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The Effect of Tacit Knowledge and Marketing Capability on International Diversification Premium by Industry

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Abstract

Numerous studies have been undertaken on the performance implications of international diversification. While early research indicates the existence of a diversification discount, later research reports mixed results (both premiums and discounts). This study hypothesizes that the success of international diversification depends on industry and firm specific advantages such as tacit knowledge and marketing capability. Industries/firms that possess a significant competitive advantage in one or more of these areas will likely have an international diversification premium, while those that do not will likely have an international diversification discount. The ability of firms to generate a competitive advantage in these areas varies significantly across industries. Our findings do indicate the existence of international diversification discounts and premiums by industry, with the industry results moderated by level of tacit knowledge and marketing capability.

Keywords: *international diversification, diversification premium / discount, tacit knowledge*

INTRODUCTION

There has been a significant volume of research performed in the areas of corporate and international diversification. However, the results of much of this research are contradictory, as several studies find the existence of corporate and international diversification discounts (Lins and Servaes, 1999; Denis, Denis, and Yost, 2002), while other findings suggest that related corporate diversification (CD) and international diversification (ID) can result in an increase in firm value and, thus, have a diversification premium (Morck and Yeung, 1991; Garrod and Rees, 1998; Gande, Schenzler, and Senbet, 2009; Purdy and Wei, 2014). Other findings include the existence of a non-linear relationship between international diversification and firm performance, with those being a U-shaped, an inverted U-shaped, or S-shaped curves (Gomes and Ramaswamy, 1999; Capar and Kotabe, 2003; Ruigrok, Amann and Wagner, 2007; Lu and Beamish, 2004; Tsai, 2014).

From an ID standpoint, study results are mixed. Denis et al. (2002) indicate that ID has a negative effect on firm value. This ID discount is also supported by the research of Click and Harrison (2000) and Christophe (1997). This could be due to chal-

lenges from coordination and control across geography, time, and culture (Hitt, Hoskisson, and Ireland, 1994; Lu and Beamish, 2004); the inefficient use of assets (Click and Harrison, 2000) and the liability of foreignness (Zaheer, 1995; Katrishen and Scordis, 1998).

However, other studies find an ID premium (Morck et al., 1991; Garrod and Rees, 1998; Gande et al., 2009). This is due to firms that expand internationally achieving economies of scale and scope (Capar and Kotabe, 2003; Brock, Yaffe, and Dembovsky, 2006), taking advantage of local resources, and utilizing their intangible assets more effectively (Kotabe, Srinivasan, and Aulakh 2002; Gande et al., 2009).

Numerous studies have found the relationship between ID and performance to be non-linear (Gomes and Ramaswamy, 1999; Lu and Beamish, 2004; Ruigrok et al., 2007; Tsai, 2014). Their rationale is that increasing levels of multinationality increase performance up to a point, but beyond this optimal point the costs of ID begin to outweigh the benefits, causing a performance decline (Gomes and Ramaswamy, 1999; Ruigrok et al., 2007). These costs include increasing coordination and control, difficulties managing businesses in multiple markets with diverse cultures, and developing products to meet significant variations in customer needs.

Several studies even suggest the ID performance relationship is an S-curve (Lu and Beamish, 2004; Ruigrok et al., 2007; Tsai, 2014). This may occur as a firm realizes excessive costs and initial negative returns when first expanding into foreign markets due to the liability of foreignness (Zaheer, 1995). As firms' tacit knowledge increases, these costs diminish and the firms are able to exploit their intangible assets (Lu and Beamish, 2004). However, like those studies that yielded the inverted U-shaped relationship, eventually coordination and control costs lead to diseconomies of scale and result in a downward slope to the ID-performance curve (Gomes and Ramaswamy, 1999; Ruigrok et al., 2007; Tsai, 2014).

We explore ID by industry and examine whether the costs and benefits of internationalization are moderated by an industry's specific needs. A difference in ID by industry is discussed by Contractor, Kundu and Hsu (2003), as they suggest that dichotomies in previous studies may be the result of treating all industries the same. In a study of 11 service industries, they find that service industries are fundamentally different from manufacturing industries. This is also supported by Capar and Kotabe (2003), who suggest that the relationship between ID and performance in manufacturing firms might not apply to service firms.

We suggest that the success of ID is derived from certain firm specific advantages that are more suitable in a given industry, but not necessarily in others. These advantages arise from different types of intangible assets, which are often difficult to evaluate and measure. These specific assets can vary widely across firms within an industry, leading to matches and mismatches.

As technology advances and firms implement more sophisticated systems for global coordination and control (Chari, Devaraj, and David, 2007), these advantages are even found to have interaction effects (Cantwell and Narula, 2001; Tsai, 2014), thus increasing the effect they can have on firm performance. Therefore, firms that possess significant advantages in these areas, which are needed by specific industries in order to be successful, should be positively affected and could have an ID premium. Our study attempts to investigate this industry-firm match and explores whether ID premiums vary by industry-firm-intangible assets. Thus, we hypothesize that ID premiums are driven by firm specific advantages generated by the intangible assets of tacit knowledge and marketing capability in specific industries only.

Our study has multiple components. First, we explore whether 41 industry sectors have an ID premium or discount. Second, we analyze the factors of tacit knowledge and marketing capability to determine whether these factors are related to ID premiums or discounts at the firm level. Third, we analyze tacit knowledge and marketing capability at the industry level to determine their relationship with industry ID premiums and discounts. We present evidence that certain intangible assets such as marketing capabilities interact with diversification strategy and lower the costs of such strategies. This interaction effect has not been previously investigated.

This research should aid firm management in

several areas. First, it should indicate whether firms in their industry are likely to have an ID discount or premium when moving from a domestic to an international firm. Second, it indicates if the factors of tacit knowledge or marketing capability may be important capabilities in their expansion plans. They could then analyze the investments they have made and the capabilities their firm has developed in each of these areas.

In the next section, we review related ID literature and performance relationships, formulate the conceptual model and develop the hypotheses. Then, we describe the research methodology, the variables and measures, the sample selection criteria, and the data. We proceed to the hypotheses and present the empirical findings, followed by the discussion of our research findings and future research opportunities.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Prior literature offers mixed evidence on the benefits of ID. Denis et al. (2002) indicate that ID has increased over time, as an increasing percentage of U.S. firms operate in international markets and existing multinational firms have increased their percentage of foreign sales. Click and Harrison (2000) find that MNEs tend to use their assets inefficiently, as they have high levels of assets relative to their earnings, thus yielding a poor ROA. Using Tobin's *q*, they find a discount associated with ID in the range of 8.6% to 17.1%.

However, this research is contradicted by Defusco, Philippatos, and Choi (1988), whose findings suggest that foreign market involvement of MNEs is viewed by investors as a potential source of risk, which is compensated for by higher required rates of return on their stock holdings. In addition, Morck and Yeung (1991) suggest that a firm can increase its value by internalizing markets for intangible assets. They find that a firm's degree of multinationality is positively correlated with Tobin's *q* and that it is also related to its level of intangible assets. This finding is supported in the meta-analysis of 111 studies by Kirca et al. (2011), who suggest that "multinationality provides the most efficient governance structure for transferring these valuable, rare, inimitable, nonsubstitutable resources across country borders within a firm and for these transfers to have positive effects on firm profitability." An additional benefit of ID is that, in emerging markets, ID positively affects the firm's innovation performance (Wu, Chen, and Jiao, 2016).

Internalization theory posits that direct foreign investment occurs when a firm can increase its value by internalizing markets for its intangible assets (Buckley and Casson, 1976; Morck and Yeung, 1991; Hitt et al., 1994). These assets include superior production processes, managerial skills (Saham and Nam, 2013), proprietary products, the ability to innovate, IT systems (Chari et al., 2007), or marketing capability/brand equity (Kotabe et al., 2002; Brock et al., 2006). As a result, firms in industries that are suited to possessing advantages in these areas should have a benefit in ID and, thus, gain competitive advantage over their purely domestic rivals. There are numerous factors that can be exploited in order to gain competitive advantage. These include management skill and experience, economies of scale, economies of scope (Katrishen and Scordis, 1998), capital intensive investments (Purdy et al., 2014) and the benefits of inter-firm relationships and transactions. Additional advantages can be gained from the reduction of transaction and coordination costs, and by exploiting intangible assets (Hitt et al., 1994; Gande et al., 2009; Mayer, Stadler and Hautz, 2015). These intangible assets include tacit knowledge, human capital (Hitt et al., 2006), marketing capability, IT systems (Chari et al., 2007) and a strong R&D capability (Morck and Yeung, 1991; Kotabe et al., 2002; Kirca et al., 2011; Tsai, 2014). Cantwell and Narula (2001) find that globalization has increased the interaction among these previously mentioned firm specific advantages. This is due to increases in competition and rapid advances in communications and other technologies; which have resulted in increased cross-border interdependence and the integration of production and markets for goods, services, and capital. Thus, firms with strong competitive advantages should be able to leverage these capabilities globally in a coordinated way to increase firm value, resulting in a higher ID premium. Certain industries can also present the opportunity for firms to exploit more of these competitive advantages than

firms in other industries. For example, it is very expensive to develop a new product in the pharmaceutical industry; however, once it is developed, it is relatively inexpensive to manufacture and market the product (Hennart, 2007). Therefore, we hypothesize that:

Hypothesis 1: The firm's ID premium will be higher, the greater its possession of tacit knowledge.

Another intangible asset that firms use to enhance their performance is possession of marketing capabilities. Marketing capability is an integrative process that could be used by firms as a resource for customer satisfaction and to promote customer loyalty (Song, Benedetto, and Nason, 2007). Developing marketing capabilities could establish market power for a firm which would be very difficult for a competitor to imitate (Day, 1994; Hitt et al., 1994). One of the major costs in international diversification strategy is to understand customer needs and offer products in a way that is attractive to customers. Firms with good marketing capabilities are less likely to face this challenge when they undertake international diversification strategies. Therefore, we hypothesize that:

Hypothesis 2: The firm's ID premium will be higher, the greater its possession of marketing capability.

Industry/Firm Competitive Advantages

While certain industries are more conducive than others to capturing the benefits of ID, on a firm specific basis, it is up to firm management to capitalize on firm capabilities to build competitive advantage (Hutzschenreuter, Pedersen, and Volberda, 2007). However, in industries that present the opportunity for few, if any, advantages of becoming international, it may be difficult to overcome the liability of foreignness (Zaheer, 1995) and management may be prudent to keep the firm domestic. Therefore, firm management must understand the capabilities and potential of the firm and industry, and develop their strategy accordingly. Thus, international firms in certain industries that do a superior job of exploiting their competitive advantage should have increased firm value over firms that stay domestic.

Multinationality is value-increasing for firms with significant intangible assets. For example, the level of a firm's tacit knowledge and its knowledge management can be viewed as a source of competitive advantage (Nonaka and Takeuchi, 1995). Numerous studies have found that intangible assets such as knowledge development and its efficient transfer across different geographical regions are key drivers of ID premium (Fang et al., 2008). However, some studies argue that the transfer of such capabilities could be challenging due to various limitations, such as government restrictions and socio-cultural limitations (Capar and Kotabe, 2003; Zaheer, 1995).

These costs diminish as the firm's experience increases and it is able to exploit its intangible assets (i.e., technological know-how, tacit knowledge, management skill, and consumer goodwill). This results in an acceleration of profits and a more positive slope on the ID-performance curve. The role of such intangible assets have been studied before (e.g., Nath, Nachiappan, and Ramanathan, 2010) but how these assets help internationally diversified firms in mitigating the negative effects of diversification has not received much attention in the prior literature.

Similar to studies of industrial firms, studies of service firms have found that the relationship between ID and performance has an inverted U-shaped curvilinear relationship (Katrishen and Scordis, 1998; Brock et al., 2006). In a study of firms in the media industry, Jung and Chan-Olmsted (2005) find that related product expansion and ID yield better financial performance. The media industry is a good example of an industry that should benefit from global expansion. The primary reason is that much of the product in the media industry involves the transfer of knowledge, as in media, gathering and producing the knowledge is very expensive, but replication/distribution costs are typically low. In some ways the media industry is actually similar to manufacturing in that it is R&D intensive (Jung and Chan-Olmsted, 2005), where the cost of product development is high, but manufacturing costs are relatively low.

In summary, a strong knowledge base can pro-

vide internationally diversifying firms with the competitive advantages of extensive market knowledge, cultural understanding, improved production processes, enhanced service and support to customers, strong R&D capabilities, and proprietary product and service offerings. Therefore, a higher level of tacit knowledge should make a firm more successful globally, and this should lead to a higher ID premium (or smaller discount) for the firm. Hence, the following hypotheses are established:

Hypothesis 3: Within industries, the firm's ID premium will be higher, the greater its possession of tacit knowledge and marketing capability.

RESEARCH METHODOLOGY AND CONSTRUCT MEASUREMENTS

Industry Model

In order to understand if the ID discount/premium is industry specific (initial research question), the change in valuation premium between domestic and international firms in the same industry is used to determine whether a given industry has an ID discount or premium. Tobin's *q* is used as a proxy for valuation premium, as it has been widely used in research on diversification discounts/premiums (Morck and Yeung, 1991; Chari et al., 2007; Gande et al., 2009).

The average Tobin's *q* of international firms in a given industry segment is compared to the average of Tobin's *q* of domestic firms in that same industry segment. A domestic firm is defined as a firm with less than 5% foreign sales. If the resulting weighted average is positive (negative), there will be an ID premium (discount). Hence, for a specific industry the equation to find the average Tobin's *q* for domestic firms is:

$$\text{Tobin's } q\ D_I = \frac{\Sigma(\text{Tobin's } q\ D_F)}{\text{Firms}_D} \qquad \text{[Eq. 1]}$$

Tobin's $q\ D_I$ = Average Tobin's *q* for domestic firms in a given industry

Tobin's $q\ D_F$ = Tobin's *q* for each domestic firm in a given industry

Firms_D = Number of domestic firms in the industry

We find the average Tobin's *q* for international firms in a specific industry as follows:

$$\text{Tobin's } q\ I_I = \frac{\Sigma(\text{Tobin's } q\ I_F)}{\text{Firms}_I} \qquad \text{[Eq. 2]}$$

Tobin's $q\ I_I$ = Average Tobin's q for international firms in a given industry

Tobin's $q\ I_F$ = Tobin's q for each international firm in a given industry

Firms_I = Number of international firms in the industry

Equation 3 yields the valuation premium/discount for international firms by taking the Tobin's $q\ I_I$ (Eq. 2) generated for all international firms in an industry and dividing it by Tobin's $q\ D_I$ that was generated for all domestic firms in an industry (Eq. 1):

$$PD_I = (\text{Tobin's } q\ I_I/\text{Tobin's } q\ D_I) - 1 \qquad \text{[Eq. 3]}$$

PD_I = Diversification discount/premium (percentage) for international firms relative to domestic firms in a given industry

Tobin's $q\ I_I$ = Tobin's *q* for international firms in a given industry

Tobin's $q\ D_I$ = Tobin's *q* for domestic firms in a given industry

Variables and Measures

H1 suggests that greater tacit knowledge provides the firm/industry with a competitive advantage, which should lead to an increase in the ID premium (reduction in discount). Tacit knowledge is difficult to measure, but previous research has used the number of patents (Mancusi, 2008), percentage of firm employees who are technical/professional staff (Thornhill; 2006), and R&D intensity (Kirca et al., 2011). Fang et al. (2007) and Fang et al. (2008) use R&D intensity as a proxy for technological knowledge, while Nesta and Saviotti (2006) use R&D intensity as a proxy for a firm's knowledge capital. Adler and Hashai (2007) use R&D intensity as a proxy for knowledge, while Lu and Beamish (2004) use R&D intensity as a proxy for technological know-how.

This study uses two measures of tacit knowledge. First, we use firm R&D spending divided by the number of patents received over three years (*Patent Investment*). Since patents largely represent explicit/codified knowledge, more R&D spending per patent suggests that the firm had more knowledge than what was explicitly documented. Thus, the firm should also have a higher level of tacit knowledge[1]. Second, we use *R&D intensity* (R&D spending divided by sales) as a proxy for tacit knowledge. These variables are lagged three years in order to allow time for the R&D investments to have an impact.

H2 suggests that, on a firm specific basis, marketing capability (brand equity/consumer goodwill) can provide a sustainable competitive advantage, which should lead to an increase in ID premium (or reduction in discount). While it is difficult to measure marketing capability directly, the firm's advertising can differentiate products and increase brand equity, and is thus an indication of its marketing capability. Kirca et al. (2011) indicate that an increase in advertising intensity will lead to increased performance in multinational firms. In earlier research, advertising intensity is used as a proxy for the variables marketing capability (Kotabe et al., 2002; Fang et al., 2007; and Fang et al.; 2008) and consumer goodwill (Morck and Yeung, 1991). Therefore, this study will use *advertising intensity* as a proxy for marketing capability.

Industry Characteristics Model

In order to test H3, a model is developed to see if there are specific firm/industry characteristics that lead to ID discounts/premiums. Therefore, in addition to the industry analysis previously discussed, firm specific independent variables (IVs) are compared with firm performance (dependent variable (DV)). The data for the IVs and DV are gathered from the Compustat database and the National Bureau of Economic Research (NBER).

The model required to test these hypotheses is as follows:

$$TQ = \alpha + \beta_1 TK + \beta_2(TK^*DINTL) + \beta_3 ADI + \beta_4(ADI^*DINTL) + \beta_5 DINTL + \beta_6 LEV + \beta_7 ASSETS + \beta_8 ROA + \varepsilon \quad \text{[Eq. 4]}$$

TQ = Tobin's *q*
TK = Tacit Knowledge which is either RDI or RDP
RDI = R&D intensity (annual R&D expense/annual total firm sales)
RDP = Patent Investment (annual R&D expense/number of patents over 3 years)
ADI = Advertising intensity (annual advertising expense/annual total firm sales)
DINTL = 1 if a firm is categorized as internationally diversified, zero otherwise
LEV = Firm leverage (total debt/total assets)
ASSETS = Firm size (total assets)
ROA= Return on Assets (net income/total assets)

In testing for multicollinearity in all models, we find that all the VIFs are below 2.00. Also, since we use robust standard errors and industry fixed effects, we do not believe that multicollinearity is a problem.

If TQ is positively correlated with some/all of the IVs, it would support the hypotheses that the ID premium increases with an increase in tacit knowledge and/or marketing capability. However, smaller firms usually have faster growth rates than larger firms. Therefore, we control for firm size by using annual firm sales as a proxy. Capital structure can also affect firm valuation, so we control for differences in capital structure by using firm debt as a percentage of total assets. We also control for firm profitability, as more profitable firms are more likely to be more valuable.

Sample Selection and Data Collection

U.S.-based firms from Compustat are used in the study, as Compustat segment files provide information on industry segment and foreign sales. This allows the firms to be segregated into different industry segments. Within these industry segments, the data on foreign sales can be used to categorize a firm as either international or domestic. An international firm is considered a firm that reports at least 5% of its sales as foreign. If a firm does not have at least 5% foreign sales, then it is considered domestic. Sensitivity analysis is performed to see if the level of internationalization (at the 1%, 5%, and 10% levels of foreign sales ratio) affects the results. Firms with annual sales under $10 million and share prices under $1 are excluded, as are industries

Table 1. 2001, 2004, and 2007 Sample Description

Initial Sample (Number of Firms)	32,535
Stocks with share prices below $1	1,779
Firms with sales of less than $10 million	6,393
Firms eliminated due to missing financial information	6,877
Firms in SIC code 60 (depository institutions)	2,210
Final sample of firms used in analysis	15,276

Table 2: Descriptive Statistics

Variables	Mean	Median	Maximum	Minimum	Std. Deviation	No. of Observations
Assets ($ mill.)	10382.380	505.595	3771200.0	0.314	83898.690	18031
Sales ($ mill.)	2984.131	244.805	358600.0	10.012	12449.220	17939
R&D Expenses ($ mill.)	54.694	0.000	10092.58	0.000	398.674	18031
Advertising Expenses ($ mill.)	25.216	0.000	7937.0	0.000	203.229	18031
Number of Patents	116.645	7.000	9686.0	0.000	505.860	3578
Tobin's q	1.573	1.066	243.963	0.000	3.669	18031
Leverage	0.228	0.181	5.985	0.000	0.234	18031
ROA	-0.002	0.022	24.977	-11.657	0.409	17940
R&D Intensity	0.335	0.000	1109.947	0.000	9.930	16247

Table 3: Correlation Coefficients

	Assets	Advertising Intensity	Patent Investment	Tobin's Q	Leverage	ROA	R&D Intensity
Assets	1.000						
Advertising Intensity	-0.031	1.000					
Patent Investment	0.234	0.035	1.000				
Tobin's *q*	-0.229	0.098	0.057	1.000			
Leverage	0.230	-0.038	0.039	-0.124	1.000		
ROA	0.202	-0.080	0.023	0.069	-0.050	1.000	
R&D Intensity	-0.165	0.036	0.088	0.244	-0.093	-0.360	1.000

that have fewer than 100 firm/year observations. Banking firms are excluded (SIC Code = 60) since they are almost all domestic. Previous research on ID has used a wide variety of time periods.

This study covers the years 2001, 2004 and 2007 in order to sample multiple periods during the relatively stable economic cycles before the major global economic disruption. The sample selection is summarized in Table 1 and descriptive statistics are presented in Table 2. Table 3 presents pairwise correlations between the variables.

In order to determine which industries have the largest number (and percentage) of international firms, the data are divided into a macro industry view. This information includes SIC code, industry, total number of firms in the industry, number of firms per industry that are ID (5% FSTS level), and percentage of firms per industry that are ID. Two-digit SIC codes are used in the breakdown for 29 industry sectors, while data are available to break down 12 industry sectors at the three-digit SIC code level.

Table 4 shows that of the 13,148 firm/year observations, 5,463 (42%) represent firms with foreign sales greater than 5% of total sales and are internationally diversified. Industries with the highest

Table 4: Univariate Results: International Diversification Premiums/Discounts by Industry

SIC Code	Industry	Total Number of Firms	Number of Intl Firms	% Intl	2001 to 2007 Domestic Tobin's *q*Wtd Av	2001 to 2007 Intl. Tobin's *q*Wtd Av	2001 to 2007 Premium or Discount
10	Metal Mining	234	108	46%	1.66	1.8	8.4%
13	Petroleum/Natural Gas	753	179	24%	1.51	1.46	-3.3%
20	Mfg.- Food/Beverages	384	136	35%	1.43	1.71	19.6%
23	Mfg.- Apparel	131	54	41%	1.37	1.38	0.7%
26	Mfg.- Paper	168	106	63%	0.87	1.05	20.7%
27	Printing	187	68	36%	1.37	1.58	15.3%
283	Drugs	666	301	45%	2.98	2.91	-2.3%
291	Petroleum Refining	105	57	54%	1.22	1.27	4.1%
30	Rubber/Plastic Products	148	92	62%	1.06	1.18	11.3%
33	Primary Metals (Steel)	232	133	57%	1.15	1.09	-5.2%
34	Fabricated Metals	198	107	54%	1.21	1.25	3.3%
353	Construction Machinery	107	82	77%	1.57	1.48	-5.7%
355	Special Industry Mach	134	108	81%	1.44	1.49	3.5%
356	General Industry Mach	123	89	72%	1.37	1.9	38.7%
357	Computer Equipment	322	242	75%	2.13	1.79	-16.0%
366	Communications Equip	377	246	65%	1.68	1.69	0.6%
367	Electronic Components	572	431	75%	2	2.02	1.0%
37	Transportation Equip	334	180	54%	1.35	1.1	-18.5%
382	Measuring/Control Dev	313	244	78%	2.12	1.98	-6.6%
384	Medical Instruments	424	263	62%	2.73	2.68	-1.8%
39	Misc. Manufacturing	136	93	68%	1.59	1.4	-11.9%
42	Trucking	115	30	26%	1.24	1.3	4.8%
44	Shipping	132	34	26%	1.28	1.07	-16.4%
45	Air Transportation	136	55	40%	0.98	0.86	-12.2%
481	Telephone Comm.	389	130	33%	1.23	1.42	15.4%
483	Radio/TV Broadcasting	127	24	19%	1.39	1.67	20.1%
49	Electric/Gas Utilities	578	99	17%	0.99	1.15	16.2%
50	Wholesale Trade-Durable	329	130	40%	1.07	1.11	3.7%
51	Wholesale Trade-Non	206	64	31%	1.41	1.3	-7.8%
56	Apparel/Shoe Stores	123	13	11%	1.51	2.01	33.1%
58	Retail-Restaurants	212	24	11%	1.49	2.03	36.2%
59	Other Retail	264	45	17%	1.65	1.79	8.5%
61	Credit Union/Mortgage	206	23	11%	1.11	0.92	-17.1%
62	Securities Brokers	267	71	27%	2.1	1.46	-30.5%
63	Insurance	527	92	17%	0.52	0.32	-38.5%
65	Real Estate	179	27	15%	1.22	1.25	2.5%
67	Investment Firms/Trusts	758	45	6%	1.55	2.64	70.3%
73	Business Services	1831	1057	58%	2.02	2.15	6.4%
79	Amusement/Rec Services	153	24	16%	1.59	1.23	-22.6%
80	Health Services	269	22	8%	1.82	1.9	4.4%
87	Engineering Services	289	135	47%	1.88	1.65	-12.2%
	Totals	13,138	5,463	42%	1.51	1.55	2.6%

Note: Industry premiums/discounts as measured by Tobin's *q*. Since only industries with > 100 firms are listed, the total number of firms in this table is < total of the sample in Table 1.

Table 4A: Univariate Results: Average Marketing Capability and Tacit Knowledge by Industry

SIC Code	Industry	Marketing Capability (Advertising Expenditure / Sales) (%)	Tacit Knowledge (R&D Expenditure / Sales) (%)
10	Metal Mining	0.038	0.0047
13	Petroleum/Natural Gas	0.004	0.775
20	Mfg.- Food/Beverages	1.968	0.413
23	Mfg.- Apparel	2.316	0.007
26	Mfg.- Paper	0.285	0.782
27	Printing	1.437	0.276
283	Drugs	1.432	56.068
291	Petroleum Refining	0.087	0.973
30	Rubber/Plastic Products	0.664	1.244
33	Primary Metals (Steel)	0.077	0.723
34	Fabricated Metals	0.640	1.139
353	Construction Machinery	0.480	11.612
355	Special Industry Mach	0.129	12.684
356	General Industry Mach	0.261	2.400
357	Computer Equipment	0.809	19.107
366	Communications Equip	0.367	19.836
367	Electronic Components	0.211	20.396
37	Transportation Equip	0.280	2.852
382	Measuring/Control Dev	0.363	20.709
384	Medical Instruments	0.778	24.50
39	Misc. Manufacturing	2.844	2.407
42	Trucking	0.051	0.000
44	Shipping	0.346	2.605
45	Air Transportation	0.502	0.000
481	Telephone Comm.	1.625	1.316
483	Radio/TV Broadcasting	1.897	0.000
49	Electric/Gas Utilities	0.004	0.028
50	Wholesale Trade-Durable	0.164	0.303
51	Wholesale Trade-Non	0.458	0.531
56	Apparel/Shoe Stores	2.191	0.000
58	Retail-Restaurants	2.201	0.010
59	Other Retail	3.275	2.627
61	Credit Union/Mortgage	0.540	1.574
62	Securities Brokers	0.852	1.138
63	Insurance	0.033	0.000
65	Real Estate	0.704	0.165
67	Investment Firms/Trusts	0.348	1.842
73	Business Services	1.374	0.184
79	Amusement/Rec Services	1.670	0.555
80	Health Services	0.230	3.176
87	Engineering Services	0.172	19.082
Total		0.870	8.907

Note: Since only industries with greater than 100 firms are listed, the total number of firms in this table is less than the total of the sample in Table 1.

percentage of ID firms are Special Industry Machinery (81%), Measuring/Control Devices (78%), Construction Machinery (77%), Computer Equipment (75%), and Electronic Components (75%). Industries with the smallest percentage of ID firms are Investment Firms and Trusts (6%),

Health Services (8%), Retail-Restaurants (11%), Credit Unions/Mortgage Brokers (11%), Apparel/ Shoe Stores (11%), and Real Estate (15%).

Table 4A shows how industry vary in terms of the marketing capability and tacit knowledge. Companies in industries such as drug development (56.068) and engineering services (19.082) spend a large proportion of their sales in R&D investments. On the other hand, companies in Radio/ Broadcasting or Air Transportation do not appear to be spending much on R&D. Similarly, companies in retail services or Food Manufacturing tend to spend above average amount on advertising as a proportion of sales. Gas/Utilities or mining or refining companies tend to spend fewer dollars on building marketing capabilities. Obviously, firms operating in various industries will have differing levels of marketing capabilities or tacit knowledge that they could use to manage complexities arising out internationalization.

HYPOTHESIS TESTING AND EMPIRICAL RESULTS

We first document the difference in ID premium by industry. The results from our univariate analysis indicate that this is the case (see Table 4). Of the 41 industries tested, 22 had ID premiums, 17 had discounts, and two had neither (i.e. within the range of +1% to –1%). There was a wide range in the premiums/discounts, as the lowest discount was -38.5% (Insurance), while the highest premium was 70.3% (Investment Firms/Trusts). Other industries with high premiums were General Industry Machinery (38.7%), Retail-Restaurants (36.2%), and Apparel/ Shoe Stores (33.1%); those with the greatest discounts also included Securities Brokers (-30.5%), Amusement/Recreation Services (-22.6%), and Transportation Equipment (-18.5%). Thus, ID premiums/discounts by industry do exist and vary.

However, with the entire sample in aggregate, the overall result was an ID premium of only 1.2% (near zero). This highlights the importance of examining the industries individually; in the aggregate, we may erroneously conclude that ID premiums/discounts do not exist for the sample used in this study.

The ID Premium of Tacit Knowledge and Marketing Capability

We now focus on the relevance of firm specific capability to the ID premium. H1 and H2, respectively, test the effect of tacit knowledge and marketing capability on firm performance, based on their internationalization. To test whether tacit knowledge impacts international firms differently than domestic firms,[2] we introduce an interaction term of tacit knowledge proxies (i.e. *Patent Intensity*Dinternational* and *R&D Intensity* Dinternational*) and firm internationalization to the baseline regressions presented in Table 5. Similarly, to see the differential impact of marketing capability on international and domestic firms, we introduce the interaction term of advertising intensity and internationalization (*Advertising Intensity*Dinternational*). For tractability of these models and for easier interpretation of results from estimations with the interaction terms, we use an indicator variable for internationalization, *Dinternational*, which takes a value of one if a firm is categorized as international, otherwise it is zero.[3] The results from these regressions are presented in Table 5.

The first column of Table 5 presents the results from a regression that uses R&D intensity as a proxy of tacit knowledge. These results indicate that R&D intensity (α1) has a positive coefficient which is significant at the 1% level. The interaction term *R&D intensity * Dinternational* (α2) is also positive and significant at the 10% level. The F-test for the combined effect of R&D intensity (α1+ α2) is positive and significant at the 1% level. These results indicate that the impact of R&D intensity on Tobin's *q* is positive for both domestic and international firms, but it is stronger in international firms. Further tests indicate that α1 (0.348) is significantly lower than α1+ α2 (0.402). Thus, these results support Hypothesis 1.

Column 3 of Table 5 uses patent investment as an additional proxy for tacit knowledge.

Table 5: The Impact of Tacit Knowledge and Marketing Capability on Firm Performance (Tobin's *q*) in International Firms versus Domestic Firms

	Dependent Variable: Ln (Tobin's *q*)		
R&D Intensity (α1)	0.348***	0.365***	0.332***
	(15.033)	(17.820)	(8.290)
R&D Intensity*Dinternational (α2)	0.054*		
	(1.832)		
Advertising Intensity (α3)	2.183***	1.824***	2.402***
	(8.353)	(4.928)	(3.934)
Advertising Intensity*Dinternational (α4)		0.749*	
		(1.727)	
Patent Investment (α5)			-0.002
			(-1.434)
Patent Investment*Dinternational (α6)			0.009***
			(2.643)
Dinternational	0.048***	0.048***	-0.052
	(3.981)	(3.874)	(-1.141)
Assets	-0.024***	-0.025***16	-0.042***
	(-7.776)	(-7.922)	(-4.782)
ROA	0.955***	0.952***	1.022***
	(19.562)	(19.504)	(8.182)
leverage	-0.038	-0.039	-0.201**
	(-1.272)	(-1.309)	(-2.128)
Intercept	0.286***	0.319***	0.651***
	(11.925)	(10.568)	(9.581)
Industry and Time Fixed Effects Included	Yes	Yes	Yes
NOBS	6339	8018	1653
Adj. R-Sqd.	0.2940	0.2937	0.2455
F-Test ((α1+α2/α3+α4/α5+α6)) (p>F-Test)	0.402*** (p<0.000)	2.573*** (p<0.000)	0.007** (p=0.032)

Note: Results from pooled cross sectional regressions. t-statistics are based on the Huber-White-sandwich estimator to correct for serial correlations and is reported in parentheses below each coefficient estimate.
* p< .10; ** p< .05; ***p < .01

The results in column 3 show that the coefficient on patent investment is insignificant (α5). However, the coefficient on the interaction term *Patent Investment*Dinternational* is positive and significant at the 1% level. The F-test indicates that α5+ α6 = 0.007 is positive and significant at the 1% level. These results indicate that the positive impact of patent investment on firm performance is driven by international firms only. Therefore, the results for Patent Investment and R&D Intensity indicate that tacit knowledge has a greater effect on performance in international firms than in domestic firms, further supporting Hypothesis 1.

In column 2 of Table 5, we use advertising intensity as a proxy for marketing capability. The results in column 2 show that the coefficient on *Advertising Intensity* (α3) is positive and significant at the 1% level. The coefficient on the interaction term *Advertising Intensity* Dinternational* (α4) is also positive and significant at the 10% level. An F-Test for the combined impact of advertising intensity (α3+ α4) is positive and significant at the 1% level. These results indicate that advertising intensity has a positive impact on firm performance in

Table 6: Samples of Industry-wise analysis of Tacit Knowledge and Marketing Capability and Tobin's *q*

R&D Intensity	R&D Intensity*Dintl.	Ad. Intensity	Ad. Intensity*Dintl.	Dintl.	Leverage	Assets	ROA	NOBS	Adj. R-Sqd.
SIC : 10									
0.99	0.99	-37.65		0.22**	-0.71***	-0.04	0.21	234	0.12
(0.36)	(0.36)	-(0.95)		(2.31)	-(2.79)	-(1.25)	(0.58)		
87.49		1.29	-130.64	0.23**	-0.78***	-0.04	0.21	234	0.08
(0.53)		(0.45)	-(0.77)	(2.45)	-(2.77)	-(1.22)	(0.57)		
SIC : 13									
8.47	-3.98	5.94		0.03	-0.34	-0.02	0.81	753	0.0843
(1.18)	-(0.49)	(0.38)		(0.68)	-(3.01)	-(2.01)	(3.40)		
9.15		6.36	-30.35	0.03	-0.34	-0.02	0.81	753	0.084
(0.63)		(1.60)	-(0.60)	(0.59)	-(3.03)	-(2.02)	(3.42)		
SIC:20									
1.00	6.11	4.43***		0.15**	-0.01	-0.04**	2.31**	384	0.2282
(0.22)	(0.77)	(4.43)		(2.27)	-(0.07)	-(2.39)	(2.28)		
5.15***		1.87	-1.25	0.19***	0.00	-0.04**	2.32**	384	0.2283
(3.25)		(0.46)	-(0.61)	(3.12)	(0.00)	-(2.31)	(2.28)		

Note: Results from pooled cross sectional regressions. t-statistics are based on the Huber-White-sandwich estimator to correct for serial correlations and is reported in parentheses below each coefficient estimate.
* p< .10; ** p< .05; ***p < .01

both domestic and international firms, but when compared with domestic firms, this impact is stronger in international firms. This is indicated by the F-test of $\alpha 3 + \alpha 4 = 2.573$ being statistically greater than $\alpha 3 = 1.824$, thus supporting H2.

Does the Effect of the IVs on Firm Performance with International Diversification Vary with Industry?

To see if the impact of internationalization varies with the possession of tacit knowledge across industries, an industry-wise analysis is performed. The proxy for tacit knowledge is R&D Intensity,[4] while marketing capability uses Advertising Intensity. The proxy for firm performance is Tobin's *q*.

As presented in Table 6, the results confirm that the effect of these proxies in firms that are internationally diversified vary across different industries. For example, when we examine the impact of R&D intensity in firms with international diversification in SIC Code 23 (Mfg.-Apparel), we notice that R&D intensity impacts firm performance negatively. Conversely, domestic firms in this SIC Code are impacted positively by R&D intensity. Using an F-Test, we find a negative impact of R&D intensity for firms in SIC codes 48, 49, 65 and 79. Similarly, we find no impact of R&D intensity for firms in multiple SIC codes such as SIC code 10, 13 and 34. One possible reason why R&D intensity does not impact firm value positively in these industries is because companies are sometimes unable to take advantage of their innovations in countries where intellectual property rights are not strong or not protected. Thus, internationalization in such countries could be costly for these firms.

When we analyze the value of marketing capability for firms with ID, we again find that the value of marketing capability varies across industries. In some industries (e.g. SIC 23, 28 and 62), marketing capability is valuable for firms with international diversification, but in many other industries this relationship does not exist. For example, in SIC code 26 (Mfg.-Paper), we find that advertising in-

Table 7: Comparison of the Impact of Tacit Knowledge and Marketing Capability on Firm Performance (Tobin's *q*) in International Firms Based on Industry Level Premium and Discount

	Dependent Variable: Ln (Tobin's *q*)					
	ID Premium Firms			ID Discount Firms		
R&D Intensity (α1)	0.298***	0.331***	0.665***	0.342***	0.336***	0.092**
	(5.895)	(7.531)	(3.317)	(8.964)	(10.010)	(2.043)
R&D Intensity*Dinternational (α2)	0.122*			-0.014		
	(1.656)			(-0.259)		
Advertising Intensity (α3)	2.114***	1.519**	4.108***	3.346***	1.102**	0.157
	(4.205)	(2.257)	(3.911)	(7.225)	(1.979)	(0.133)
Advertising Intensity*Dinternational (α4)		1.293			-0.505	
		(1.361)			(-0.560)	
Patent Investment (α5)			-0.003			-0.013***
			(-0.972)			(-3.370)
Patent Investment*Dinternational (α6)			0.009**			0.011***
			(2.392)			(2.604)
Dinternational	0.050**	0.049**	0.146*	0.007	0.009	-0.156**
	(2.386)	(2.348)	(1.762)	(0.302)	(0.391)	(-2.030)
Assets	-0.010*	-0.011**	-0.018	-0.044***	-0.044***	-0.018
	(-1.901)	(-2.022)	(-0.972)	(-7.701)	(-7.684)	(-1.232)
ROA	0.879***	0.867***	1.546***	0.996***	0.997***	0.573***
	(10.262)	(10.162)	(3.687)	(9.918)	(9.905)	(3.391)
leverage	0.170***	0.167***	-0.131	-0.412***	-0.411***	-0.089
	(3.203)	(3.160)	(-0.683)	(-6.806)	(-6.781)	(-0.686)
Intercept	0.401***	0.216***	0.342***	0.426***	0.260***	0.196**
	(15.210)	(12.051)	(13.017)	(16.064)	(10.150)	(8.104)
Industry and Time Fixed Effects Included	Yes	Yes	Yes	Yes	Yes	Yes
NOBS	2387	1762	394	2387	1762	394
Adj. R-Sqd.	0.3267	0.3211	0.3142	0.4335	0.3782	0.3417
F-Test ((α1+α2/α3+α4/α5+α6))	0.420***	2.812***	0.006**	0.328***	0.597	-0.002
(p>F-Test)	(p<0.000)	(p<0.000)	(p=0.041)	(p<0.000)	(p=0.249)	(p=0.532)

Note: Results from pooled cross sectional regressions. t-statistics are based on the Huber-White-sandwich estimator to correct for serial correlations and is reported in parentheses below each coefficient estimate. * p< .10; ** p< .05; ***p < .01

tensity is valuable for domestic firms, but is costly for firms with ID. Similarly, for firms in SIC code 27 (Printing), an F-test indicates that domestic firms benefit from marketing capability, but not internationally diversified firms.

Overall, the analysis in Table 6 indicates that the value of intangible assets, such as tacit knowledge and marketing capability, in internationally diversified firms varies not only across firms, but also across industries, which supports H3.

The Effect of the IVs on Industries with ID Premiums versus ID Discounts

So far, our analysis indicates that a firm's ID premium varies with tacit knowledge and marketing capability, and also that the impact of tacit knowledge and marketing capability on ID premium varies across industries. To further check the robustness of our results, we test to see if, for multinational firms, the effect of the IVs on firm performance is magnified (reduced) if the industry has an ID premium (discount). In other words, if a firm is

Table 8: The 1st Stage of 2-SLS (IV) Regression of the Impact of Tacit Knowledge and Marketing Capability on Firm Performance (Tobin's *q*)

	Dependent Variable: Dinternational
Foreign Incorporation Dummy	0.619***
	(11.729)
Major Exchange Dummy	0.953***
	(17.969)
Merger Dummy	0.354***
	(6.111)
Capital Intensity	-1.023***
	(-7.090)
Dividend Dummy	-0.545***
	(-11.668)
Assets	0.165***
	(14.224)
ROA	-0.620***
	(-5.396)
Intercept	2.028***
	(11.925)
Industry and Time Fixed Effects Included	Yes
NOBS	14357
Adj. R-Sqd.	0.3211

Note: Results from logistic regressions on the likelihood of a firm being international. The DV is Dinternational. Foreign Incorporation Dummy = 1 if a firm is incorporated outside USA; otherwise it is zero. Major Exchange Dummy = 1 if a firm is listed on a major US exchange (NYSE or NASDAQ); otherwise it is zero. Merger Dummy = 1 if a firm has been in a merger within the last one year; otherwise it is zero. Capital Intensity is the ratio of capital investment to sales. Dividend dummy = 1 if a firm pays a dividend; otherwise it is zero. Z-statistics are reported in parentheses below each coefficient estimate.

* p< .10; ** p< .05; ***p < .01

multinational, the effect of tacit knowledge and marketing capability would be greater only in those industries that have an ID premium.[5)]

To confirm this assertion, we run two sets of regressions similar to those displayed in Table 6. One regression is for the sub-sample of firms with ID premiums and the other is for the sub-sample of firms with ID discounts. Thus, we run a total of six regressions with the estimated coefficients presented in Table 7. The first three columns present results for international firms and the last three columns for domestic firms. In analyzing these results, the coefficients for each IV in the international firm sub-sample are greater for the industries with ID premiums than those with ID discounts. These results are as follows: R&D Intensity (α1+ α2) is 0.420 and significant at the 1% level in ID premium firms, but it is only 0.328 (and significant) in ID discount firms. However, the difference between (α1+ α2) for ID premium and ID discount firms is greater and statistically significant. In looking at the impact of Advertising Intensity (α3+ α4), we see that it is positive and significant in ID premium firms, but it is insignificant in ID discount firms. Similarly, the impact of Patent Investment (α5+ α6) is positive and significant in ID premium firms, but is insignificant in ID discount firms. Therefore, this supports the robustness of our results, that if a firm is multinational, the effect of the IVs on performance will be greater in industries with an ID premium than in industries with an ID discount. This highlights the importance of tacit knowledge and mar-

Table 8A: The 2nd Stage of 2SLS(IV) regression: Comparison of the Impact of Tacit Knowledge and Marketing Capability on Firm Performance (Tobin's *q*) in International Firms Based on Industry Level Premium and Discount

	Dependent Variable: Ln (Tobin's *q*)					
	ID Premium Firms			ID Discount Firms		
R&D Intensity (α1)	0.226	0.348***	0.431*	0.191	0.338***	0.033
	(1.600)	(8.141)	(1.878)	(1.117)	(9.569)	(0.729)
R&D Intensity*Pred. Dinternational (α2)	0.273*			0.206		
	(1.904)			(0.500)		
Advertising Intensity (α3)	2.166***	0.405	2.836**	2.984**	1.959	0.557
	(3.788)	(0.206)	(2.091)	(2.438)	(0.933)	(0.455)
Advertising Intensity*Pred.Dinternational (α4)		5.465*			-2.632	
		(1.744)			(-0.584)	
Patent Investment (α5)			0.014			0.008
			(0.600)			(0.779)
Patent Investment* Pred.Dinternational (α6)			0.016*			-0.025
			(1.837)			(-1.432)
Pred.Dinternational	0.254***	0.232**	0.523	0.224**	0.460***	1.127***
	(2.767)	(2.441)	(1.160)	(2.183)	(4.276)	(4.118)
Assets	-0.014*	-0.014**	-0.041	-0.069***	-0.064***	-0.060***
	(-1.918)	(-1.965)	(-1.383)	(-8.664)	(-8.179)	(-3.386)
ROA	0.805***	0.804***	1.617***	1.122***	1.000***	0.563***
	(8.566)	(8.578)	(3.201)	(8.305)	(8.790)	(3.380)
leverage	0.264***	0.264***	0.114	0.232***	-0.405***	-0.092
	(4.616)	(4.609)	(0.514)	(3.289)	(-5.851)	(-0.673)
Intercept	0.386***	0.197***	0.292***	0.366***	0.296***	0.206**
	(14.322)	(10.151)	(11.171)	(14.162)	(12.181)	(9.901)
Industry and Time Fixed Effects Included	Yes	Yes	Yes	Yes	Yes	Yes
NOBS	2387	1762	394	2387	1762	394
Adj. R-Sqd.	0.3216	0.3220	0.3463	0.3797	0.3795	0.3707
F-Test ((α1+α2/α3+α4/α5+α6))	0.499***	5.870***	0.030***	0.407	-0.673	-0.017
(p>F-Test)	(p<0.000)	(p<0.000)	(p=0.002)	(p=0.119)	(p=0.573)	(p=0.127)

Note: Results from the 2nd stage of 2-SLS (IV) regressions. Pred. Dinternational is the predicted value of Dinternational from the 1st stage regression of 2-SLS (IV) regression. t-statistics are based on the Huber-White-sandwich estimator to correct for serial correlations and is reported in parentheses below each coefficient estimate.

* p< .10; ** p< .05; ***p < .01

keting capability to firms which internationally diversify.

Endogeneity in Independent Variables, Internationalization and Firm Performance

It can be argued that the results are driven by reverse causality (i.e., firms that are more valuable and have more tacit knowledge are more likely to diversify internationally). We address the issue of endogeneity by using 2-SLS (IV) estimation. This allows us to address the concerns associated with reverse causality. In using this procedure, we follow Villalonga (2004) and predict a firm's propensity to diversify internationally first, and then use the predicted value of ID to estimate the association between the IVs and firm performance in internationally diversified firms. The results from the 2-SLS (IV) estimation are presented in Tables 8 and 8A.

Table 8 presents estimated coefficients from the first stage of the 2-SLS (IV) estimation where we first model firm internationalization. Following Villalonga (2004), we use foreign incorporation, membership on a major exchange (NYSE and NASDAQ) and past mergers as predictors of a firm's likely ID. Thus, we expect firms that are incorporated in a foreign country are more likely to have ID. Similarly, compared to firms listed on smaller regional exchanges, firms listed on a major exchange are more likely to diversify internationally. Finally, firms having gone through a merger are also more likely to diversify internationally; as a merger could provide them with international operations. The estimated coefficients presented in Table 8 support our predictions, as all three predictors have a positive and significant coefficient, thus indicating a greater likelihood of ID.

In the second stage, we use predicted internationalization to estimate the association between IVs and firm performance in international versus domestic firms. We repeat regressions from Table 7 using the predicted value of ID and present the estimated coefficients from the 2nd stage regression in Table 8A. These results are similar to our OLS results presented in Table 7. In fact, these results indicate that considering a firm's propensity to diversify internationally, the impact of R&D intensity in internationally diversified firms is limited to ID premium firms only. We find similar results for the other IVs as well. Thus, our results are robust to the concerns of reverse causality and support our hypotheses, that the impact of the IVs on firm performance is moderated by ID.

In order to examine whether the definition of an international firm affected the previously discussed results, sensitivity analysis was performed at different levels of international sales in defining an international firm. In the main analysis, an international firm is defined as having a minimum of 5% FSTS. In this sensitivity analysis, we also use minimums of 1% and 10% FSTS. Tobin's *q* for each of these thresholds was computed by industry and ID premiums/discounts determined. The results were similar to those found at the 5% FSTS level.

DISCUSSION AND CONCLUSIONS

Previous research on ID has shown conflicting results, reporting both ID premiums and discounts. This study suggests that a major reason for these mixed results is that the success of ID depends on specific industry and/or firm characteristics. By looking at all firms and industries in aggregate when building a model, past diversification studies have been undertaken at too aggregate a level to understand how firm and industry specific issues affect ID.

Our study analyzed 41 industry sectors to determine whether these industries have an ID premium or discount. While the results of the overall sample shows an average ID premium of only 1.2%; the results found for the individual industries showed significant variations in premiums and discounts. In comparing firm performance of the international firms of each of these industry sectors to firm performance of the domestic firms, we do find that ID premiums/discounts vary by industry. The results found that 22 industries have premiums, while 17 have discounts; two have neither. The majority of these premiums/discounts were considerable, as 11 industries had premiums of greater than 10%, while 10 had discounts greater than -10%. Thus, the results show that industry does matter when looking at ID and firm performance.

These findings contradict earlier research that found ID discounts relative to domestic firms (Christophe, 1997; Click and Harrison, 2000; Denis et al., 2002) or ID premiums relative to domestic firms (Defusco et al., 1988; Morck and Yeung, 1991; Garrod and Rees, 1998). Thus, it could be interesting to re-examine on an industry specific basis the samples used in these past studies to see if their results would also vary by industry. Overall, all hypotheses developed in this study found statistical support.

In examining the results of specific industries, the study found that the knowledge based industries of Business Services, Health Services, Radio/TV Broadcasting and Investment Firms/Trusts have ID premiums. Therefore, it does appear that in high value, knowledge based industries, where the product has some level of standardization, that firms in these industries will likely have an ID

premium.

These findings are in line with the research of Brock et al. (2006), who found a positive ID-firm performance relationship in their study of firms in the knowledge based legal industry. Also, our results have both similarities and differences with the findings of Capar and Kotabe (2003), who found a U-shaped ID-firm performance relationship in their study of service firms. Thus, while we largely found ID premiums in the industries tested in the Capar and Kotabe (2003) study, their results indicated that, at low levels of ID, the ID-performance relationship was initially negative and did not turn positive until an 18% FSTS threshold was reached.

Industries with non-standardized products or services and/or required high capital expenditures would likely have an ID discount, and this was found to be the case in Air Transportation, Insurance, Wholesale Trade, and Shipping. Trucking was found to be the exception, as the Trucking industry had a premium of +4.8%.

For the insurance industry, our results are similar to the findings of Katrishen and Scordis (1998), who found that insurance firms with a low degree of ID have a premium. However, their results also found that insurers with the highest levels of ID suffered from diseconomies of scale and had a discount. This compares favorably to our results, where insurers at the 1% FSTS level had a premium of +14.8% (likely from following home clients overseas), however, at the 5% and 10% FSTS levels they had discounts of -38.5% and -36.6 % respectively.

The Wholesale Trade–Durable industry's premium could be the result of the low cost of manufacturing in developing countries, particularly in Asian countries. Wholesale Trade firms that sell purely domestically in the U.S. may not have developed the level of relationships with Asian suppliers as have international firms with more experience in dealing with foreign countries and markets. Therefore, the purchasing costs of domestic firms may be higher, thus reducing their profits and firm value relative to international firms. To investigate this issue further, researchers would have to explore potential differences in supplier relationships between international and domestic firms within the Wholesale Trade industry.

Surprising results were found in our testing of the pharmaceutical industry. It could be argued that the pharmaceutical industry should have an ID premium; however, the results of the study showed it actually has an ID discount of -2.3%. This may be an anomaly due to the way pharmaceutical firms price their products. A premium was expected for this industry due to the combination of pharmaceutical firms spending highly on R&D to develop new drugs, and the variable costs of production and distribution being low once the product has been developed. Thus, gross margins are very high once a product is developed and any increase in sales yields high margins and profits.

However, there is a pricing anomaly that affects the firms in the study since they are U.S. based. While the U.S. allows drug prices to be market based, many other countries do not. This leads to higher drug prices in the U.S. than in other countries (Wagner and McCarthy, 2004) and could explain why this industry showed an ID discount (when measured by Tobin's *q*). It could also explain why firms in the pharmaceutical industry have an ID premium when using ROA and ROE as alternate measures of firm performance. Since expanding internationally increases profit with very little additional investment, this could lead to the positive effects on both ROA and ROE that were seen in the study results.

This study hypothesized that the success of ID depends on firm specific advantages gained from tacit knowledge and marketing capability. We did find a positive and significant correlation between firm performance and tacit knowledge and marketing capability. The finding that this correlation was greater for international firms than for domestic firms indicates the greater effect these factors have on firms that have internationally diversified. Thus, firms that have capabilities in these areas are likely to have improved performance when internationally diversifying. This highlights the importance of investments in tacit knowledge and marketing capability when a firm is considering ID.

We explored the relationship between the two factors and individual industry ID premiums/discounts, finding that tacit knowledge and marketing capability have a greater effect in firms that are in industries that have an ID premium than those industries that have an ID discount. This again sug-

gests that tacit knowledge and marketing capability are important intangible assets to firms that are considering international expansion, and they could be key drivers of the higher performance levels of firms in industries with premiums.

In summary, our results had both consistencies and inconsistencies from prior research. Our findings tended to confirm past studies that had examined ID by using a sample of only one industry, or a group of similar industries. Conversely, studies that used a sample covering a wide range of industries tended to find disparate results (either ID premiums or discounts). Therefore, our findings did not agree with the results of the studies conducted on an aggregate basis.

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NOTES

1) Patent Investment is a new proxy which utilizes data from the NBER.
2) Regression analyses confirm that firm specific capability such as tacit knowledge (proxied by R&D intensity and Patent investments) and marketing capability (proxied by advertising intensity) are valuable for the average firm. Results are presented in Appendix 1.
3) Regressions for domestic and international firms were run separately, without the interaction of firm specific knowledge and internationalization dummy, and find similar results. Results are presented in Appendix 2.
4) Since we did not have enough observations with patents as an alternative proxy for tacit knowledge, the data for SIC-level analysis were not sufficient for many industries and, therefore, we had to drop this variable from the regression analysis.
5) Appendix 3 shows that, compared with firms in industries that have an ID discount, the impact of tacit knowledge and marketing capability is greater for firms in industries that have ID premium.

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Appendix 1: Tacit Knowledge and Marketing Capability and Tobin's *q*

	Dependent Variable: Ln(Tobin's *q*)	
R&D Intensity	0.372***	0.348***
	(18.179)	(9.186)
Advertising Intensity	2.228***	2.310***
	(8.510)	(3.820)
Patent Investment		0.003***
		(2.613)
Assets	-0.025***	-0.037***
	(-8.574)	(-4.288)
ROA	0.994***	0.975***
	(20.667)	(7.908)
Leverage	-0.114***	-0.220**
	(-3.912)	(-2.464)
Intercept	0.341***	0.657***
	(17.007)	(10.500)
Industry Fixed Effects Included	Yes	Yes
NOBS	14357	2023
Adj. R-Squared	0.2909	0.2403

Note: Results from pooled cross sectional regressions. t-statistics are based on the Huber-White-sandwich estimator to correct for serial correlations and is reported in parentheses below each coefficient estimate.

* p< .10; ** p< .05, ***p < .01

Appendix 2: The Impact of Tacit Knowledge and Marketing Capability on Firm Performance (Tobin's *q*) in International Firms versus Domestic Firms

	Dependent Variable: Ln(Tobin's *q*)			
	Intl. Firms	Dom. Firms	Intl. Firms	Dom. Firms
R&D Intensity	0.432***	0.334***	0.551***	0.138***
	(11.628)	(12.662)	(7.020)	(2.850)
Advertising Intensity	2.398***	1.759***	4.095***	-1.257
	(6.773)	(4.592)	(6.289)	(-1.224)
Patent Investment			0.004***	-0.004
			(3.096)	(-1.329)
Assets	-0.019***	-0.039***	-0.041***	-0.010
	(-4.443)	(-8.560)	(-4.404)	(-0.349)
ROA	1.080***	0.913***	1.369***	0.260
	(15.977)	(13.556)	(8.221)	(1.330)
leverage	-0.180***	-0.050	-0.334***	0.064
	(-3.800)	(-1.333)	(-3.370)	(0.358)
Intercept	0.396***	0.348***	0.645***	0.630***
	(13.061)	(11.595)	(9.208)	(3.494)
Industry Fixed Effects Included	Yes	Yes	Yes	Yes
NOBS	6339	8018	1653	370
Adj. R-Sqd.	0.2797	0.2950	0.2849	0.2849
F-Test (Diff. in R&D Impact)	0.098*** (p<0.000)		0.413*** (p<0.000)	
F-Test (Diff. in Ad. Impact)	0.639* (p=0.092)		5.352*** (p<0.000)	

Note: Results from pooled cross sectional regressions. t-statistics are based on the Huber-White-sandwich estimator to correct for serial correlations and is reported in parentheses below each coefficient estimate.
* p< .10; ** p < .05; ***p < .01

Appendix 3: Comparison of the Impact of Tacit Knowledge and Marketing Capability on Firm Performance (Tobin's *q*) in International Firms Based on Industry Level Premium and Discount

	Dependent Variable: Ln(Tobin's *q*)			
	ID Premium	ID Discount	ID Premium	ID Discount
R&D Intensity	0.437***	0.263***	1.048**	0.316***
	(5.780)	(5.828)	(2.427)	(4.254)
Advertising Intensity	2.987***	1.650*	5.776***	2.592
	(5.422)	(1.818)	(5.268)	(1.544)
Patent Investment			0.005**	-0.001
			(2.487)	(-0.615)
Assets	-0.011	-0.029***	-0.025	-0.030**
	(-1.514)	(-4.012)	(-1.308)	(-1.973)
ROA	1.114***	1.136***	1.536***	1.184***
	(11.027)	(7.919)	(3.295)	(4.721)
leverage	-0.135*	-0.147*	-0.191	-0.403***
	(-1.679)	(-1.760)	(-0.863)	(-2.796)
Intercept	0.363***	0.424***	0.405**	0.686***
	(6.987)	(7.966)	(2.207)	(6.053)
Industry Fixed Effects Included	Yes	Yes	Yes	Yes
NOBS	2387	1762	394	502
Adj. R-Sqd.	0.2018	0.4929	0.3339	0.4080
F-Test (Diff. in R&D Impact)	0.174*** (p<0.000)		0.732*** (p<0.000)	
F-Test (Diff. in Ad. Impact)	1.337* (p=0.083)		3.184*** (p<0.000)	

Note: Results from pooled cross sectional regressions. t-statistics are based on the Huber-White-sandwich estimator to correct for serial correlations and is reported in parentheses below each coefficient estimate.
* p< .10; ** p< .05; ***p < .01

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