Tobin's *q*, Corporate Diversification, and Firm Performance

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In this paper, we show that Tobin's q and firm diversification are negatively related throughout the 1980s. This negative relation holds for different diversification measures and when we control for other known determinants of q. Further, diversified firms have lower q's than comparable portfolios of pure-play firms. Firms that choose to diversify are poor performers relative to firms that do not, but there is only weak evidence that they have lower q's than the average firm in their industry. We find no evidence supportive of the view that diversification provides firms with a valuable intangible asset.

I. Introduction

When do shareholders benefit from firm diversification? Coase's answer is that the boundary of the firm should be at the point at which "the costs of organizing an extra transaction within the firm become

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equal to the costs of carrying out the same transaction by means of an exchange in the open market or the costs of organizing in another firm" (Coase 1937, p. 395). As pointed out by Williamson (1981) and others, this answer requires an operational definition of transaction costs.

Depending on one's view of transaction costs, one can look at a firm and find it either efficiently organized or not. For instance, the 1960s and 1970s view of conglomerates often was that conglomerates can operate unrelated businesses more efficiently than these businesses could be operated as stand-alone units, possibly by organizing an internal capital market that is more efficient in allocating resources than external markets.[1] In contrast, in the 1980s the view that many conglomerates survive only because the high costs associated with corporate control transactions prevent active investors from acquiring these companies and dividing them up gained substantial ground among economists (see Jensen 1989).

In this paper, rather than pursue an analysis of transaction costs, we investigate whether the market's valuation of a firm is correlated with its degree of diversification. If diversified firms differ from specialized firms only because diversification improves performance, one would expect diversified firms to be valued more than comparable portfolios of specialized firms. Although there is a substantial literature that compares the performance of diversified firms and specialized firms, this literature has not reached a decisive conclusion. The reason is that the results are sensitive to the measures used to perform the comparisons, to the way these measures are normalized to facilitate comparisons across firms, and to the starting dates of the comparisons.[2] By focusing on Tobin's q rather than on performance over time, we avoid some of the problems of the earlier literature. In particular, since q is the present value of future cash flows divided by the replacement cost of tangible assets, no risk adjustment or normalization is required to compare q across firms, in contrast to comparisons of stock return or accounting performance measures. Further, in contrast to performance comparisons, a valuation comparison directly yields an estimate of the benefit from splitting a conglomerate into stand-alone divisions when, in the spirit of LeBaron and Speidell's (1987) "chop-shop" approach, one assumes that the stand-alone q of divisions of conglomerates is well approximated by the average q of specialized firms in the same industry.

[1] See Weston (1970) and Williamson (1970) for the financing argument. Chandler (1977) and others have advanced arguments suggesting that the M-form of organization used by multidivisional firms inherently makes firms more efficient.

[2] See Williamson (1981), Mueller (1987), and Ravenscraft and Scherer (1987) for extensive reviews of the literature.

Recent studies analyze the contribution of changes in the degree of diversification to firm value. Specifically, Morck, Shleifer, and Vishny (1990) show that the market reacts negatively to unrelated acquisitions during the 1980s but not during the 1970s. More recently, Comment and Jarrell (1993) investigate the effect of changes in firm focus directly and demonstrate that firms that become more focused increase in value. In this paper, we provide evidence that complements these studies. By studying the relation between q and the degree of diversification at a point in time, we can investigate the relative efficiency of diversified firms even if these firms do not change their degree of diversification. Such an inquiry can yield important insights into the interpretation of studies of stock returns around changes in firms' degree of diversification. For example, it could be that firms that change their degree of diversification failed in their diversification efforts in contrast to firms that do not change their degree of diversification.[3]

Comparing the Tobin's q of diversified firms to the Tobin's q of specialized firms, we find that through the late 1970s and the 1980s, single-industry firms are valued more highly by the capital markets than diversified firms. Further, highly diversified firms (defined as those firms that report sales for five segments or more) have both a mean and a median Tobin's q below the sample average for each year in our sample. Hence, conglomerates are not even average firms in terms of q.

After showing that the Tobin's q of diversified firms is lower than that of specialized firms, we investigate whether the relation between q and the degree of diversification can be explained by industry effects. It could be that diversified firms are concentrated in industries with fewer growth opportunities. We account for industry effects by constructing portfolios of specialized firms that match the industry composition of diversified firms. We find that industry effects reduce the magnitude of the diversification discount. Yet, after we correct for industry effects, the diversification discount is positive and significant every year in our sample. Our industry-adjusted approach provides an estimate of the Tobin's q a diversified firm would have if its divisions were not part of a conglomerate and were valued like the average firm in their three-digit Standard Industrial Classification (SIC) code. It follows from our results that shareholder wealth would increase on average if diversified firms could be dismantled in such a way that each division would have the average q of specialized firms in its industry.

[3] See, e.g., Porter (1987) for the argument that divestitures represent strategic failures.

Since industry effects do not explain the diversification discount, we investigate whether the result that diversified firms are valued less than specialized firms can be explained by other variables commonly used to explain q. We find that our results hold up if we control for size, for access to capital markets, and for intensity of research and development. We also provide estimates of the diversification discount obtained by eliminating firms with large q's, using only firms that did not change their number of segments in the five previous years, and using the ratio of firm market value to book value. The diversification discount estimate is always positive in these additional regressions, but sometimes it is not significant.[4]

Although our evidence shows that there is a diversification discount, this discount can be attributed fully to diversification only if the stand-alone q of divisions of conglomerates is on average equal to the average q of specialized firms in the same industry. Since the stand-alone q of divisions is not directly observable, it is possible that the lower q of diversified firms results partly from these firms' having divisions whose stand-alone q is systematically lower than the q of comparable specialized firms. In particular, it could be the case that firms that diversify do so because they are performing poorly and are seeking growth opportunities. In this case, our evidence would mean that diversification does not make good firms out of bad firms, but the diversification discount would result at least partly from the low stand-alone q of the divisions of the diversified firms. One way to gain a better understanding of this is to look at firms that diversify and firms that focus in our sample. We find that firms that diversify are poor performers relative to firms that do not, lending support to the view that poor performers diversify in search of growth opportunities. At the same time, though, there is only weak evidence that firms that diversify have lower q's than firms in the same industry that do not diversify, suggesting that firms that diversify are not poorly performing firms within their industry.

The paper proceeds as follows. In Section II, we motivate and define the measures of firm value and diversification we use in our analysis. In Section III, we provide extensive evidence on the relation between q and the degree of diversification for the middle year of our sample, 1984. In Section IV, we compare the value of diversified firms to portfolios of specialized firms with similar distributions of

[4] One issue we cannot address directly is the existence of potential reporting biases. The data we use, namely Compustat's Industry Segment file, are constructed by Compustat from information reported by firms. Firms have some latitude in how they choose to report their number of segments. It could be that firms choose to report more segments when they are doing poorly. Lichtenberg (1991) discusses some reporting biases in the Compustat Segment file.

total assets across industries. In Section IV, we also investigate the stability of the relation between diversification and Tobin's q during our sample period. In Section V, we examine the robustness of our results in a multivariate regression framework and by looking at subsamples. In Section VI, we consider firms that change their degree of diversification. Concluding remarks are provided in Section VII.

II. Diversification and Performance

Almost all studies that investigate the performance of diversified firms focus on the performance of these firms measured over a period of time as opposed to their performance as measured by their valuation at a point in time.[5] The conclusions reached by these studies are heavily influenced by their sample period. This is true both for studies that focus on accounting measures of performance and for studies that use stock market measures of performance.[6] Besides the dependence of their results on the sample period, ex post studies suffer from two additional problems. The first problem is the choice of a benchmark for performance comparisons. The second problem is the interpretation of a finding of poor performance. We discuss these problems in studies that investigate stock price performance, but these problems are equally acute for studies that focus on accounting measures of performance.

In comparing the stock price performance of conglomerates to the stock price performance of nonconglomerates, one has to adjust stock returns for risk. Otherwise, one set of firms might perform better simply because, having greater risk, they have to earn a greater expected return for their shareholders. If the market correctly anticipates the performance of firms, they should not earn abnormal returns on average once one takes risk into account. The presence of abnormal returns over long periods of time could therefore be evidence that risk is not properly accounted for. Since most of the studies that evaluate the stock returns of conglomerates account for risk using asset pricing models that are known to explain incompletely the cross section of expected returns, they can document as performance abnormal returns resulting from the lack of proper risk adjustment.[7]

[5] Mueller (1987) provides an extensive survey of the performance literature.

[6] For instance, Weston, Smith, and Shrieves (1972) find that, in the 1960s, a sample of conglomerates outperformed a sample of mutual funds; Ravenscraft and Scherer (1987) argue that the performance of a sample of conglomerates becomes noticeably worse if the 1970s are included.

[7] Most studies use the capital asset pricing model (CAPM) or make no risk adjustment. Fama and French (1992), among others, provide evidence that the CAPM does not explain the cross section of expected returns. Using the CAPM, a number of authors have shown that acquirers underperform the market for up to 3 years follow-

For instance, it is well known that, on average, the stock returns of small firms outperform the stock returns of large firms (see Schwert [1983] for a review of this evidence). Since diversified firms typically are large firms, they could have lower ex post returns than nondiversified firms because of this size effect.

Further, the ex post poor performance of conglomerates over some sample periods does not necessarily mean that ex ante diversification does not increase value. It could simply be that unexpected technological and regulatory changes made conglomerates a less efficient organizational form. For example, one could argue that the growth in the high-yield bond market made intrafirm capital markets less important and hence decreased one of the benefits from intrafirm diversification (see Jensen 1986). It might therefore be the case that investors properly assessed the benefits of intrafirm diversification when that diversification took place but were surprised, ex post, by changes in the costs and benefits of various institutional forms. Hence, at a point in time, diversified firms could still be valued more, but their higher valuations could fall or increase over a sample period.

In this paper, we avoid the drawbacks of ex post approaches by focusing on a performance measure observed at a point in time that does not require the use of a risk adjustment, Tobin's q. The advantage of Tobin's q is that it incorporates the capitalized value of the benefits from diversification. The problem with this is that Tobin's q reflects what the market thinks are the benefits from diversification, whether illusory or not. Hence, for us to be able to infer from Tobin's q the benefits from diversification, we have to assume that financial markets are efficient and that a firm's market value is an unbiased estimate of the present value of its cash flows. With this assumption, the ratio of the market value of the firm to the replacement value of its assets is a measure of the contribution of the firm's intangible assets to its market value. A firm's intangible assets include its organizational capital, reputational capital, monopolistic rents, investment opportunities, and so on. Management's actions directly affect the value of the intangible assets, and managerial entrenchment can be viewed as an intangible asset that has negative value. Hence, management can add or subtract from the value of the firm's tangible assets whose replacement value is the denominator of the q formula. Since man-

ing the acquisition (Jensen and Ruback [1983] review some of this evidence). Franks, Harris, and Titman (1991) show that these results are sensitive to how the risk adjustment is made; for their sample period, the abnormal returns disappear if a multifactor model is used. Agrawal, Jaffe, and Mandelker (1992) show that the negative abnormal returns hold with a multifactor model except for mergers at the end of the 1970s.

agement is responsible for the firm's investments, it can add or subtract value by choosing the right or wrong portfolio of activities for the firm.

If the value of a portfolio of unrelated businesses is simply the sum of the values of the unrelated businesses, then the q ratio of diversified firms should not differ from the q ratio of comparable portfolios of specialized firms. In this case, management would not add value to the businesses by assembling them in a conglomerate. However, if diversification creates or destroys value, then the q ratio of diversified firms should be greater or less than the q ratio of comparable portfolios of specialized firms under the null hypothesis that the stand-alone q of divisions of diversified firms does not differ from the average q of specialized firms in their industry.

All variables that affect firm value affect q. Therefore, there is a risk that one might attribute to diversification differences in q that are due to variables correlated with diversification rather than diversification itself. This possibility of attributing to diversification valuation effects caused by correlated variables is a serious one. It is reduced, however, by the fact that we look at large portfolios of firms where one would hope that the valuation effects of other variables would be diversified away. In addition, and perhaps more important, we investigate extensively whether variables known to affect q can explain the relation between q and firm diversification. First, since diversified firms are likely to be larger, it could be that a firm's efficiency depends on its size rather than its degree of diversification and that diversification simply proxies for size.[8] Second, when R & D is not capitalized, firms that have heavy investments in R & D have larger q's because the replacement cost of assets does not include the capitalized value of R & D (see Salinger 1984). It could be that, if diversified firms are less R & D intensive than specialized firms, they have lower q's for reasons that are unrelated to diversification. Third, if financial markets are imperfect, specialized firms might face greater obstacles exploiting investment opportunities, so that a specialized firm with a high q cannot raise enough capital to equate its marginal q to one. We investigate each of these alternative explanations after presenting our results on the relation between diversification and q. The reader should remember, however, that when we use q to infer the benefits of diversification, this inference assumes that the market capitalizes the benefits from diversification that are a diversified firm's ability to extract more cash flow out of a given portfolio of tangible

[8] Lichtenberg (1992) provides evidence showing that the estimated relation between size and performance differs when one controls for size in a study that uses total factor productivity as the estimate of performance.

assets than a specialized firm. Hence, not finding any benefits of diversification could mean that this assumption is incorrect.

In an earlier paper, Wernerfelt and Montgomery (1988) investigate the contributions to q of industry, focus, and market share. They do not provide estimates of regression coefficients. Instead, they indicate the contribution of these variables to the adjusted R^2 of a regression for 247 firms for 1976. They argue that the effect of focus on performance is positive and has a marginal contribution to adjusted R^2 of less than 3 percent. Their limited database makes it impossible for them to provide direct comparisons between diversified and specialized firms.

Our approach differs from studies that use stock returns to evaluate how the market assesses changes in the degree of diversification of firms. For instance, Morck et al. (1990) show that unrelated acquisitions have a negative announcement effect on stock prices in the 1980s, and Kaplan and Weisbach (1992) provide evidence on the divestiture of diversifying acquisitions. In their study, Comment and Jarrell (1993) do not perform an event study, but instead estimate the cumulative abnormal returns over the year of the change in focus and the preceding year. With this approach, after controlling for a number of variables that are known to affect abnormal returns, they find a significant positive correlation between abnormal returns and increases in focus. These studies address the issue of how changes in the degree of diversification initiated by firms are correlated with changes in firm value. By showing that such a correlation exists, these studies show that changes in the degree of diversification of firms convey information. They do not, however, identify this information. In particular, such a correlation could arise even if successful diversification on average increases shareholder wealth. For instance, it could be that firms change their degree of diversification because they failed in their diversification efforts. Investors would react favorably to seeing a bad diversifier focus and unfavorably to seeing it diversify more. Observing the stock price reactions to changes in the degree of diversification would therefore not tell us anything about the benefits from successful diversification if successful firms do not change their degree of diversification much. Evidence on firms that do not change their degree of diversification can therefore help understand the results of the return studies.

III. Tobin's q and Diversification Measures

All our data come from Compustat. The Business Information file of Compustat provides information for firms disaggregated for up to 10 different industry segments. Statement of Financial Accounting

Standards number 14 of the Financial Accounting Standards Board and Securities and Exchange regulation S-K require firms to report segment information for fiscal years ending after December 15, 1977. Statement number 14 defines an industry segment as "a component of an enterprise engaged in providing a product or service, or a group of related products or services primarily to unaffiliated customers (i.e., customers outside the enterprise) for a profit." Firms must report information for segments that represent 10 percent or more of the consolidated sales. The file has information available for some firms for 1976 and 1977, though firms did not have to report for these years if their fiscal year ends December 15 or earlier. Below, however, we use only data reported in 1978 and later to have the whole reporting population in each sample year. For this purpose, we used the active and research files of Compustat, so that our sample includes the firms that were subsequently delisted from Compustat because of mergers, bankruptcies, liquidations, and so on.

We construct q using the algorithm proposed by Lindenberg and Ross (1981) and modified by Smirlock, Gilligan, and Marshall (1984) to compute the replacement cost of plant and equipment. As suggested by Lindenberg and Ross, we set up an acquisition schedule for plant and equipment. We correct for price level changes using the implicit gross national product price deflator and for depreciation assuming 5 percent depreciation per year. We assume that the technological parameter is zero as in Smirlock et al. and assume that the value of plant and equipment equals its book value in 1970 or in the first year thereafter in which a firm becomes available on Compustat.[9] We treat inventories as suggested by Lindenberg and Ross. Finally, we assume that the replacement value of other assets equals book value. Consequently, to compute the denominator of Tobin's q, we use the book value of assets other than plant, equipment, and inventories and the estimated replacement cost of plant, equipment, and inventories. To compute the numerator of Tobin's q, we use the market value of common stock and the book value of debt and preferred stock. The end-of-year number of shares of common stock and end-of-year stock price are obtained from Compustat. We exclude firms that have less than $100 million of assets on average in Compustat to keep the data set manageable. In Section V, we show that even if we ignore q altogether and focus instead on the ratio of a firm's market value to the book value of its assets, there is a negative relation between market to book and the degree of diversification.

The literature on diversification has also used other data sources

[9] We always require that there be at least one year of data available on Compustat before including a firm in the sample.

to measure the degree of diversification. In an earlier study measuring the degree of diversification of firms, Scherer and Ravenscraft (1984) use data from the 1975 Line of Business sample of the Federal Trade Commission. To construct this sample, the FTC collected sales and other financial variables from 471 large corporations; the data classify sales using 262 manufactured product categories but allow firms to aggregate sales from different categories into a single category in cases in which sales in one category are small. Scherer and Ravenscraft measure diversification using the inverse of the Herfindahl index constructed from the lines of business sales of a firm and by counting the number of different categories in which a firm produces. Wernerfelt and Montgomery (1988), Lichtenberg (1992), and Liebeskind and Opler (1992) use census data on plants and measure diversification in terms of numbers of different SIC codes for plants. Lichtenberg also uses the Compustat SIC file, which reports up to 90 SIC codes per company. More recently, Comment and Jarrell (1993) compute measures of diversification using the same database we use. The advantage of the Compustat database is that it includes more firms than the FTC database, is available for all years since 1976, and has segment information such as total assets per segment. However, the Compustat database reports information for up to 10 segments only, does not have private firms, and, as argued by Lichtenberg (1991), is subject to possible reporting biases.

We investigate three diversification measures used by Comment and Jarrell. The first measure is a Herfindahl index computed from the sales of a firm by segment. This index is the sum of the squared values of sales per segment as a fraction of total firm sales. If a firm has only one segment, its Herfindahl index is one; if a firm has 10 segments that each contribute 10 percent of the sales, its Herfindahl index is 0.1. Hence, the Herfindahl index falls as the degree of diversification increases. The second measure is a Herfindahl index computed from the firm's assets per segment. The third measure is simply the number of segments. A firm becomes more diversified as its number of segments increases.[10]

Table 1 shows the means, medians, standard deviations, and correlations of our variables for 1984. The mean value for Tobin's q substantially exceeds its median, because of the skewed distribution of q. Below we report data on the mean and median of q.

The means and medians of the diversification measures indicate

[10] In preliminary work for which the research segment tapes were not available, we also investigated a measure inspired by Scherer and Ravenscraft (1984), the number of different main four-digit SIC codes reported by the firm. This measure turned out to be extremely similar to the number of segments since almost all firms report segments that have different main four-digit SIC codes.

TABLE 1

MEAN, MEDIAN, STANDARD DEVIATION, AND CORRELATIONS OF TOBIN'S q AND THE DIVERSIFICATION MEASURES FOR 1984

				Correlation (Spearman Rank Correlation)		
Variables	Sample Size	Mean (Median)	Standard Deviation	Number of Segments	*H*sales	*H*assets
Tobin's q	1,449	1.11 (.77)	1.22	−.25 (−.30)	.26 (.27)	.26 (.27)
Number of segments	1,449	2.54 (2.00)	1.69	1.00	−.87 (−.94)	−.88 (−.95)
Herfindahl from sales	1,420	.70 (.71)	.29		1.00	.96 (.97)
Herfindahl from assets	1,420	.70 (.69)	.29			1.00

NOTE.—All numbers used in computations are obtained from Compustat files. The sample includes all firms in the Business Information files with average total assets over $100 million for which q could be computed. The p-values for the correlations are all reported as .0001. *H*sales and *H*assets denote, respectively, the Herfindahl index constructed from sales and the Herfindahl index constructed from the book value of assets.

that the typical firm exhibits some diversification since all median diversification measures differ from the values they would have if the typical firm was specialized in one segment. The correlations in table 1 provide the main theme of this paper. The first row shows that Tobin's q is strongly negatively correlated with the degree of firm diversification. The degree of diversification increases with the number of segments, and therefore the correlation is negative for that measure of diversification. In contrast, with the Herfindahl indices, the degree of diversification falls as the Herfindahl index increases and the correlations are positive. We provide both the Pearson correlations of the diversification measures with Tobin's q and the Spearman rank-order correlations. All these correlations are significant at the .01 level. The significance of the Spearman rank-order correlations means that our results are not due to large q values that are spuriously associated with a low degree of diversification. We also estimated the correlations eliminating the values of q that exceed five and obtained similar results. The other correlations reported in table 1 show that our diversification measures have very high correlations in absolute value. This explains why our results are the same irrespective of which diversification measure we use.

In table 2, we report the average and median values of Tobin's q for various numbers of segments and for various values of the Herfindahl indices. Irrespective of the measure of diversification used, the mean and median of Tobin's q for the specialized firms are higher than for the other firms. In 1984, the average Tobin's q for the sample is 1.11 and the median is 0.77. Consequently, the average Tobin's q for the undiversified firms exceeds the average Tobin's q for the sample by 39 percent, and the median Tobin's q exceeds the sample median by 31 percent. These numbers suggest a substantial difference in the valuation of diversified and specialized firms. The relation between Tobin's q and the degree of diversification for firms with more than one segment seems weaker: it is monotone for the mean Tobin's q when the number of segments is considered, but not when the Herfindahl indices are used.

In table 2, the median is always smaller than the mean and proportionately more so for the one-segment firms than for the firms with more than one segment. This suggests that the distribution of q's is skewed and has some large values. From table 1 and the nonparametric results presented there, we know that these large values do not affect our conclusions. They do, however, affect estimates of the diversification discount defined here as the difference between the q of specialized firms and the q of diversified firms, because all the large values of q occur for one-segment firms. No q exceeds five for firms with two segments or more. In contrast, for one-segment firms, the

TABLE 2

Average and Median of Tobin's q for Given Values of the Diversification Measures for 1984

A. Number of Segments

	1	2	3	4	≥5
Tobin's q	1.53 (1.01) {580}	.91 (.71) {215}	.91 (.74) {272}	.77 (.63) {198}	.66 (.58) {184}

B. Herfindahl Index Constructed from Sales

	$H = 1$	$.8 < H < 1$	$.6 < H < .8$	$.4 < H < .6$	$.0 < H < .4$
Tobin's q	1.53 (1.01) {580}	.85 (.69) {76}	.91 (.76) {160}	.86 (.66) {299}	.74 (.64) {305}

C. Herfindahl Index Constructed from Assets

	$H = 1$	$.8 < H < 1$	$.6 < H < .8$	$.4 < H < .6$	$0 < H < .4$
Tobin's q	1.53 (1.01) {580}	.79 (.66) {67}	.95 (.72) {140}	.86 (.68) {309}	.75 (.64) {324}

Note.—The numbers in parentheses are the medians and the numbers in braces are the number of firms in the cells. All data come from Compustat, including the Research files. The sample includes all firms in the Business Information files with more than \$100 million worth of assets on average for which q could be computed.

largest q is 17. Consequently, throughout the analysis, we keep discussing results for medians as well as for means. We also report in Section V results from a truncated sample in which firms with q's of five or more are excluded.

In table 2, the mean q of firms with five segments or more is significantly below one with a t-statistic for the difference from one of 11.7. Throughout the sample period, the mean q of firms with five segments or more is always significantly below one. In contrast, the sample mean of q's is never significantly below one during the 1980s, but it is in 1978 and 1979. Obviously, the sample mean is always greater than the mean for the firms with five segments or more, and significantly so.

The median q for the firms with five segments or more is always below one and always below the sample median. This evidence is difficult to reconcile with the view that diversification is a valuable intangible asset. The best case for that view given our evidence is that diversified firms allocate capital more efficiently than specialized firms because of their efficient use of an internal capital market. This market enables the various divisions of a diversified firm to invest up to the point at which the marginal return on capital equals the cost of capital and ensures that their cost of capital is lower relative to their stand-alone cost of capital because of the lesser impact of informational asymmetries. Hence, relative to stand-alone specialized firms, the conglomerates invest more and might therefore have lower q's since their marginal return to capital would be lower. With this view, however, one would expect average q to exceed one for conglomerates because their market value would capitalize the contribution to shareholder wealth of the reduction in informational asymmetries if there was no error in computing q. One might therefore conclude from the low average and median q of firms with five segments or more that the benefit from the reduction in informational asymmetries for conglomerates is dominated by inefficiencies such as influence costs and agency costs.

Table 2 has no estimates of statistical significance of the incremental contribution to q of diversification. In table 3, we provide such estimates using a regression framework for each year in our sample. Define $D(j)$ to be a dummy variable that takes value one if a firm has j segments or more. We then regress q on a constant and $D(j)$, $j = 2, 3, 4, 5$. With this regression, the coefficient on $D(2)$ is interpreted as the difference between q for firms with two segments and q for firms with one segment. The sum of the coefficients on $D(2)$ and $D(3)$ is the difference between the q of firms with three segments and the q of firms with one segment, and so on. Hence, the coefficient on $D(j)$ is interpreted as a marginal contribution to q of the jth segment in the cross-sectional regression. Throughout the table, the coefficient on $D(2)$ is always significant, so that diversified firms have a lower average q in each year. There are very few cases in which any of the other dummy variables has a significant coefficient, implying that in general the contribution of the additional segments is not statistically significant. Since out of the 39 coefficients for these additional segments only three are positive, a nonparametric test would reject the hypothesis that the sign of the coefficients is random. The conclusion that one can draw from the table is that we have strong evidence that firms with two or more segments have lower q's than firms with one segment, but we have weaker evidence supporting the view that there is a significant drop in q when one moves from firms with j segments to firms with $j + 1$ segments, when $j \geq 2$. Since in large samples economically trivial effects can be statistically significant, it is important to note that the effect documented here is also economically significant. The drop in q as one goes from one-segment firms to firms with more segments implies that over the years the q of diversified firms is lower than the q of single-segment firms by 10 percent to almost 50 percent. The diversification discount is positively

TABLE 3

MARGINAL CONTRIBUTIONS TO q OF DIVERSIFICATION

Year (Number of Firms)	a	b_2	b_3	b_4	b_5	Adjusted R^2
1978 (N = 1,454)	1.07 (33.91) {460}	−.14 (−2.60) {218}	−.08 (−1.38) {294}	−.05 (−.76) {216}	−.10 (−1.66) {266}	.04
1979 (N = 1,439)	1.13 (33.95) {470}	−.15 (−2.45) {207}	−.12 (−1.88) {280}	−.02 (−.34) {227}	−.11 (−1.66) {255}	.04
1980 (N = 1,438)	1.43 (18.86) {479}	−.24 (−1.78) {210}	−.26 (−1.71) {282}	−.01 (−.04) {217}	−.13 (−.86) {250}	.02
1981 (N = 1,423)	1.32 (22.61) {500}	−.45 (−4.21) {220}	−.05 (−.42) {264}	−.07 (−.57) {196}	−.11 (−.88) {243}	.04
1982 (N = 1,404)	1.67 (21.50) {505}	−.71 (−5.00) {213}	−.08 (−.47) {262}	.02 (.14) {193}	−.24 (−1.44) {231}	.05
1983 (N = 1,448)	2.08 (23.02) {562}	−1.01 (−5.92) {220}	−.07 (−.35) {251}	−.10 (−.47) {203}	−.18 (−.85) {212}	.06
1984 (N = 1,449)	1.53 (31.53) {580}	−.62 (−6.67) {215}	.00 (.04) {272}	−.14 (−1.28) {198}	−.11 (−.89) {184}	.08
1985 (N = 1,425)	1.80 (25.38) {612}	−.82 (−5.80) {205}	.04 (.26) {270}	−.16 (−.95) {186}	−.11 (−.57) {152}	.06
1986 (N = 1,427)	1.82 (28.41) {652}	−.73 (−5.74) {221}	−.10 (−.69) {248}	−.10 (−.60) {171}	−.09 (−.49) {135}	.06
1987 (N = 1,468)	1.59 (28.27) {720}	−.59 (−5.11) {226}	−.03 (−.22) {236}	−.14 (−.91) {158}	−.01 (−.07) {128}	.05
1988 (N = 1,388)	1.45 (36.45) {711}	−.39 (−4.80) {288}	−.07 (−.68) {204}	−.09 (−.80) {131}	−.10 (−.70) {114}	.05
1989 (N = 1,334)	1.52 (34.11) {697}	−.36 (−4.01) {225}	−.07 (−.63) {185}	−.18 (−1.32) {125}	−.04 (−.23) {102}	.04
1990 (N = 1,158)	1.26 (28.97) {603}	−.29 (−3.27) {196}	−.10 (−.86) {170}	−.10 (−.73) {105}	−.04 (−.23) {84}	.03

NOTE.—We estimate the regression

$$q = a + b_2D(2) + b_3D(3) + b_4D(4) + b_5D(5) + \epsilon,$$

where $D(j)$ takes value one if a firm has j segments or more. All data are obtained from Compustat data files, including all historical files. The sample includes all firms in the Business Information files with more than \$100 million worth of assets on average for which q could be computed. t-statistics are reported in parentheses. The number of firms for which no dummy higher than j has value one is reported in braces; this number is the number of firms with j segments.

correlated with the level of q and reaches a maximum in 1983. This correlation with q could mean that diversified firms are apparently not as able to take advantage of economywide changes in growth opportunities.

Table 3 also reproduces the cross-sectional distribution of firms across degrees of diversification. As already documented by Comment and Jarrell (1993), firms became more focused during the 1980s. For the sample we use in this study, the number of highly diversified firms as a fraction of the number of specialized firms falls dramatically from more than one-half to less than one-sixth. In computing these numbers, we do not use the whole universe of firms, but only the firms with more than $100 million in assets on average. Comment and Jarrell document the same trend using all firms. Further, Lichtenberg (1992) and Liebeskind and Opler (1992) show similar results using different databases less subject to reporting biases. Liebeskind and Opler find a surprising additional result using census data, however. They argue that highly diversified firms that remained highly diversified actually increased their degree of diversification.

IV. A "Chop-Shop" Approach

In the previous section, we compared the average q of diversified firms to the average q of specialized firms. This is equivalent to comparing the q of an equally weighted portfolio of diversified firms to that of an equally weighted portfolio of specialized firms. The q of a diversified firm is the replacement cost weighted average of the q's of its divisions. If diversified firms or their large divisions are systematically in low-q industries, comparing diversified firms to equally weighted portfolios of specialized firms will lead to the conclusion that diversified firms have lower q's than specialized firms even though this negative relation between diversification and q has nothing to do with diversification. In this section, we eliminate this problem by comparing the q's of diversified firms to the q these firms would have if the stand-alone q of each division were the average q of the single-segment firms in its industry. We call this hypothetical q the pure-play q or the industry-adjusted q. Hence, if diversification neither adds nor subtracts value, one would expect the q of diversified firms to equal the pure-play q. Such an approach, though not based on q, was pioneered by LeBaron and Speidell (1987) and named by them the "chop-shop" approach.

To show that comparing diversified firms to equally weighted portfolios of specialized firms creates a bias if the large divisions of diversified firms are in low-q industries, let q_i be the q of the ith division of a firm, R_i the replacement cost for that division, and M_i the market value of that division. The variables q, M, and R are, respectively, the q, the market value, and the replacement cost of the firm. With the chop-shop approach, it should be the case that if one constructs a holding company that is just a portfolio of firms and adds nothing to the value of its holdings, the q of that holding company should also be its pure-play q constructed from the firms that constitute the holding company. Let α_i be the weight of the ith firm in the construction of the comparison q and assume that the holding company has n firms. In this case, the comparison becomes

$$
\begin{aligned}
q - \sum_{i=1}^{i=n} \alpha_i q_i &= \frac{\sum_{i=1}^{i=n} M_i}{\sum_{i=1}^{i=n} R_i} - \sum_{i=1}^{i=n} \alpha_i \frac{M_i}{R_i} \\
&= \sum_{i=1}^{i=n} \frac{R_i M_i}{\left(\sum_{i=1}^{i=n} R_i\right) R_i} - \sum_{i=1}^{i=n} \alpha_i q_i \\
&= \sum_{i=1}^{i=n} \frac{R_i}{\sum_{i=1}^{i=n} R_i} q_i - \sum_{i=1}^{i=n} \alpha_i q_i \\
&= \frac{1}{E(R_i)} [\operatorname{cov}(R_i, q_i) + E(R_i)E(q_i)] \\
&\quad - n[\operatorname{cov}(\alpha_i, q_i) + E(\alpha_i)E(q_i)],
\end{aligned}
\tag{1}
$$

where $E(\cdot)$ and $\operatorname{cov}(\cdot, \cdot)$ indicate, respectively, sample means and covariances. We can now evaluate equation (1) for three different weighting schemes. First, suppose that α_i is a replacement cost weight, that is, the replacement cost of the ith division divided by the sum of the replacement costs of the firm's divisions. In this case, equation (1) is identically equal to zero and the q of a holding company of firms is equal to the chop-shop q as long as the q of the divisions is evaluated correctly. This comparison is therefore unbiased: if diversification is neutral, we find no difference between the chop-shop q and the q of the diversified firm. In contrast, comparing the q of the diversified firm to either an equally weighted or a value-weighted average of the q's of the divisions leads to a bias that could suggest that diversification decreases value even when it does not. To see this, note first that in the case of an equally weighted average of division

q's, we get

$$q - \sum_{i=1}^{i=n} \alpha_i q_i = \frac{1}{E(R_i)} [\text{cov}(R_i, q_i) + E(R_i)E(q_i)] - n\left[\text{cov}\left(\frac{1}{n}, q_i\right) + \frac{1}{n}E(q_i)\right] = \text{cov}\left[\frac{R_i}{E(R_i)}, q_i\right]. \tag{2}$$

When one compares the q of a holding company to an equally weighted average of the q's of its constituents, the q of the holding company will be lower than the q of the equally weighted average if constituent q's and replacement costs are negatively correlated. Hence, if the divisions with larger replacement costs are in low-q industries, one would conclude that diversification and q are negatively related when comparing the q of a holding company to the equally weighted average of its divisions when, by construction, diversification has no effect on firm value.

It is useful to note that comparing the q of a diversified firm to a market value–weighted average of its divisions could lead one to conclude that the diversified firm is valued less or more than the value-weighted portfolio of its divisions even when diversification is neutral. In this case, the bias is

$$q - \sum_{i=1}^{i=n} \alpha_i q_i = q - \frac{E(M_i q_i)}{E(M_i)} = \frac{E(M_i)}{E(R_i)} - \frac{1}{E(M_i)} E\left(\frac{M_i^2}{R_i}\right) = \frac{1}{E(M_i)}\left[\frac{E(M_i)^2}{E(R_i)} - E\left(\frac{M_i^2}{R_i}\right)\right]. \tag{3}$$

Because of Jensen's inequality, the expression in brackets is negative if the inverse of the replacement value is not correlated with the square of the market value.[11] Hence, we would find that a portfolio

[11] To see this, note that $E(M^2/R) = \text{cov}(M^2, 1/R) + E(M^2)E(1/R)$, where the subscript i is omitted. If the covariance term is zero, we can use Jensen's inequality to obtain the result that $E(M^2)E(1/R)$ is no less than $E(M)^2/E(R)$. When the covariance term is not zero, the sign of the bias cannot be assessed without explicit distributional assumptions. One would generally expect the covariance term to be negative (i.e., large market values being associated with large replacement values), in which case the covariance term reduces the effect of Jensen's inequality.

of a holding company has a lower q than the value-weighted average of the q's of its divisions even though diversification does not affect firm value by construction. In general, there is a bias when one uses market value weights, but the sign of the bias is hard to evaluate since it depends on the joint distribution of the market and replacement values.

It follows from the analysis above that, to compare the q of the conglomerate to the q of a pure-play portfolio, one should use a replacement cost–weighted average of the stand-alone q's of the divisions. Neither the division replacement values nor the stand-alone q's can be computed directly from available data. In our computations, we substitute for a division's replacement value the book value of its assets. As long as the ratio of a division's total assets to a firm's total assets is an unbiased estimate of the ratio of a division's replacement value to a firm's replacement value, our approach will be satisfactory. To construct an estimate of the stand-alone q of a division, we take the average of the q's of all one-segment firms in the division's three-digit SIC code.[12]

In table 4, we show how the q's of firms with more than one segment differ from their pure-play q's for 1984. The statistics we reproduce are the means and medians of the diversification discounts, where a firm's diversification discount is the difference between its pure-play q and its q. For comparison purposes, we also provide estimates of the difference between the mean q of one-segment firms and the mean q of firms with more than one segment. These estimates correspond to estimates of the diversification discount in the absence of the industry adjustment. It is immediately clear that adjusting for industry effects decreases the diversification discount. Nevertheless, the discount is positive, statistically significant, and economically large. With industry-adjusted discounts, the difference between the mean and median is generally less striking. The difference between the mean q of one-segment firms and that of two-segment firms is 0.6, whereas the difference between the medians is 0.3. In contrast, for industry-adjusted discounts the difference between the means is 0.35 and the difference between the medians is 0.24.

We also investigate whether the industry-adjusted diversification discount increases with the number of segments. In table 5, we report these results for each year in the sample. We estimate the marginal effect of having an additional segment by using the same approach as in table 3. In this case, however, the effect is measured using

[12] We also performed the comparisons using four-digit SIC codes when a match at that level could be obtained. The results for this alternative procedure are similar to those reproduced here.

TABLE 4

INDUSTRY-ADJUSTED DISCOUNT OF DIVERSIFIED FIRMS FOR 1984

Statistic	Two-Segment Firms	Three-Segment Firms	Four-Segment Firms	Five-Segment or More Firms
Mean discount (t-statistic)	.35	.43	.43	.49
	(5.80)	(8.62)	(9.08)	(11.23)
Median discount (p-value for nonparametric sign test)	.24	.34	.35	.38
	(<.01)	(<.01)	(<.01)	(<.01)
Unadjusted discount (t-statistic)	.62	.62	.75	.86
	(7.46)	(7.74)	(9.34)	(11.34)

NOTE.—The industry-adjusted discount for a diversified firm is the difference between its pure-play q and its q. The pure-play q of a firm is an asset value–weighted average of division q's. The division q is proxied by the average of the q's of one-segment firms in the same three-digit SIC code as the division. The unadjusted discount is the difference between the average one-segment q and the n-segment q. The t-statistics for the unadjusted discount are obtained from a cross-sectional regression of q's on a constant and dummy variables for the number of segments. All information is taken from Compustat, including the Research files. The sample includes all firms in the Business Information files with more than $100 million in total assets on average for which q could be computed.

a firm's q minus its pure-play q as the dependent variable. For a single-segment firm, this measure is just its q minus the average q of the single-segment firms in the industry. To estimate the regressions, we use the whole sample including the single-segment firms. We do not reproduce the constant to save space here. By construction, the constant is zero except for rounding error. The reason we use the whole sample rather than estimate the regression using only diversified firms is to investigate whether the diversification discount is significant given the sampling variation of single-segment firms around their industry means. There is one case in which $D(2)$ (i.e., the marginal contribution to q of having two segments rather than one) is not significantly different from zero, namely in 1980. For that year, however, the $D(3)$ coefficient (i.e., the marginal contribution to q of having three segments rather than two) is significantly different from zero. The lack of significance in the regression is due to the fact that the t-statistic in the regression compares the diversification discount of two-segment firms to the industry-adjusted q of single-segment firms. Although the industry-adjusted q of single-segment firms averages zero, it differs across firms; and if its standard deviation is large enough, it is difficult to reject the hypothesis that the industry-adjusted q of one-segment firms differs from the industry-adjusted q of two-segment firms. In contrast, if the diversification discount of two-segment firms is compared to zero rather than to the industry-adjusted q of one-segment firms, the diversification discount of two-segment firms is always significantly different from zero. There are only two cases in which dummy variables for $j > 2$ are significantly different from zero, namely 1979 and 1980. The conclusions that

TABLE 5

Marginal Industry-Adjusted Diversification Discount

Year	$D(2)$	$D(3)$	$D(4)$	$D(5)$	Adjusted R^2	$D(\text{Div})$
1978	.14	.08	.10	.07	.05	.27
	(2.66)	(1.35)	(1.69)	(1.14)		(7.42)
1979	.15	.14	.04	.08	.06	.31
	(2.79)	(2.43)	(.65)	(1.36)		(8.48)
1980	.14	.30	.07	−.01	.02	.40
	(1.09)	(2.14)	(.54)	(−.07)		(4.78)
1981	.21	.14	.07	.04	.02	.36
	(2.15)	(1.32)	(.60)	(.38)		(5.49)
1982	.41	.13	−.06	.16	.02	.52
	(3.16)	(.86)	(−.39)	(1.05)		(5.97)
1983	.67	.02	.07	.05	.03	.73
	(4.25)	(.08)	(.36)	(.27)		(6.88)
1984	.36	.08	.01	.05	.04	.43
	(4.22)	(.79)	(.06)	(.49)		(7.56)
1985	.49	−.02	.03	.07	.02	.50
	(3.79)	(−.14)	(.19)	(.38)		(5.86)
1986	.45	.08	.05	.05	.03	.54
	(3.88)	(.61)	(.33)	(.28)		(6.84)
1987	.47	−.04	.13	.01	.03	.49
	(4.56)	(−.34)	(.94)	(.05)		(6.98)
1988	.34	.00	.03	−.15	.03	.38
	(4.54)	(−.03)	(.31)	(−1.18)		(7.12)
1989	.31	.08	.04	−.14	.03	.39
	(3.67)	(.71)	(.27)	(−.90)		(6.54)
1990	.31	.02	.06	−.05	.03	.36
	(3.87)	(.20)	(.50)	(−.37)		(6.22)

Note.—The industry-adjusted discount for a diversified firm is the difference between its pure-play q and its q. The pure-play q of a firm is an asset value–weighted average of division q's. The division q is proxied by the average of the q's of one-segment firms in the same three-digit SIC code as the division. We estimate two regressions for each year. In the first regression, we regress the discount on a constant and on four dummy variables. Dummy variable $D(j)$ takes value one if a firm has j or more segments. In the second regression, we regress the discount on a constant and dummy variable $D(\text{Div})$ that takes value one if the firm has two or more divisions. All data are taken from Compustat. In each regression, we use all firms on the Business Information files with more than $100 million in assets on average for which q could be computed, including the single-segment firms. t-statistics are in parentheses.

emerge from table 5 are generally similar to those from table 3, where we compare the q's of diversified firms to the q's of single-segment firms. In table 5, we also report the average diversification discount measured as the coefficient on a dummy variable that takes value one for firms with more than one segment in a regression of industry-adjusted discounts on a constant and the dummy variable.

Figure 1 shows the diversification discount for each year in our sample. For this figure, we use medians. For comparisons of q's, we plot two series. First, we plot the difference between the median q for one-segment firms and two-segment firms. Second, we plot the difference between the median q of one-segment firms and the me-

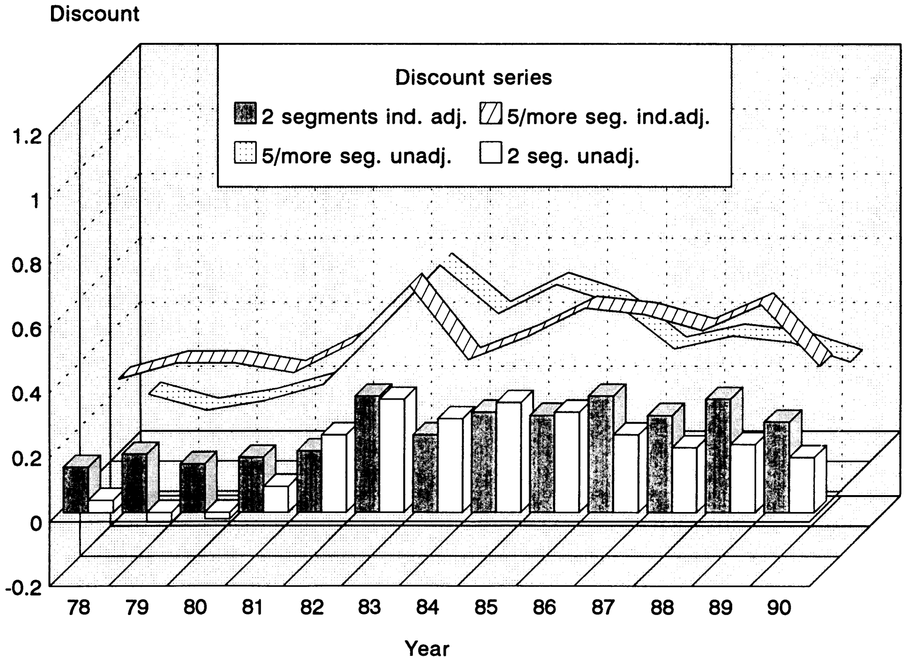

FIG. 1.—Discount for diversification. This figure shows the median diversification discount for each year from 1978 to 1990 for two-segment firms and for firms with at least five segments. The unadjusted discount is defined as the difference between the median q of one-segment firms and the median q of multisegment firms. The median industry-adjusted discount is the median difference between the q the multisegment firm would have if its divisions were valued like the average single-segment firm in their industry and the multisegment firm's q.

dian q of firms with five or more segments. The two-segment firm diversification discount is negative for two years at the end of the 1970s and is positive every year afterward. Hence, the discount first increases and then seems to remain largely stationary. The five-segment firm discount is always positive, but also increases at the beginning of the period. If we compute the mean differences instead, we find that the mean difference is always significantly different from zero at the .01 level except for the three years in the 1970s, where the p-values for years 1978, 1979, and 1980 are, respectively, .011, .018, and .077. The difference between q's of firms with one segment and q's of firms with five segments is significant at the .01 level each year, with the lowest t-statistic being 4.01 in 1990. For the mean differences as well as the median differences, there is always more of a discount for five-segment firms than for two-segment firms.

Figure 1 also shows the median industry-adjusted diversification discount for two- and five-segment firms for every year in the sample. To gain some insight into the significance of these results that is consistent with our focus on medians rather than means, we use a nonparametric sign test. Although we do not reproduce the results here, we find that the industry-adjusted discounts are significantly different from zero every year. As for the unadjusted discounts, the industry-adjusted diversification discounts increase first and then remain relatively constant.

Overall, our evidence shows that the diversification discount is economically and statistically significant throughout the 1980s whether we adjust for industry effects or not. At the end of the 1970s, however, the two-segment firm discount is weaker if one does not adjust for industry effects and is weaker if one focuses on medians.

V. How Robust Is the Diversification Discount?

In this section, we investigate whether the lower q of diversified firms can be explained by variables other than the degree of diversification. We first investigate whether diversification proxies for other firm characteristics and then address the issue of whether biases in the way q is computed can explain our results.

To investigate whether diversification proxies for other firm characteristics, we use a multivariate regression framework in which we use as explanatory variables a dummy variable that takes value one if a firm is diversified and the following three firm characteristics.

a) *Size*.—There exists a literature that investigates the relation between size and accounting profitability. In this literature, it seems that for the United States, the relation between size and profitability is ambiguous whereas abroad it is negative.[13] In our sample, there is a significant positive relation between size (defined as total assets) and the degree of diversification.[14] For instance, the correlation coefficient between the number of segments and total assets is .227, and it is significant at the .01 level. Since there is a positive relation between size and diversification, it could be that our results are explained by differences in efficiency between small and large firms rather than by the degree of diversification. To investigate this possibility, we control for the log of total assets.

b) *R & D*.—When we measure the replacement cost of assets, we

[13] Mueller (1987) summarizes that literature. See Hall and Weiss (1967) and Peltzman (1977) for the view that size is correlated with greater efficiency. Stigler (1963) argues that size is mostly irrelevant.

[14] Lichtenberg (1992) finds a similar result using a different database.

do not include R & D as an asset. Hence, firms with large R & D investments have intangible assets that are not accounted for in our replacement cost measures. We could therefore attribute the larger q's of single-segment firms to specialization when it is caused by larger R & D investments. Since our results hold when we control for industry effects, R & D can explain our results only if, within industries, diversified firms invest less in R & D than specialized firms. In our regressions, we control for the ratio of R & D to total assets.

c) Ability to access financial markets.—In a neoclassical model in which firms have a stock of capital that they put to use with decreasing returns to scale, marginal q differs from one only if the firms cannot raise enough capital because of capital market imperfections. It could therefore be that specialized firms have more trouble raising funds and hence have higher q's than diversified firms because they are unable to exhaust their positive net present value projects. To control for this, we use a dummy variable that takes value one if a firm pays dividends. This approach is similar to the one of Fazzari, Hubbard, and Petersen (1988). Their reasoning is that a firm that pays dividends could invest more by cutting dividends, and hence it is unlikely to be rationed in the financial markets.

In table 6, we provide estimates of multivariate regressions for 1984 using the unadjusted discount and the adjusted discount as the dependent variables. In table 7, we reproduce estimates of the diversification discount for all years obtained from such regressions. Note that in table 5, the estimate of the industry-adjusted diversification discount across all multisegment firms using a linear regression is 0.43 in 1984 with a t-statistic of 7.56 in absolute value. The discount estimate in table 6 (minus one times the coefficient on the diversification dummy variable) remains significant when we control for these other firm characteristics, but its value falls slightly. When we use industry adjusted q's, only size has a significant coefficient in addition to the diversification variable. Size is negatively correlated with q when one controls for diversification. With unadjusted q's, the diversification discount falls from 0.64 to 0.43. In addition to size being significant, whether the firm pays dividends matters and affects q negatively. Although there is a significant positive coefficient in regressions of q on R & D when one does not control for diversification in our sample, the coefficient on R & D is not significant when one controls for diversification. In table 7, the diversification discount remains significant every year whether we use the unadjusted discount or the adjusted discount.

A possible problem with our approach of using q as a dependent variable is that highly diversified firms are likely to engage more

TABLE 6

MULTIVARIATE REGRESSION ESTIMATES OF THE DIVERSIFICATION DISCOUNT FOR 1984

Regression	Number of Observations	Diversification Dummy	Log Size	Dividend Not Paid	R & D/Total Assets	Adjusted R^2
1. Unadjusted q	632	−.43	−.21	−.19	1.15	.15
		(−4.61)	(−5.97)	(−1.76)	(1.45)	
2. Adjusted q	609	−.34	−.12	.07	−.25	.05
		(−3.77)	(−3.48)	(.69)	(−.34)	
3. Unadjusted q: constant segments	337	−.20	−.12	−.17	1.72	.07
		(−2.05)	(−3.19)	(−1.38)	(2.21)	
4. Adjusted q: constant segments	325	−.21	−.03	.31	1.34	.02
		(−2.01)	(−.64)	(2.39)	(1.62)	
5. Unadjusted q: $q < 5$	618	−.29	−.13	.02	1.46	.11
		(−4.53)	(−5.22)	(.21)	(2.71)	
6. Market to book	632	−.17	−.84	.02	.91	.07
		(−3.46)	(−4.38)	(.31)	(2.16)	

NOTE.—All data are taken from Compustat. The regressions use the sample of firms with total assets more than $100 million on average for which the dependent and explanatory variables could be computed. The diversification discount variable is the coefficient on a dummy variable that takes value one if a firm has more than one division, so that the discount is minus one times the coefficient on the dummy variable. The unadjusted q is the firm's q. The adjusted q is the firm's q minus the q of a pure-play firm. The q of the pure-play firm is the asset value–weighted average of the proxies for the q's of the division. The proxy for the q of a division is the average q of the single-segment firms in the sample with the same three-digit main SIC code. The constant segment sample is obtained by eliminating all firms that changed their number of segments during 1978–83. t-statistics are in parentheses.

TABLE 7

ESTIMATES OF THE DIVERSIFICATION DISCOUNT FROM MULTIVARIATE REGRESSIONS CONTROLLING FOR SIZE, DIVIDEND PAYMENTS, AND R & D EXPENDITURES

Year	Unadjusted q	Adjusted q	Unadjusted q: Constant Segments	Adjusted q: Constant Segments	Unadjusted q: $q < 5$	Market to Book
1978	.26	.30			.20	.12
	(4.24)	(5.20)			(3.91)	(3.19)
	[668]	[662]			[665]	[668]
1979	.25	.34			.17	.13
	(3.83)	(6.40)			(3.33)	(2.77)
	[668]	[657]			[663]	[668]
1980	.29	.31			.15	.05
	(2.40)	(2.91)			(2.44)	(.70)
	[633]	[629]			[620]	[633]
1981	.38	.23			.19	.15
	(3.66)	(2.70)			(3.30)	(2.63)
	[603]	[597]			[592]	[603]
1982	.53	.39	.27	.28	.29	.25
	(3.37)	(2.71)	(2.21)	(2.19)	(4.25)	(3.24)
	[598]	[591]	[363]	[359]	[584]	[598]
1983	.70	.41	.33	.25	.36	.26
	(4.09)	(2.38)	(2.97)	(1.52)	(4.90)	(3.88)
	[620]	[611]	[357]	[354]	[594]	[620]
1984	.43	.34	.20	.21	.29	.17
	(4.61)	(3.77)	(2.04)	(2.01)	(4.53)	(3.46)
	[631]	[608]	[337]	[324]	[617]	[631]
1985	.53	.34	.31	.23	.31	.20
	(2.75)	(1.88)	(1.95)	(1.48)	(4.40)	(2.95)
	[614]	[590]	[318]	[307]	[594]	[614]
1986	.56	.48	.41	.43	.29	.13
	(3.14)	(3.00)	(2.04)	(2.51)	(4.05)	(1.54)
	[613]	[600]	[305]	[299]	[587]	[613]
1987	.45	.47	.27	.44	.21	.09
	(2.86)	(3.63)	(1.67)	(2.89)	(2.87)	(1.18)
	[636]	[621]	[324]	[315]	[614]	[636]
1988	.30	.33	.21	.33	.23	.05
	(2.65)	(3.12)	(1.36)	(2.26)	(3.18)	(.58)
	[597]	[583]	[323]	[313]	[582]	[597]
1989	.39	.42	.30	.48	.26	.10
	(2.89)	(3.39)	(1.47)	(2.58)	(3.22)	(.90)
	[547]	[533]	[319]	[313]	[525]	[547]
1990	.43	.44	.29	.41	.27	.14
	(2.97)	(3.44)	(1.27)	(2.05)	(2.99)	(1.45)
	[438]	[425]	[280]	[276]	[429]	[438]

NOTE.—The regression coefficients on size, dividend payments, and R & D expenditures are omitted. All data are taken from Compustat. The regressions use the sample of firms with total assets more than $100 million on average for which the dependent and explanatory variables could be computed. The diversification discount variable is the coefficient on a dummy variable that takes value one if a firm has more than one division multiplied by minus one. The unadjusted q is the firm's q. The adjusted q is the firm's q minus the q of a pure-play firm. The q of the pure-play firm is the asset value–weighted average of the proxies for the q's of the divisions. The proxy for the q of a division is the average q of the single-segment firms in the sample with the same three-digit main SIC code. The constant segment sample is obtained by eliminating all firms that changed their number of segments during the five previous years. t-statistics are in parentheses and sample sizes are in brackets.

frequently in sales and purchases of divisions than specialized firms.[15] When a division is purchased by a firm, it may be "marked to market" for accounting purposes. Hence, in an extreme case in which a firm replaces all its divisions every year and diversification contributes nothing, the firm could have a q of one by definition. In contrast, if calculated replacement costs have a systematic downward bias, specialized firms that keep the same assets over time would have a q greater than one simply because of that bias and because of the fact that their assets are not marked to market frequently. There is no a priori reason for a systematic bias in the estimate of replacement costs since replacement cost calculations take inflation into account.

This potential bias would be a serious source of concern if the q ratio of highly diversified firms (firms with five segments or more) was close to one. In our sample, however, the q of highly diversified firms has a maximum yearly average of 0.87 in 1989 and a maximum yearly median of 0.75 the same year. An alternative approach to investigate whether the bias should be a source of concern is to restrict our analysis to firms that have not changed their number of segments for a number of years to exclude the diversified firms that are more likely to have assets marked to market. In table 6, we report regression estimates for 1984 for firms that have not changed their number of segments for at least the five previous years. When restricting our sample in this way, we lose half of the firms in 1984. Yet, the diversification discount is still significant whether we use unadjusted or industry-adjusted q's. In table 7, however, we reproduce estimates of the diversification discount for every year in the sample from similar regressions and find that our results are less strong. With unadjusted q's, the diversification discount is no longer significant for the last three years of the sample. With adjusted q's, the diversification discount is not significant in 1983 and 1985 but is significant for the last three years of the sample. If we do not control for size, R & D, and dividend payments, the diversification discount is always significant for this subsample, whether we use the adjusted or the unadjusted q's.

A further concern has to do with possible outliers. We saw in Section III that the negative relation between q and diversification holds

[15] We thank Robert Comment for drawing this issue to our attention. Comment and Jarrell (1993) provide useful evidence on this point. When focusing on large firms (equity of $500 million or more) and large corporate transactions ($100 million or more), they find that the frequency of divestitures and acquisitions is much higher for firms with five segments or more than for firms with one segment. In their sample, the rate of divestiture is 0.8 percent of all firm years for single-segment firms and 6.7 percent for firms with five segments or more. For acquisitions, the rates are, respectively, 2.7 percent and 10.9 percent.

when we use a measure of rank correlation and hence does not depend on a small number of outliers. An alternative approach to evaluating the robustness of the results is to eliminate firms with large q's. We do so in regression 5 of table 6, where we eliminate all firms with q's greater than five. There are 14 firms with such q's in 1984. All these firms are single-segment firms. Removing these firms decreases the estimate of the diversification discount but not its significance. We estimate similar regressions for all years and report the estimates for the diversification discount from these regressions in table 7. In general, removing firms with q greater than five decreases the discount but increases its significance and affects none of our qualitative conclusions.

In the last row of table 6, we discard q altogether and use the numerator of q divided by the book value of total assets. Market to book is a coarse proxy for the valuation ratio we want to consider, but its computation requires fewer assumptions. Since market to book is a coarse measure, we would expect that its use explains less of the cross-sectional variation and leads to a less precise estimate of the relation between valuation and the degree of diversification. With the market to book ratio as the dependent variable, there is still a significant discount for diversification in 1984 when we control for size, dividend payments, and R & D expenses. In table 7, we reproduce estimates of the diversification discount from such regressions for every year. The diversification discount is always positive, but it is not significant toward the end of our sample period. If instead we estimate the diversification discount for the sample of firms used in table 3 (i.e., all firms for which we have an estimate of q irrespective of whether R & D expenses are available), then the diversification discount computed using market to book is significant every year in the sample, with the lowest t-statistic being 3.67 in 1990 with an estimate for the discount of 0.17.

VI. Why Do Firms Change Their Degree of Diversification?

We showed that q falls as diversification increases. The approach we followed so far relates q cross-sectionally to the degree of diversification. This raises the question of whether firms that diversify are low-q firms or whether they are high-q firms that become low-q firms through diversification. In other words, do poorly performing firms diversify and find out that doing so does not make them high performers, or do high performers diversify and become poor performers?

In table 8, we provide evidence from the firms with one segment

TABLE 8

FIRMS THAT CHANGE THE NUMBER OF SEGMENTS THEY REPORT

VARIABLES	DIVERSIFYING FIRMS		FOCUSING FIRMS	
	Mean (t-Statistic)	Median (p-Value for Sign Test)	Mean (t-Statistic)	Median (p-Value for Sign Test)
Segment-adjusted q	−.163	−.165	−.016	−.001
	(1.23)	(<.01)	(−.70)	(.87)
Industry-adjusted q	.078	−.026	−.597	−.417
	(.80)	(<.01)	(−14.1)	(<.01)
Segment-adjusted earnings before interest and taxes	−.021	−.020	−.002	−.069
	(−2.86)	(<.01)	(−.61)	(.37)
Segment-adjusted cash flow	−.028	−.17	−.004	−.003
	(−2.01)	(<.01)	(−1.15)	(.23)
Segment-adjusted change in q	−.204	−.01	.024	.001
	(−1.60)	(.87)	(1.39)	(.91)

NOTE.—Data on firms with one segment that add segments (diversifying firms) and firms with five segments or more that reduce their number of reported segments to four or less during our sample period (focusing firms). All data are taken from Compustat and include only firms on the Business Information files with more than $100 million in total assets on average. All statistics pertain to the year before the change except the last row, which reports the change in q for the end of the fiscal year before the change to the end of the fiscal year after the change. The mean (in mean computations) or median (in median computations) of the sample of firms that had the same number of segments (i.e., one or five or more) in the year before the change is subtracted from the firm statistics, except the industry-adjusted q, where the procedure is the same as the one used in table 4. The segment-adjusted change in q is the segment-adjusted q at the end of the year after the change in the number of segments minus the segment-adjusted q at the end of the year before the change in the number of segments. There are 192 firms that diversify and 320 that choose to focus.

that change the number of segments they report in our sample period to two or more. We call these firms diversifying firms under the assumption that firms that increase the number of segments reported are firms that either have acquired a new, important line of business or have expanded an existing line of business to the point at which it is large enough to justify reporting. We reproduce means and medians of the relevant statistics for the whole sample period. In computing our statistics, we standardize our variables in the following way. Consider a firm that chooses to go from one segment to two segments in year $t + 1$. We compute a segment-adjusted q for year t for that firm by subtracting from its q the average q of all one-segment firms in that year. Using these segment-adjusted q's, we can then compute the average q of one-segment firms that choose to diversify. To construct the median q, we proceed in the same way, except that we subtract from firm q's the median for the year of all firms with the same number of segments. We compute all segment-adjusted statistics in the same way. From the evidence in table 8, firms that choose to diversify have lower than average segment-adjusted q's, but the result is not statistically significant at conventional levels for the mean. In contrast to statistical significance, however, the result is economically significant since it implies that the typical firm that diversifies has a q that is more than 10 percent lower than the q of firms that do not diversify. Also, diversifying firms have lower median segment-adjusted q's with a significant sign test at the .01 level. One possible explanation for this tendency of diversifying firms to have lower q's is that the market anticipates poorer performance to result from the diversification attempt. This does not seem to be the correct explanation, however, since the firms that diversify also have poor accounting performances.

In table 8, there is a contrast between segment-adjusted q's and industry-adjusted q's. For segment-adjusted q's of firms that diversify, all evidence points to the same direction, namely that firms that diversify have lower q's. For industry-adjusted q's, firms that diversify have an insignificantly higher mean q and a lower median q. In terms of the economic magnitude of the differences, they are smaller for the median than for the mean. Hence, table 8 supports the view that firms in poor industries diversify, but not the view that bad firms in an industry diversify. This evidence shows again that there are industry effects that cannot be ignored, but it does not help to understand why the industry-adjusted discount is significant since firms that diversify seem to have the average q of their industry.

The evidence of table 8 shows that, although firms that diversify experience a drop in q relative to the firms that do not diversify over the two years following the diversification attempt, the statistical significance of the drop is marginal. Hence, although the evidence that firms do not gain from diversification seems convincing, the evidence that they suffer in the short run is weaker.

We also provide some evidence for firms with five segments or more that choose to reduce their diversification level. These firms do not appear to have lower q's than other firms with five segments or more. Further, the accounting performance of these firms does not suggest that they are doing poorly. There is weak evidence that these firms outperform the firms with five segments or more that do not choose to become more focused. There is somewhat stronger evidence that firms that focus outperform firms that diversify. The mean change in q of firms that focus is significantly greater than the mean change in q for firms that diversify at the .10 level. The difference in median changes in q is not significant when a sign test is used.[16]

[16] It is interesting to note that whereas firms that choose to focus have only a weak improvement in performance relative to the firms that do not, the economic magnitude of that improvement is consistent with the estimates provided by Comment and Jarrell (1993). To see this, note that our computation of q uses book values of debt. Hence, all the change in the numerator of q due to a performance improvement for constant debt shows up in equity. If a firm has a market value of equity equal to the book value

VII. Concluding Remarks

In this paper, we find that highly diversified firms have significantly lower average and median q ratios than single-segment firms. Further, highly diversified firms have mean and median q ratios below one and below the sample mean and median every year in our sample period. This is strong evidence that highly diversified firms are consistently valued less than specialized firms. Our attempt to explain this valuation difference in terms of industry effects is not successful. Although industry effects explain part of the discount of diversified firms, they do not explain all of it. Hence, when we compare the q's of diversified firms to estimates of the q's they would have if broken up into portfolios of specialized firms under the assumption that each division would inherit the average q of the specialized firms in their industry, we find that diversified firms have lower q's. We show further that the valuation differences are not explained away but are reduced by taking into account differences in size or R & D expenditures between single-segment and highly diversified firms or by constraints that prevent single-segment firms from accessing capital markets. After investigating the robustness of our results, we conclude that there is a diversification discount in our data set. We argue that this diversification discount is not due to reporting biases or subtle advantages of diversified firms that we do not capture in our tests, but we can provide only indirect evidence on these issues given the data available to us.

Our evidence is supportive of the view that diversification is not a successful path to higher performance, but it is less definitive on the question of the extent to which diversification hurts performance. The reason is that in our sample, the firms that become more diversified appear to perform poorly before becoming more diversified, indicating that firms that diversify do not become poor performers only or mainly because they diversify. A plausible explanation for our results is that diversifying firms seek growth through diversification because they have exhausted growth opportunities in their existing activities. This explanation suggests that further insights could be obtained by investigating diversification at a more disaggregated level than at the segment level and by distinguishing between firms that diversify into similar activities and those that diversify into unrelated activities. Presumably, firms that diversify into similar activities can use some of their existing skills and hence might have a comparative

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of its debt and a q of 0.5, the 0.024 improvement in q translates into a cumulative abnormal return for the calendar year of the refocusing and the year following the refocusing of 8 percent.

advantage in these activities, whereas firms that diversify into unrelated activities might not have such an advantage and hence might perform poorly. Our results suggest also that a more detailed disaggregated analysis of the benefits and costs of diversification that tests explicit models of these benefits and costs would be useful. Using such an approach, one might uncover evidence that some firms benefit from diversification. However, in this paper we are unable to find any evidence that diversification benefits firms on average.

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