Both Sides of Corporate Diversification:

The value impacts of geographic and industrial diversification

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April 2000

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We would like to thank Sudipta Basu, Catherine Chiang, Charles Hadlock, Ludger Hentschel, Bruce Kogut, Antonio Mello, Peter Pope, Eric Press, Dennis Sheehan, René Stulz, Charles Trzcinka, the Wharton corporate finance discussion group and seminar participants at Baruch College, Frankfurt University, Korea University, Lancaster University, Melbourne University, Penn State University, SAIS Johns Hopkins University, SUNY-Buffalo, Tel Aviv University, Temple University, University of Maryland, University of Rochester, University of Wisconsin-Madison as well as participants at the 1998 Western Finance Association Meeting and 3rd Annual International Finance Conference (Georgia Tech University) for their comments.

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Abstract

This paper examines the effect of geographic and industrial diversification on firm value for a sample of over 31,000 firm-year observations of U.S. corporations from 1984 - 1997. Consistent with the predictions of most theories, we find the value of a firm with international operations is 2.7% higher than a comparable single-activity domestic firm. Consistent with previous literature on the (industrial) diversification discount, we find that the value of a multiactivity firm is 6.0% lower than a comparable portfolio of single-activity domestic firms. We further demonstrate that the failure to account for geographic diversification leads to an overestimation of standard diversification discount. Possible sources of the value effects of both dimensions of diversification are also investigated.

JEL Classification: F3, G3

Keywords: Firm Value, Diversification, Geographic, Industrial

1. Introduction

Studies on the relation between firm value and corporate diversification have focused on a result that has become known as the "diversification discount". Lang and Stulz (1994) Berger and Ofek (1995), show that, on average, industrially diversified firms are more than 10 percent less valuable than comparable combinations of single activity firms. Attempts to explain this discount have focused on cross-subsidization of investment opportunities among divisions (see, e.g., Sharfstein and Stein (1997) and Rajan, Servaes, and Zingales (2000)), to agency problems arising from limited management ownership (Denis, Denis, and Sarin (1997). A more recent line of research has examined whether earlier estimates of the diversification discount overstate the value destruction of industrial diversification due to selection bias and measurement error problems (see, e.g., Campa and Kedia (1999), Chevalier (1999) and Lamont and Polk (1999)). While these attempts to overcome these problems generally reduce the diversification discount, they do not eliminate it.

One issue that this entire line of research on corporate diversification has overlooked is that in addition to diversifying across industries, managers can also diversify their firms across national boundaries (geographic diversification). As suggested by theory, geographic diversification may have important value impacts for firms, though such effects have received less attention. In contrast to evidence for the industrial diversification discount, there is no generally accepted estimate of the value implications of geographic diversification for a large cross-section of firms over an extended time period.

The failure to consider geographic diversification as a potential source of value for corporations also affects the interpretation of existing studies on the effect of industrial diversification on firm value. The failure of these studies to control for geographic diversification leaves open the possibility of a bias in existing estimates of the negative value impact of industrial diversification due to a correlated omitted variable problem. Since a substantial portion of industrially diversified firms are also geographically diversified, this potential bias needs to be controlled for in order to obtain an accurate estimate of the impact of industrial diversification on firm value.

In this paper we estimate the average value impact of geographic and industrial diversification for a large sample of U.S. firms over the period 1984 – 1997 in a framework that simultaneously controls for both forms of diversification. This approach allows us to measure the *independent* impacts of geographic and industrial diversification on firm value. We use industry and geographic segment data provided under the disclosure

requirements of Statement of Financial Accounting Standard (SFAS) No. 14 (FASB 1976) and the Securities and Exchange Commission to identify the diversification characteristics of more than 6,000 U.S. firms. The FASB requirement mandates the disclosure sales, income, and assets on a segmental basis (either industrial or geographic) if any one of these components is 10% or more of the firm's total. This approach to identifying a diversified firm is used in most previous studies on diversification. The second disclosure is part of the of income taxes disclosure required by the SEC and identifies multinational firms that report foreign income and/or related taxes as small as 5% of the firm's total. This second disclosure allows us a more sensitive measure of multinationality than previous studies using the SFAS No. 14 disclosures.

Initially, we compare value differences across diversification choices for both an excess market value of equity-to-sales ratio and an asset-to-book value of assets ratio. We find that geographic diversification is associated with significant increases in both value measures, while industrial diversification is associated with significant reductions. We find similar results on a sophisticated value measure that adjusts for industry-based influences based on a technique similar to that used by Berger and Ofek (1995). For this adjusted-value measure, the size of both the geographic and industrial diversification effects appears economically large, roughly a 7 percent increase in firm value for geographic diversification and 7 percent decrease in firm value for industrial diversification.

However, these results do not control for the problem of self-selection among the firms. If a firm's pre-diversification relative value is positively correlated with the predicted diversification effect, then not all of the subsequent value differences identified above can be attributed to diversification. Analysis of the subset of firms that diversified during our sample indicates that self-selection is a problem only for geographic diversification. Although important, we demonstrate that the self-selection problem does not account for all of the value of geographically diversified firms. To control for this sort of self-selection problem for the entire sample, as well as control for other potential firm-specific influences on the value measures, we use a multivariate regression to control for firm specific characteristics that have been shown to be related to value in other studies.

After controlling for these influences, we find the value of geographic diversification falls relative to the unconditional values mentioned above, while the value of industrial diversification remains roughly similar. The results from the multivariate regressions suggest that geographically diversified firms are still, on average, 2.7% **more** valuable than comparable single-activity domestic firms. This estimate is statistically significant and

consistent with, but slightly larger than, an estimate of the value of corporate geographic diversification implicit in an earlier study of the value of multinationality Morck and Yeung (1991) that examines U.S. firms for 1978. For the other form of diversification, our results suggest that industrially diversified firms are, on average, 6.0% **less** valuable than a comparable portfolio of single industry domestic firms. While this finding is qualitatively consistent with previous results, it is smaller in magnitude than estimates from Lang and Stulz (1994) and Berger and Ofek (1995). We show that one reason for this smaller estimate of the value loss from industrial diversification comes from controlling for geographic diversification (both in the development of the adjusted-value measure and the control variable regression).

Finally, we present evidence on the possible determinants of the value impacts of diversification. We find that the value of geographic diversification is increasing in the degree (breadth) of diversification, but that the industrial diversification effect is not related to the number of the firm's different activities. We also find results suggesting the beneficial impact of geographic diversification arise partially from a significantly stronger association between profitability and value, and capital expenditures and value for multinational firms. This result is consistent with the findings of Bodnar and Weintrop (1997) which presents evidence consistent with the market perceiving foreign operations offering greater growth opportunities to U.S. firms than domestic operations.

The rest of the paper is organized as follows. Section II reviews the theory and value implications of geographic diversification and briefly summarizes the literature on industrial diversification. Section III discusses the sample selection and data sources. Section IV considers the empirical tests of the value effects of geographic and industrial diversification using conventional market valuation measures. Section V constructs an industry-adjusted value measure that controls for possible industry and industrial composition effects and considers the value differences across groups using this measure. Section VI outlines our tests to isolate the value impact of diversification from measurement problems and self-selection problems. Section VII investigates the impact of the omitted variable bias on previous diversification and value studies. Section VIII considers possible sources of the value effects, and Section IX summarizes and concludes.

2. Theory and Literature Review

2.1 Theory Behind Value Implications of Geographic Diversification

The concept that geographic diversification enhances firm value has its roots in the literature on the sources of foreign direct investment (FDI). Firms invest abroad to exploit firm-specific assets, the markets for which are imperfect so that the assets cannot be sold for their internal value (see, e.g., Caves (1971) and Hymer (1976)). The firm internalizes the market imperfections for obtaining rents on these assets and transfers the assets abroad within an internal market. By internalizing the market imperfections, the firm is able to extract above market returns on its specific assets which, in efficient financial markets, are capitalized into a higher value of the firm. The specific source of these gains to firm value from growing geographically comes from expanding firm-specific assets and potential economies of scale for the use of these assets. Economies of scale of specific assets such as marketing and research and development suggest that their value to the firm increase with the size of the firm's activities that use these specific assets.

Value creation from geographic diversity can also be created through the operational flexibility associated with a multinational corporate system (Kogut (1983)). In light of the increasing uncertainty of the international environment, a geographically diversified network gives the firm the opportunity to *exploit* market conditions. For example, a multinational production network allows shifting of production in response to any large-scale changes in relative prices that can occur internationally. This cost structure flexibility helps reduce the average marginal cost of worldwide production relative to that of purely domestic production and results in higher profit margins or greater market share. A similar argument holds for average output prices across foreign markets when demand shocks are not perfectly correlated. Conditional on the costs of creating and maintaining a corporate network that is diversified across geographic-based uncertainties and the variability of the relative prices, such a network can add additional value to the firm because of ability to exploit a larger variety of market conditions.

On top of these issues, a geographically diversified firm can be more valuable because of its ability to arbitrage institutional restrictions such as tax codes and financial restrictions (both formal and informal see, e.g., Errunza and Senbet (1981,84)). Having operations in multiple geographic locations, the multinational firm creates an additional string of options which it can exercise upon occurrence of particular outcomes, such as the location to

declare profits, the appropriate market to concentrate market power, and the low-cost location to raise capital.[1] For example, differences in taxation across countries give rise to the possibility for the firm to transfer some profits and/or losses within the firm to locations where they are tax advantaged, thus reducing the firm's total tax liability (see, e.g., Hines and Rice (1990)). These enhanced capabilities to make value-maximizing conditional decisions increase the expected cash flows from geographically diversified firms relative to domestic firms.

Finally, value from corporate geographic diversification can come from investor preferences. To an investor, multinational firms represent a geographically diversified portfolio—a claim on a collection of profit streams from various areas of the world. To the extent that investors value global diversification (beyond domestic diversification) and direct geographic diversification by investors is expensive, investors should be willing to pay a premium for shares of geographically diversified firms for providing them this service. This premium will increase the value of the geographically diversified firms relative to that of domestic firms.

Thus there are a variety of ways that geographic diversification can enhance the value of a firm. To the extent the characteristics noted above and flexibility options are available uniquely to geographically diversified firms and cannot be otherwise acquired by investors, the value of the geographically diversified firms should be increased to reflect these benefits. This suggests that geographically diversified firms should be more valuable than domestic firms. Moreover, the incremental value of the geographically diversified firm should be increasing with the ownership of these characteristics and flexibility options, the dispersion of its functional operations across different regulatory and consumer markets as well as the volatility of the environment in which it operates (see Kogut and Kulatilaka (1994)).

In contrast to the above arguments, corporate geographic diversification could also reduce firm value. While shareholders seek value maximization as a goal of corporate decisions, managers' objectives may differ. In particular, managers seek to act in their own self-interest, which at times may be at the expense of shareholders' interests. A large literature has developed discussing the negative value implications of shareholders' difficulties in monitoring the activities of managers.[2] These problems increase as the organization becomes more complex. Multinational firms, due to their operations in different locations, are arguably more complex than domestic

[1] The assumption of a value advantage in raising capital implicitly assumes that capital markets are not perfectly integrated (i.e., that the location of a security issue impacts its price).

organizations. Moreover, a common solution to this incentive problem is to give managers equity stakes in their firms. This makes managers concerned about firms' specific risk in addition to systematic risk. As a result managers may favor geographic diversification because it reduces the firm-specific risks they face, even if it results in lower shareholder value. Thus despite the benefits from above, it is possible that extensive geographic diversification may result in a negative impact on firm value.

2.2. Empirical Evidence on Value of Geographic Diversification

Early empirical work on the effects of geographic diversification on the firm generally focused on financial performance rather than value. They also report on relatively small samples. The results of these studies on performance are mixed. For example, Mikhail and Shawky (1979) found multinational firms earn excess returns using Jensen's risk-adjustment measure. However, Brewer (1981) reports no difference between multinationals and purely domestic firms in terms of risk-adjusted performance while Fatemi (1984) reports no difference in the rates of return to investors for multinational versus domestic firms, except in some sub-samples when the multinational firms under-perform domestic firms. Michel and Shaked (1986) find that multinational firms have inferior risk-adjusted performance when compared to domestic firms.

Errunza and Senbet (1981, 1984) are the earliest studies to point out that with efficient capital markets, all benefits of geographic diversification will be capitalized into the current market value of the firm. Errunza and Senbet (1981) demonstrate that across a small sample of multinational firms from 1968 – 1977 excess value increases with the extent of international activity.[3] Errunza and Senbet (1984) re-examine the question on a larger set of multinational firms from 1971-1978, this time controlling for the effect of firm size and using different measures of international activity. They continue to find a positive association between the excess value measure for two of their three proxies for international involvement. Kim and Lyn (1986) extend these findings by controlling for advertising expenditures, R&D expenditures, prior sales growth, and industry concentration. Like the Errunza and Senbet findings, their results suggest that among multinational firms value is increasing with the degree of international involvement. However, because these studies examine only multinational firms they are

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[2] See, e.g., Jensen and Meckling (1976).

[3] They also show the relation between excess market value and international involvement was stronger for a subsample characterized by barriers to capital flows compared to the more liberal financial rules of the later part of the sample, suggesting that multinationals are valuable when they provide below market cost diversification services.

unable to provide an estimate of the average value benefit of geographically diversified firms relative to domestic firms.

Morck and Yeung (1991) examine the value impact of various measures of geographic diversification for 1,644 U.S. domestic and multinational firms for the year 1978. They show that geographic diversification is positively related to Tobin's q (defined as the market value of the firm over the book value of its tangible assets). Their results suggest that even upon controlling for other sources of intangible assets such as R&D and advertising expenditures, q is positively correlated with the number of foreign subsidiaries or countries in which the firm operates.

More recent research using Tobin's q finds remarkably different results. Christophe (1997) examines the value implications of foreign operations from a sample of more than 1,800 U.S. firms for the period from 1978 – 1986. He finds that foreign operations are associated with decreased firm value, with the effect being effect larger during years when the dollar was strongest. In these years, the average value decrease due to foreign operations was 6 percent. Click and Harrison (1999), also examine the value of foreign operations for US firms using data from 1984 - 97. They report that capital markets penalze corporate multinatioanlity by putting a lower value on the equity of mulktinational firms. They report multinationality results in a decrease in firm value that ranges between 8 – 17% of the value of a purely domestic firm. Together these two papers cast some doubt on the results of the earlier studies that geographic diversification enhances the value of a firm.

It is important to point out that a potential problem with the previous three studies is that they use Tobin's q as a dependent variable. Accurate measures of q for multinational firms are complicated by two factors. The first is the method used for translating foreign currency assets into U.S. dollars. Use of the two different methods of accounting for foreign currency assets (the temporal method and the current rate method) can result in different reported dollar values for the same foreign assets. In particular, use of the more common current rate method makes the dollar value of foreign assets a function of the level of the current exchange rate. The second factor is that even if the firms used the temporal method for the translation of all foreign assets, the replacement cost of the foreign assets cannot be accurately estimated unless purchasing power parity is assumed to hold or foreign inflation is explicitly taken into account. Since it is well known that purchasing power parity does not hold, and these studies do not explicitly account for foreign inflation in generating the replacement cost of foreign assets, it is very likely

that the Tobin's q are mismeasured for firms that are highly multinational (have a large percentage of foreign assets).

On final related line of research considers the stock-price reaction around foreign acquisitions and the valuation of foreign income. Event studies of foreign acquisitions (e.g., Fatemi (1984), Doukas and Travlos (1988), Morck and Yeung (1992), Markides and Ittner (1994), and Desai, Doukas, and Fatemi (1996)) generally find small positive abnormal returns around the date of an international expansion, effect is often conditional and small (less than 50 basis points) when compared to other corporate events. For example, Doukas and Travlos (1988) find a significant effect only for a sub sample of 99 firms the diversify into a new geographic regions. While these studies suggest some value benefit to foreign operations, they do not address the full capitalized value impact of the firms foreign operations.

2.3. Theory and Evidence on Value Implications of Industrial Diversification

As mentioned in the introduction, the impact of industrial diversification on firms has been more thoroughly examined than that of geographic diversification. Industrial diversification's impact of firm value has been extensively addressed in the finance literature both theoretically (see, e.g., Weston (1970), Meyerson (1982), Stulz (1990), and Meyer, Milgrom, & Roberts (1992)) and empirically (see, e.g., Copeland and Weston (1979), Eckbo (1985), Morck, Schleifer, and Vishney (1990), Kaplan & Weisbach (1992), Aggrawal, Jaffe, & Mandelker (1992), Wernerfelt & Montgomery (1988)). The preponderance of recent evidence finds a significant negative cost to industrial diversification. Lang and Stulz (1994) demonstrate a negative relation between Tobin's q and industrial diversification on a large sample of firms from 1978 - 1990. They provide a comparison of the average q across industrially diversified and specialized firms and estimate the mean Tobin's q of the specialized firms is nearly 40% higher than the sample average. Similar results occur when they adjust their measures for industrial composition. Berger and Ofek (1995) present another measurement of the overall value impact of industrial diversification. Using a large sample of firms from 1986 - 1991, they compare the market value of industrial diversified firms to a theoretical value measured as the sum of the imputed value of each industrial segment. The imputed value is determined from multipliers drawn from single activity firms in that industrial segment. They find that upon controlling for other sources of value, industrial diversification reduces firm value by 13% - 15%. They also

demonstrate that this loss in value is related to problems of over-investment in industries with low growth opportunities and cross-subsidization of loss generating activities.

It is important to note that none of these papers on industrial diversification considers geographic diversification in their analysis.[4] In particular, neither Lang and Stulz (1994) nor Berger and Ofek (1995) control for the effect of geographic diversification on firm value when they estimate the value discounts to industrial diversification. Given the evidence from the geographic diversification literature that suggests a positive value impact of geographic diversification, the failure to control for geographic diversification represents an omitted variable problem. This omitted variable problem can result in bias in the estimated value impact of industrial diversification if these two phenomena are related.[5] In order to generate an unbiased estimate of the impact of industrial diversification on firm value one must consider both forms of diversification simultaneously. Such an approach is also necessary to obtain an unbiased estimate of the value impact of geographic diversification.[6] The remainder of the paper develops a framework to produce bias free estimates of both forms of diversification on firm value.

3. Sample Selection and Data Sources

Our sample selection procedure begins by identifying all firms on COMPUSTAT's Annual Industrial and Full-Coverage files incorporated in the United States and covered by COMPUSTAT's Business Information (CBI) file over the period 1984- 1997.[7] Initially, we identify a firm's geographic and industrial diversification status from the CBI Geographic Segment and Industrial Segment databases. The segmental data are generated as part of the disclosure requirements mandated under the Statement of Financial Accounting Standards No. 14 (Financial

[4] A few papers consider the two forms of diversification simultaneously. However, all of them look at performance rather than value and do so for small samples. Miller and Pras (1980) look at 246 U.S. multinationals (MNCs) over 3 years in the 1960's and find that profit stability depends on geographic diversification but not on industrial diversification. Buhner (1987) looks at 40 German MNCs from 1966- 81 and finds performance positively related to geographic diversification but negatively related to industrial diversification. Kim, Hwang, and Burgers (1989) look at 62 U.S. MNCs and find that geographic diversification moderates the negative relation between industrial diversification and performance. Finally, Sambharya (1995), using 53 MNCs from 1985 finds an inverse relation between geographic and industrial diversification, and that individually neither is related to financial performance but when combined they lead to a substantial increase in firm performance.

[5] In addition to the obvious fact that some firms are simultaneously diversified in both dimensions, previous research has shown that similar characteristics are correlated with both geographic and industrial diversification (see, Wolf (1977)).

[6] A parallel complaint can be made about the geographic diversification papers mentioned in the previous section in that none of them fully controls for industry effect and the impacts of industrial diversification. Thus, existing measures of the impact of geographic diversification are biased as they suffer from an omitted variable problem.

Accounting Standards Board 1976). This statement requires firms to report data about material segments of their business, such as operations in different four-digit standard industrial classification (SIC) code industries, operations in foreign locations, export sales, and major customer sales, for fiscal years ending after December 15, 1977.

We use the COMPUSTAT Geographic Segment (CGS) database to identify firms as being geographically diversified. If a firm has more than 10 percent of its consolidated sales, income, or assets, from operations outside of the U.S., SFAS No. 14 requires that it report data on unaffiliated sales, income, and identifiable assets for non-domestic operations. For our purposes, firms that report any revenue, income, or asset data for a non U.S. segment are treated as being geographically diversified (multinational) for that year. Firms that report no non U.S. segment information are treated as being domestic firms, despite the possibility that they may have up to 10% of their sales, income, or assets abroad.[8] We use a dummy indicator for geographic diversification because it is difficult to determine the extent of geographic diversification from the COMPUSTAT reporting.[9] COMPUSTAT classifies the actual geographic segments disclosed by the firms into one of seven predefined geographic regions (i.e., Europe, Asia, Africa, Pacific, South America, Middle East, North America, or Other Foreign) and aggregates them (if necessary) to fit its own database structure.[10] The database also indicates the presence of operations in certain specific countries (12 major locations of US investment abroad) as reported in the annual report. These are counted along with the total number of geographic regions and provide a limited measure of the degree of the firm's geographic diversification.

To further determine whether a firm is geographically diversified, we utilize the reporting requirements of SEC Regulation §210.4-08(h), General Notes to Financial Statements-Income Tax Expense. This regulation requires firms to make separate disclosures of pre-tax income and current and deferred taxes for U.S. and non-U.S. operations. The disclosure is mandated if any of the three measures (pre-tax income, current and deferred taxes) for

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[7] We require data on earnings, sales, assets, share price, number of shares outstanding at the end of the year, book value of common equity, total liabilities, and assets. Incorporation in the U.S. is determined by a zero value for the FINC variable.

[8] We consider the possible impact of this classification error given the reporting requirements of SFAS No. 14 in a later test.

[9] Note that we are only interested in determining the mean value impact of diversification. Clearly, there will be variation around these means within each group. Such variation in the value effects around the mean is left for future work. For current work examining the source of the variation of these value effects around the mean, see Boston Consulting Group (1997) for industrial diversification and Allen and Pantzalis (1996) for geographic diversification.

[10] COMPUSTAT arbitrarily restricts the number of foreign segments that it reports to four plus a sum of the total foreign information. Thus, there may be an aggregation of segment of data on the tape beyond that observed in the firms reporting under FASB No. 14. In addition, COMPUSTAT only provides codes for 10 foreign countries with heavy U.S. foreign investment. Consequently, this count of the combination of regions and country codes as a measure of the extent of geographic diversification should be interpreted with some caution.

non-U.S. operations exceed 5% of the consolidated total. Thus, this measure allows us to identify firms with smaller foreign operations than the SFAS No. 14 disclosure.[11]

We only use the COMPUSTAT Industrial Segment (CIS) database to identify a firm as being industrially diversified. Firms are required to report data for any activity segment making up more than 10 percent of the firm's consolidated revenues, operating income, or identifiable assets. The basis of segmentation is left to the discretion of the firm, but is generally differentiated at the 4-digit SIC code level. We identify any firm reporting information in more than one industrial segment on the CIS tape as being industrially diversified (multiactivity) for that year. We total the number of four-digit SIC code industries the firm reports as a measure of the intensity of the firm's industrial diversification but use a zero-one dummy variable as an indicator of industrial diversification and use their total as a measure of the degree of diversification. .[12]

To prevent potential distortions from small firms, we delete all firm-year observations with total sales less than $30 million. This leaves us with a sample of 6,693 firms and 45,930 firm-year observations over the period 1984 - 1997. Segmenting the observations by both forms of diversification results in four separate groups: single activity domestic firms, single activity multinational firms, multiactivity domestic firms, and multiactivity multinational firms. Descriptive statistics for these four groups are displayed in Table 1. The first group contains 4,386[13] single-activity domestic firms generating 19,295 firm-year observations (42% of the sample). This group acts as the benchmark to calibrate the value impacts of the two types of diversification. These firms are the smallest in the sample measured on assets, sales, or capital. The mean (median) total assets of this group are $859 ($125) million. The second group consists of 2,677 single-activity multinational firms generating 13,045 firm-year observations (28.4% of the sample). These firms report activities in a mean (median) of 2.50 (2) different foreign locations.[14] As a group, they are larger than the single-activity domestic firms along all size dimensions, with mean (median) total assets of $939 ($186) million. The third group consists of 1311 multiactivity domestic firms generating 5,791 firm-year observations (12.6% of the sample). These firms report activities in a mean (median) of

[11] For a complete discussion of the regulation, we refer the reader to Bodnar and Weintrop (1997) pp. 74-75.

[12] Because of the greater number of reporting possibilities on the CIS tape for industrial segments as compared to the geographic segments, these measures of the intensity of industrial and geographic diversification are not necessarily comparable. To the best of our knowledge, there is no analogous SEC requirement for firms to identify industrial segments that are 5% of net income.

[13] Note that the sum of these firm numbers exceed the total number of firms in our sample as these figures double count firms that move between classifications over time.

2.73 (2) different 4-digit SIC code industries. They tend to be more than twice as large as the benchmark firms in all dimensions with mean (median) total assets of $1,354 ($204) million. The fourth group consists of 1343multiactivity multinational firms with 7,799 firm-year observations (17% of the sample). These firms report activities in a mean (median) of 3.05 (3) industrial segments and 3.04 (2) foreign locations. These firms are the largest firms in the entire sample along all dimensions, with mean (median) total assets of $3,743 ($665) million.

4. Empirical Tests of the Value of Diversification

4.1. Common Value Measures

To measure the value impacts of diversification, we begin with two standard value measures. Our first measure is an excess equity value to sales ratio measured as the market value of common equity minus the book value of common equity divided by total sales and denoted as EV.[15] Thomadakis (1977) first used this measure to study the impacts of market structure on firm value. It is also the value measure used in the studies of Errunza and Senbet (1981, 1984) and Kim and Lyn (1986) for examining the impact of diversification on the value of multinational firms. The second measure is a market-to-book ratio measured as the total market value of assets to the book value of assets for the firm and denoted as MTB. The market value of assets is defined as the sum of the market value of equity plus the book value of liabilities and preferred stock. This measure is a close proxy for Tobin's q, which is the value measure used in the studies by Morck and Yeung (1991) and Lang and Stulz (1994).[16]

In Table 2 and 3, we report summary statistics for distributions of these measures across the four groups of firms. Due to the influence of outliers on parametric measures such as means and standard deviations, we focus our comparison of these ratios using non-parametric tests. The test statistic for a test of the similarity of the medians and a Wilcoxon rank-sum test comparing the entire distribution of value measures are displayed in the box corresponding to each row and column (as the two diagonals). These statistics are Z-scores, which are distributed as

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[14] Recall that these numbers are the sum of Compustat's pre-determined regions and selected countries for which the firm reports data.

[15] All the market value measures are based upon prices as of the end of the calendar year. While this can create a distortion due to mis-timing between market values and accounting data (for those firms with non-December 31 fiscal year-ends) it insures that all firms' market values are comparably measured. Fortunately, this choice matters little as using fiscal-year end market values results in virtually identical results.

[16] This measure differs from a true measure of Tobin's q in that it uses book values for liabilities and normalizes by the book value of tangible assets. Tobin's q generally involves estimating both the market value of a firm's liabilities as well as the market value (replacement cost) of the tangible assets. Morck and Yeung (1990) report that they obtain very similar results to those reported in their study when they use a simple market-to-book ratio instead of their measure of Tobin's q.

unit normal distributions under the standard null hypothesis. For robustness, we also report, but do not discuss, the result of a 2 sample t-test comparing the means of the distributions (despite the skewness of the distributions, these tests are always consistent with the non-parametric tests).

4.2. Results

Table 2 displays the results for the EV measure of value. For single activity multinational firms, the median firm has an EV measure of 0.402, which is significantly higher than the EV measure for the median single activity domestic firm of 0.247. The Wilcoxon test statistic also indicates a significant shift in the entire distribution of EV measures for the single activity multinational firms compared to the single activity domestic firms. For multiactivity domestic firms, the median firm has an EV measure of 0.159, which is significantly lower than for the median single-activity domestic firm. Again, the Wilcoxon test statistic indicates this difference extends to the entire distributions. In both dimensions, these differences across groups are economically significant, translating to a equity value difference of approximately round 15% and 7% of total sales, respectively, based upon the median differences.

To examine the relative importance of these two diversification effects we compare the value measures of the multiactivity multinational firms (with both diversification effects) to the single activity domestic firms. The median EV measure for the multiactivity multinational firms is 0.230, which is lower than the median EV measure for the single activity domestic firms. The test statistics in the lower right-hand corner reveal that both the median and the entire distribution of EV measures are significantly lower for the multiactivity multinational firms than the single activity domestic firms.

Table 3 displays the same set of results for MTB. For single activity multinational firms, the median firm has an MTB measure of 1.976, which is significantly higher than the MTB measure for the median single activity domestic firm of 1.636. The Wilcoxon test statistic also indicates that the entire distribution of MTB measures is significantly higher for the single-activity multinational firms. For multiactivity domestic firms, the median firm has a MTB measure of only 1.403, which is significantly lower than the median for the single-activity domestic firms. The Wilcoxon test statistic confirms this result for the entire distribution. In both cases, these median differences across groups are economically significant, translating to a 21% of book assets increase in value for geographic diversification and a 14% of book assets decrease in value for industrial diversification.

When we consider the relative importance of the two diversification effects by comparing the value measures along the main diagonal, we again find that simultaneously diversified firms have similar values to single-activity domestic firms. The multiactivity multinational firms have an MTB of 1.658, which is about 1.3% of book assets higher than the median MTB for the single activity domestic firms. The test statistics in the lower right-hand corner both indicate this difference as well as the difference between the two distributions is not statistically significant.

We replicate all of the tests in Tables 2 and 3 on a year-by-year basis. Our results, not reported for the 14 sets of annual tables, show the difference between the median value measures of single activity multinationals and single activity domestic firms is consistent with Table 2 and significant at the 10 percent level for both value measures in all but two cases.[17] For industrial diversification, the difference in the median value measure is consistent with Table 2 and is statistically significant at the 10 percent level for each of the value measures in all years. Finally, in all cases, the Wilcoxon tests of differences in the distributions of value measures between the groups are consistent with Table 2 and significant at the 10 percent level.

In summary, the consistent results across both value measures indicate two distinct patterns. First, moving from the domestic column to the multinational column always results in an increase of the value measure, independent of industrial diversification. Second, moving from the single activity row to the multiactivity row always results in a decrease of the value measure, independent of geographic diversification. Test statistics reveal the differences in both the medians and the entire distributions are statistically significant when moving to the right or down in the table.

5. Adjusted-Value Measure

One limitation to the results presented in Tables 2 and 3 is that we have not controlled for possible industry effects across the different groups of firms. To control for industry problems we use an approach similar to that used by Berger and Ofek (1995). This approach creates an adjusted-value measure, whereby the market value of each firm is compared to an imputed market value of the industrial activities within that firm. To allow for

[17] The only exception is for the EV measure in 1989 and 1991 when the difference is positive but not significant.

examination of the value of geographic diversification, the imputed value for each industrial activity is based upon representative market capitalization-to-sales ratios for domestic single-activity firms (for full details on this measure see the Appendix).

5.1. Adjustment Procedure

To calculate this adjusted-value measure, we require each firm-year observation to have data on total market capitalization (defined as the sum of the market value of common equity plus the book value of preferred stock and total liabilities) and industrial segment sales data that reconciles with total sales (the sum of segment sales must be within ±1 percent of consolidated sales).[18] The imputed value of a firm's activity in a particular industry is determined from the median market value-to-sales ratio for all ***single-activity domestic*** firms in that particular industry. In obtaining the multiplier for a particular industry, we use the narrowest SIC code grouping that includes at least five single activity domestic firms in that industry. Using this algorithm, 30 percent of the industrial multiples are taken from 4-digit SIC groupings, 43 percent from 3-digit SIC groupings, and the remaining from 2-digit SIC groupings.[19]

The representative industry multiplier is applied to each firm's annual reported sales in that industry to create the imputed market value for that activity. For single industry firms, this result becomes the imputed value of the firm. For multiactivity firms, the imputed value for each industrial segment of the firm is summed to generate a total imputed value of the firm. By definition, this imputed value represents an estimate of the value of the firm if all of its activities were valued as ***stand-alone domestic*** firms. The natural log of the ratio of the firm's total market value to this imputed value, denoted VM, is our adjusted-value measure. When this ratio is greater than zero, it indicates the firm, if single activity, is more valuable than the representative domestic firm in that industry adjusted for the same level of sales. If the firm is multiactivity, a positive ratio indicates that the firm is more valuable than

[18] For data reasons, sales are the best segment information to form cross-firm comparisons. Under SFAS No. 14, segment sales are required to be fully allocated on both an industrial and geographic basis. The same is not true for segment assets, where firms often report a large common (corporate) allocation. Segment income suffers from the same problems in addition to the fact that firms can use transfer pricing to distort segment income for tax or informational purposes.

[19] An insufficient number of single activity domestic firms are available, even at the 2 digit SIC level, for industries 01 (Agriculture Production) and 21 (Tobacco Products). Consequently 1,207 firm-year observations with activities in these industries are dropped from this part of the analysis.

the portfolio of representative domestic firms in the same industries with comparable sales levels. When this ratio is less than zero, the firm is less valuable than its comparable domestic benchmark(s).[20]

This procedure is similar to the one used by Berger and Ofek (1995) to control for industry effects and composition of firm value in their tests of the value impact of industrial diversification. Because they were only interested in studying the effect of industrial diversification, they obtained their industry median multipliers from *all single-activity* firms, which included both domestic and multinational firms. Our procedure is different in that we obtain our median multipliers from ***single-activity domestic*** firms only. As such, we are able to examine value impacts of both dimensions of diversification with our imputed value measure.

Another desirable feature of this adjusted-value measure is that it controls for the influence of the exchange rate on multinational firms.[21] This is because the impact of the level of the important exchange rates for each multinational firm appear in the both numerator and denominator of the adjusted-value measure. In the numerator, the market value of the multinational firm reflects the valuation of foreign operations using the current (end-of-year) exchange rates. In the denominator, the imputed market value of the multinational firms reflects the average level of the exchange rates over the fiscal year, as this is the exchange rate used to convert foreign sales into dollar terms upon consolidation. Thus a "weak" dollar should result in both a higher actual market valuation and a correspondingly higher imputed market valuation, resulting in an elimination of any gross impacts of the level of the exchange rate on the adjusted-value measure for the multinational firms.[22]

5.2. Results

The data requirements to calculate the adjusted-value measure decrease our sample to 45,650 firm-years observations. Of these observations, 19,276 (42.2%) are for single-activity domestic firms, 12,993 (28.4%) are for

[20] For a discussion of potential benefits and drawbacks to this approach, see Berger and Ofek (1995). The important difference between their methodology and the one used here is that we use the single-activity domestic firms to draw the multipliers whereas they use all single segment firms. Approximately one-third of the single activity firms has international operations (and therefore potentially higher value).

[21] As discussed earlier, this is one important advantage of this measure over alternative approaches such as using Tobin's q. Measures of q cannot accurately reflect the replacement cost of foreign assets unless foreign inflation is explicitly taken into account or purchasing power parity is assumed to hold. As a result, measures of q for multinational firms are likely to be dependent upon the current real exchange rate levels.

[22] The effect of exchange rates on the value measure of multinational firms may not be *exactly* offsetting because of differences between the end-of-year exchange rate(s) that influence the market valuation and the average exchange rate(s) over the fiscal year that affect the imputed market value through sales. However, tests (not reported) indicate that the effect of this minor timing difference is virtually zero and has no material affects on the comparisons between domestic and multinational firms.

single-activity multinational firms, 5,792 (12.7%) are for multiactivity domestic firms, and 7,652 (16.7%) are for multiactivity multinational firms.

Table 4 displays the summary statistics for the distribution of adjusted-value measure for each group. We report the mean and three quartiles of these distributions. By construction, the median adjusted-value measure is zero for the single activity domestic firms; however, the mean for these firms is slightly positive, 0.0218 and significant at the 1 percent level suggesting a slight positive skewness to the distribution. The single-activity multinational firms have a median adjusted-value measure of 0.0682 and a mean adjusted-value measure of 0.0988. Both of these values are significantly different from zero. The differences with respect to the single-activity domestic firms suggest that, within an industry, firms that are geographically diversified are approximately 7 percent more valuable than domestic firms. We find a similar increase in value related to geographic diversification for industrially diversified firms. The median multiactivity multinational firm has an adjusted-value measure that is 0.085 [0.016-(-0.069)] larger than that of the median multiactivity domestic firm. The difference in mean adjusted-value measures is 0.037 [-0.030 - (-0.067)] and both differences are statistically significant. These numbers suggest that multiactivity multinational firms are around 4 to 8 percent more valuable than multiactivity domestic firms.[23]

Multiactivity domestic firms report a median adjusted-value measure of -0.069 and a mean adjusted-value measure of -0.067. Both of these values are significantly different from the comparable values for single activity domestic firms. These findings suggest that combining different activities within a domestic firm results in a loss of value of around 6 to 7 percent. This estimate of the diversification discount is corroborated by a similar difference in adjusted-value measures between single-activity multinationals and multiactivity multinationals. For these firms the difference in median (mean) adjusted-value measures is -0.052 [0.068 - 0.016] (0.0567 [0.0998 - 0.0309]). These figures suggest a slightly smaller value impact of industrial diversification among multinational firms of about 5 - 6 percent.[24] Overall, these results on industrial diversification are consistent with, although smaller than, the findings of Berger and Ofek (1995) using a similar measure (without controlling for geographic diversification).

[23] It is not surprising that this value is slightly larger than the single activity multinationals as the multiactivity multinationals are slightly more geographically diversified, with an average of 4.09 geographic segments compared to 3.49.

[24] The smaller size of this estimate is predictable given the fact that industrially diversified multinationals are more geographically diversified than single activity multinationals.

Two comparisons of the relative size of the diversification effects can be seen in Table 4. First, we compare the single activity domestic firms with the multiactivity multinational firms along the main diagonal. For the firms that diversify in both dimensions, the value impacts of the two forms of diversification offset one another. There is no statistical difference between the distribution of adjusted-value measures for these two groups. This result is also supported by tests on the off diagonal. These tests fail to reject that the value associated with each form of diversification is equal and opposite in magnitude (except for the test on the means).

These results with the adjusted-value measures reveal the same basic pattern found in Table 2. Moving to the right in the table is associated with increases in the adjusted-value measures while moving down is associated with decreases in adjusted-value measures. Except for the diagonals, all difference tests are statistically significant. With this adjusted-value measure, we show that the value effects of industrial and geographic diversification are not likely to be the result of industry effects or industry composition of diversified firms. Consistent with previous studies, industrially diversified firms have significantly lower market value when compared to their single activity domestic counterparts. Furthermore, these results suggest the size of the geographical diversification effect is economically significant and comparable in magnitude to the value effect of industrial diversification.

6. Isolating the Diversification Effects

The value results presented above are consistent with the findings of event studies on the stock price reaction to changes in corporate diversification. These studies tend to show that announcements of foreign investments/acquisitions or domestic divestments are associated with positive stock price reactions. However, in attempting to measure the average value effect of firms' entire diversification investments, one problem that can cloud a measure of the cumulative impact of diversification on value is firm self-selection. Simply stated, if the initial values of firms that diversify are systematically different from the remaining single activity domestic firms, then the value effects documented earlier need not represent the true impacts of diversification. For example, if firms that diversify industrially were initially low value firms or if firms that diversify geographically were initially high value firms then our previous results would overstate the value impact of diversification.[25]

6.1. Investigating the Self-Selection Problem

[25] Of course if firms that diversified industrially were initially high value firms while firms that diversified geographically were initially low value firms, the results in Table 3 would be understating the size of diversification's impact on value.

Studies that have examined the value implications of industrial diversification have tended to find that self-selection is not a significant problem with respect to industrial diversification (see Lang and Stulz (1994)). Simply, the evidence does not suggest that firms that diversify industrially are initially undervalued or low-value firms. Tests on our sample looking at firms that switch from single activity to multiactivity confirm this result. We find no evidence that firms that diversify industrially are initially low-value.

To evaluate the importance of the self-selection problem for our measurement of the geographic diversification effect, we examine the adjusted value measures for firms that switched from domestic to multinational during the sample period. To do this we re-estimate our value multipliers from subgroup of single-activity firms that operate only in the U.S. for their entire life in the sample. For these 15,737 firm year observations, the median adjusted-value measure is by construction zero.[26] We then calculate the adjusted value measures for those firms that switched from being single activity domestic to single activity multinational during the sample period. During the time before they became multinational, the median adjusted-value measure of these 3,539 firm-year observations is 0.080. The fact that this value is significantly larger than zero highlights the existence of a significant self-selection problem for geographic diversification.[27] Firms that became multinational during the sample were initially more valuable than the other domestic firms. This suggests that the estimates of the value of geographic diversification in Table 4 are overstated.

We can extend this investigation to determine whether there is any evidence that geographic diversification added additional value to these already more valuable firms. When we looked at the adjusted-value measures of these same firms after they became multinational, the 9,286 firm year observations have a median of 0.143. This median is significantly larger than the median from the pre-geographic diversification period at the 1 percent level, suggesting that despite their high initial level of value, the market attributes more value to these firms following the geographic diversification. In addition to being consistent with the event studies on international investments (see, e.g., Doukas and Travlos (1988), Morck and Yeung (1992), Markidies and Ittner (1994))[28], this result leaves open

[26] We disregard multiactivity firms, as we would have to control for the degree of multiactivity. Note also that because the base-line group has changed, the adjusted-value measures for this test are not directly comparable to those reported in Table 4.

[27] Note that these median and mean adjusted-value measures are not directly comparable to those reported in Table 4 as they are based upon a different base-line set of firms.

[28] Tests of this difference indicate that it is weakly significant.

the possibility that part of the value increase is the result of geographic diversification.

6.2. Controlling for the Self-Selection Problem

To control for the self-selection problem as well as other firm-specific value effects, we develop a multivariate regression that allows us to separate the value due to each firm's unique characteristics from the average remaining value effect due to their diversification position. We use a series of value-control variables from previous research on both industrial and geographic diversification. From the geographic diversification literature, Morck and Yeung (1991) provide a theoretical justification for controlling for R&D and advertising expenditures as proxies for firm specific assets that may lead to economic rents. They also control for leverage as a proxy for any financing benefits of being multinational. From the industrial diversification literature, Berger and Ofek (1995) demonstrate the importance of controlling for measures of profitability, growth opportunities, and firm size as factors that could affect excess value and whose magnitudes are not fully determined by the form of diversification.

Since the dependent variable, the adjusted-value measure from the previous section, VM, is a relative measure, we also measure the corporate control variables in relative terms. Thus, our corporate control variables are measured relative to the value for each firm's multiplier firm or weighted-average multiplier firms that form the basis of the adjusted-value measure. Finally, as value may be time dependent, we include time dummies for each year to control for market-wide value effects.

Thus our multivariate regression is:

$$VM = \alpha_0 + \sum_{i=1988}^{1993} \gamma_i TD_i + \alpha_1 GEOG + \alpha_2 INDUST + \alpha_3 Size + \alpha_4 Leverage + \alpha_5 EBIT/Sales + \alpha_6 Capex/Sales + \alpha_7 R\&D/Sales + \alpha_8 Adv/Sales + \varepsilon_t$$

where:

VM	is the adjusted-value measure derived in the previous section;
TD	is a time-based dummy equal to one for year i and zero otherwise (omitted for 1987);
GEOG	is a indicator dummy set equal to one if the firm is geographically diversified and zero otherwise;
INDUST	is an indicator dummy equal to one if the firm is industrially diversified and zero otherwise;
Size	is the log ratio of the firm's total sales to that of its multiplier firm(s);
Leverage	is the difference between the firm's debt/market value of asset ratio and that of its multiplier firm(s);
EBIT/Sales	is the difference between the ratio of the firm's earnings before interest and taxes to its total sales and that of its multiplier firm(s);
Capex/Sales	is the difference between the firm's capital expenditures to sales ratio and that of its multiplier firm(s);
R&D/Sales	is the difference between the firm's R&D expenditures to sales ratio and that of its multiplier firm(s);

Adv/Sales is the difference between the firm's advertising expenditures to sales ratio and that of its multiplier firm(s).

Estimates from the multivariate panel regression and the associated White (1980) adjusted standard errors are displayed in Panel A of Table 5 (the time dummies results are not reported). Due to the more stringent data requirements for the control variables, the multivariate regression is reduced to 31,648 firm-year observations. The results of the multivariate tests are consistent with our preliminary conclusions drawn from Table 4 and the impact of self-selection discussed above.

Controlling for the self-selection problem and other firm-specific sources of value changes our estimates of the value impacts of diversification. The conditional estimate of the industrial diversification effect is –0.060, which is slightly smaller than the size of the effect reported in Table 4. The conditional estimate of the geographic diversification effect is 0.027, which is substantially smaller than the size of the effect reported in Table 4. This decrease in the estimate of the value impact of geographic diversification is consistent with the evidence of a significant self-selection problem among geographically diversified firms. Both of these estimates are significant at the 1 percent level.

The estimates on the corporate control variables are generally consistent with intuition and results of previous studies. Positive relative profitability (EBIT/Sales), R&D intensity (R&D/Sales), and investment opportunities (Capex/Sales) are all significantly associated with greater excess value. Excess value is also positively related to relative firm size, reflecting the fact that successful firms (large sales relative to the industry) are more highly valued by the market. Advertising intensity within an industry (Adv/Sales) is only weakly associated with excess value, while relative leverage (debt/market value of assets) shows no significant relation. The explanatory power of the regression in Panel A is high given its size, with an adjusted R-squared of 24.8%.

Because of the pooled nature of the data set, there is the possibility that the standard errors may be under-stated due to positive cross-sectional correlation among the residuals, resulting in inappropriate inferences about statistical significance. To consider the impact this issue on our results, Panel B of Table 5 reports the means (and the associated standard errors of the means) for the parameter estimates of the multivariate regression estimated cross-sectionally for each of the 14 years of data. The results are similar to those of Panel A. This suggests that our pooled results are not driven by any particular year, nor is the statistical inference significantly affected by the possibility of cross sectional dependency in the residuals.

7. Importance of the Omitted Variable Problem for the Industrial Diversification Discount

The previous section demonstrates that geographic diversification is significantly related to firm value. Recognizing this and the fact that industrial diversification and geographic diversification are correlated in the sample, implies that the previous studies measuring the value impact of industrial diversification suffer from an omitted variable problem. Given that our estimate of the value impact of industrial diversification is substantially smaller than that of previous studies, it is tempting to presume that this difference is the result of our controlling for geographic diversification. However, as we discuss below, this omitted variable problem has two effects that make it impossible to predict unambiguously the direction of the bias.

To consider the importance of this omitted variable problem for the industrial diversification discount, we re-calculate adjusted-value measures from our sample without regard to firms' geographic diversification position. To do this we draw our representative value-to-sales multipliers from the set of *all* single activity firms, not just domestic single activity firms. The adjusted-value measure in computed in the same fashion. This adjusted-value measure is similar in construction to that used by Berger and Ofek (1995).

There are two important changes to the data to consider when disregarding geographic diversification considerations in a model. The first is the standard implication of omitting a positively correlated variable. In this case, the omission of the geographic diversification dummy, which is positively related to both value and industrial diversification, should make the industrial diversification dummy less negative than in our previous estimation.

The second change is an offsetting effect on the benchmark against which the multiactivity firms are being compared. In this case, ignoring geographic diversification results in the benchmark firms changing from single domestic firms to *both* single activity domestic and single activity multinational firms. Because single-activity multinational firms are, on average, more valuable than domestic single activity firms, the distribution of values for the benchmark firms is shifted upwards relative to the case when geographic diversification is accounted for. The implication of ignoring geographic diversification increases the value of the benchmark firms and this works to increase the value difference between single-activity and multiactivity firms relative to our case where geographic diversification is controlled for. Due to these possible offsetting effects from ignoring geographic diversification, the bias in the estimate of the industrial diversification discount is an empirical question.

Table 6 displays the results of the multivariate regression for the value impact of industrial diversification using the new value measure that completely ignores geographic diversification. The average value impact of industrial diversification is -0.076, which is larger than the estimate of -0.060 from Panel A of Table 5. In our sample the overstatement of the industrial diversification discount due to the failure to control for geographic diversification difference is slightly over 2% and economically significant at about 40% of the unbiased estimate. This result suggests that previous research overstates the industrial diversification discount due to the failure to control for geographic diversification.

Although we demonstrate that failure to control for geographic diversification results in a larger estimate of the industrial diversification discount, our estimate of -6.0% is smaller than the discount reported by Berger and Ofek (1995) for the same construction of an adjusted-value measure. The remaining differences are due to several specification changes made to the multivariate regression used by Berger and Ofek. First, we include additional control variables, R&D, advertising and leverage beyond the size, EBIT/Sales and CAPEX/Sales variables they used as control variables. For example, R&D expenditures, in particular, turn out to be an important variable for explaining firm value. Second, we measure the control variables relative to the baseline firm rather than in raw levels. This dramatically improves the explanatory power of most of the variables. Finally, we include year dummies to control for common swings in the market valuation of equity over time. When we eliminate these differences, we obtain (not reported) an estimate of the industrial diversification discount from our sample of 10.3% which is much closer to the -13 to -15% discount reported in their paper.

8. Investigations into the Sources of the Value Effects

Studies on industrial diversification have examined possible explanations for the industrial diversification discount. They have shown the discount is related to an over investment in activities with few growth opportunities and/or cross subsidization of loss making segments. We examine whether the relation between excess value and the firms' characteristics is different between geographically diversified firms, industrially diversified firms and non-diversified firms. We run a multivariate regression where each diversification dummy is interacted with all of the corporate control variables plus a measure of the firm's degree of diversification (number of industrial/geographic segments) from COMPUSTAT's Business Information databases.

The estimates of the coefficients on the interacted corporate variables allow us to determine how the diversification premiums are related to firm characteristics. Alternatively, the interacted variables provide a method of determining whether the relation between corporate characteristics and firm value is significantly different for firms diversified in either dimension than it is for non-diversified firms. For each corporate control variable, the relation with value for non-diversified firms is given by the coefficient on the non-interacted control variable. For diversified firms, the relation with value is given by the sum of the non-interacted coefficient plus the coefficients on the characteristic interacted with the appropriate diversification dummy. The estimates of the coefficients on the diversification intensity measures indicate whether each diversification value effect is related to the extent of the diversification. Finally, the coefficient on the non-interacted diversification indicator captures the remaining portion of the value impact that is unconditional, i.e., not related to the corporate control variables or the degree of diversification. Together the interacted regression provides some insight into the sources of the diversification value effects. The results of the interacted regression are displayed in Table 7.

The results suggest that both the geographic and industrial diversification premiums are significantly related to many of the firm specific characteristics. The value of multinational firms is significantly increasing in the extent of their diversification, evidenced by the significantly positive coefficient on the interactive degree of diversification term. This result is consistent with the findings of Errunza and Senbet (1981, 1984). The results also suggest that relative firm size and the value of multinationality are negatively related. This is possibly due to large multinational firms becoming too difficult to manage or control effectively. The value of geographically diversified firms is also positively related to relative profitability and relative capital expenditures. This result is consistent with Bodnar and Weintrop (1997), who find that changes in firm value are more sensitive to changes in foreign income than domestic income and show that is consistent with the perception of the greater growth opportunities for foreign operations than domestic operations. In contrast to the results of Morck and Yeung (1991), we do not find the value benefit of geographic diversification arising from the presence of R&D and advertising assets among these firms. In fact, we find no relation between relative R&D and value and a negative relation between relative advertising expenditures and value for geographically diversified firms. Moreover, unlike their results, we find that upon controlling for these effects the unconditional relation between geographic diversification (the non-interacted geographic diversification indicator) and the adjusted value measure is significant, at 1.9 percent. One possible

explanation for this difference is that our sample is more recent and covers 14 years, as opposed to their reliance on data from just 1978.

The variables interacted with industrial diversification tell a different story. Most interestingly is the fact that the industrial diversification discount is not related to the degree of industrial diversification. Once a firm is industrially diversified, we find no significant relation between the value discount and the extent of the diversification. All of the other relative variables interacted with the industrial diversification indicator, save relative advertising expenditures, are positively related to the adjusted value-measure. Thus the industrial diversification *discount* is smaller for diversified firms that have positive relative measures of size, profitability, capital expenditures, leverage, and R&D, but larger for firm with positive relative advertising expenditures. Upon controlling for all of these conditional influences on the industrial diversification discount, the mean discount remains significant at –6.4%, a similar magnitude as reported in Table 5

9. Summary and Conclusions

In this paper, we investigate the valuation effect of geographic diversification while simultaneously considering the negative effect of industrial diversification for a sample of approximately 31,000 U.S. firm-year observations. Using common measures of firm valuation: an excess market value of equity to sales ratio and a market-to-book ratio for total assets of the firms, we demonstrate that geographical diversification is value increasing and reconfirm that industrial diversification is value decreasing. Moreover, for both of these value measures, the effect of each form of corporate diversification is similar in magnitude, though opposite in sign. We also consider a value measure that controls for both industry effects and multinationality. We find similar results with this adjusted-value measure. Differences across classes of firms indicate the effect geographic diversification is opposite to the value effect of industrial diversification, and both are on the order of 7 percent of total firm value.

Robustness tests reveal that a self-selection problem exists for multinational firms, but not for multiactivity firms. Upon controlling for self-selection using firm-specific variables demonstrated to affect value, such as size, profitability, capital expenditures, R&D, advertising, and leverage, we find the magnitude of the geographic diversification effect falls to 2.7 percent but remains both statistically and economically significant. In contrast, the average value effect of industrial diversification is not substantially affected by the firm-specific control variable and remains at –6.0 percent. Further tests indicate that the failure to control for geographic diversification in our data

results in a larger estimate of the industrial-diversification discount of -7.6 percent. This suggests that studies on the value impact of industrial diversification that fail to account for do not take into account geographic diversification over-estimate the diversification discount.

Finally, the value impact of geographic diversification is positively related to the degree of international diversification while the value impact of industrial diversification is not related to the degree of diversification. The positive value of geographic diversification is partially related to a stronger relation between current profitability/ capital expenditures and firm value than domestic firms. This is consistent with previous research and suggests that foreign operations provide the firm greater growth opportunities.

Our conclusion is consistent with the predictions of economic theory and the indirect evidence of previous research, geographic diversification is associated with a significant increase in firm value that is not explained by other changes in corporate performance. In addition, previous studies on industrial diversification overstate the negative impact of industrial diversification on firm value due to their failure to control for the impact of geographic diversification. Thus, our results suggest that both forms of diversification are important for firm value and that studies looking at the impact of diversification on firms need to consider both forms of diversification simultaneously to more accurately gauge their impact.

Appendix

The adjusted-value measure we use is similar in nature to the one used in Berger and Ofek (1995). We compute the value measure in the following fashion:

$$\textit{Adjusted-Value Measure}_{i,t} = \ln\left(\frac{\text{Market Value of Assets}_{i,t}}{\text{Imputed Value of Assets}_{i,t}}\right) \quad \text{(A1)}$$

$$\textit{Imputed Value of Assets}_{i,t} = \sum_{k=1}^{n}\left(SS_{i,t,k}\cdot\gamma_k\right) \quad \text{(A2)}$$

where:

Market Value of Assets $_{i,t}$ = firm's total capital (market value of common equity plus book value of debt and preferred stocks) for firm i at year *t*,
Imputed Value of Assets $_{i,t}$ = sum of imputed value of assets of firm's segments as stand-alone activities,
$SS_{i,t,k}$ = sales revenue in industry segment *k* reported by firm *i* at year *t*,
γ_k = median total market capitalization -to-sales ratio for the domestic-single activity firms in industry *k*,
n = number of industrial segments reported by firm *i* at year *t,*
ln = the natural logarithm function.

Equation (A1) shows the adjusted-value measure as the natural logarithm of the ratio of the firm's actual value to its imputed value. The firm's imputed value is expressed in equation (A2) as the sum of the imputed asset value of each segment. To compute the segment imputed capital value, we multiply an industry median capital-to-sales multiplier for single-activity domestic firms by the segment sales in the same industry reported by the firm. Thus the imputed value of each segment represents the imputed capital of firm's industry segment as if it is a stand-alone single-activity domestic firm. We repeated this process for each of the firm's segments and then sum them to obtain the firm's imputed capital value.

We find the firm's adjusted-value measure by taking the natural logarithm of the ratio of actual to imputed value. The measure will have a value of less than zero if the actual value of firm is less than the imputed market capitalization of its segments based upon the median market capital-to-sales ratio of domestic-single-activity firms in each industry. This suggests that a firm is less valuable than the sum of its components on a standalone basis. Similarly, the measure will have a positive value if the actual value of the firm is more than the imputed market value. This suggests that a firm is more valuable than the sum of its components on a stand-alone basis.

Berger and Ofek (1995) obtain their median industry multipliers on a base sample of single-activity firms, which include both domestic and multinational firms. We, on the other hand, compute the industry median multipliers on a base sample of single-activity domestic firms, a subset of those used by Berger and Ofek. Single-activity multinational firms are excluded when we compute the industry median multipliers. This procedural difference is required because we examine the valuation effects of both industrial and geographic diversification. The single-activity domestic firm is not diversified along any direction. Excluding the single-activity multinational firms when computing the median multipliers helps avoiding a potential bias that would act toward increasing the significance of our test. The positive value effect of geographic diversification of the single-activity multinational firms has the potential of over-estimating the imputed value for multiple-activity domestic firms while under-estimating the imputed value for the single-activity multinational firms, if the single-activity multinationals are included to compute industry median multipliers.

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Table 1: Descriptive Statistics

Descriptive statistics are for a sample of 45,930 observations of single and multiple industrial and geographic segment firms with sales of more than $30 million and information available from COMPUSTAT Business Segment database. Segments are lines of business for which separate accounting disclosures are made in accordance with FASB No. 14 and SEC Regulation S-K. Single Industrial Segment Firms are those reporting only one segment on the COMPUSTAT Industrial Segment database, whereas multi-segment firms are those reporting two or more segments on the same database. Domestic firms are those reporting only a domestic (U.S.) geographic segment on the COMPUSTAT Geographic Segment database, whereas MNC (multinational companies) are those reporting two or more segments, including a U.S. segment, on the same database. Thus, a domestic firm reporting one industry segment is grouped in group 1, whereas a multinational firm reporting the same is grouped in group 2, and etc. Numbers on the first (second) line of each variable indicate the mean (median) statistics of the variable. Between group significance of medians is assessed using the nonparametric median test, and for means, a t-test, with the exception of the first 2 rows, which are total values. All data are from COMPUSTAT.

	Single-industry Firms		Multi-industry Firms		Test of Differences					
	Domestic	MNC	Domestic	MNC						
	(1)	(2)	(3)	(4)	(1)-(2)	(1)-(3)	(1)-(4)	(2)-(3)	(2)-(4)	(3)-(4)
Number of Firms	4,386	2,677	1,311	1343						
Total Observation	19,295	13,045	5,791	7,799						
Number of	1	1	2.731	3.05						
Industrial Segments	1	1	2	3						
Number of	1	3.50	1	4.04						
Geographic Segments	1	3	1	3						
Total Sales ($mil.)	571	939	816	2,742	12.168[a]	10.169[a]	26.939[a]	2.953[a]	-20.576[a]	22.472[a]
	121	186	204	757	26.295[a]	21.108[a]	70.757[a]	2.164[b]	50.435[a]	-39.040[a]
Total Assets ($mil.)	859	1152	1,354	3,743	3.768[a]	6.965[a]	18.090[a]	-2.514[a]	-15.829[a]	14.878[a]
	125	165	204	665	18.045[a]	19.984[a]	63.420[a]	7.553[a]	49.547[a]	-31.007[a]
Total Capital ($mil.)	1,122	1,858	1,603	5,078	7.708[a]	6.081[a]	21.372[a]	2.618[a]	-16.626[a]	18.671[a]
	189	284	263	939	23.999[a]	14.337[a]	59.312[a]	-2.104[a]	40.440[a]	-32.442[a]
Debt to Asset Ratio	0.298	0.222	0.322	0.272	-28.563[a]	2.904[a]	-9.206[a]	-11.833[a]	-17.276[a]	-5.907[a]
	0.278	0.175	0.312	0.251	-29.480[a]	6.468[a]	-4.370[a]	29.807[a]	24.829[a]	11.287[a]
EBIT on Sales	0.107	0.083	0.090	0.079	-13.809[a]	-8.503[a]	-16.862[a]	-3.713[a]	2.382[b]	-5.906[a]
	0.075	0.083	0.075	0.078	-0.356	-0.531	-2.244[b]	0.130	-3.788[a]	2.140
Capital Expenditure	0.100	0.083	0.102	0.076	-7.381[a]	0.634	-8.646[a]	-5.046[a]	2.570[b]	-6.363[a]
on Sales	0.038	0.044	0.047	0.047	10.137[a]	9.833[a]	11.793[a]	3.618[a]	3.934[a]	0.958
R&D Expenditure	0.009	0.047	0.005	0.018	58.180[a]	-12.147[a]	20.217[a]	64.470[a]	41.552[a]	29.834[a]
on Sales	0.000	0.016	0.000	0.006	84.486[a]	3.555[a]	63.616[a]	-56.160[a]	-24.434[a]	-44.179[a]
Advertising Expense	0.013	0.017	0.010	0.018	8.742[a]	-5.268[a]	8.621[a]	11.365[a]	-1.798[c]	11.189[a]
on Sales	0.009	0.000	0.000	0.000	10.704[a]	-6.124[a]	12.053[a]	-13.159[a]	3.241[a]	-14.431[a]

Tables Notes: [a] Significant at the 0.001 level; [b] Significant at the 0.05 level; [c] Significant at the 0.1 level

Table 2: Excess Value Measure

Conditional distributions of the adjusted-value measure by form of diversification. The excess value measure is calculated measure as the difference between the market value and book value of the firm's common equity scaled by total sales for all firms with sales values greater than $30m. The null hypothesis of diversification having no value impact implies that all boxes should have identical distributions. The test statistics in the outer boxes refer to tests on the differences between the two corresponding boxes.

		Geographic Diversification		
		Domestic	**Multinational**	
Industrial Diversification	**Single Activity**	Q1 0.030 Median 0.247 [0.000] Q3 0.782 Mean 0.724 (t = 62.004) N = 19276 iseg = 1 gseg = 1	Q1 0.094 Median 0.402 [0.000] Q3 1.070 Mean 0.939 (t =57.065) N = 12993 iseg = 1 gseg = 2.49	Row Test Stats Median Z = -18.427 Wilcoxon Z = -19.942 2-sample t-test t = -10.637
	Multi Activity	Q1 0.005 Median 0.159 [0.000] Q3 0.464 Mean 0.432 (t = 28.84) N = 5791 Iseg = 2.73 gseg = 1	Q1 0.049 Median 0.230 [0.000] Q3 0.603 Mean 0.462 (t = 51.060) N = 7799 iseg = 3.05 gseg = 3.04	Row Test Stats Median Z = -9.904 Wilcoxon Z = -11.611 2-sample t-test t = - 1.698
		Column Test Stats Median Z = 12.539 Wilcoxon Z = 15.492 2-sample t-test t = 15.398	Column Test Stats Median Z = 17.947 Wilcoxon Z = 21.633 2-sample t-test t = 25.428	Diagonal Test Stats Median Z = -2.076 Wilcoxon Z = -4.150 2-sample t-test t = -17.787

Table Notes: In addition to the mean, Q1, Median and Q3 are the first, second, and third quartiles, respectively, of the distributions and N refers to the number of observations in each group. Tests statistics in parenthesis for the mean (t-value) and median [p-value] are for significance of the measure from zero. Iseg is the mean number of industrial segments that the firm reports on its financial statement, as reported on the COMPUSTAT Industrial Segment tape. Gseg is mean number of foreign (non-domestic) geographic locations that the firm reports on its financial statement, as reported on the COMPUSTAT Geographic Segment tape. The test statistics refer to tests on the differences between the same two boxes. The test statistics are Z-scores that are distributed N(0,1). The median test statistic is to test whether the medians of the two distributions are equal. The Wilcoxon test statistics is for a rank sum test that tests whether the two distributions are statistically similar. The 2-sample t-test is for a test that the means of the two corresponding boxes are equal.

Table 3: Market to Book

Conditional distributions of market to book measure by form of diversification. The market to book measure is calculated as the market value of common equity scaled by the book value of common equity for all firms with sales values greater than $30m. The null hypothesis of diversification having no value impact implies that all boxes should have identical distributions. The test statistics in the outer boxes refer to tests on the differences between the two corresponding boxes.

		Geographic Diversification		
		Domestic	**Multinational**	
Industrial Diversification	**Single Activity**	Q1 Median Q3 1.019 1.636 2.747 [0.000] Mean 2.282 (t = 8.870) N = 19275 Iseg = 1 Gseg = 1	Q1 Median Q3 1.198 1.976 3.287 [0.000] Mean 2.917 (t =13.220) N = 12993 Iseg = 1 Gseg = 2.49	Row Test Stats Median Z = -18.309 Wilcoxon Z = -19.528 2-sample t-test t = -1.874
	Multi Activity	Q1 Median Q3 0.955 1.403 2.081 [0.000] Mean 1.717 (t = 12.021) N = 5791 Iseg = 2.72 Gseg = 1	Q1 Median Q3 1.097 1.658 2.549 [0.000] Mean 2.231 (t = 19.832) N = 7799 Iseg = 3.05 Gseg = 3.04	Row Test Stats Median Z = -14.415 Wilcoxon Z = -14.408 2-sample t-test t = -2.827
		Column Test Stats Median Z = 14.340 Wilcoxon Z = 14.478 2-sample t-test t = 1.928	Column Test Stats Median Z = 14.596 Wilcoxon Z = 16.257 2-sample t-test t = 2.771	Diagonal Test Stats Median Z = -1.221 Wilcoxon Z = -0.684 2-sample t-test t = 0.182

Table Notes: In addition to the Mean, Q1, Median and Q3 are the first, second, and third quartiles, respectively, of the distributions and N refers to the number of observations in each group. Tests statistics in parenthesis for the mean (t-value) and median [p-value] are for significance of the measure from zero. Iseg is the mean number of industrial segments that the firm reports on its financial statement, as reported on the COMPUSTAT Industrial Segment tape. Gseg is mean number of foreign (non-domestic) geographic locations that the firm reports on its financial statement, as reported on the COMPUSTAT Geographic Segment tape. The test statistics refer to tests on the differences between the same two boxes. The test statistics are Z-scores that are distributed N(0,1). The median test statistic is to test whether the medians of the two distributions are equal. The Wilcoxon test statistics is for a rank sum test that tests whether the two distributions are statistically similar. The 2-sample t-test is for a test that the means of the two corresponding boxes are equal..

Table 4: Excess Value Using Adjusted-Value Measure

Conditional distributions of adjusted-value measure by form of diversification. The value measure is adjusted for industry and multinationality effects and is calculated as the natural logarithm of the ratio of a firm's actual total market value to its imputed value. A firm's imputed value is the sum of the imputed market values of its segments, with each segment's imputed value equal to the segment's sales multiplied by the median ratio of capital to sales among the domestic single-activity firms in that industry with sales greater than $30m. By definition, the median measure for the single activity domestic firms will be zero. The null hypothesis of diversification having no value impact implies that all boxes should have identical distributions. The test statistics refer to tests on the differences between boxes.

		Geographic Diversification		
Ln(MVA/ Imputed MVA)		**Domestic**	**Multinational**	
Industrial Diversification	**Single Activity**	Q1 -0.319 Median 0.000 [0.925] Q3 0.326 Mean 0.022 (t =4.977) N = 19276 Iseg = 1 gseg = 1	Q1 -0.342 Median 0.068 [0.001] Q3 0.502 Mean 0.099 (t =16.996) N = 12993 iseg = 1 gseg = 2.49	Row Test Stats Median Z = -9.936 Wilcoxon Z = -10.151 2-sample t-test t = -10.571
	Multi Activity	Q1 -0.376 Median -0.069 [0.000] Q3 0.225 Mean -0.067 (t = -9.424) N = 5729 Iseg = 2.72 gseg = 1	Q1 -0.295 Median 0.016 [0.030] Q3 0.341 Mean 0.030 (t =4.940) N = 7652 iseg = 3.01 gseg = 3.09	Row Test Stats Median Z = -8.885 Wilcoxon Z = -11.002 2-sample t-test t = 10.380
Diagonal Test Stats Median Z = -0.832 Wilcoxon Z = -0.474 2-sample t-test t = 4.832		Column Test Stats Median Z = 9.371 Wilcoxon Z = 10.400 2-sample t-test t = 10.634	Column Test Stats Median Z = 5.700 Wilcoxon Z = 6.508 2-sample t-test t = 8.218	Diagonal Test Stats Median Z = -2.783 Wilcoxon Z = -2.227 2-sample t-test t = 1.076

Table Notes: In addition to the mean, Q1, Median and Q3 are the first, second, and third quartiles, respectively, of the distributions and N refers to the number of observations in each group. Tests statistics in parenthesis for the mean (t-value) and median [p-value] are for significance of the measure from zero. Iseg is the mean number of industrial segments that the firm reports on its financial statement, as reported on the COMPUSTAT Industrial Segment tape. Gseg is mean number of foreign (non-domestic) geographic locations that the firm reports on its financial statement, as reported on the COMPUSTAT Geographic Segment tape. The test statistics refer to tests on the differences between the same two boxes. The test statistics are Z-scores that are distributed N(0,1). The median test statistic is to test whether the medians of the two distributions are equal. The Wilcoxon test statistics is for a rank sum test that tests whether the two distributions are statistically similar. The 2-sample t-test is for a test that the means of the two corresponding boxes are equal..

Table 5: Multivariate Test for Diversification Value Impacts

OLS estimates of the regression of adjusted-value measure on geographic and industrial diversification indicators, year dummies (for Panel A, not reported) and relative control variables. The value measure is adjusted for industry and multinationality effects and is measured as the natural logarithm of the ratio of a firm's total market value to its imputed value. A firm's imputed value is the sum of the imputed market values of its segments, with each segment's imputed value equal to the segment's sales multiplied by the median ratio of capital to sales among the domestic single-activity firms in that industry with sales greater than $30m. The extreme values of the natural logarithm above 1.386 or below -1.386 (i.e., actual values either more than 4 times imputed, or less than one-fourth imputed value) are deleted. Indicator variables for geographic diversification and industrial diversification take a value of 1 if the firm reports any segment information in that dimension and zero otherwise. The other control variables are all measured relative to the industry (or sales-weighted composite industry) median measures. Observations with an R&D or advertising to sales ratio greater than 50% are deleted from the sample. The control variables are calculated in a straightforward fashion given their definition using standard COMPUSTAT data. Panel A reports the results for the pooled regression from 1984 - 1997, and Panel B reports the means of the estimates and the associated standard error of the seven year-by-year regressions.

OBS R^2	Geographic Diversification Indicator	Industrial Diversification Indicator	Relative Firm Size	Relative Leverage	Relative EBIT/Sales	Relative Capital Ex/Sales	Relative R&D/Sales	Relative Advertising/Sales
Panel A: Pooled Sample								
dependent variable: adjusted-value measure								
31648	0.027	-0.060	0.016	0.028	2.093	0.645	2.537	-0.177
0.248	(0.006)[a]	(0.006)[a]	(0.002)[a]	(0.013)[b]	(0.026)[a]	(0.018)[a]	(0.074)[a]	(0.082)[b]
Panel B: Means of Year-by-Year Estimates								
dependent variable: adjusted-value measure								
14	0.022	-0.059	0.014	0.033	2.234	0.785	2.256	-0.156
0.247	(0.007)[a]	(0.005)[a]	(0.004)[a]	(0.028)	(0.083)[a]	(0.069)[a]	(0.169)[a]	(0.089)[b]

Table Notes: Panel A: the top number is the OLS estimate of the parameters and the numbers below in parentheses is the White (1980) heteroskedasticity corrected standard error. Superscript a, b, and c indicate statistical significant at the 1, 5 and 10 percent levels for two tailed tests. Panel B: the top number is the mean of the parameter estimate across the seven single year regressions. The number in parentheses is the standard error of the mean. Superscript a, b, and c indicate statistical significant at the 1, 5 and 10 percent levels for two tailed tests for a t-test with 13 degrees of freedom.

Table 6: Effect of Ignoring Geographic Diversification on Estimates of Value Impact of Industrial Diversification

OLS estimates of the regression of an alternative adjusted-value measure on an industrial diversification indicator, year dummies (for Panel A, not reported) and relative control variables. This value measure is adjusted *only* for industry effects and is measured as the natural logarithm of the ratio of a firm's total market value to its imputed value. In this case a firm's imputed value is the sum of the imputed market values of its segments, with each segment's imputed value equal to the segment's sales multiplied by the median ratio of capital to sales among *all single-activity firms* in that industry (without regard to multinationality) with sales greater than $30m. This value measure is analogous to the one used by Berger and Ofek (1995) since it does not take into account geographic diversification. The extreme values of the natural logarithm above 1.386 or below -1.386 (i.e., actual values either more than four times imputed, or less than one-fourth imputed value) are deleted. Indicator variables for geographic diversification and industrial diversification take a value of 1 if the firm reports any segment information in that dimension and zero otherwise. The other control variables are all measured relative to the industry (or sales-weighted composite industry) median measures. Observations with a R&D or advertising to sales ratio greater than 50% are deleted from the sample. The control variables are calculated in a straightforward fashion given their definition using standard COMPUSTAT data.

OBS R^2	Industrial Diversification Indicator	Relative Firm Size	Relative Leverage	Relative EBIT/Sales	Relative Capital Ex/Sales	Relative R&D/Sales	Relative Advertising/Sales
Not Controlling for Geographic Diversification dependent variable: adjusted-value measure created ignoring geographic diversification							
31734 0.245	-0.076 (0.006)[a]	0.026 (0.002)[a]	0.048 (0.012)[a]	1.806 (0.026)[a]	1.413 (0.032)[a]	2.132 (0.071)[a]	-0.134 (0.079)[c]

Table Notes: The top number is the OLS estimate of the parameter and the numbers below in parentheses is the White (1980) heteroskedasticity corrected standard error. Superscript a, b, and c indicate statistical significant at the 1, 5 and 10 percent levels for two tailed tests.

Table 7: Sources of Diversification Value Effects

Reported OLS estimates of the regression of adjusted-value measure on year dummies (not reported), relative control variables, geographic and industrial diversification indicators, and interaction terms of the diversification indicator variables and various firm characteristics. The value measure is adjusted for industry and multinationality effects and is measured as the natural logarithm of the ratio of a firm's total market value to its imputed value. A firm's imputed value is the sum of the imputed market values of its segments, with each segment's imputed value equal to the segment's sales multiplied by the median ratio of capital to sales among the domestic single-activity firms in that industry with sales greater than $30m. The extreme values of the natural logarithm of actual to imputed value above 1.386 or below -1.386 (i.e., actual values either more than four times imputed, or less than one-fourth imputed value) are deleted. Indicator variables for geographic diversification and industrial diversification take a value of 1 if the firm reports any segment information in that dimension and zero otherwise. The degree of geographic (industrial) diversification is the number of segments reported in COMPUSTAT. The other control variables are all measured relative to the industry (or sales-weighted composite industry) median measures. Observations with an R&D or advertising to sales ratio greater than 50% are deleted from the sample. The control variables are calculated in a straightforward fashion given their definition using standard COMPUSTAT data. The interacted terms pick up the differential relation between the control variables and value for firms diversified in each dimension relative to the single-activity domestic firms.

dependent variable: adjusted-value measure

Variable	Estimate	Std Error
Relative Size	0.011[a]	(0.003)
Relative EBIT/Sales	1.559[a]	(0.034)
Relative CapEx/Sales	0.627[a]	(0.023)
Relative Leverage	-0.032[b]	(0.017)
Relative R&D/Sales	2.451[a]	(0.130)
Relative Advert/Sales	-0.121	(0.120)
Geographic Diversification Indicator (GEOG)	0.019[b]	(0.008)
GEOG * Degree of Diversification	0.007[a]	(0.002)
GEOG * Relative Size	-0.020[a]	(0.004)
GEOG * Relative EBIT/Sales	0.850[a]	(0.053)
GEOG * Relative CapEx/Sales	0.130[a]	(0.044)
GEOG * Relative Leverage	-0.087[a]	(0.025)
GEOG * Relative R&D/Sales	-0.231	(0.161)
GEOG * Relative Advert/Sales	-0.285[c]	(0.167)
Industrial Diversification Indicator (IND)	-0.064[a]	(0.015)
IND * Degree of Diversification	0.005	(0.005)
IND * Relative Size	0.021	(0.004)
IND * Relative EBIT/Sales	0.351[a]	(0.072)
IND * Relative CapEx/Sales	0.223[a]	(0.049)
IND * Relative Leverage	0.166[a]	(0.027)
IND * Relative R&D/Sales	1.300[a]	(0.212)
IND * Relative Adv/Sales	-0.268	(0.183)

NOBS = 31907 Adj R^2 = 0.2388

Table notes: : The first number in each row is the OLS estimate of the parameter and second number in parentheses is the White (1980) heteroskedasticity corrected standard error. Superscript a, b, and c indicate statistical significant at the 1, 5 and 10 percent levels for two tailed tests.