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Financial Value of Brands in Mergers and Acquisitions: Is Value in the Eye of the Beholder?

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June 2006

The authors would like to thank Douglas Bowman, Sriram Venkataraman, and participants of research seminar in marketing department at Goizueta Business School for their helpful comments and suggestions.

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Abstract

Firms frequently engage in merger and acquisition deals. In these transactions, brands account for significant but differential proportions of overall transaction value. Extant marketing literature on financial value of brands focuses on drivers of financial value only *within* a firm. However, in a merger and acquisition context, value of brands also depends on how their new owners might leverage them in the marketplace. This study identifies and empirically tests *both* the target and acquirer characteristics that affect the value of target firm's brands in mergers and acquisitions. Furthermore, the authors examine the moderating role of deal type and target firm sales growth on a subset of main effects. The results suggest that target marketing capability and acquirer brand portfolio diversity have positive effect on target's brand(s) value. Deal type inhibits the impact of acquirer portfolio diversity on target's brand value. Target firm sales growth inhibits the impact of target's marketing capability on target's brand value.

Brands are critical assets in mergers and acquisitions (Keller 1993; Rao, Mahajan and Varaiya 1991). For example, Constellation Brands Inc. justifies the acquisition of Robert Mondavi as follows:

> The acquisition of Robert Mondavi supports the company's strategy of strengthening the breadth of its portfolio across price segments to capitalize on the overall growth in the premium, superpremium and fine wine categories. The Company believes that acquired Robert Mondavi brand names have strong brand recognition globally.
>
> *Constellation Brands, 2005 10-K filing*

In several of these transactions, firms paid significantly higher prices to acquire targeted brands. In a watershed transaction, Philip Morris acquired Kraft for $12.9 billion, which was four times its book value. Reflecting on the premium paid, Philip Morris CEO, Hamish Marshall concluded, "The future of consumer marketing belongs to the companies with the strongest brands," (Biggar and Selame 1992). Recently, HP purchased Compaq's brands for $1.5 billion where total transaction value was $24 billion. Table 1 provides a set of recent transactions and illustrates the variance in brand value as a percentage of firm value.

What is the source of heterogeneity in the targeted brand's value across mergers and acquisitions? Extant marketing literature would argue that each brand has a different potential for generating future cash flows as a result of differences in brand-specific factors such as price premium (cf. Srivastava, Shervani and Fahey 1998). Although this approach is valid, acquirers may have different cash flow expectations from the brands independent of brand-specific factors. For example, in 1994, Quaker Oats paid $1.7 billion for the Snapple brand, a price which was higher than Coca-Cola and other bidders' offers (Deighton 2002). Similarly, PepsiCo and Coca-Cola bid different prices in the competition to acquire Quaker Oats' brand portfolio (especially Gatorade), $13.4 billion and $15.75 billion respectively (4 December 2004, New York Times). Taken together, these examples point to two sources of heterogeneity in brand value in the

context of mergers and acquisitions: (a) different brands have different financial values and (b) buyers vary in their cash flow expectations from brands.

The objective of this paper is to understand the factors that determine the value of target firms' brands in the context of mergers and acquisitions. Brand value is defined as "the incremental cash flows which accrue to branded products over and above the cash flows which would result from sale of unbranded products" (Simon and Sullivan 1993)[1]. In the marketing literature, conceptual and empirical work focuses on antecedents to brand value *within* a firm (e.g., Farquhar and Ijiri 1991). Although prior studies incorporate important and relevant factors (e.g., market share), they do not address acquirer's perspective of brand value. Only Mahajan, Rao and Srivastava (1994) allude to the importance of acquirer's perspective on target firm's brand value, but they do not provide empirical tests of specific target and acquirer characteristics that could affect the value of target firms' brands in a merger and acquisition transaction. Even though firms allocate substantial amounts of resources to acquire brands and brands continue to be of strategic importance to firms, there is dearth of academic research on factors that influence value of brands, especially in the context of mergers and acquisitions (Table 2).

Against this background, we contribute to marketing literature in the following way. First, we identify and examine the impact of *both* target and acquirer characteristics on target firm's brand value in the mergers and acquisitions context. We test for the relative effects of target and acquirer marketing capabilities and brand strategies on a target's brand value. We find that the target's marketing capability and acquirer's brand portfolio diversity affect target's brand value positively.

[1] Brand value can also be defined from consumer perspective (e.g., Keller 1993). The context of this study is mergers and acquisitions so brand value from firm's perspective is more appropriate than value from consumer perspective.

Second, we investigate the moderating effect of deal type (horizontal acquisition vs. others) on following relationships: target firm's marketing capability and target's brand value, acquirer's brand portfolio diversity and target's brand value. We find that the positive impact of acquirer's brand portfolio diversity on target's brand value is lower when the acquisition is horizontal. This finding corroborates the argument that horizontal transactions cause brand redundancies. Brand redundancies between the acquirer and target lead to divestment of some of the target's brands. We also study the interaction between the target's sales growth and the target's marketing capability. We find that the positive the impact of target's marketing capability on target's brand value is less when the target's sales growth is higher. This finding suggests that target firms can increase the financial value of their brands when they generate sales growth, even if their marketing spending is not efficient at generating sales growth.

Third, we use an accounting (NPV based) estimate of brand value as reported in 10-K and merger and acquisition documents of acquirer firm in the analysis. Prior empirical work on brand value extracts the value of brands from aggregate measures such as Tobin's q (e.g., Simon and Sullivan 1993). We use the dollar value that an acquirer firm attaches to a target firm's brand(s) in a merger and acquisition transaction as the measure of brand value. The precision of parameter estimates in the analysis is likely to be higher than precision of estimates in other studies because the measure does not include the value of other intangible assets like more aggregate measures, such as Tobin's q or goodwill, do.

Model Development

The theoretical model is developed from the following streams of research: (i) resource-based view (RBV) and (ii) brand strategy. The RBV literature portrays the firm as a collection of resources and capabilities (e.g., Barney 1991; Wernerfelt 1984). Amit and Schoemaker (1993, p.35) define resources as "stocks of available factors that are owned or controlled by the firm" and they define capabilities as "the firm's capacity to deploy *resources,* usually in combination, using organizational processes, to effect a desired end." The fundamental premise in the RBV literature is that firms differ in terms of their strategic resources and capabilities (Barney 1991). The source of heterogeneity stems from imperfect tradability of strategic resources. Barney (1986) argues that the heterogeneity in resources and capabilities may explain why potential acquirers have different value expectations from the same strategic assets. Makadok (2001) demonstrates analytically how resource-deployment capability leads to differential value expectations from same resources among potential acquirers.

In the marketing literature, brands (and brand equity) are identified as market-based assets and sources of competitive advantage (Bharadwaj, Varadrajan and Fahey 1993; Srivastava, Shervani and Fahey 1997). Brands conform to the asset properties that lead to market imperfections (e.g., rarity, inimitability). Thus, firms differ in their market-based assets and capabilities. Consequently, in a merger and acquisition transaction, we expect that the acquirer's cash flow expectations from the target firm's brand portfolio should vary as a function of target and acquirer's marketing capabilities.

The RBV perspective points only to capabilities in explaining value expectations from a target's strategic assets. However, the brand strategy literature suggests that there are other target and acquirer characteristics that could affect the formation of an acquirer's expectations from a

target's brands. We use two premises from brand strategy literature in developing the conceptual model.

The first premise is that choice of brand strategy has performance implications. The branding strategy literature identifies the presence of three main branding strategies in practice: corporate, house of brands and mixed in practice (Laforet and Saunders 1994, 1999). On a branding strategy continuum, one end is corporate branding strategy where the firm only uses one brand name across markets (e.g., GE). On the other end of the continuum is the house-of-brands strategy where the firm uses different brands to serve different markets (e.g., P&G). The trade-off between the two marketing strategies is economies of scale in marketing spending versus the customization of brands specific to segments (cf. Rao, Agarwal and Dahlhoff 2004). Better targeting enables firms to capture higher revenues by brand differentiation. If the firm implements a corporate branding strategy, then it will achieve economies of scale in marketing spending. Smith and Park (1992) find that extended brands have lower advertising-to-sales ratio than individual brands. If the firm implements a house-of-brands strategy, then it is able to target and position each brand to the specific needs of the segments. Morgan and Rego (2006) report a positive association between number of brands in a portfolio and market share. In the context of a merger and acquisition, a target firm's brand strategy will provide one of two benefits that will affect future cash flows of the brand portfolio. For example, Rao, Agarwal and Dahlhoff (2004) find that corporate branding strategy has a greater positive effect on Tobin's q than a house-of-brands strategy. Thus, target firm brand portfolio strategy will affect acquirer's cash flow expectations from target's brand(s).

The second premise is that a firm's choice of brand strategy reflects its preference for economies of scale over differentiation benefit or visa versa. For example, firms that implement

a corporate branding strategy have significantly lower advertising-to-sales ratio than firms implementing a house-of-brands strategy (Rao, Agarwal and Dahlhoff 2004). Firms go to the extent of restructuring their brand portfolios to achieve differentiation or economies of scale benefits. For example, in the early 1990s, Colgate-Palmolive reduced its brand portfolio size by a quarter, which led to savings of $20 million a year (Knudsen, Finskud, Tornblom and Hogna 1997). In the context of mergers and acquisitions, acquirers are likely to reflect heterogeneity in brand strategies. The acquirer firm will restructure a target firm's brand portfolio following the transaction depending on its preference for economies of scale or differentiation benefit. In fact, empirical evidence suggests that target firms' assets undergo substantial restructuring in the post-merger and acquisition period (e.g., Capron, Mitchell and Swaminathan 2001). Restructuring of the brand portfolio will affect the value of the brand portfolio.

In the following section, we present the conceptual model based on the premises from the RBV and brand strategy literatures. Then, we introduce the moderators and their impact on a subset of the proposed main effects.

Marketing Capabilities

Target's marketing capability. A target's marketing capability refers to the firm's ability to combine efficiently a number of marketing resources to engage in productive activity and attain marketing objectives (Amit and Schoemaker 1993; Dutta, Narasimhan and Rajiv 2005). Traditionally, marketing objectives have been customer satisfaction, market share or sales. However, achieving these objectives may be costly. In fact, firms are increasingly interested in productivity of marketing investments (Rust, Ambler, Carpenter, Kumar, and Srivastava 2004). If revenues are highly dependent on substantial marketing spending, then the margins on these brands will be low. Thus, a critical metric for the acquirer firm is the outputs (revenue) generated

by marketing inputs (advertising, promotion). Target firms with strong marketing capabilities are likely to achieve financial outcomes more efficiently than firms with weaker marketing capabilities. Empirical findings suggest that stronger marketing capabilities lead to higher profitability (Dutta, Narasimhan and Rajiv 1999), which implies that firms with stronger capabilities do achieve efficiency in marketing spending. This efficiency will affect an acquirer's cash flow expectations from the brand portfolio. If the brand portfolio is very productive with respect to marketing spending, then it implies that the acquirer firm will be able to generate higher revenues from the target's brand portfolio with lower marketing spending. Consequently, we expect that:

H1: The higher the target firm's marketing capability, the higher the target firm's brand portfolio value.

Acquirer's marketing capability. Acquirer's marketing capability refers to a firm's ability to combine efficiently a number of marketing resources to engage in productive activity and attain marketing objectives (Amit and Schoemaker 1993; Dutta, Narasimhan and Rajiv 2005). Acquirers vary in terms of their marketing resources (e.g., brands, customer relationships and sales personnel). The differences in marketing resources create differences among acquirers' marketing capabilities (cf. Makadok 2001). Empirical findings corroborate this argument: there is heterogeneity across firms' marketing capabilities even among the firms in the same industry (Dutta, Narasimhan and Rajiv 1999). Firms with stronger marketing capabilities will attribute higher value to a target's brands because their expectations of future revenues from a brand portfolio will be higher than firms with lower marketing capabilities. This stems from the fact that acquirers with stronger marketing capabilities will be able to deploy a target's brand portfolio more effectively and efficiently. More specifically, "marketing competent" acquirers

may leverage a target's brands successfully in following ways: (i) achieve same or higher level revenues by spending fewer marketing dollars, (ii) extend the target's brands to new markets more efficiently and (iii) co-brand the target's brands with existing brands more efficiently. Being aware of the strength to execute these possibilities, an acquirer's cash flow expectations from a target's brand portfolio will be higher. Formally,

> **H2: The higher the acquirer's marketing capability, the higher the target firm's brand portfolio value.**

Brand Portfolio Strategy

*Target firm brand portfolio diversity***.** Brand portfolio diversity is defined as the degree to which a firm chooses to serve markets with different brands. If a firm uses one brand name across industries (e.g., GE) then the diversity is low. If the firm uses different brand names across its businesses then the diversity is high (e.g., P&G). Portfolio diversity is a continuum whose one end is corporate branding strategy and the other end is a house-of-brands strategy. The choice of portfolio diversity has performance implications. If the firm chooses to have a less diverse brand portfolio, then the firm can achieve economies of scale in marketing investments (cf. Rao, Agarwal and Dahlhoff 2004). Diverse brand portfolios are likely to require more marketing spending than less diverse portfolios because each brand will require a distinct marketing program due to different brand images. In fact, Smith and Park (1992) find that brand extensions lead to advertising efficiency, which suggests that having fewer brands in the portfolio increases economies of scale in marketing spending.

Three risks, however, are associated with having less diverse brand portfolios. First, having few brands per category imposes the risk of ignoring some segments of the market which will reduce the revenues from the overlooked segments. Second, the risk of brand dilution or

brand identity increases as the firm extends the brand to different businesses because established brand associations and certain product categories may not fit (Keller 1993). Third, failure of the brand in one category could have a negative spillover effect in other categories where the brand is used (John, Loken and Joiner 1998; Loken and John 1993).

Empirical evidence on the net performance effects of these strategies is sparse. Rao, Agarwal and Dahlhoff (2004) find that corporate branding strategy has a higher positive effect on Tobin's q than a house-of-brands strategy. In favor of less diverse brand portfolios, Smith and Park (1992) report that brand extensions are associated with higher market shares compared to individual brands. Also, Morgan and Rego (2006) find that the number of brands in a portfolio is negatively associated with cash flows.

In the context of merger and acquisitions, we argue that acquirers will attribute higher value to brands when the target's brand portfolio diversity is low for the following reasons. First, firms are challenged with high costs of maintaining many brands independent of a merger and acquisition (Laforet and Saunders 2005). Following a merger and acquisition, the acquirer firm usually incurs large integration and restructuring costs (Larsson and Finkelstein 1999). Under such conditions, managers will be more sensitive to costs of maintaining different brands and attribute lower value to diverse brand portfolios.

Second, if the target has fewer (or perhaps one) brands, then it is easier for the acquirer to communicate the strengths of the brand(s) to customers and investment community compared to a large portfolio of brands. Different brands have distinct identities and perhaps they are targeted at different segments. For example, Nike conveys one image across products with a single brand (Keller 2003) and P&G has distinct images for the brands in its portfolio. Communicating the different images of a diverse brand portfolio to consumers and investors should be more difficult

than communicating single image to same audience. In fact, Rao, Agarwal and Dahlhoff(2004) conclude that investors may not be able to see the benefits of brand differentiation. Thus, acquirers will attribute lower value to diverse brand portfolios.

H3: The higher the target firm's brand portfolio diversity, the lower the target firm's brand portfolio value.

Acquirer firm portfolio diversity. Acquirer portfolio diversity is defined as the degree to which the acquirer chooses to serve markets with different brands. An acquirer's branding strategy reflects its approach to branding. For example, if the acquirer's portfolio diversity is high, then the firm prefers differentiation benefits by serving various markets with multiple brands to achieving economies of scale with fewer brands. If the acquirer's brand portfolio diversity is low, it is likely that the acquirer will keep only a few of the target's brands because keeping more of the target's brands will lead to inefficiency in marketing spending. Empirical findings suggest that the target's assets are more likely to be divested than acquirer's assets following a transaction (Capron, Mitchell and Swaminathan 2001). Brands are subject to divestiture along with other assets. For example, following the merger between AT&T and SBC, AT&T which has low portfolio diversity, has recently decided to abandon the Cingular brand and logo as early as 2007 (Advertising Age, May 2006). Empirical and anecdotal evidence indicate that the acquirer is likely to keep few, if any, of the target's brands alive when the acquirer's portfolio diversity is low. Less number of brands will lead to lower brand portfolio value.

H4: The higher the acquirer's brand portfolio diversity, the higher the target firm's brand portfolio value.

Deal Type: Horizontal vs. Other Type of Mergers and Acquisitions

A merger and acquisition is defined as a horizontal deal when the target and acquirer operate in the same industry. If the acquirer and the target firm operate in the same industry, two dynamics emerge that could affect the functioning of the main effects: (i) redundancy (ii) information asymmetry.

Varadarajan, DeFanti, and Busch (2006) allude to the importance of deal type in creating redundancies among acquirer's and target's brands. When the acquirer and target operate in the same industry, redundancies among the target and the acquirer brand portfolios will be higher than when they operate in different industries. Redundancy is likely to affect the acquirer's divestment behavior following the merger and acquisition.

The RBV literature emphasizes the significance of firm abilities in determining the value of strategic factors. In fact, Barney (1986) concludes that the only way firms could gain competitive advantage is via internal analysis of their capabilities. The underlying logic for the argument is that capabilities are complex in nature and difficult to understand. In context of a merger and acquisition, the acquirer's ability to assess the target firm's marketing capabilities will depend on its understanding of the target firm.

Horizontal M&A and acquirer firm brand portfolio diversity. When the acquirer and the target operate in the same industry, the redundancy between the acquirer and target's brands will be greater (cf. Varadarajan, DeFanti and Busch 2006). Acquirers with more diverse brand portfolios will suffer more from redundancy compared to acquirers with less diverse brand portfolios because firms with more diverse brand portfolios will have more brands targeted at different consumer segments within the same industry. The likelihood of overlap among acquirer's and target's brands will be higher and the acquirer's propensity to retain as many

target's brands will be lower. For example, P&G decided to divest Gillette's Right Guard, Soft and Dri and Dry Ideas brands in the deodorant category even though P&G has a highly diverse brand portfolio. Thus,

H5: The effect of the acquirer's portfolio diversity on target firm's brand value will be lower when the deal is horizontal.

Horizontal M&A and target firm's marketing capability. Marketing capabilities are tacit in nature as a result of the complex skills and processes involved in building them (Day 1994). It is not easy for a firm's competitors or potential acquirers to assess the strength of a firm's marketing capabilities. Sometimes it is even difficult for a firm's executives to comprehend different facets of a firm's marketing capability (Dierickx and Cool 1989). If the acquirer and target operate in different industries, then it is more difficult for the acquirer to assess the marketing capabilities of the target. Although performance outcomes of targets are visible to all acquirers, acquirers that operate in the same industry as the target are likely to have more information on the marketing organization, personnel and other determinants of the target's performance than "outsider" acquirers. Thus, insider acquirers will have a more accurate assessment of target's marketing capabilities. More accuracy, however, may inflate or deflate an acquirer's assessment of a target's marketing capability. Thus, we pose two competing hypotheses. Formally,

H6a: The effect of the target firm's marketing capability on the target firm's brand portfolio value will be higher when the deal is horizontal

H6b: The effect of the target firm's marketing capability on the target firm brand portfolio value will be lower when the deal is horizontal

Target Firm Sales Growth

Target firm sales growth & target firm marketing capability. Firms with stronger marketing capabilities are more efficient in deploying marketing resources, which in turn lead to higher profitability (Dutta, Narasimhan and Rajiv 1999). Such firms are attractive acquisition candidates. However, acquirer firms may not always focus on efficiency of target firms for two reasons. First, marketing executives tend to focus on top-line metrics, such as sales and market share, rather than profitability (Armstrong and Collopy 1996). If the target achieves a high level of sales growth, then managers may pay less attention to efficiency in generating the sales growth. Consequently, the impact of the target's marketing capability on brand value will be lower when sales growth is high. Second, acquirers enter or exit markets based on growth prospects (e.g., Chang 1996). For example, Jones Apparel Group acquired Barneys New York "to enter the high-growth, resilient luxury goods market" (Jones Apparel Group 10-K 2006). When the acquirer's fundamental objective is to capture the target firm's growth opportunities, it will pay less attention to efficiency of growth. Thus,

> **H7: The higher the target firm's three-year-average sales growth, the lower the effect of target firm's marketing capability on the target firm's brand portfolio value.**

Control Variables

Target Firm Industry Characteristics. Industry factors explain 9-10% of variability in firm performance (McGahan and Porter 2002). We incorporate five industry factors to control for industry effects. We include industry growth because firms enter and exit markets depending on the growth prospects (Reed and Luffman 1986). Cash flow expectations from brands may be higher in growth industries than in mature or declining industries. We also incorporate the demand risk and competition in the industry as controls. If the demand is highly volatile in an

industry, then perceptions of risk associated with future cash flows will be high. Similarly, high levels of competition in an industry may increase the risk expectations associated with the future cash flows due to possibility of price competition, entry of new brands. High risk may have negative impact on brand value via higher discount rates.

We capture the nature of target firm's industry by categorizing the industries on two different dimensions: products versus services and consumer versus business-to-business industries. Ambler, Bhattacharya**,** Edell, Keller, Lemon, and Mittal (2002) argue that brands may be less important in service-oriented industries than they are in product-oriented industries. Similarly, importance of brands may be different in industries where the customer is the end-consumer than industries where the customer is a firm due to differences in decision-making and risks associated with the product (cf. Cannon and Perrault 1999).

Target Firm Characteristics. Simon and Sullivan (1993) argue that market share should affect the cash flows of the brands so we incorporate market share as a control variable.

Acquirer Firm Financial Reporting. Findings in the accounting literature indicate that firms may overestimate or underestimate the value of acquired intangible assets for financial reporting purposes (e.g., Wyatt 2005). Muller III(1999) discusses the potential impact of two factors on brand value reporting, namely leverage and financing considerations. First, firms with high leverage ratios adopt income increasing accounting practices (e.g., Christie 1990). Attribution of value to brands improves the leverage ratio which may help the firm in provision of long term debt from financial institutions. Second, firms that have to renegotiate their debt restructure may attempt at signaling stronger financial positions by recognizing acquired brands (Muller III 1999). Anecdotal evidence suggests that firms use brand valuations to support the

raising of new loan capital (e.g., Jackson 1996). Thus, we incorporate acquirer leverage and financing considerations as control variables.

Methodology

Sample

The study sample includes all the mergers and acquisitions where targets and acquirers were U.S.-based public firms for the period 1998-2004. We focused on public firms because data for some of the independent variables (e.g., marketing capability) is only available for public companies. The sampling period starts at 1998 because detailed reporting of intangible assets in a merger and acquisition was voluntary prior to 2001. Consequently, few firms reported the breakdown of intangible assets following a transaction during 1998-2000 period which reduced the likelihood of firms reporting breakdown of intangible assets prior to 1998. This is reflected in the final sample as well. There are only eight cases where the transaction date is prior to 2001.

The final sample includes target and acquirer firms from a wide variety of two-digit SIC industries: 20, 23, 27, 28, 31, 33, 35, 42, 59, 73, 87. 30.54% of target firms operate in business services industry (SIC code 73). 10.68% of target firms operate in measurement instruments industry (SIC code 38). 25.19% of acquirer firms operate in business services industry (SIC code 73) and 12.21% of acquirer firms operate in industrial, commercial machinery, computer equipment industry (SIC Code 35).

Data

Data set was manually compiled from a combination of secondary sources such as U.S. Securities and Exchange Commission (SEC) filings, Compustat, SDC Platinum. After identifying the mergers and acquisitions where both targets and acquirers were U.S. based firms and public companies, we searched U.S. Securities and Exchange Commission (SEC) filings of

all the acquirers individually and identified the firms that recognized the financial value of target's brand(s) on their balance sheet.

We collected data from Compustat, Advertising Age and updated NBER Database to measure marketing capability variable. Compustat was used to obtain sales, advertising, selling and general administrative expenses, receivables and sub-market segmentation data. We checked Advertising Age to validate whether firms in the sample incurred advertising expenses but did not report it. We used the updated NBER patent citation database compiled by Dr. Bronwyn H. Hall at the University of California Berkeley.

We used the U.S. Patent and Trademark database to collect the data on the target and the acquirer's brands. We searched all the brands registered in the firm's name. We did not include the brands in the portfolio if the brand was abandoned before the effective data of the transaction. Also, we did not include the brands in firms that were registered after the effective date of the transaction.

We obtained data on industry concentration, industry demand growth, target firm's market share, target firm's sales growth, industry type (direct-to-consumer vs. business-to-business; products vs. services), acquirer leverage, acquirer financing consideration, acquirer value creation, acquirer value appropriation emphasis, and acquirer firm size from Compustat.

Measures

Measure of Dependent Variable

We use the dollar value of the target brand portfolio that acquirer firms report in their SEC filing associated with a merger and acquisition transaction. We divide brand value by firm value to control for target firm size. Firm value is the total purchase price that the acquirer firm pays for the target firm.

Measures of Independent Variables

Relative marketing capability. We use stochastic frontier estimation (SFE) to measure marketing capability (Dutta, Narasimhan and Rajiv 1999, 2005). This operationalization is analogous to the concept of "production frontier" in economics (Kumbhakar 1987). There are inputs and there is an output associated with these inputs. For example, "sales" is an output that the firms would try to maximize. Inputs to achieve sales are advertising, other marketing investments and technology. We compute the firm's distance from the efficient frontier of sales given advertising, other marketing expenditures and technology. We use the three-year average of relative marketing capability scores in the estimation.

Following DNR(1999), we estimate following function for each four-digit SIC industry to compute a marketing efficiency for a firm in year t[2]. We use two lags of advertising and SGA spending because prior literature suggests that impact of advertising and other marketing spending depreciates rapidly (Simon and Sullivan 1993). In the literature, little guidance exists on the lag structure of patent citation in a model where the dependent variable is sales. Patent citations are closer to market performance of the products than research and development expenditures in the process of technology development (cf. Hall, Jaffe and Trajtenberg 2005). Research and development expenditures may not necessarily result in innovative output due to uncertainty associated with technology development process. Prior empirical studies use up to six lags of the research and development expenditures (Erickson and Jacobson 1992). Given the closeness of the patenting to performance in sequence of technology development, we use up to three lags of weighted patent citations in estimation:

[2] We use Equation (1) in stochastic frontier estimation. However, there are no registered patents for the firms operating in following SIC codes: 5130, 5600, 5621, 5900, 5945, 6531, 7381, 8741 which required to drop technology variable in the estimation or to use only contemporaneous zero values of technology.

$$
\begin{aligned}
\text{Ln}\,(\text{Sales}_{it}) = {} & \alpha_0 + \Sigma\, \alpha_1 * \text{Sub_Market}_{it} + \alpha_2 * [\beta_1 * \ln(\text{Ad}_{it}) + \beta_2 * \ln(\text{Ad}_{it-1}) + \beta_2 * \ln(\text{Ad}_{t-2})] \\
& + \alpha_3 * [\beta_3 * \ln(\text{Marketing Spending}_t) + \beta_4 * \ln(\text{Marketing Spending}_{t-1}) \\
& + \beta_5 * \ln(\text{Marketing Spending}_{t-2})] + \alpha_4 * [\beta_6 * \ln(\text{Techbase}_{it}) + \\
& + \beta_7 * \ln(\text{Techbase}_{i(t-1)}) + \beta_8 * \ln(\text{Techbase}_{i(t-2)}) + \beta_9 * \ln(\text{Techbase}_{i(t-3)})] + \\
& + \alpha_5 * \ln(\text{Receivables}_{it}) + \alpha_6 * \ln(\text{Installedbase}_{i(t-1)}) + \nu_{it} - u_{it} \qquad (1)
\end{aligned}
$$

Sub_Market_{it}	: 1 if the firm is operating in a NAICS category within a SIC.
	: 0 otherwise
Ad_{it}	: Advertising spending of firm i year t
$\text{Marketing Spending}_{it}$	: SGA expense of firm i in year t
Techbase_{it}	: Weighted number of citations firm's patents received in year t
Receivables_{it}	: Receivables on the balance sheet for firm i in year t
$\text{Installedbase}_{it}$	: Lagged values of sales
ν_{it}	: Random error component
u_{it}	: Error component accounting for firm specific inefficiency

We compute the technical efficiency score using the parameter estimates of equation (1) (Appendix A). Then we divide this score by the industry maximum score and multiply it by 100 for each year.

There are two minor differences between the estimation we use and that of DNR (1999). First, DNR (1999) use trade press reports and two independent experts to measure within-industry segments. We use NAICS classification system to measure within industry competition. NAICS scheme slices four-digit SIC codes into finer subcategories which allows us to account for the within-industry competition alluded to by DNR (1999). Second, DNR (1999) use Koyck-lag structure to compute stock values of technology base, advertising, marketing spending and installed base, and then insert these values into stochastic frontier estimation. Instead of estimating the Koyck-lag model separately, we estimate the coefficients of lagged values of these four variables simultaneously in SFE. This approach is conceptually similar to Koyck specification, but it does not require assuming an apriori decay parameter in estimation.

Brand portfolio diversity. We use a measure of brand portfolio diversity that is conceptually similar to Rao, Agarwal and Dahlhoff (2004). Specifically, brand portfolio diversity

is portfolio size divided by the number of categories in which a firm operates. Portfolio size is measured as the number of brands that a firm owns. The number of categories is computed as the number of different NAICS categories in which the firm operates. For example, if the firm implements a pure corporate branding strategy, then the portfolio size is equal to one. If the firm is operating in five different NAICS categories then the brand portfolio diversity is equal to 0.2 (i.e., 1/5). As this ratio approaches to zero, it suggests that the firm's brand is extended into many different categories. If the ratio increases, then it suggests that firm's strategy is closer to a house-of-brands strategy.

Deal type. We categorize type of deal as horizontal if the target and acquirer's primary SIC codes are the same. We code the dummy variable as one if the target and acquirer operate in the same industry, and zero otherwise.

Target firm sales growth. We compute the year-over-year sales growth of target firm in primary SIC industry for the three years preceding the transaction. Then we compute the average of three year-over-year sales growth rates to arrive at target firm sales growth.

$$\text{Target firm sales growth} = \left(\sum_{k=1}^{3}(fs_{i(t-k)} - fs_{i(t-k-1)}) / fs_{i(t-k-1)}\right) / 3 \qquad (2)$$

where, fs_{it} refers to the target firm sales in industry i at time t.

<u>Control Variables</u>

Target firm market share. We divide target firm's sales by the total sales in the primary SIC industry for each year preceding the transaction. Then I compute the average market share for the three-year period before the transaction.

$$\text{Market Share}_i = (\text{Market Share}_{it-1} + \text{Market Share}_{it-2} + \text{Market Share}_{it-3})/3 \qquad (3)$$

where i refers to the target firm and t refers to the transaction year

Target industry demand risk. In economics and finance, standard deviation of a time series, i.e. stock prices, is used as a measure of risk (Eraker 2004; Kose, Prasad, and Terrones 2005). We follow this convention and compute the standard deviation of target firm's primary industry sales over the three years preceding the merger and acquisition to measure industry risk. We divide the standard deviation by the mean industry sales to correct for the size effects.

$$\text{Target Industry Demand Risk} = \frac{(\sum_{k=1}^{3}(\bar{S}_i - s_{i(t-k)}))^{1/2}}{(\sum_{k=1}^{3} s_{i(t-k)})/3} \tag{4}$$

where,
S-bar is the mean industry sales during the three years prior to transaction
s_i refers to the total industry sales in industry i
t refers to the transaction year.

Target industry growth. We compute the three-year average of the year-over-year sales growth rate in the target's primary SIC code. This measure controls for the growth trend in target's industry.

$$\text{Target industry growth} = (\sum_{k=1}^{3}(s_{i(t-k)} - s_{i(t-k-1)})/s_{i(t-k-1)})/3 \tag{5}$$

where, s_{it} refers to the total industry sales in industry i at time t.

Target industry competition. A three-firm industry concentration measure is used to capture competition in the industry. We sum the market shares of three leading firms in the target firm's primary SIC code (Clark 1984; Sharma and Kesner 1996).

*Time***.** We use a time dummy to control for two reasons. First, FASB regulation on reporting of intangible assets in merger and acquisition transactions came into effect in 2001. Second, time dummy controls for general macroeconomic conditions at the time of transaction.

*Products vs. services***.** We classify the target firm's primary industry as product vs. service industries. We code SIC codes starting with numbers greater than four as service industries and others as product industries.

*Direct-to-consumer vs. business-to-business***.** We classify the target firm's primary industries into two groups based on the customers of these industries. If an industry primarily sells to end consumers it is coded as one and zero otherwise.

Acquirer leverage. The leverage is measured as the long term debt one year prior to the transaction divided by total assets one year prior to the transaction (Muller III 1999).

Acquirer financing considerations. Financing considerations of the acquirer is measured as debt due in one year divided by total assets one year prior to the transaction (Muller III 1999).

Acquirer value appropriation. Value appropriation is measured as acquirer's advertising spending one year prior to the effective date of the merger and acquisition divided by the acquirer's sales one year prior to the transaction (Mizik and Jacobson 2003).

Acquirer value creation. Value creation is measured as the acquirer's R&D spending one year prior to the merger and acquisition divided by the acquirer's sales one year prior to the transaction (Mizik and Jacobson 2003).

Acquirer Firm Size. Firm size is measured as the number of employees one year prior to the transaction.

Model Specification and Estimation

The dependent variable, brand value divided by firm value, is truncated zero and one. The truncation of the dependent variable violates the OLS estimator assumption that the dependent variable is a continuous normal variable. Therefore, we use a Tobit estimator to test the model.

In analyzing the moderator effects, we include interaction terms hierarchically.

Base Model: No Interaction Terms

$$\text{Log (Brand Value/Firm Value)} = \beta_0 + \beta_1 * \text{TMC} + \beta_2 * \text{AMC} + \beta_3 * \text{TPD} + \beta_4 * \text{APD} + \beta_5 * \text{TYPE} + \beta_6 * \text{TGR} + \beta_7 * \text{TMS} + \beta_8 * \text{COMP} + \beta_9 * \text{IGR} + \beta_{10} * \text{IDR} + \beta_{11} * \text{TIME} + \beta_{12} * \text{SERVICES} + \beta_{13} * \text{CONSUMER} + \varepsilon \quad (6)$$

Model with Interactions

$$\text{Log (Brand Value/Firm Value)} = \beta_0 + \beta_1 * \text{TMC} + \beta_2 * \text{AMC} + \beta_3 * \text{TPD} + B_4 * \text{APD} + \beta_5 * \text{TYPE} + \beta_6 * \text{TGR} + \beta_7 * (\text{TMC} * \text{TYPE}) + \beta_8 * (\text{APL} * \text{TYPE}) + \beta_9 * (\text{TMC} * \text{FGR}) + \beta_{10} * \text{TMS} + \beta_{11} * \text{COMP} + \beta_{12} * \text{IGR} + \beta_{13} * \text{IDR} + \beta_{14} * \text{TIME} + \beta_{15} * \text{SERVICES} + \beta_{16} * \text{CONSUMER} + \beta_{17} * \text{LEVERAGE} + \beta_{18} * \text{FINANCE} + \varepsilon \quad (7)$$

where:

TMC	: Target Marketing Capability
AMC	: Acquirer Marketing Capability
TPD	: Target Portfolio Diversity
APD	: Acquirer Portfolio Diversity
TYPE	: Whether or not the deal is horizontal
TGR	: Target Firm Sales Growth
TMS	: Target Firm Market Share
COMP	: Target Industry Concentration
IGR	: Target Industry Sales Growth
IDR	: Target Industry Sales Volatility
TIME	: 1 if before 2001, 0 otherwise
SERVICES	: Products vs. Services
CONSUMER	: Direct-to-Consumer vs. Business-to-Business
LEVERAGE	: Acquirer Leverage
FINANCE	: Acquirer Financing Considerations

Robustness Test

The factors that affect acquirer firm's decision to recognize the target firm's brand value may be different than the factors that affect how much value the acquirer attributes to target firm's brands. We specify a Heckman selection model to test the robustness of the findings from

Tobit analysis. This requires first step model specification for the choice of brand value recognition. Muller III (1999) argues that firm's leverage ratio, financing considerations and firm size affect their decision to recognize the brand value.

Strategic emphasis of the firm may affect the choice of brand value recognition. Strategic emphasis is defined as the relative emphasis a firm places on value appropriation compared to value creation (Mizik and Jacobson 2003). Mizik and Jacobson (2003) argue that strategic emphasis of the firm determines the fundamental resource allocation decisions. According to authors, firms with value creation emphasis tend to invest in technology. Such a firm is less likely to recognize the brand value of a target firm compared to a firm whose emphasis is on value appropriation because they will focus on target's technology assets rather than marketing assets.

Finally, we include a time dummy to control for the change in accounting regulation for the recognition of intangible assets on balance sheet as a result of a merger and acquisition.

$$\text{Brand Value Recognition} = \beta_0 + \beta_1 * \text{LEVERAGE} + \beta_2 * \text{FINANCE} + \beta_3 * \text{ADVINT} + \beta_4 * \text{RDINT} + \beta_5 * \text{SIZE} + \beta_6 * \text{TIME} + \varepsilon \quad (8)$$

where:

BRAND VALUE RECOGNITION	: 1 if acquirer firm attributes value to target firm's brands, 0 otherwise
LEVERAGE	: Acquirer Firm Leverage Ratio
FINANCE	: Acquirer Firm Financing Considerations
ADVINT	: Acquirer Firm Value Appropriation
RDINT	: Acquirer Firm Value Creation
SIZE	: Acquirer Firm Size
TIME	: 1 if before 2001, 0 otherwise

We follow the procedure introduced by Heckman (1979) to estimate the system of equations. We use a probit model to estimate equation (8). Inverse Mills' ratio is computed using the parameter estimates of equation (8) (Appendix B). Then, we augment equation (2) with inverse Mills' ratio to control for the sample selection.

Preliminary Results

Descriptive Statistics

We start by exploring the magnitude of target firm's brand value in mergers and acquisitions. When we compare the value of brands to major intangible assets, we observe patterns that conform to extant perspectives on relative significance of these assets (Table 3). Mean comparison test of customer relationship value to brand value ratio between business-to-business and direct-to-consumer groups suggests that customer relationship value to brand value ratio is greater in business-to-business than it is in direct-to-consumer industries at 95% confidence level. There is a similar pattern in brand value to technology value ratio. Mean comparison test of technology value to brand value ratio between business-to-business and direct-to-consumer groups suggests that technology assets value to brand value ratio is greater in business-to-business than it is in direct-to-consumer industries at 99% confidence level.

On average, brands account for 9.8% of the value of the transaction (Table 4). When we consider the magnitude of these transactions (mean transaction value is $1.8 billion), we observe that brands account for substantial value of a firm. These descriptive statistics underscore the significance of brands in creation of financial value.

Preliminary Estimation Results

We estimate the equations (6) and (7) using a Tobit estimator (Table 7). The likelihood ratio suggests that model with interactions leads to a significant increase in the model fit ($\chi 2$ d.f.=3, $p<0.01$). Overall results indicate that both target and acquirer characteristics are important determinants of financial value of target firm's brands in a merger and acquisition.

Marketing capabilities. We find support for H1 ($\beta_1=0.014$, $p<0.1$). A target's marketing capability has a positive effect on the target's brand value. Significance of this finding is

compounded by the fact that we control for market share. It is not enough just to pursue market share, firms need to be cognizant of cost-benefit ratio of marketing investments with respect to their competitors if they are interested in increasing the value of their brands in a merger and acquisition.

We do not find support for H2 (β_2=-0.003, p=0.66). Enhancing the cash flows of brands is not easy. Brand repositioning or brand extensions can be risky. Acquirer firms may expect that the additional costs of improving a brand's profitability to be too high. Consumers may have already established brand associations and repositioning a brand may be far more difficult than creating a new brand. Altering these associations is likely to require substantial resources.

Brand portfolio diversity. We do not find support for H3 (β_3=0.003, p=0.20). A target's brand portfolio diversity may not affect the acquirer's value expectations because the acquirer has the flexibility to restructure the target's brand portfolio. For example, if the target implements a corporate branding strategy and the acquirer does not value this strategy, it can redeploy its own brands in target's markets.

We find support for H4 (β_4=0.032, p<0.01). Acquirer's brand portfolio diversity has a positive effect on target's brand value. Acquirers that are closer to a house-of-brands strategy will attribute higher value to the target's brand portfolio. It corroborates the argument that acquirers with less diverse brand portfolios are more likely to divest more of the target's brands.

Deal type and acquirer firm portfolio diversity. We find support for H5 (β_7=-0.027, p<0.1). When the target and the acquirer operate in the same industry, the impact of acquirer's brand portfolio diversity on target's brand value is lower. This result corroborates arguments on the impact of redundancy between target's and acquirer's brand portfolios on target's brand value. When acquirer and target operate in the same industry, acquirers with diverse brand

portfolios are more likely to divest more target firm's brands compared to acquirers with less diverse brand portfolios due to redundancy between brand portfolios.

Deal type and target's marketing capability. We do not find support for H6 (β_8=-0.007, p=0.60). Given the financial magnitude of merger and acquisition deals, the acquirers that operate in different industries than targets (outsider acquirers) collect as much as information on potential targets as acquirers that operate in the same industry as the target (insider acquirer). It is possible that outsider acquirers have access to information on advertising and other marketing activities of the targets from secondary sources or consulting firms (cf. Makadok and Barney 2001). Thus, information asymmetry does not arise among outsider and insider acquirers.

Target's sales growth and target's marketing capability. We find support for H7 (β_9=-0.022, p<0.01). When a target firm achieves high levels of sales growth, the impact of target's marketing capability on target's brand value is lower. This result suggests that target firms can charge higher prices for their brands in a merger and acquisition if they achieve sales growth without achieving efficiency in their marketing spending. The moderating effect of sales growth may stem from two sources. First, managers may be focusing on top line growth as opposed profitability as some experimental findings imply (Armstrong and Collopy 1996). Second, firms may be putting a premium on growth as some managerial surveys suggest (Graham et al. 2005).

Robustness Test

The reasons that drive firms to recognize brand value may be different than the factors that drive them to attribute more value brands in a merger and acquisition. We estimate a Heckman selection model in order to test this possibility. Sample selection equation is estimated and Inverse Mills' ratio is included in the main model (Table 8). Results indicate that sample selection correction does not change the results pertaining to the parameter estimates of proposed

relationships. For example coefficient of target marketing capability is positive and significant in Tobit and Heckman models (Tobit: β_1=0.014, p<0.1, Heckman: β_1=0.012, p<0.1). The consistency of parameter estimates in different technique increases the validity of the results.

Discussion

Preliminary Implications

Preliminary results indicate that values of brands are determined by *both* the target and acquirer characteristics in the context of mergers and acquisitions. Two factors emerge as the determinants of the target's brand value, namely target's marketing capability and acquirer's brand portfolio diversity. We find that the target's marketing capability has a positive effect on target's brand value. Our conceptualization and measurement of marketing capability focuses on the efficiency of marketing investments. Thus, it is important for target firms to be cognizant of marketing dollars they spend to generate sales or acquire market share. If they do not achieve efficiency in marketing investments, they may fail to recover a good value for their brands in a merger and acquisition deal. However, there is a caveat, since the impact of marketing efficiency is lower when the target achieves high level of sales growth. Thus, sales growth may help overcome some of the marketing inefficiencies of the target firm.

Target firms need to be cognizant of the acquirer's brand portfolio strategy in a merger and acquisition. Acquirers with diverse brand portfolios (i.e. firms that are closer to house-of-brands strategy) are likely to value their brand portfolios higher than acquirers with less diverse brand portfolios. Thus, targets may seek acquirers with such branding strategies to obtain higher value for their brand portfolios. This finding is conditional on deal type. If the acquirer and the target operate in the same industry, the impact of acquirer portfolio differentiation on target's brand value will be lower. Redundancy between the acquirer and the target's brand portfolio is

likely to lead to divestment of some of the target's brands even if the acquirer prefers having many brands per business.

Limitations & Future Research Directions

A limitation of the study is that it relies on cross-sectional data. We do not observe the change in value of brands over time. The journey of Snapple brand from Quaker Oats to Triarc Beverage and finally to Cadburry Schwepps is a great example of the change in value of a brand. Future research can examine the change in the financial value of brands over time.

We examine the impact of acquirer characteristics on target firm's brand value across transactions. Therefore, the sample does not contain information on potential buyers' expectations from the same brand. If data were available on potential buyers' bids for a target firm's brand portfolio, then it would be possible to examine the factors that lead to differential value expectations from the same brand among potential buyers.

Future research can examine the impact of accumulation of different intangible assets, namely brands, customer relationships and technology on financial value and analyst expectations. Accounting literature provides some insights into main effects of intangible assets on analyst forecasts (e.g., Amir, Lev and Saugiannis 2003). However, contingency factors, such as corporate branding strategy or strategic emphasis of the firm, may moderate the relationship between brand value and analyst forecasts. Such work would enhance our understanding of the relationship among market-based assets, financial value and Wall Street expectations.

Table 1. Illustrative Transactions and Brand Portfolio Value

Acquirer	Target	Target Firm Value (in millions)	Target Firm Brand Value (in millions)	Brand Value/Firm Value
Constellation Brands	Robert Mondavi	1,042	186	17.85 %
Cisco Systems	Latitude Communications	86	1	1.16%
Checkers-Drive in Restaurants	Rallys Hamburgers	40	19	49.72%
Manpower Inc.	Right Management Consultants	630.6	191.3	30.30 %
Sybase	Avantgo	40.5	3.1	7.60 %

Table 2. Positioning of the Paper

	Within a Firm	**In a Merger and Acquisition**
Conceptual Literature on the Determinants Of Financial Brand Value	Farquhar and Ijiri (1991) Shocker and Weitz (1988)	Mahajan, Rao and Srivastava(1994) **THIS STUDY**
Empirical Literature on the Determinants of Financial Brand Value	Simon and Sullivan(1993)	**THIS STUDY**

Table 3. Variable Definitions

Variable	Definition	Measure[1]
Brand Value	The incremental cash flows which accrue to branded products over and above the cash flows which would result from sale of unbranded products (Simon and Sullivan 1993)	Dollar value of target firm's brand(s) reported by the acquirer firm
Marketing Capability	The extent to which firm is able to combine efficiently a number of marketing resources to engage in productive activity and attain marketing objectives (Dutta, Narasimhan and Rajiv 2005)	Technical efficiency score from stochastic frontier estimation (Dutta, Narasimhan and Rajiv 1999, 2005). See Appendix A for details.
Brand Portfolio Diversity	The extent to which firm prefers stand-alone brands to serve markets.	Number of $Brands_{it}$ / Number of $Categories_{it}$
Deal Type	Whether or not the deal is horizontal type.	Coded 1 if target and acquirer firm operate in the same four-digit SIC code, 0 otherwise
Target Firm Sales Growth	The extent to which target firm grows.	The average of three year-over-year target firm sales growth rates in primary four-digit SIC industry during 3 years prior to transaction.
Target Firm Market Share		Target firm's average market share during three-year period prior to deal
Target Industry Demand Growth	The extent to which demand in target firm's industry grows.	The average of three year-over-year sales growth rates in target firm's primary four-digit SIC code during 3 years prior to transaction.
Target Industry Demand Risk	The extent to which demand in target firm's industry is volatile.	Coefficient of variation of sales in target firm's primary four-digit SIC code.
Target Industry Competition	The extent to which there is competition in target firm's industry (Sharma and Kesner 1996)	Average of sum of top three market shares in target firm's primary four-digit SIC code during 3 years prior to transaction.

Table 3 (Continued). Variable Definitions

Variable	Definition	Measure[1]
Time	Whether or not deal date is prior to 2001	1 if deal is prior to 2001, 0 otherwise
Services	The extent to which target firm's industry is product vs. service oriented.	1 if target firm's primary four-digit SIC code start with 5-9, 0 otherwise
Consumer	The extent to which target firm's industry sells to end consumers vs. businesses.	1 if target firm's primary four-digit SIC code sells to end consumers, 0 otherwise
Acquirer Leverage	The extent to which firm is able to finance its long term debt (Muller III 1999)	Long Term $Debt_{it-1}$ / Total $Assets_{it-1}$
Acquirer Financing Consideration	The extent to which the firm needs to raise capital in the short term ((Muller III 1999)	Short Term $Debt_{it-1}$/Total $Assets_{it-1}$
Acquirer Value Appropriation Emphasis[2]	The extent to which the firm emphasizes value appropriation as a strategy (Mizik and Jacobson 2003)	Advertising $Spending_{it-1}$ / $Sales_{it-1}$
Acquirer Value Creation Emphasis[2]	The extent to which the firm emphasizes value creation as a strategy (Mizik and Jacobson 2003)	R&D $Spending_{it-1}$ / $Sales_{it-1}$

[1] i refers to the firm and t refers to deal year.
[2] These variables are only used in the Heckman sample selection model.

Table 4. Brand Value Compared to Customer Relationship and Technology Value

Value Ratios	**Direct-to-Consumer**	**Business-to-Business**
Customer Relationship Value / Brand Value[1]	$Mean_A$=**0.41** Obs =41	$Mean_B$ = **8.51** Obs =90
Technology / Brand Value[2]	$Mean_C$ = **0.90** Obs = 41	$Mean_D$ = **11.46** Obs = 90

[1]T-test of mean comparison suggests that $Mean_B > Mean_A$ at 95% confidence level
[2]T-test of mean comparison suggests that $Mean_D > Mean_C$ at 99% confidence level

Table 5. Descriptive Statistics

Variables	*Observations*	*Mean*	*Std.Dev.*	*Min*	*Max*
Brand Value Equation Sample					
Brand Value/ Firm Value	131	0.098	0.152	0.001	0.97
Log(Brand Value/ Firm Value)	131	-3.453	1.705	-7.613	-0.031
Target Marketing Capability	131	75.969	23.830	15.290	99.99
Acquirer Marketing Capability	131	78.699	22.738	12.544	99.94
Target Portfolio Diversity	131	5.598	7.196	0.25	54
Acquirer Portfolio Diversity	131	8.679	16.669	0.00	127
Deal Type	131	0.458	0.500	0	1
Target Sales Growth	131	0.358	0.624	-0.269	2.929
Target Market Share	131	0.045	0.116	0.001	0.728
Target Industry Competition	131	0.618	0.200	0.249	0.969
Target Industry Growth	131	0.032	0.285	-0.673	2.902
Target Industry Demand Risk	131	0.129	0.161	0.008	1.230
Time	131	0.046	0.210	0	1
Products vs. Services	131	0.489	0.502	0	1
Consumer vs. Business-to-Business	131	0.313	0.465	0	1
Acquirer Leverage	131	0.151	0.175	0	0.837
Acquirer Financing Consideration	131	0.016	0.034	0	0.235
Selection Equation Sample					
Acquirer Leverage	250	0.157	0.176	0	0.996
Acquirer Financing Consideration	250	0.015	0.031	0	0.212
Acquirer Value Appropriation Emphasis	250	0.027	0.136	0	1.97
Acquirer Value Creation Emphasis	250	0.596	6.231	0	97.912
Acquirer Firm Size	250	15,886	35352	27	315,889
Time	250	0.027	0.163	0	1

Table 6. Correlation Matrix (n=131)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1) Log(Brand Value/Firm Value)	1.00															
2) Target Marketing Capability	0.11	1.00														
3) Acquirer Marketing Capability	0.19	0.43	1.00													
4) Target Portfolio Diversity	0.18	0.13	0.17	1.00												
5) Acquirer Portfolio Diversity	0.14	-0.17	-0.10	0.01	1.00											
6) Deal Type	-0.03	0.05	-0.01	-0.07	-0.01	1.00										
7) Target Sales Growth	-0.16	-0.06	-0.12	-0.18	-0.08	0.05	1.00									
8) Target Market Share	0.19	0.21	0.16	0.19	0.07	-0.12	-0.15	1.00								
9) Target Industry Concentration	0.17	0.25	0.17	0.17	-0.09	-0.22	-0.15	0.38	1.00							
10) Target Industry Growth	0.05	-0.10	0.01	-0.10	0.01	0.01	0.01	-0.20	-0.04	1.00						
11) Target Industry Demand Risk	0.18	0.06	0.19	0.17	0.01	-0.14	0.02	0.30	0.31	0.45	1.00					
12) Time	0.22	0.04	0.35	0.02	-0.02	-0.05	-0.10	0.05	0.09	0.35	0.29	1.00				
13) Products vs. Services	-0.12	-0.34	-0.32	-0.33	0.04	-0.01	0.29	-0.26	-0.31	-0.02	-0.22	-0.14	1.00			
14) Consumer vs. Business-to-business	0.51	0.13	0.35	0.18	-0.08	0.01	-0.12	0.15	0.13	0.08	0.12	0.16	-0.23	1.00		
15) Acquirer Leverage	0.30	0.22	0.30	-0.00	-0.04	0.04	-0.01	0.22	0.16	0.04	0.12	0.01	-0.19	0.40	1.00	
16) Acquirer Financing Consideration	0.26	0.10	0.17	0.12	-0.02	-0.02	-0.06	0.26	0.25	-0.17	0.22	-0.08	-0.22	0.36	0.18	1.00

Table 7. Tobit Estimation Results

DV: Log(Brand Value/Firm Value)	*No Interactions*		*With Interactions*	
Independent Variables	*Coefficient*	*Std.Err.*	*Coefficient*	*Std.Err.*
Intercept	**-5.124**	**0.745*** **	**-5.997**	**0.953*** **
Target Marketing Capability	0.004	0.006	**0.014**	**0.008***
Acquirer Marketing Capability	-0.002	0.006	-0.003	0.007
Target Portfolio Diversity	0.020	0.018	0.003	0.018
Acquirer Portfolio Diversity	**0.019**	**0.007*** **	**0.032**	**0.009*** **
Moderators				
Deal Type	0.021	0.247	0.846	0.997
Target Sales Growth	-0.256	0.205	**1.360**	**0.571*** **
Interactions				
Deal Type * Acquirer Portfolio Diversity			**-0.027**	**0.014***
Deal Type * Target Marketing Capability			-0.007	0.012
Target Firm Sales Growth*Target Marketing			**-0.022**	**0.007*** **
Controls				
Target Market Share	0.125	1.256	-0.255	-0.255
Target Industry Competition	0.489	0.703	0.357	0.674
Target Industry Growth	-0.229	0.562	-0.291	0.539
Target Industry Demand Risk	0.689	1.036	0.632	0.994
Time	**1.264**	**0.633** **	**1.310**	**0.606** **
Products vs. Services	**0.421**	0.288	**0.508**	**0.281***
Consumer vs. Business-to-business	**1.493**	**0.319*** **	**1.449**	**0.309*** **
Acquirer Leverage	**1.371**	**0.782** **	**1.838**	**0.766** **
Acquirer Financing Consideration	4.248	4.093	3.713	3.930
n	131		131	
Log Likelihood	-224.714		-218.797	
Model $\chi 2$ (p-level)	0.000		0.000	
Likelihood Ratio Test $\chi 2$ (3)			11.83	0.008

* p <0.1
** p <0.05
*** p <0.01

Table 8. Tobit and Heckman Selection Models

DV: Log(Brand Value/Firm Value)	*Tobit*		*Heckman*	
Independent Variables	*Coefficient*	*Std.Err.*	*Coefficient*	*Std.Err.*
Intercept	-5.997	**0.953*** **	**-4.499**	**1.263*** **
Target Marketing Capability	**0.014**	**0.008***	**0.013**	**0.007***
Acquirer Marketing Capability	-0.003	0.007	-0.004	0.007
Target Portfolio Diversity	0.003	0.018	0.023	0.018
Acquirer Portfolio Diversity	**0.032**	**0.009*** **	**0.032**	**0.009*** **
Moderators				
Deal Type	0.846	0.997	0.752	0.991
Target Sales Growth	**1.360**	**0.571*** **	**1.004**	**0.605***
Interactions				
Deal Type * Acquirer Portfolio Diversity	**-0.027**	**0.014***	**-0.027**	**0.014** **
Deal Type * Target Marketing Capability	-0.007	0.012	-0.006	0.012
Target Firm Sales Growth*T. Marketing Capability	**-0.022**	**0.007*** **	**-0.018**	**0.007** **
Controls				
Target Market Share	-0.255	-0.255	-0.319	1.189
Target Industry Competition	0.357	0.674	0.207	0.697
Target Industry Growth	-0.291	0.539	-0.234	0.609
Target Industry Demand Risk	0.632	0.994	0.289	0.998
Time	**1.310**	**0.606** **	0.576	1.084
Products vs. Services	**0.508**	**0.281***	0.371	0.291
Consumer vs. Business-to-business	**1.449**	**0.309*** **	**1.273**	**0.322*** **
Acquirer Leverage	**1.838**	**0.766** **	**2.126**	**0.895*** **
Acquirer Financing Consideration	3.713	3.930	7.450	5.373
Inverse Mills' Ratio			-1.435	0.811
Selection Equation				
Intercept			0.062	0.133
Acquirer Leverage			-0.356	0.479
Acquirer Financing Consideration			-1.162	2.811
Acquirer Value Appropriation Emphasis			**7.937**	**2.980**
Acquirer Value Creation Emphasis			**-0.547**	**0.335**
Acquirer Firm Size			-0.000	0.002
Time			**0.664**	**0.737**
n	131		(131) , (250)	
Model F (p-level)	0.000		0.000	

* p <0.1, ** p<0.05, *** p<0.01

APPENDIX A

Marketing Capability Score

In this section, we provide the method of computation for marketing capability measure. We omit the variable names for ease of exposition. Following section is based on derivations by Kumbhakar and Lovell (2000):

$$y_{it} = \beta_0 + \sum_{j=1}^{k} \beta_j x_{jit} + v_{it} - u_{it} \qquad \textbf{(A.1)}$$

$$u_i \overset{iid}{\sim} N^{+}(\mu, \sigma_{\mu}^2)$$

$$v_{it} \overset{iid}{\sim} N(0, \sigma_{v}^2)$$

where y_{it} is the natural logarithm of sales and x_{jit} are the natural logarithm of the input quantities.

u_{it} is the error component that captures time-varying inefficiency effect.

v_{it} is the idiosyncratic error term.

u_{it} and v_{it} are assumed to be distributed independently of each other and the covariates in the model.

$$\begin{aligned} \ln L = & -1/2\left(\sum_{i=1}^{N} T_i\right)\left\{\ln(2\pi) + \ln(\sigma_S^2)\right\} - 1/2\sum_{i=1}^{N}(T_i - 1)\ln(1-\gamma) - 1/2\sum_{i=1}^{N}\ln\left\{1 + \left(\sum_{i=1}^{T_i}\eta_{it}^2 - 1\right)\gamma\right\} \\ & -N\ln\left\{1 - \Phi(-\tilde{z})\right\} - 1/2N\tilde{z}^2 + \sum_{i=1}^{N}\ln\left\{1 - \Phi(-z_i^*)\right\} + 1/2\sum_{i=1}^{N} z_i^{*2} - 1/2\sum_{i=1}^{N}\sum_{t=1}^{T_i}\frac{\varepsilon_{it}^2}{(1-\gamma)\sigma_S^2} \end{aligned} \qquad \textbf{(A.2)}$$

where

N is the number of firms in the industry

T_i is the last time period in the ith panel

$$\sigma_S^2 = \sqrt{(\sigma_u^2 + \sigma_v^2)}$$
$$\gamma = \sigma_u^2 / \sigma_S^2$$
$$\varepsilon = y_{it} - x_{it}\beta$$
$$\eta_{it} = e^{\{-\eta(t-T_i)\}}$$
$$\tilde{z} = \frac{\mu}{\sqrt{\gamma\sigma_S^2}}$$

$\Phi()$ is the cumulative distribution function of the standard normal distribution, and

$$z_i^* = \frac{\mu(1-\gamma) - \gamma\sum_{t=1}^{T_i}\eta_{it}\varepsilon_{it}}{\left[\gamma(1-\gamma)\sigma_S^2\left\{1+\left(\sum_{t=1}^{T_i}\eta_{it}^2 - 1\right)\gamma\right\}\right]^{1/2}} \qquad \textbf{(A.3)}$$

η_{it} is the decay parameter. When $\eta > 0$, the degree of inefficiency decreases over time; when $\eta <$ 0 the degree of inefficiency increases over time.

Maximizing the log-likelihood (A.2) estimates the coefficients η, μ, σ_v, and σ_u.

Marketing Capability Score (MCS) is computed as follows:

$$\text{MCS} = \text{E}\left\{e^{(-u_{it})}\middle|\varepsilon_{it}\right\} = \left[\frac{1-\Phi\left\{\eta_{it}\tilde{\sigma}_i - (\tilde{\mu}_i / \tilde{\sigma}_i\right\}}{1-\Phi(-\tilde{\mu}_i / \tilde{\sigma}_i)}\right] e^{\left(\eta_{it}\tilde{\mu}_i + \frac{1}{2}\eta_{it}^2\tilde{\sigma}_i^2\right)} \qquad \textbf{(A.4)}$$

where

$$\tilde{\mu}_i = \frac{\mu\sigma_v^2 - \sum_{t=1}^{T_i}\eta_{it}\varepsilon_{it}\sigma_v^2}{\sigma_v^2 + \sum_{t=1}^{T_i}\eta_{it}^2\sigma_u^2}, \qquad \tilde{\sigma}_i^2 = \frac{\sigma_v^2\sigma_u^2}{\sigma_v^2 + \sum_{t=1}^{T_i}\eta_{it}^2\sigma_u^2}$$

Maximum marketing capability score is assumed to be 100 and all the other scores are computed with respect to 100 point benchmark.

APPENDIX B

Inverse Mills' Ratio

We use Heckman (1979) two step estimation technique in conducting the analysis. The critical component of this technique is the computation of inverse Mills' ratio.

The regression equation is

$$y_j = x_j\beta + u_{1j} \qquad \textbf{(B.1)}$$

The selection equation is

$$z_j\gamma + u_{2j} \qquad \textbf{(B.2)}$$

where

$$u_1 \sim N(0,\sigma)$$

$$u_2 \sim N(0,1)$$

$$corr(u_1,u_2) = \rho$$

Probit estimates of the selection equation are obtained from

$$\Pr(y_j observed \,|\, z_j) = \Phi(z_j\gamma)$$

From these estimates, inverse Mills' ratio (a.k.a. nonselection hazard) for each observation j is computed as

$$m_j = \frac{\phi(z_j\hat{\gamma})}{\Phi(z_j\hat{\gamma})} \qquad \textbf{(B.3)}$$

where the ϕ is the normal density.

In the following step, the two-step parameter estimates are obtained by augmenting the regression equation with the inverse Mills' ratio m. Thus, the regressors become [X m].

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