985; Hula 1988). In general, studies have focused on the relationship between advertising expenditures and financial performance measures such as stock returns and ROI on advertising over a period of several years, while mainstream advertising effectiveness research in marketing has probed the relationship between advertising and market performance measures in relatively shorter time periods (Hanssens, Parsons, and Shultz 1990).

Dean's (1966) definition of an investment compared to an expense elucidates the difference between research outside marketing and the traditional mainstream advertising effectiveness research in marketing:

> An investment is an outlay made today to achieve benefits in the future. A current expense is an outlay whose benefits are immediate. The question is not how the outlay is treated in conventional accounting, how it is taxed, or whether the asset is tangible or intangible. The hallmark of an investment is futurity (Dean 1966, p. 16).

Dean (1966) argued that promotional investments have distinctive traits of corporate investments. Most promotional investments have an indeterminate economic life. In other words, benefits from promotional investments may not be immediate but can last longer than anyone would expect. The benefits streams of promotional investments also have irregular and diverse time-shapes (Dean 1966). In spite of slight differences in empirical findings regarding the magnitude of the contribution of advertising to firms' financial performance, it is generally accepted that advertising plays a role in enhancing firms' financial performance in the long run and, therefore, advertising should be treated as an investment.

For example, Hirschey and Weygandt (1985) showed, using Fortune 500 companies in 1977, that there is a positive effect of advertising on the market value of the firm. They suggested that advertising expenditures should be considered an investment rather than an expense. Using Compustat data, Chauvin and Hirschey (1993) also recognized positive effects of advertising on the market value of the firm. In addition,

Robinson (1986) found that even though the duration of advertising effects is variable and difficult to determine, it is long enough to meet the conditions required to be considered an investment. Even though other variables such as firm profitability (Erickson and Jacobson 1992) and competitors' reactions (Hula 1988) may affect the relationship between advertising and a firm's financial performance, there has been a general consensus in business research that advertising is an investment.

However, despite these academic findings emphasizing the investment nature of advertising, many marketing managers still tend to see advertising as a kind of expense under their control for meeting marketing objectives. The positive relationship between advertising and the market value of a firm may not be sufficient to change their perceptions of advertising because of the pressure to deliver short-term profits (Kuykendall, Gjertsen, and Raab 2002; *AdAge* 2004). Unless the benefits of advertising are sufficiently comprehensive and tangible to marketing managers, they will continue to consider advertising an expense rather than an investment for brands and firms.

ADVERTISING, MARKET-BASED ASSETS, AND SHAREHOLDER VALUE

Since academic researchers have not been able to provide a comprehensive explanation of the advertising-sales relationship with market response analysis, a reexamination of the role of advertising is warranted at this time. Should advertising always be related to market performance measures? If it should, how can we explain advertising that supposedly builds brand image instead of selling products? Is there any different way to analyze the value of advertising inside and/or outside of a marketing

context? Can advertising function as a value-generator rather than a resource-sink for firms and their brands? Can we empirically show marketing managers that advertising is an investment?

The alternative framework this dissertation will use to explore these questions is based on a theoretical contribution by Srivastava, Shervani, and Fahey (1998) emphasizing the marketing-finance interface. Even though the concept of the interface of marketing and finance is not new (Anderson 1979), the actual application of this notion in both academe and practice was not recognized in the marketing community until Day and Fahey (1988) asserted the importance of replacing traditional market performance measures such as market share or sales with measures that capture the capability of marketing activities to enhance shareholder value. However, due to the difficulties of identifying, measuring, and communicating the financial value created by marketing activities within business organizations, study of the marketing-finance interface to illuminate the ultimate effects of marketing activities in enhancing values for brands and firms has been, to some extent, ignored in the marketing community (Srivastava et al. 1998).

Srivastava, Shervani, and Fahey (1999) suggested that the traditional assumptions regarding marketing activities within business organizations should be rethought and amended to reflect the current and somewhat revolutionary changes in measuring the success or failure of marketing activities. Anderson (1979) highlighted the importance of new measures of firm performance in marketing as follows:

> Too often marketing tends to focus on sales growth and market share, and it fails to recognize the impact of marketing decisions on such variables as inventory levels, working capital needs, financing costs, debt-to-equity ratios, and stock prices. To assume such factors are purely the responsibility of finance is to be guilty of a kind of marketing myopia not less damaging than that originally envisioned by Levitt (Anderson 1979, p. 328)

Fortunately, some marketing managers have recently decided that the impact of marketing activities should not be limited to market performance measures but extended to shareholder-based measures because they realize that positive market performance measures do not necessarily result in the financial well-being of business organizations (Srivastava et al. 1998).

MARKET-BASED ASSETS

Given the approach of adopting the interface of marketing and finance in measuring the effect of marketing activities, according to Srivastava and his colleagues (1998), the ultimate purpose of marketing activities should be to enhance shareholder value by "cultivating and leveraging market-based assets" (p. 2). The term "asset" can be defined broadly as any physical, organizational, or human attribute that enables the firm to generate and implement strategies that improve its efficiency and effectiveness in the marketplace (Barney 1991), even though there is much debate in the management, marketing, finance, and economics literatures as to what constitutes an asset (Mahoney and Pandian 1992).

Market-based assets consist of two related types: relational and intellectual (Srivastava et al. 1999). Such assets are mainly external to the firm, generally do not appear on the balance sheet, and are largely intangible (Hall 1993). Even so, these assets can be "developed, augmented, leveraged, and valued" (Srivastava et al. 1998, p.4) in order to contribute to values for consumers and firms (Hunt and Morgan 1995).

Relational market-based assets are usually outcomes of relationships between a firm and key outside stakeholders, such as distributors, retailers, end customers, and other strategic partners (Sheth and Parvatiyar 1995). Two examples suggested by Srivastava and colleagues (1998) that can play a key role in enhancing relational market-based assets are brand equity and channel equity. Brand equity is defined as the marketing effects or outcomes that accrue to a product with its brand name compared with those that would accrue if the same product did not have the brand name (Aaker 1991; Keller 1993; Ailawadi, Lehmann, and Neslin 2003). Extensive advertising and superior product quality can result in brand equity. Channel equity, also known as relationship equity, can be defined as the outcomes or effects of unique, long-standing, and successful business relationships between a firm and key channel members (Srivastava et al. 1998).

Intellectual market-based assets consist of the types of knowledge or information a firm possesses about the market environment, such as information about competitors, customers, and channels (Glazer 1991; Srivastava et al. 1998). Based on this knowledge or information, a firm can develop its own strategy to deal with the strengths and weaknesses of its products or services and with opportunities and threats within the environment. Research and development (R&D) can help a firm acquire information or

knowledge to develop a new product or service. Research and development can enhance intellectual market-based assets and, in turn, develop marketing strategies to compete with other competitors in the market (Hirschey and Weygandt 1985; Hula 1988; Erickson and Jacobson 1992; Frels, Shervani, and Srivastava 2003). These marketing strategies can result in value for the brand and the firm.

The term, "research and development," consists of two terms: research and development. Research, as formally defined by the National Science Foundation, is "Systematic intensive study directed toward fuller scientific knowledge of the subject studied" (Weidenbaum 1961, p.38). Weidenbaum (1961) stated that development is "the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, methods, and process" (p. 38).

R&D is considered a discretionary expenditure influenced by a firm's financial situation. Firms allocate their limited resources among the fundamental processes of generating value, mainly between creating and appropriating value and, therefore, trade-offs occur between developing value creation capabilities and developing value appropriation capabilities (Erickson and Jacobson 1992). According to Mizik and Jacobson (2003), a firm's technology capability driven by R&D expenditures has been linked to value creation, whereas a firm's ability to differentiate its offering through advertising has been linked to value appropriation. Advertising tends to have a greater association with value appropriation efforts and R&D has a greater association with value creation. In this regard, the decision-making process for R&D expenditures is closely related to that of advertising expenditures.

These relational and intellectual market-based assets can intertwine to create a unique competitive edge for the firm in the marketplace (Srivastava et al. 1998). For example, stronger customer relationships could be created when a firm uses knowledge about buyer needs and preferences to build long-term relationship bonds with external entities such as customers and distributors (Srivastava et al. 1998). The importance of these market-based assets has been also emphasized by other researchers in marketing. Brand equity (Aaker 1991; Keller 1993, 1998; Shocker et al. 1994), customer satisfaction (Anderson and Sullivan 1993; Fournier and Mick 1999), and the management of strategic relationships (Anderson and Narus 1996; Garbarino and Johnson 1999; Morgan and Hunt 1994) are the underlying concepts of market-based assets, whether relational market-based assets, intellectual market-based assets, or both.

Unlike other tangible assets in business organizations, such as plant and equipment, raw materials, and finished products, the value of market-based assets is hard to measure and does not appear on the balance sheet. For these reasons, many firms still consider expenditures for marketing activities an expense rather than an investment. However, market-based assets can also function in the exact same way as any other tangible asset that is believed to be an investment, doing so by way of "lowering costs, attaining price premiums, generating competitive barriers, providing a competitive edge by making other resources more productive, and providing managers with options" (Srivastava et al. 1998, p. 6).

SHAREHOLDER VALUE

A firm's market-based assets can enhance shareholder value by improving market performance through helping a product or service penetrate markets faster, getting price premiums, making brand extensions easier, lowering costs for sales and service, and/or obtaining higher customer loyalty and retention (Srivastava et al. 1998). Shareholder value is composed of the present value of cash flows during the value growth period and the long-term, residual value of the product/business at the end of the value growth period (Day and Fahey 1988; Rappaport 1986). Better market performance based on superior market-based assets can accelerate and enhance cash flows, reduce volatility and vulnerability of cash flows, and increase the residual value of cash flows that, in turn, generate higher shareholder value (Srivastava et al. 1999). Therefore, benefits generated by market-based assets are unique and essential to enhancing shareholder value.

THE IMPACT OF ADVERTISING ON MARKET-BASED ASSETS AND SHAREHOLDER VALUE

Brand equity is the core concept of this dissertation research because it can influence customer relationships and partner relationships, which are major forms of market-based assets. The specific effects of brand equity could be either consumer-level outcomes such as attitude awareness, image, and knowledge, or firm-level outcomes such as market share, price, revenue, and cash flows (Ailawadi et al. 2003). The two perspectives of brand equity are linked since firm-level outcomes, such as incremental

cash flow, are the aggregated consequences of consumer-level effects, such as image and attitude (Aaker 1991; Keller; 1993; Srivastava et al. 1999).

Brand equity is generally believed to be the outcome of marketing and R&D efforts for a product (Keller 1998; Srivastava et al. 1998). According to Leuthesser (1988), from the firm's perspective, brand equity can be the incremental cash flows resulting from the product with the brand name compared with the product without the brand name. From the consumer's perspective, brand equity can be a utility, loyalty, or differentiated clear image not explained by product attributes.

Advertising can play a key role in achieving superior brand equity by communicating with potential customers (Ailawadi et al. 2003; Srivastava 1998). R&D can also contribute to brand equity by helping a firm be equipped with knowledge and information about customers and competitors to survive in the market. Knowledge and information are essential to develop new products and services which can bring superior brand equity. This knowledge and information sometimes can be acquired through the relationships built around a firm's customers and channel members (Srivastava et al. 1998).

Even though all marketing efforts may be important, it is believed that the role advertising plays is superior to that of other forms of marketing efforts in building and maintaining brand equity (Aaker 1991; Keller and Aaker 1992; Keller 1998; Ailawadi et al. 2003). As a testament to the importance of advertising to build and maintain brand equity, top consumer product companies usually allocate a significant amount of their

budgets to advertising, often between 10 to 15 percent of sales every year (Herremans, Ryans, and Aggarwal 2000).

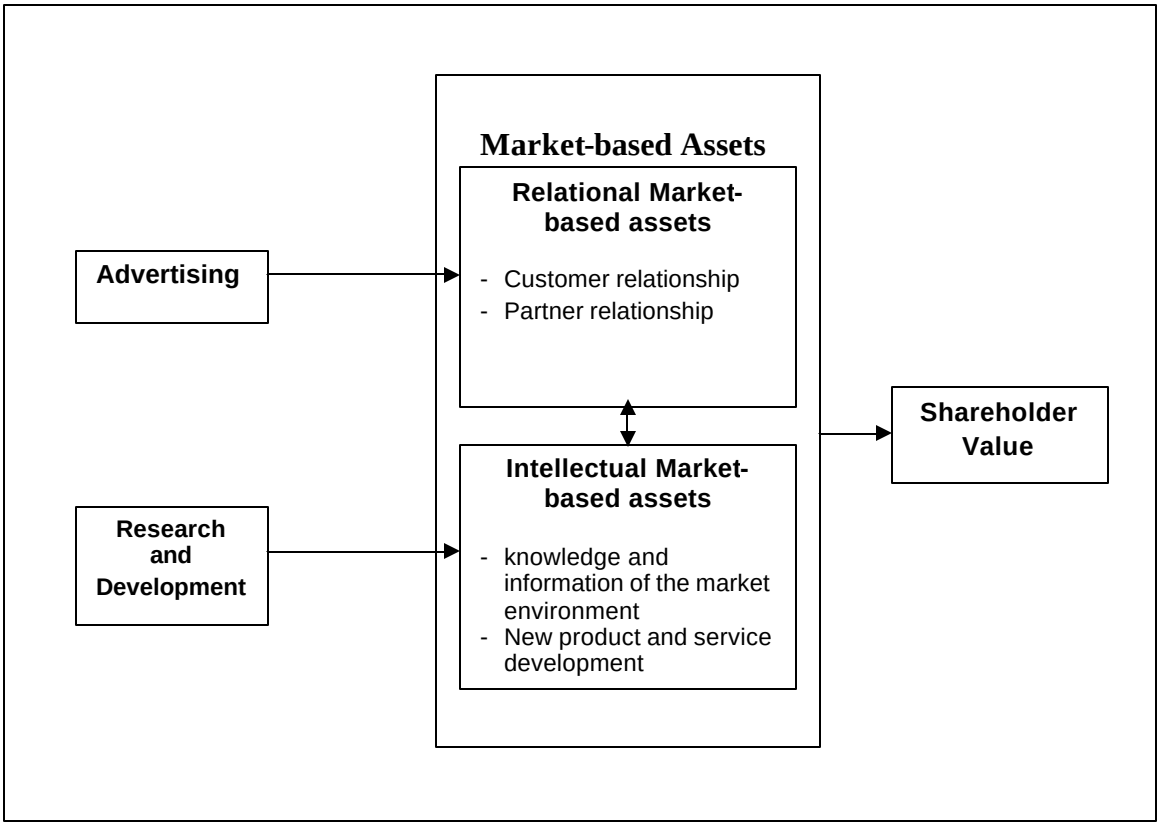
What can advertising do to enhance market-based assets and, ultimately, increase shareholder value, and how does this happen? First, advertising can influence relational market-based assets by improving customer relationships. Customer relationships are mainly created on the basis of value delivered to customers. Customers perceive higher value for a certain brand when it can provide unique and superior product functionality, features, and quality as well as wider availability, greater ease of use, and better reputation and image (Srivastava et al. 1998). Advertising communicates these elements of brand value to customers, and it helps marketing managers build, increase, and maintain customer relationships with the brand. This brand value contributes to brand equity (Keller 1998; Srivastava and Shocker 1991).

Brand equity is generated when customers have a high level of awareness and familiarity with the brand and hold some strong, favorable, and unique brand associations in memory (Keller 1998). A brand with significant equity can result in customers being more accepting of a new brand extension, less sensitive to price increases, and more willing to seek the brand in a new distribution channel (Keller 1993).

Brand equity can also reinforce partner relationships with other external entities such as retailers and distributors. Distribution channels are willing to cooperate with firms that maintain high brand equity across their brand portfolios, and other strategic partners may also be interested in co-branding with these brands (Srivastava et al. 1998). Therefore, advertising can play a key role in increasing the value of market-based assets

by creating brand equity, which can function as a stepping stone between advertising and shareholder value. Incorporating brand equity with a conceptual framework may provide a comprehensive structure for exploring the ultimate utility of advertising in business organizations. The relationship of three important components – advertising, market-based assets, and shareholder value – is portrayed in Figure 1.

Figure 1: Conceptual Framework



As seen in Figure 1, advertising is directly related to the relational market-based assets, which include customer relationships and partner relationships. The customer and partner relationships are the important elements to develop and maintain the relational

market-based assets, one of the two types of market-based assets. Likewise, R&D also influences brand equity by keeping the firm updated with information and knowledge about the market environment, which is an example of intellectual market-based assets. This type of information and knowledge about customers, channel members, and competitors are a firm's main sources for developing new products and services. New products and services are typical outcomes of a firm's R&D efforts.

These two types of market-based assets, relational market-based assets and intellectual market-based assets, are developed and maintained by brand equity. It is argued that brand equity captures the essence and value of market-based assets because a firm with unique market-based assets usually has superior brand equity. These two kinds of market-based assets can interact with each other to generate and enhance shareholder value.

RESEARCH QUESTIONS

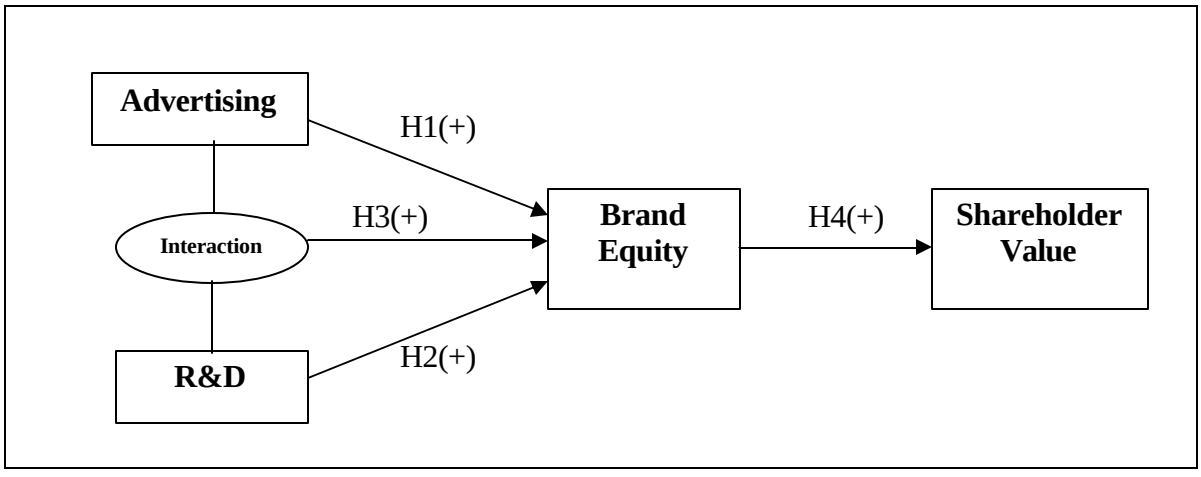
This dissertation examines the financial impact of advertising on market-based assets and the relationship between market-based assets and shareholder value. The primary question addressed is, "How much value can advertising deliver to brands and firms?" In other words, the purpose of the research reported in this dissertation is to know whether advertising can play a key role in developing market-based assets and in turn, financially contribute to the wealth of firms. If advertising is a significant factor in explaining the development of market-based assets and shareholder value, it should be considered an investment rather than an expense. The interaction effect between

advertising and R&D in contributing to shareholder value is also explored. In addition, the relative effectiveness of advertising and R&D expenditures is explored to determine whether advertising is more effective than R&D in creating brand equity. Finally, the dissertation will explore other variables in a marketing context such as sales and operating profits to see if they have any effect on market-based assets and shareholder value in this framework.

Hypotheses

The specific hypotheses investigated in this dissertation are shown graphically in Figure 2. They are discussed in more detail below. For the expository purpose, the terms, advertising expenditures, R&D expenditures, and brand value estimates are interchangeably used with advertising, R&D, and brand equity respectively unless specified otherwise.

Figure 2: Hypotheses



Advertising

Advertising plays a key role in communicating product availability, features, and benefits, and building a firm's image. Brand image generated by advertising in turn contributes to brand equity (Srivastava and Shocker 1991; Keller 1998) by improving brand awareness and cultivating favorable brand attitudes (Aaker 1991; Keller 1993). Advertising, as a variable that can play a vital role in the process of creating brand value, can be analyzed in two ways: absolute expenditures and changes in expenditures. The present research is not only interested in absolute advertising expenditures but also in changes in advertising expenditures that can explain the marginal effect of advertising on brand equity. It is possible there might be differences between these two different ways of measuring the effects of advertising. Therefore, hypotheses regarding advertising in the process of creating brand value can be stated as follows.

H1a: There is a positive relationship between gross advertising expenditures and brand equity.

H1b: There is a positive relationship between changes in advertising expenditures and changes in brand equity.

Research and Development

Research and development (R&D) also can have a positive effect on brand equity and shareholder value by improving intellectual market-based assets. Well-managed intellectual market-based assets can generate higher shareholder value by providing

information necessary for developing new technology and stimulating new product and service development. This R&D can also be examined in two ways: gross R&D expenditures and changes in R&D expenditures. Like advertising, hypotheses on R&D as an element in creating brand equity can be summarized as follows.

H2a: There is a positive relationship between gross R&D expenditures and brand equity.

H2b: There is a positive relationship between changes in R&D expenditures and changes in brand equity

Interaction between Advertising and R&D

Using data from the pharmaceutical industry, Vinod and Rao (2000) argued that there is a positive relationship between R&D intensity and promotion intensity (mainly advertising intensity) and confirmed a complementary relationship between promotion and R&D. They showed that promotional intensity is highly responsive to R&D intensity when evaluated at the mean values of promotion intensity and R&D intensity and concluded that promotion and R&D are complements rather than substitutes. Even though this research used data from one specific industry, Vinod and Rao (2000) proposed that their research framework could be applied to R&D-intensive industries such as the high-tech industry.

Advertising can spur research and development by expanding new product demand. If a firm believes that its past advertising is an intangible asset creating

consumer loyalty transferable to new products that the firm may develop, or if a firm believes that it will have sufficient funding and creativity to advertise new products effectively once they are developed, the perceived demand for the new products will be greater and the development and introduction of new products are more likely to happen. So the firm's current total advertising spending and the amount of advertising it expects to devote to promoting new products once they are developed can both be expected to influence how much R&D firms undertake (Hula 1988; Vinod and Rao 2000). R&D can also stimulate advertising because new products coming out of R&D need to be advertised. Therefore, R&D and advertising work in tandem to enhance market-based assets by generating knowledge assets that allow the firm to develop superior products and communicate their values and benefits to consumers. Therefore, Hypothesis 3 can be formulated as follows.

H3: The interaction between advertising and R&D has a positive effect on brand equity.

Brand Equity and Shareholder Value

Advertising can enhance competitive customer relationships and partner relationships through unique values delivered to firm stakeholders such as buyers and channel members (Srivastava et al. 1998, 1999). The relationships with customers and partners are essential characteristics of relational market-based assets. Therefore, a firm's advertising can improve relational market-based assets by communicating its efforts with

a firm's stakeholders. One of the key roles advertising plays in the market is to increase brand awareness and promote favorable brand attitudes. Thus, advertising can contribute to developing and maintaining relational market-based assets by communicating with customers and partners (Srivastava et al. 1998).

R&D can influence and accelerate the development of new products and services by utilizing information and knowledge about the market environment. Information and knowledge about the market environment are typical examples of intellectual market-based assets and new products and services are outcomes of a firm's intellectual market-based assets that are influenced by a firm's R&D efforts.

Brand equity comes from customer brand name awareness, brand loyalty, perceived brand quality, and favorable brand symbolism and associations that provide a platform for a competitive advantage and future earning streams (Aaker 1991; Kerin and Sethuraman 1998). It is believed that brand equity can be a surrogate measure of market-based assets in the present research because a firm with superior market-based assets is more likely to have high brand equity, and brand equity works as an intangible firm asset in improving market performance the way market-based assets do.

These two elements of market-based assets, relational market-based assets and intellectual market-based assets, can increase shareholder value by improving market performance, which can accelerate and enhance cash flows, reduce the volatility and vulnerability of cash flows, and increase the residual value of cash flows (Srivastava et al. 1998; Frels et al. 2003).

In addition, Kerin and Sethuraman (1998) suggested in their award-winning paper in *the Journal of the Academy of Marketing Science* that there is a strong and positive relationship between brand value and shareholder value using two-year observations of brand value estimates by *Financial World* as a proxy for brand value and two-year observations of M/B ratio as a proxy for shareholder value. Therefore, the relationship between brand equity and shareholder value, Hypothesis 4, is hypothesized as follows.

H4: There is a positive relationship between brand equity and shareholder value.

Advertising vs. R&D

Advertising and R&D are interdependent. In general, advertising and R&D are believed to compete for available funds in business organizations (Vinod and Rao 2000). Firms allocate their limited resources to the fundamental processes of generating value, mainly between creating value (innovating, producing and delivering new products to the market) and appropriating value (making profits in the marketplace) and, therefore, trade-offs occur between advertising and R&D (Mizik and Jacobson 2003).

According to Mizik and Jacobson (2003), the superior market performance resulting from a sustainable competitive advantage is the outcome of the firm's two main types of capabilities: superior customer-value creation capabilities and value appropriation capabilities. The value creation process is closely linked to a firm's R&D activities, whereas the value appropriation process is basically related to a firm's advertising activities. Mizik and Jacobson (2003) found that the stock market reacts

favorably when a firm increases its emphasis on value appropriation relative to value creation. This suggests that advertising has more capabilities than R&D to enhance brand equity and, in turn, shareholder value. Therefore, in terms of the relative effectiveness of advertising and R&D, Hypothesis 5 can be stated as follows.

H5: Advertising is more effective than R&D in contributing to brand equity.

Other Variables

This section explores other variables that may affect the conceptual framework of the dissertation or the results of the dissertation research. Variables used in traditional market response model analyses are examined to see if they have an effect on the relationships between advertising, brand equity, and shareholder value. These variables include industry effects (consumer products vs. business-to-business products) and product category effects (service firms vs. product firms).

Industry and Product Category Effects

The intensity of advertising, which is defined as advertising expenditures as a proportion of firm sales (Balasubramanian and Kumar 1990; Chan, Lakonishok, and Sougiannis 2001; Mizik and Jacobson 2003), can vary across different industries and product categories. According to Balasubramanian and Kumar (1990), consumer product firms (firms selling products to end consumers) are believed to spend more on advertising than business-to-business product firms (firms selling products to other firms). Top consumer product firms usually spend between 10 and 15 percent of sales on advertising,

whereas business-to-business product firms usually spend less than 5 percent of sales on advertising (*AdAge* 2001). Consumer product firms typically have broad target markets for their products, and they are more likely to rely on the mass-mediated format of marketing communications in their attempts to persuade consumers, whereas business-to-business product firms typically have more focused targets, and they are more likely to take advantage of customized marketing communications such as direct marketing and sales persons to influence a target's purchasing decisions.

In terms of product category effects of advertising, Zinkhan and Cheng (1992) found that firms selling services spend less on advertising than their counterparts selling products. In addition, Zinkhan and Cheng (1992) suggested that the average increase of the AP/S (the ratio of advertising and promotional expenditures to sales) is higher in the product market than in the service market. It is possible that product firms can better use advertising to deliver value to potential customers by communicating the quality or the performance of products than can service firms. In addition, product firms may have more chances to accommodate potential customers' needs and wants by developing and launching new products, and therefore reinforcing the relationships with potential customers by communicating the quality of these products. Consequently, it is more likely that product firms can take advantage of advertising in creating brand equity than can service firms.

In sum, the effect of advertising in creating brand equity for business-to-business product firms tends to be less prominent than for consumer product firms and the effect of advertising for product corporate brands is more salient than for service corporate

brands in developing brand equity. Regarding the industry and category effects of advertising, Hypothesis 6 and Hypothesis 7 can be stated as follows.

H6: Advertising contributes more to brand equity for product firms than for service firms.

H7: Advertising contributes more to brand equity for consumer product firms than for business-to-business product firms.

SUMMARY

To summarize, this chapter started with a definition of the term "advertising" and reviewed the important elements of advertising. The rest of the chapter was dedicated to examining the literature on the effectiveness of advertising, the role of advertising in business organizations, and the relationships between advertising, brand equity, and shareholder value, and developing a conceptual framework that culminated in hypotheses related to each of the three variables of interest. The methodology described in the next chapter contains a further discussion of each of these variables, their operationalizations, and the data and analyses used to test the hypotheses proposed in this chapter.

CHAPTER 3: Methodology

This chapter presents the research methodology used to test the hypotheses developed in Chapter 2. To facilitate the discussion of the methodology, this chapter has been divided into two broad sections: operationalizations of variables and data collection. First, the variables used in the present research are discussed in detail and their respective operationalizations are described. In addition, the issue of the unit of analysis, which may cause problems in data analysis, is discussed. Next, the data sources and method of collecting data are presented and the criteria followed when selecting firms to investigate are discussed.

OPERATIONALIZATIONS OF VARIABLES

Advertising

As discussed before, many market response models probing into the relationship between advertising and market performance measures can be classified either into aggregate-level or individual-level models based on the data used. Aggregate-level data include sales or market share; individual-level data are measures such as brand choice (Vakratsas and Ambler 1999). Most aggregate-level studies incorporating a quantitative methodology have traditionally utilized advertising expenditures in their analysis (Balasubramanian and Kumar 1990; Ailawadi, Farris, and Parry 1994; Zinkhan and Cheng 1994; Herremans et al. 2000; Yoo and Mandhachitara 2003; Ailawadi et al. 2003; Mizik and Jacobson 2003). Even though the present research develops a non-traditional

approach to shed light on the effects of advertising in business organizations, the best method of quantifying "advertising" is believed to be using actual expenditures on advertising by firms. Therefore, advertising is operationalized and measured as firms' actual annual expenditures on advertising.

Research and Development

An extensive literature in economics has documented a significant positive effect of Research and Development (R&D) on economic growth and productivity (Solow 1957). Denison (1962) reported that approximately 40 percent of the total increase in per capita national income was attributable to technological change. In spite of a slight difference in estimates of R&D effects, Griliches (1995) showed that all recent studies of R&D continuously report significant returns from it. It is believed that firm value can be created both through product innovations and process innovations by a firm, which are outcomes of a firm's R&D efforts (Mansfield, Rapport, Romeo, Wagner, and Beardsley 1977). Therefore, like most studies of R&D (Weidenbaum 1961; Vinod and Rao 2000; Mizik and Jacobson 2003; Chan, Lakonishok, and Sougiannis 2001), R&D is measured as the actual annual expenditures on research and development.

Brand Equity

As discussed above, brand equity is an intangible firm asset and has an economic value in the sense that a firm with high brand value products is worth more than a firm without them (Aaker 1991, 1996; Keller 1993). Brand equity comes from customer brand name awareness, brand loyalty, perceived brand quality, and favorable brand symbolism and associations that provide a platform for a competitive advantage and future earning

streams (Aaker 1991; Kerin and Sethuraman 1998). Even though there are some differences among marketing researchers in the domain of branding in terms of specific operationalizations of brand equity (Keller 1998), the most commonly mentioned one is brand value (Srivastava and Shocker 1991). Brand value depends on management's ability to leverage brand strength through tactical and strategic actions to provide superior current and future cash flows and lowered risks (Srivastava and Shocker 1991).

Conceptually, according to Kerin and Sethuraman (1998), the estimation of brand value consists of two related steps. The first step consists of isolating and assessing the incremental future earnings and cash flows attributed to a brand relative to its weak-branded or unbranded counterpart. The second step consists of capitalizing these incremental future earnings and cash flows at a risk-adjusted cost of capital to arrive at a net present brand value. This value shows the financial worth of a brand to its current owner and for its current use (Simon and Sullivan 1993; Haigh and Perrier 1997).

The most widely accepted brand valuation methodology is the approach used by the Interbrand Group (Kerin and Sethuraman 1998). This approach views brand value as the product of two quantities. One is a brand's two year weighted average annual net pretax operating earnings, adjusted to exclude the earnings assumed to arise from an equivalent unbranded product, and the other is a "Price-Earnings (PE) Multiple" (or discount rate), which represents the brand's strength (Srivastava et al. 1998; Kerin and Sethuraman 1998).

The key to Interbrand's valuation methodology is that brand strength determines the multiple applied to brand earnings or a discount rate used to capitalize future cash

flows (Srivastava et al. 1998; Kerin and Sethuraman 1998; Herremans et al. 2000). According to Kerin and Sethuraman (1998), the theoretical minimum brand strength multiple is 0 for an unbranded or new brand without brand strength. The maximum brand strength multiple is the reciprocal of the return from a risk-free investment such as a U.S. Treasury Bill for a brand with a strength score of 100. If the "risk-free" interest rate is 5 percent, the maximum multiple would be 20, resulting in a multiple range from 0 to 20.

A high score on the brand strength multiple (see Table 1) translates into a high PE multiple for current earnings or a low discount rate applied to future cash flows. A low score on the brand strength multiple results in a low multiple or a higher discount rate applied to future cash flows. This PE multiple is restricted by the Price-Earnings ratio, which is calculated by dividing the current market price per share of the stock by earnings per share. Earnings per share are calculated by dividing net income by the number of shares outstanding (Srivastava et al. 1998; Kerin and Sethuraman 1998). These P/E ratios are commonly used in brand valuation methodologies (Aaker 1991; Srivastava et al. 1998; Kerin and Sethuraman 1998).

According to Kerin and Sethuraman (1998), Interbrand's brand valuation methodology has several advantages. First, the Interbrand methodology is relatively public in its detail, unlike many other brand valuation practices. Second, as shown, the conceptual foundation of this methodology conforms to the view that brand value represents the incremental earnings and cash flows that successful brands can generate, relative to their unbranded or weak-branded counterparts. Third, elements of the approach are commonly applied by industry practitioners. Fourth, *Financial World* and

Interbrand have made the most comprehensive published list of brand value publicly available. Finally, the large number of brand value estimates enables comparisons of brand value estimates across industries and product categories and studying the relationship between brand value and shareholder value through firm-level analyses.

As discussed, brand equity is the core concept of the present research. A firm's advertising and R&D are two key elements for cultivating and leveraging market-based assets (relational market-based assets and intellectual market-based assets), which can be represented by brand equity. In other words, brand equity can be a surrogate measure of market-based assets because a firm with superior market-based assets is more likely to have superior brand equity and, with brand equity, a firm can generate more shareholder value. Brand value, as mentioned, is the most commonly used operationalization of brand equity in the area of branding (Keller 1998; Srivastava and Shocker 1991) and brand value estimates by *Financial World* and Interbrand Group have been used in other studies, such as that of Kerin and Sethuraman (1998). Therefore, it is believed that brand equity can be operationalized and measured as brand value estimates for the present research. An example of the Interbrand methodology for quantifying brand value is presented in Table 1. This example is drawn from Kerin and Sethuraman (1998).

Table 1: Brand Valuation Methodology: Example of Gillette in 1995

Gillette brand 1995 worldwide operating earnings	$961.00 million
Less: Estimated earnings of an equivalent unbranded product[a]	- 49.40 million
Gillette brand 1995 adjusted operating earnings	$911.60 million
Gillette brand 1994 adjusted operating earnings (calculated as above)	$830.57 million
Weighted two-year average of Gillette brand adjusted operating earnings (the most recent year counts twice as much as the previous year)	$884.57 million

Year	*Weight*	*Adjusted Earnings*
1995	2	$911.60 million
1996	1	$830.57 million

Less: U.S. corporate tax @ 35% (.35*$884.57 million)	-309.60 million
Weighted average Gillette brand after tax earnings	$574.97 million
Times: Estimated Gillette "brand strength multiple"	x17.9
Estimated 1995 Gillette brand value	$10.292 billion

Note: This table comes from Kerin and Sethuraman' study (1998)

a. The operating earnings of an equivalent unbranded razor and blade product line are estimated as follows.
   - The median ratio of capital employed to company sales in the personal-care product category is 0.38; that is, $38 of capital required to produce $100 in sales.
   - Gillette brand razor and blade 1995 sales are $2.6 billion.
   - Therefore, the estimated capital investment required to produce sales of $2.6 billion for an equivalent unbranded razor and blade product line is $988 million.
   - A generic or unbranded razor and blade product line should have 5-percent profit on total capital employed, or $49.4 million: .05*988 million = $49.4 million.

Shareholder Value

In terms of the operationalization of shareholder value, even though the valuation of assets in both academia and practice is controversial and each valuation method has its own strengths and weaknesses, the notion of market-to-book ratio in measuring the financial value of a firm is generally accepted (Srivastava et al. 1998; Kerin and Sethuraman 1998). The market-to-book ratio relates the firm's market value per share to its book value per share. Since a firm's book value reflects historical cost accounting, this ratio indicates management's success in creating value for its shareholders. In practice, this ratio is used by "value-based investors" to help to identify under-valued stocks (Srivastava et al. 1998, 1999).

The market-to-book ratio is calculated by dividing price per share by book value per share, which can be calculated by dividing total owner's equity by the number of shares outstanding (Copeland, Keller, and Murrin 1994). An M/B ratio of 1.0 means that the market value of a firm is equal to its book value. An M/B ratio greater than 1.0 means that the market value is higher than the book value and suggests that a firm has intangible assets which are not recognized by current accounting practices. An /M/B ratio less than 1.0 means that the book value of a firm is higher than the market value of a firm; it indicates that a firm does not have intangible assets exceeding tangible assets.

Another measure of the value of a firm is "Tobin's q ratio," which plays an important role in many financial interactions (Chung and Pruitt 1994). Tobin's q ratio is defined as the ratio of the market value of the firm to the replacement cost of its tangible assets, such as property, plant, equipment, inventory, cash, and investments in stocks and

bonds (Tobin 1969, 1978: Kerin and Sethuraman 1998). This ratio has been employed to explain a number of diverse corporate phenomena, such as cross-sectional differences in investment and diversification decisions in finance (Jose, Nichols, and Stevens 1986) and the relationship between managerial equity ownership and firm value (McConnell and Servaes 1990).

In spite of its influence in many important aspects of corporate finance, the actual applications of Tobin' q ratio in practice have been limited because of the difficulty of acquiring all information necessary to calculate it until Chung and Pruitt (1994) introduced an accurate approximation of q using basic financial information. Their approximation of q is extremely conservative in terms of both data requirements and computational efforts, whereas the original Tobin's q ratio algorithm requires more data and computational efforts. This approximate q ratio was shown to explain at least 96.6 percent of the variability in Tobin's q (Chung and Pruitt 1994), and many practitioners and researchers have adopted it (DaDalt, Donaldson, and Garner 2003; Kohers and Kohers 2004).

Approximate q is simply defined in a formula as follows.

$$\text{Approximate q} = (\text{MVE} + \text{PS} + \text{DEBT})/\text{TA}$$

Where MVE is the product of a firm's share price and the number of common stock shares outstanding, PS is the liquidating value of the firm's outstanding preferred stock, DEBT is the value of the firm's short-term liabilities net of its short-term assets, plus the

book value of the firm's long-term debt, and TA is the book value of the total assets of the firm. Approximate q implicitly assumes that the replacement value of a firm's plant, equipment, and inventories are equal to its book value.

A q-value of 1.0 means that the market value of a firm is equal to the replacement cost of its tangible assets. Such a firm would have no intangible assets, such as intellectual property rights, R&D, and other capabilities and resources that provide competitive advantages. A q-value greater than 1.0 indicates that a firm has intangible assets. Generally, these intangible assets enable a firm to have competitive advantages, create earnings and cash flows in excess of the return on its tangible assets, and achieve an abnormal return on invested capital relative to its competitors (Kerin and Sethuraman 1998: Srivastava et al. 1998).

Firms with intangible assets (q-ratio greater than 1) have a greater likelihood of creating wealth for their shareholders than do firms without intangible assets (Kerin and Sethuraman 1998). In other words, a firm creates shareholder wealth by ensuring that the warranted market value of the equity (M) capital invested in it by its shareholders exceeds the book value of equity (B). For example, a firm creates value for its shareholders if its M/B ratio is greater than 1.0, deteriorates shareholder value if its M/B ratio is less than 1.0, and sustains shareholder value if its M/B ratio equals 1.0 (Varaiya, Kerin, and Weeks 1987; Srivastava et al. 1998). In spite of the slight difference in the formulas to calculate the ratios (i.e., more data, such as debt, are required to calculate the market value of the firm when calculating Tobin's q ratio), in terms of the components in the model, the two valuation models, M/B ratio and Tobin's q ratio, demonstrate

theoretical and empirical similarity, and they are equivalent measures of shareholder value (Varaiya , Kerin, and Weeks 1987). Therefore, the present research takes the M/B ratio as a major proxy variable for shareholder value.

In addition to the M/B ratio, the Price-Earning ratio can be also considered a potential proxy for shareholder value. The Price-Earning ratio is calculated by dividing the current market price per share of the stock by earnings per share, which is determined by dividing net income by the number of shares outstanding. The P/E ratio indicates how much investors are willing to pay per dollar of current earnings. Therefore, high P/E ratios are associated with growth stocks because investors who are willing to pay a high price for a dollar of current earnings obviously expect high earnings in the future. The P/E ratio also indicates how expensive a particular stock is (Basu 1977). The ratio is not meaningful, however, if the firm has very little or negative earnings.

Other Variables

Industry and Product Category Effects

As proposed in Chapter 2, the effect of advertising in creating brand equity for business-to-business product firms tends to be less effective than for consumer product firms and the effect of advertising for product corporate brands is more salient than for service corporate brands in developing brand equity. Therefore, the sample is first categorized into two types of firms to measure industry effects: service firms and product firms. Service providers are firms selling services instead of tangible products. Examples include American Airlines and America On Line. Product firms are firms selling products such as Coca-Cola and Ford.

In addition, the sample is divided into three categories of firms in terms of the primary target market in order to measure category effects: consumer-product firms, mixed-product (consumer + industrial) firms, and industrial-product firms. Consumer-product firms such as Nike and Sony are selling their products mainly to final (end) consumers. Mixed-product firms such as Dell are selling their products to both final consumers and other firms. Industrial-product firms are selling their products mainly to other firms. This type of classifications has been adopted by other marketing researchers (Balasubramanian and Kumar 1990; Zinkhan and Cheng 1992; Graham and Frankenberger 2000).

Unit of Analysis

As one can see, different measurement units might be viewed as a potential problem for this type of research. Brand value estimates, the measures of brand equity, are analyzed at the brand level, whereas the measures of other variables such as advertising and R&D expenditures are calculated at the firm level.

Therefore, in order to fix the inconsistency and synchronize the units of analysis, the present research employs data from corporate brands. Argenti and Druckenmiller (2004) define a corporate brand as "a brand that spans an entire company (which can also have disparate underlying product brands) and conveys expectations of what the company will deliver in terms of products, services, and customer experience" (p. 369).

According to Aaker (2004), a corporate brand is defined by organizational associations. Even though organizational associations may be relevant to product brands such as Pontiac and Buick, the number, power, and credibility of organizational

association will greater for a brand that visibly represents a corporate organization, such as General Electric, Inc. Examples of corporate brands used in the present research include Microsoft, Dell, Hewlett Packard, and Avon.

Data

The dissertation research is basically an analysis of secondary data, which are based on two different sets of data, in order to examine the relationships between advertising, brand equity, and shareholder value. The use of two different sets of data results mainly from the availability of brand value estimates.

Brand value estimates data were collected for two different time periods from two different data sources. The first data set, for 1991-1996, comes from "Measuring the Impact of Brand Management," which was published annually in August in *Financial World (FW)* during the period 1991-1996. The second data set, for 1999-2002, comes from Interbrand Group's website, "The 100 Best Global Brands by Value." Brand value estimates data were first introduced by *FW* and made available to the public in 1991. It annually announced brand value estimates from 1991 until it went out of business in 1997. In 1995, *FW* slightly changed its brand valuation method based on the Interbrand valuation model approach to estimate more accurately and credibly the value of brands (Meschi 1995).

Interbrand Group has reported the annual brand value estimates for "The 100 Best Global Brands by Value" since 1999. The estimates by Interbrand Group, a brand consulting company headquartered in London, England, were published again in *Business Week* in 1999 for the first time since 1997. Since then, Interbrand Group has reported

brand value estimate for the 100 best global brands in August every year. The most recent data for brand value estimates were from *Business Week* in August, 2003, which were The 100 Best Global Brands by Value in 2002. These two data sets, which span a total of 10 years of brand value estimates (1991 – 2002 except 1997 and 1998). Data sets are not only unique but also reliable and publicly available and in a form amenable to statistical analysis.

With regard to shareholder value, as discussed, the Market-to-Book ratio for each firm analyzed for each analysis year was calculated using raw data from Standard & Poor's Compustat PC-Plus Database. Market-to-Book ratio relates a firm's market value to its book value. It was obtained by dividing price per share by book value per share, whereas book value was calculated by dividing total owner's equity by number of shares outstanding. Data such as price per share, total owner's equity, and the number of shares outstanding are all available through the Compustat PC-Plus database.

Advertising expenditures data from 1991 to 1996 and from 1999 to 2002 were also obtained from Standard & Poor's Compustat PC-Plus database. This database provides annual accounting and stock market information for publicly traded firms on the New York, American, and Nasdaq stock exchanges. The database is one of the most widely used secondary data sources by academic researchers and is believed to be reliable for this type of research (Chan et al. 2001; Chauvin and Hirschey 1993; Chung and Pruitt 1994; Kerin and Sethuraman 1998; Herremans et al. 2000; Graham and Frankenberger 2000; Mizik and Jacobson 2003; Zinkhan and Cheng 1992). Data for sales volume, net income, and R&D expenditures also were obtained from Standard & Poor's

Compustat PC-Plus database. Regarding data on the classification of industry and product category, an invited marketing expert assisted in the categorization based on professional knowledge and industry observations. Table 2 below presents more details on the data set and the operationalizations of variables.

The final sample of corporate brands used in the research is based on the reports from 1991 to 1996 and 1999 to 2002 by either *Financial World* or Interbrand Group. The criterion that determined which brands should be included in the analysis sample is that the focal brand for brand value estimates should be a corporate brand rather than a product or service brand. This criterion was used to avoid any potential problems due to the different units of analysis. Because the advertising expenditures available from the Compustat PC-Plus database were reported only as an aggregate number for all of a firm's brands, it was necessary to employ only corporate brand values (Herremans et al. 2000).

After applying this criterion, 445 observations were available. These 445 observations include 111 corporate brands. Lists of brand value estimates by *Financial World* and Interbrand Group generally included 100 brands but a brand listed last year might not be listed this year. Therefore, the total number of corporate brands available for the present research, 111 during the period 1991-1996 and 1999-2002, is larger than the number of corporate for which brand value estimates are available in any one year. Table 3 shows examples of corporate brands with the number of years for which the brand value estimates were publicly available. In addition, any variables with missing data were

treated as variables having no value and excluded in any statistical analyses involving them.

In addition to the data obtained from various sources such as the Compustat PC-Plus database and *Financial World*, two additional forms of data were developed for further statistical analyses, change data and weighted data.

Change data were obtained from original data by subtracting gross measures in year t from gross measures in year t+1. For example, changes in advertising expenditures were calculated by subtracting gross measures of advertising expenditures in 1993 from gross measures of advertising expenditures in 1994. In addition to change data in advertising expenditures, other primary variables, such as changes in R&D expenditures and changes in brand value estimates, were also obtained the same way that changes in advertising expenditures were obtained. Change data are of interest in the present research because they can provide a perspective on the marginal effects of variables. These marginal effects may tell a different story than the gross effects of variables.

With regard to weighted data, there were 111 corporate brands and 445 observations in the original data. As can be seen in Table 3, during the ten years of the time period, from 1991 to 1996 and 1999 to 2002, there were more data for some corporate brands than for others. For example, Accenture, Inc. and Maytag, Inc. are listed just once in the ten-year span, whereas Coca-Cola and Kodak are included every year. This difference in the number of representations in the data may cause unbalanced effects on the analyses. Therefore, the original data were weighted to reduce possible unbalanced effects such that each observation was represented equally in the analyses.

Table 2: Analysis Data

Time Periods	**Variables**		**Operationalizations**	**Sources**
1991-1996 & 1999-2001	**Primary Variables**	Advertising	Advertising Expenditure by Company	Compustat PC-Plus database
		R&D	R&D Expenditure by Company	Compustat PC-Plus database
		Value of Brand Equity	Brand Value Estimate	Financial World, Interbrand Inc.
		Shareholder Value	Market-to-Book Ratio	Compustat PC-Plus database
			P/E Ratio	
			Net Income	
	Other Variables	Market Performance	Sales Volume	Compustat PC-Plus database
		Industry Effect	Industry Classification	Expert Opinion
		Product Category Effect	Product Classification	Expert Opinion

Table 3: Examples of Corporate Brands Used in the Analysis*

Corporate Brands	**Number of Years****	**Corporate Brands**	**Number of Years****
AOL	6	Heinz	7
Apple Computer	7	Intel	9
Avon	8	IBM	7
Cadbury Schweppes	6	Kellogg	10
Campbell	6	McDonald	6
Canon	6	Microsoft	8
Coca-Cola	10	Motorola	9
Colgate	10	Nike	10
Compaq Computer	6	Pepsi	10
Dell Computer	6	Quaker	6
Kodak	10	Reebok	6
GE	8	Sara Lee	6
Gillette	10	Sony	6
Goodyear	6	Walt Disney	6
Hershey	6	Wrigley	9
Hewlett-Packard	8	Xerox	8

* All 111 corporate brands are listed in Appendix A.
**The number of years corporate brands were reported for the ten-year period (1991 to 1996 and 1999 to 2002).

In addition to the original data, the change data, obtained by subtracting gross measures of variables in year t by gross measures of variables in year t+1, are also weighted. For example, out of possible eight times (i.e., there are two years missing in the original raw data sets, which make the maximum number of changes on variables eight times), Harley and Fedex are listed just once whereas Colgate and Gillette are included all eight times. Therefore, the change data need to be weighted to ascertain the accuracy of the analyses.

The present research employs simple or multiple regression analyses to test the hypotheses suggested in Chapter 2, depending on the model specified. Standardized beta coefficients are examined with p-values to measure effects of individual variables and R^2 and adjusted R^2 measures are used with F-statistic to test overall model fit for the regression analyses.

Regression analysis requires certain assumptions about the variables used (Aiken and West 1991). Regression assumes that variables have normal distributions; this can be checked by visual examination of data plots. Regression also assumes that the variance of error terms is the same across all levels of the independent variables; this can also be examined by visual inspection of a plot of the standardized residuals by the regression standardized predicted value. Another assumption is linearity, which is that multiple regression can only accurately estimate the relationship between dependent and independent variables if the relationships are linear in nature. The multiple regression analyses performed in the present research do not seriously violate those assumptions. In

addition to the regression analyses, correlation coefficients are calculated with p-values to compare the basic relationships among variables used in the research.

SUMMARY

To summarize, this chapter presented the methodology used when testing the hypotheses developed in Chapter 2. Variables used in the present research were described and the operationalization of each variable for the analysis discussed in detail. In addition, the issue of the unit of analysis, which might create problems resulting from the two different measurement units, firm level and product level in the data analysis, was explained and the solution discussed. The method of data collection and data sources were described. Two additional forms of data, change data and weighted data, were explained and the analysis techniques for testing hypotheses were discussed. Chapter 4 presents the empirical data analyses and tests of the hypotheses developed in Chapter 2.

CHAPTER 4: Analysis and Results

In this chapter, analyses and results are organized into sections that correspond to hypotheses H1 through H7 with regard to the relationships between advertising, brand equity, and shareholder value. Each section includes an explanation of the method of analysis employed to test hypotheses, statistical results of tests, and interpretation of results. Descriptive statistics for the data used are provided at the beginning of this chapter and a summary of the results is discussed at the end of this chapter.

DESCRIPTIVE STATISTICS

Table 4 presents the descriptive statistics relating to the characteristics of the data analyzed. The minimum brand value estimate is $12,000,000 for Symantec, Inc. in 1996; the maximum brand estimate is $83,845,000,000 for Coca-Cola in 1999. Close inspection of the data revealed that several corporate brands, such as Coca-Cola, Microsoft, and IBM, consistently possessed much higher values than the rest of the data and other brands such as Symantec, Inc. and Sybase, Inc. consistently possessed much lower values than the rest of the brands.

The minimum value of firm advertising expenditures reported in the data was $1.4 million for Hewlett Packard in 2002; the maximum value of firm advertising expenditures reported in data was $4.53 billion by AOL in 2002. The mean annual value of firm advertising expenditures was $735 million in the original data. It is assumed that Hewlett Packard did not spend much on advertising under its own brand name after the

merger/acquisition of Compaq Computer in 2001. Several firms, such as Sony, Ford, and Toyota, consistently spent billions of dollars on advertising. The minimum value of firm R&D expenditures reported was $3.6 million for Starbucks in 2002; the maximum value of firm R&D expenditures was $9.69 billion by Honda in 2001. As one might expect, high technology firms such as IBM and Siemens, and automobile manufacturers such as Ford and Honda, spent much more on R&D than the other firms analyzed.

The highest M/B ratio was 98.67 for Amazon.com in 1999; the lowest value was .08 for Siemens in 1995. The M/B ratio of 98.67 for Amazon.com in 1999 could mean that the market value of Amazon.com was highly evaluated and, compared to the book value of Amazon.com, it was considered to have huge intangible assets in 1999. Contrary to the case of Amazon.com, the M/B ratio of .08 for Siemens in 1995 could mean that the market value of Siemens was not highly enough evaluated and the book value of the firm far exceeded its market value. In terms of P/E ratio, the lowest value was .94 for Siemens in 1995; the highest value was 1885.52 for Yahoo in 1999. As discussed, high P/E ratios are associated with growth stocks and the P/E ratio of 1885.52 for Yahoo reflected how high Yahoo's stock was evaluated in the market in 1999. With regard to the P/E ratio, the ratio itself can fluctuate any time of the day, month, or year because it is compared the starting price per stock to the ending price per stock in any given period. The P/E ratios in the current study was acquired based on end-of-year comparison.

The maximum net income reported in the data was $15.3 billion for Mobil in 2001; the minimum net income was the loss of $98.7 billion for America On Line in

2002. According to CFO.com (2003), an on-line magazine, $45.5 billion of the $98.7 billion loss was believed to relate to the merger/acquisition of Time Warner in 2001. The $98.7 billion loss was the largest loss in United States corporate history. The minimum sales volume reported in the data was $334.9 million for Symantec, Inc.; the maximum sales volume was $187.5 billion for Mobil in 2001. Petroleum refining firms such as Mobil, Shell, and BP consistently recorded the highest sales among the firms analyzed.

Table 4: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Brand Value	445	$12,000,000	$83,845,000,000	$9,115,800,000	$12,539,746,492
Firm Advertising	297	$1,400,000	$4,530,000,000	$735,144,933	$766,395,936
Firm R&D	334	$3,600,000	$9,694,394,000	$1,213,659,551	$1,620,997,418
M/B Ratio	422	.08	98.67	6.41	9.23
P/E Ratio	390	.94	1885.52	42.74	127.91
Net Income	445	$-98,696,000,000	$15,320,000,000	$1,278,355,946	$5,500,337,328
Sales	445	$334,867,000	$187,510,000,000	$23,651,235,252	$32,647,469,057

EMPIRICAL ANALYSES

Methodology of Brand Value Estimates

As discussed, brand equity was operationalized as brand value estimates for ten years reported by *Financial World* from 1991 to 1996 and Interbrand Group from 1999 to 2001. According to Meschi (1995), *FW* brand valuation methodology was changed to reflect the market dynamics. A new methodology, which was similar to the methodology of Interbrand Group, was deployed in 1995. *FW* announced brand value estimates using the new methodology in 1995 and in 1996 (until FW went out of business). Therefore, including data from before 1995 in the regression analyses could affect the research framework, and it is necessary to investigate whether results differ as a function of the data set used.

In order to test the effects of having pre-1995 data sets in the regression analyses, a dummy variable with values "0" and "1" was created and put into a regression model. The dummy variable "0" represented data sets before 1995 and the dummy variable "1" represented data sets after 1995. The regression model can be described as follows

$$\text{Brand Equity} = a + b_1 (\text{advertising}) + b_2 (\text{R\&D}) + b_3 (\text{dummy}) + \text{error}$$

where a is a regression intercept and
b_1, b_2, and b_3 are regression slopes for the independent variables.

Table 5 presents the results of the regression analyses for the effect of the different data sets on the relationship between advertising and R&D and brand equity. Beta coefficients are standardized regression coefficients showing the "standardized" slope for the individual independent variables. Beta coefficients for the dummy variable

with the original data and the weighted data were .095 and .049 respectively. Beta coefficients for the dummy variable with the original change data and the weighted change data were -.008 and -.006 respectively. None of those beta coefficients were statistically significant. Therefore, it was concluded that the data source and time period (before and after 1995) did not affect the regression analyses.

Table 5: Regression Results for Data Sources

Regression Model	**BE = a + b_1 (advertising) + b_2 (R&D) + b_3 (dummy) + e**											
Data Sets	**Original Data**			**Weighted Data**			**Original Change Data**			**Weighted Change Data**		
Variables	**Adv**	**R&D**	**Dummy**	**Adv**	**R&D**	**Dummy**	**Adv**	**R&D**	**Dummy**	**Adv**	**R&D**	**Dummy**
Beta Coefficient	**.117**	**.555****	**.095**	**.193****	**.492****	**.049**	**.256****	**.008**	**-.008**	**.283****	**.043**	**-.006**
R^2	**.446**			**.420**			**.066**			**.083**		
Adjusted R^2	**.438**			**.417**			**.042**			**.071**		
Overall Model Fit *F*-statistics	**57.93****			**112.50****			**2.74***			**6.75***		

** Regression coefficient is significant at the 0.01 level (2-tailed).
* Regression coefficient is significant at the 0.05 level (2-tailed).
Note: BE refers to brand equity.

Advertising and Brand Equity

The theoretical argument for a positive relationship between advertising and brand equity, which were respectively operationalized as the actual advertising expenditures and brand value monetary estimates, was empirically tested and supported. As shown in Table 6, using the original data, the correlation between advertising and brand equity was .476. This correlation was statistically significant ($p<.01$), suggesting a fairly strong association between advertising and brand equity.

Another analysis using the weighted data was also performed to see if there is a statistically significant association between advertising and brand equity. As mentioned, the weighted data were specifically developed to prevent unbalanced effects due to the difference in the numbers of times that individual firms were represented in the data. Table 7 shows the correlation matrix using the weighted data for the variables of interest in the present research. The correlation between advertising and brand equity was .501. Thus, the association between advertising and brand equity was statistically significant at $p<.01$.

Even though there was a positive relationship between advertising and brand equity and the correlation coefficients between advertising and brand equity were statistically significant at $p<.01$ for both the original data and the weighted data, one may argue that the positive relationship between advertising and brand equity for the weighted data would merely result from the increased sample size due to the weighting, and the statistical significance might not show what the relationship

Table 6: Correlation Matrix for the Original Data

		Brand Value	Firm Advertising	Firm R&D	M/B Ratio	P/E Ratio	Net Income	Firm Adv*Firm R&D[a]	Firm Sales
Brand Value	Correlation	1	.476(**)	.544(**)	.077	.006	.234(**)	.549(**)	.310(**)
	N	445	297	334	422	390	445	220	445
Firm Advertising	Correlation	.476(**)	1	.608(**)	-.088	.020	-.137(*)	.717(**)	.695(**)
	N	297	297	220	284	267	297	220	297
Firm R&D	Correlation	.544(**)	.608(**)	1	-.124(*)	-.023	.170(**)	.905(**)	.523(**)
	N	334	220	334	319	288	334	220	334
M/B Ratio	Correlation	.077	-.088	-.124(*)	1	.418(**)	.020	-.097	-.134(**)
	N	422	284	319	422	387	422	213	422
P/E Ratio	Correlation	.006	.020	-.023	.418(**)	1	-.086	.012	-.047
	N	390	267	288	387	390	390	196	390
Net Income	Correlation	.234(**)	-.137(*)	.170(**)	.020	-.086	1	.144(*)	.304(**)
	N	445	297	334	422	390	445	220	445
Firm Adv*Firm R&D	Correlation	.549(**)	.717(**)	.905(**)	-.097	.012	.144(*)	1	.850(**)
	N	220	220	220	213	196	220	220	220
Firm Sales	Correlation	.310(**)	.695(**)	.523(**)	-.134(**)	-.047	.304(**)	.850(**)	1
	N	445	297	334	422	390	445	220	445

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation significant at the 0.05 level (2-tailed).
a Firm Adv* Firm R&D is the product of firm advertising and firm R&D expenditures.

Table 7: Correlation Matrix for the Weighted Data

		Brand Value	Firm Advertising	Firm R&D	M/B Ratio	P/E Ratio	Net Income	Firm Adv*Firm R&D[a]	Firm Sales
Brand Value	Correlation	1	.501(**)	.546(**)	.053	.010	.224(**)	.569(**)	.303(**)
	N	1110	652	799	1031	955	1110	469	1110
Firm Advertising	Correlation	.501(**)	1	.646(**)	-.097(*)	.001	-.061	.752(**)	.718(**)
	N	652	652	469	605	565	652	469	652
Firm R&D	Correlation	.546(**)	.646(**)	1	-.101(**)	-.039	.168(**)	.911(**)	.446(**)
	N	799	469	799	749	672	799	469	799
M/B Ratio	Correlation	.053	-.097(*)	-.101(**)	1	.481(**)	-.002	-.082	-.130(**)
	N	1031	605	749	1031	948	1031	449	1031
P/E Ratio	Correlation	.010	.001	-.039	.481(**)	1	-.083(*)	-.014	-.062
	N	955	565	672	948	955	955	407	955
Net Income	Correlation	.224(**)	-.061	.168(**)	-.002	-.083(*)	1	.173(**)	.395(**)
	N	1110	652	799	1031	955	1110	469	1110
Firm Adv*Firm R&D	Correlation	.569(**)	.752(**)	.911(**)	-.082	-.014	.173(**)	1	.840(**)
	N	469	469	469	449	407	469	469	469
Firm Sales	Correlation	.303(**)	.718(**)	.446(**)	-.130(**)	-.062	.395(**)	.840(**)	1
	N	1110	652	799	1031	955	1110	469	1110

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation significant at the 0.05 level (2-tailed).
a Firm Adv* Firm R&D is the product of firm advertising and firm R&D expenditures.

really was. Therefore, in order to test whether differences existed between corresponding correlation coefficients in the two data sets, Table 8 was developed.

As shown in Table 8, correlation coefficients from both data sets were compared. Each correlation coefficient was converted into a *z*-score using Fisher's *r*-to-*z* transformation (Cohen and Cohen 1983) and Fisher's Z scores computed for both correlations. The resulting p-values did not present statistically strong evidence that the corresponding correlation coefficients reflected different population correlation coefficients. Even so, tests of hypotheses will use both the original and the weighted data to permit comparisons and insights.

Table 8: Comparison of Coefficients for Original and Weighted Data

Variables		Original Data		Weighted Data		Z-scores	Two tailed p-values
		N	r	N	r		
Brand Value	Advertising	297	.476	652	.501	-.467	.640
Brand Value	R&D	334	.544	799	.546	-.044	.965
Brand Value	M/B Ratio	422	.077	1031	.053	.416	.678
Brand Value	P/E Ratio	390	.006	955	.010	-.066	.947
Brand Value	Net Income	445	.234	1110	.224	.188	.851
Brand Value	Adv*R&D	220	.549	469	.569	-.354	.723
Brand Value	Sales	445	.310	1110	.303	.137	.891
Advertising	R&D	220	.608	469	.646	-.762	.446

Note: N is the sample size and r is the correlation coefficient.

In order to test H1a ("There is a positive relationship between gross advertising expenditures and brand equity"), a simple regression model was developed as follows.

$$\text{Brand Equity} = a + b\,(\text{Advertising}) + \text{error}$$

Where a is a regression intercept and b is a regression slope.

Table 9 presents the results of the regression analysis using the original data as well as the weighted data. The values of beta standardized coefficients were .476 and .501 respectively and both were statistically significant at $p<.01$. The values of R^2 were .226 and .251 for the analysis with the original data and the analysis with the weighted data respectively. These values mean that 22.6 percent of the variance in the dependent variable, brand value estimates, could be explained by the actual advertising expenditures of corporate brands with the original data and 25.1 percent of variance in the brand value estimates can be accounted for by advertising expenditures using the weighted data.

In addition, the values of overall model fit F-statistic, which was 86.2 ($p<.01$) for the original data and 218.47 ($p<.01$) for the weighted data, indicate that the regression model used to explain the relationship between advertising and brand value in the analysis performed well in predicting brand value. Comparing the two regression models, one with the original data and the other with the weighted data, the latter, the weighted data, showed a little better result than the former, with the original data, with regard to R^2 and F-value. Based on the statistical significance of the beta coefficients, R^2 values, and overall model fit *F*-statistics, H1a was accepted.

Table 9: Regression Results for H1a

Regression Model	**BE = a + b (Advertising) + e**	
Measure	**Original Data (N=297)**	**Weighted Data (N=652)**
Beta Coefficient	**.476 (*p*<.01)**	**.501 (*p*<.01)**
R^2	**.226**	**.251**
Adjusted R^2	**.224**	**.250**
Overall Model Fit *F*-statistics	**86.2 (*p*<.01)**	**218.47(*p*<.01)**

Note: BE refers to brand equity.

A simple regression analysis was also performed to test H1b, "There is positive relationship between changes in advertising expenditures and changes in brand equity." The regression model can be expressed as follows.

Changes in Brand Equity = a + b (Changes in Advertising) + error

Where a is a regression intercept and b is a regression slope.

As discussed, changes in brand equity were operationalized as changes in brand value estimates and measured by subtracting brand value estimates in year t from brand value estimates in year t+1 for all observations in the original data. Changes in advertising expenditures were measured the same way that changes in brand value estimates were, which is subtracting advertising expenditures in year t from advertising expenditures in

year t+1. It is possible that there could be negative numbers for both variables, changes in brand equity and changes in advertising, if a firm's brand value estimate decreased from the previous year and a firm spent less on advertising in year t+1 than year t.

In addition to the original change data, the weighted change data were calculated and used to determine if there were any discrepancies between these two data sets. Table 10 and Table 11 show the correlation matrices for the original change data and the weighted change data respectively.

However, as discussed previously, even though these two correlation coefficients were statistically significant, one can argue that the difference in p-values may result from the increased sample size of the weighted change data due to the weighting. Table 11 was developed to test whether differences in corresponding correlation coefficients in the original change data and the weighted change data.

Table 10: Correlation Matrix for the Original Change Data

		Brand Value	Firm Advertising	Firm R&D	M/B Ratio	P/E Ratio	Net Income	Firm Adv*Firm R&D[a]	Firm Sales
Brand Value	Correlation	1	.167(*)	.103	-.094	.019	.075	.115	.211(**)
	N	277	185	209	265	229	277	137	277
Firm Advertising	Correlation	.167(*)	1	.095	-.021	-.057	-.159(*)	.409(**)	.423(**)
	N	185	185	137	180	162	185	137	185
Firm R&D	Correlation	.103	.095	1	-.003	-.025	.027	.265(**)	.322(**)
	N	209	137	209	199	167	209	137	209
M/B Ratio	Correlation	-.094	-.021	-.003	1	.489(**)	-.009	.038	-.052
	N	265	180	199	265	228	265	132	265
P/E Ratio	Correlation	.019	-.057	-.025	.489(**)	1	-.140(*)	-.013	-.013
	N	229	162	167	228	229	229	116	229
Net Income	Correlation	.075	-.159(*)	.027	-.009	-.140(*)	1	.009	.084
	N	277	185	209	265	229	277	137	277
Firm Adv*Firm R&D	Correlation	.115	.409(**)	.265(**)	.038	-.013	.009	1	.186(*)
	N	137	137	137	132	116	137	137	137
Firm Sales	Correlation	.211(**)	.423(**)	.322(**)	-.052	-.013	.084	.186(*)	1
	N	277	185	209	265	229	277	137	277

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation significant at the 0.05 level (2-tailed).

[a] Firm Adv* Firm R&D is the product of changes in firm advertising expenditures and change in firm R&D expenditures.

Table 11: Correlation Matrix for the Weighted Change Data

		Brand Value	Firm Advertising	Firm R&D	M/B Ratio	P/E Ratio	Net Income	Firm Adv*Firm R&D[a]	Firm Sales
Brand Value	Correlation	1	.212(**)	.103(*)	-.114(**)	-.035	.075	.121	.242(**)
	N	608	352	454	577	497	608	253	608
Firm Advertising	Correlation	.212(**)	1	.075	.007	-.049	-.184(**)	.439(**)	.451(**)
	N	352	352	253	335	293	352	253	352
Firm R&D	Correlation	.103(*)	.075	1	.001	-.031	.017	.358(**)	.318(**)
	N	454	253	454	425	354	454	253	454
M/B Ratio	Correlation	-.114(**)	.007	.001	1	.600(**)	-.009	.055	-.040
	N	577	335	425	577	496	577	236	577
P/E Ratio	Correlation	-.035	-.049	-.031	.600(**)	1	-.114(*)	-.013	-.007
	N	497	293	354	496	497	497	200	497
Net Income	Correlation	.075	-.184(**)	.017	-.009	-.114(*)	1	-.006	.082(*)
	N	608	352	454	577	497	608	253	608
Firm Adv*Firm R&D	Correlation	.121	.439(**)	.358(**)	.055	-.013	-.006	1	.248(**)
	N	253	253	253	236	200	253	253	253
Firm Sales	Correlation	.242(**)	.451(**)	.318(**)	-.040	-.007	.082(*)	.248(**)	1
	N	608	352	454	577	497	608	253	608

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation significant at the 0.05 level (2-tailed).

[a] Firm Adv* Firm R&D is the product of changes in firm advertising expenditures and change in firm R&D expenditures.

Table 12: Comparison of Correlation Coefficients for Original Change and Weighted Change Data

Variables		Original Data		Weighted Data		Z-scores	Two-tailed p-values
		N	r	N	r		
Brand Value	Advertising	185	.167	352	.212	-.511	.610
Brand Value	R&D	209	.103	454	.103	0	1.0
Brand Value	M/B Ratio	265	-.094	577	-.114	.271	.786
Brand Value	P/E Ratio	229	.019	497	.-035	.673	.501
Brand Value	Net Income	277	.075	608	.075	0	1.0
Brand Value	Adv*R&D	137	.115	253	.121	-.057	.955
Brand Value	Sales	277	.211	608	.242	-.449	.654
Advertising	R&D	139	.095	253	.075	.189	.850

Note: N is the sample size and r is the correlation coefficient.

As shown in Table 12, corresponding correlation coefficients calculated on the original and weighted data and primarily involving brand value were compared. Each correlation coefficient was converted into a *z* score using Fisher's *r*-to-*z* transformation (Cohen and Cohen 1983), and Fisher's z scores were computed for both correlation coefficients. These p-values did not present statistically strong evidence that the

corresponding correlation coefficients were estimating different population correlation coefficients.

Table 13 shows the results of the regression analysis using both the original change data and the weighted change data. The beta coefficients for these two regression models, one with the original change data and the other with the weighted change data, were .167 and .212 respectively. The beta coefficient for the original data set of changes was statistically significant at $p<.05$, whereas the beta coefficient for the weighted data set of changes was statistically significant at $p<.01$.

In Table 13, the values of R^2 were .028 and .045 for the analysis with the original change data and the analysis with the weighted change data respectively. These values mean that only 2.8 percent of the variance in the dependent variable, changes in brand equity, could be explained by changes in advertising expenditures in the original change data, and 4.5 percent of the variance in changes in brand equity could be accounted for by changes in advertising expenditures with the weighted change data. In addition, the values of the overall model fit F-statistic, which were 5.25 ($p<.05$) for the original change data and 16.48 ($p<.01$) for the weighted change data, reveal that the regression model with the weighted changes data produced slightly better results than the regression model with the original change data.

Even though the regression model for the original change data was marginally poorer than the regression model for the weighted change data, it still showed a statistically significant relationship at $p<.05$ between changes in advertising expenditures and changes in brand equity. A p-value less than .05 is widely recognized as a

meaningful value for the regression analyses among marketing researchers and used to validate the statistical significance of variables or models (Kerin and Sethuraman 1998; Graham and Frankenberger 2000; Herremans et al. 2000). Therefore, considering the statistical significance of measures in the two regression models, one with the original change data and the other with the weighted change data, H1b, "There is a positive relationship between changes in advertising expenditures changes in brand equity," is accepted.

Table 13: Regression Results for H1b

Regression Model	**Changes in BE = a + b (Changes in Advertising) + e**	
Data Set	**Original Change Data (N=185)**	**Weighted Change Data (N=352)**
Beta Coefficient	**.167 (p<.05)**	**.212 (p<.01)**
R-square	**.028**	**.045**
Adjusted R-square	**.023**	**.042**
Overall Model Fit *F*-statistic	**5.25 (*p*<.05)**	**16.48 (*p*<.01)**

Note: BE refers to brand equity.

R&D and Brand Equity

Analyses were performed to validate the theoretical argument for a positive relationship between R&D expenditures and brand equity. As discussed in Chapter 3, R&D was operationalized as the actual annual expenditures on R&D by corporate brands and obtained from the Compustat PC-Plus database. Brand equity, as operationalized and measured in the previous section, consisted of brand value estimates. Table 6, "Correlation Matrix for the Original Data," shows that the bi-variate, cross-sectional correlation coefficient between R&D expenditures and brand value was .544 at $p<.01$, which means that there is a statistically significant association between R&D and brand equity as suggested in H2a.

Another correlation analysis with the weighted data was executed to see if the association between R&D and brand equity with the original data was valid for the weighted data. Table 7, "Correlation Matrix for the Weighted Data," shows that the bi-variate, cross-sectional correlation coefficient between R&D and brand equity was .546 and statistically significant at $p<.01$. This means that the association between R&D and brand equity was fairly strong.

In order to test H2a, "There is a positive relationship between R&D expenditures and brand equity," a simple regression analysis was performed. The specific model is as follows.

$$\text{Brand Equity} = a + b\,(\text{R\&D}) + \text{error}$$

where a is a regression intercept and b is a regression slope.

As discussed, brand equity was operationalized and measured as brand value estimates by *Financial World* (1991 to 1996) and Interbrand Group (1999 to 2002) and R&D was operationalized as annual expenditures and obtained from the Compustat PC-Plus database. Table 14 describes the results of the regression analyses using the original data and the weighted data. As mentioned above, the weighted data were used to reduce the potential bias by over-representations of certain corporate brands in the regression model and ascertain the accuracy of the analyses.

Table 14: Regression Results for H2a

Regression Model	**BE = a + b (R&D) + e**	
Data Set	**Original Data (N=334)**	**Weighted Data (N=799)**
Beta Coefficient	**.544 (p<.01)**	**.546 (p<.01)**
R-square	**.296**	**.298**
Adjusted R-square	**.294**	**.297**
Overall Model Fit *F*-statistic	**139.62 (*p*<.01)**	**338.48 (*p*<.01)**

Note: BE refers to brand equity.

The values of R^2 were .296 and .298 for the regression analyses with the original data and the weighted data respectively. These values mean that 29.6 percent of the variance in the dependent variable, brand value estimates, can be explained by R&D

expenditures in the original data and 29.8 percent of the variance in brand value estimates can be accounted for by R&D expenditures in the weighted data.

The values of the overall model fit F-statistic, which were 139.62 (p<.01) for the original data and 338.48 (p<.01) for the weighted data, indicate that the regression model employed performed well in predicting brand equity. There were virtually no differences in terms of beta coefficients, the values of R^2, and overall model fit F-statistics for the original data and the weighted data. Therefore, H2a was accepted.

A simple regression analysis was done to test H2b, "There is a positive relationship between changes in R&D expenditures and changes in brand equity." The regression model can be described as follows.

Changes in Brand Equity = a + b (Changes in R&D) + error

where a is a regression intercept and b is a regression slope.

As before, changes in brand equity were operationalized as changes in brand value estimates measured by subtracting brand value estimates in year t from brand value estimates in year t+1 in the original data. Changes in R&D expenditures were calculated the same way, which was subtracting R&D expenditures in year t from R&D expenditures in year t+1. As before, there could be negative values on both variables, changes in brand equity and changes in R&D, if a firm's brand value estimate decreased from the previous year and a firm spent less on R&D in year t+1 than in year t.

Table 15: Regression Results for H2b

Regression Model	**Changes in BE = a + b (Changes in R&D) + e**	
Data Set	**Original Change Data (N=209)**	**Weighted Change Data (N=454)**
Beta Coefficient	**.103**	**.103 (p<.05)**
R-square	**.011**	**.011**
Adjusted R-square	**.006**	**.008**
Overall Model Fit *F*-statistic	**2.22**	**4.86 (*p*<.05)**

Note: BE refers to brand equity.

In Table 15, the beta coefficients in the two regression models, one for the original change data and the other for the weighted change data, were the same, .103. However, unlike the previous regression models, the beta coefficient for the original change data was not statistically significant, whereas the beta coefficient for the weighted change data was marginally significant at p<.05. Furthermore, the values of R^2 were .011 for both the original change data and the weighted change data. These values mean that only 1.1 percent of the variance in changes in brand equity was explained by the independent variable, changes in R&D expenditures, for both data sets.

In addition, the values of the overall model fit F-statistic were 2.22 and 4.86. The F-value of 2.22 for the original change data was not statistically significant. The F-value

of 4.86 for the weighted change data was marginally significant. However, the difference in statistical significance between these two F-values probably results from the difference in the sample sizes between the two data sets. Therefore, considering the beta coefficients, the values of R^2, and F-values with these two regression models, it was determined that H2b, "There is a positive relationship between changes in R&D expenditures and changes in brand equity," could not be accepted.

Interaction between Advertising and R&D on Brand Equity

In order to test H3, "The interaction between advertising and R&D has a positive effect on brand equity," a new variable, which was the product of advertising and R&D, was created. The new variable was entered into the regression model with advertising and R&D expenditures. The regression equation used to analyze the interaction effect between advertising and R&D is as follows.

$$\text{Brand Equity} = a + b_1 (\text{advertising}) + b_2 (\text{R\&D}) + b_3 (\text{advertising*R\&D}) + \text{error}$$

where a is a regression intercept and
b_1, b_2, and b_3 are regression slopes for independent variables.

As discussed, brand equity was operationalized and measured as brand value estimates by *Financial World* (1991 to 1996) and Interbrand Group (1999 to 2002); advertising and R&D were operationalized as annual expenditures and obtained from the Compustat PC-Plus database.

Table 16 presents the results of the regression analyses using four types of data, the original data, the weighted data, the original change data, and the weighted change

data. The beta coefficients for the interaction effect, operationalized by the new variable which was the product of the actual annual advertising and R&D expenditures, were -.469 and -.288 with the original data and the weighted data respectively and were statistically significant at $p<.01$, whereas the beta coefficients were not statistically significant with the other data sets (the original change data and the weighted change data).

The negative values of the beta coefficients for the interaction between advertising and R&D on brand equity mean that the increase in R&D makes the variance in brand value accounted for by advertising decrease. The negative beta coefficients may result from the fact that advertising and R&D expenditures usually come from the same source and, therefore, the two variables (advertising and R&D) are not independent.

In addition, the regression coefficients for the new variable, the interaction effect between advertising and R&D with the original change data and the weighted change data, were not statistically significant. Therefore, H3, "the interaction between advertising and R&D has a positive effect on brand equity," was not accepted.

Table 16: Regression Results for H3

Regression Model	**BE = a + b_1 (advertising) + b_2 (R&D) + b_3 (advertising*R&D) + e**											
Data Set	**Original Data (N=220)**			**Weighted Data (N=469)**			**Original Change Data (N=137)**			**Weighted Change Data (N=253)**		
Variables	**Adv**	**R&D**	**Adv* R&D**	**Adv**	**R&D**	**Adv* R&D**	**Adv**	**R&D**	**Adv* R&D**	**Adv**	**R&D**	**Adv* R&D**
Beta Coefficient	**.254****	**.923****	**-.469****	**.279****	**.711****	**-.288****	**.184***	**-.006**	**.041**	**.235****	**.033**	**.006**
R-square	**.468**			**.429**			**.042**			**.059**		
Adjusted R-square	**.460**			**.425**			**.020**			**.048**		
Overall Model Fit *F*-statistic	**63.31****			**116.28****			**1.92**			**5.20****		

** Regression Coefficient is significant at the 0.01 level (2-tailed).
* Regression Coefficient is the significant at the 0.05 level (2-tailed).
Note: BE refers to brand equity and SV refers to shareholder value

Brand Equity and Shareholder Value

The theoretical argument for the role of brand equity in enhancing shareholder value, H4, "There is a positive relationship between brand equity and shareholder value," was empirically tested with a simple regression analysis. As discussed, brand equity was operationalized as brand value estimates. Shareholder value was operationalized using M/B ratio (Market-to-Book ratio), the most common proxy for shareholder value (Kerin and Sethuraman 1998). In addition, two other proxy variables, P/E ratio (Price-Earning ratio) and net income, were explored.

In order to test H4, the simple regression model is depicted as follows.

$$\text{Shareholder Value} = a + b\,(\text{Brand Equity}) + \text{error}$$

where a is a regression intercept and b is a regression slope.

As mentioned previously, the M/B ratio relates the firm's market value to its book value. Since a firm's book value is total owner equity and reflects historical cost accounting, this ratio indicates management's success in creating value for its stockholders (Srivastava et al. 1998; Kerin and Sethuraman 1998). The P/E ratio indicates how much investors are willing to pay per dollar of current earnings and how expensive a particular stock is. High P/E ratios are associated with growth stocks and those assumed to possess high potential value. These two measures of shareholder value, the M/B ratio and the P/E ratio, were calculated using data from the Compustat PC-Plus database. Net income in dollars for corporate brands was also extracted from the Compustat PC-Plus database.

Table 17 shows the results of the regression analyses using four different data sets: the original data, the weighted data, the original change data, and the weighted change data. All three measures of shareholder value, M/B ratio, P/E ratio, and net income, were employed as dependent variables for each data set. In general, regression coefficients and overall model fit F-statistics for the three measures of shareholder value across the data sets did not show strong associations between brand equity and shareholder value. The exceptions were for net income for the original data and the weighted data and M/B ratio for the weighted change data.

The measures of R^2 in the regression models using the different data sets were not high enough to meaningfully explain the variance in shareholder value. With respect to the three measures of shareholder value, M/B ratio, P/E ratio, and net income, none of them produced consistently meaningful results or statistically significant relationships with brand equity in the regression models. Based on the results, H4, "There is a positive relationship between brand equity and shareholder value," was not accepted.

Table 17: Regression Results for H4

Regression Model	**SV = a + b (BE) + e**											
Data Set	**Original Data**			**Weighted Data**			**Original Change Data**			**Weighted Change Data**		
Dependent Variables	**M/B**	**P/E**	**N.I**	**M/B**	**P/E**	**N.I**	**M/B**	**P/E**	**N.I**	**M/B**	**P/E**	**N.I**
N	**422**	**390**	**445**	**1031**	**995**	**1110**	**265**	**229**	**277**	**577**	**497**	**608**
Beta Coefficient on Brand Equity	**.077**	**.006**	**.234****	**.053**	**.010**	**.224****	**.094**	**.019**	**.075**	**.114****	**.035**	**.075**
R-square	**.006**	**.000**	**.055**	**.003**	**.000**	**.050**	**.009**	**.000**	**.006**	**.013**	**.001**	**.006**
Adjusted R-square	**.003**	**n/a**	**.052**	**.002**	**n/a**	**.049**	**.005**	**n/a**	**.002**	**.011**	**n/a**	**.004**
Overall Model Fit *F*-statistic	**2.48**	**.013**	**25.56****	**2.90**	**.010**	**58.48****	**2.33**	**.080**	**1.57**	**7.54****	**.594**	**3.45**

** Regression Coefficient is significant at the 0.01 level (2-tailed).
* Regression Coefficient is significant at the 0.05 level (2-tailed).
Note: BE refers to brand equity and SV refers to shareholder value

Advertising vs. R&D

The fifth hypothesis (H5), "Advertising is more effective than R&D in contributing to brand equity," was empirically tested with all four types of data: the original data, the weighted data, the original change data, and the weighted change data. In addition to H5, the regression model testing H5 also examined the effects of the industry type (service vs. product) as well as the effects of product category (consumer vs. business-to-business) by factoring both into the regression model. Therefore, H6, "Advertising contributes more to brand equity for product firms than service firms," and H7, "Advertising contributes more to brand equity for consumer products than for business-to-business products," were empirically tested.

In order to test H5, H6, and H7, the multiple regression model was developed as follows.

$$\text{Brand Equity} = a + b_1 \text{ (advertising)} + b_2 \text{ (R\&D)} + \text{error}$$

where a is a regression intercept and
b_1 and b_2 are regression slopes for independent variables.

As discussed, brand equity was operationalized and measured as brand value estimates by *Financial World* (1991 to 1996) and Interbrand Group (1999 to 2002) and advertising and R&D were operationalized as annual expenditures and obtained from the Compustat PC-Plus database. Tables 18, 19, 20, and 21 show the classifications of data and the results of the regression analyses including the beta coefficients for the variables of advertising and R&D, R^2, adjusted R^2, and overall model fit F-statistics with all four

types of data sets: the original data, the weighted data, the original change data, and the weighted change data.

Table 18: Regression Results for Original Data

Regression Model	$BE = a + b_1$ (advertising) $+ b_2$ (R&D) $+ e$				
	Beta Coefficients		R^2	Adjusted R^2	*F*-Statistics
Variables	Advertising	R&D			
Total (N=220)	.130 (.043)	.574 (.000)	.438	.432	84.44 (.000)
Service (N=15)	.202 (.423)	.489 (.068)	.291	.173	2.47 (.127)
Product (N=205)	.105 (.162)	.594 (.000)	.454	.448	83.87 (.000)
Consumer (N=121)	.486 (.000)	.189 (.048)	.392	.381	37.98 (.000)
Consumer + Business-to-Business (N=79)	.289 (.025)	.398 (.002)	.405	.390	25.90 (.000)
Business-to-Business (N=20)	.767 (.004)	.186 (.427)	.892	.879	70.02 (.000)
Consumer/Product (N=115)	.847 (.000)	-.158 (.847)	.533	.525	64.00 (.000)
Consumer+ Business-to-Business /Product (N=74)	.203 (.234)	.467 (.007)	.418	.402	25.51 (.000)
Business-to-Business /Product (N=16)	.718 (.013)	.238 (.356)	.889	.872	52.29 (.000)

N represents the number of observations used for the analysis.
The numbers in parentheses are p-values for the beta coefficients and F-statistics.
The sum of observations in the classification of the combination of industry type and product category is not equal to the total number of observations due to the exclusion of service firms.

Table 19: Regression Results for Weighted Data

Regression Model	$BE = a + b_1$ (advertising) $+ b_2$ (R&D) $+ e$				
	Beta Coefficients		R^2	Adjusted R^2	*F*-Statistics
Variables	Advertising	R&D			
Total (N=469)	.198 (.000)	.501 (.000)	.418	.416	167.54 (.000)
Service (N=43)	.315 (.022)	.422 (.003)	.308	.274	9.00 (.001)
Product (N=426)	.170 (.002)	.529 (.000)	.440	.437	165.95 (.000)
Consumer (N=273)	.444 (.000)	.328 (.000)	.513	.510	142.37 (.000)
Consumer + Business-to-Business (N=147)	.462 (.000)	.225 (.013)	.408	.400	49.74 (.000)
Business-to-Business (N=49)	.832 (.000)	.112 (.373)	.874	.868	159.61 (.000)
Consumer/Product (N=260)	.684 (.000)	.093 (.182)	.580	.576	176.92 (.000)
Consumer+ Business-to-Business /Product (N=137)	.447 (.000)	.226 (.054)	.417	.409	48.01 (.000)
Business-to-Business /Product (N=29)	.729 (.000)	.236 (.112)	.896	.888	112.02 (.000)

N represents the number of observations used for the analysis.
The numbers in parentheses are p-values for the beta coefficients and F-statistics.
The sum of observations in the classification of the combination of industry type and product category is not equal to the total number of observations due to the exclusion of service firms.

Table 20: Regression Results for Original Change Data

Regression Model	$BE = a + b_1$ (advertising) $+ b_2$ (R&D) $+ e$				
	Beta Coefficients		R^2	Adjusted R^2	*F*-Statistics
Variables	Advertising	R&D			
Total (N=137)	.200 (.020)	.004 (.965)	.040	.026	2.81 (.064)
Service (N=9)	.629 (.108)	.038 (.912)	.414	.219	2.12 (.201)
Product (N=128)	.142 (.112)	.000 (.996)	.020	.005	1.29 (.279)
Consumer (N=76)	.151 (.190)	-.176 (.127)	.050	.024	1.93 (.153)
Consumer + Business-to-Business (N=50)	.176 (.224)	-.101 (.486)	.040	n/a	.981 (.383)
Business-to-Business (N=11)	.426 (.277)	.180 (.635)	.305	.132	1.76 (.233)
Consumer/Product (N=72)	.184 (.119)	-.205 (.082)	.071	.044	2.63 (.080)
Consumer+ Business-to-Business /Product (N=47)	.045 (.764)	-.118 (.433)	.016	n/a	.356 (.702)
Business-to-Business /Product(N=9)	.425 (.339)	.203 (.638)	.321	.094	1.42 (.313)

N represents the number of observations used for the analysis.
The numbers in parentheses are p-values for the beta coefficients and F-statistics.
The sum of observations in the classification of the combination of industry type and product category is not equal to the total number of observations due to the exclusion of service firms.

Table 21: Regression Results for Weighted Change Data

Regression Model	$BE = a + b_1$ (advertising) $+ b_2$ (R&D) $+ e$				
	Beta Coefficients		R^2	Adjusted R^2	*F*-Statistics
Variables	Advertising	R&D			
Total (N=253)	.237 (.000)	.035 (.572)	.059	.051	7.83 (.001)
Service (N=26)	.656 (.000)	.053 (.745)	.454	.406	9.55 (.001)
Product (N=227)	.149 (.025)	.029 (.661)	.024	.015	2.72 (.068)
Consumer (N=147)	.049 (.571)	-.082 (.340)	.011	n/a	.796 (.453)
Consumer + Business-to-Business (N=85)	.306 (.004)	-.121 (.250)	.105	.084	4.84 (.010)
Business-to-Business (N=21)	.402 (.140)	.227 (.395)	.338	.266	4.69 (.023)
Consumer/Product (N=137)	.050 (.572)	-.107 (.229)	.017	.002	1.15 (.320)
Consumer+ Business-to-Business /Product (N=77)	.126 (.272)	-.143 (.212)	.036	.011	1.41 (.251)
Business-to-Business /Product (N=13)	.396 (.262)	.248 (.474)	.349	.223	2.77 (.109)

N represents the number of observations used for the analysis.
The numbers in parentheses are p-values for the beta coefficients and F-statistics.
The sum of observations in the classification of the combination of industry type and product category is not equal to the total number of observations due to the exclusion of service firms.

Table 18 shows the results of the regression analyses using the original data. Beta coefficients are presented for advertising and R&D for all brand observations, service and product firms, consumer, consumer + business-to-business, business-to-business products, and consumer products/product firms, consumer + business-to-business products/product firms, and business-to-business /product firms. As discussed, even though the effects of the combinations of two classifications, industry type and product category, were not of direct interest in the present research, they were added to further examine the relative effectiveness of advertising and R&D under different circumstances.

Regarding H5, "Advertising is more effective than R&D in contributing to brand equity," the magnitude of the beta coefficients for advertising expenditures and R&D expenditures can be compared to assess the relative effectiveness of advertising and R&D. As can be seen, the beta coefficients for advertising and R&D for all observations (N=220) were .130 ($p<.05$) and .574 ($p<.01$) respectively for the original data and the weighted data. Since the beta coefficient of R&D was greater than that of advertising, R&D was believed to contribute more to brand equity than advertising for the total observations in terms of dollar expenditures.

Appendix B provides the classifications of corporate brands used in the research in terms of industry type and product category. As can be seen in Appendix B, industry type was classified into service firms and product firms. All corporate brands in the data were classified according to the type(s) of customers served. Product category was divided into consumer products, consumer + business-to-business products, and business-to-business products. The consumer + business-to-business products category was

designed to incorporate corporate brands that do business with final consumers as well as other firms. These firms would include Dell and Goodyear Tires, Inc.

In addition to these two forms of classifications, the classification based on the combination of industry type and product category was divided into product firms with consumer products, product firms with consumer and business-to-business products, and product firms with business-to-business products. A firm such as Nike would be an example of a product firm marketing consumer products. General Electric would be an example of a product firm marketing consumer and business-to-business products. An example of a product firm marketing business-to-business products would be Intel. This classification was developed to determine if there is any difference in the relative effectiveness of advertising and R&D on brand equity moderated by product category and industry type.

Beta coefficients for advertising and R&D for the service firms (N=15) were .202 and .489 respectively; these were not statistically significant at $p<.05$. For the product firms (N=205), the beta coefficients were .105 and .594 respectively, but only the beta coefficient for R&D was statistically significant at $p<.01$. Based on the regression coefficients, R&D seemed to contribute more to brand equity than advertising for both service firms and product firms but the beta coefficients for advertising were not significant. Therefore, the discussion regarding the relative effectiveness of advertising and R&D would not be meaningful.

The beta coefficients for advertising and R&D for consumer products (N=121) were .486 ($p<.01$) and .189 ($p<.05$) respectively, whereas the beta coefficients for

advertising and R&D for the business-to-business products (N=20) were .767 ($p<.01$) and .186 ($p<.05$) respectively. The beta coefficients for advertising and R&D for consumer + business-to-business products (N=70) were .289 ($p<.05$) and .398 ($p<.01$). These coefficients suggest that there were differences between advertising and R&D in their contributions to brand equity depending on the product category. In other words, for consumer + business-to-business products, R&D contributed more to brand equity than did advertising, but for consumer products and business-to-business products, advertising contributed more to brand equity than did R&D.

In terms of the combination of the two categories, product category and industry type, the beta coefficients for advertising for consumer products/product firms (N=115) and business-to-business products/product firms (N=16) were .847 ($p<.01$) and .718 ($p<.05$). The beta coefficient for R&D for consumer + business-to-business products/product firms was .467 ($p<.01$). These findings mean that advertising contributed more to brand equity for consumer products/product firms and for business-to-business products/product firms than R&D, whereas R&D contributed more to brand equity than advertising for consumer + business-to-business products/product firms. The beta coefficient for R&D for consumer products/ product firm was -.158 and not statistically significant. It was believed to be negative due to chance.

Table 19 shows the results of the regression analysis using the weighted data. As mentioned previously, weighting the original data prevents some firms in the data sets from being over-represented and gives all observations an equal weight in the regression

analyses. The total number of observations increased from 220 to 469 due to the weighting process.

Beta coefficients are shown for advertising and R&D for all observations, service and product firms, consumer products, consumer products + business-to-business products, business-to-business products, and consumer products/product firms, consumer + business-to-business products/product firms, and business-to-business products/product firms in Table 19. Beta coefficients for advertising and R&D for all observations (N=469) with the weighted data were .198 ($p<.01$) and .501 ($p<.01$) respectively. The beta coefficient for R&D was greater than that for advertising, although both were statistically significant at $p<.01$. These coefficients confirmed the findings from the regression analyses using the original data, which was that R&D was more effective than advertising in increasing brand equity. Therefore, contrary to H5, R&D was more effective than advertising in contributing to brand equity in terms of absolute dollars.

The beta coefficients for advertising and R&D for the service firms (N=43) were .315 ($p<.05$) and .422 ($p<.01$) respectively. Beta coefficients for advertising and R&D for the product firms (N=426) were .170 ($p<.01$) and .529 ($p<.01$) respectively. These beta coefficients show the same results as the analyses with the original data, which were that R&D was more effective than advertising in contributing to brand equity for both service firms and product firms.

Beta coefficients for advertising and R&D for the consumer products (N=273) were .444 ($p<.01$) and .328 ($p<.01$) respectively. Beta coefficients for advertising and R&D for the consumer + business-to-business products were .462 ($p<.01$) and .225

($p<.01$) respectively. The beta coefficient for advertising for business-to-business products was .832, which was statistically significant at $p<.01$, whereas the beta coefficient for R&D for business-to-business products was .112, which was not statistically significant. Unlike the analyses for all observations and industry type, these results of the analyses showed that advertising contributed more to brand equity than did R&D for consumer products, consumer + business-to-business products, and business-to-business products.

In terms of the combination of product category and industry type, for the consumer products/product firms (N=260), the beta coefficient for advertising was .684 ($p<.01$), but the beta coefficient (.093) for R&D was not statistically significant. For the consumer + business-to-business products/product firms, the beta coefficient for advertising was .447 ($p<.01$), while the beta coefficient for R&D was .226 and marginally significant at $p<.10$. The beta coefficients for advertising and R&D for the business-to-business products/product firms were .729 and .236 respectively, with the beta coefficient for advertising (.729) being statistically significant at $p<.01$. Therefore, based on these beta coefficients, advertising contributed more to brand equity than did R&D for the consumer products/product firms, the consumer + business-to-business products/product firms, and the business-to-business products/ product firms.

Table 20 and Table 21 contain the results of investigating possible relationships between changes in both advertising and R&D and changes in brand equity. Table 20 shows the results of the regression analyses using the original change data. Beta coefficients for advertising and R&D for all observations (N=137) with the original

change data were .200 and .020 respectively. The beta coefficient for advertising was greater than that of R&D and statistically significant at $p<.05$; the beta coefficient for R&D was not statistically significant. Unlike the previous findings from the regression analyses using the original data and the weighted data, these beta coefficients showed that advertising was more effective than R&D in contributing to changes in brand equity in terms of expenditure changes. In other words, changes in advertising expenditures were more effective in contributing to changes in brand equity than were changes in R&D expenditures.

Beta coefficients for advertising and R&D for service firms (N=9) were .629 and .038 respectively. Neither coefficient was not statistically significant. Beta coefficients for advertising and R&D for product firms (N=128) were .142 and .000 respectively. Even though the beta coefficients for advertising were larger than those for R&D for both service firms and product firms, they were not statistically significant. Thus, nothing conclusive can be stated regarding the relative effective of advertising and R&D for industry type using the original change data.

Beta coefficients for advertising and R&D for consumer products (N=76) were .151 and -.176 respectively. Beta coefficients for advertising and R&D for the consumer + business-to-business products (N=50) were .176 and -.101 respectively. Beta coefficients for advertising and R&D for business-to-business products were .426 and .180 respectively. None of the beta coefficients for product category were statistically significant. Similar to findings for industry type, even though the beta coefficients for advertising were greater than those for R&D, it could not be concluded that advertising

was more effective than R&D in contributing to changes in brand equity for any of three product categories due to the lack of statistical support. In addition, negative beta coefficients were believed to be due to chance because none of them were statistically significant.

With regard to the combination of product category and industry type, for the consumer products/product firms (N=72), the beta coefficient for advertising was .184 and the beta coefficient of R&D was -.205. For the consumer + business-to-business products/product firms, the beta coefficient for advertising was .045 and the beta coefficient for R&D was -.118. Beta coefficients for advertising and R&D for business-to-business products/product firms were .425 and .203 respectively. None of the beta coefficients for advertising and R&D were statistically significant. Similar to findings for the product category, negative beta coefficients for consumer products/product firms and consumer + business-to-business products/product firms were considered to be due to chance.

Therefore, based on the beta coefficients in Table 20, changes in advertising were not more effective than changes in R&D in contributing to changes in brand equity except for all combined observations. In this situation, advertising was relatively more effective than R&D in contributing to changes in brand equity.

The results of the regression analyses using the weighted change data are shown in Table 21. The total number of observations in Table 21 was increased from 137 to 253 due to weighting the data. Beta coefficients for advertising and R&D for all observations (N=253) with the weighted change data were .237 and .035 respectively. The beta

coefficient for advertising was greater than that for R&D, and the beta coefficient for advertising was statistically significant at $p<.01$; the beta coefficient for R&D was not statistically significant. Analogous to the previous findings from the regression analyses using the original change data, these beta coefficients showed that advertising was more effective than R&D in contributing to changes in brand equity. This means that changes in advertising were more effective in contributing to changes in brand equity than changes in R&D expenditures.

Beta coefficients for advertising and R&D for the service firms (N=26) were .656 and .053 respectively; thus the beta coefficient for advertising was greater than that for R&D. The beta coefficient for advertising was statistically significant, whereas the beta coefficient for R&D was not statistically significant. Beta coefficients for advertising and R&D for product firms (N=227) were .149 and .029 respectively. Like the analysis of the service firms, the beta coefficient for advertising was statistically significant, whereas the beta coefficient for R&D was not statistically significant. Since beta coefficients for advertising for both the service firms and product firms were greater than those for R&D and were statistically significant, it was concluded that changes in advertising were more effective than changes in R&D in contributing to changes in brand equity for service and product firms.

Beta coefficients for advertising and R&D for consumer products (N=147) were .049 and -.082 respectively; neither coefficient was statistically significant. Beta coefficients for advertising and R&D for the consumer + business-to-business products (N=85) were .306 and -.121 respectively. The beta coefficient for advertising was

statistically significant, whereas the beta coefficient for R&D was not statistically significant. Beta coefficients for advertising and R&D for the business-to-business products were .402 and .227 respectively. Those two beta coefficients were not statistically significant. Even though the beta coefficient for advertising was greater than the beta coefficient for R&D, statistical significance was not present for most of the beta coefficients (except for the beta coefficient for advertising for the consumer + business-to-business products). Therefore, it was concluded that only changes in advertising for consumer + business-to-business products were more effective than changes in R&D in contributing to changes in brand equity. As mentioned previously, negative beta coefficients were believed to be due to chance.

With respect to the combination of product category and industry type, for consumer products/product firms (N=137), the beta coefficient for advertising was .050 and the beta coefficient for R&D was -.107. The beta coefficient for advertising for consumer + business-to-business products/product firms was .126 and the beta coefficient for R&D was -.143. Beta coefficients for advertising and R&D for business-to-business products/product firms were .396 and .248 respectively. None of the beta coefficients for advertising and R&D were statistically significant. Therefore, based on the beta coefficients in Table 21, it was concluded that changes in advertising were not more effective than changes in R&D in contributing to changes in brand equity. As discussed, negative beta coefficients were due to chance.

To summarize, based on the regression analyses with all four types of data, the original data, the weighted data, the original change data, and the weighted change data,

it appeared that absolute R&D expenditures were more closely related than absolute advertising expenditures to brand equity, but changes in advertising expenditures were more effective than changes in R&D expenditures in increasing brand equity. Therefore, H5, "Advertising is more effective than R&D in contributing to brand equity," was partially supported.

Additional Analyses

This section discusses a variable that may function as a covariate and affect the regression analyses performed. It was believed that investigating this variable in conjunction with the primary variables of interest would help to determine if any confounding effects were related to the variable. In addition, this section examines whether there is a difference between more represented corporate brands and less represented corporate brands in the analyses in the relative effectiveness of advertising and R&D in contributing to brand equity.

Market Performance

One can argue that firms with large advertising expenditures are likely to have high sales volumes if advertising can drive sales. Conversely, it could be true that firms with high sales volume can afford more advertising expenditures because they have more resources due to higher sales. Even though it has been widely discussed among marketing researchers that there could be a two-way directional relationship between advertising and sales (Vakratsas and Ambler 1999), this dissertation focuses mainly on the advertising-sales relationship, not the sales-advertising relationship.

High sales volumes may result from superior brand equity because firms with superior brand equity can provide customers and potential customers with more value and benefits from their products. Customers and potential customers tend to believe that products with high brand equity are better in their attributes and qualities than unbranded or weak-branded products. Customers and potential customers are more likely to buy a product if it is a well-known corporate brand. As discussed previously, brand equity can be a source of extra cash flow for firms by selling more units, penetrating markets faster, and reducing price resistance from customers and potential customers. Advertising can contribute to brand equity by communicating with customers and potential customers. Therefore, it is possible that the relationship between advertising and brand equity may be affected by a firm's sales.

A firm's sales can also affect the relationship between R&D and brand equity. A firm with a high sales volume has more resources to allocate to R&D than a firm with a low sales volume. As discussed, R&D can help a firm acquire necessary information and knowledge to develop new products or services. New products or services can increase the sales volume of a firm. Information and knowledge are critical elements of intellectual market-based assets, which are one of the two types of market-based assets and can be represented by brand equity. Therefore, sales can affect the relationship between brand equity and R&D.

There are two popular marketing variables that can be operationalized for market performance: sales volume and market share. Sales volume represents the total sales of a given type of product or service, whereas market share refers to a product's (service's)

share of the total quantity or dollar sales of all products within the product category in which the product (service) competes. Market share is determined by dividing a brand's sales by total category sales in either quantity or dollar (Kotler and Armstrong 1999).

According to Assmus et al. (1984), using sales volume as a proxy variable for a firm's market performance implies two effects of advertising – sales gained from a competitor and sales from possible expansion of the market due to advertising. The use of market share instead of sales volume as a proxy variable for a firm's market performance may eliminate market expansion from the analysis by allowing the impact of advertising on primary demand to appear in both a product level and a category level. In addition, sales volume is one of the most commonly used proxy variables for a firm's market performance (Kyle 1978: Hanssens et al. 1990). Therefore, market performance will be operationalized as a firm's annual sales volume and analyzed in this framework.

In order to test the effects of sales on the respective relationships between advertising, R&D, and brand equity, three regression models were developed as follows.

$$\text{Brand Equity} = a + b_1 \text{ (advertising)} + b_2 \text{ (sales)} + \text{error}$$

$$\text{Brand Equity} = a + b_1 \text{ (R\&D)} + b_2 \text{ (sales)} + \text{error}$$

$$\text{Brand Equity} = a + b_1 \text{ (advertising)} + b_2 \text{ (R\&D)} + b_3 \text{ (sales)} + \text{error}$$

Where a is a regression intercept and
b_1, b_2, and b_3 are regression slopes for independent variables.

Tables 22, 23, and 24 presents the results of each regression analysis for the four types of data, the original data, the weighted data, the original change data, and the weighted change data.

Table 22: Regression Results for Sales and Advertising on Brand Equity

Regression Model	**BE = a + b_1 (advertising) + b_2 (sales) + e**							
Data Sets	**Original Data (N=297)**		**Weighted Data (N=652)**		**Original Change Data (N=185)**		**Weighted Change Data (N=352)**	
Variables	**Adv**	**Sales**	**Adv**	**Sales**	**Adv**	**Sales**	**Adv**	**Sales**
Beta Coefficient	**.335****	**.202****	**.283****	**.305****	**.031**	**.322****	**.031**	**.401****
R^2	**.247**		**.296**		**.113**		**.173**	
Adjusted R^2	**.242**		**.294**		**.103**		**.168**	
Overall Model Fit *F*-statistics	**48.27****		**136.80****		**11.59****		**36.58****	

** Regression coefficient is significant at the 0.01 level (2-tailed).
* Regression coefficient is significant at the 0.05 level (2-tailed).
Note: BE refers to brand equity and N is the sample size for each data set.

Table 23: Regression Results for Sales and R&D on Brand Equity

Regression Model	**BE= a + b_1 (R&D) + b_2 (sales) + e**							
Data Sets	**Original Data (N=334)**		**Weighted Data (N=799)**		**Original Change Data (N=209)**		**Weighted Change Data (N=454)**	
Variables	**R&D**	**Sales**	**R&D**	**Sales**	**R&D**	**Sales**	**R&D**	**Sales**
Beta Coefficient	**.475****	**.131***	**.497****	**.109****	**.039**	**.198****	**.038**	**.204****
R^2	**.309**		**.308**		**.046**		**.048**	
Adjusted R^2	**.304**		**.306**		**.036**		**.044**	
Overall Model Fit *F*-statistics	**73.85****		**176.79****		**4.93****		**11.34****	

** Regression coefficient is significant at the 0.01 level (2-tailed).
* Regression coefficient is significant at the 0.05 level (2-tailed).
Note: BE refers to brand equity and N is the sample size for each data set.

Table 24: Regression Results for Sales, Advertising, and R&D on Brand Equity

Regression Model	**BE = a + b_1 (advertising) + b_2 (R&D) + b_3 (sales) + e**											
Data Sets	**Original Data (N=220)**			**Weighted Data (N=469)**			**Original Change Data (N=137)**			**Weighted Change Data (N=253)**		
Variables	**Adv**	**R&D**	**Sales**	**Adv**	**R&D**	**Sales**	**Adv**	**R&D**	**Sales**	**Adv**	**R&D**	**Sales**
Beta Coefficient	**.119**	**.556****	**.031**	**.091**	**.338****	**.289****	**.003**	**-.284****	**.536****	**-.013**	**-.277****	**.605****
R-square	**.438**			**.441**			**.195**			**.254**		
Adjusted R-square	**.430**			**.438**			**.177**			**.245**		
Overall Model Fit *F*-statistics	**56.09****			**122.56****			**10.73****			**28.29****		

** Regression coefficient is significant at the 0.01 level (2-tailed).
* Regression coefficient is significant at the 0.05 level (2-tailed).
Note: BE refers to brand equity and N is the sample size for each data set.

Table 22 shows the results of the regression analysis for the effect of sales on the relationship between advertising and brand equity. The beta coefficient for sales with the original data was .202 and the beta coefficient for sales with the weighted data was .305. Both coefficients were statistically significant at $p<.01$. The beta coefficient for sales with the original change data .322 and the beta coefficient for sales with the weighted change data was .401. Both coefficients were statistically significant at $p<.01$. Therefore, as shown Table 22, firm sales were believed to be positively and significantly related to brand equity.

In order to test whether firm sales mediate the relationship between advertising and brand equity, the partial correlation coefficient for advertising and brand equity after controlling for sales was computed and compared to the zero-order correlation coefficient for advertising and brand equity. As shown in Table 6, the correlation coefficient for advertising and brand equity was .476 and the correlation coefficient for sales and brand equity was .310. Both correlation coefficients were statistically significant at $p<.01$. The partial correlation coefficient for advertising and brand equity was .267, which was decreased from .476 after controlling for sales.

According to Baron and Kenny (1986), if the partial correlation coefficient compared to the zero-order correlation coefficient decreases, it could indicate that the variable of interest (sales) is mediating the relationship between the independent variable (advertising) and the dependent variable (brand equity). The strongest mediator would drop the partial correlation coefficient to 0. If the partial correlation is not zero, it could indicate there were multiple mediating factors. Considering the area of study, it would be

natural to assume that there were other factors, such as channels and promotions, which could possibly mediate the relationship.

In addition to the mediating effect for the original data, another analysis was performed for the original change data to check if there was any mediating effect of changes in sales on the relationship between changes in advertising and changes in brand equity. The partial correlation coefficient for changes in advertising and changes in brand equity after controlling for changes in sales was calculated and compared to the zero-order correlation coefficient for changes in advertising and changes in brand equity.

As shown in Table 10, the correlation coefficient for changes in advertising and changes in brand equity was .167 ($p < .05$) and the correlation coefficient for changes in sales and changes in brand equity was .211 ($p < .01$). The partial correlation coefficient for changes in advertising and changes in brand equity was .030, which was less than .167 after controlling for sales. Even though the partial correlation coefficient for changes in advertising and changes in brand equity with the original change data was not statistically significant, the partial correlation coefficient for the original change data showed the same direction that the partial correlation coefficient for the original data showed. Therefore, it was concluded that sales had a positive effect on the relationship between advertising and brand equity in terms of dollar expenditures, but changes in sales did not have a positive effect on the relationship between changes in advertising and changes in brand equity.

Table 23 shows the results of the regression analysis for the effect of sales on the relationship between R&D and brand equity. The beta coefficient for sales with the

original data was .131 and the beta coefficient for sales with the weighted data was .109. The beta coefficient for sales with the original data was statistically significant at $p<.05$, whereas the beta coefficient for sales with the weighted data was statistically significant at $p<.01$. The beta coefficient for sales with the original change data was .198 and the beta coefficient for sales with the weighted change data was .204. Both coefficients were statistically significant at $p<.01$.

The partial correlation coefficient for R&D and brand equity after controlling for sales was computed and compared to the zero-order correlation coefficient for R&D and brand equity to investigate whether firm sales mediate the relationship between R&D and brand equity. In Table 6, the correlation coefficient for sales and brand equity was .310 and lower than the correlation coefficient for R&D and brand equity, which was .544. Both correlation coefficients were statistically significant at $p<.01$.

The partial correlation coefficient for R&D and brand equity was .438 after controlling for sales. The decline from the z-order correlation coefficient, .544, was not as much as decline in the partial correlation coefficient for the effect of sales on the relationship between advertising and brand equity. Close observation revealed that there was a mediating effect by sales and statistically significant at $p<.01$, but the sales effect on the relationship between R&D and brand equity was weaker than the sales effect on the relationship between advertising and brand equity.

With regard to the original change data, the partial correlation coefficients for changes in R&D and changes in brand equity and for changes in sales and changes in brand equity were .103 and .211. The partial correlation coefficient for changes in sales

and changes in brand equity was statistically significant at $p < .01$, whereas the partial correlation coefficient for changes in R&D and changes in brand equity was not statistically significant.

The partial correlation coefficient for changes in R&D and changes in brand equity after controlling for changes in sales was calculated and compared to the zero-order correlation coefficient for R&D and brand equity to check whether firm sales mediate the relationship between R&D and brand equity.

The partial correlation coefficient for changes in R&D and changes in brand equity was .038 after controlling for sales. Compared to the zero-order correlation coefficient, .103, for changes in R&D and changes in brand equity, the partial correlation coefficient declined but was not statistically significant. Contrary to the analysis with the original data, changes in sales did not have a positive effect on the relationship between changes in R&D and changes in brand equity.

Table 24 presents the results of the regression analysis of brand equity when advertising, R&D, and sales were the independent variables. The beta coefficient for sales with the original data was .031 and the beta coefficient for sales with the weighted data was .289. The beta coefficient for sales for the original data was not statistically significant, whereas the beta coefficient for sales with the weighted data was statistically significant at $p<.01$. The beta coefficient for sales with the original change data .536 and the beta coefficient for sales with the weighted change data was .605. Both coefficients were statistically significant at $p<.01$. It was observed that the beta coefficients for the original change data and weighted change data were more than two times larger than the

beta coefficients for the original data and weighted data. This suggests that changes in sales affected changes in the relationship between advertising, R&D, and brand equity more than they did for the absolute sales.

In order to test whether firm sales mediate the relationships between advertising, R&D, and brand equity, the partial correlation coefficients for advertising, R&D, and brand equity after controlling for sales were computed and compared to the zero-order correlation coefficients for advertising, R&D, and brand equity. As shown in Table 6, the correlation coefficient for advertising and brand equity was .476 and the correlation coefficient for R&D and brand equity was .544. The correlation coefficient for sales and brand equity was .310. These three correlation coefficients were statistically significant at $p<.01$. The partial correlation coefficients for advertising and brand equity and for R&D and brand equity after controlling for sales were .130 and .404 respectively. The partial correlation coefficient for advertising and brand equity was not statistically significant, whereas the partial correlation coefficient for R&D and brand equity was statistically significant at $p< .01$. Since the partial correlation coefficients for advertising and brand equity and R&D and brand equity declined, it is believed that sales had a mediating effect on the relationship between advertising and brand equity and R&D and brand equity.

In addition to the mediating effect for the original data, another analysis was performed for the original change data to check if changes in sales can affect the relationships between changes in advertising, changes in R&D, and changes in brand equity. The partial correlation coefficients for changes in advertising, changes in R&D, changes in brand equity after controlling for changes in sales were computed and

compared to the zero-order correlation coefficients for changes in advertising and changes in brand equity.

As shown in Table 8, the correlation coefficient for changes in advertising and changes in brand equity was .167 and the correlation coefficient for changes in R&D and changes in brand equity was .103. The partial correlation coefficient for changes in sales and changes in brand equity was .211. The correlation coefficient for changes in R&D and changes in brand equity was not statistically significant, whereas the correlation coefficient for changes in advertising and changes in brand equity was statistically significant at $p < .05$ and the correlation coefficient for changes in sales and changes in brand equity was statistically significant at $p < .01$.

After controlling for sales, the partial correlation coefficient for changes in advertising and changes in brand equity was .052, which decreased from .167; the partial correlation coefficient for changes in R&D and changes in brand equity was -.252. The partial correlation coefficient for changes in advertising and changes in brand equity with the original change data after controlling for sales was not statistically significant, whereas the partial correlation coefficient for changes in R&D and changes in brand equity was statistically significant at $p < .01$. Therefore, even though it was concluded that sales had a positive effect on the relationship between advertising, R&D, and brand equity in terms of dollar expenditures, changes in sales did not have a positive effect on the relationship between changes in advertising, changes in brand equity, and changes in brand equity due to the lack of statistical support.

Number of Observations

One may argue that there could be a difference between more represented corporate brands and less represented corporate brands in the relative effectiveness of advertising and R&D contributing to brand equity. Corporate brands more represented during the ten-year period in the analyses might be more established and better recognized by their respective markets and, compared to corporate brands less represented in the analyses, may have different patterns of expenditures for advertising and R&D.

To test the effect of the number of times firms were represented in the regression analyses, a dummy variable with values "0" and "1" was created and put into a regression model. The value "0" indicated corporate brands represented more than five times; the value "1" indicated corporate brands represented five times or less in the ten-year analysis period. The regression model can be described as follows.

$$\text{Brand Equity} = a + b_1\,(\text{advertising}) + b_2\,(\text{R\&D}) + b_3\,(\text{dummy}) + \text{error}$$

Where a is a regression intercept and
b_1, b_2, and b_3 are regression slopes for the independent variables

Table 25 presents the results of the regression analyses for the effect of the number of firm representations on the relationship between advertising and R&D and brand equity using the original data and the weighted data. Beta coefficients for the dummy variable with the original data and the weighted data were .214 and .242

respectively and were statistically significant ($p<.01$). This finding implies that the number of representations of corporate brands used affected the regression analyses.

Table 25: Regression Results for Dummy Variable

Regression Model	**BE = a + b_1 (advertising) + b_2 (R&D) + b_3 (dummy) + e**					
Data Sets	**Original Data (N=220)**			**Weighted Data (N=469)**		
Variables	**Adv**	**R&D**	**Dummy**	**Adv**	**R&D**	**Dummy**
Beta Coefficient	**.109**	**.612****	**.214****	**.168****	**.535****	**.242****
R^2	**.482**			**.476**		
Adjusted R^2	**.475**			**.473**		
Overall Model Fit *F*-statistics	**67.10****			**140.97****		

N represents the number of observations used for the analysis.
** Regression coefficient is significant at the 0.01 level (2-tailed).
* Regression coefficient is significant at the 0.05 level (2-tailed).
Note: BE refers to brand equity.

Therefore, additional analyses were performed to see whether there is a difference between more represented corporate brands and less represented corporate brands in the relative effectiveness of advertising and R&D. Table 26 shows the results of the regression analyses for the relative effectiveness of advertising and R&D as a function of the number of corporate brand representations. The regression analyses were performed using the original data and the weighted data.

Table 26: Regression Results for the Number of Representations

Regression Model		$BE = a + b_1$ (advertising) $+ b_2$ (R&D) $+ e$				
		Beta Coefficients		R^2	Adjusted R^2	*F*-Statistics
Variables		Advertising	R&D			
Original Data	Total (N=220)	.130 (.043)	.574 (.000)	.438	.432	84.44 (.000)
	5 or less (N=68)	.671 (.000)	.158 (.178)	.638	.626	57.19 (.000)
	More than 5 (N=152)	.028 (.641)	.760 (.000)	.598	.593	110.78 (.000)
Weighted Data	Total (N=469)	.198 (.000)	.501 (.000)	.418	.416	167.54 (.000)
	5 or less (N=269)	.539 (.000)	.304 (.000)	.623	.620	219.13 (.000)
	More than 5 (N=200)	-.001(.985)	.773 (.000)	.596	.592	145.68 (.000)

N represents the number of observations used for the analysis.
The numbers in parentheses are p-values for the beta coefficients and F-statistics.
The sum of observations in the classification of the combination of industry type and product category is not equal to the total number of observations due to the exclusion of service firms.

Beta coefficients for advertising and R&D for the corporate brands represented five times or less with the original data were .671 and .158 respectively. Beta coefficients for advertising and R&D for the corporate brands represented more than five times

were .028 and .760 respectively. Among these beta coefficients, the beta coefficient (.671) for advertising for the corporate brands represented five times or less and the beta coefficient for R&D for the corporate brands represented more than five times were statistically significant ($p<.01$).

Beta coefficients for advertising and R&D for the corporate brands represented five times or less with the weighted data were .539 and .304 respectively and statistically significant ($p<.01$). Beta coefficients for advertising and R&D for the corporate brands represented more than five times were -.001 and .773 respectively. The beta coefficient for R&D was statistically significant ($p<.01$).

The results show that, for corporate brands represented more than five times in the analyses, R&D is more effective than advertising in contributing to brand equity, whereas while advertising is more effective than R&D for the corporate brands represented five times or less in the analyses. As can be seen in Appendix A, the corporate brands used in the analyses were established brands in their respective markets. However, among these corporate brands, there is a difference with regard to how long or how many times the corporate brands were represented during the ten-year analysis period. Corporate brands listed more than average (5 out of 10) could mean that they are more established and better recognized brands than corporate brands listed five times or less. Therefore, it is concluded that more established brands tend to rely more on R&D than advertising in contributing to brand equity, whereas less established brands are more likely to spend more on advertising than R&D in enhancing brand equity.

Path Analysis

The fundamental relationships in the present research described in Figure 2 indicated that there are causal relationships among primary variables. In order to test these potential causal relationships among the primary variables advertising, R&D, brand equity, and shareholder value, a path analysis was performed. Furthermore, as mentioned previously, the main research question in the present research was: "How can advertising contribute to value for brands and firms?" If advertising can contribute to value for brands and firms, how much value can advertising deliver to brands and firms? To examine these fundamental research questions, a path analyses was performed.

The basic path model of interest is described as follows and in Figure 3. Specifically, the model in Figure 3 was specified by the following path equations.

Equation 1: $SV = cBE + e_1$

Equation 2: $BE = aAdvertising + bR\&D + e_2$

where the a, b, and c are the regression coefficients and their subscripts are the equation number and variable number.

Figure 3: Path Analysis

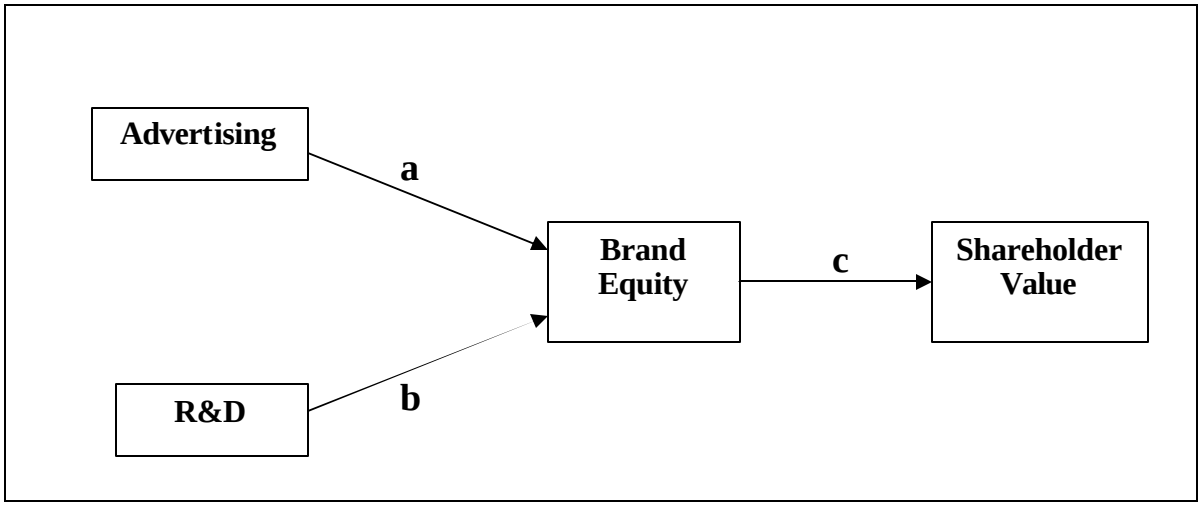


Table 27 shows the path coefficients for Figure 3 with all four types of data, the original data, the weighted data, the original change data, and the weighted change data. The M/B ratio, the most common proxy for shareholder value, was used for the path analyses. A path coefficient is a standardized regression coefficient showing the direct effect of an independent variable on a dependent variable in the path model. Each path coefficient is presented in Table 25 under paths respectively a, b, and c. Total path effects for shareholder value were computed by summing coefficients from two paths, one from advertising and one from R&D. The total path effects for the original data and the weighted data were .054 and .037 respectively. The total path effects for the original change data and the weighted change data were -.023 and -.031 respectively. Therefore, it is possible that the path model used may not effectively reveal the relationships among advertising, R&D, brand equity, and shareholder value.

Table 27: Path Coefficients and Total Effect

Data set		Original Data			Weighted Data			Original Change Data			Weighted Change Data		
		a	b	c	a	b	c	a	b	c	a	b	c
Path Coefficients		.130	.574	.077	.198	.501	.053	.200	.004	-.094	.237	.035	-.114
Path Effect	a->c	.130*.077 = .010			.198*.053 =.010			.200*-.094 = -.019			.237*-.114 = -.027		
	b->c	.574*.077 = .044			.501*.053 = .027			.004*-.094 = -.004			.035*-.114 = -.004		
	Total	.054			.037			-.023			-.031		

Table 28 and Table 29 summarize the results of hypothesis testing. Beta coefficients for each hypothesis reflecting the statistically significant relationships are shown in Table 26 and the hypotheses are presented in an abbreviated form representing the relationships between the variables tested in Table 27. The implications and limitations of the research are discussed in Chapter 5. The dissertation research concludes with a brief note about the contribution of this research and potential research directions in this field.

Table 28: Beta Coefficients for Hypotheses

Hypothesis	Variable			Original Data		Weighted Data		Original Change Data		Weighted Change Data	
	DV	IV	IV2 or Covariate								
H1a	Brand Equity	Adv		**.476****		**.501****					
H1b	Change in Brand Equity	Change in Adv						**.167***		**.212****	
H2a	Brand Equity	R&D		**.544****		**.546****					
H2b	Change in Brand Equity	Change in R&D						ns		**.103***	
H3	Brand Equity	Adv*R&D	Adv and R&D	**-.469****		**-.288****		ns		ns	
H4	Shareholder Value	Brand Equity		ns		ns		ns		ns	
H5	Brand Equity	Advertising	R&D	**.130***	**.574****	**.198****	**.501****	**.200***	ns	**.237****	ns
H6	Brand Equity	Advertising	Industry Type	NS	NS	NS	NS	NS	NS	NS	NS
H7	Brand Equity	Advertising	Product Category	NS	NS	NS	NS	NS	NS	NS	NS

** Regression Coefficient is significant at the 0.01 level (2-tailed).

* Regression Coefficient is significant at the 0.05 level (2-tailed).

Note: DV and IV refer to dependent variable and independent variable respectively. Adv refers to advertising. NS refers to not supported and ns refers to not statistically significant.

Table 29: Summary of Hypothesis Tests

Hypothesis		Results
H1a	There is a positive relationship between gross advertising expenditures and brand equity.	**supported**
H1b	There is positive relationship between changes in advertising expenditures and changes in brand equity.	**supported**
H2a	There is a positive relationship between R&D expenditures and brand equity.	**supported**
H2b	There is a positive relationship between changes in R&D expenditures and changes in brand equity.	**partially supported**
H3	The interaction between advertising and R&D has a positive effect on brand equity.	**not supported**
H4	There is a positive relationship between brand equity and shareholder value.	**not supported**
H5	Advertising is more effective than R&D in contributing to brand equity.	**not supported**
H6	Advertising contributes more to brand equity for product firms than service firms.	**not supported**
H7	Advertising contributes more to brand equity for consumer products than for business-to-business products.	**not supported**

Chapter 5: Discussion

In this chapter, the results presented in the previous chapter and their implications are discussed. The limitations and contributions of the research are also discussed. Finally, directions for future research are suggested.

IMPLICATIONS OF RESULTS

The main research question of the dissertation was, "How much value can advertising deliver to brands and firms?" Measuring the impact of advertising in enhancing brand equity and shareholder value was the focus of the research. In the previous chapter, the impact of advertising and R&D in enhancing brand equity was first analyzed. This was followed by an examination of the relative effectiveness of advertising and R&D. The relationship between brand equity and shareholder value was tested to verify the conceptual framework proposed in Chapter 2. Other factors, such as industry type and product category, which may affect the relationships investigated, were also examined. The implications of the results from each of the analyses are discussed below.

Advertising and Brand Value

The role of advertising in enhancing brand equity was confirmed when the relationship between advertising and brand equity was analyzed using a simple regression model. As discussed, brand equity is the core concept of the present research. A firm's

advertising and R&D can develop and improve market-based assets (relational market-based assets and intellectual market-based assets), which can in turn be represented by brand equity. In other words, brand equity can be considered a surrogate measure of market-based assets because a firm with superior market-based assets is more likely to have superior brand equity and, with brand equity, a firm can generate more shareholder value.

Advertising for corporate brands had a fairly strong association with brand equity. In addition, changes in advertising were positively related to changes in brand equity. This means that increases (decreases) in expenditures on advertising directly lead to increases (decreases) in brand value estimates.

These findings have theoretical and managerial implications. First, from a theoretical point of view, the findings show that advertising affects brand equity, which can be a primary source of developing and maintaining the relationships with a firm's stakeholders, such as consumers and channel members. These relationships become relational market-based assets, which are suggested to enhance shareholder value.

Compared with market response analysis, a traditional approach of advertising effectiveness research which usually measures the effectiveness of advertising in relation to market performance measures such as sales volume and market share, the present research suggests another approach to evaluating advertising effectiveness. This is because advertising can not only work to improve market performance measures, but also can contribute to brand equity.

With regard to the managerial implications of these findings, advertising can be perceived and utilized to generate value for brands and firms. Advertising is a favorite discretionary expenditure for managers to cut, especially when they are under severe pressure to improve profits. However, given the present findings, managers can argue that advertising not only influences sales and market share but also brand equity. There is an argument that brand equity will be the most important value generator for brands and firms in the future (Aaker 1991, 1996; Keller 1993). Therefore, advertising should be considered an investment rather than an expense.

R&D and Brand Equity

Like advertising, the relationships between R&D and brand equity was confirmed in the present research. R&D for corporate brands showed a strong association with brand equity. Furthermore, changes in R&D had a positive effect on changes in brand equity. This means that increases (decreases) in expenditures on R&D can contribute to increases (decreases) in brand value estimates.

These findings show the potential of R&D to enhance brand equity can be realized by improving intellectual market-based assets. Since the present research shows that R&D can contribute to brand equity, managers can take advantage of these findings and consider R&D as a legitimate option to generate value for brands and firms in the future.

Brand Equity and Shareholder Value

The theoretical argument regarding the relationship between brand equity and shareholder value was not supported. Regression analyses using all four types of data, the

original data, the weighted data, the original change data, and the weighted change data, did not support the theoretical argument. Even with three different measures of shareholder value, M/B ratio, P/E ratio, and net income, the analyses failed to consistently support the theoretical argument.

From a theoretical point of view, there is no good explanation for the findings. The present research posited a positive relationship between brand equity and shareholder value based on the notion that brand equity by marketing activities (mainly advertising) should lead to shareholder value (Srivastava et al 1998). It was believed that a firm with superior market-based assets can increase shareholder value by improving market performance through helping a product or service penetrate markets faster, getting price premiums, making brand extensions easier, lowering costs for sales and service, and/or obtaining higher customer loyalty and retention.

There are several possible reasons why no meaningful relationship was found between brand equity and shareholder value. The most common measure of shareholder value used in marketing research is the M/B ratio (Srivastava 1998; Kerin and Sethuraman 1998). However, considering the characteristics of shareholder value, M/B ratio may not be the best measure to represent shareholder value because it is calculated by dividing market value by book value. For example, 12.8 percent of observations (57 out of 445) in the original data and 10.5 percent of the observations (29 out of 277) in the original change data were service firms. As one might expect, since service firms do not usually have a high book value, the use of the M/B ratio in the present research might distort the results of the analyses.

By the same token, P/E ratio is not a good indicator of shareholder value because it is more related to the stock valuation approach. As discussed previously, the ratio itself can fluctuate any time of the day, month, quarter, year, or in any given period because it is calculated by dividing the current market price per share of the stock by earning per share. Thus, it may not fully reflect shareholder value in a longer time period. Net income is also just one part of shareholder value. Therefore, none of the three measures is a comprehensive measure of shareholder value. Consequently, they may not capture significant relationships between brand equity and shareholder value, even if there was a fairly strong association between them.

Another possible reason for not supporting the argument would be the particular observations in the present research. Brand value estimates were only available for large, well-known brands (e.g., IBM, Intel, and Coca-Cola). Therefore, the observations might not adequately represent corporate brands in general or other companies that might show a strong association between brand equity and shareholder value.

Another reason could be the fact that the measure of brand value estimates itself might not be a well-designed tool. Even though the methodology by *Financial World* and Interbrand Group is apparently one of the most widely used methodologies in the branding area, it is not without problems. For example, as shown Table 1, considering the method to compute the operating earnings of an equivalent unbranded razor and blade product line for Gillette, the method would not be an appropriate one, especially when there were insufficient data available. Therefore, it can be argued that the measure of brand value estimate was also suspect.

In sum, the theoretical argument for the relationship between brand equity and shareholder value was not confirmed. Even so, this does not necessarily mean that they are unrelated. The present research might not have found a relationship even if one was present due to either incomplete measures or limited data.

Interaction between Advertising and R&D

The hypothesis, "The interaction between advertising and R&D can have a positive effect on brand value," was not supported when the interaction effect was added to the regression model used. The regression analyses with all four types of data, the original data, the weighted data, the original change data, and the weighted change data, showed that there were negative beta coefficients with the original data and the weighted data, which were statistically significant at $p<.01$. Two other beta coefficients with the original change data and the weighted change data were positive and not statistically significant. Negative beta coefficients for the interaction term (advertising X R&D) in the regression analyses imply that the slope of the regression line between brand equity and advertising decreases with increasing value of R&D.

The findings of the regression analyses for the interaction effect for the original data and the weighted data showed that the relationship between the focal independent variable (advertising) and the dependent variable (brand equity) weakens with increasing values of R&D even though advertising expenditures and R&D expenditures both had a positive relationship with brand equity. Thus, the magnitude of the positive relationship between brand equity and advertising can be affected negatively by increases in R&D.

This result may explain why many firms still have different perspectives on advertising expenditures and R&D expenditures. As Mizik and Jacobson (2003) argued, advertising and R&D compete for available funds in business organizations and trade-offs occur between advertising and R&D when allocating limited resources to the process of generating value, between creating value and appropriating value.

Advertising vs. R&D

With regard to the relative effectiveness of advertising and R&D in contributing to brand equity, the theoretical argument that advertising is more effective than R&D in contributing to brand equity was not statistically confirmed across the four types of data analyzed: the original data, the weighted data, the original change data, and the weighted change data. The multiple regression analyses found inconsistent patterns of relationships. For example, beta coefficients for R&D with the original data and the weighted data were greater than those for advertising, whereas the beta coefficients for advertising for the original change data and the weighted change data were greater than the beta coefficients for R&D.

The findings of the multiple regression analyses actually provide intriguing perspectives on the relative effectiveness of advertising and R&D. R&D is more effective than advertising in contributing to brand equity when it comes to absolute expenditures. In other words, brand equity was more influenced by total R&D expenditures than total advertising expenditures.

However, advertising is more effective than R&D in contributing to brand equity with respect to changes in expenditures. In other words, changes in brand value estimates

were more affected by changes in advertising expenditures than changes in R&D expenditures. This could mean that R&D is more effective than advertising in contributing the total value of brand equity whereas advertising is more effective than R&D in contributing to the marginal value of brand equity.

In terms of the relative effectiveness of advertising and R&D on industry type, it was found that R&D was more effective than advertising in contributing to brand equity for the original data and the weighted data, whereas changes in advertising were more effective than changes in R&D in contributing to changes in brand equity. This was the same pattern that all observations presented.

With regard to the relative effectiveness of advertising and R&D on the product category, meaningful findings for two out of three product category classifications, consumer product, consumer + industrial products, and industrial products, were obtained. Analyses of consumer products with the original data showed that advertising was more effective than R&D in contributing to brand equity. This was opposite to the result obtained for all observations. The finding that advertising was more effective than R&D was consistent regardless of the types of data analyzed. It suggests that advertising for consumer products could be more effective than R&D in contributing to brand equity because a firm selling consumer products is more likely to generate value from advertising than R&D and spend more on advertising than on R&D. Advertising could be a main source to develop and maintain relationships with customers and potential customers.

The analysis also revealed that, across the four types of data, advertising was more effective than R&D in contributing to brand equity for business-to-business products. Unlike the case of consumer products, however, the sample size underlying the business-to-business products analyses was not large enough to statistically confirm any findings from the multiple regression analyses. For example, the sample size for business-to-business products in the original data was only 20 and the sample size in the weighted data, which was the largest number for the industrial products, was 49.

One speculation possible as to why advertising for business-to-business products was more effective than R&D in contributing to brand equity across the four types of data analyzed would be industry characteristics. Business-to-business product firms, in general, do not advertise as much as consumer product firms, but they do spend much money on R&D. Therefore, if some firms spend money on advertising appropriated from R&D or somewhere else, the effect of advertising for them would be much more salient and effective than money spent on R&D. However, as discussed, in spite of the statistical significance shown in the analyses, caution would be needed to interpret such findings.

Service vs. Product Firms

The hypothesis, "Advertising contributes more to brand equity for product firms than service firms," was not accepted. Contrary to the hypothesis, the findings from the multiple regression analyses revealed exactly opposite relationships, which was that advertising contributed more to brand equity for service firms than product firms for the four types of data sets. Once again, as discussed above, since the sample size for the service firms in the observations was extremely small, any findings based on this small

sample size need extra caution. In addition, even though beta coefficients for service firms were greater than product firms, some p-values were not statistically significant.

One possible explanation why advertising contributed more to brand equity for service firms than product firms would be that service firms included in the observations are some of the most advertised firms in their respective industries. Examples of service firms analyzed are American Airlines, Federal Express, and AT&T. Therefore, these big-name service firms might distort the relationships between advertising and brand equity.

Consumer vs. Business-to-Business Products

The theoretical argument for product category effects, "Advertising contributes more to brand equity for consumer products than for business-to-business products," was not accepted. Indeed, the multiple regression analyses found the opposite to be true, which was that advertising contributed more to brand equity for business-to-business products than for consumer products for all types of data.

Business-to-business product firms, in general, do not advertise as much as their counterparts, consumer product firms. Therefore, if business-to-business product firms spend money on advertising, advertising might be more effective than for consumer product firms, which tend to advertise more (as a proportion of sales and absolute expenditures). However, as discussed above, since the sample size for business-to-business products was extremely small, findings based on this small sample size need extra caution when interpreting results, even though beta coefficients were statistically significant.

LIMITATIONS

The first limitation of the present research results from the data sets. The methodology for brand value estimates by *Financial World* and Interbrand Group was not a perfect tool to measure brand equity. In fact, their methodology was just one of many methodologies that could be used for the same purpose. According to Kerin and Sethuraman (1998), common criticisms of the methodology are (1) the method for estimating future earnings and cash flows over and above future earnings and cash flows that an unbranded product can produce, (2) the choice of a discount rate based on seemingly subjective assessments of brand strength and the use of the P/E ratio, and (3) the tendency to overlook asset synergies and brand or trademark extension potential when valuing brands (Aaker 1996; Kerin and Sethuraman 1998). In spite of these shortcomings, the methodology by Interbrand Group is considered generally reliable to do this type of empirical analysis (Kerin and Sethuraman 1998; Herremans et al. 2000).

Another limitation comes from the cross-section data analyses. Variables in the data sets used for the present research are basically time-series data but were used as cross-section data for the analyses due to the small number of observations. Since the present research took the measures of variables investigated in a given time period, it does reflect the ever-changing characteristics of variables analyzed such as the M/B ratio and the P/E ratio. In other words, due to the use of the time-series data for the cross-section data analyses, it does not reveal dynamic changes during a given time period. Therefore, a longitudinal analysis may better capture the dynamics of relationships among the variables investigated.

Further limitations regarding the data sets used in the present research relate to data obtained from the Compustat PC-Plus database. Even though this data source is dependable and reliable for empirical analyses (Mizik and Jacobson 2003; Kerin and Sethuraman 1998), its accuracy is not always warranted, especially with respect to advertising. The data on advertising expenditures were based on firms' reports, like other data from the Compustat PC-Plus database. However, data on advertising expenditures from the Compustat PC-Plus database usually include other marketing communication expenditures such as consumer promotions, and it is not the most precise advertising data if exact data on advertising expenditures only are required (Graham and Frankenberger 2000; Mizik and Jacobson 2003).

In addition, the sources of data used in the analyses may or may not have been true representations of the phenomena. For example, the traditional P/E ratio may not be an ideal indicator for shareholder value because some companies pay dividends and others do not pay dividends, thus "distorting" the P/E ratios in the present instance. Nonetheless, the Compustat PC-Plus data are among the most commonly used data in financially based marketing research studies like the present one (Graham and Frankenberger 2000).

Another possible limitation relates to time. R&D likely has a longer effect than advertising, yet this research examined both advertising and R&D on a short-term, year-to-year basis.

Besides the quantity aspect of advertising such as the level and duration of advertising expenditures, the quality aspect of advertising, which is conventionally called

"advertising creative," may affect the effectiveness of advertising in enhancing the value of brand equity. The exact same media plan with different creative (e.g., TV commercials in the same spot in the same broadcasting companies) may produce different results in terms of advertising effectiveness. Customers and potential customers may perceive and evaluate advertising differently depending on how attracted they are to advertising for a certain brand.

Favorable attitudes of customers and potential customers toward advertising can establish the favorable attitude toward a certain brand and, in turn, the favorable attitudes of consumers toward a brand are more likely to influence consumers' purchasing decisions for a certain brand and help establish the competitive value of brand equity (Keller 1998, O'Guinn 1998). By the same token, R&D expenditures may not reflect the qualitative aspect of R&D efforts because spending money on R&D does not necessarily lead to superior intellectual market-based assets. A firm should well plan and utilize R&D to reap the most benefits from its R&D efforts. Therefore, as can be seen, since the data analyzed for the research were quantitative, such as expenditures on advertising and R&D, the qualitative aspect of the effectiveness of advertising and R&D was not captured in the present research.

A final limitation relates to the unbalanced nature of observations. The corporate brands used in the research were mainly from U.S firms and did not include brands from non-U.S. firms. Therefore, the results of the dissertation research may not be applied to brand firms outside the U.S. In addition, by definition, the corporate brands used in the research were all well-known brand since brand value estimates were only available for

the most successful corporate brands. This means that the sample is a convenience sample and does not allow broad generalizations to other brands and firms.

The unbalanced nature of observations is also apparent in different numbers of observations for different firms. Even though this research weighted original data and original change data in order to reduce the potential bias by unbalanced numbers of observations in data sets, one may argue that there could be still problems using unbalanced data.

RESEARCH DIRECTIONS

Future research needs to expand the scope of the study. Data sets need to include corporate brands outside the U.S. and less-well known corporate brands inside the U.S. By doing so, the findings of the research will have more generalizability. In addition, in order to capture the dynamic nature of the relationships between variables used in the research, such as advertising, brand value estimates, and shareholder value, longitudinal analysis is necessary.

Accurately measuring shareholder value is an important topic for research in this area. None of the three measures of shareholder value (M/B ratio, P/E ratio, and net income) investigated here were related to the measure of brand equity used. Incorporating other variables, such as sales promotion, into the relationships among advertising, brand equity, and shareholder value might provide intriguing results.

Another interesting research direction would be to see whether the concept of brand equity for business firms can be applied to brands for nonprofit organizations.

Comparing and contrasting the two different organizations with regard to brand equity may shed light on the success and failure of non-profit organizations.

CONTRIBUTIONS

The main contribution of this dissertation is that it provides a framework for exploring alternative approaches to understanding the role of advertising within a business organization. Traditional research on the role or effect of advertising has been limited to a marketing context and has not been able to generate comprehensive explanations about the relationship between advertising and market performance measures. Even though advertising is believed to have an impact on marketing performance, the ultimate utility of advertising for firms and their brands has not been well understood or analyzed beyond a marketing context. Therefore, there is not much knowledge about whether or how advertising can contribute to the total wealth of a business organization. This research attempts to show the value of advertising by broadening the mainstream advertising effectiveness research into the interface of marketing and finance.

The findings from this research may offer practical insights regarding marketing management. Marketing managers are often under pressure to deliver short-term profits and tend to consider advertising only as a marketing tactic for producing operating profits rather than a strategic investment for brands and firms. As a result, advertising budgets at the individual firm level and at the aggregate industry level are frequently cut when financial difficulties are expected (*Adage* 2001).

However, based on the findings from the present dissertation research, marketing managers will have a better understanding of the ultimate utility of advertising in developing and maintaining brand equity. Managers can use brand equity to substantiate their decisions on advertising expenditures. Contrary to the common belief that advertising and marketing are resource-spenders, they may actually enhance brand equity, which is widely believed to produce wealth for a firm and help a firm survive and perpetuate itself. In addition, by incorporating other variables, such as R&D, which may affect the relationships between advertising and brand equity into the framework, the findings of this research may provide advertising and marketing managers with a more comprehensive understanding of the role of advertising in their business organizations.

Appendix A: Corporate Brands Used in the Analysis

Corporate Brands	Number of Times Represented in the research	Corporate Brands	Number of Times Represented in the research
3COM	2	Danone	1
AA	2	Del Monte	2
Accenture	1	Dell	6
Adobe System	2	Delta Air	2
Coors	5	Duracell	1
Amazon.com	4	Kodak	10
AMEX	4	Ericsson	4
AOL	6	Estee Lauder	2
Apple	7	Exxon	1
AT&T	5	Fedex	2
Avon	8	Fila	2
Bayer	3	Fisher-Price	1
Benetton	5	Ford	4
Black & Decker	4	Fuji Photo	3
Boeing	2	Gap	4
BP	4	Gateway	1
Cadbury	6	General	8
Campbell	6	Gillette	10
Canon	6	Goldman	2
Caterpilar	1	Goodyear	6
Cisco System	3	GTE	1
CitiGroup	3	Gucci	4
Coca-Cola	10	Harley Davidson	2
Colgate	10	Hershey	6
Compaq Computer	6	HP	8
CompuServe	2	Hilton	5
Computer Associates	3	Heinz	7
Continental Airline	2	Honda	3

Corporate Brands	Number of Times Represented in the research	Corporate Brands	Number of Times Represented in the research
Intel	9	Philips	6
IBM	7	Polo Ralph Lauren	5
Johnson & Johnson	5	Quaker	6
JP Morgan	1	Reebok	6
Kellogg	10	Reuters	3
Kraft	2	SAP	3
Levi's	2	Sara Lee	6
Liz Claiborne	2	Shell	1
LVMH	1	Siemens	4
Maytag	1	Sony	6
McDonald's	6	Sprint	1
MCI	1	Starbucks	3
Merck	2	Sun MicroSystem	4
Merrill	2	Sybase	2
Microsoft	8	Symantec	2
Mobil	3	Texaco	1
Morgan Stanley	1	Texas Instruments	1
Motorola	9	Tiffany	1
NEC	1	Toyota	3
Nestle	7	Tupperware	1
Nike	10	UAL Corp	2
Nintendo	1	Volkswagen	2
Nokia	4	Walt Disney	6
Novell	3	Whirlpool	2
NWA	2	Wrigley	9
Oracle System	5	Xerox	8
PepsiCo	10	Yahoo	4
Pfizer	2	**Total**	**445**

Appendix B: Corporate Brands used in the Present Research

INDUSTRY AFFILIATION

Service Firms	Product Firms
AA, Accenture, AMEX, AOL, AT&T, CitiGroup, Continental Air, Delta Air, Fedex, Goldman Sachs, GTE, Hilton, J P Morgan, Merrill Lynch, Morgan Stanley, NWA, Reuters, Sprint, UAL Corp, Walt Disney, Yahoo	3COM, Adobe System, Coors, Amazon.com, Apple, Avon, Bayer, Benetton, Black & Decker, Boeing, BP, Cadbury, Campbell, Canon, Caterpilar, Cisco System, Coca-Cola, Colgate, Compaq, CompuServe, Computer Associates, Danone, Del Monte, Dell, Duracell, Kodak, Ericsson, Estee Lauder, Exxon, Fila, Fisher-Price, Ford, Fuji Photo, Gap, Gateway, GE, Gillette, Goodyear, Gucci, Harley Davidson, Hershey, HP, Heinz, Honda, Intel, IBM, Johnson & Johnson, Kellogg, Kraft, Levi's, Liz Claiborne, LVMH, Maytag, McDonald's, Merck, Microsoft, Mobil, Motorola, NEC, Nestle, Nike, Nintendo, Nokia, Novell, Oracle, PepsiCo, Pfizer, Philips, Polo Ralph Lauren, Quaker, Reebok, SAP, Sara Lee, Shell, Siemens, Sony, Starbucks, Sun Microsystem, Sybase, Symantec, Texaco, Texas Instruments, Tiffany, Toyota, Tupperware, Volkswagen, Walt Disney, Whirlpool, Wrigley, Xerox

PRODUCT CATEGORY

Consumer Products	Consumer + Business-to-Business products	Business-to-Business Products
Coors, Amazon.com, AOL, Avon, Bayer, Benetton, Cadbury, Campbell, Coca-Cola, Colgate, Danone, Del Monte, Duracell, Estee Lauder, Fila, Fisher-Price, Fuji Photo, Gap, Gillette, Gucci, Harley Davidson, Hershey, Heinz, Johnson & Johnson, Kellogg, Kraft, Levi's, Liz Claiborne, LVMH, Maytag, McDonald's, Merck, Nestle, Nike, Nintendo, PepsiCo, Pfizer, Polo Ralph Lauren, Quaker, Reebok, Sara Lee, Sony, Starbucks, Tiffany, Toyota, Tupperware, Walt Disney, Whirlpool, Wrigley, Yahoo	AA, Adobe System, AMEX, Apple, AT&T, Black & Decker, BP, Canon, CitiGroup, Compaq, CompuServe, Continental Air, Dell, Delta Air, Kodak, Ericsson, Exxon, Fedex, Ford, Fuji Photo, Gateway, GE, Goldman Sachs, Goodyear, GTE, HP Hilton, Honda, IBM, JP Morgan, MCI, Merrill Lynch, Microsoft	3COM, Accenture, Boeing, Caterpilar, Cisco System, Computer Associates, Intel, Novell, Oracle, Reuters, SAP, Siemens, Sun Microsystem, Sybase, Symantec, Xerox

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