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## ABSTRACT

This paper is an empirical examination of capital allocation in a sample of 165 diversified conglomerates in 1979. I find that divisions in high-Q manufacturing industries tend to invest less than their stand-alone industry peers, while divisions in low-Q manufacturing industries tend to invest more than their stand-alone industry peers. This sort of "socialism" in capital allocation in which investment tends to get equalized across divisions is particularly pronounced in a conglomerate's smaller divisions. It is also more pronounced in firms in which management has small equity stakes suggesting that agency problems between corporate headquarters and investors are at the root of the problem. By 1994, only 53 (32%) of these firms continue to be free-standing diversified conglomerates. Fifty-five (33%) choose to sell off unrelated divisions and focus on one core business. These firms tend to sell their smaller divisions, and when they do, their investment behavior changes relative to 1979: it more closely resembles that of their stand-alone industry peers. The remaining 57 (35%) firms were acquired or (in two cases) liquidated.

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## 1. Introduction

Corporate diversification is out of style; focus is in. The consensus among academic researchers, consultants, and investment bankers is that diversified firms destroy value. They tend to have lower Tobin's Q; they trade at discounts to a portfolio of comparable stand-alone firms; they are more likely to be broken up when these discounts are larger; and the stock market reacts favorably to increases in corporate focus.[1]

Although this view is now conventional wisdom[2], the precise mechanism through which diversification destroys value is less well understood. One line of argument is that division managers of diversified firms have weak incentives to maximize value. There are many reasons why this might be so, including the difficulty of motivating division managers by giving them equity stakes in their businesses.[3] Another line of argument --- popular in the strategic management literature --- is that diversification does not add value unless it allows a firm to capitalize on its unique competitive advantage (Porter, 1980), core competency (Pralahad, 1990), or excess resources (Wernerfelt 1984).[4]

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[1] See Wernerfelt and Montgomery (1988) and Lang and Stulz (1992) for the findings on diversification and Tobin's Q; Berger and Ofek (1995, 1996) for the findings on the conglomerate discount and its relationship to conglomerate bustups; and Comment and Jarrell (1995) for the findings on increased corporate focus. Lins and Servaes (1997) also find a conglomerate discount in the United Kingdom and Japan, but none in Germany.

[2] This has not always been the conventional wisdom. Many of the conglomerates that were busted up in the last 15 years, were formed in the 1960s and early 1970s, when corporate diversification was thought to be value enhancing. Matsusaka (1993) shows that the stock market reacted favorably to announcement of diversifying acquisitions. Interestingly, Servaes (1996) shows that there was a conglomerate discount in the 1960s, but that this discount disappeared in the 1970s.

[3] See Aron (1989) and Rotemberg and Saloner (1994) for models of the increased incentives of managers in focused firms. See Aron (1988) and Hermalin and Katz (1994) for a model of increased incentives of managers in diversified firms. Baker and Wruck (1989) document the muted incentives of O.M. Scott managers when the business was a division of ITT and the increase in their incentives after the company was purchased in a leveraged buyout in 1986.

[4] These related theories are less clear on the costs of diversification.

In this paper, I examine a third rationale for why diversification destroys value, namely that headquarters in diversified conglomerates does a poor job allocating capital. One version of this rationale is based on the "free-cash-flow hypothesis" of Jensen (1986) in which the managers of firms with excess cash flow tend to invest more than they should. If conglomerates have better access to capital --- perhaps because the lower volatility of their cash flows gives them more debt capacity --- then they might overinvest relative to more focused firms. However, while the level of investment might be too high, there is no particular reason to believe that there should be any systematic misallocation of capital across divisions. Indeed, Stein (1997) presents a model in which headquarters with a penchant for overinvesting, efficiently allocates capital across divisions given its overall capital budget.[5]

Here, I examine a specific way in which diversified conglomerates might misallocate capital *across* business units. In particular, I analyze the hypothesis that conglomerates will practice a kind of "socialism" in capital budgeting --- underinvesting in divisions with relatively good investment opportunities and overinvesting in divisions with relatively poor investment opportunities. A model along these lines is presented by Scharfstein and Stein (1996). In the model, the marginal return to productive activity is lower in divisions with poor investment opportunities, leading their managers to devote more time trying to capture corporate rents and perks for themselves. Headquarters tries to induce these managers not to rent-seek by giving them an excessive capital budget. Since headquarters is itself an agent of investors, it prefers to "bribe" managers by misallocating capital, rather than by giving up some of its own perks.[6]

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[5] In addition, Comment and Jarrell (1995) do not find that diversified conglomerates are more leveraged nor that they rely more on external financing.

[6] The idea that managers in bad divisions spend more time rent-seeking has also been suggested by Meyer, Milgrom and Roberts (1992) and Rajan and Zinglales (1996), though the implications for capital allocation are less clear.

I look for evidence of socialism by analyzing the capital expenditures of 165 diversified conglomerates in 1979, firms that operate in at least two unrelated lines of business. I estimate a model that implies that manufacturing divisions in industries with good investment opportunities (as measured by a variant of Tobin's $Q$) tend to invest less than their single-segment, stand-alone industry peers, while manufacturing divisions in industries with poor investment opportunities (low Q) tend to invest more than their stand-alone industry peers. This follows from the fact that the capital expenditures of focused, stand-alone firms are responsive to Q, while this is not the case for divisions of diversified conglomerates. This effect is more pronounced for the relatively small divisions of conglomerates; in fact, the capital expenditures of relatively large divisions are positively related to $Q$ in much the same way that it is for stand-alone firms.

Of course, it is possible that stand-alone firms themselves make the wrong capital expenditure decisions --- perhaps by underinvesting in low-$Q$ businesses and overinvesting in high-$Q$ businesses. This might be the case, for example, if the stock market systematically undervalues low-$Q$ businesses and overvalues high-$Q$ businesses. High-$Q$ stand alone firms would have access to cheap funding and thus might overinvest, while low-$Q$ businesses would be cut off from cheap financing and might underinvest.[7] To the extent that a diversified conglomerate has both low-$Q$ and high-$Q$ divisions, it might be able to efficiently reallocate resources from the overvalued high-$Q$ divisions to the undervalued low-$Q$ divisions.

As it turns out this explanation does not square with the data. First, I show that the observed differences between conglomerates and stand alones is less pronounced in firms where management has a large equity stake. This suggests that conglomerate's investment behavior

[7] As Stein (1996) points out, it is not obvious that firms with over-priced equity would overinvest. If they are long-run value maximizing investors, they could always invest in zero net present value investments (such as Treasury bills) rather than invest in negative net present value investments.

stems, at least in part, from agency problems between headquarters and investors, a key implication of the theory proposed by Scharfstein and Stein (1997).

Second, this alternative explanation of the results implies that the conglomerates in the sample should be successful and enduring. However, this does not appear to be the case in general, nor is it true of my sample. Of the 165 conglomerates, 55 (33%) became focused by the end of 1994. Moreover, 57 (35%) of the firms that did not become focused on their own were acquired by other firms (or in two cases were liquidated). In many of these acquisitions, the unrelated lines of business were sold. Only 53 (32%) firms continued as diversified conglomerates through 1994.

Interestingly, conglomerates that became focused tended to sell off their smaller divisions --- the divisions whose capital expenditures deviated most from industry peers --- and focus on their largest, "core" division. Investment in these core divisions, which in 1979 resembles that of a typical conglomerate, begins to look more like that of a stand-alone firm in the year the conglomerate becomes focused.

There are a number of other papers that study capital expenditures in diversified conglomerates. Lamont (1997) shows that exogenous adverse shocks to cash flow in one division can affect capital expenditures in unrelated divisions --- in particular the sharp drop in oil prices in 1986 led diversified oil companies to cut investments in their *non-oil* divisions. This suggests that there is cross-subsidization across divisions in these conglomerates. The open question is whether the reduction in capital expenditures was efficient or inefficient: if the non-oil divisions had been investing at or below the efficient level, the oil shock exacerbated inefficiencies; if they had been investing too much, the oil shock may have enhanced efficiency by putting these divisions on a much-needed diet. There is some evidence that the latter is what

happened: prior to the oil shock, the non-oil divisions seemed to underperform their industry peers yet they invested at the same rate. Thus, these divisions may well have been overinvesting.

Shin and Stulz (1997) take a somewhat similar approach with a much larger sample of firms operating in multiple business segments. They find that the capital expenditures of small segments are positively related to the cash flow of other segments, while this is not the case for large segments. Thus, like Lamont, Shin and Stulz find some evidence of cross-subsidization in diversified conglomerates. They argue, however, that this diversification may be inefficient because it does not appear to depend on the investment opportunities of the subsidized segment: reductions in the cash flow of other segments do not reduce the capital expenditures of low-$Q$ segments more than they reduce the capital expenditures of high-$Q$ segments.

Finally, Berger and Ofek (1995) examine a large sample of multi-segment firms to see whether overinvestment in low-$Q$ segments is related to the conglomerate discount. They identify overinvestment as any capital expenditures in excess of depreciation in industries with median Tobin's Q in the lowest quartile. They find that the unrelated segments of diversified conglomerates tend to invest more in these low-$Q$ industries, and that the more they do, the greater is the conglomerate discount.

This paper builds on elements of each of these papers. I follow Lamont in using personal judgment to identify diversified conglomerates and in analyzing a relatively small sample of firms that operate in unrelated lines of business. This differs from the other studies which use much larger samples, but which also use crude screens of relatedness and segment data that may include very diverse businesses.

The paper also builds on the approach of Shin and Stulz by looking at whether firms seem to favor their high $Q$ businesses or penalize them. But rather than looking at the sensitivity of

investment to cash flow --- and how this sensitivity depends on $Q$ --- I relate investment directly to Q, showing that focused firms are more responsive than conglomerates to investment opportunities.

Moreover, unlike any of the other papers I show that investment inefficiencies are less pronounced in firms where we would expect agency problems to be less severe --- firms where management has large ownership stakes. This is a direct implication of the theory proposed by Scharfstein and Stein (1996). And finally, unlike the other studies I track conglomerates over time and document the changes in their investment behavior.

The paper is organized as follows. The next section describes the data and the construction of a sample of diversified conglomerates. Section 3 establishes the basic results comparing focused firms and conglomerates. Section 4 shows that the difference between diversified firms and focused firms is more pronounced in conglomerates in which management has only a small equity stake. I discuss what happens to diversified conglomerates during the period 1980-1994 in Section 5. Section 6 concludes the paper.

## 2. Data

As of the end of 1977, FASB No. 14 and SEC Regulation S-K required all publicly-listed firms to report sales, operating profit, depreciation, capital expenditures, and total assets at the business segment level. A business segment is defined as a line of business with at least 10% of the firm's sales.

These business segment data are included in the Standard & Poor's Compustat database beginning in 1978. Compustat assigns a primary and secondary Standard Industrial Classification (SIC) code at the four-digit level to each of a company's business segments. The

database also includes the segment's name as reported by the company. These business segment data are used in conjunction with Compustat's firm-level data.

The empirical analysis focuses on firms that operate in unrelated lines of business. Thus, we need a way of determining whether businesses are related. The standard approach is to classify segments as unrelated if they operate in different 2-digit, 3-digit, or 4-digit SIC codes. This approach has some potentially important limitations. The first limitation is that even though the segments are in two different SIC codes, they can produce related products and provide related services. This is true even across 2-digit SIC codes. For example, one of the firms in the sample is Gifford-Hill & Co. Two of the segments the company reports are Construction Materials and Metal Building Products. The former segment produces concrete-related products and is listed under SIC code 32 (Stone, Clay and Glass), while the latter produces roll-formed metal building products and custom-designed metal buildings and is listed under SIC code 34 (Fabricated Metal Industries). Although the segments are in different two-digit SIC codes, both segments manufacture products for the construction industry. It would be mistaken to label them unrelated, and indeed in my sample I group these segments together.

The second limitation of using 2-digit SIC codes as a measure of relatedness is that there can be vertical connections between segments in different 2-digit SIC codes. For example, Brunswick Corporation reports five business segments, one of which is Recreation Products (2-digit SIC code 39) and another of which is Recreation Centers (2-digit SIC code 79). Recreation Products manufactures bowling products (bowling lanes, automatic pinsetters, bowling balls, etc.); Recreation Centers operating bowling alleys. Clearly, the Recreation Products segment supplies Brunswick's Recreation Centers segment, and they are related even though they are in different 2-digit SIC codes.

A somewhat more sophisticated approach to measuring relatedness is taken by Matsusaka (1993), who tries to identify these vertical relationships through an economy-wide input-output matrix. He calls two divisions unrelated if: (1) they are in different two-digit industries; (2) if the divisions' three-digit industries buy less than 5% of their inputs from each other and sell less than 5% of their outputs to each other. A similar approach is taken by McGuckin, Nguyen and Andrews (1992). While this approach may identify divisions that are vertically related, it does not help identify horizontal linkages.

As an alternative to these approaches, I follow Lamont (1997) in using personal judgment to determine whether segments are related. This is an admittedly imprecise approach, but I believe it is a good way of identifying diversified conglomerates, and is probably more likely than the standard approach to eliminate firms in related industries. Thus, I began by reviewing the segment names reported in the 1979 Compustat for all companies reporting segment data. If any two of a company's segments appeared to be unrelated I included the company in the (very) preliminary sample. Most of the firms did not meet this screen, in part because I was very aggressive in eliminating firms I suspected of having segments that were related in some way. However, because the segment name is only suggestive of the kinds of products the segment produces, companies that were not eliminated in this first round were cross-referenced in the *Moody's Industrial Manual*. In most cases, *Moody's* includes a detailed description of the products produced by each segment. At this point, I eliminated firms from the sample for one of five reasons.

1. The company appeared to have no unrelated segments.

2. The business segments themselves were very diverse and included business in very different industries.

3. The description of the business segments was vague.

4. The company had a financial services segment or no manufacturing segments.

5. The company was not listed in *Moody's*.

Since there are still some segments in the firm that are related, I pooled these related segments into what I call "divisions." Thus, all of the divisions in a firm operate in unrelated lines of business, though segments within a group may be related. Keep in mind that these divisions do not necessarily correspond to what the company labels a division.

To provide some indication of the kinds of subjective choices I made, Appendix 1 lists all of the companies in the final sample. Appendix 2 gives more details on the segments of the first twenty companies in alphabetical order, and briefly describes the rationale for including these firms in the sample.

A couple of points are worth noting about the sample. First of all, it clearly understates the number of publicly-traded diversified conglomerates that existed in 1979 because of the restrictions (2-5 above) I impose on the sample firms to ensure that the data are meaningful. General Electric, perhaps the most well-known diversified conglomerate, is excluded from the sample because the reported business segments include very diverse businesses that are themselves unrelated. For example, Technical Systems, one of General Electric's business segments in 1979, appears to include products as diverse as missiles and diagnostic imaging equipment.

Moreover, the sample is restricted to conglomerates in one year because of the time consuming process of evaluating whether a company is a true conglomerate in unrelated lines of business. In addition, I chose the year 1979, because it is the first year with all available data

(including lagged Q), and I wanted to be able to track what happens to these conglomerates over time.

Table 1 provides some summary statistics on the sample firms. The mean sales is almost $1.44 billion, while median sales is $326 million. Not surprisingly, these firms are larger than the average Compustat firm which has sales of $727 million. The average number of segments is 4.1 which I aggregate into a mean of 3.4 divisions. Average divisional sales are $424 million for the whole sample, and $464 million for the divisions I ultimately study.

The two key variables in the analysis are capital expenditures (our measure of investment) and a variant of Tobin's Q (our measure of investment opportunities). Divisional capital expenditures are just the sum of the capital expenditures in each of the division's segments as reported in the segment file of Compustat. In the analysis, divisional capital expenditures are normalized by divisional sales in 1979. I use sales as my normalization rather than assets because firms have more latitude in allocating assets across segments than they have in allocating sales. Also, I normalize by 1979 sales rather than lagged, 1978 sales for two reasons. First, there may be no segment in 1978. Second, the composition of the segment may change between years, thus making comparison difficult. Lamont (1997) takes a similar approach. Table 1 shows that the average ratio of division capital expenditures to sales, *CAPXS*, is 0.045 and the median is 0.033.

To measure the value of investing in a segment, I calculate the median beginning-of-year $Q$ of single-segment firms in the three-digit industry of the segment. My measure of $Q$ is the market value of the firm divided by the book value of its assets.[8] Note that this measure differs from standard measure of Q in that I do not try to construct an estimate of replacement cost of

fixed assets, nor do I adjust for taxes. Previous studies have shown these adjustments are not essential.[9] I also am defining the industry at the three-digit level. I choose this rather than the two-digit level because two-digit industries are too broad. I do not use four-digit codes because they are somewhat narrow and because there are often very few (or no) single-segment firms in the four-digit classification. Finally, since we are trying to explain divisional investment, rather than segment investment, we calculate a weighted average Q for the division, where the weights are the fraction of divisional sales attributable to the segment. The average division Q is 1.03, while the median is 0.98.

## 3. Empirical Approach and Basic Results

As discussed in the Introduction, the question under consideration is whether conglomerates allocate capital in an efficient manner or whether they tend to practice a kind of "socialism" in their allocation of capital --- overinvesting in bad divisions and underinvesting in good ones. One simple way of addressing this question is to see whether divisions of conglomerates tend to invest more than their stand-alone industry peers in bad industries and invest less than their stand-alone industry peers in good industries.

Table 2 presents two regressions that take this approach. The dependent variable, *DCAPXS*, is the difference between divisional capital expenditures (normalized by divisional sales) and the median investment of stand-alone firms in the same three-digit industry (also

[8] More specifically, the market value of assets is equal to the book value of assets plus the market value of common equity less the sum of the book value of common equity and balance sheet deferred taxes.

[9] See Perfect and Wiles (1994)

normalized by sales).[10] The first column reports the results of regressing *DCAPXS* on the median beginning-of-period $Q$ of the stand-alone firms in the industry.

The coefficient of industry $Q$ is negative and statistically significant. On average, conglomerate divisions invest 0.6% more than stand-alone firms. However, the coefficient of Q implies that divisions with industry Q one standard deviation above the mean Q --- i.e. a Q of 1.25 as compared to 1.03 --- invest at a rate that is equal to the average of the stand-alones. By contrast, divisions in industries with Q one standard deviation below the average (Q of 0.81) invest 1.2% more than the average stand alone. Given that the average stand-alone's investment rate is 3.9%, this constitutes an investment rate for low-Q divisions of conglomeraets that is 30.7% higher than stand-alones. Thus, the regressions indicate that conglomerates tend to invest more than stand-alone firms and, more interestingly, that they invest even more relative to stand-alones in industries with worse investment prospects.

One possible explanation of this result is that conglomerate divisions are in some way different from stand-alone firms. In particular, it may be that the divisions in low-$Q$ industries have better investment prospects than the median firm in the industry, and that is why they tend to invest more. To address this concern one would like some measure of division-specific investment prospects. Of course, there is no divisional $Q$. The best I can do is to include some measure of divisional performance relative to stand-alone firms in the industry. Thus, I include the divisional cash flow to sales ratio less the same ratio for the median firm in the industry, *DCFS*, where cash flow is defined as operating income plus depreciation. As the second column of Table 2 indicates, this ratio is positively related to *DCAPXS*; divisions which outperform their

[10] Divisions can have multiple segments, so there may be multiple 3-digit industries. The industry capital expenditure variable is a sales-weighted average of the relevant 3-digit industries.

stand-alone industry peers tend to invest more. More importantly, the inclusion of divisional cash flow has no appreciable effect on the coefficient of industry $Q$.

A potentially greater concern about these results is that they may be "hard-wired." My measure of investment prospects is industry median $Q$ and I adjust divisional capital expenditures by industry median capital expenditures. Note that $Q$ contains information about both industry investment prospects and firm-specific investment prospects. Thus, the firm with median capital expenditures is more likely than a random firm to be the firm with median $Q$. As a result, industry median $Q$ is likely to be more correlated with industry median capital expenditures than it is correlated with the capital expenditures of a random firm or division; the medians are both drawn from the centers of the distributions. This would then induce a negative relationship between *DCAPXS* and $Q$ even if the capital expenditures of divisions and stand-alone firms are equally responsive to their own investment prospects.

To get around this potential problem, I first estimate the relationship between stand-alone firms' capital expenditures and industry median $Q$ throwing out the firm with median $Q$. This guarantees that there is no hard-wiring, and if anything, the approach may underestimate the true relationship. Then, I estimate the sensitivity of conglomerate divisions' capital expenditures to industry median $Q$. If the capital expenditures of stand-alone firms are more sensitive to $Q$ than are the capital expenditures of divisions, it follows that there will tend to be overinvestment in low-$Q$ divisions and underinvestment in high-$Q$ divisions.

The results of the two sets of regressions are reported in the first two columns of Table 3. The first column indicates that there is a positive, statistically significant relationship between stand alone firms' capital expenditures and industry median $Q$ (excluding the firm with the median $Q$ from the regression). By contrast, the second column shows that there is no such

relationship for divisions of conglomerates. The coefficient is statistically indistinguishable from zero and smaller than the coefficient in the regression for stand alone firms. The difference in the coefficients is also statistically significant.

This model implies that divisions in low-$Q$ industries --- those in an industry with a median $Q$ of 0.81, one standard deviation below the mean of 1.03 --- invest at a rate of 4.7% of sales. Stand-alone firms with $Q$ of 0.81 are predicted to invest at a rate of 3.9% of sales. Thus, the regression results imply that in low-$Q$ industries, divisions of conglomerates invest more than stand-alone firms. By contrast, in high-$Q$ industries, the regressions imply that stand-alone firms invest at a higher rate than divisions: with an industry $Q$ of 1.25 --- one standard deviation above the mean --- conglomerates would invest at a rate of 4.3% of sales whereas divisions would invest only 5.2% of sales.

As discussed above, it is conceivable that in low-$Q$ industries, $Q$ underestimates the investment opportunities of divisions relative to stand alones and in high $Q$ industries it overestimates the investment opportunities of divisions relative to stand alones. In principle, this could explain why divisions invest less than stand alones in high $Q$ industries and more than divisions in low $Q$ industries. To control for this possibility, I include divisional cash flow in the regression for divisions, and segment cash flows for the stand-alone firms. Cash flow will pick up firms-specific differences in investment opportunities as well as differences in resources available for investment.

The third and fourth columns of Table 3 indicate that the coefficient of cash flow to sales, *CFS*, is positive and statistically significant for both divisions and stand-alone firms. The point estimate is slightly higher for the stand-alone firms, but the difference in the coefficients is not statistically significant. More interestingly, the inclusion of cash flow does not alter the

conclusion that the coefficient of industry $Q$ is greater for stand alone firms than it is for divisions of conglomerates. Moreover, the difference in the coefficients is statistically significant at the 1% confidence level. The predicted capital expenditure rates for high and low-$Q$ operating units are basically the same as those of the models that exclude cash flow.

In Table 4, I investigate whether socialism depends on the relative size of the divisions within the conglomerate. On the one hand, one might expect large divisions to have more power within the firm, and more say over the allocation of corporate resources. In this view, large divisions would invest more in low $Q$ industries. On the other hand, there is less scope to cross-subsidize large divisions, since the other divisions will tend to have fewer resources at their disposal to do so.

The first column of Table 4 shows that it is the small divisions where socialism prevails; in fact, the large divisions look more like stand-alone firms. As in Table 3, I regress divisional capital expenditures (*CAPXS*) on industry $Q$, but now I add the division's share of overall sales, *SALESHARE*, and an interaction between *SALESHARE* and $Q$. The coefficient of $Q$ is now negative and statistically significant. More interestingly, the coefficient of the interaction term is positive and statistically significant. This means that the investment of relatively large divisions tends to respond more positively to increases in $Q$ than the investment of relatively small divisions.

The coefficients of $Q$ and $Q$ x *SALSHARE* imply that in a division of average size --- one with 32.4% of company's sales --- the effect of $Q$ on *CAPXS* is equal to 0.008. Recall that for stand-alone companies, the coefficient is 0.044, over five times as large. However, for relatively larger divisions, the difference between conglomerates and stand-alone firms is smaller; the

effect of $Q$ on *CAPXS* for divisions that comprise 80% of company sales is 0.027, still less than it is for stand-alone firms, but the difference is smaller.

The second column of Table 4 adds to this regression the cash flow variable as well as an interaction between cash flow and *SALESHARE*. The coefficient of cash flow continues to be positive and statistically significant while the interaction term is indistinguishable from zero. The other coefficients are not affected much.

It is possible that larger divisions show a greater sensitivity of their investment to industry Q because they more closely resemble their stand-alone industry peers. However, segments of the diversified conglomerates tend to be somewhat larger than stand-alone segments. Nevertheless, to take account of absolute size I also include the natural log of divisional sales. This variable is also interacted with Q. As the last column of Table 4 shows, neither of these variables is statistically significant and it has no appreciable effect on the other coefficients.

## 4. Evidence on Management Ownership and Investment

In this section I consider whether the investment behavior documented above depends in some way on management's ownership stake in the firm. I focus on management ownership because Scharfstein and Stein (1996) argue that socialism in capital allocation stems from the simultaneous existence of two factors: (1) rent-seeking behavior between divisional managers and headquarters and (2) agency problems between headquarters and investors. Without agency problems between headquarters and investors, headquarters would choose to eliminate rent-seeking in an efficient manner --- i.e. pay division managers not to rent seek --- rather than distort capital spending. Thus, the theory predicts that where management ownership stakes are high, one should observe conglomerate investment behavior more in line with stand-alone firms, and

that investment distortions should be more pronounced in firms with low management ownership.

To investigate this hypothesis, I collected management ownership data on the sample firms from proxy statements for fiscal year 1979. I was unable to find information on 29 firms in the sample, leaving me with a sample of 136 firms. Management ownership is defined as the fraction of outstanding common stock held by managers identified in the proxy statement. These are typically the managers on the board of directors. The mean holding is 10.6% of the outstanding shares, while the median is 3.1%. A quarter of the management teams in the sample hold 16.9% or more, while a quarter of the sample holds less than 0.7% of the company's stock. Thus, there is quite a bit of ownership variation among management teams.

To analyze the link between ownership and investment, I return to the basic regressions in Table 2 which regress industry adjusted capital expenditures, *DCAPXS*, on median industry *Q*. Recall that in Table 2 it was shown that *DCAPXS* was negatively related to industry *Q*. Now I add management ownership to this specification, and an interaction term between management ownership and *Q*. The theory predicts that the coefficient of the interaction term should be positive; *DCAPXS* should be less negatively related to *Q* for companies with high management ownership.

The first column of Table 5 shows that this is indeed the case. The coefficient of *Management Ownership x Industry Q* is positive and statistically significant while the coeffcient of *Q* continues to be negative and statistically significant. The model implies that, at low ownership levels, conglomerates tend to invest more than their stand-alone industry peers in low-*Q* industries, and less than their stand-alone industry peers in the high-*Q* industries. For example, at the lowest quartile of management ownership (0.7%), the model implies that conglomerates

invest 1.6% more than stand alone firms in an industry with $Q$ of 0.81. By contrast, at the highest quartile of ownership (16.9%), firms invest only 0.7% more than stand alone firms. In high $Q$ industries, low-ownership firms invest 0.5% less than stand-alone firms, while high-ownership firms invest 0.2% more than stand-alone firms. The second column of Table 5 shows that the results are robust to the inclusion of industry adjusted cash flow.

One concern about these results is that management ownership may be proxying for size: large firms tend to have much lower ownership percentages. Thus, it may be that investment by small firms is more sensitive to $Q$ than investment by large firms. The regressions reported in the third and fourth columns deal with this concern by using the component of management ownership not explained by firm size. That is, I regress management ownership on the market value of equity ---- not surprisingly, the relationship is negative --- and use the residuals from this regression as the ownership variable. As the table shows, "excess" ownership is related to investment in much the same way as ownership is.

These results are potentially important for two reasons. First, they indicate that to the extent there is socialism in capital allocation, it appears to be related to agency problems between headquarters and investors. This is a critical part of the theory proposed by Scharfstein and Stein (1997).

Second, the results lend support to the interpretation that the observed differences between conglomerate investment and stand-alone investment is inefficient. As discussed in the Introduction, an alternative explanation of the results is that low-$Q$ stand alone firms invest too little (perhaps because their equity is undervalued) and the high-$Q$ stand alone firms invest too much (perhaps because their equity is overvalued). Thus, conglomerates are able to finance investments in low-$Q$ divisions because they are able to issue equity based on their overvalued

high-$Q$ divisions. In this view, the observed pattern of greater investment by divisions in low Q industries and lower investment by divisions in high-$Q$ industries is actually efficient.

The results on ownership cast some doubt on this view. According to this interpretation, the investment pattern should be either unrelated to management ownership, or should be more pronounced in firms where management has large ownership stakes. That we find just the opposite --- that this pattern is *less* pronounced in firms with high ownership stakes --- suggests that the alternative interpretation is probably not valid.

## 5. What Happens to the Conglomerates After 1979?

While the 1970s may have been the heyday of the diversified conglomerate, they are now in decline. During the 1980s and 1990s, many conglomerates were busted up through hostile takeovers and friendly acquisitions.[11] Others dissolved through spinoffs of business units into separate publicly traded companies. Still others chose to sell off businesses and focus on one core business.

What became of the conglomerates in my sample after 1979? Panel A of Table 6 begins to answer the question. Of the 165 firms in the sample, 55 (33%) sold off businesses and became focused on one line of business. Twenty of these 55 firms were later acquired; the remaining 35 remained independent. Another 57 firms were acquired while they were diversified conglomerates (two through non-bankruptcy liquidation). Although I do not yet have complete information on these acquisitions, it is clear that many of the firms were either acquired by focused companies related in some way to one of the conglomerate's divisions, or by leveraged buyout groups. There are numerous cases in which the unrelated parts of the conglomerate were

[11] See, Bhagat, Shleifer and Vishny (1990).

sold off. Only 53 (32%) of the original 165 firms continued as diversified conglomerates through 1994.

The conglomerates that became focused after 1979, chose to do so by selling off their smaller businesses and holding on to their larger, "core" businesses. As Panel B of Table 6 shows, the average share of sales of the divisions that are sold is 20.1%, while the average share is 58.1% for the businesses that are retained. Recall that the investment inefficiencies are most pronounced in the smaller divisions. Thus, it is not surprising that these are the divisions that are sold.

Finally, Panel C of Table 6 indicates that once conglomerates become focused, their investment became more responsive to investment opportunities. As the first two columns indicate, the coefficient of industry $Q$ is 0.040 in the year conglomerates become focused and the coefficient is statistically significant. This coefficient is larger but not significantly different than the coefficient of industry $Q$ for stand-alone firms (which is either 0.022, or 0.024 if time dummies are included).

The third column of the table shows that, in 1979, the core divisions the conglomerates chose to retain showed no sensitivity of capital expenditures to $Q$; in that year; the coefficient is small and statistically indistinguishable from zero. This suggests that focusing *changes* the way companies allocate capital.

Recall that an alternative interpretation of the results is stand alones *overinvest* relative to conglomerates in high-$Q$ industries, while they underinvest relative to conglomerates in low-$Q$ industries. However, this would imply that conglomerates are a more efficient organizational form, and thus ought to survive and flourish. Yet, the fact that such a small percentage of the

conglomerates in the sample endure until 1994 --- combined with our results on management ownership --- raises doubts about this interpretation.

## 6. Conclusion

This paper examines capital allocation in a sample of 165 diversified conglomerates in 1979. The observed investment behavior suggests that conglomerates tend to overinvest in industries with poor investment prospects and underinvest in industries with promising investment prospects. These effects are more pronounced in smaller divisions, and in firms in which management has small equity stakes --- firms where agency problems are likely to be most severe. Over time, however, the conglomerates in the sample, either become focused --- in which case their investment begins to resemble that of their stand-alone industry peers --- or they are acquired. Less than one third of the firms continue as diversified conglomerates through 1994.

There are a number of directions one can proceed from here. First, what determines what happens to the conglomerates in the sample? Why do some conglomerates choose to focus on their core businesses? Why are some acquired? And why do some remain diversified and independent throughout? Are these outcomes related to the degree of the investment problem, or to management's ownership stake, or both? Second, this paper has not explicitly considered interactions among the divisions of conglomerates. How, for example, do investment opportunities in one division affect investment of the other divisions? Third, while research in this area has relied on segment-level data, these are difficult to work with because the reported segments do not necessarily correspond to a business unit. In this respect, the plant level data

from United States Census Bureau may be more suitable as might be line-of-business data at the Federal Trade Commission.

The final, and perhaps most important, question is why some conglomerates seem to work so well while others do not. The results indicate that management ownership may be part of the answer, but it is clearly not the whole answer; for example, the management of General Electric, the best known conglomerate, has a small stake in the firm, yet it is one of the most successful firms in the world. It is likely that part of the answer lies in understanding better the internal workings, capital allocation processes, and culture of large diversified companies. In this respect, the study by Baker and Wruck (1989), comparing the way in which O.M. Scott functioned as a division of ITT compared to the way in which it functioned as a stand-alone LBO, is an excellent first step at understanding why conglomerates do not work. Comparisons of poorly performing conglomerates like ITT with more successful ones like General Electric would provide even more clues.

## Table 1
## Summary Statistics on Sample of Diversified Conglomerates

This table presents summary statistics on 165 diversified conglomerates in 1979. *Segments* are lines of business reported by each firm in its annual 10-K filing with the Securities and Exchange Commission. *Divisions* are groupings of segments in related lines of business as determined by the author. *CAPXS* is the ratio of divisional capital expenditures to sales. *Industry Q* is the median beginning-of-period *Q* of single segment firms in the same 3-digit SIC-code as the division, where *Q* is the ratio of the market value of the firm's assets divided by the book value. When there is more than one segment in a division, Industry Q is calculated as a sales-weighted average of the industry Q's of the component segments. The summary information is also provided on only those observations that are in the regressions. See Table 2 for more information on the criteria for inclusion in the regressions.

| Variable | Mean | Median | Standard Deviation | No. of Obs. |
|---|---|---|---|---|
| Firm Sales ($ mill.) | 1439.8 | 326.5 | 4089.2 | 165 |
| Number of Segments | 4.1 | 4 | 1.5 | 165 |
| Number of Divisions | 3.4 | 3 | 1.2 | 165 |
| Divisional Sales | | | | |
| Full sample | 424.2 | 97.1 | 1843.2 | 560 |
| Regression data points | 464.4 | 109.6 | 2120.4 | 405 |
| CAPXS Regression data points | 0.045 | 0.033 | 0.287 | 405 |
| Industry median Q for regression data points | 1.03 | 0.98 | 0.22 | 405 |

## Table 2
## The Relationship between Industry-Adjusted Capital Expenditures and Industry Q

The dependent variable in the regressions below is *CAPXSDEV*, the ratio of divisional capital expenditures to sales less the industry median ratio of capital expenditure to sales for single-segment firms. The sample includes the manufacturing divisions of 165 diversified conglomerates in 1979. *Industry Q* is the median beginning-of-period *Q* of single segment firms in the same 3-digit SIC-code as the division, where *Q* is the ratio of the market value of the firm's assets divided by the book value. When there is more than one segment in a division, Industry Q is calculated as a sales-weighted average of the industry Q's of the component segments. *CFSDEV* is the ratio of divisional cash-flow to sales less the industry median ratio of cash flow to sales for single-segment firms. Cash flow is segment operating income plus depreciation. Several outliers in *Q* and cash flow to sales are removed. Standard errors correct for heteroskedasticity and correlation in errors across divisions of the same firm. t-statistics are in parentheses below the coefficient estimates. ** indicates that the coefficient is statistically significant at the 1% confidence level.

| Variable | Model 1 | Model 2 |
|---|---|---|
| *Constant* | 0.037** | 0.029** |
| | (3.72) | (2.91) |
| *Industry Q* | -0.030** | -0.026** |
| | (3.26) | (-2.83) |
| *CFSDEV* | | 0.103** |
| | | (3.04) |
| Number of Observations | 405 | 404 |
| Adjusted $R^2$ | 0.020 | 0.053 |

## Table 3
## The Relationship between Capital Expenditures and Q for Conglomerate Divisions and Stand Alone Companies

This table estimates the relationship between capital expenditures and Q for manufacturing divisions of conglomerates and stand-alone firms in 1979. The dependent variable is the ratio of capital expenditures to sales. *Industry Q* is the median *Q* of stand-alone firms in the division's industry at the beginning of 1979, where *Q* is calculated as the market value of a firm's assets divided by their book value. *CFS* is cash-flow to sales ratio, where cash flow is operating income plus depreciation. Several outliers in *Q* and cash flow to sales are removed. Standard errors correct for heteroskedasticity and correlation in errors across divisions of the same firm. t-statistics are in parentheses below the coefficient estimates. ** indicates that the coefficient is statistically significant at the 1% confidence level.

| Variable | Stand-Alones Model 1 | Divisions Model 1 | Stand Alones Model 2 | Divisions Model 2 |
|---|---|---|---|---|
| *Constant* | 0.003 | 0.054** | 0.000 | 0.043 |
| | (0.36) | (5.43) | (0.02) | (4.27) |
| *Industry Q* | 0.044** | -0.009 | 0.034** | -0.015 |
| | (6.77) | (-0.93) | (5.46) | (-1.58) |
| *CFS* | | | 0.125** | 0.135** |
| | | | (6.77) | (3.42) |
| No. Observations | 1152 | 408 | 1116 | 407 |
| Adjusted $R^2$ | 0.050 | 0.002 | 0.095 | 0.046 |

## Table 4
## The Relationship between Capital Expenditures and Q and Divisional Size

This table estimates the relationship between capital expenditures and *Q* for manufacturing divisions of conglomerates and stand-alone firms in 1979. The dependent variable is the ratio of capital expenditures to sales. *Industry Q* is the median *Q* of stand-alone firms in the division's industry at the beginning of 1979, where *Q* is calculated as the market value of a firm's assets divided by their book value. *CFS* is cash-flow to sales ratio, where cash flow is operating income plus depreciation. Several outliers in *Q* and cash flow to sales are removed. Standard errors correct for heteroskedasticity and correlation in errors across divisions of the same firm. t-statistcs are in parentheses below the coeffcient estimates. ** indicates that the coefficient is statistically significant at the 1% confidence level.

| Variable | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| *Constant* | 0.078** | 0.063** | 0.069* |
| | (5.20) | (3.96) | (2.18) |
| *Industry Q* | -0.033* | -0.037* | -0.059* |
| | (-2.33) | (-2.49) | (-1.96) |
| *Industry Q x SALESHARE* | 0.075* | 0.068 | 0.075* |
| | (2.13) | (1.91) | (2.15) |
| *SALESHARE* | -0.076* | -0.063 | -0.067 |
| | (-2.11) | (-1.73) | (-1.85) |
| *CFS* | | 0.138* | 0.172** |
| | | (2.33) | (2.95) |
| *CFS x SALESHARE* | | -0.010 | -0.085 |
| | | (-0.076) | (-0.65) |
| *Industry Q x ln(Division Sales)* | | | 0.004 |
| | | | (0.81) |
| *ln (Division Sales)* | | | -0.001 |
| | | | (0.23) |
| No. of Observations | 408 | 407 | 407 |
| Adjusted $R^2$ | 0.010 | 0.055 | 0.050 |

## Table 5
## The Relationship between Industry-Adjusted Capital Expenditures, Industry Q, and Management Ownership

The dependent variable in the regressions below is *CAPXSDEV*, the ratio of divisional capital expenditures to sales less the industry median ratio of capital expenditure to sales for single-segment firms. The sample includes the manufacturing divisions of 165 diversified conglomerates in 1979. *Industry Q* is the median beginning-of-period *Q* of single segment firms in the same 3-digit SIC-code as the division, where *Q* is the ratio of the market value of the firm's assets divided by the book value. When there is more than one segment in a division, Industry Q is calculated as a sales-weighted average of the industry Q's of the component segments. *CFSDEV* is the ratio of divisional cash-flow to sales less the industry median ratio of cash flow to sales for single-segment firms. Cash flow is segment operating income plus depreciation. Management ownership is the fraction of the firm's common stock held by management as reported in the 1979 proxy statement. Models 3 and 4 below report results where management ownership is the residual of a model in which management ownership is regressed on the market value of the firm's equity in 1979. Several outliers in *Q* and cash flow to sales are removed. Standard errors correct for heteroskedasticity and correlation in errors across divisions of the same firm. t-statistics are parentheses below the estimated coefficients. ** indicates that the coefficient is statistically significant at the 1% confidence level; * indicates that the coefficient is statistically significant at the 5% confidence level.

| Variable | Model 1 | Model 2 | Model 3 "Excess" Ownership | Model 4 "Excess" Ownership |
|---|---|---|---|---|
| *Constant* | 0.057** | 0.046** | 0.034 | 0.025* |
| | (4.48) | (3.66) | (2.92) | (2.14) |
| *Industry Q* | -0.050** | -0.043** | -0.028* | -0.023* |
| | (-4.25) | (-3.68) | (2.59) | (-2.13) |
| *Mgmt. Ownership* | -0.247** | -0.220** | -0.230** | -0.214** |
| | (-3.49) | (3.11) | (3.09) | (-2.81) |
| *Management Ownership x Industry Q* | 0.235** | 0.205** | -0.226** | 0.209** |
| | (3.26) | (2.81) | (3.15) | (2.75) |
| *CFSDEV* | | 0.093* | | 0.097** |
| | | (2.56) | | (2.62) |
| Number of Observations | 327 | 325 | 325 | 324 |
| Adjusted $R^2$ | 0.041 | 0.068 | 0.029 | 0.062 |

## Table 6
## What Happened to the Sample Firms?

### Panel A: Focus, Acquisition, and the Status Quo

This table provides information on what happened to the 165 diversified conglomerates in the period 1980-1994. *Focus, No Acquisition* indicates that the firm became focused on related lines of business and that there was no subsequent acquisition. *Focus, the Acquisition* indicates that the firm became focused and was later acquired, *Acquisition of Diversified Conglomerate* indicates that the conglomerate was diversified (unfocused) at the time of acquisition. *Remain Diversified* indicates that the firm continued to operate in unrelated lines of business.

| Outcome | Number of Firms | % of Sample | Median Year |
|---|---|---|---|
| *Focus, No Acquisition* | 35 | 21.8% | 88 |
| *Focus, then Acquisition* | 20 | 12.1 | 85 (focus)<br>88.5 (acquisition) |
| *Acquisition* of Diversified Conglomerate* | 57 | 34.5 | 83 |
| *Remain Diversified (Status Quo)* | 53 | 32.1 | NA |

*There were at least two cases in which the conglomerate was liquidated.

### Table 6, Panel B:
### Which Divisions Get Sold?

This table presents 1979 information on the 55 firms that became focused on a related set of businesses prior to 1994.

| | % of Firm Sales in 1979 | Number of Observations |
|---|---|---|
| *Unsold Divisions* | 58.1% | 55 |
| *Sold Divisions* | 20.1 | 119 |

## Table 6, Panel C:
## Panel C: What Happens to the Investment of Focused Firms

This table estimates the relationship between capital expenditures and Q for diversified conglomerates that become focused on related lines of business in the first year that they do so. It also estimates this relationship for stand alone firms during the period 1979-1994. The dependent variable is the ratio of all segments' capital expenditures to all segments' sales. *Industry Q* is the median beginning-of-period *Q* of single segment firms in the same 3-digit SIC-code as the division, where *Q* is the ratio of the market value of the firm's assets divided by the book value. When there is more than one segment in a division, Industry Q is calculated as a sales-weighted average of the industry Q's of the component segments. Several outliers in *Q* and cash flow to sales are removed. Standard errors correct for heteroskedasticity using White (1980). t-statistics are in parentheses below the coefficient estimates. * indicates that the coefficient is statistically significant at the 5% confidence level. ** indicates that the coefficient is statistically significant at the 1% confidence level.

| Variable | Newly Focused Firms in Year of Focus | Newly Focused Firms in Year of Focus | Core Divisions of Newly Focused Firms in 1979 | Stand Alone Firms in All Years | Stand Alone Firms in All Years |
|---|---|---|---|---|---|
| *Constant* | .000<br>(0.27) | -0.002<br>(-0.13) | 0.037<br>(1.26) | 0.022**<br>(16.98) | 0.025**<br>(0.024) |
| *Industry Q* | 0.040**<br>(2.90) | 0.040*<br>(2.16) | 0.006<br>(0.205) | 0.022**<br>(24.97) | 0.024**<br>(24.89) |
| *Year Dummies ?* | No | Yes | No | No | Yes |
| No. Obs. | 44 | 44 | 43 | 27069 | 27069 |
| Adjusted $R^2$ | 0.137 | 0.422 | -0.022 | 0.032 | 0.044 |

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**Appendix 1**
**List of Diversified Companies in the Sample**

ACF Industries
AMF
APL Corp
AVC Corp
Acton Corp
Aegis Corp
Aeronca
Allied Products
Allied Signal
Altamil Corp
American Biltrite
American Controlled Industries
American Cyanamid
American Maize
American Ship Building
Ametek
Amstar
Anthony Industries
Apache
Armco
Artra Group
Asarco Inc
Athlone Inds
Atlas Corp
Ball Corp
Bangor Punta
Barnes Group
Barry Wright
Bell & Howell
Bemis
Bendix
Bickford
Blessings
Borg-Warner Security
Bristol Brass
Brunswick
Bundy
Bunker Ramo
Cabot Corp
Capital Cities/ABC
Celanese
Cenco
Chelsea Industries
Chris-Craft
Chromalloy American
Clabir
Clark Consolidated
Clary
Compudyne
Connelly Containers
Conroy
Constar International
Continental Group
Cooper Industries
Core Industries
Crompton & Knowles
Cubic
De Soto
Dexter
Dravo
EAC Industries
Elcor
Emhart
Esmark
Esquire
Evans-Aristocrat
Federal Signal
Gerber Products
Gifford-Hill & Co
Guardian Industries
Health-Chem
Heublein
High Voltage Engineering
Hillenbrand Industries
IC Products
Insilco
Interlake
International Rectifier
Johnson Controls
Jones & Laughlin
Jupiter Industries
Katy Industries
Keystone International
Koppers
Kysor Industrial
Lear Siegler
Lionel
Litton Industries
Loral
Lynch
Martin Marietta
Masco
McDonough
Medalist Inds
Mirro
Mobil
Monogram Industries
NL Industries
National Service Inds
New Idria
Norris Industries
Nortek
Norlin Industries
Olin
Ormand Industries
PPG Industries
Paramount
Pepsico
Pillsbury
Pittway
Ply-Gem Industries
Purex Industries
Quaker Oats
Quantum Chemical
Questor
RCA
Ralston Purina
Raytheon
Regal Beloit
Republic
Robertson Ceco
Rockwell Intl.
Royal Crown Cos
SCM
SSP Industries
Schiller Industries
Schlumberger
Scovill
Signal
Smith (A O)
Sparton
Sperry
Springs Industries
Standex International
Steego
Stevens (J.P.)
Sunbeam
Synalloy
Tannetics
Tasty Baking
Tech-Sym
Technical Tape
Tenneco
Time Warner
Tonka
Triarc Cos
Trinova
Twin Fair
Tyler
Unidynamics
Unimax
Union
U S Industries
United Technologies
VSI
Vendo
Vernitron
Vulcan Materials
Watsco
Weiman
Whitman
Whittaker
Wyle Electronics
Wynn's International
Yardney Corp

## Appendix 2
## More Detailed Information on Twenty Companies Included in the Sample

*ACF Industries*

*Segments:* 1. Auto Fuel System Components 2. Valves and Related Products 3. Industrial Plastics 4. Oil and Gas 5. Leasing Railroad Freight Cars 6. Manufacturing Railroad Freight Cars.

*Comments:* Segments 5 and 6 are clearly related and are grouped together in a division. The Valves and Related Products segment manufactures valves for the oil and gas industries among others. It is grouped together with Oil and Gas to be conservative. The other segments are unrelated.

*AMF*

*Segments:* 1. Motorcycles and Other Vehicles 2. Bowling Products 3. Marine Products 4. Sports Products 5. Wheel Goods - Lawn and Garden 6. Electronic Controls and Systems 7. Automated Process Equipment 8. Energy Services and Products 9. Specialty Products

*Comments:* Bowling Products and Sports Products (golf clubs, tennis rackets etc.) are clearly related and are grouped together. Marine products includes recreational boats and is therefore grouped with these segments as well. Motorcycles shares some features with Marine products and with Wheeled Goods so these are all grouped with the above segments. This is obviously a diverse group of businesses but they are grouped together to be conservative. The other segments are unrelated.

*APL*

*Segments:* 1. Paper Products and Packaging Material 2. Plastic Products 3. Vitamins and Related Products
*Comments:* All segments unrelated.

*AVC*

*Segments:* 1. Industrial Fasteners --- Metal Forming 2. Textiles 3. Friction Materials --- Industrial Products
*Comments*: All segments unrelated.

*Acton Corp*

*Segments:* 1. Snack Foods; 2. Cable Television 3. Telephone Interconnect 4. Other

*Comments*: Cable TV and Telephone Interconnect (sale, lease and maintenance of telephone interconnect and communication equipment) are related and are grouped together in the analysis. The Snack Foods segment (which also includes the third largest egg producer in the U.S.) is unrelated to the above communications segments. The segment labeled Other is small and is excluded from the analysis.

*Aegis Corp*

*Segments*: 1. Rubber Products; 2. Metal Products 3. Ship Repair and Conversion 4. Pleasure Boats 5. Oil and Gas Related Products and Services.

*Comments*: Segments 3 and 4 are clearly related and are grouped together in the analysis into a "Marine Group.". The Rubber Products segment manufactures tread rubber, the Metal Products segment is a ductile iron foundry. These are unrelated to each other, as well as to the Marine Group and the Oil and Gas Related Products and Services segment.

*Aeronca*

*Segments*: 1. Aircraft --- Parts and Engines 2. Environmental Control Systems
*Comments*: Both segments unrelated

*Allied Products*

*Segments*: 1. Field Machinery; 2. Processing Equipment 3. Fastening Systems 4. Parts and Services 5. Textile.

*Comments*: The Field Machinery and Processing Equipment segments are both part of the Bush Hog Agricultural Equipment Group and both segments manufacture agricultural equipment. They are therefore grouped together. The Fastening Systems segment manufactures special and standard fasteners for industrial and construction applications. Products and Services manufactures a variety of molded parts and coatings. The Textile segment makes towels among other textile products. None of these business groups appear to be significantly related.

*Allied Chemical*

*Segments:* 1. Oil and Gas 2. Chemicals 3. Fibers and Plastics 4. Electrical
*Comments*: Unrelated segments. Note the company did not produce petrochemicals so there is no real link to Oil and Gas.

*Altamil Corp*

*Segments:* 1. Wirebound Containers 2. Truck Equipment 3. Precision Aluminum Forgings
*Comments*: Unrelated segments. Wirebound Containers are for poultry, fruits and vegetables.

*American Biltrite*

*Segments:* 1. Footwear Products 2. Industrial Products 3. Flooring Products
*Comments*: Unrelated segments. Industrial Products manufactures various types of hoses.

*American Controlled Industries*

*Segments:* 1. Real Estate and Other Investments 2. Heat Transfer Components 3. Flexible Packaging
*Comments*: Unrelated segments.

*American Cyanamid*

*Segments:* 1. Medical 2. Agriculture 3. Specialty Chemicals 4. Consumer Products 5. Decorative Laminate Products.
*Comments*: Not completely clear that all of these segments are unrelated to each other, but I do classify them that way. Some of Agriculture is animal veterinary products which may be related to the pharmaceutical products in the Medical segment, but this appears to be a small part of Agriculture. Specialty Chemicals is targeted for the industrial user, so appears rather different from the portion of Agriculture related to chemicals. Consumer Products are those such as shampoo and other toiletries. The fifth segment makes Formica brand countertops.

*American Maize Products*

*Segments*: 1. Corn Processing 2. Cigar Manufacturing 3. Coffee Manufacturing 4. Building Products 5. Candy Manufacturing
*Comments*: Segments seem unrelated, although arguably one could group together Corn Processing, which is makes corn syrup, and Candy Manufacturing which would likely use corn syrup as an input.

*American Ship Building*

*Segments:* 1. Marine 2. Building Products
*Comments:* Unrelated segments.

*Ametek*

*Segments:* 1. Electro-Mechanical 2. Process Equipment 3. Precision Instruments 4. Industrial Materials
Comments: Unrelated segments.

*Amstar*

*Segments:* 1. Nutritive Sweeteners; 2. Industrial Tools and Equipment 3. Other
*Comments*: Unrelated segments.

*Anthony Industries*

*Segments:* 1. Swimming Pools 2. Paperboard Products 3. Athletic Apparel
*Comments*: Only possible related segments are Swimming Pool and Athletic Apparel, but the Athletic Apparel segment manufactures bowling shirts and jackets (not swimming trunks).

*Apache Corp*

Segments: 1. Oil & Gas On & Offshore; 2. Agriculture; 3. Forest Products 4. Engineered Products 5. Plastic Products.
*Comments:* Unrelated segments.

*Armco*

*Segments:* 1. Oil Field Equipment & Production; 2. Fabricated Metal Products; 3. Industrial Products - Service 3. Carbon Steel; 4. Specialty Steel 5. Mineral Resources.
*Comments*: The Fabricated Metal Products, Specialty Steel, and Carbon Steel segments are grouped together. This Steel division is unrelated to the other segments and they are unrelated to each other.