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ABSTRACT

In this paper, we show that Tobin's q and firm diversification are negatively related. This negative relation holds for different diversification measures and when we control for other known determinants of q. We show further that diversified firms have lower q's than equivalent portfolios of specialized firms. This negative relation holds throughout the 1980s in our sample. Finally, it holds for firms that have kept their number of segments constant over a number of years as well as for firms that have not. In our sample, firms that increase their number of segments have lower q's than firms that keep their number of segment constant. Our evidence is consistent with the view that firms seek growth through diversification when they have exhausted internal growth opportunities. We fail to find evidence supportive of the view that diversification provides firms with a valuable intangible asset.

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Section 1. Introduction.

When do shareholders benefit from firm diversification? Coase's answer is that the boundary of the firm should be at the point where "the costs of organizing an extra transaction within the firm become 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)). 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 they 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 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.[2]

In this paper, rather than pursuing an analysis of transaction costs, we investigate whether the market's valuation of a firm is correlated with its degree of diversification. Although there is a substantial literature that compares diversified firms to specialized firms, this literature has not reached a decisive conclusion because its results are sensitive to the measures used to perform the comparisons, to how these measures are normalized to facilitate comparisons across firms,

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[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 multi-divisional firms inherently makes firms more efficient.

[2] See Jensen (1989).

and to the starting dates of the comparisons.[3] By focusing on the present value of cash flows at a point in time normalized by the replacement cost of tangible assets, Tobin's q, rather than on performance over time, we avoid some of the problems of the earlier literature. In addition, our valuation perspective permits us to carry out LeBaron and Speidell's (1989) "chop-shop" approach and to compare the Tobin's q of diversified firms to the Tobin's q of comparable portfolios of specialized firms. If the stand-alone q of divisions of conglomerates is well-approximated by the q of specialized firms in the same industry, the "chop-shop" approach provides an estimate of the benefit from splitting a conglomerate into stand-alone divisions.

Recent studies focus on the contribution to firm value of changes in the degree of diversification. 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 the value of firms increases during periods when they become more focused. In this paper, we provide evidence that complements these studies. By investigating 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 in the interpretation of the stock return studies that focus on changes in firms' degree of diversification because it could be that firms that change their degree of diversification are firms that failed in their diversification efforts in contrast to firms that do not change their degree of diversification.[4]

If diversification does not contribute to value, one would expect the Tobin's q of a

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

[4] See Porter (1987), for instance, for the argument that divestitures represent strategic failures.

diversified firm to simply be the Tobin's q of an equivalent portfolio of specialized firms. If diversification contributes value, it should be as an intangible organizational asset that increases market value relative to replacement cost. We find the opposite result. 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, we investigate whether this 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 account for a significant fraction of the diversification discount. Yet, after correcting 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 3-digit 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.

Since industry effects do not explain the diversification discount, we investigate whether the result that diversified firms are valued less than specialized firms could be explained by other variables commonly used to explain q besides a firm's industry. We find that the result holds up if we control for size, for access to capital markets and R&D intensity. We also find that our results are robust if we restrict the sample to firms that have not changed their number of segments for at least the five previous years and if we exclude firms with large q's.[5]

Though we control for access to capital markets and find that it does not explain our results, it could still be that conglomerates allocate capital more efficiently than specialized firms because of their ability to operate an internal capital market that does not suffer from the informational asymmetries that affect the cost of capital on external markets. To see this, suppose that informational asymmetries between firms and outside investors increase the cost of capital.[6] In this case, diversified firms could provide funds more cheaply than external markets to divisions that would face high informational asymmetries when dealing with outside investors. This cost of capital advantage would enable these divisions to use up growth opportunities that specialized firms with a higher cost of capital would have to leave unused. This argument suggests that conglomerates could have lower q's than specialized firms. If this ability to mitigate informational asymmetries is the main advantage of conglomerates, however, it should be part of the present value of their future cash flows. For these firms, the ability to exploit growth opportunities that cannot be captured by specialized firms would be capitalized in their market value whereas specialized firms would be discounted because of the constraints they face in taking advantage of growth opportunities. On balance, therefore, this greater efficiency of conglomerates should translate itself into a higher average q if properly incorporated in firm value by the capital markets.

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[5] One issue we cannot address directly is the issue of potential reporting biases. The data we use, namely Compustat's Industry Segment File, is 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, therefore, that firms choose to report more segments when they are doing poorly. We find evidence, however, that contradicts this possible bias. In particular, firms that start reporting fewer segments do not have higher q's than the firms that keep their number of segments constant. Lindenberg (1991) discusses some reporting biases in the Compustat Segment File. The data we use seems to have fewer biases than the one he analyzes because in his analysis, he had access to a subset of what we use. His data does not include firms dropped from the Compustat Segment File whereas ours does.

[6] See Fazzari, Hubbard and Peterson (1988), for instance, for a detailed discussion.

It therefore seems inconsistent with the low average and median q's of the highly diversified firms in our sample.

Although we believe that our evidence leads to the conclusion that there is a negative relation between q and diversification, the reason for this relation does not appear to be that good firms diversify and therefore become bad firms. In our sample, there is some evidence that firms that add segments are firms with lower q's relative to other specialized firms but not relative to firms in their industry. This evidence could imply that firms diversify when they no longer have growth opportunities in their industry or that the market anticipates ill-fated diversification and already impounds it in the firm's value. We find, however, that when we use accounting performance measures, one-segment firms that add segments have lower cash flow to total assets and earnings to total assets than firms that do not diversify, indicating that the lower q of firms that add segments does not appear to be due mainly or only to the market anticipating problems with diversification. In contrast, firms with five segments that start reporting fewer segments seem to be similar to other firms with five segments or more in q, cash flow and earnings. There is weak evidence that firms that stop reporting only one segment experience a fall in q relative to those that remain specialized. The firms with five segments or more that reduce their number of segments to less than five experience an insignificant increase in q.

The paper proceeds as follows. In section 2, we motivate and define the measures of firm value and diversification we use in our analysis. In section 3, we provide extensive evidence on the relation between q and the degree of diversification for the middle year of our sample, 1984. In section 4, we compare the value of diversified firms to portfolios of specialized firms with similar distributions of total assets across industries. In section 5, we investigate the stability of the relationship between diversification and Tobin's q during our sample period. In section 6, we examine the robustness of our results in a multivariate regression framework and by looking at subsamples. In section 7, we consider firms that change their degree of diversification. Concluding remarks are provided in section 8.

Section 2. 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.[7] We discuss these studies first. 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.[8] 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 non-conglomerates, one has to adjust stock returns for risk. Otherwise, it might be that one set of firms performs 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

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

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

accounted for. Since most of the studies that evaluate the stock returns of conglomerates account for risk in a naive way, it is possible that such studies measure as performance abnormal returns resulting from the lack of a proper risk adjustment.[9] For instance, it is well-known that on average the stock price of small firms outperforms the stock price of large firms.[10] Since diversified firms typically are large firms, they could have lower **ex post** returns than non-diversified 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 intra-firm capital markets less important and hence decreased one of the benefits from intra-firm diversification.[11] It might therefore be the case that investors properly assessed the benefits of intra-firm 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

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[9] Most studies use the capital asset pricing model (CAPM) or make no risk adjustment. Using the CAPM, a number of authors have shown that acquirers underperform the market for up to three years following 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 multi-factor model is used. Agrawal, Jaffee and Mandelker (1992) show that the negative abnormal returns hold with a multi-factor model except for mergers at the end of the 1970s.

[10] See Schwert (1983) for a review of this evidence.

[11] See Jensen (1989) for the view that financial innovations increased the efficiency of the LBO form of organization.

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 management 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 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 specialized firms under the null hypothesis that diversified firms are simply random portfolios of business units.

All variables that affect firm value affect q. Hence, 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 importantly, 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.[12] 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 therefore 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 is a firm that 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 capitalized value of the benefits from diversification constitute an intangible asset such that a diversified firm extracts more cash flow out of a given portfolio of tangible 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

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[12]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.

firms for 1976. In that paper, they argue that the effect of focus on performance is positive and has a marginal contribution to adjusted R^2 of less than 3%. 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, Shleifer and Vishny (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 year preceding the change in focus. 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 affect firm value. In contrast, we address the issue of the efficiency of diversified firms directly. Both approaches are instructive, but they provide information about different issues. Return studies provide information about the correlation between firm value and changes in firms' activities. For event studies, causality is well established: the announcement of a focusing or diversifying event is the cause of the change in value. There is a problem in interpreting these studies: the change in the degree of diversification could come about because the firm failed in its diversification rather than because diversification is unprofitable in general. For the studies that look at longer periods to estimate returns coincident with changes in diversification, there is some possibility of spurious correlation since returns are affected by many variables, some of which might be correlated with the change in the degree of diversification. By looking at changes in the degree of diversification and relating them to changes in firm value, however, the advantage of the Comment and Jarrell (1993) study is that it can exclude spurious correlation from variables that do not change over time, whereas we cannot.

Section 3. Tobin's q and diversification measures.

All our data comes from COMPUSTAT. The Business Information file of COMPUSTAT provides information for firms disaggregated for up to 10 different industry segments. FASB-SFAS No. 14 and SEC Regulation S-K require firms to report segment information for fiscal years ending after December 15, 1977. SFAS No. 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% 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. In the following, 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. Note that we use segment information for firms dropped from the Industry Segment File.

We construct q using the algorithm proposed by Lindenberg and Ross (1981) and modified by Smirlock, Gilligan and Marshall (1984) to compute replacement cost of plant and equipment. As suggested by Lindenberg and Ross (1981), we set up an acquisition schedule for plant and equipment and correct for price level changes using the implicit GNP price deflator and for depreciation assuming 5% depreciation per year. We assume that the technological parameter is zero as in Smirlock, Gilligan and Marshall (1984) and assume that the value of plant and equipment equals its book value in 1970. We treat inventories as suggested by Lindenberg and

Ross (1981). 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 dollars of assets on average in COMPUSTAT to keep the dataset manageable. In section 6, 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 significant relation between market-to-book and the degree of diversification. Since market-to-book is a coarser measure of the valuation ratio we want to consider, the use of the market-to-book ratio means that we explain a smaller proportion of the cross-sectional variation in firm valuation with that ratio than with q and also that the relation between valuation and the degree of diversification is estimated less precisely.

The literature on diversification has also used other data sources 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 classifies sales using 262 manufactured product categories, but allows firms to aggregate sales from different categories into one in cases where sales in one category are small. Scherer and Ravenscraft (1984) 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 measured diversification in terms of numbers of different SIC codes for plants. Lichtenberg (1992) 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 do. 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 ten segments only, does not have private firms and, as argued by Lichtenberg (1991), is subject to possible reporting biases. The FTC database does not have these limitations, but it is not generally available.

We investigated three diversification measures used by Comment and Jarrell (1993). 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 ten segments that each contribute 10% 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.[13]

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, which is due to the skewed distribution of q. In the following, we always report data on the mean and median of q.

The means and medians of the diversification measures indicate that the typical firm exhibits some diversification since all median diversification measures differ from the values they

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[13] 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.

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 dollars. The p-values for the correlations are all reported as 0.0001. Hsales and Hassets denote respectively the Herfindahl index constructed from sales and the Herfindahl index constructed from the book value of assets.

Variables	Sample size	Mean (Median)	St. dev.	Correlation (Spearman rank correlation)		
				# seg.	Hsales	Hassets
Tobin's q	1449	1.11 (0.77)	1.22	-0.25 (-0.30)	0.26 (0.27)	0.26 (0.27)
# of segments	1449	2.54 (2.00)	1.69	1.00	-0.87 (-0.94)	-0.88 (-0.95)
Herfindahl from sales	1420	0.70 (0.71)	0.29		1.00	0.96 (0.97)
Herfindahl from assets	. 1420	0.70 (0.69)	0.29			1.00

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 0.01 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% and the median Tobin's q exceeds the sample median by 31%. 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 segment 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 non-parametric 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. This is 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 largest q is 17. Consequently, throughout the analysis, we keep discussing results for medians as well as for means. We also report in section 5 results from a truncated sample where firms with q's of five and more are excluded.

In table 2, the mean q of firms with five segments or more is significantly below one with

Table 2

Average and median of Tobin's q for given values of the diversification measures for 1984.

The number in parentheses is the median and the number in braces is the number of firms in the cell. All data is from COMPUSTAT, including the Research Files. The sample includes all firms in the Business Information Files with more than 100 million dollars worth of assets on average.

Panel A. Number of segments.

# of segments	1	2	3	4	≥ 5
Tobin's q	1.53 (1.01) {580}	0.91 (0.71) {215}	0.91 (0.74) {272}	0.77 (0.63) {198}	0.66 (0.58) {184}

Panel B. Herfindahl index constructed from sales.

Herfindahl index	H = 1	$0.8<H<1$	$0.6<H<0.8$	$0.4<H<0.6$	$0.0<H<0.4$
Tobin's q	1.53 (1.01) {580}	0.85 (0.69) {76}	0.91 (0.76) {160}	0.86 (0.66) {299}	0.74 (0.64) {305}

Panel C. Herfindahl index constructed from assets.

Herfindahl Index	H = 1	$0.8<H<1$	$0.6<H<0.8$	$0.4<H<0.6$	$0<H<0.4$
Tobin's q	1.53 (1.01) {580}	0.79 (0.66) {67}	0.95 (0.72) {140}	0.86 (0.68) {309}	0.75 (0.64) {324}

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 1980's, but is in 1978 and 1979. Obviously, the sample mean is always greater than the mean of the firms with five segments or more and significantly so. Looking at the medians, the median q for the firms with 5 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 where the marginal return on capital equals the cost of capital and insures 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 conglomerate invests more and might therefore have a lower q since the 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 5 segments or more that the reduction in informational asymmetries benefit from 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) has the interpretation of the difference between q for firms with two segments and 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) has the interpretation of a marginal contribution to q of the j-th 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 where 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 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 is equal to 2 or greater. Whereas 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 going 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% to almost 50%. The diversification discount is positively 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 economy-wide 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 (1991), 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 1/2 to less than 1/6. In computing these numbers, we do not use the whole universe of firms, but only the firms with more than 100 million dollars in assets on average. Comment and Jarrell (1993) documented the same trend using all firms. Further, Lichtenberg (1992) and Liebeskind and Opler (1992) also show similar results using different databases. Liebeskind and Opler (1992) find a surprising additional result using the Trinet database, however. They argue that highly diversified firms that remained highly diversified actually increased their degree of diversification.

Table 3
Marginal contribution to q of diversification

We estimate the regression:

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

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

Year (# firms)	a	b_2	b_3	b_4	b_5	Adj. R^2
1978 {1454}	1.07 (33.91) {460}	-0.14 (-2.60) {218}	-0.08 (-1.38) {294}	-0.05 (-0.76) {216}	-0.10 (-1.66) {266}	0.04
1979 {1439}	1.13 (33.95) {470}	-0.15 (-2.45) {207}	-0.12 (-1.88) {280}	-0.02 (-0.34) {227}	-0.11 (-1.66) {255}	0.04
1980 {1438}	1.43 (18.86) {479)	-0.24 (-1.78) {210}	-0.26 (-1.71) {282}	-0.01 (-0.04) {217}	-0.13 (-0.86) {250}	0.02
1981 {1423}	1.32 (22.61) {500}	-0.45 (-4.2 1) {220}	-0.05 (-0.42) {264}	-0.07 (-0.57) {196}	-0.11 (-0.88) {243}	0.04
1982 {1404}	1.67 (21.50) {505}	-0.71 (-5.00) {213}	-0.08 (-0.47) {262}	0.02 (0.14) {193}	-0.24 (-1.44) {231}	0.05
1983 {1448}	2.08 (23.02) {562}	-1.01 (-5.92) {220}	-0.07 (-0.35) {251}	-0.10 (-0.47) {203}	-0.18 (-0.85) {212}	0.06
1984 {1449}	1.53 (31.53) {580}	-0.62 (-6.67) {215}	0.00 (0.04) {272}	-0.14 (-1.28) {198}	-0.11 (-0.89) {184}	0.08
1985 {1425}	1.80 (25.38) {612}	-0.82 (-5.80) {205}	0.04 (0.26) {270}	-0.16 (-0.95) {186}	-0.11 (-0.57) {152}	0.06
1986 {1427}	1.82 (28.41) {652}	-0.73 (-5.74) {221}	-0.10 (-0.69) {248}	-0.10 (-0.60) {171}	-0.09 (-0.49) {135}	0.06

1987 {1468}	1.59 (28.27) {720}	-0.59 (-5.11) {226}	-0.03 (-0.22) {236}	-0.14 (-0.91) {158}	-0.01 (-0.07) {128}	0.05
1988 {1388}	1.45 (36.45) {711}	-0.39 (-4.80) {288}	-0.07 (-0.68) {204}	-0.09 (-0.80) {131}	-0.10 (-0.70) {114}	0.05
1989 {1334}	1.52 (34.11) {697}	-0.36 (-4.01) {225}	-0.07 (-0.63) {185}	-0.18 (-1.32) {125}	-0.04 (-0.23) {102}	0.04
1990 {1158}	1.26 (28.97) {603}	-0.29 (-3.27) {196}	-0.10 (-0.86) {170}	-0.10 (-0.73) {105}	-0.04 (-0.23) {84}	0.03

Section 4. A "chop-shop" approach.

In this section, we investigate whether industry effects can explain our results. If diversification does not matter, the value of a diversified firm should be equal to the sum of the values of its divisions if standing alone. Alternatively, the q of a conglomerate should be the sum of the market values of its divisions standing alone divided by the sum of their replacement costs standing alone. Such a comparison is not possible without having the market values of the stand-alone divisions and their replacement costs. In the previous section, we abstracted from industry effects and compared the average q of diversified firms to the average q of specialized firms. In this section, we proxy the q of a division by the average q of the specialized firms in the industry of the division. We call the q obtained from the proxies of the q's of the divisions the pure-play q. Here, the pure-play q is the q the conglomerate would have if diversification does not add or subtract value taking into account industry effects. Such an approach, though not based on q, was pioneered by LeBaron and Speidel (1987) and named by them the "chop-shop" approach.

When forming the pure-play q for a diversified firm, it is important to remember that the q of a portfolio of firms is a replacement-value weighted average of firms and not a market-value weighted average. Comparing the q of a diversified firm to either an equally-weighted or a value-weighted average of proxies for the q's of its divisions could lead to the spurious conclusion that diversified firms are valued less even when they are not. To see this, let q_i be the q of the i-th division of a firm, R_i be the replacement cost for that division and M_i be the market value of that division. q, M and R are, respectively, the q, the market value and the replacement cost of the firm. In carrying out 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 derived from the firms that constitute the holding company. Let α_i be the weight of the i-th firm in the construction of the comparison q and assume that the holding company has n firms. In this case, the comparison becomes:

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

where $E(.)$ and $Cov(.,.)$ 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, i.e., the replacement cost of the i-th 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 approximated in an unbiased way. 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:

$$
\begin{aligned}
q - \sum_{i=1}^{i=n} \alpha_i q_i &= \frac{1}{E(R_i)}[Cov(R_i,q_i) + E(R_i)E(q_i)] - n[Cov(\frac{1}{n},q_i) + \frac{1}{n}E(q_i)] \\
&= Cov(\frac{R_i}{E(R_i)},q_i)
\end{aligned}
\tag{2}
$$

When comparing a diversified firm to an equally-weighted average of the q's of its constituents, the q of the diversified firm will be lower than the q of the equally-weighted average if q's and replacement costs are negatively correlated. Next, comparing a diversified firm to a value-weighted portfolio of the q's of its divisions leads to the following bias:

$$
\begin{aligned}
q - \sum_{i=1}^{i=n} \alpha_i q_i &= q - \frac{E(M_i q_i)}{E(M_i)} \\
&= \frac{E(M_i)}{E(R_i)} - \frac{1}{E(M_i)}E(\frac{M_i^2}{R_i}) \\
&= \frac{1}{E(M_i)}[\frac{E(M_i)^2}{E(R_i)} - E(\frac{M_i^2}{R_i})]
\end{aligned}
\tag{3}
$$

Because of Jensen's inequality, the expression in square brackets is negative if the inverse of the replacement value is not correlated with the square of the market value.[14] Hence, we would find that a portfolio of firms has a lower q than the value-weighted average of the division q's even though here diversification does not affect firm value by construction. In general, there is a bias when using market-value weights, but the sign of the bias is hard to evaluate since it depends on the distribution and magnitudes of the market and replacement values.

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 total assets of the division. 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 3-digit SIC code.[15]

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 purpose, we also provide estimates of the difference between the mean q of one segment firms and the mean q for firms with more than one segment. These

[14] To see this, note that $E(M^2/R) = Cov(M^2,(1/R)) + E(M^2)E(1/R)$ 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.

[15] We also performed the comparisons with similar results 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

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 3-digit SIC code as the division. The unadjusted discount is the difference between the average 1-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 from COMPUSTAT, including the Research Files. The sample includes all firms in the Business Information Files with more than 100 million dollars in total assets on average.

Statistic	2 segment firms	3 segment firms	4 segment firms	5 segment or more firms
Mean discount (T-statistic)	0.35 (5.80)	0.43 (8.62)	0.43 (9.08)	0.49 (11.23)
Median discount (p-value for nonparamatric sign test)	0.24 (<0.01)	0.34 (<0.01)	0.35 (<0.01)	0.38 (<0.01)
Unadjusted discount (T-statistic)	0.62 (7.46)	0.62 (7.74)	0.75 (9.34)	0.86 (11.34)

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, highly 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 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 investigated whether the diversification discount increases with the number of segments. In table 5, we report these results for each year in the sample. We estimated 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 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 industry average of q. To estimate the regressions, we used 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 where 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 where dummy variables for $j > 2$ are significantly different from zero, namely 1979 and 1980; for both these years, however, the discount of two-segment firms is significantly different from zero using the cross-sectional standard deviation of discounts for firms with two segments to compute a t-statistic. The conclusions that 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

Table 5

The marginal industry-adjusted diversification discount

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 3-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 variables 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(Div) that takes value one if the firms has two or more divisions. All data is from COMPUSTAT. In each regression, we use all firms on the Business Information Files with more than 100 million dollars in assets on average including the single-segment firms. (t-statistics in parentheses.)

Year	D(2)	D(3)	D(4)	D(5)	Adj. R^2	D(div)
1978	0.14 (2.66)	0.08 (1.35)	0.10 (1.69)	0.07 (1.14)	0.05	0.27 (7.42)
1979	0.15 (2.79)	0.14 (2.43)	0.04 (0.65)	0.08 (1.36)	0.06	0.31 (8.48)
1980	0.14 (1.09)	0.30 (2.14)	0.07 (0.54)	-0.01 (-0.07)	0.02	0.40 (4.78)
1981	0.21 (2.15)	0.14 (1.32)	0.07 (0.60)	0.04 (0.38)	0.02	0.36 (5.49)
1982	0.41 (3.16)	0.13 (0.86)	-0.06 (-0.39)	0.16 (1.05)	0.02	0.52 (5.97)
1983	0.67 (4.25)	0.02 (0.08)	0.07 (0.36)	0.05 (0.27)	0.03	0.73 (6.88)
1984	0.36 (4.22)	0.08 (0.79)	0.01 (0.06)	0.05 (0.49)	0.04	0.43 (7.56)
1985	0.49 (3.79)	-0.02 (-0.14)	0.03 (0.19)	0.07 (0.38)	0.02	0.50 (5.86)
1986	0.45 (3.88)	0.08 (0.61)	0.05 (0.33)	0.05 (0.28)	0.03	0.54 (6.84)
1987	0.47 (4.56)	-0.04 (-0.34)	0.13 (0.94)	0.01 (0.05)	0.03	0.49 (6.98)
1988	0.34 (4.54)	0.00 (-0.03)	0.03 (0.31)	-0.15 (-1.18)	0.03	0.38 (7.12)

1989	0.31 (3.67)	0.08 (0.71)	0.04 (0.27)	-0.14 (-0.90)	0.03	0.39 (6.54)
1990	0.31 (3.87)	0.02 (0.20)	0.06 (0.50)	-0.05 (-0.37)	0.03	0.36 (6.22)

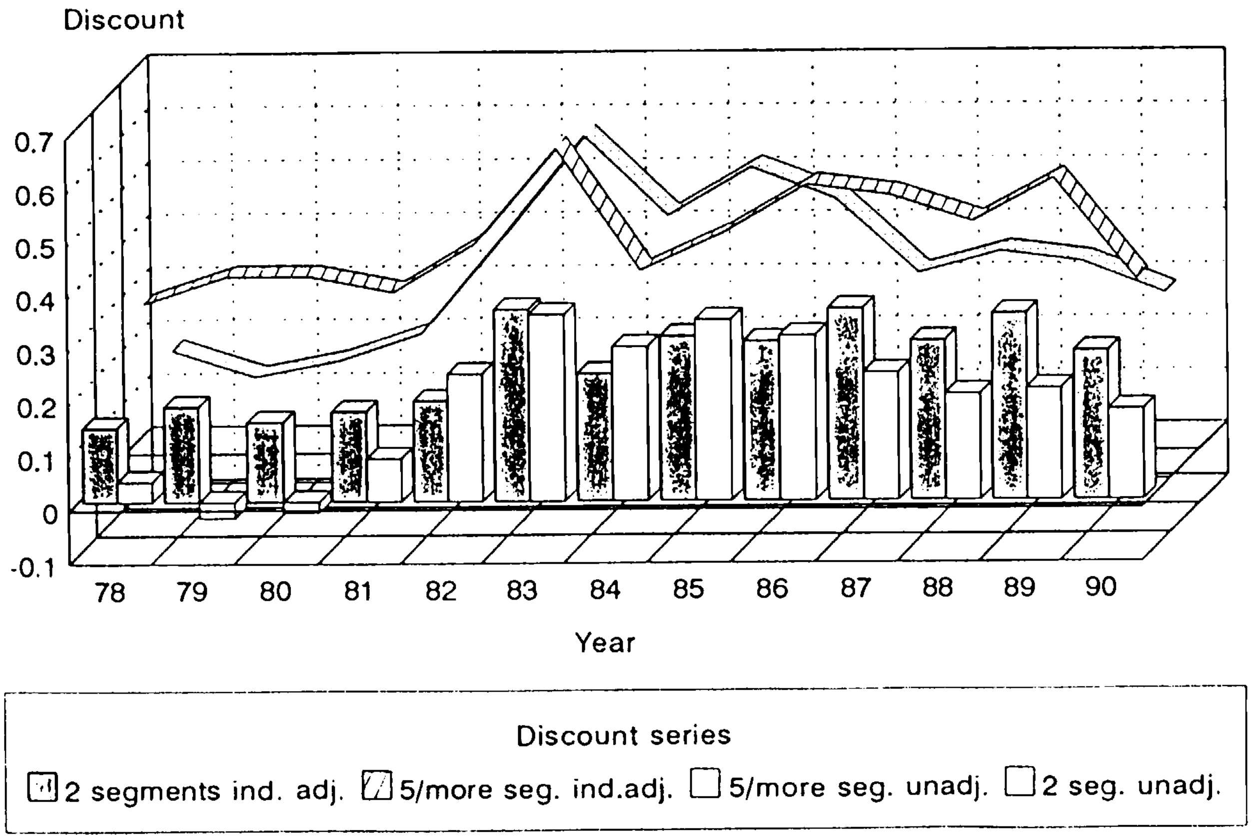
also report the average diversification discount measured as the coefficient on a dummy variable that takes value one for firms with more than one segment in a regression of industry adjusted discounts on a constant and the dummy variable.

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 median q of firms with five or more segments. For the two-segment firm diversification discount, it is negative for two years at the end of the 1970s and is positive every year afterwards. Hence, the discount first increases and then seems to remain largely stationary. For the five-segment firms discount, it is always positive, but also increases at the beginning. If we compute the mean differences instead, we find that the mean difference is always significantly different from zero at the 0.01 level except for the three years in the 1970s where the p-values for years 78, 79 and 80 are respectively 0.011, 0.018 and 0.077. The difference between q's of firms with one segment and q's of firms with five segments is significant at the 0.01 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

Figure 1

Discount for diversification



The discount is the difference between the median q of 1 and multi-segment firms.
The industry adjusted difference is the q of a multi-segment firm a comparable pure-play q.

results that is consistent with our focus on medians rather than means, we used 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 firms' discount is weaker if one does not adjust for industry effects and is weaker if one focuses on medians.

Section 5. 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 of a firm. 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 where 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.[16] In our sample, there is a significant positive relation between size (defined as total assets) and the degree of diversification.[17] For

[16] 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.

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

instance, the correlation coefficient between the number of segments and total assets is 0.227 and it is significant at the 0.01 level. Since there is a positive relation between size and diversification, it could be that our results are explained by the fact that large firms are less efficient 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 do not include R&D as an asset. Hence, firms with large R&D investments will 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 neo-classical model where 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 NPV 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 on the financial markets.

In table 6, we provide estimates of this multivariate regression for 1984 using the unadjusted discount and the adjusted discount as the dependent variables. Note that in table 5, the estimate of the industry-adjusted diversification discount across all multi-segment 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 (i.e., minus one times the coefficient on the diversification dummy variable) remains significant when we control for these other firms 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 controlling 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 also and affects q negatively. We repeated these regressions for every year and find similar results, namely that the diversification discount remains significant. We also estimated the regressions using cumulative dummy variables as in tables 3 and 5 with similar results.

A possible problem with our approach of using q as a dependent variable is that firms that are highly diversified are likely to engage more frequently in sales and purchases of divisions than specialized firms.[18] Doing so will mark to market the cost of divisions. Hence, in an extreme case where a firm replaces all its divisions every year and diversification contributes nothing, the firm would 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 concem if the q ratio of highly diversified

[18] 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 5 segments or more than for firms with one segment. In their sample, the rate of divestiture is 0.8% of all firm years for single-segment firms and 6.7% for firms with 5 segments or more. For acquisitions, the rates are, respectively, 2.7% and 10.9%.

Table 6

Multivariate regressions estimating the average diversification discount

These regressions investigate the robustness of the diversification discount for 1984. All data is from COMPUSTAT. The regressions use the sample of firms with total assets more than 100 millions dollars 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 3-digit main SIC code. The constant segment sample is obtained by eliminating all firms that changed their number of segments during 1978 to 1983. (t-statistics in parentheses.)

Regression	Number of observations	Diversification dummy	Log size	Dividend not paid	R&D/Total assets	Adj. R^2
1 Unadj. q	632	-0.43 (-4.61)	-0.21 (-5.97)	-0.19 (-1.76)	1.15 (1.45)	0.15
2. Adj. q	609	-0.34 (-3.77)	-0.12 (-3.48)	0.07 (0.69)	-0.25 (-0.34)	0.05
3. Unadj. q Constant segments	337	-0.20 (-2.05)	-0.12 (-3.19)	-0.17 (-1.38)	1.72 (2.21)	0.07
4. Adj. q Constant segments	325	-0.21 (-2.01)	-0.03 (-0.64)	0.31 (2.39)	1.34 (1.62)	0.02
5. Unadj. q q < 5	618	-0.29 (-4.53)	-0.13 (-5.22)	0.02 (0.21)	1.46 (2.71)	0.11
6. Market-to-book	632	-0.17 (-3.46)	-0.84 (-4.38)	0.02 (0.31)	0.91 (2.16)	0.07

firms, i.e., of firms with five segments or more, is 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 give regression estimates for firms that have not changed their number of segments for at least the five previous years. We report the results for 1984. 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. Using this approach, we find our results to weaken somewhat, however. 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 outliers. We saw in section 3 that the negative relation between q and diversification holds 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 the last regression 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 of these firms are single-segment firms. Removing these firms decreases the estimate of the diversification discount but has no impact on significance. We estimated similar regressions for all years. 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 the table, we discard q altogether and use the numerator of q divided by the book value of total assets. With this market-to-book ratio, there is still a significant discount for diversification. Hence, the effect we document does not depend on the algorithm used for the computation of q.

Section 7. 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 is it that high performers diversify and become poor performers?

In table 7, we provide evidence from the firms with one segment that change the number of segments they report in our sample period to 2 or more. We call these firms diversifying firms under the assumption that the reporting of segment numbers is unbiased. With this assumption, firms that increase the number of segments reported are firms that either have acquired a new, important line of business or firms that have expanded an existing line of business to the point where 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 which chooses to go from one segment to two segments in year t. We compute a segment-adjusted q 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 7, firms that choose to diversify have lower average segment-adjusted q's, but the results 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% lower than the q of firms that do not

Table 7

Firms that change the number of segments they report

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 is from COMPUSTAT and includes only firms on the Business Information Files with more than 100 million dollars in total asset on average. All statistics are for the year before the change except the last row that reports the change in q for the end of the fiscal year before the change to the end of the fiscal year after the changed. 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 are 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.

	Diversifying firms		Focusing firms	
Variables	Mean (t-statistic)	Median (p-value for sign test)	Mean (t-statistic)	Median (p-value for sign test)
Segment-adjusted q	-.163 (1.23)	-0.165 (<0.01)	-0.016 (-0.70)	-0.001 (0.87)
Industry-adjusted q	0.078 (0.80)	-0.026 (<0.01)	-0.597 (-14.1)	-0.417 (<0.01)
Segment-adjusted EBIT	-0.021 (-2.86)	-0.020 (<0.01)	-0.002 (-0.61)	-0.069 (0.37)
Segment-adjusted cash flow	-0.028 (-2.01)	-0.17 (<0.01)	-0.004 (-1.15)	-0.003 (0.23)
Segment-adjusted change in q	-0.204 (-1.60)	-0.01 (0.87)	0.024 (1.39)	0.001 (0.91)

diversify. Also, diversifying firms have lower median segment-adjusted q's with a significant sign-test at the 0.01 level. One possible explanation for this tendency of diversifying firms to have lower q's is that the firms that diversify have lower q's because the market anticipates poorer performance to result from the diversification attempt. This does not seem to be the correct explanation, however, as the firms that diversify also have poor accounting performances. The accounting performance evidence is not consistent with the free cash flow theory either.[19] This theory predicts that firms use excess cash flows to diversify rather than to pay out dividends to shareholders. It is clearly the case that firms that diversify seem to have poor investment opportunities relative to those that do not. However, even if we focus on firms with q less than one, we find (in work not reported here) that they still do not have substantial cash flows relative to firms that do not diversify.

In table 7, 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.

The evidence of table 7 seems to be consistent with the view that firms diversify because they have exhausted growth opportunities in their existing activities and that some of the difficulties of these firms appear to be due to their industry. Whereas the 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, whereas the evidence that firms do not gain from diversification seems convincing, the evidence that they suffer from it 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 either. There is weak evidence that these firms outperform the firms with

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[19] See Jensen (1988). See also Lang, Walkling and Stulz (1991) for supportive evidence.

five segments or more that do not choose to become more focused contemporaneously. 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 0.10 level. The difference in median changes in q is not significant using a sign test. Interestingly, 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 of its debt and a q of 0.5, the 0.024 improvement in q translates in a cumulative abnormal return for the calendar year of the refocusing and the year following the refocusing of 8%.

Section 8. 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 evidence shows strongly 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. Whereas 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 therefore that there is a diversification discount in our dataset. 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 can only provide 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. This is because, 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 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 since our evidence is not inconsistent with the view that some firms do gain from diversification.

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