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The Parent Company Puzzle: When is the Whole Worth Less Than One of its Parts?"
forthcoming, Journal of Corporate Finance

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<https://escholarship.org/uc/item/1sv5f5xf>

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Publication Date

2000-08-01

First draft: February 2000

Current draft: August 2000

The Parent Company Puzzle: When is the Whole Worth Less than One of the Parts?

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We would like to thank Michael Brennan, Tony Bernardo, Michael Schill, Walter Torous, an anonymous referee and the editor, William Schwert, for helpful comments on earlier versions of this paper. Unfortunately, the errors remain our own.

Abstract

This paper examines seven instances in which the market value of a parent company was less than the market value of its holdings of a publicly traded subsidiary. Efforts are made to explain this “parent company puzzle” in terms of taxes, agency costs, liquidity effects and noise trader risk. None of them work. The only explanation consistent with the evidence is a mispricing of the subsidiary shares associated with a downward sloping demand curve. As further evidence in support of this view, five corporate control transactions, all designed to exploit the apparent mispricing, were initiated while this research was in progress.

1. Introduction

After selling Medco to Merck for \$6.6 billion in 1993, Marty Wygod became deeply involved in the emerging electronic health care business. Following a series of transactions, Wygod ended up as chairman of two companies, Medical Manager and its publicly traded e-commerce subsidiary, Careinsite. He also had a major puzzle on his hands.

As of January 2000, Medical Manager had four major assets:

- 1) A 72 percent ownership in Careinsite.
- 2) 100 percent ownership of Medical Manager Health Systems (MMHS), a provider information systems and software to physicians.
- 3) 100 percent ownership of a plastics company known as Porex.
- 4) Approximately \$325 million in cash.

On January 3, 2000 Careinsite's stock price was \$83.375 and its market capitalization was \$5.87 billion. Consequently, Medical Manager's 72 percent stake in Careinsite had a market value of \$4.23 billion. In comparison, Medical Manager had a stock price of \$83.25 and a market capitalization of \$2.92 billion. Taken together, these two facts imply that the remaining assets of Medical Manager were worth *negative* \$1.31 billion. What makes this even more surprising is that both MMHS and Porex were staid companies with long histories of good management and positive earnings and cash is, well, cash.

The Careinsite puzzle was not lost on market analysts. In October 1999, William Blair and Company published a detailed report suggesting the purchase of Medical Manager on the basis of the puzzle. In the report, William Blair conservatively valued MMHS at \$500 million and Porex at \$300 million. Assuming these estimates are

reasonable, the aggregate value of all the components of Medical Manager comes to \$5.35 billion as of January 2000 compared to the market value of \$2.92.

Although perhaps the most dramatic case, the Careinsite example is not unique. Periodically, publicly traded companies have market values less than the market value of their holdings of other publicly traded firms. In this paper, we investigate seven such cases in attempt to offer empirical insight into the puzzle.

Although the parent company puzzle studied here is akin to the closed-end fund discount, the two phenomena are not identical. First, parent holdings tend to be highly concentrated. Second, parent companies are rarely passive investors in their subsidiaries. For instance, the parent determines the terms under which cash will be dispersed to the subsidiary's investors. Finally, parent companies typically have significant other assets in addition to their holdings of publicly traded stock.

To investigate the puzzle, the remainder of the paper is organized as follows. Section 2 discusses hypotheses that could explain how parent companies could be worth less than their holdings of publicly traded subsidiaries. The data and the empirical analyses are presented in section 3. Section 3 also examines which, if any, of the hypotheses are consistent with the data. In this regard, it is worth noting at the outset that the seven cases could well be heterogeneous. The reasons why a parent company trades at a discount to the value of its holdings may vary from firm to firm. Nonetheless, the surprising conclusion of section 3 is that the only consistent explanation is market inefficiency in the form of a downward sloping demand curve for the subsidiary company stock. Given such inefficiency in the market pricing mechanism, there is an incentive to engage in corporate control transactions to exploit the mispricing. The stunning fact, documented in section 4, is that during the period of time this research was being conducted five of the seven pairs of companies were involved in control transactions of one type or another. Furthermore, in each case, the transactions were structured, at least in part, to exploit the apparent

mispricing. This provides evidence that at least in certain circumstances companies and their investment bankers can create value by structuring control transactions to exploit market mispricing. The final section summarizes the conclusions.

2. Possible Explanations for the Parent Company Discount

Research on closed-end funds points to four factors that can lead to a divergence between the value of a fund and the value of its holdings: 1) Deadweight management (agency) costs, 2) Taxes, 3) Illiquidity, and 4) The activity of noise traders. We consider how each in turn might potentially explain the parent company puzzle. To these we add a fifth possibility – that the market is inefficient and that the demand curve for the stock of the parent and/or the subsidiary is downward sloping. Under such circumstances, sufficient demand for the subsidiary stock from optimistic investors could lead to mispricing.

Agency Costs

In the case of closed-end funds, the deadweight agency costs are the difference between the management fees charged and the benefits that management conveys. The situation is more complex when dealing with a parent company and its subsidiary because of the issue of control. Agency theory, as developed by Jensen and Meckling (1976), recognizes that there are numerous conflicts internal to the corporation that can produce deadweight costs. For example, if managers are not the owners of a company they have an incentive to expropriate free cash flow as described by Jensen (1986). Even if management does not explicitly expropriate free cash flow, the internal politics of capital allocation can lead to inefficiencies. For instance, Shin and Stulz (1998) and Rajan, Servaes and Zingales (2000) present evidence which indicates that diversified firms destroy value by subsidizing inefficient divisions. As a result, diversified firms are worth less than the sum of the pure play components.

It may seem that the work by Shin and Stulz and by Rajan, Servaes and Zingales provides an explanation for the parent firm puzzle, but there is a wrinkle. The research on diversified firms compares the value of diversified firms with the values of *other* less diversified companies. In the parent firm puzzle, all the assets are part of the parent firm. The puzzle is based on the *relative* value of the parent company to its holdings of publicly traded subsidiaries, not the absolute value of either. The relative value of the parent and the subsidiary will generally not be affected by inefficiencies caused by agency problems. Consider, for instance, the extreme case in which the subsidiary is a successful, cash generating enterprise, but parent management is siphoning off cash from the subsidiary to fund inefficient parent operations. As long as this behavior is expected to continue indefinitely, it will simply reduce the value of the subsidiary and thereby, the parent's holdings of the subsidiary stock. It will not affect the value of the parent's subsidiary holdings compared to the holdings of independent investors in the subsidiary.

For agency costs to explain the parent firm puzzle, the relationship between the parent and the subsidiary must be akin to that between a closed-end mutual fund and its holdings. More specifically, all the costs and benefits associated with ownership of the subsidiary must be prorata distributed among all the shareholders without first passing through the parent. In that situation, owning the stock independently could be more valuable than owning it as part of the parent because parent management can expropriate or misallocate cash as it passes through the parent company. Such deadweight losses can be thought of as analogous to fees charged by closed-end mutual funds.

The biggest problem with this explanation is that the parent company puzzle arises only in situations where the parent holds a large, and usually controlling, block of stock in the subsidiary. Under such circumstances, cash reaches the shareholders of the subsidiary only after it passes through the parent, or at a minimum only after parent management decides that it should be paid out. If this is the case, there are no agency costs that could

be avoided by holding the stock of the subsidiary directly rather than by holding it as part of the parent. If the parent acts suboptimally, it affects all subsidiary shareholders.

Consequently, any impact on the relative price would be minimal.

Taxes

Two types of tax effects have been suggested as explanations for the closed-end fund discount. The first, as proposed by Malkiel (1977), and others, is the existence of unrealized capital gains. Malkiel notes that many closed-end funds have unrealized capital gains on securities that they hold. Therefore, an investor buying into the fund is also buying into a future capital gain. Because of the high turnover of mutual funds, most capital gains are realized in a relatively short time, so new investors have to pay them in the short run. The situation is quite different for parent holdings of subsidiary stock. Unlike an actively managed mutual fund, the parent firm has no incentive to sell the subsidiary stock, particularly if it leads to the realization of a capital gain.

If the parent believes it is appropriate to distribute the subsidiary shares, there are mechanisms by which this can be accomplished without precipitating a capital gains tax. The most direct mechanism is to spin-off the shares of the subsidiary to the parent company shareholders. In order to avoid taxation, such spin-offs must meet the criterion described under section 355 of Federal tax code.¹ The main requirements for a section 355 tax-free spin-off are: 1) The controlled corporation must have been actively engaged in a trade or business and must continue to be so after the distribution; 2) The trade or business must have been conducted for at least five years; and 3) The distributing corporation must distribute at least 80 percent of the outstanding stock of the controlled corporation. As described in section 4, one of the pairs of companies in this study 3Com/Palm did take advantage of the code to undertake a tax-free spin-off.

¹ For more details see the Standard Federal Tax Reports (1999), Section 355, at 16, 460.

If the parent and subsidiary do not satisfy the criterion for a tax-free spin-off, there are more complex transactions that can be structured to move stock without precipitating a capital gain. A good example is the Seagate/Veritas transaction described in section 4.

The examples of tax-free spin-offs and the Seagate/Veritas transaction are not meant to be exhaustive. The point is that capital gains taxes cannot explain the parent company puzzle for two reasons. First, unlike actively trading mutual funds, parent companies rarely have a need to sell the stock of the subsidiary. Second, if the parent does want to distribute the stock, it can do so in the form of a Section 355 spin-off or other more complex transaction which avoids the realization of a capital gain.

Second, tax timing options of the type described by Constantinides (1983) have also been suggested as a partial explanation to the closed-end fund discount. Tax timing options arise because of the ability to realize losses and postpone gains. When individual stocks are pooled into a fund, most of the benefits associated with the timing options on individual shares are lost. The greater the number of individual companies held in the fund, the larger the loss. The problem is that most parent firms, including all of those in our sample, own stock in only one publicly traded subsidiary. Consequently, no meaningful loss of tax timing options is incurred by holding the parent in the place of the underlying subsidiary.

Liquidity Considerations

Malkiel (1977) presents evidence which indicates that a portion of the closed-end fund discount can be explained by the fact that funds often hold illiquid or restricted stock. Malkiel demonstrates that these illiquid share frequently are included in the funds' net asset values at inflated prices. Such liquidity considerations are not applicable in the case of the puzzle studied here because the shares of both the parent and the subsidiary are publicly held. Furthermore, as shown in the next section, subsidiary trading volume is sufficiently

great to dispense with the theory that the prices fail to reflect fair market value because of non-trading.

Noise trading and market inefficiency

In two provocative papers, by DeLong, Shleifer, Summers and Waldman (1990) and by Lee, Shleifer and Thaler (1991) develop, and offer evidence to support, the hypothesis that variation in the closed-end fund discount reflects the activity of noise traders. The noise trader argument requires a number of assumptions to operate. First, noise traders must both hold and trade more of the fund than the underlying shares. Second, noise trader sentiment must change randomly over time, but must be correlated across securities. Finally, there must be sufficient impediments to arbitrage to prevent informed traders from buying the fund and shorting the underlying securities. The authors point to three sources of such impediments. One, the fund changes its portfolio over time making it difficult to maintain an offsetting short position. Two, buying the fund and shorting all the individual securities is costly, particularly in light of the fact that the arbitrageur does not get use of all the funds from the sales. Three, the hedge is not a pure arbitrage unless the position potentially can be held forever. If the hedge has to be liquidated in a finite period, the arbitrageur bears the risk that the discount will be wider at the time of sale.

Given these assumptions, Lee, Shleifer and Thaler show that any investor in a closed-end fund bears both the risk of the underlying assets and the risk associated with unpredictability in future noise trader sentiment. Because holding the fund is riskier than holding the portfolio directly, the fund must, on average, sell at a discount to its net asset value. However, the discount will vary over time with investor sentiment.

It is difficult to see how the noise trader model could be applied to the parent company puzzle. For the noise trader model to work, noise traders must be more likely to trade and hold the parent, as opposed to the subsidiary. While Lee, Shleifer and Thaler present empirical evidence which suggests that this makes sense in the case of mutual

funds, why would noise traders be more likely to hold and trade Medical Manager than Careinsite? Furthermore, the impediments to arbitrage will be much less when only two equities are involved. Instead of juggling an ever changing hedge, all rational investors have to do is buy the parent and short the subsidiary in the proper proportions.

Finally, there is one critical empirical fact that distinguishes the parent company puzzle from the closed-end fund discount. Whereas virtually all mature closed-end funds sell at discounts, cases in which a company is worth less than its holdings of publicly traded securities are rare. This fact could be interpreted as a plus for the noise trader hypothesis. It is possible that only in rare circumstances do noise trader clienteles develop in such a way that the assumptions of the model are met. Nonetheless, given the weak impediments to arbitrage, the noise trader interpretation is a stretch at best.

Downward Sloping Demand for the Subsidiary Stock

The most direct explanation for the puzzle is the least consistent with investor rationality – there are downward sloping demand curves for the shares of both the parent and the subsidiary. This has been a controversial issue in finance since the early work of Scholes (1972) and Shleifer (1986). For our sample, the impact of a downward sloping demand curve is likely to be magnified in the cases of the subsidiaries by the fact that the public float is small. Because most of the shares are held by the parent, small changes in the public's desire to hold the subsidiary's shares would lead to large changes in price, if the demand curve is sloped. For instance, only 7 percent Careinsite's shares are available for public purchase.² Therefore, when e-commerce stocks got hot, it is possible that the demand for Careinsite's shares drove up the price relative to Medical Manager because Careinsite was a marquee e-commerce company.

² In addition to the 72 percent of the shares held by Medical Manager, 19 percent are held by Cerner corporation and another 2 percent are held by Careinsite insiders.

It is worth noting that this subsidiary demand hypothesis requires more irrationality than the downward sloping demand theory generally. For the demand curve for an individual security to be downward sloping, it must be the case that investors (wrongly?) believe that they cannot construct adequate substitutes for the company's shares. For the demand curve for the subsidiary stock to be downward sloping, it must be the case that investors believe that even trading in the parent company stock does not allow an adequate substitute to be constructed – despite the fact that the parent's main asset is the subsidiary!

3. Empirical Analysis of Five Case Studies

The sample consists of seven parent companies and their publicly traded subsidiaries. Table 1 gives the name of the parent, the name of the subsidiary and the time period for which publicly traded prices are available for both. The daily average volume of trading is also reported.

Table 1 here

Company summaries

The first pair of firms is Cordant Technologies and Howmet International. Both companies are in the Aerospace/Defense industry. Cordant competes in three business segments, propulsion systems, fastening systems and investment castings. Howmet is a global manufacturer of aircraft and IGT engine components. During the sample period, Cordant owned between 62 and 84.6 percent of Howmet.

The second pair is Flowers Industries and Keebler Foods. Flowers produces a full line of baked goods including breads, rolls, cakes, pies and snacks. Keebler Foods manufactures cookies, crackers and snacks. Keebler produces numerous branded products includes Cheez-it, Famous Amos, Fudge Shoppe and Vienna Fingers. In addition, Keebler supplies more than half of the Girl Scout Councils with cookies. The company also manufactures branded products for other marketers including Kellogg Pop Tarts and

Nutrigrain bars. During the sample period, Flowers owned between 45 and 55 percent of Keebler.

The third pair is the Limited, Inc. and Intimate Brands. The Limited, Inc. is engaged in the purchase, distribution and sale of women's apparel, lingerie, men's apparel, personal care products, children's apparel and sporting goods. The Company conducts its business in two segments. The Apparel Segment, which sells women's, men's and children's apparel, consists of Express, Lerner New York, Lane Bryant, Limited, Structure and Limited Too. The second segment, 84.5 percent-held Intimate Brands, Inc., sells women's intimate and other apparel, and personal care products and accessories. Intimate Brands consists of two widely known and highly successful brands – Victoria's Secret and Bath & Body Works.

The fourth pair is IPC Communications and IXnet Inc. IPC Communications, Inc. provides integrated telecommunications equipment and services that facilitate the execution of transactions by the worldwide financial services community. The Company designs, manufactures, installs and services turret systems, which provide desktop access to time-sensitive communications and data. IXnet, Inc. operates a global network (the IXnet Extranet), providing a variety of voice, data and content distribution services specifically designed to meet the specialized communications requirements of the financial services community. IPC's primary customers include securities and investment banking firms and insurance companies. The Company's three major operating units are Trading Systems, Information Transport Systems (ITS) and IXnet. During the sample period, IPC owned 73 percent of IXnet.

The fifth pair is 3Com and Palm. 3Com Corp. is a broad-based supplier of local area network (LAN) and wide area network (WAN) systems. 3Com offers a broad range of products, which are grouped into two general categories: Network Systems Products and Personal Connectivity Products. Among the Company's networking products are switches,

hubs, remote access systems, routers, network management software, network interface cards, modems and handheld connected organizers. Palm, Inc. is a global provider of handheld computing devices. The Company develops, designs and markets its Palm-branded handheld devices, which currently include the Palm III, Palm V and Internet-enabled Palm VII product families. The sample period for the 3Com/Palm pair begins on March 2, 2000, the day on which Palm shares began trading following the company's IPO. During the sample period, 3Com owned 94.8 percent of the stock of Palm.

The sixth pair is Seagate and Veritas. Seagate Technology Inc. designs, manufactures and markets products for storage, retrieval and management of data on computer and data communications systems. These products include disc drives and disc drive components, tape drives and software. Veritas Software Corp. is an independent supplier of storage management software. The Company's products help to improve the levels of centralization, control, automation and manageability in various computing environments, including the Internet. Seagate became a 33 percent owner of Veritas when Veritas acquired Seagate's software division.

The final pair, Medical Manager and Careinsite, was discussed in the introduction.

There is one interesting observation that can be drawn from the brief discussion of the seven pairs. With the possible exception of Cordant and Howmet, in every case the subsidiary is the "sexy" company. Careinsite is a leading e-business firm, IXnet is a state of the art computer networking firm, and both Keebler and Intimate Brands produce renowned branded products. Palm is the leading producer of hand held computing devices. Veritas is the leading software company devoted to solving storage problems in networked systems. Although this should not be in an important distinction from a valuation standpoint, because it affects the value of the parent's holding of the subsidiary as well as the independent value of the subsidiary, the evidence presented subsequently suggests that it is.

The puzzle

To provide an overview of the puzzle, Figure 1 plots the market value of the parent company's holdings its publicly traded subsidiary as a percent the parent's market value for each of the seven sample pairs. The figure shows that in all seven cases the parent was worth less than the value of its holdings of the publicly traded subsidiary for at least part of the sample period.

Figure 1 here

Of course, the ratio of the value of the parent to the value of publicly traded holdings also depends on what other assets the parent company holds. It is possible that other than the subsidiary the "other assets" of the parent are, in fact, hidden net liabilities such as unfunded pension obligations or environmental clean-up costs. The problem is estimating the fair market value of the other assets. To provide a rough estimate, Figure 1 also plots the net *book* value of the parent's other assets as a percent of the parent's market value. The underlying data at quarterly intervals are presented in Table 2. With the exception of IPC, the other assets of the parent are significant in each case. Furthermore, the book value of IPC is exceptionally low because much of the company's value is intangible intellectual property.

Table 2 here

In general, one would expect that during the sample period used here book value would be a highly conservative estimate of market value for the parent's other assets. Because of the large run-up in stock prices, most companies were trading at high multiples of book value by the end of 1999. For instance, the market to book ratio for the S&P 500 during the sample period averaged approximately 4.0. However, there is a strong selection bias in the five companies chosen for the study. Conditional on the fact that the parent company puzzle exists during the sample period, the probability is much higher that the

value of the parent's other assets is small. To address this issue we take several approaches.

To begin, we examined the financial statements of the parent company to determine if there were hidden liabilities such as outstanding litigation, unfunded pension benefits or environmental clean-up costs. Only two items emerged. First, Cordant carries derivatives at book value and does not plan to mark them to market until June 2001. Although the market values are not reported, the company stated that the adjustment to market values are small. Second, both Flowers and Keebler actively trade forward purchase commitments and futures contracts to manage exposure to commodity price and interest rate risk. As far as we could determine, however, the outstanding positions were marked to market, so there would not be hidden liabilities.

Second, we studied analysts reports to determine whether there were any unique operational problems that we had missed in the examination of the financial statements. The only issue we found was concern that IPC and IXnet may have Y2k problems with some of their software. That turned out not to be the case.

Finally, we looked at the market to book ratios of companies that analysts considered comparable to the parent company. The lowest ratios we found in the analysts reports for companies deemed by analysts to be comparable to the parent firms were in the range of 2.5 to 3.0. In the case, of Medical Manager the appraised value of the parent assets, other than Careinsite, was 2.6 times the book value.

In light of the foregoing, we feel that it is safe to conclude that net book value is a conservative measure of the market value of the parent's net assets other than the subsidiary. Therefore, book values are used in Table 2. Even making this conservative assumption, Table 2 shows that when the subsidiary holdings and the parent's other assets are added together, the result is in a range of 120 to over 200 percent of the value of the parent, depending on the pair chosen and the observation date.

Another possibility is that the parent is undervalued because of the exclusion of options and warrants in the valuation calculation. This issue is addressed in Table 3 which presents the options, or warrants, outstanding and the weighted average exercise price for the seven parent companies. The table shows that including parent options adds at most about 10 percent to the value of the parent. In no case, does it eliminate the puzzle. Ironically, in the case of the pair for which the puzzle is least pronounced, Flowers/Keebler, the parent company has virtually no options or warrants outstanding.

Table 3 here

Finally, the puzzle is deepened by the fact that the apparent mispricing was not lost on the market. In the case of Medical Manager, it is the focus of the analyst's recommendation to purchase the stock. The mispricing for the Seagate/Veritas and 3Com/Palm pairs was widely discussed on the Internet due to the great interest in technology stocks at the time. For the other four pairs, the relative pricing puzzle is at least mentioned in passing by analysts. Finally, at its height, the mispricing of three of the pairs studied here was the subject of a short article in the *Wall Street Journal*.³ Whatever its source, the parent company puzzle cannot be attributed to investor oversight.

The role of arbitrage

One of the central questions of the puzzle is how the mispricing can persist in the presence of potential arbitrage. Recall from the previous section that there are two primary impediments to arbitrage, the cost of trading, particularly taking short positions, and the risk that, at least in the short run, the mispricing will widen. To determine the extent of the risk that an arbitrageur would face, we run some simple regressions. For each of the seven pairs, the returns of the subsidiary company are regressed on the parent company returns and the market as estimated by the S&P 500 index. If the mispricing were relatively

³ Wall Street Journal, September 28, 1999.

constant, then the R^2 for this regression should be large and the coefficient on the parent company return should be near one. Conversely if the mispricing varies significantly, making arbitrage risky, the R^2 will be low and the coefficient on the parent return will be far from one. The sample period for the regressions the same as that used to track the puzzle as shown in Figure 1 – with one exception. During the sample period, the relative prices of several of the pairs were affected by corporate control transactions. Days on which such relative price adjustments occurred are excluded from the regression analysis. This tends to increase the R^2 's of the regressions.

The regression results reported in Table 4 are a mixed bag, but they reveal that there is always significant arbitrage risk. The highest R^2 for the Limited/Intimate Brands pair is 0.69. After that, the R^2 drops to a range of 0.43 to 0.53 for IPC, Medical Manager, 3Com and Seagate. For the final two pairs, the R^2 's are 0.11 and 0.04. Such low R^2 's are quite surprising given the large parent holdings in the subsidiary. Clearly, a trader who bought the parent and sold the subsidiary short would face significant risk of loss. Such risk would act as a deterrent to arbitrage. Of course, this risk, and other costs of arbitrage, do not explain how the puzzle could arise in the first place. That is, given the relative mispricing, why would any investor purchase the subsidiary instead of the parent. Arbitrage risk does, however, offer a rationale why once the discrepancy has arisen, it is not immediately eliminated by market forces.

There is one added impediment to arbitrage for the five pairs studied here that does not apply to closed-end funds. By definition each of the subsidiaries has a relatively small public float. In each case, the parent alone holds a large block of the subsidiary stock. A small float increases the risk of a short squeeze. An investor who takes a large short position may be unable to obtain the stock except from the parent or other insiders.

Furthermore, the small public float makes borrowing the stock in reasonable quantity more difficult and expensive.

Explanations for the puzzle

It is easiest to start with the explanations that clearly do not work. At the top of the list is liquidity. Table 1 shows that all fourteen stocks in the sample are actively or very actively traded. In the case of Veritas and Palm the average trading volume is over 5 million shares per day. There is nothing akin to the liquidity problems that concerned Malkiel in his work on closed-end funds. Furthermore, the volume of trading for the parent firms is greater than the volume of trading for the subsidiary firms in five of the seven cases and it is the parent firm that sells at a relative discount. Liquidity differences cannot be the explanation for that discount.

Taxes also do not offer a reasonable explanation for the puzzle. First, as noted in the previous section, there is no tax obligation unless the subsidiary firm is sold. Presumably, the parent company can defer that obligation indefinitely. If the parent does decide to dispose of the subsidiary shares there are a number of ways in which that can be done without precipitating a capital gains tax. The most basic method is a tax-free spin-off under Section 355 of the code as discussed earlier. However, it is also possible to structure more complex solutions if the Section 355 criteria are not satisfied. In addition, taxes cannot explain the marked variation in parent discount shown in Figure 1. For instance, for each of the seven pairs, there are intervals during which the discount does not exist. Furthermore, the parent discount is not positively correlated with the level of the subsidiary stock price as it should be if the discount were due to a hidden capital gain. To the extent there is any correlation, it is negative. For all of these reasons, taxes cannot explain the parent company puzzle.

The noise trader model is also largely inconsistent with the data. As noted previously, the framework is questionable to begin with because there is no reason why

noise traders would be more attracted to the parent, as opposed to the subsidiary.⁴ Putting that issue aside, for the model to work it must be the case that noise trader risk is systematic. For example, Lee, Shleifer and Thaler report that discounts on closed-end funds move together. For the seven pairs of firms, only three have histories long enough to compute meaningful correlations. Whereas LST compute correlations in both levels and changes, using levels would be misleading for our sample. Remember this sample was selected because there was a positive discount during the sample period. Therefore, if we take the three pairs and construct a discount series backwards in time, the series will have upward trends that will induce positive correlation in levels. For this reason, the correlations are computed only for the changes in the discount. Those correlations (not reported) are on the order of 0.05 and not significantly different from zero. This finding is not surprising in light of Figure 1 which reveals no apparent relation between changes in the discount across the five firms. If the risks of the changes in the discount are diversifiable, then they should not be priced and the parent firms should not trade at a discount. In defense of the noise trader model, it is worth noting that there are not many instances of the parent company discounts. As a result, satisfactory diversification across pairs of firms may not be possible. Nonetheless, if variation in the discount is truly idiosyncratic, then it could be diversified away by combining arbitrage positions in mispriced pairs with holdings of other assets.

The agency theory explanation fares only marginally better. As noted at the outset, agency explanations for the puzzle have their root in the internal allocation of cash. What we are looking for is evidence that cash produced by the subsidiary is not efficiently invested or distributed. For example, if the rest of the parent operation is strapped for cash, the subsidiary may be bled to finance other less efficient operations. Recall, however, that

⁴ In fact the arguments presented by LST suggest that noise traders would be more attracted to the “sexier” and better known subsidiaries.

for this theory to explain the relative mispricing it must be the case that the independent shareholders of the subsidiary receive their cash directly without passing through the parent. For five of the pairs this clearly does not occur. Howmet, Careinsite, IXnet, Palm and Veritas all pay no dividends. Consequently, any cash generated by these subsidiaries automatically flows through the parent. If the parent is squandering the cash, the value of the subsidiary to independent shareholders and the value to the parent are affected equally.

More fundamentally, the basic agency story does not begin to apply to Careinsite, IXnet, Palm or Veritas. Table 5 presents disaggregated financial data for both the subsidiary and the parent for all five pairs. Data for the sample period are presented in Panel A. That is the only data available for the IPC/IXnet, Medical Manager/Careinsite, 3Com/Palm and Seagate/Veritas pairs. For the other three pairs, somewhat longer term financial data are available. Those data are reported in Panel B. Panel A makes it clear that the Careinsite and IXnet are *consumers* of cash. The capital expenditures for both greatly exceed EBITDA, which in this case of IXnet is negative. This is not surprising given that Careinsite is an e-company and IXnet a closely related networking firm. The only surprise is that Careinsite actually has positive earnings. Consequently, the situation is just the reverse of the explanation given for the closed-end fund discount.

Table 5 here

The same is basically true of the Palm and Veritas. Whereas the cash flow produced by these two subsidiaries is close to zero, both of the parents produce huge positive cash flows. It clearly is not the case that the parent is squandering the cash produced by the subsidiary.

For these four pairs, the only possible agency story that works is that the parent is inefficiently over investing in the subsidiary. That explanation has two serious shortcomings. The first is that the parent would have no reason to subsidize independent

subsidiary shareholders. Doing so runs counter to the assumption of self-interested behavior on which agency theory is based. The second problem is that it is hard to call investment in any of subsidiaries “inefficient” because the relative values of all of them are so high. Presumably the goal of capital allocation is to direct funds to operations in which they receive the highest value. In relation to any measure of earnings or cash flow, Careinsite, IXnet, Palm and Veritas all have extraordinarily high values.

The agency explanation fares only slightly better in the case of Cordant and Howmet. Once again, the subsidiary pays no dividend so all cash flows through the parent. For this pair, at least, Howmet is not a net consumer of cash. On the other hand, there is no evidence that Howmet is subsidizing Cordant. Both firms produce enough operating income to fund capital expenditures without cross subsidization. In fact, perusal of the financial reports indicates that both companies act largely independently. Under such circumstances, agency costs cannot explain the parent company discount.

For the Flowers/Keebler and Limited/Intimate Brands pairs, there is stronger evidence that the subsidiary has been subsidizing the parent. During both the sample period and in the preceding years, Flowers had negative net income and the Limited was only marginally profitable. Both produced negligible EBIT as a fraction of assets. In distinction, both subsidiaries were highly profitable. In fact, the EBIT return on assets for Intimate Brands averaged over 45 percent. Because both Keebler and Intimate Brands pay dividends, it is possible that those dividends were inefficiently allocated when returned to the parent, whereas such unnecessary expenditure investment was avoided when dividends were paid directly to independent shareholders. If such inefficient cash allocation occurred, the subsidiary stock would be worth less as part of the parent than it would if held independently. However, to explain a discount on the order of magnitude reported in Table 2, investment of dividends would have to be highly inefficient and expected to continue over the long term without corrective action. That combination seems highly

unlikely. Furthermore, it should also be noted that the two pairs for which the agency explanation is most plausible have the smallest discounts as shown in Figure 1 and Table 2.

The bottom line is that agency costs may explain a part of the puzzle for two of the seven pairs of firms. They do not, however, offer a satisfactory explanation for the parent discount generally.

The final hypothesis is demand curve for individual stocks, like most real goods, is downward sloping. Therefore, when there is a surge in investor demand for an issue, particularly an issue for which few shares are outstanding, the price rises significantly. As long as the demand is great enough, the supply small enough and the impediments to arbitrage large enough, relative mispricing will persist. In this regard, Table 6 shows that one characteristic of all the subsidiary firms is that the outstanding float is small, both in absolute terms and relative to the float of the parent companies. Whereas the parent firms had an average float of 142 million shares, representing 75 percent of the shares outstanding, the subsidiary firms had an average float of 49 million shares representing just 18 percent of the shares outstanding. Furthermore, if Veritas is excluded, because Seagate held only 33 percent of its shares, the average subsidiary float fall to 24 million shares representing only 13 percent of the shares outstanding.

Table 6 here

Of course, the effective number of shares outstanding could be increased by the existence of short positions. Therefore, Table 6 also reports aggregate short positions as of July 1, 2000.⁵ The observation point is purposely picked to be towards the end of the sample period so that arbitrageurs would have time to observe the relative mispricing and

⁵ For Cordant/Howmet and IPC/IXnet, the data are for February 1, 2000 because of mergers, discussed in the next section, which occurred prior to July 1.

react. The surprising finding is that short positions in the apparently overpriced subsidiaries are small. The average short holdings are only 2.5 percent of the shares outstanding for the five subsidiary firms. The largest short position, 8.6 percent of the shares outstanding, is for Veritas. The next largest is 3.8 percent for Palm. What is the most surprising is that short positions are approximately the same for the parent firms. The average short position for the parent companies is 2.1 percent of the shares outstanding. Given such results, it is hard to argue that impediments to arbitrage prevented arbitrageurs from closing the gap.

4. Corporate Control Considerations

When this research began, the goal was simply to document the parent company puzzle and determine whether it could be explained by well known financial theories. The basic finding was that the puzzle could not be explained by any of the standard theories. The only explanation consistent with all the data was a downward sloping demand curve that led to overpricing of scarce subsidiary shares. Assuming that these results are correct, there would be incentives for the companies involved to engage in transactions to exploit the apparent mispricing. The remarkable fact is that while this research was in progress, five of the seven pairs of firms were involved in corporate control related transactions. In several cases, those transactions were specifically structured to take account of the apparent mispricing of the subsidiary.

First, Healtheon made a tender offer to acquire both Medical Manager and Careinsite after the close of trading on Friday, February 11, 2000. At the close of Friday's trading, the market value of Medical Manager's holdings of Careinsite stood at 152 percent of the market value of Medical Manager. The terms of the offering were unique. Healtheon offered 1.65 shares its stock for every share of Medical Manager, but only 1.3 shares of its stock for every share of Careinsite. Based on Friday's closing prices for the three companies, this offer represented a 35.4 percent premium for Medical Manager, but only

a 5.4 percent premium for Careinsite. The merger was designed to be tax exempt from the standpoint of Careinsite and Medical Manager shareholders. Because these were receiving Healtheon shares in exchange for their shares, the basis would be carried over, but there would be no immediate taxable event.

On Monday, an agreement between the companies was publicly announced. As a result, Medical Manager's stock price jumped 33.5 percent, but Careinsite's rose only 6.1 percent. This significant shift in relative prices lessened, but did not eliminate the parent firm discount. Based on Monday's closing prices Medical Manager's holdings of Careinsite had a value equal to 118 percent of Medical Manager, significantly reducing the extent of the parent company puzzle.

The terms of the offer clearly show that Healtheon was aware of the apparent mispricing. In fact, Healtheon executives noted that the mispricing presented a ticklish problem. How could Healtheon be fair to the public shareholders of both Medical Manager and Careinsite, in terms of offering the same premium, without paying a relative price for the two companies that was unreasonable? Presumably, the final offer represented some type of compromise in this regard.

As unique as the Healtheon offer was, it was not the last word. In the weeks following the offer, Healtheon's stock price declined. This pulled down the prices of both Careinsite and Medical Manager because they were now tied to Healtheon. Although the parent company puzzle did not deepen, because Medical Manager and Careinsite were dropping, the mispricing became more pronounced when the other assets of Medical Manager are taken into account. This is because the market was revaluing e-health stocks. As the leaders in this area, Healtheon and Careinsite were hammered, dragging Medical Manager down with them. At one point, the value of Medical Manager fell under \$1 billion, less than the appraised values of MMHS and Porex plus the holdings of cash.

In response, Healtheon took a unique step. On June 19, 2000, the company announced that it was revising the terms its merger with Medical Manager to take account of the drop in Healtheon's stock price. Under the revised merger agreement, Medical Manager shareholders would receive 2.5 shares of Healtheon stock instead of the previously announced 1.65 shares. However, the exchange ratio for Careinsite shares would remain fixed at 1.3. In addition, to valuing the other assets of Medical Manager more highly, the revision in the exchange ratio finally eliminated the parent company puzzle as shown in Figure 1.

The second corporate control event occurred on February 22, 2000 when Global Crossing Ltd. announced an agreement to acquire both IXnet and its parent, IPC. Like the Healtheon offer, the offer made by Global Crossing was also asymmetric. Under the terms of the agreement announced Monday, February 22, 2000, Global Crossing agreed to exchange 1.184 common shares of its stock for each IXnet share not owned by IPC and 5.417 Global shares for each share of IPC. Based on Friday's closing prices for the three companies, this represented a premium of 103 percent for IPC, but a premium of only 18 percent for IXnet. As a result of this asymmetric offer, the price of IPC jumped 75 percent following the announcement, while the price of IXnet rose only 5 percent. The large relative price realignment caused the parent company discount to fall from 172 percent to 102 percent. Like the Healtheon deal, the transaction was structured as a tax exempt exchange of shares.

The third corporate control event also produced a marked readjustment of relative prices. On March 14, 2000 Alcoa Inc. announced that it would buy Cordant for \$57 per share and would assume \$685 million in Cordant debt. In response, Cordant's stock price jumped from \$29.56 on March 13 to \$55.06 on March 14, an increase of more than 86 percent. In contrast, Howmet's share price rose a meager 8 percent from \$18.5 to \$20. This huge relative price adjustment caused the value of Cordant's holding of Howmet to fall

from 145 percent of the value of Cordant to 85 percent, thereby eliminating the parent firm puzzle. In making the offer, Alcoa referred to what it felt was the attractive price of Cordant's shares. Once again, the transaction was structured as a tax exempt exchange of shares.

The fourth transaction involved Seagate and Veritas. The Seagate transaction is a complicated one, in large part because it had to be structured to avoid realizing a capital gain on the hugely appreciated Veritas shares that Seagate held. The deal as announced on March 29, 2000 resulted in a 15% premium over the closing price of Seagate stock the previous day. However, the premium is 70% when measured against the price of Seagate stock 6 weeks earlier. The transaction called for Seagate stockholders to receive \$1.2 billion in cash and \$19.2 billion in Veritas stock (valued as of March 28, 2000) for their shares in Seagate. Because the transaction involves Veritas acquiring the Seagate stock in exchange for Veritas stock and then retiring it, most of the transaction is treated as a tax exempt exchange. Seagate shareholders are only required to pay tax on the fraction of remuneration received in cash. The transaction also involved the sale of various Seagate divisions, but that is not germane for this article. The key point is that the transaction allowed Seagate to capture a portion of the "parent company puzzle wealth" for its shareholders without precipitating a capital gains tax.

Finally, on July 28, 2000, after the end of the sample period, 3Com announced that it had completed its separation of Palm through the distribution of all of its 532 million share of the company. After the close of the market on July 27, 3Com shareholders were issued 1.4832 share of Palm for each share of 3Com stock held. The transaction was structured as a tax-free spin-off under Section 355. Under the terms of the spin-off shareholders were told to allocate 21.02% of their pre-distribution tax basis to their 3Com shares and the remaining 79.98% to their Palm shares. As a result of the transaction, Palm became an independent company.

Although the spin-off was anticipated, there was an increase in wealth associated with it. At the close of trading on July 27, 2000, the 350.8 million shares of 3Com had a total value of \$22.649 billion. On July 28, those shares were worth \$12.938 billion and the spun-off Palm shares were worth \$19.952 billion for a total market value of \$24.490 billion. The increase in value was thus \$1.842 billion or 8.1% of the value the day before the spin-off. Furthermore, the NASDAQ Index declined by 4.7% on the same day so that the net of market residual was 12.8%. Because of the huge volatility of 3Com and Palm that net of NASDAQ residual is only significant at the 10% level. Nonetheless, in dollar terms it represents an impressive creation of wealth, particularly in light of the fact that the transaction was anticipated. If the transaction is credited with capturing for shareholders all the excess wealth implied by the parent company discount in the days following the Palm IPO, then the benefits are clearly much greater.

In summary, the corporate control events that occurred as this research was in progress all strongly support the downward sloping demand (inefficient market) theory. Rather than being corrected by normal trading within the market, the mispricing of Cordant, IPC, Medical Manager, 3Com and Seagate, relatively to their holdings of a publicly traded subsidiary, apparently provided the impetus for corporate control transactions. In three cases – Cordant, IPC and Medical Manager – there were takeover offers with asymmetric bids. In fact, in the case of Medical Manager the asymmetric bid was further adjusted because of the apparent misvaluation. This provides striking support for the view that, at least in some situations, companies and their investment bankers can create significant wealth for shareholders by structuring transactions to exploit mispricing that the market has failed to correct.

5. Summary and conclusions

In this paper, we have investigated seven instances in which the stock of a parent company had a market capitalization less than the value of its holding of a publicly traded subsidiary. We have tried to explain this puzzle on the basis of rational theories such as agency problems, liquidity and taxes. We have also investigated whether the noise trader model developed by DeLong, Shleifer, Summers and Waldman (1990) offer a possible explanation. Unfortunately, these theories, even in combination, are not able to explain the puzzle. The only hypothesis consistent with all the results is that the market is inefficient and there is a downward sloping demand for the subsidiary shares.

The most dramatic support for the hypothesis of market inefficiency is while this research was in progress, the parent discount was an important factor in subsequent corporate control transactions for five of the seven pairs. In three transactions, differential premiums were offered specifically because of the parent company discount. In the case, of Medical Manager the differential premium was subsequently increased to adjust for apparent mispricing.

In summary, given the evidence examined here, it is hard to dispute the explanation for the parent company discount offered by some practitioners. High demand for a limited number of subsidiary company shares simply produced irrationally high prices. Furthermore, the mispricing persisted over significant periods of time even when there were apparently close substitutes for the subsidiary shares (i.e. the parent company shares). This suggests that deviations from rational pricing could be even more extreme in situations where there is large noise trader demand and fewer close substitutes. Along the lines of Summers (1986), this raises concerns that stock prices, at least of individual companies, can deviate markedly from fundamental value over prolonged periods of time. Furthermore, the research indicates that when such mispricing can be identified, as in the case of the

parent company puzzle, companies and their investment bankers can create shareholder wealth by designing transactions to exploit it.

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First draft: February 2000

Current draft: August 2000

The Parent Company Puzzle: When is the Whole Worth Less than One of the Parts?

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We would like to thank Michael Brennan, Tony Bernardo, Michael Schill, Walter Torous, an anonymous referee and the editor, William Schwert, for helpful comments on earlier versions of this paper. Unfortunately, the errors remain our own.

Abstract

This paper examines seven instances in which the market value of a parent company was less than the market value of its publicly traded subsidiary. Efforts are made to explain this “parent company puzzle” in terms of taxes, agency costs, liquidity effects and noise trader risk. None of them work. The only explanation consistent with the evidence is a mispricing of the subsidiary shares associated with a downward sloping demand curve. As further evidence in support of this view, five corporate control transactions, all designed to exploit the apparent mispricing, were initiated while this research was in progress

Table 1
Parent Company Discount Puzzle -- The Sample

The sample consists of seven parent companies and their publicly traded subsidiaries. The table provides the names of the parent and the subsidiary, the time periods over which both are publicly traded. The average daily trading volume is calculated over the latest 3-month trading period. For each firm, we also specify the industry to which it belongs.

Parent	Subsidiary	Time period over which both are publicly traded	Percentage held by parent company	Daily trading volume (Parent)	Daily trading volume (Subsidiary)
Cordant Technologies ¹ Aerospace/Defense	Howmet International Aerospace/Defense	12/97 - 05/00	62% - 84.6% ²	149,020	54,501
Flowers Industries Food products/Agribusiness	Keebler Foods Food products/Agribusiness	01/98 - present	45% -55% ³	405,311	231,893
The Limited, Inc. Retail-Specialty&Apparel	Intimate Brands Retail-Specialty&Apparel	01/97 - present ⁴	84%	935,122	465,351
IPC Communications ⁵ Telecom Equipment	IXnet Inc. ⁵ Computers- Software&Services	08/99 - 06/00	73%	42,891	406,601
Medical Manager ⁶ Health Care	Careinsite ⁶ e-business	06/99 - present	72%	466,474	186,950
3 Com Computer Network	Palm Computer Hardware	03/00 - present ⁷	94.8%	6,750,000	5,110,000
Seagate ⁸ Computer storage devices	Veritas ⁸ Software&programming	05/99 - present	33% - 41.6%	2,320,000	5,700,000

Note:

¹ Cordant Technologies, Inc. and Howmet International entered into a merger agreement with Alcoa and stopped trading on May 25, 2000.

² Cordant increased its holding of Howmet International, Inc. from 62% to 84.6% in February 1999.

³ Flowers Industries increased its holding of Keebler Foods from 45% to 55% in February 1998.

⁴ Both the Limited, Inc. and Intimate Brands went public before January 1997. However, we only look at the period starting from January 1997.

⁵ IXnet Inc. went IPO in August 1999. On February 22, 2000, IPC Communications and IXnet were acquired by Global Crossing. Both firms stopped trading on June 14, 2000.

⁶ Healtheon made a tender offer to acquire both Medical Manager and Careinsite on February 11, 2000.

⁷ Palm Inc. started trading on March 2, 2000.

⁸ Strictly speaking, Veritas is not Seagate's subsidiary. Both companies went public before 1999. On May 28, 1999, Seagate acquired approximately 41.6% of Veritas' shares through the sale of its Network & Storage Management Group. On March 29, 2000, Veritas, Seagate, and an investor group including Seagate's management announced a transaction in which Veritas would acquire all of the shares of its common stock owned by Seagate. Seagate would go private as part of this deal.

Table 2
Quarterly Data on the Values of the Holdings by the Parent Company

The table presents the parent's holding of the subsidiary, the parent's net assets other than the subsidiary, and the total value of all holdings by the parent for the six pairs of firms. The parent's holdings include its holding of the publicly traded subsidiary (defined as percentage of ownership times the market capitalization of the subsidiary) and net other assets (defined as total assets of the firm (excluding subsidiary) - total debts of the firm (excluding subsidiary)). Net other assets are stated in terms of book value. All nominal values are in millions US dollar.

	Date	The Parent's holding value of the subsidiary	Net Other Assets	Total Value of the holdings	The parent's Market Capitalization	Holding of the Sub. as a percent of the parent's market value	Total value of the holdings as a percent of the parent's market value
Cordant/Howmet	09/99	1,185	934	2,119	1,116	106.18%	189.87%
	12/99	1,528	1,091	2,619	1,207	126.59%	216.98%
	03/00	1,699	1,310	3,009	2,057	81.14%	146.28%
Flowers/Keebler	09/99	1,375	1,044	2,419	1,356	100.08%	178.39%
	12/99	1,294	1,035	2,330	1,594	81.28%	146.21%
	03/00	1,327	1,312	2,639	1,514	87.65%	174.31%
Limited/Intimate	09/99	8,144	2,376	10,519	6,415	126.96%	163.99%
	12/99	9,107	2,039	11,146	9,299	97.94%	119.86%
	03/00	8,625	2,221	10,846	9,045	95.36%	119.91%
IPC/IXnet	09/99	554	71	625	497	111.56%	125.87%
	12/99	1,113	55	1,168	573	194.07%	203.74%
	03/00	2,109	55	2,164	1,967	107.22%	110.02%
MMGR / Careinsite	09/99	2,522	510	3,032	1,767	142.72%	171.59%
	12/99	4,217	539	4,755	2,810	150.07%	169.25%
	03/00	1,261	770	2,031	1,223	103.11%	166.07%
3-Com / Palm	03/00	24,064	5,544	29,608	19,515	123.31%	151.72%
Seagate / Veritas	09/99	5,597	6,368	11,965	6,379	87.74%	187.57%
	12/99	15,824	5,925	21,749	9,699	163.15%	224.24%
	03/00	19,323	6,452	25,775	13,974	138.28%	184.45%

Table 3
Shares Issuable Upon Exercise of Stock Options, Warrants, or Restricted Stock Offers (for Parent Companies)

The parent companies' outstanding stock options, warrants, and restricted stocks are obtained from the firms' 10-K, 3-S and 8-K reports.

The Parent Firm	Outstanding Shares issuable through stock options, warrants, or the offer of restricted stocks (in millions) (a)	Weighted exercise price	Stock Price	Total Share Outstanding (in millions) (b)	(a) / (b)	(stock price - exercise price) * number of shares issuable / Value of stock
The Limited, Inc. (as of 1/29/00)	31.5	\$11.3	\$30.6	227.8	13.83%	8.72%
Cordant Technology (as of 12/31/99)	3.1	\$25.1	\$33.0	36.6	8.47%	2.03%
Flower Industries (as of 12/31/99)	1.9	\$15.7	\$15.9	100.0	1.90%	0.02%
IPC Communications (as of 9/30/99)	1.1	\$10.5	\$61.5	8.1	13.58%	11.26%
Medical Manager (as of 6/30/99)	1.8	\$36.6	\$43.1	34.9	5.16%	0.78%
3-Com (as of 12/31/99)	37.3	\$25.6	\$55.6	350.8	10.63%	5.74%
Seagate (as of 7/02/99)	33.9	\$23.7	\$25.6	208.3	16.3%	1.21%

Table 4
OLS regressions of the Subsidiary's Daily returns on the Parent's daily returns and the market returns¹

For all 6 pairs of companies, we regress the subsidiary's daily returns against the parent's daily returns and market returns. The t-statistics based on heteroscedasticity-adjusted standard errors are in parenthesis, under each estimated coefficient.

	Time period	Intercept	Market returns	Parent returns	Adj. R ²	No. of Obs.
Cordant/Howmet ¹	3/17/99- 3/13/00	0.00152 (0.941)	0.11974 (0.867)	0.35327 (5.510)	0.1132	249
Flowers/Keebler	3/17/99 - 6/30/00	-0.00002 (-0.016)	0.28504 (3.503)	-0.03331 (-0.831)	0.0385	325
Limited/Intimate	3/17/99 - 6/30/00	-0.00067 (-0.711)	0.31705 (4.042)	0.85731 (22.888)	0.6876	325
IPC/Ixnet ²	8/25/99- 2/20/00	0.00215 (0.400)	0.15717 (0.364)	0.98408 (9.66)	0.4330	123
Medical Manager /Careinsite ³	6/17/99 - 6/30/00	0.00754 (0.412)	0.43888 (1.780)	0.75929 (14.737)	0.5010	262
3-Com/Palm	3/3/00 - 6/30/00	-0.00781 (-1.546)	-0.30243 (-0.889)	0.86408 (9.274)	0.5312	84
Seagate/Veritas ⁴	6/1/99 - 6/30/00	0.00593 (2.374)	1.23462 (5.643)	0.00592 (2.374)	0.4310	273

Note:

¹ On March 14, 2000, Alcoa made an announcement to acquire both Cordant and Howmet, therefore, our sample ends on March 13, 2000.

² Global Crossing announced a plan to acquire IPC Communications and IXnet on February 22, 2000. Our sample ends on February 20, 2000.

³ Healthcon made a tender offer to acquire Medical Manager and Careinsite on February 11, 2000 and adjusted it plan later. The dates with those important corporate events have been dropped from our sample. Adding them in, however, does not change the regression results in a significant way.

⁴ On March 29, 2000, Seagate announced its "going private" plan. The daily return on that day, correspondingly, was dropped from the sample.

Table 5
Financial Data for Parent and Subsidiary Firms

The financial data are obtained from the parent and the subsidiary's consolidated financial statements. All nominal values are in millions US dollars.

Panel A: Financial data for 1999 fiscal year¹

		Net Income	EBIT	EBITDA	Capital Expenditure	Net Inc./total asset	EBIT/total assets	EBITDA/total assets	Capital Expen./to tal assets
Cordant/ Howmet	Parent net of sub.	48.8	120.2	182.3	152.0	3.2%	7.8%	11.9%	9.9%
	Subsidiary	136.7	213.4	280.2	112.9	12.2%	19.0%	25.0%	10.1%
Flowers/ Keebler	Parent net of sub.	-41.2	28.8	127.2	211.2	-2.0%	1.4%	6.2%	10.3%
	Subsidiary	88.2	199.2	283.4	100.7	5.8%	13.0%	18.5%	6.6%
Limited/ Intimate	Parent net of sub.	75.3	240.6	431.8	261.7	2.6%	8.1%	14.6%	8.8%
	Subsidiary	458.9	796.9	900.1	147.2	34.1%	59.3%	66.9%	8.2%
IPC/ IXnet	Parent net of sub.	0.1	6.7	14.7	31.3	0.02%	3.1%	6.8%	14.4%
	Subsidiary	-71.4	-59.5	-41.1	26.2	-32.7%	-27.3%	-18.9%	12.0%
MMGR/ Careinsite	Parent net of sub.	15.3	21.3	38.5	13.1	1.8%	2.5%	4.5%	1.5%
	Subsidiary	-19.0	-19.0	-7.4	9.4	-6.6%	-6.6%	-2.6%	3.3%
3-Com / Palm	Parent net of sub.	496.8	811.9	843.1	231.9	8.9%	14.6%	15.1%	4.2%
	Subsidiary	10.9	20.1	20.6	7.4	4.6%	8.4%	8.6%	3.1%
Seagate/ Veritas	Parent net of sub.	136.0	298.0	839.0	385.0	1.9%	4.2%	11.7%	5.4%
	Subsidiary	-174.4	-146.9	97.7	20.2	-4.2%	-3.5%	2.4%	0.5%

Panel B: The historical financial data²

		Net Income	EBIT	EBITDA	Capital Expenditure	Net Inc./total asset	EBIT/total assets	EBITDA/total assets	Capital Expen./total assets
Cordant/ Howmet ³	Parent net of sub.	26.2	56.6	59.9	3.1	2.7%	5.8%	6.1%	0.3%
	Subsidiary	110.4	189.7	249.9	83.0	6.1%	10.5%	13.9%	4.6%
Flowers/ Keebler ⁴	Parent net of sub.	-10.3	186.5	277.2	103.3	-0.9%	15.4%	23.0%	8.5%
	Subsidiary	94.9	207.5	276.7	66.8	5.7%	12.5%	16.7%	4.0%
Limited/ Intimate ⁵	Parent net of sub.	-9.9	175.8	387.9	251.0	-0.3%	5.8%	12.8%	8.3%
	Subsidiary	344.5	626.5	770.3	122.9	24.6%	44.8%	55.1%	8.8%

Note:

¹ The nominal values of IPC/IXnet are for the six months ended March 31, 2000; the nominal values of 3-Com/Palm are for the quarterly period ended February 25, 2000; the nominal values of Seagate/Veritas are for the quarterly period ended March 31, 2000 (Seagate's fiscal year ends on June 30, therefore, its annual report for 1999 fiscal year is not available yet).

² There are no historical data for IXnet, Careinsite, and Palm since all of them went public recently.

³ For fiscal year 1998. We did not include the data before 1998 given the fact that Howmet went public in December 1997.

⁴ The data are for fiscal year 1998. Flowers became the majority shareholder of Keebler in February 1998.

⁵ The numbers are based on the average for fiscal years 1997 and 1998.

Table 6
Float Analysis for Parent and Subsidiary Companies: July 1, 2000¹

	Shares outstanding (millions)	Float (millions)	Float (as percent)	Shares Short (millions)	Short/ Outstanding
Cordant	36.7	28.6	77.9%	0.47	1.3%
Howmet	100.0	14.0	14.0%	0.05	0.1%
Flowers	100.0	86.0	86.0%	2.96	3.0%
Keebler	84.4	21.9	25.9%	1.66	2.0%
Limited	431.6	319.4	74.0%	19.40	4.5%
Intimate Brands	496.6	76.5	15.4%	2.04	0.4%
IPC Communications	8.8	2.5	28.4%	0.06	0.7%
IXnet	51.1	6.1	11.9%	1.22	2.4%
Medical Manager	40.7	31.4	77.1%	0.52	1.3%
Careinsite	75.0	5.2	6.9%	0.23	0.3%
3Com	350.8	333.3	95.0%	5.98	1.7%
Palm	565.0	23.0	4.1%	21.70	3.8%
Seagate	227.2	190.9	84.0%	4.51	2.0%
Veritas	398.7	195.3	49.0%	34.10	8.6%
Average Parent		141.7	74.6%	4.84	2.1%
Average Subsidiary		48.9	18.2%	8.71	2.5%

Note:

¹ The data for Cordant and Howmet, IPC Communications and IXnet are as of February 1, 2000. All of these four firms have been acquired by other firms and are not traded anymore.

Figure 1
The Value of Subsidiary Holdings and the Parent's Other Assets as a Percentage of the Parent Firm's Market Value

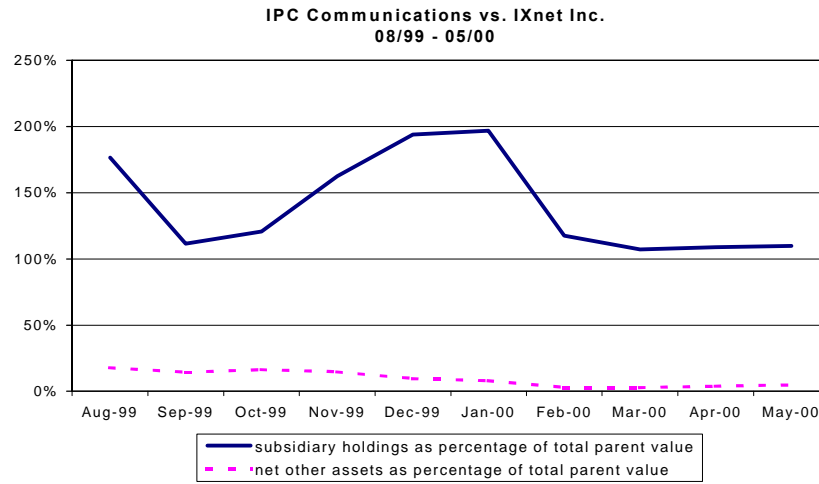
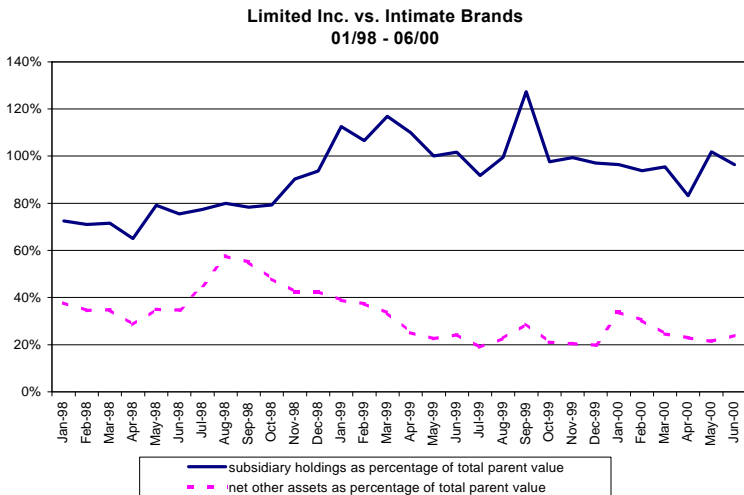
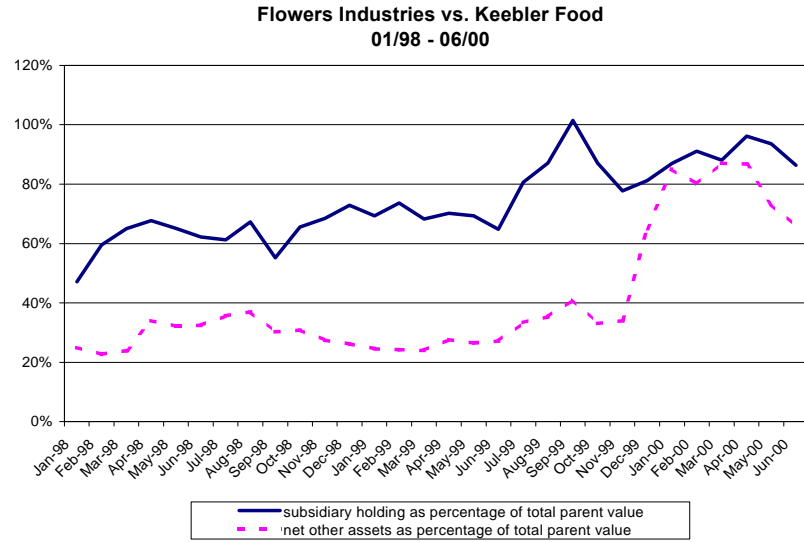
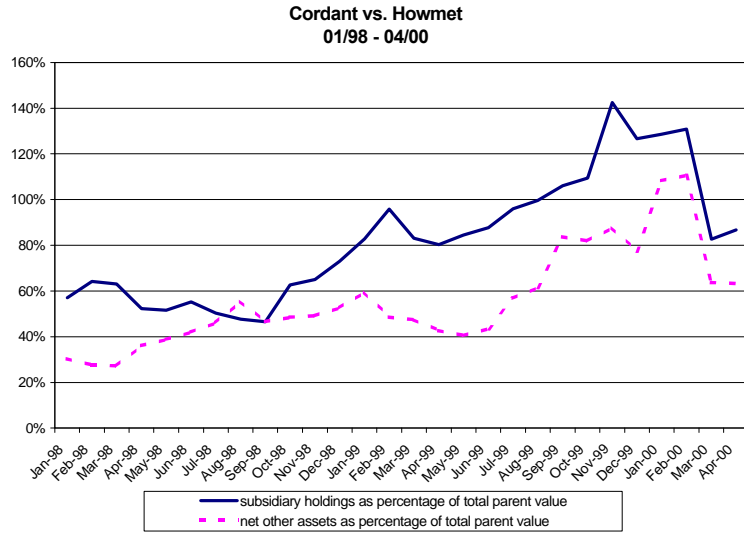
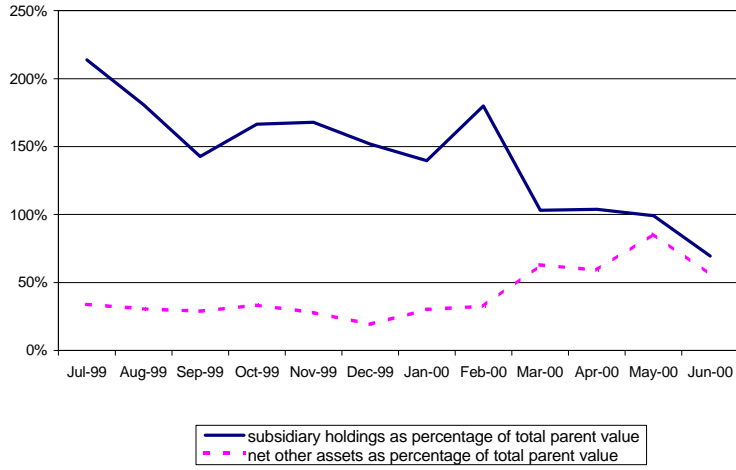
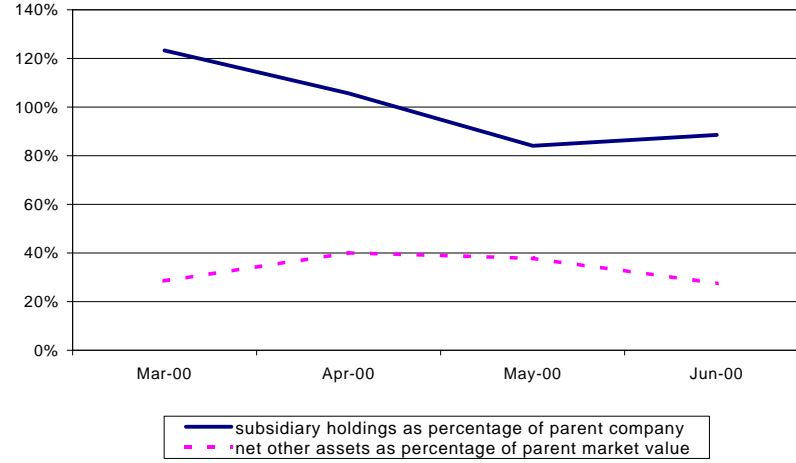


Figure 1 (continued)

**Medical Manager vs. Careinsite
07/99 - 06/00**



**3 Com vs. Palm Inc.
03/00 - 06/00**



**Seagate Vs. Veritas
05/99 - 06/00**

