

ACQUIRER SYSTEMATIC RISK:  
EVIDENCE ON CORPORATE MERGERS AND ACQUISITIONS

By  
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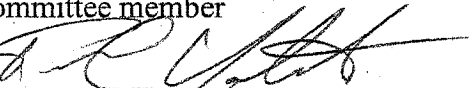
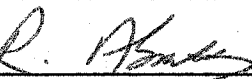
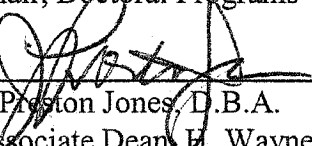
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We hereby certify that this Dissertation submitted by Sidney W. Yeomans. conforms to acceptable standards, and as such is fully adequate in scope and quality. It is therefore approved as the fulfillment of the Dissertation requirements for the Degree of Doctor of Business Administration with Finance Concentration.

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2004

## CERTIFICATION STATEMENT

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## ABSTRACT

### ACQUIRER SYSTEMATIC RISK: EVIDENCE ON CORPORATE MERGERS AND ACQUISITIONS

by

Sidney W. Yeomans

A review of historical literature shows that merger and acquisition (M&A) abnormal returns, premiums, and related stock prices have been widely studied. However, a gap in the research regarding analysis of variables determinant of change in systematic risk was identified. Therefore, factors found historically to be associated with the variability in M&A results were studied in relation to systematic risk. Since systematic risk is such an important component of corporate strategy, investment decision making, and finance this analysis was long overdue. Capital Asset Pricing Model (CAPM) Beta was utilized as a proxy for systematic risk. Securities Data Corporation (SDC) M&A transaction data, Standard and Poor's COMPUSTAT, and The University of Chicago's Center for Research on Security Prices (CRSP) financial data were utilized. Determinants of change (pre vs. post merger) in acquirer systematic risk, within the manufacturing industry, were analyzed. After correlation and regression analysis, multiple variables are identified to be statistically significant in determining changes in systematic risk. A 473 M&A transaction sample yields an average pre-transaction acquirer systematic risk near that of the overall market (Average Pre-Transaction Beta = 0.9903). Post transaction results show a 0.2454 decrease in beta on average (Average Post-Transaction Beta = 0.7449).

## ACKNOWLEDGEMENTS

Success was once defined to me as the progressive realization of worthwhile dreams and goals. Anyone can have dreams and goals but progressive realization takes personal determination, self-discipline, and the help of others. While I am a very determined and generally self-disciplined person, I am forever thankful to the following people for their help, motivation, and encouragement during the journey called the dissertation process. Thomas Edison once remarked, "If we did all the things we're capable of doing, we would literally astound ourselves." To me, a completed dissertation is definitely a worthwhile dream and goal and it literally astounds me that it is finally completed.

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## CHAPTER 1

### INTRODUCTION

#### Background to Research Questions

Despite the risks, mergers and acquisitions are here to stay. Driven by globalization, economic or strategic barriers to growth within a given organization or industry, mergers and acquisitions have become the primary means by which many companies can quickly attempt to grow revenues. Largely because of these drivers, today's deals are fundamentally different from those figured in previous waves of merger activity.

In the 1980s, for example, a merger deal was primarily a financial transaction aimed at gaining control of an undervalued asset, which was then often resold or left to stand alone as an independent entity. The target was often a dissimilar industry, or a business line distinctly separate from the acquirer's main business. Price premiums were less common, and the margin for error was often greater. The main risk involved taking enough cost out of the business to ensure sufficient cash flow for debt service. Today, the typical merger or acquisition is quite strategic and operational in nature. Executives are buying a customer base, as well as, new and better distribution channels and geographic markets. They are buying organization competencies and an infusion of talent which

leverage and extend strategic opportunities, and they are gaining control over competitors' products and services. They are also consolidating business units or industries in a down cycle, to increase revenue and shareholder value. The differences don't stop there! Given the all-out race for globalization, not to mention the constant short-term pressure for earnings growth, desirable targets are fewer in number, demand for them is much greater, and price premiums are far more common. There is less margin for error in actually achieving the economic projections of the deal. Costs must still be driven out of the business, but now without any sacrifice of the ability to capture revenue-generating synergies. Moreover, in contrast to the 1980s (an era when an acquisition normally could be integrated over a longer period, perhaps two or three years), today the businesses must be merged as quickly as possible – often within six to twelve months after the close. Managers and employees, instead of having to survive only one or two merger and acquisition (M&A) transactions in their careers, must now be ready to manage deals routinely, incorporating new businesses as a matter of course, one right after another, and often with multiple transactions occurring simultaneously.

According to Galpin and Herdon (2000), with heightened expectations of Wall Street are factored in, it is clear that failure to integrate the businesses properly after the M&A deal has closed can lead to disaster, as in Quaker Oats Company's acquisition of Snapple Beverage Corporation, one the most ill-fated M&A deals in corporate history, in which Quaker Oats lost \$1.4 billion in just twenty-seven months. Quaker's strength in supermarkets and mass distribution was a poor match with Snapple's convenience-store market. The new owners of Snapple replaced a popular ad campaign with new marketing programs that immediately flopped. In addition, Wall Street considered Snapple's

purchase price to have been about \$1 billion too high. All these factors and more resulted in a \$1.6 million loss for every day that Quaker owned Snapple. It is no longer sufficient just to buy the right company at the right price. Today's deals start there, but they also demand effective execution and a vision of the deal's impact on the acquirer's systematic risk.

### The Acquisition Game

According to Sirower (1997), the 1990s will go down in history as the time of the biggest merger and acquisition (M&A) wave of the century. Few, if any, corporate resource decisions can change the value of a company as quickly or dramatically as a major acquisition.

Shareholders of acquiring firms routinely lose money right on announcement of acquisitions. They rarely recover their losses. But shareholders of the target firms, who receive a substantial premium for their shares, generally gain.

Here's a puzzle. Why do corporate executives, investment bankers, and consultants so often recommend acquiring firms pay more for a target company than anybody else in the world is willing to pay? It cannot be because so many acquisitions turn out to be a blessing in disguise.

It doesn't make sense. For over thirty years, academics and practitioners have been writing books and articles on managing mergers and acquisitions. Corporations have spent billions of dollars on advisory fees. The platitudes are well known. Everyone knows you should not pay "too much" for an acquisition, acquisitions should make

“strategic sense,” and corporate cultures need to be “managed carefully.” But do these sound bites have any practical value?

How does one predict up front whether a company is overpaying for an acquisition – in order to prevent costly failures? What exactly does the acquisition premium represent, and when is it too big? What is the acquirer paying for?

Like a major research and development (R&D) project or plant expansion, acquisitions are a capital budgeting decision. Stripped to the essentials, an acquisition is a purchase of assets and technologies. But acquirers often pay a premium over the stand-alone market value of these assets and technologies. They pay the premium for something called synergy. Dreams of synergy lead to lofty acquisition premiums. Yet virtually no attention has been paid to how these acquisition premiums affect systematic risk.

Sirower (1997) posits that mergers and acquisitions are arguably the most popular and influential form of discretionary business investment. Sirower (1997) also indicated on the single day of April 22, 1996, with the announcement of the Bell Atlantic – NYNEX merger and Cisco Systems’ acquisition of Stratcom, over \$27 billion of acquisitions were announced. For 1995, the total value of acquisition activity was over \$400 billion. By comparison, in the aggregate, managers spent only \$500 billion, on average, in the late 1990s, on new plant and equipment purchases and a mere \$130 billion on R&D.

Sirower (1997) indicated that acquisition premiums can exceed 100 percent of the market value of target firms and evidence for acquisitions between 1993 and 1995 shows



shareholders of acquiring firms lose an average of 10 percent of their investment on announcement. And over time, perhaps waiting for synergies, lose even more.

Logically, one should expect managers choose an acquisition strategy only when it offers a better payoff than other strategic alternatives. But there are several pitfalls inherent in acquisitions because they are, in fact, a very unique investment.

First, since acquirers generally pay a premium for the business, they actually have two business problems to solve: (1) to meet or surpass the performance targets the market already expects, and (2) to meet or surpass the even higher targets implied by the acquisition premium. This situation is analogous to emerging technology investments where investors pay for breakthroughs that have not yet occurred, knowing competitors are chasing the same breakthroughs. However, in acquisitions, the breakthroughs are called “synergies”.

The common definition for synergy is  $1+1=3$ . Synergy as it relates to M&A may better be defined as increases in competitiveness and resulting cash flows beyond what the two companies are expected to accomplish independently. In other words, managers who pay acquisition premiums commit themselves to delivering more than the market already expects from current strategic plans. The premium represents the value of the additional performance requirements.

Second, major acquisitions, unlike major R&D projects, allow no test runs, no trial and error, and, other than divesting, no way to stop funding during the project. Acquirers must pay up front just for the right to “kick the tires”.

Finally, once companies begin intensive integration, the costs of exiting a failing acquisition strategy can become very high. The integration of sales forces, information

and control systems, and distribution systems, for example, is often very difficult to reverse in the short term. And in the process, acquirers may run the risk of taking their eyes off competitors or losing their ability to respond to changes in the competitive environment.

The M&A field is well established. Since 1980 managers have allocated over \$20 billion to investment banking and other advisory fees to help formulate and ensure the success of their acquisition strategies. In addition to professional advisers, there are academic courses with leading universities providing week-long seminars to packed houses all over the world, and the American Management Association has an extensive program on M&A. Yet despite all of this advice, many fail.

A “failed” acquisition is one that does not earn back its cost of capital. Stock market reactions to mergers and acquisitions are the aggregate forecasts of investors and analysts around the world of the expectations of the value of the investment.

The theory of the acquisition game is rooted in the Nobel Prize winning research of Professors Franco Modigliani and Merton Miller (M&M). The M&M propositions and their path breaking research on valuation began with the assumption that the value of a firm (V) is equal to the market value of the debt (D) plus the market value of the equity (E):  $V=D+E$ . Think of this as an economic balance sheet where the market value of claims (the debt and equity) is a function of the expected earnings stream coming from the assets. You can divide the claims any way you like, but the value of the firm will remain the same. According to Black (1993), Merton Miller once said, “ Think of the firm as a gigantic pizza, divided into quarters. If now you cut each quarter in half or the

pizza in eighths, the M&M proposition says that you will have more pieces but not more pizza.”

The application of this principle is crucial to understanding what it means for acquiring firms to lose huge chunks of market value following acquisition announcements. When making a bid for the equity of another company, you are issuing claims or cash to the shareholders of that company. If you issue claims or cash in an amount greater than the economic value of the assets you purchase, you have merely transferred value from the shareholders of your firm to the shareholders of the target -- right from the beginning. This is the way the economic balance sheet of your company stays balanced.

Markets give estimates of this range of value transfer through changes in share prices. The idea of the transfer of value is the stepping-off point for the development of the acquisition game. In short, playing the acquisition game is a business gamble where you pay up front for the right to control the assets of the target firm, and earn, you hope a future stream of payoffs. But while the acquisition premium is known with certainty, the payoffs are not. Investors around the world have already valued the future expected performance of the target firm. That value equals the pre-acquisition share price. But in the current hyper-competitive markets, it is a difficult challenge just to achieve the expected performance that is already built into existing share prices let alone exceed it to cover the acquisition premium. Because markets have already priced what is expected from the stand-alone firms, the net present value (NPV) of playing the acquisition game can simply be described as the “synergy” after deducting the acquisition premium.

### The Problem of Risk

On the one hand, increased systematic risk (corporate leverage is one proxy) has alarmed those whose primary concern is with the possibility of a wave of corporate bankruptcies. On the other hand, the merger and acquisition activity's tendency to trim large conglomerates by forcing them to sell or spin off assets may reassure those who have been concerned about either the large conglomerate's asserted ability to engage in low-visibility anticompetitive practices or its political power. The impact of the acquisition on the incentive of corporate management to accept high risk gambles and the interrelation of systematic risk and leverage are worth considering.

Let us begin with a simple example of the moral hazard problem as applied to corporate decision-making. Consider the position of a CEO whose corporation is rapidly approaching insolvency and who has a choice between two investment decisions: Investment A will yield an attractive return well in excess of his company's historic cost of capital and carry relatively little risk. Investment B is much riskier but alone offers the possibility, albeit remote, of a bonanza payoff that will prevent insolvency. Ordinarily, the CEO (and his shareholders) would prefer the higher net present value associated with Investment A; but when bankruptcy looms (with the result that management will be superseded in control by the firm's creditors), it is entirely rational for them to prefer Investment B. This incentive to accept risky investments arises ultimately because the managers and the shareholders enjoy limited liability. Put simply, they have nothing to lose from Investment B and nothing to gain from Investment A.

(because the returns it generates will only go to the firm's creditors). The standard literature on corporate finance recognizes that limited liability can give rise to moral hazard problems and that this danger grows in direct proportion to the degree of leverage in the corporation's financial structure.

The hostile takeover may provide a slightly different scenario. Consider now the CEO of a firm that is reputed to be an acquisition target. His investment bankers tell him unless the firm's stock rises sharply, the firm will be "in play." In that event, he can anticipate he will be omitted in the wake of an eventual acquisition by someone. Once again, an incentive arises to accept risky investments (or make risky strategic decisions) that otherwise would be disdained, because the manager knows from his perspective he will not be worse off if the investment or project fails. The only difference here is in this variation his preference for the high-risk, high-payoff strategy conflicts with that of the shareholders, who have no desire to avoid an acquisition bid or to accept high-risk gambles [whereas in the first hypothetical the shareholders, as well as, the CEO would wish to accept the one alternative (Alternative B) that could possibly avert bankruptcy]. This conclusion that management may sometimes behave in a risk-preferring fashion may seem to contradict the basic premise managers tend to be more risk averse than shareholders with regard to their corporation. Yet there is no contradiction. The manager's utility function remains constant, but whether the manager will disdain a desirable risk or accept an excessive one depends in each case on what will preserve control.

The problem with this moral hazard explanation is it is endemic to any system of accountability, corporate or political. A president whose popularity plummets in public

opinion polls may have an incentive to manufacture a crisis or take some other gamble, when a more prudent course of action would be in the best interest of the citizenry. But even if this is true, one would hardly suggest the abolition of elections as a remedy.

Similarly, if one views the acquisition as a mechanism of accountability, it – or a proxy contest or, for that matter, any other conceivable system for disciplining managers – will produce an incentive for managers to accept higher risk when they otherwise are in a position where they face being disciplined.

What then is distinctive about the acquisition as a form of accountability? One answer is its threat of discipline is constant and unrelenting, whereas other mechanisms of accountability tend to force their threat on specific, periodic moments. As a result, the moral hazard problem is generalized under the discipline of the acquisition, while it would tend to exist only during periodic moments under other systems of accountability.

Although the economist's concept of moral hazard simply assumes individuals will gamble when they have little or nothing to lose, social psychologists have developed a subtler theory seeking to explain in a different manner how individuals will behave with respect to risky decisions. Many individuals do not simply compare the expected values of different alternatives as standard economic theory assumes. Rather, maybe individuals begin with a reference point (or aspiration level) they seek to achieve. This premise seems reasonably close to that of organization theorists, such as Herbert Simon, who long ago postulated organizational decision making occurred against a backdrop of specific target levels of profit or growth that were deserved. If this is true, individuals will prefer lower-risk (i.e., lower-variance) options as long as they are performing above their aspiration level. Conversely, individuals will opt for higher-risk (i.e., high-variance)

options when they are below their aspiration. In effect, there is a preference reversal as individuals move from being risk preferers to risk averters, or vice versa, depending on whether they are performing above or below their aspiration level.

Translated into the corporate context, this theory has meaningful applications. Essentially, the idea corporate managers tend to behave in a highly bureaucratic manner and do not pursue profit-maximizing policies vigorously can be translated into a statement these managers, having met their aspiration level, thereafter act in a risk-averse manner and pursue growth over higher profitability.

### Risk and Leverage

Standard finance theory recognizes the shareholder in a highly leveraged firm will prefer a higher-risk (i.e., higher-variance) course of action than would the same shareholder in a less leveraged firm. This is because the greater the degree of leverage, the more the downside risk falls not on shareholders, but on the firm's creditors. As the residual claimant, the shareholders receive all the upside return; but because they have limited liability, they can avoid downside loss, except to the extent their capital is invested in the firm. Then, the higher the degree of leverage, the less capital they have at risk and the more they would be attracted by high-variance investments or policies in which they receive the full upside return.

In this light, the claim made by Jensen (1986) and others that higher leverage is simply a bonding device by which management assures the capital market that it will subject itself to the discipline of the market's judgment misses a critical point: As

leverage is increased, shareholders' attitudes do not remain static. Rather, shareholders would come to favor higher-risk policies and would pressure management in that direction.

Of course, one answer to this hypothesis that increased leverage will produce a still higher level of risk preference in shareholders is creditors will not sit by passively and permit higher risk to be imposed on them. Arguably, either creditors will contract with the corporation through such devices as bond indentures and loan agreements to restrict the risks that may be imposed on them, or they will charge higher interest, which at some point should chill the shareholders' desire for higher leverage. Although these contractual devices can restrict higher leverage, it is doubtful they can restrict management from accepting higher risk. Debt-equity ratios are easily monitored, but particularly in a large conglomerate, management's choice between competing investments or business strategies is not (at least not by creditors from their relatively remote vantage point).

#### The Impact of Risk on Shareholders

From the preceding discussion it may seem the clear winner in the trend toward higher leverage is the shareholder, for whom the acquisition arguably maximizes value by forcing management to accept a higher level of risk in keeping with his own preferences. Yet this conclusion is subject to one potentially important qualification: It is not all shareholders who want the corporation to accept a higher risk level than managers prefer, but only diversified ones. There may also be a significant and unrecognized conflict



between institutional shareholders, who do approximate full diversification, and other shareholders who do not. The latter group may logically occupy a position on the continuum somewhere between managers and diversified shareholders, depending on the size of its investment in the corporation and its degree of diversification.

Should one therefore be concerned about and seek to protect the undiversified shareholder? This conclusion does not necessarily follow. It remains a puzzle why they have failed to diversify. Arguably, some of these undiversified shareholders may actually be risk preferrers and hence do not seek the benefits of diversification. If so, these shareholders would hardly want restraints placed on leverage. Or they may in fact be fully diversified, once their ownership of other risky assets other than securities is considered. Finally, they may simply be commercially incompetent and then do not realize the ease with which full diversification could be achieved by investing in mutual funds.

### The Impact of Risk on Creditors

Creditors represent an intermediate class of participants in the corporation who appear to have lost more than they have gained, although their long-term reaction may not yet be fully visible. Anecdotal evidence is now abundant that bondholders have been adversely affected by highly leveraged acquisitions. This evidence conflicts with earlier findings bondholders typically either gained or suffered no loss in mergers. The reason for this reversal seems intuitively obvious: Although traditional synergistic mergers typically increase the firm's assets and hence the bondholders' security, the new

generation of highly leveraged acquisitions has had the opposite effect. The recent series of credit downgradings by Moody's and Standard & Poor's, which have been the by-product of acquisitions in a significant percentage of the cases, provides evidence that creditors may have less ability to monitor risk taking by management than neoclassical theory has assumed. Although economists have traditionally assumed creditors can protect themselves adequately by imposing financial tests and covenants in bond and loan indentures, the empirical evidence suggested their confidence is unjustified, because contrary to the conventional wisdom, the trend is very much in the direction of eliminating most such covenants from bond indentures. No consensus exists as to why bond creditors are today abandoning contractual restrictions, but it appears the contracting process has proven both costly and ineffective. In part, this may be because there are too many ways in which the firm's level of risk can be increased that are simply not feasible to restrict via contractual obligation. Management can, for example, change its corporate strategy as to accept more risk in a variety of invisible ways. Typically the basic managerial bias is toward risk aversion. Yet under shareholder pressure, this bias is being overcome; and at least over the short run, creditors suffer as a result.

Over time, creditors may devise new financial instruments, demand voting rights, or invest only in shorter-term notes (as junk bonds typically are). Yet over the interim, they seemingly are unprotected at a time when managerial behavior is shifting rapidly toward the acceptance of greater risk. As a result, one of the least noted aspects of the takeover phenomenon is massive wealth transfers appear to be occurring from bondholders to stockholders. Whether the end result will be bondholders demand in the

future to share in the upside return through an equity kicker or to share in control through voting rights is uncertain, but the present pattern cannot remain stable.

### The Impact of Risk on Employees

Employees and managers constitute the best example of a class that has had to accept the imposition of higher risk. Many instances can be identified where corporations first leveraged up as an acquisition defense and then followed this action with subsequent massive dismissals or compelled retirements of employees. Another prevalent phenomenon has been the termination of pension plans or the transfer of “excess” funds from continuing such plans back to the corporation, particularly as leveraged firms struggle to maintain liquidity.

In some industries, particularly the oil industry, the acquisition wave has probably only anticipated and hastened a shrinkage that developments in the product market and the gradual depletion of oil reserves would have eventually necessitated. In other industries, particularly the food and broadcasting industries it is more difficult to find any revolution occurring in the product market. Yet the efficiency of these staff reductions does not fully answer the critical issue: Should the expectations of employees be that they would have had continuing employment in the absence of a leverage induced financial crisis?

### The Impact of Risk on the State

Neoclassical theory sees the corporation as an exclusively private body. The state's corporations code is valid as simply a model-form contract the state provides to simplify the contracting process and from which the parties are free to opt out by inserting specially tailored provisions in the corporation's certificate of incorporation. Historically, it is clear, however, the corporation originated in the United States as a quasi-public body in which the state was often a very unsilent partner.

What view then can be taken of the state's role that still treats the corporation as a private body essentially focused on wealth maximization? One answer is to view the state's role as that of an insurer for the losses that limited liability spares shareholders. It is a fundamental error to believe costs disappear just because shareholders escape them. The costs shareholders avoid through limited liability fall most heavily on creditors, but a significant portion are ultimately borne by the state as the ultimate residual risk bearer. At a minimum, the state's welfare rolls increase when corporations fail, and often it winds up partially compensating tort creditors. This inevitable role of the state has been neglected because significantly concentrated losses usually occurred only during recessionary periods. Also, the state's role has low visibility because the state does not in any formal sense guarantee the obligations of the firm; rather, it absorbs indirectly many of the losses initially experienced by the other constituencies surrounding the firm. If manufacturing plants are closed and workers and managers are laid off in the aftermath of either a takeover or a defensive tactic that increases corporate leverage, much of the resulting costs will fall on the state, which typically will be required to pay increased welfare benefits and make other transfer payments. In the case of local communities,

there may also be extensive firm-specific investments the community has funded to create the infrastructure of social services surrounding a major plant or corporate headquarters. To be sure, the relationship is a symbiotic one, and the state or local community also benefits; there is no reason to believe the community should rationally be indifferent to the level of risk accepted by such a firm.

Once again, as with bond creditors, contractual restrictions could in theory protect the community's interest. But no such contracting process appears visible. Whether this is because of intercommunity competition for corporate relocations or because smaller governmental units tend not to be sophisticated "repeat players" (and so are overreached) can be debated. For present purposes, the only contention is the state and local communities frequently stand in the position of a creditor or partial surety for the corporation. With the creditor, they may come to demand greater "voice."

#### Risk and the Interaction Between Shareholders and Managers

Shareholders and managers can potentially have many conflicts: salary, dividends, and self-serving transactions. All these and other topics have long produced disputes that sometime reach the courts. Theorists of the firm have argued, however, it is in the interests of both sides – managers and shareholders – to resolve these conflicts in advance through a variety of contractual devices and institutional mechanisms.

Whether or not one accepts the contention the traditional problems of corporate law have been solved, economic theory suggests there is one area of conflict that was never addressed, even recognized, by the traditional law of fiduciary duties and that is

rational shareholders will hold diversified portfolios. Although there is evidence individual investors do not in fact hold well-diversified portfolios, this generalization certainly fits institutional investors, who today dominate the marketplace. In any event, it seems clear investors, whether individual or institutional, are better diversified than managers. Managers are inherently over invested in the firm they serve, for at least three distinct reasons.

First, the manager's most important asset is his or her job. Although the manager generally does not have a recognized property right in his or her employment relationship with the corporation, this relationship still has a present value to the manager equal to the discounted earnings stream he or she expects to receive from that job (or career path) until retirement. Both because lateral mobility among senior corporate executives is limited and because the manager may develop firm specific human capital, the manager cannot assume the existence of an external market rate of return applicable to his or her labors, as the lower-echelon employee may be able to assume. Rather, the still-prevailing pattern is one in which there are "ports of entry" within the corporate hierarchy but with little opportunity for lateral movement at an equivalent level. Managerial compensation is set within an internal market, and loss of a job means more to a manager than to those employees whose wages are determined by an external market. To sum up the basic contrast is shareholders own many stocks, but managers have only one job.

Second, the manager is over invested in his own firm because the firm in its own interest awards him a generally nontransferable interest in itself through stock options and other fringe benefits. Empirically, there is no doubt senior managers do in fact have a substantial portion of their personal wealth invested in their own firm. The firm's

purpose is to align the manager's interests with those of the shareholders. This concept of aligning managerial and shareholder interests is at the very heart of Jensen and Meckling (1976), which demonstrated most shareholders/manager conflicts can be minimized in part through such incentive compensation. However, for present purposes, the relevant point is the use of stock as compensation gives the manager an undiversified portfolio. Ironically, as this device cures other conflicts, it tends to exacerbate the asymmetry in risk attitudes between shareholders and managers.

Third, although shareholders have limited liability, managers and directors may well have personal liability in the event of corporate insolvency or financial distress. In some circumstances they may even face criminal liability for securities fraud or other offenses if, after insolvency, allegations surface they hid the corporation's financial distress.

As a result, the bottom line is the manager may not view corporate insolvency with the same equanimity the diversified shareholder can. Because the manager cannot spread his risks or escape them safely in the event of insolvency, he is then economically wedded to his firm. The implications of this point are at once obvious and far-reaching: managers will be more risk-averse than their shareholders. Indeed, it is axiomatic that fully diversified shareholders should not be risk-averse at all. Portfolio theory divides the risk associated with any security into two components: a firm-specific component and a "systematic" or nondiversifiable component associated with general market conditions. Once shareholders have diversified their portfolio, they are in theory largely immune from firm-specific risk, both because no individual stock will have that material an impact on their portfolio's performance and because their portfolios will include counter-

cyclical stocks whose price movements will offset each other. Hence, the investor should in theory be risk-neutral. Under some circumstances, such an investor may even behave as a risk preferrer, because the investor may seek stocks having a high-risk level to offset the debt or low-risk components of the portfolio. The manager, however, has no real protection against firm-specific risk and hence will be risk-averse. This is both inevitable and in some respects desirable, because if the manager could diversify away all firm-specific risk, serious moral hazard problems would arise and the senior manager would have little incentive to monitor others.

Once this conflict is recognized, it can be seen to constitute an underlying tension which runs through the corporate landscape much like the San Andreas fault, that is, seldom overtly visible in its operation but still powerful in its impact. At the level of ordinary business decisions, the impact of this “risk aversion differential” will seldom be evident. In choosing among competing investment opportunities or business projects that do not threaten the firm’s solvency, managers have little reason to act as if they were risk-averse because they are “repeat players” who understand the firm itself is a diversified portfolio. However, when one moves from the tactical to the strategic level, the conflict becomes pronounced. For example, some economists have argued corporate managers maximize sales or growth, not profits. In part, such an empowered-building policy is pursued, they claim, to increase the security of the corporation’s managers, because the acquisition of additional divisions and product lines both reduces the risk of insolvency and provides opportunities for personal advancement. This claim can be understood as an assertion that managers seek to build a diversified portfolio within their firm. Exactly this specific claim has been made by financial economists, most notably Amihud and



Mendelson (1991), who marshal evidence, “managers, as opposed to investors, ... engage in conglomerate mergers to decrease their largely undiversifiable ‘employment risk.’”

What starts to become clear is the mutual recognition that empowered building may be rational for managers but inefficient for shareholders. This perception can be generalized to cover all investment decisions. In the area of corporate financial policy, there is again a close fit between this theory and empirical observations.

In a well-known field study, Professor Gordon Donaldson of the Harvard Business School found the corporations he studied as a participant observer preferred to finance through retained earnings rather than through the issuance of debt. Many firms he interviewed plainly revealed a strong bias against any financing that involved resorting to the capital markets and required a considerably higher expected return from an investment before they would resort to external financing sources. In a more and extended study of a dozen mature industrial firms over the period of 1969 to 1978, Donaldson found of the capital funds invested by these companies over that period, some 74% was internally generated, 26% came from long-term debt, and none came from new equity issues. What explained this aversion for the public capital markets? Donaldson concluded the policy of these firms with respect to the use of debt could be “summed up in one word: conservation.” In his view, managers treated their firm’s debt capacity as if it were a hidden bank account to be saved for a rainy day. Leverage then is something managers avoid, his study implied, because it consumes the firm’s debt capacity, which they view as the buffer that protects them from the risk of future adverse events.

Heretical as this thesis may sound, other studies also point to this same conclusion that managers under-utilize debt and avoid non-essential entanglements with the capital

markets. These studies have found the rate of return experienced by public corporations on internally generated funds was well below that on debt or equity. Indeed, for firms that did not resort to the equity market, the return on “ploughbacked” funds has been found to be near zero. This startling point suggested managers are overly biased toward earnings retention (possibly because they wish to maximize growth) and they are reluctant to upset the capital markets unless the projected investment offers a much higher rate of return than is ordinarily available to the firm. Even more to the point, other studies have found management-controlled firms have a lower return on investment than firms where ownership and control is not separated and management-controlled firms retain a higher percentage of earnings.

All this data becomes clear presuming senior management, having a fixed investment in the firm, will act in a more risk-averse manner than the shareholders. In this view, managers tend to be reluctant to accept any form of capital market discipline, not just the discipline of the market for corporate control. Accordingly, a naïve “growth maximization” model miss specifies managerial incentives. Although the corporations Donaldson studied doggedly pursued growth and enhanced market share (rather than the highest stock price or return on equity), they did so always with the constraint of seeking only the level of growth that could be “self-maintained” (financed through internally generated funds and without utilizing the corporation’s much protected debt capacity). Such a portrait describes management that can be both as risk averse and as extremely protective of its own autonomy.

Excessive earning retention is, of course, another facet of this same phenomenon. Although managerialists have seen this behavior either as motivated by a desire for

growth or as proof managers have an “expense preference” that conflicts with the shareholders’ interest, the more fundamental cause-and-effect relationship may be the disparity in the level of risk aversion between managers and shareholders. Then, the less risk-averse shareholder wants a high payout, but the manager wants to hoard cash and assets to protect against future contingencies. Of course, tax motives may also play a role here, because dividends are highly taxed; but if managers were simply conforming their behavior to the incentives the tax laws held out, they would long ago have also increased the firm’s degree of leverage. Because they clearly have not, tax effects seem then to have only a partial explanatory power. In particular, tax incentives cannot explain the critical empirical finding that management-controlled firms are characterized by lower levels of systematic and unsystematic risk than owner-controlled firms.

Finally, risk is also the critical element that may shape managerial compensation systems. A leading model of the labor market assumes employers are risk neutral and employees are risk-averse. Then, the two sides negotiate employment contracts in which employees trade off some portion of the wages they could demand for employment stability. Because this model has the ability to explain both wage rigidity and underemployment equilibrium, it has attracted considerable attention. To date, it has been chiefly met with respect to lower-level employees, but it applies at least as well to the manager, because the manager is even more dependent on the firm for his expected future wealth and may suffer a greater loss if forced to resort to the marketplace. There is a profound irony here, because one tradition of neoclassical economics has long argued managers are under compensated and so lack true entrepreneurial spirit. The short answer

to this thesis is managers have probably chosen fixed-wage contracts over more “entrepreneurial” variable-wage contracts precisely because they are risk-averse.

The point of immediate relevance is, however, this implicit contract is disrupted if the merger or acquisition can deprive the manager of the employment stability for which he has already paid a price in terms of forgone earnings. In short, all these pieces of evidence fit a larger pattern in which managers and shareholders have a hidden conflict over the level of risk the firm should accept. This conflict affects not only the variance of the firm’s expected returns, but also their mean value to the shareholders, because it implies the firm’s managers will delay the payout of earnings, restrict the issuance of debt, and hoard cash and other assets that might be put to higher-valued means by the market. Against this backdrop, the merger or acquisition may be viewed as a mechanism which compels a management to accept that level of business risk shareholders deem appropriate. Such an assessment sounds optimal, but it considers, however, only the interests of shareholders.

#### Purpose and Importance of the Study

M&A is one of the largest, if not the largest, strategic financial investment a firm can make. Therefore, a relevant question is what happens to systematic risk when a firm merges with or acquires another firm. More specifically, using the Capital Asset Pricing Model (CAPM) as a base theory one could ask whether the systematic risk (non-diversifiable risk proxied by CAPM beta) of the acquiring firm increase, decrease, or remain unchanged? Furthermore, if the systematic risk does change, then discovering the

relationship of underlying determinants (variables) of that change for the acquirer would be very much of interest. What are the variables impacting the systematic risk of the acquiring firm? Based on the preponderance of literature, a number of variables have been identified that may impact systematic risk of the acquirer. These variables are specified in Chapter 3 of this dissertation and are summarized in Table 8 of Chapter 3.

In an effort to focus the analysis of this dissertation, the initial sample of pre merger acquirers are limited to the manufacturing industry for five years of transactions occurring from 1995 to 1999. If the beta of the acquirer increases after merger, by definition the shareholder takes on more risk to own the merged entity. Therefore, the shareholder would expect the stock value to increase. However, if beta decreases after merger, the systematic risk, shareholder value, and stock price would decline in value. If the former occurs, with beta increasing, the shareholder expects the potential to realize greater fluctuation in their investment (relative to the overall market) after the merger. However, if the later occurs, with beta decreasing, the shareholder expects the potential to realize less fluctuation in their investment (relative to the overall market) after the merger. If systematic risk can be found to either increase or decrease the finding would increase the M&A research. If the determinants of the increase or decrease could be determined it would be invaluable to corporate executives trying to decide what premium to pay for their next acquisition.

Modern Portfolio Theory was introduced by Markowitz (1952). There are several extensions of this theory and one of these extensions is the Capital Asset Pricing Model (CAPM). The CAPM attempts to describe how the market values investments with expected returns and provides some additional insight to the nature of risks. There are

several ways to classify investment risks. However, under the CAPM approach there are only two types of risks. The first is diversifiable risk, which is known as nonsystematic risk. This type of risk is avoidable and under the CAPM investors will not be compensated for avoidable risk. The other type of risk is systematic (a.k.a. nondiversifiable) risk that cannot be diversified away. Since systematic risk is unavoidable, the CAPM rewards investors for assuming it. The way the CAPM model measures the systematic risk is through beta. Beta, by definition equals one (1.0) for the overall market. Each company has a beta. Hence, a company's beta is that company's risk compared to the risk of the overall market. If the company has a beta of 3.0, then it is said to be three (3) times more risky than the overall market.

The formula for CAPM is  $K_s = K_{rf} + B (K_m - K_{rf})$ .

$K_s$  = The Required Rate of Return

$K_{rf}$  = The Risk Free Rate

$B$  = Beta

$K_m$  = The expected return on the overall stock market.

By utilizing financial data from COMPUSTAT and The University of Chicago's Center for Research of Security Prices (CRSP), the financials related to a sample of merging companies in the manufacturing industry can be examined.

### Background of the Problem

There are three groups of theories of the firm: (1) The neoclassical model (where writers such as Michael Jensen, Eugene Fama, Armen Alchian, and Harold Demsetz

constitute the principal theorists). (2) The Managerialist model (whose leading advocates include William Baumol, Robin Marris, Harvey Leibenstein, and Dennis Mueller), and (3) the transaction cost model (whose leading proponent is Oliver Williamson). Although these theories ultimately may be complementary or at least can be read to reinforce each other, it is useful to take each initially on its own terms.

### The Neoclassical Model

The leading neoclassical model of the firm, offered by Professors Jensen and Meckling, begins essentially where Berle and Means left off a half century ago. Initially, they recognize the potential conflicts that arise between managers and shareholders once shareownership becomes dispersed. The utility-maximizing agent, they acknowledge, does not necessarily have an incentive to act in the best interests of his principal. Accordingly, the principal will have to incur costs to monitor the agent's performance and will pay less for shares in the corporation in proportion to the magnitude of the "agency costs" that must be so incurred. At this point, Jensen and Meckling make their distinctive contribution in that agent's interest, to convince investors the firm will have an institutional structure which will minimize agency costs (a term which includes both the expenditures incurred to reduce managerial misappropriation and shirking and the irreducible minimum of such losses). These agency costs can be reduced in a variety of ways: (1) Through monitoring expenditures (such as the use of outside directors, audit committees, and independent directors), (2) Through bonding devices and (3) Through incentive compensation giving the agent a substantial equity investment in the firm

driving a desire to maximize share value. Following Jensen and Meckling, neoclassical economists have tended to assume market forces will alone result in the installation of the optimal level of monitoring devices and incentive systems that bring agency costs down to an irreducible minimum. At this minimal level, no additional dollar spent on internal controls or incentive compensation will yield an equivalent reduction in managerial opportunism or shirking. One could debate at length whether market forces are alone adequate to minimize agency costs or whether the law also has a positive role to play. Do these forces work to align the manager's risk aversion level with those of the shareholders? It seems extremely doubtful the contractual devices described by Jensen and Meckling do anything like this. For example, outside directors have reason to be even more risk-averse than managers. This is because their economic stake in the corporation is relatively small while their potential personal liability may be significant once the corporation becomes financially distressed. Their own individual cost-benefit calculation should therefore make them resist a high-risk course of action, even if they in general were risk-neutral, because for them the potential losses are likely to exceed the potential gains. In addition, directors are subject to severe cognitive limitations: the information they receive comes to them through management, and they have little independent means of verifying the set of opportunities the corporation has to choose among. Interestingly, business school academics have independently concluded outside directors are inherently more likely to be a brake on, rather than a motor force for, organization innovation or other change that would produce a higher-risk level. The other principal mechanism identified by Jensen and Meckling, incentive compensation through stock options, seems even more limited in its impact. Although the use of



options does give the manager greater incentives to accept risk, it also aggravates the degree to which the manager holds an undiversified portfolio that is over invested in a single firm; then, their use may expose both the manager's savings and human capital to the unique risks of a single firm.

Once one introduces the institution of the hostile acquisition and postulate that at least operated in a bureaucratic, overly risk-averse, and insufficiently entrepreneurial fashion, then the merger or acquisition becomes comprehensible as a device that disciplines "excessive" risk aversion. Given its existence, managers may find it in their interest to turn to what can be described as a "bonding" device. They can increase corporate leverage as an ex ante acquisition defense.

Professor Jensen views leverage as a tactic by which management makes a more credible promise to accept the market's judgment because more frequent returns to the market will be necessary for a firm with a high debt-equity ratio. Consequently, managers do not seem to have voluntarily adopted their suggested technique for "bonding" themselves. Only with the advent of the bust-up acquisition is there any evidence suggesting a process that even vaguely resembles the kind of bonding Jensen and Meckling predict managers will engage in. Yet this acquisition-induced bonding can hardly be called voluntary. This in turn suggests either managers' aversion to risk is very strongly held or Jensen and Meckling generally overestimate the willingness of managers to bond themselves in order to increase the firm's stock value.

### The Managerial Model

While the neoclassical model uses the market as its starting point, another variety of model begins with the manager. Rather than assume the firm is externally controlled by the market, theorists have developed “internal theories” of the firm in which the manager is the central actor. In focusing on the manager, these theorists emphasize both the severe cognitive limitations surrounding business decision making and the opportunities for discretionary behavior by managers. Denied perfect information, the manager in the large organization exists in a world of “bounded rationality” in which he must search for satisfactory answers to immediate problems by adopting more or less trial-and-error strategies. As a result, the manager functions not by seeking optimal solutions but only satisfactory ones. As developed by Herbert Simon and his colleagues, this “behavioral” theory of the firm postulates managers do not profit-maximize but, rather, “profit-satisfy”, they seek the level of profits that will suffice to prevent external interventions by dissatisfied creditors or stockholders. So viewed, managers are in effect semi-autonomous, subject only to the weak external constraint the providers of the firm’s capital receive a minimal return.

How do managers exercise the vast discretion this model sees them as possessing? In the best-known of these models, Robin Marris saw managers as being those residual funds left over after external constraints were satisfied to expand the size of the firm. Why is growth maximization the goal of managers? According to Marris, growth provides managers with greater compensation, greater psychic income, and greater security. A similar theme (absent is the emphasis on the personal security of the manager as a force for growth) appears in another well-known model of the manager’s utility

function developed by Oliver Williamson. Professor Williamson believed managers have an “expense preference” and gain a personal utility from expenditures on increased staff or growth. Neither Marris nor Williamson places the problem of risk at center stage in their models, but in each case this idea is at least consistent with their analysis that managers use their discretion to reduce the insecurity to which they are subject.

Ultimately, their assertions translate into a claim managers are seeking to reduce risks that do not appear to trouble the firm’s shareholders. Much this same theme that managers use their discretion to reduce their insecurity within the firm can be found in the writings of the principal organization theorists. However phrased, the claim managers want to pursue growth or other security-enhancing objectives within the boundaries established by external profit constraints on the firm is at least in part a statement managers will seek to reduce risk up to that point where the shareholders may omit them if they pursue this objective further.

How valid do these managerialist theories seem today? Although they are intuitively attractive in their description of managerial objectives, they have a dated quality in their implicit assumption firms are large, unchanging bureaucracies and the market constitutes only a weak external constraint. Historically, these models were developed in the early 1970s based on the experience of the late 1960s, when it was still possible to have bureaucratic organizations that were only weakly constrained to the market. In short, these models predate the emergence of the acquisition as a major constraining force, the rise of active institutional investors, and the traumatic series of shocks the American economy began to experience in the 1970s.

Yet if these theories understate the external constraints on the corporate manager, there is, if anything, additional reason today to believe they correctly describe the manager's own preferences as biased in favor of growth over profitability. The best evidence of this bias lies in the prevalence of liquidation type acquisitions in which the asset value of the firm on liquidation clearly exceeds the price a bidder pays to the acquirer firm's stock. The puzzling question about such acquisitions has been why the firm's asset value is so much in excess of its stock market value. The most plausible answer is not that these firms were inefficient in the mean sense of substandard operating performance but, rather, they either had grown to an inefficient size or were failing to exploit opportunities to create value for their shareholders through increased leverage or a higher payout ratio. This answer helps to explain the "deconglomeration" movement, which has involved a record level of spin-offs and sales of assets by large corporations under the threat of an acquisition.

Ironically, this resolution implies both sides in the debate between the neoclassical and managerial positions may be partially correct. That is, the acquisition may in these instances be enhancing efficiency (at least to the extent the market's judgment can serve as a proxy for efficiency), but it is doing so largely because the manager had a preference for inefficient growth and earnings retention, as the managerialists hypothesized.

### The Transaction Cost Model

The theory of the firm developed by Oliver Williamson builds upon a historical base. It relies on the work of the business historian Alfred Chandler, who found that

American corporations underwent a major transition during the middle of this century, as a result of which a new form of corporate structure arose was characterized by

decentralized, semi-autonomous divisions coordinated by a central executive office.

Williamson has offered a plausible theory to explain this development by returning to a central question posed by Ronald Coase: "Why are some business decisions coordinated by markets and others resolved by internal administrative decisions within the firm?"

Williamson's answer (also suggested by Coase in a more rudimentary form) is the internal processes within the firm involve lower transaction costs than does the use of the market system. In effect, the firm exists to affect those processes it can coordinate more efficiently than the market.

In Williamson's view, the modern multidivisional conglomerate functions as a miniature capital market in which the central executive office reallocates funds from stagnant or low growth divisions to high-growth winners in a manner which outperforms the capital market. Because of its superior monitoring ability, the multidivisional conglomerate firm gradually superseded its predecessor, the focused competencies firm, which had a functionally specialized management but did not have the same multiunit, diversified scope of operations or the decentralized system of administration developed within multidivisional conglomerate.

Yet it is precisely with respect to this claim of superior efficiency for the multidivisional conglomerate firm developments in corporate structure present a problem. Indeed, these developments suggest the Williamsonian theory may be historically bounded, as well as, historically derived. Put simply, if the conglomerate form is more efficient than the earlier focused firm, why has there been a trend toward

deconglomeration? To say the deconglomeration movement is acquisition-induced begs the question: Why is it acquisition-induced? What inefficiency does the market see in the conglomerate form?

One possibility is, the managerialists could be more right than Professor Williamson. The growth of the conglomerate could owe more to the growth-maximizing preferences of managers, who are seeking to build a diversified portfolio within a single firm, than to its greater efficiency, as Professor Williamson postulates. A satisfactory basis for empirical evaluation of these competing claims is still elusive, but some evidence has shown that diversification at the shareholder level has outperformed conglomerate firms. This is hardly the result one would expect if the modern conglomerate had superior monitoring ability. In addition, the work of Dennis Mueller and others casts doubt on whether the conglomerate firm has achieved greater efficiencies.

Even if Williamson were more correct than the managerialists, another possibility is the tendency toward inefficient expansion could be sufficiently prevalent to create a cloud over the use of the conglomerate form. Investors may find it difficult to distinguish these pseudo conglomerate firms that have grown to inefficient size or intend to “hoard” earnings when shareholders would prefer a higher dividend payout from those in which use of the conglomerate form has achieved an efficient reallocation of funds at lower transaction costs. Such judgments involve predictions of the future, during periods when the corporation may be under a different management team, and then are highly speculative. In short, if investors cannot distinguish “good” from “bad” conglomerates (in terms of their likely future behavior), a “market-for-lemons” effect could arise. In this

light, even if only a minority of all conglomerates exhibited the behavior predicted by the managerialists, the market might still penalize the stock prices of all conglomerates if monitoring by investors could not easily distinguish between these firms. As a result, arbitrage profits would still be available to bidders seeking to realize the difference between the stock market price and the asset value on all conglomerates.

Finally, the Williamsonian model gives no attention to the rise over the past 20 years of two external monitoring forces: (1) the institutional investor and (2) the acquisition bidder. Inherently, any improvement in external monitoring controls reduces the significance of the disparity between the internal monitoring capacity of the multidivisional conglomerate and the focused firm.

As a result, the comparative advantage of the conglomerate is reduced. In addition, because the institutional investor is already fully diversified (or nearly so), the diversification advantages of the conglomerate are minimized. First, because the institutional investor is already the holder of a diversified portfolio, it has little need to invest in another diversified portfolio, which is what the large conglomerate essentially resembles. Rather, the institutional investors need is to pick and choose stocks to fill specific holes in its own portfolio. Almost by definition, a diversified conglomerate does not have such a specific profile that can match this need. Then, the institutional investor has reason to disdain it or to purchase its stock only at a discount. To the extent that such an attitude prevails in the market, there may again be a market penalty imposed on the use of the conglomerate form. Second, the institutional money manager has a self-interest which disinclines him toward investing in diversified conglomerates. Investing in a portfolio of conglomerates is little different from investing in a market index fund. From

the standpoint of the money manager, it becomes difficult to justify high management fees for transactions that are so easily and costlessly effected. Hence, self-interest – whether conscious or unconscious dictates these managers maintain they can outperform this simple strategy of diversification by selecting less diversified companies.

### Do Targets and Acquirers Gain from M&A?

Virtually every empirical study has found target firms display statistically significant positive price response to the announcement of an acquisition attempt. Jensen and Ruback (1983) averaged the results of about twenty scholarly papers and found an increase (over the pre-announcement market price) of 20% for mergers and 30% for tender offers in the period around the acquisition event.

Dennis and McConnell (1986) found that the average target firm's share price increased by 8.7%, adjusted for market movements, on the day of bid announcement versus the previous trading day. This is an annualized return of several thousand percent!

Although there is a mystery about the motives of bidding firms in acquisitions, there is absolutely no doubt a bid is good economic news for the target. No matter what might happen to target firm shareholders subsequent to the original announcement bid, the bid per se is beneficial. If the target firm's shareholders were concerned about subsequent damaging action by the bidder (say in a two tiered offer), they could simply sell at the prevailing price just after the bid. In doing so, they would realize a total return considerably higher than what would have obtained in the absence of a bid.



The empirical support for the value of receiving a bid is bolstered further by studies of target firms after the original bid. Perhaps the most dramatic and persuasive evidence was uncovered by Bradley et al. (1983) in a study of unsuccessful tender offers. When an unsuccessful tender offer is followed by another offer within a few years, the original price increase around the first bid is maintained permanently. However, when the original (unsuccessful) offer is not followed by a successful offer within five years, the entire market price increase associated with the original bid is reversed.

Before turning to the more complex issues surrounding the bidding firm, one should emphasize bids are apparently surprises to target firm shareholders. Most studies have found a large price increase in the few days surrounding the original bid announcement; and this announcement effect is much larger per unit of time than observed price movements either before or after. This result points to the essentially passive role played by the target firm, which is an important contrast to the active role of the bidding firm. It is much easier to ascribe price movements to the bid when the firm is surprised. The bidding firm is not surprised, and this complicates the attribution to price movements of its shares to the acquisition event.

The empirical results for bidding firms permit a variety of interpretations. Methods, time periods, and samples of firms vary across studies, making it difficult to draw conclusive inference. The same factors differed across papers for target firms but, nevertheless, the results agree. Just to mention a sample of papers, Bradley (1980), Asquith (1983), and Dennis and McConnell (1986) report positive price movements of bidding firms; Dodd (1980), Firth (1980), and Eger (1983) report negative price

movements. Some papers, e.g., Malatesta (1983), report both, depending on the method and sample.

Whether bidding firm price movements are positive or negative on average, they are generally small in percentage terms (much smaller than target firm returns), and are less statistically significant. Dennis and McConnell (1986) report a market-adjusted return in the equities of bidding firms of  $-0.12\%$  on the day of the announcement and the previous trading day. This tiny, negative, two-day return is to be contrasted with the large, positive  $8.74\%$  two-day return they found for target firms.

The return on the two-day announcement period is negative for bidders in the Dennis-McConnell sample, but it is not statistically significant. Interestingly, the authors conclude the effect on bidders actually is positive, not negative, because of a positive price movement during a long period around the announcement. The announcement day itself displays a negative return of  $-0.34\%$ , which is marginally significant, but when the authors calculate returns for other periods, (day  $-19$  to  $-2$  day  $-19$  to  $0$ , day  $-6$  to  $+6$ ), they find overall positive returns! Strangely, the greatest positive returns occur after the announcement. The Dennis-McConnell paper is the most and one of the very best empirical papers on this subject, which is why it is extensively cited. It seems their results make something less than a persuasive case for the proposition bidding firms' stockholders gain around merger events. Their paper is typical in this regard.

Dennis and McConnell (1986) also investigate the possibilities (1) that total potential gains to bidding firms may be larger than gains to stockholders (e.g., bondholders may also benefit), and (2) returns may be a less useful gauge of benefits than

dollar price movements, particularly when assessing the relative gains of target and bidder firms, which generally differ substantially in size.

Dollar gains are reported only for a chosen period (for equities, the period is 20 days before until 20 days after the announcement). For all classes of stakeholders combined, target firms gain an average of \$30 million and bidding firms an average of \$40 million during this period. Keep in mind the figure would be quite different for other periods around the announcement. For example, it would likely be negative for bidding firms on the announcement day itself.

The results for bidding firms reported in the Dennis and McConnell (1986) are typical of every empirical paper. Depending on the paper, the sample, the period, and the biases of the reader, widely differing conclusions can be reached. This state of affairs is possible, moreover, even ignoring the more critical problem of interpretation of bidding firm market price reactions: the fact the bid itself may convey information about the bidder unrelated to the acquisition event.

To put this problem in perspective, one should remember many types of public announcements by firms cause market prices to react. Dividend declarations, earnings results, splits, new products, personnel changes, etc., have been associated with market price movements. Any public announcement has this potential because it leads investors to revise their opinions about the value of the firm. The announcement of an acquisition bid discloses at least two pieces of information: first, the acquisition will be attempted, and second, the internal affairs of the bidding firm are in such a state an acquisition bid is possible. The second item is new information about the firm that is not necessarily related to whether a acquisition will ever occur. It can signal a good thing such as the

cash flow over the past has been higher than previously estimated and high enough to elicit an acquisition attempt. It can also signal something less favorable, such as the managers going to use the company's cash in pursuit of an expensive and elusive target, for which they may overpay.

The problem is the bid is a "polluted" information item. The bidding firm is an activist, unlike the target firm, and its actions can be interpreted in the market as conveying more than just information about the acquisition per se.

### Research Questions

This study addressed the key variables in determining acquirer systematic risk. It included various financial and other measures to model the systematic risk in a merger situation. A specific area of focus for the paper was analyzing determinants of merger premiums in relation to Capital Asset Pricing Model (CAPM) beta for the manufacturing industry and answering the following questions: Do the financial determinants of merger premiums also provide insight into the change in acquirer systematic risk? Does the acquirer's systematic risk increase, decrease, or remain unchanged do to merger?

### Source of the Data

Merger and acquisition timing and size data were extracted from the Securities Data Corporation (SDC) database. Center for Research of Securities Prices (CRSP) Stock return and Index return data were used. Financial data was extracted from Standard

and Poors' COMPUSTAT database. A more detailed description of the data used in this study is provided in Chapter 3.

### Variables

The following table provides a summary of the variables that the study examined.

The financial variables are commonly used measurements for performance within the finance industries. The dummy variables provide a tool for measuring other characteristics of the acquirer.

Table 1:  
List of Variables and their Definitions

Type:	Variable:	Description:
<b>Dependent</b>	BETA	Capital Asset Pricing Model Beta
<b>Acquirer</b>	BVPS	Change in Acquirer Book Value
	TD	Change in Acquirer Debt Level
	PE	Change in Acquirer P/E Ratio
	OITA	Change in Acquirer Ratio of Operating Income to Assets
	SBVPS	Change in \$ Value of the Merger to Acquirer Book Value
	ROA	Change in Acquirer Return on Assets
	TA	Change in Acquirer Asset Size
	NI	Change in Acquirer Net Income
	SE	Change in Acquirer Net Sales to Selling, General, and Administration Expenses
	MV	Change in Acquirer Market Value
	TDTA	Change in Acquirer Debt-to-Asset Ratio
<b>Other</b>	S129	Acquirer SIC code classification is 1-29
	S3034	Acquirer SIC code classification is 30-34
	S35	Acquirer SIC code classification is 35
	S36	Acquirer SIC code classification is 36
	S3739	Acquirer SIC code classification is 37-39
	S4099	Acquirer SIC code classification is 40-99

### Research Hypotheses to be Tested

The following section provides a summary of each of the hypotheses that this study will address. Each hypothesis corresponds to an independent variable.

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#### Hypothesis One:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer book value increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O1</sub>: There is a negative or no relationship between the change in the acquirer's book value and the change in the acquirer's systematic risk.

H<sub>A1</sub>: There is a positive relationship between the change in the acquirer's book value and the change in the acquirer's systematic risk.

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#### Hypothesis Two:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirers' total debt level increase the change in systematic risk also increases. The focus here is the impact of managerial risk taking.

H<sub>O2</sub>: There is a negative or no relationship between the change in the acquirer's total debt level and the change in the acquirer's systematic risk.

H<sub>A2</sub>: There is a positive relationship between the change in the acquirer's total debt level and the change in the acquirer's systematic risk.

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### Hypothesis Three:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer PE ratio increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O3</sub>: There is a negative or no relationship between the change in the acquirer's P/E ratio and the change in the acquirer's systematic risk.

H<sub>A3</sub>: There is a positive relationship between the change in the acquirer's P/E ratio and the change in the acquirer's systematic risk.

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### Hypothesis Four:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer ratio of operating income to assets increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O4</sub>: There is a negative or no relationship between the change in the acquirer's ratio of operating income to assets and the change in the acquirer's systematic risk.

H<sub>A4</sub>: There is a positive relationship between the change in the acquirer's ratio of operating income to assets and the change in the acquirer's systematic risk.

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#### Hypothesis Five:

This hypothesis suggests as changes (post-merger to pre-merger) in merger size to acquirer book value increase the change in systematic risk decreases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O5</sub>: There is a positive or no relationship between the change in the ratio of the dollar value of the merger to the acquirer book value and the change in the acquirer's systematic risk.

H<sub>A5</sub>: There is a negative relationship between the change in the ratio of the dollar value of the merger to the acquirer book value and the change in the acquirer's systematic risk.

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#### Hypothesis Six:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer return on assets increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O6</sub>: There is a negative or no relationship between the change in the return on assets of the acquiring firm and the change in the acquirer's systematic risk.

H<sub>A6</sub>: There is a positive relationship between the change in the return on assets of the acquiring firm and the change in the acquirer's systematic risk.

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#### Hypothesis Seven:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer asset size increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O7</sub>: There is a negative or no relationship between the change in asset size of the acquiring firm and the change in the acquirer's systematic risk.

H<sub>A7</sub>: There is a positive relationship between the change in asset size of the acquiring firm and the change in the acquirer's systematic risk.

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#### Hypothesis Eight:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer net income increase the change in systematic risk decreases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O8</sub>: There is a positive or no relationship between the change in the acquiring firm's net income and the change in the acquirer's systematic risk.

H<sub>A8</sub>: There is a negative relationship between the change in the acquiring firm's net income and the change in the acquirer's systematic risk.

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#### Hypothesis Nine:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer net sales to selling, general, and administrations expense ratio increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O9</sub>: There is a negative or no relationship between the change in the acquiring firm's net sales to selling, general, and administration expenses and the change in the acquirer's systematic risk.

H<sub>A9</sub>: There is a positive relationship between the change in the acquiring firm's net sales to selling, general, and administration expenses and the change in the acquirer's systematic risk.

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#### Hypothesis Ten:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer market value increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O10</sub>: There is a negative or no relationship between the change in the acquiring firm's market value and the change in the acquirer's systematic risk.

H<sub>A10</sub>: There is a positive relationship between the change in the acquiring firm's market value and the change in the acquirer's systematic risk.

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### Hypothesis Eleven:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer debt-to-asset ratio increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O11</sub>: There is a negative or no relationship between the change in the acquirer debt-to-asset ratio and the change in the acquirer's systematic risk.

H<sub>A11</sub>: There is a positive relationship between the change in the acquirer debt-to-asset ratio and the change in the acquirer's systematic risk.

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### Limitations of the Study

The seminal work of Markowitz (1952) is possibly one of the most important contributions of operations research and microeconomics to applied finance and to some aspects of macroeconomic theory. It has immediate application to the small, passive investor. It says, "If you are small and do not have a special edge, then there is an optimal way to diversify and hedge yourself against the unknown." Sharpe (1964) and Lintner (1965) and others developed the capital asset-pricing model for application, and it was accepted to the point any financial analyst knows his "alphas and betas", as well as, he knows his ABCs. The key observation of Markowitz was a single security's contribution to the risk of a portfolio was not the same as the risk of holding the single security alone. In order to develop a theory of how an individual with a given amount of money should

select an optimal portfolio, one must make the following assumptions. The individual's preferences can be represented by a utility function; market prices are given; and the future performance expected from the stock can be summed up as though the stock were a lottery ticket. In a fundamental way portfolio theory has no contribution to make to security analysis. It tells us how to mix risks only if the risks have been assessed and the correlations between the expected performances of the stocks have been taken into account. Given our assessment is correct, the concept of an efficient portfolio as one which provides a given expected return with minimum risk provides economic insight and practical assistance. The steps from Markowitz' theory to actual application are large. The capital asset pricing model's (CAPM) attempts to apply them. It is at this point that a subtle intermix of assumptions and facts concerning divergence of assessments and the functioning and information revelation aspects of competitive markets appear.

The CAPM assumptions are all investors have the same information and expectations concerning the future; transactions costs and taxes are ignored. In essence, in the original CAPM the efficient portfolio would be the market portfolio or the holding of all securities in proportion to their market value. Empirically, the best immediately available approximation for this portfolio is the Wilshire 5000 index, but probably Standard and Poor's Industrial Average is the most used. The distance between theory and practice is often great. If one wished to use the Wilshire 5000 list in detail for market calculations, one would need millions of correlation coefficients. The use of historical data to characterize stock performance is suspect. The empirical problems with the estimation of utility functions are many. When companies are merged, bought, sold,

liquidated, reorganized, taken public, or taken private, there are other markets which might be taken into account; and the arbitrage is between markets, with the mass stock market providing only on part of the trading arena.

### Organization of the Study

This dissertation is organized into five chapters. Chapter I provides an introduction to the study. It includes background material, research questions, research variables, research hypotheses, the inherent assumptions, limitations, and importance of the study.

Chapter II provides a summary of the historical background of merger activity in the United States. It reviews the various financial theories on mergers and acquisition. Also, this chapter summarizes and discusses the previous academic literature related to mergers, acquisitions, and systematic risk.

Chapter III presents the methodology, and discusses the primary research questions and provides a listing of the hypotheses proposed. Second, it identifies the variables the study utilized. Third, it describes the source and type of data to be analyzed. Finally, the analytic techniques and procedures used including correlation and regression analysis are explained.

Chapter IV presents a summary of the statistical findings after the data is analyzed. It outlines the use of correlation and regression analysis to examine the various determinants used to test the proposed hypotheses. It discusses the research findings and provides an interpretation of the results.

Chapter V provides a summary and final conclusions resulting from the research. It provides suggestions for future extensions to the current research. Finally, it provides suggestions for practitioner application.

## CHAPTER 2

### LITERATURE REVIEW

#### Introduction

This chapter discusses the prior research performed on the topic of mergers and acquisitions. Much of the discussion regarding prior research is closely adapted from Bruner (2001). Also based on a review of relevant literature, this chapter provides substantial information and historical context for the capital asset pricing model (CAPM). Finally, the chapter summarizes the various theories for mergers and reviews the research that has explored those theories.

In the wake of the largest M&A wave in history, it is appropriate to assess the evidence on the profitability of this activity. One popular view is that merger activity is highly unprofitable. Does research substantiate this view? Looking at the evidence from over 100 studies from 1971 to 2004 this chapter summarizes what it means for M&A to “add value”. The review comments on various research approaches, and highlights findings for the broad activity, as well as, niches of special note. The mass of research suggests target shareholders earn sizable positive market-returns, bidders (with interesting exceptions) earn zero adjusted returns, and bidders and targets combined earn positive adjusted returns. On balance, one should conclude M&A activity does add value. But

the broad dispersion of findings around a zero or negative return to buyers suggests merger activity should be approached with caution.

The profitability of merger and acquisition (M&A) activity has generated a small mountain of research over the past 30 years. With each passing decade, more scientific evidence emerges, permitting us to sharpen our conclusions. It is appropriate to consider the latest findings along with earlier studies to synthesize some insights from the literature. Reviews of the scientific evidence were published in 1979, 1983, 1987, and 1992. In the wake of the largest merger wave in history, spanning the years 1992-2000, a fresh review of the findings seems appropriate. The more than 100 scientific studies surveyed here include the classic most-cited research, and some of the newer and notable work.

A review of the evidence is also warranted by the view, grown popular in circles of executives, consultants, and journalists, that M&A destroys value. According to Grubb and Lamb (2000), "The sobering reality is that only about 20 percent of all mergers really succeed. Most mergers typically erode shareholder wealth...the cold, hard reality that most mergers fail to achieve any real financial returns... very high rate of merger failure...rampant merger failure..."

A manager should find these assertions alarming. But the findings of a broad range of scientific studies rooted in economics and tested using conventional statistical methods should be considered. One possible reason for the disparity between popular perception and scientific findings is confusion about what it means for an investment "to pay".



In this review, a very specific benchmark for measuring performance is used: investors' required returns, commonly defined as the return investors could have earned on other investment opportunities of similar risk. Against this benchmark, one can define three possible outcomes: value conserved, value created, and value destroyed.

### Value Conserved

Here, investment returns equal the required returns. Shareholders get just what they required. The investment has a net present value of zero. This does not indicate an investment failure. If the investor requires a return of 15 percent, and gets it, he or she would be satisfied. Under this scenario, wealth will grow at the rate the investor requires.

### Value Created

This occurs where the returns on the investment exceed the returns required. This investment bears a positive net present value; the investor's wealth grew higher than was required. The investor must be very happy. However, given competition in markets, it is difficult to earn "supernormal" returns, and very difficult to earn them on a sustained basis over time.

### Value Destroyed

In this case, investment returns are less than required. The investor could have done better investing in another opportunity of similar risk. The investor is justifiably unhappy here. Notions of success or failure should be linked to these measurable economic outcomes. In economic terms, an investment is “successful” if it does anything other than destroy value.

### Focus of this Meta Analysis

Why should one focus so narrowly on economics? Many managers describe a complex set of motives for acquisitions and one could ask why M&A activity shouldn't be benchmarked against all of these? The use of broader benchmarks is debatable for at least two reasons. First, the managers' motives may be inappropriate, or the managers themselves foolhardy. One hears of M&A deals that are on track for vague strategic benefits, the creation of special capabilities, the achievement of competitive scale, or because two organizations or CEOs are especially friendly. But the only way one can prove these are actually beneficial is by measuring the economic outcomes rigorously. Second, special deal-specific definitions of success limit generalizing from the research findings. Enhancing the welfare of shareholders is a fundamental and common objective of all firms. Indeed, in the United States, corporate directors are required to implement policies consistent with shareholder welfare, mutually synonymous with creating value. Fortunately, benchmarking against value creation does permit generalizations to be drawn. Indeed, the definition of M&A success and its drivers is a fertile area for further

research. A narrow question is pursued here in hope of saying something meaningful about M&A activity.

There are two primary parties to an M&A transaction: the buyer and the seller of the target company. In addition, there are numerous ancillary economic interests in the deal, those of advisors, creditors, suppliers, customers, employees, communities, governments, and so on. This survey will focus mainly on the consequences for the shareholders of the two primary parties. This is not to deny the relevance of other interests, but to acknowledge the fiduciary responsibility of boards of directors to their shareholders (above all others). The possible transfer of wealth among shareholders and other groups in a deal is a very interesting topic, on which there is little rigorous research. M&A activity may affect a variety of influences on the common good, including industry concentration and monopolies, international competitiveness, productivity growth, and technology transfer. The research literature on these aspects, however, parallels the more narrow discussion here about shareholder welfare. For brevity, therefore, the discussion here does not survey the impact on other stakeholders.

#### Measurement of M&A Profitability

Our ability to say anything meaningful about the profitability of M&A depends critically on our confidence in the methods and measures from which insights are extracted. Research offers four approaches to measure M&A profitability.

Event studies examine the abnormal returns to shareholders in the period surrounding the announcement of a transaction. The raw return for one day is simply the

change in share price and any dividends paid, divided by the closing share price the day before. The abnormal return is simply the raw return less a benchmark of what investors required that day and typically, the benchmark is the return dictated by the capital asset pricing model (CAPM) or quite simply the return on a large market index, such as the S&P500. These studies are regarded to be forward-looking on the assumption that share prices are simply the present value of expected future cash flows to shareholders.

According to Caves (1989), since the 1970s these event studies have arguably dominated the field.

Accounting studies examine the reported financial results (i.e., accounting statements) of acquirers before, and after, acquisitions to see how financial performance changed. The focus of these studies ranges across net income, return on equity or assets, EPS, leverage, and liquidity of the firm. The best studies are structured as matched-sample comparisons; matching acquirers with non-acquirer peers.

Surveying executives or simply asking managers whether an acquisition created value seems like an obvious course. These studies present a sample of executives with a standardized questionnaire, and aggregate across the results to yield generalizations from the sample.

Clinical studies focus on one transaction or on a small sample in great depth, mutually deriving insights from field interviews with executives and knowledgeable observers. This is inductive research. By drilling down into the detail and factual background of a deal, the researchers often induce new insights.

Table 2 summarizes the approaches and strengths and weaknesses of each research method. Plainly, no research approach is fault-free, though some command

more respect of scientific researchers than others. The task must be to look for patterns of confirmation across approaches and studies.

Table 2  
Comparison of Research Approaches Regarding the Profitability of M&A

Research Approach	Strengths	Weaknesses
Market-Based Returns to Shareholders ("Event Studies")	<ol style="list-style-type: none"> <li>1. A direct measure of value created for investors</li> <li>2. A forward-looking measure of value creation. In theory, stock prices are the present value of expected future cash flows.</li> </ol>	<ol style="list-style-type: none"> <li>1. Requires significant assumptions about the functioning of stock markets: efficiency, rationality, and absence of restrictions on arbitrage. Research suggests that for most stocks these are not unreasonable assumptions, on average and over time.</li> <li>2. Vulnerable to confounding events, which could skew the returns for specific companies at specific times.</li> </ol>
Financial Studies: Returns estimated from reported financial statements.	<ol style="list-style-type: none"> <li>1. Credibility. Statements have been certified. Accounts have been audited.</li> <li>2. Used by investors in judging corporate performance. An indirect measure of economic value creation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Possibly non-comparable data for different years. Companies may change their reporting practices. Reporting principles and regulations change over time.</li> <li>2. Backward looking.</li> <li>3. Ignores value of intangible assets.</li> <li>4. Sensitive to inflation and deflation because of historic cost approach.</li> <li>5. Possibly inadequate disclosure by companies. Great latitude in reporting financial results</li> <li>6. Differences among companies in accounting policies adds noise.</li> <li>7. Differences in accounting principles from one country to the next make cross-border comparison difficult</li> </ol>
Executive Surveys	<ol style="list-style-type: none"> <li>1. Yields insights into value creation that may not be known in the stock market.</li> <li>2. Benefits from the intimate familiarity with the actual success of the acquisition</li> </ol>	<ol style="list-style-type: none"> <li>1. Gives the perspectives of managers who may or may not be shareholders, and whose estimates of value creation may or may not be focused on economic value.</li> <li>2. Recall of historical results can be hazy, or worse, slanted to present results in the best light.</li> <li>3. Typically, surveys have a low rate of participation (2-10%) that makes them vulnerable to criticisms of significance.</li> </ol>
Clinical Research (Case Studies)	<ol style="list-style-type: none"> <li>1. Objectivity and depth in reconstructing an actual experience.</li> <li>2. Inductive research. Ideal for discovering new patterns and behaviors.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ill-suited to hypothesis testing because the small number of observations limits the researcher's ability to generalize from the case(s).</li> <li>2. The research reports can be idiosyncratic making it difficult for the reader to abstract larger implications from one or several reports.</li> </ol>

### Returns to Target Firms

Event studies yield insights about market-based returns to target firm shareholders, buyers, and a combination of both. Target firm shareholders enjoy returns that are significantly and materially positive. Table 3 summarizes the findings of 20 studies, which reveal returns that are material and significant, despite variations in time period, type of deal (merger vs. tender offer), and observation period. Jensen and Ruback (1983) and Data et al. (1992) concluded target shareholders receive average abnormal returns in the 20-30 percent range. Jayaraman, Khorana, Nelling (2002) report their results indicate significant improvements in postmerger performance and a reduction in expense ratios for target fund shareholders. In short, the M&A transaction delivers a premium return to target firm shareholders.

Table 3  
Summary of Shareholder Return Studies for M&A: Returns to the Target Firm Shareholders

Study	Cumulative Abnormal Returns (% or avg\$/acq)	Sample Size	Sample Period	Event Window (days)	% Positive Returns	Notes
Langteieg (1978)	+10.63%**	149	1929-69	(-120,0)	71.6%	Mergers; uses effective date as event date
Bradley, Desai, Kim (1988)	+31.77%**	236	1963-84	(-5,5)	95%	Tender offers only; subperiod data available for 7/63-6/68, 7/68-12/80. 1/81-12/84; acquirer returns have increased from +19% to +35% over time
Dennis and McConnell (1986)	8.56%**	76	1962-80	(-1,0)	70%	
Jarrell, Poulsen (1989)	+28.99%**	526	1963-86	(-20,10)	N/A	Tender offers only
Lang, Stulz, Walking (1989)	+40.3%**	87	1968-86	(-5,5)	N/A	Tender offers only
Franks, Harris, Titman (1991)	+28.04%**	399	1975-84	(-5,5)	N/A	Mergers and tender offers; segment data available on means of payment and competition
Servaes (1991)	+23.64%**	704	1972-87	(-1,Close)	N/A	Mergers and tender offers; segment data by payment method
Healy, Palepu, Ruback (1992)	+45.6%**	50	1979-84	(-5,5)	N/A	Largest U.S. mergers during period
Kaplan, Weisbachgh (1992)	+26.9%**	209	1971-82	(-5,5)	94.7%	Mergers and tender offers
Smith, Kim (1994)	+30.19%** +15.84%**	177	1980-86	(-5,5) (-1,0)	96.0% 91.3	Successful and unsuccessful tender offers
Schwert (1996)	+26.3%**	666	1975-91	(-42,126)	N/A	Mergers, tenders offers; segment data available for various transaction attributes
Loughran, Vijh (1997)	+29.6%**merger +126.9%**tender +47.9%**combined	419 135	1970-89	(-2,1250)	N/A	5 yr. post-acquisition returns; segment data also available on form payment
Maquieira, Megginson and Nail (1998)	+41.65%**congl +38.08%**non-congl	47 55	1963-96	(-60,60)	61.8% 83.0%	Study of returns for conglomerate and non-conglomerate stock-for-stock mergers.
Eckbo, Thorburn (2000)	+7.45%**	332	1964-83	(-40,0)	N/A	Canadian targets only
Leeth, Borg (2000)	+13.27%**	72	1919-30	(-40,0)	N/A	
Mulherin and Boone (2000)	+21.2%**	376	1990-1999	(-1,+1)	N/A	
DeLong (2001)	+16.61%**	280	1988-95	(-10,1)	88.6%	Studied deals where at least one party is a bank
Hometon et al. (2001)	+15.58%** (1985-90) +24.60%** (1991-96) +20.80%** (all)	27 37 64	1985-96	(-4,1)	N/A	Deals in which both parties are banks
Jayaraman et al. (2002)	+7.51%**	742	1994-1997	(-2, +2)	N/A	Open-end mutual fund mergers
Fuller et al. (2002)	-1.00%**public 2.08%**private 2.75%**subsidiary	539	1990-2000	(-2,2)	N/A	US acquirers of \$1M or more deal value

Notes:

Unless otherwise noted, event date is announcement date of merger/bid

\*\* Statistically significant

### Returns to Buyer Firms

The pattern of findings about market-based returns to buyer firms' shareholders is more sporadic. The findings of 42 studies are analyzed and the results tabulated in Tables 4 and 5. 18 studies report negative returns. The negative returns vary between one and three percent. 24 studies report zero or positive returns. In short, the findings are distributed rather evenly between value destruction, value conservation, and value creation. Caves (1989) infers these findings are due to "second thoughts" by bidders' shareholders, and/or the release of new information about the deal. But interpretation of longer-run returns following the transaction is complicated by possibly confounding events that have nothing to do with transaction. The studies show a slight tendency for returns to decline over time. Returns appear to be higher (more positive) in the 1960s and 1970s than in the 1980s and 1990s, except for deals in technology and banking, where, according to Bradley, Desai, and Kim (1988), returns to bidders increase in the 1990s. When the welfare of all security holders in the buyer firm is considered, Dennis and McConnell (1986) and Maquieira, Megginson, and Nail (1998) suggest the value of the buyer firm increases by a statistically significant amount. This suggests the research focus on common stock may ignore other important gains to investors.

One must conclude in the aggregate, abnormal (or market-adjusted) returns to buyer shareholders from M&A activity are essentially zero. A reasonable conclusion from these studies is that buyers essentially break even (i.e., that acquisitions tend to offer zero net present values, or equivalently, that investors earn their required return.) Even though some studies differentiate between categories of mergers the general aggregate result is the same. Fuller, Netter, and Stegemoller (2002) indicate bidder shareholders



gain when buying a private firm or subsidiary but lose when purchasing a public firm.

Further, the return is greater the larger the target and if the bidder offers stock.

Sudarsanam and Mahate (2003) posit that one of the most extensively researched areas in finance has been whether mergers create value for the shareholders of the target and bidder firms. This has become a very important question for researchers to answer as the level of takeover activity has increased since the 1960s. Sundarsanam et al. (2003) conclude that in both US and UK studies the shareholders of target firms receive economically large and statistically significant wealth gains. However, reported returns to bidder firm shareholders at the time of bid announcement are quite ambiguous with small positive or negative returns or zero returns (Weston et al., 2001).

Any inferences about the typical returns to buyers based on returns must grapple with the difficult issue of the size difference between buyers and targets. Buyers are typically much larger than targets. Then, even if the dollar gains from merger were divided equally between the two sides, the percentage gain to the buyer's shareholders would be smaller than to the target's. Asquith, Bruner, and Mullins (1983) reported results consistent with the size effect. For instance, in mergers where the target's market value was equal to 10 percent or more of the buyer's market value, the return to the buyer was 4.1 percent ( $t=4.42$ ). But where the target's value was less than 10 percent, the return to the buyer was only 1.7 percent.

Table 4  
Summary of Shareholder Return Studies for M&A: Returns to Acquiring Firm Shareholders:  
Negative Returns Demonstrated

Study	Cumulative Abnormal Returns	Sample Size	Sample Period	Event Window (days)	% Positive Returns	Notes
Langetieg (1978)	-1.61%	149	1929-69	(-120,0)	71.6%	Mergers; uses effective date as event date
Dodd (1980)	-1.09%** Successful -1.24%* Unsuccessful	60 66	1970-77	(-1,0)	N.A.	Mergers only. Daily data.
Varaiya, Ferris (1987)	-2.15%** -3.9%**	96 96	1974-83 1974-83	(-1,0) (-20,80)	N/A 42%	
Morck, Schleifer, Vishney (1990)	-0.70%	326	1975-87	(-1,1)	41.4%	Measured return by comparing change in bidder MV to MV of target's equity
Franks, Harris, Titman (1991)	-1.45%	399	1975-84	(-5,5)	N/A	Mergers and tender offers; segment data by payment method
Servaes (1991)	-1.07%**	384	1972-87	(-1,Close)	N/A	Mergers and tender offers; segment data by payment method
Jennings, Mazzeo (1991)	-0.8%**	352	1979-85	(-1,0)	37%	
Byrd, Hickman (1992)	-1.2%**	128	1980-87	(-1,0)	33%	
Healy, Palepu, Ruback (1992)	-2.2%	50	1979-84	(-5,5)	N/A	50 Largest U.S. mergers during period
Kaplan, Weisbach (1992)	-1.49%	271	1971-82	(-5,5)	38%	Mergers and tender offers
Eckbo, Thorburn (2000)	-0.30%	390	1964-83	(-40,0)	N/A	U.S. Acquirers of Canadian Targets
Mulherin and Boone (2000)	-0.37%	281	1990-1999	(-1,+1)	N/A	
Mitchell, Stafford (2000)	-0.14%** -0.07%	366 366	1961-1993	(-1,0)	N/A	Fama and French 3-Factor Model, applied to monthly returns.
Walker (2000)	-0.84%** -0.77%	278 278	1980-1996	(-2,+2)	41.4% 46.4%	
DeLong (2001)	-1.68%**	280	(1988-95)	(-10,1)	33.6%	Deals in which at least one party is a bank.
Hometon et al. (2001)	-4.64%** (1985-90) -2.61% (1991-96) -3.47%** (all)	27 37 64	(1985-96)	(-4,1)	N/A	Deals in which both parties are banks.
Jayaraman et al. (2002)	-3.06%***	742	1994-1997	(-2,+2)	N/A	Open-end mutual fund mergers
Sundarsanam et al. (2003)	-1.4%**bid -15%**3year	519	1983-1995	(-1,1)	N/A	Successful UK takeovers

Notes:

Unless otherwise noted, event date is announcement date of merger/bid

\*\* Statistically significant

Table 5  
Summary of Shareholder Return Studies for M&A: Returns to Acquiring Firm Shareholders:  
Zero or Positive Returns Demonstrated

Study	Cumulative Abnormal Returns (% or avg\$/acq)	Sample Size	Sample Period	Event Window (days)	% Positive Returns	Notes
Dodd and Ruback (1977)	+2.83%** Successful +0.58% Unsuccessful	124 48	1958-78	(0,0)	N.A.	Tender offers only. Monthly data.
Kummer and Hoffmeister (1978)	+5.20%** Successful	17	1956-70	(0,0)	N.A.	Tender offers only. Monthly data.
Bradley (1980)	+4.36%** Successful -2.96% Unsuccessful	88 46	1962-77	(-20, +20)	N.A.	Tender offers only. Daily data
Jarrell and Bradley (1980)	6.66%**	88	1962-77	(-40, +20)	N.A.	Tender offers only. Daily data
Bradley, Desai, and Kim (1983)	2.35%** Successful	161	1962-80	(-10, +10)	N.A.	Tender offers only. Daily data
Asquith (1983)	+0.20% Successful +0.50% Unsuccessful	196 89	1962-76	(-1,0)	N.A.	Mergers only. Daily data
Asquith, Bruner, and Mullins (1983)	+3.48%** Successful +0.70% Unsuccessful	170 41	1963-79	(-20, +1)	N.A.	Mergers only. Daily data
Eckbo (1983)	+0.07% Successful 1.20%** Unsuccessful	102 57	1963-78	(-1,0)	N.A.	Mergers only. Daily data
Malatesta (1983)	+0.90% Successful	256	1969-74	(0,0)	N.A.	Mergers only. Monthly data
Weir (1983)	+3.99% Unsuccessful	16	1962-79	(-10, cancellation date)	N.A.	Unsuccessful mergers only. Daily data.
Dennis and McConnell (1986)	-0.12% (-1.0) +3.24% (-6,+6)	90	1962-80	(-1,0)	52%	
Jarrell, Brickley, Netter (1988)	+1.14%**	440	1962-85	(-10,5)	N/A	Tender offers only; data available for 1962-69, 70-79, 80-85; acquirer returns have decreased from +4% to -1%.
Bradley, Desai, Kim (1988)	+1%**	236	1963-84	(-5,5)	47%	Tender offers only; subperiod data available for 7/63-6/68, 7/68-12/80, 1/81-12/84; acquirer returns have decreased (+4% to -3% over time)
Jarrell, Poulsen (1989)	+92%**	461	1963-86	(-5,5)	N/A	Tender offers only
Lang, Stulz, Walking (1989)	0%	87	1968-86	(-5,5)	N/A	Tender offers only
Loderer, Martin (1990)	+1.72%**1966-68 +0.57%**1968-80 -0.07% 1981-84	970 3401 801	1966-84	(-5,0)	N/A	Mergers and tenders offers; segment data available on size of acquisition
Smith, Kim (1994)	+0.50% -0.23%	177	1980-86	(-5,5) (-1,0)	49.2% 76.2%	Successful and unsuccessful tender offers
Schwert (1996)	1.4%	666	1975-91	(-42,126)	N/A	Mergers, tender offers; segment data available for various transaction attributes
Maquieira et al (1998)	+6.14%**non-conglomerate deals -4.79% conglomerate	55 47	1963-96	(-60,60)	61.8% 36.2%	Study of returns in conglomerate and non-conglomerate stock-for-stock deals

Lyrودي, Lazardis, Subeniotis (1999)	0%	50	1989- 91	(-5,5)	N/A	International acquisitions by European and Japanese firms
Eckbo, Thorburn (2000)	+1.71%**	1261	1964- 83	(-40,0)	N/A	Canadian acquirers and targets
Leeth, Borg (2000)	+3.12%**	466	1919- 30	(-40,0)	N/A	
Kohers and Kohers (2000)	1.37%** cash deals 1.09%** stock 1.26% whole sample	961 673 1634	1987- 96	(0,1)	N/A	Sample of mergers among high-tech firms.
Fuller et al. (2002)	3.8%**public 4.2%**private 8.5%**subsidiary	539	1990- 2000	(-2,2)	N/A	US acquirers of \$1M or more deal value

Notes:

Unless otherwise noted, event date is announcement date of merger/bid

\*\* Statistically significant

### Returns to Target and Buyer Firms Combined

Finding of positive abnormal returns to the seller and breakeven returns to the buyer raise the question of net economic gain from this event. The challenge here stems from the size difference between buyer and target. Typically, the buyer is substantially larger. Hence, a large percentage gain to the target shareholders could be more than offset by a small percentage loss to the buyer shareholders. A number of studies have examined this by forming a portfolio of the buyer and target firms and examining either their weighted average returns (weighted by the relative sizes of the two firms) or by examining the absolute dollar value of returns. Table 6 reports the findings of 16 studies. Almost all of the studies report positive combined returns. The findings in Table 6 suggest that M&A does pay the investors in the combined buyer and target firms. For example, Graham, Lemmon, and Wolf (2002) find the combined market reaction to

acquisition announcements is positive but acquiring firm excess values decline after the diversifying event.

Table 6  
Summary of Shareholder Return Studies for M&A:  
Combined Returns to Shareholders of Acquiring Firm and Target Firm

Study	Cumulative Abnormal Returns (% or avg\$/acq)	Sample Size	Sample Period	Event Window (days)	% Positive Returns	Notes
Halpren (1973)	+\$27.35 MM	77	1950-65	(-140,0)	N/A	Mergers
Langetieg (1978)	0%	149	1929-69	(0,60)	46%	Mergers; uses effective date as event baseline
Firth (1980)	-\$36.6 MM	434	1969-75	(-20,0)	N/A	U.K. acquisitions
Bradley, Desai, Kim (1983)	+\$33.9 MM	161	1963-80	(-20,5)	N/A	Referenced through Weidenbaum, Vogt (1987)
Malatesta (1983)	+\$32.4 MM**	30	1969-74	(-20,20)	N/A	Mergers
Bradley, Desai, Kim (1988)	+\$117 MM (7.43%)	236	1963-84	(-5,5)	75%	Tender offers only; sub period data available for 7/63-6/68, 7/68-12/80, 1/81-12/84; combined returns have not changed significantly over time
Lang, Stulz, Walking (1989)	11.3%**	87	1968-86	(-5,5)	N/A	Tender offers only
Franks, Harris, Titman (1991)	3.9%**	399	1975-84	(-5,5)	N/A	Mergers and tender offers
Servaes (1991)	+3.66%**	384	1972-87	(-1, Close)	N/A	Mergers and tender offers
Healy, Palepu, Ruback (1992)	+9.1%**	50	1979-84	(-5,5)	N/A	Largest U.S. mergers during period
Kaplan, Weisbach (1992)	3.74%**	209	1971-82	(-5,5)	66%	Mergers and tender offers
Smith, Kim (1994)	+8.88%** +3.79%**	177	1980-86	(-5,5) (-1,0)	79.1% 73.8%	Tender offers only
Leeth, Borg (2000)	+\$86MM	53	1919-30	(-40,0)	56.6%	In 1998 dollars
Mulherin, Boone (2000)	+3.56%	281	1990-1999	(-1, +1)	N/A	
Hometon et al. (2001)	+0.14% (1985-90) +3.11%** (1991-96) +1.86%** (all)	27 37 64	(1985-96)	(-4,1)	N/A	Deals in which both parties are banks.
Graham et al. (2002)	3.4%**	356	1980-1995	(-1,1)	N/A	Publicly traded company merger

Notes:

Unless otherwise noted, event date is announcement date of merger/bid

\*\* Statistically significant

### Findings Based on the Analysis of Reported Financial Performance

A second important stream of research on M&A returns is found in 12 studies of profit margins, growth rates, and returns on assets, capital, and equity, summarized in Table 7. Geoffrey Meeks (1977) explored the gains from merger for a sample of transactions in the United Kingdom between 1964 and 1971. This study draws upon a relatively large sample (233 observations), and tests the change in profitability following the merger. Meeks looks at the change in return on assets (ROA) compared to the change in ROA for the buyer's industry. Meeks' findings reveal a decline in ROA for acquirers following the transaction. For nearly two-thirds of acquirers, performance is below the standard of the industry. He concluded the mergers in his sample suffered a "mild decline in profitability".

Mueller (1980) edited a collection of studies of M&A profitability across seven nations (Belgium, German, France, Netherlands, Sweden, U.K., and U.S.). All the studies applied standard tests and data criteria and therefore afford an unusually rich cross-border comparison of results across parts of Europe and the U.S. The research tested theories about changes in size, risk, leverage, and profitability. Profitability was measured three ways: (a) profit divided by equity; (b) profit divided by assets, and (c) profit divided by sales. The changes in profitability for an acquirer (measured as the difference between the post-acquisition performance, and the average profitability for five years before the transaction) were compared to similar measures for two benchmark groups: (i) firms matched on the basis of size and industry and who made no acquisitions, and (ii) a general sample of firms that neither made acquisitions nor were acquired during the observation period. Consistent with Meeks' finding, Mueller's work found acquirers

are significantly larger than targets, acquirers have been growing faster than their peers and than their targets, and are more highly leveraged than targets and peers. Regarding profitability, acquirers show no significant differences – the specific data for the U.S. are generally representative of the findings across many nations.

The main observation from Mueller's findings is acquirers reported worse returns in the years after acquisition than their non-acquiring counterparts, but not significantly so. Commenting on the results for all seven countries, Mueller wrote,

“No consistent pattern of either improved or deteriorated profitability can therefore be claimed across the seven countries. Mergers would appear to result in a slight improvement here, a slight worsening of performance there. If a generalization is to be drawn, it would have to be that mergers have but modest effects, up or down, on the profitability of the merging firms in the three to five years following merger. Any economic efficiency gains from the mergers would appear to be small, judging from these statistics, as would any market power increases.” (page 306)

Ravenscraft and Scherer (1987) studied 471 acquirers between 1950 and 1977.

The novelty in this study was the reliance of the researchers upon a special line-of-business database maintained by the Federal Trade Commission that would permit greater definition of control groups than in previous studies, and more careful assessment of asset values and the impact of accounting method choices. The drawback to the line-of-business focus is acquisition synergies might occur in other areas of the acquiring firm, and therefore might be missed by this study. Also, the comparison in post merger years is undermined by misalignment with the merger year. The researchers considered the ratio of operating income to assets. Strengthening the analysis are controls for industry effects, accounting method choices, and market shares. Their principal finding is profitability is one to two percentage points less for acquirers than for control firms.

Healy, Palepu, and Rubak (1992) studied the post-acquisition accounting data for the 50 largest U.S. mergers between 1979 and mid-1984, and use industry performance as a benchmark against which acquirers' performance may be tested. Asset productivity improves significantly for these firms following acquisition, which contributes to higher operating cash flow returns relative to their non-acquiring peers. Acquirers maintain their rates of capital expenditure and R&D relative to their industries, suggesting the improved performance is not at the expense of fundamental investment in the business. Most importantly, the announcement returns on stock for the merging firms is significantly associated with the improvement in post-merger operating performance, suggesting anticipated gains drive the share prices at announcements.



Table 7  
Summary of Studies of Financial Statement Data

Author, Sample Period, and Sample Size	Major Findings
Meeks (1977) 1964-72 233 mergers	ROA for acquiring firms in the UK consistently declined in post-merger years.
Mueller (1980) 1962-72 287 mergers	Using measures such as ROE, ROA, and ROS, firms engaging in merger activity were less profitable, although not significantly so, than comparable firms. Similar conclusions were reached for representative European countries.
Mueller (1985) 1950-72 100 firms involved in merger	The largest 100 firms in the U.S. involved in merger, both conglomerate and horizontal, suffer significant losses in market share.
Ravenscraft, Scherer (1987 article) 1950-77 471 mergers	Significant negative relationships between operating ROA and tender offer activity were 3.1% less profitable than firms without the activity.
Herman, Lowenstein (1988) 1975-83 56 hostile acquisitions	ROC for acquirers (using tender offers) increased from 14.7% to 19.6% post-merger in 1975-78. A similar measure for the 1981-83 period showed a decrease in ROC.
Seth (1990) 1962-79 102 tender offers	Using a modeled (rather than a market) value of equity based on expected cash flows and a required rate of return, acquisitions return 9.3% in additional equity value. Operational synergies, in the form of additional cash flows, returned 12.9% and financial synergies, form changes in the required rate of return, were -3.6%
Healy, Palepu, Ruback (1992) 1979-84 50 mergers	In 50 largest U.S. mergers, merged firms showed significant abnormal improvements in asset productivity (asset turnover), but no significant abnormal increases in operating cash flow margins.
Chatterjee, Meeks (1996) 1977-90 144 mergers	Before 1985, UK mergers showed no significant increase in profitability after merger. Between 1985 and 1990, firms showed significant improvement in accounting profitability returns (13-22%) in years following merger, presumably because of changes in accounting policy.
Dickerson, Gibson, Tsakalotos (1997) 1948-77 613 Mergers	For the first 5 years, post-acquisition, ROA for acquirers is 2% lower than ROA for non-acquirers.
Healy, Palepu, Ruback (1997) 1979-84 50 mergers	Based on the 50 largest U.S. mergers, operating cash flow returns as a result of merger met but did not exceed the premium paid for target; therefore M&A is a zero NPV activity. Stock price activity at time of announcement was related to post-acquisition cash flow performance.
Parrino, Harris (1999) 1982-1987 197 mergers	Buyers experience a significant +2.1% operating cash flow return after merger. This return is defined as operating cash flow divided by market value of assets. Post merger returns are significantly higher where the buyer and target share at least one common business line, or merge to take advantage of technology.
Ghosh, (2001) 1981-1995, 315 mergers	Buyers experience returns on assets no different from a control sample following acquisitions. But cash flows increase significantly following acquisitions made with cash, and decline for stock acquisitions.
Stein (2002)	Large hierarchy type companies perform better when information can be costlessly passed along inside the firm. This leads to the tendency for mergers to promote declines in small-business lending (banking industry perspective)

### Findings about the Drivers of Profitability

The studies yield a number of interesting insights about the determinants of M&A profitability. First, diversification destroys value while focus conserves it. Berger and Ofek (1995) found an average loss in value from diversification of between 13 and 15 percent. The degree of relatedness between the businesses of the buyer and seller is positively associated with returns (Rumelt (1974), Comment and Jarrell (1995), Healy, Palepu and Ruback (1992 and 1997), Macquieria, Megginson, and Nail (1998), Meeks (1977), Wansley et al. (1983), Singh and Montgomery (1987) and Walker (2000), Weston, Smith and Schrieves (1972) contribute research in conglomerate performance). Cheng (2003) warns that diversified companies' impact of goodwill on earnings should be another consideration of merger value or value loss. If the merged company's book value goodwill overstates the estimated fair value of goodwill, the difference has to be recognized as a lump sum "goodwill impairment loss." According to Cheng (2003), AOL took a \$54 billion write-down due to goodwill impairment mostly as a result of the Time Warner acquisition.

Secondly, expected synergies are important drivers of the wealth creation through merger. Hometon, James, and Ryngaert (2001) studied the association of forecasted cost savings and revenue enhancements in bank mergers and found a significant relationship between the present value of these benefits, and the announcement day returns. The market appears to discount the value of these benefits, however, and applies a greater discount to revenue-enhancing synergies, and a smaller discount to cost-reduction synergies.

Third, value acquiring pays, glamour acquiring does not. Rau and Vermaelen (1998) found post acquisition underperformance by buyers was associated with “glamour” acquirers (companies with high book-to-market value ratios). Value-oriented buyers (low book-to-market ratios) outperform glamour buyers. Value acquirers earn significant abnormal returns of 8% in mergers, and 16% in tender offers, while glamour acquires earn a significant -17% in mergers and insignificant +4% in tender offers.

Fourth, M&A to build market power does not pay. Studies by Ravenscraft and Scherer (1987) and Mueller (1985) reveal efforts to enhance market position through M&A yield no better performance, and sometimes worse. Studies by Stillman (1983) and Eckbo (1983) found share price movements of competitive rivals of the buyer do not conform to increases in market power by buyers. It suggests the sources of gains from M&A do not derive from anticompetitive combination of firms.

Fifth, paying with stock is costly, paying with cash is neutral. Huang and Walkling (1989) and Travlos (1987) found stock based deals are associated with significantly negative returns at deal announcements, whereas cash deals are zero or slightly positive.

Sixth, M&A regulation is costly to investors. Weir (1983) and Eckbo (1983) find evidence suggesting the Federal Trade Commission antitrust actions benefit competitive rivals of the buyer and target. Jarrell and Bradley (1980) and Asquith, Bruner and Mullins (1983) found returns to merging firms were significantly higher before than after implementation of the Williams Amendment in October 1969. Schipper and Thompson (1983) consider four regulatory changes between 1968 and 1970, and found reducing-reducing effects associated with increased regulation.

Seventh, M&A to use excess cash generally destroys value except when redeployed profitably. Cash-rich firms have a choice of returning the cash to investors through dividends, or reinvesting it through such activities as M&A. Harford (1999) and Jensen (1986) report value destruction by the announcement of M&A transactions by firms with excess cash. However, Bruner (1988) reported the pairing of slack-poor and slack-rich firms creates value. Before merger, buyers have more cash and lower debt ratios than nonacquirers. And the return to the buyers' shareholders increases with the change in the buyer's debt ratio due to the merger.

Eighth, tender offers create value for bidders. Mergers are typically friendly affairs, negotiated between the top management of buyer and target firms. Tender offers are structured as take-it-or-leave-it proposals, directly to the target firm shareholders. Quite often, tender offers are unfriendly. Research suggests bypassing the target firm's management, and appealing directly to target shareholders can pay. Several studies report larger announcement returns to bidders in tender offers, as compared with friendly negotiated transactions. Jensen and Ruback (1983) gave a survey of returns in contested and friendly deals. Also, numerous studies report positive significant returns to bidders in hostile transactions (Gregory (1997), Loughran and Vijh (1997), Rau and Vermaelen (1998), Lang, Stultz and Walkling (1989), and Jarall and Poulsen (1989)). On the other hand, Healey, Palepu and Ruback (1997) found hostile deals were associated with insignificant improvements in cash flow returns, owing possibly to the payment of higher acquisition premiums. These findings are consistent with the view unwanted suitors are entrepreneurs who have uncovered special value-creating insights about the target firm.

By making an unsolicited bid, the buyer seeks to retain value for itself, rather than drive it up in a negotiation.

Ninth, when managers have more at stake, more value is created. Studies suggest returns to buyer firm shareholders are associated with larger equity interests by managers and employees. Agrawal et al. (1987) found lower equity investment by managers in their own firms was associated with higher propensity to undertake variance-reducing acquisitions. In assessing the pattern of performance associated with deal characteristics, Healey, Palepu, and Ruback (1997) concluded “while acquisitions were mutually break-even investments, the profitability of individual transactions varied widely...the transactions characteristics that were under management control substantially influenced the ultimate payoffs from acquisitions.” A related finding is LBOs create value for buyers. The sources of these returns are not only from tax savings due to debt and depreciation shields, but also significantly from efficiencies and greater operational improvements implemented after the LBO. In LBOs, managers tend to have a significant portion of their net worth committed to the success of the transaction. Several studies about LBOs reveal cash flow increases and capital spending declines materially in the years following the transaction. According to Field and Karpoff (2002), managers shift the cost of takeover protection onto non-managerial shareholders. These findings indicate that there frequently exists some degree of agency conflict between managers and non-managerial shareholders. Such expected agency costs must be considered in M&A.

Tenth, the initiation of M&A programs is associated with creation of value for buyers. Asquith, Bruner, and Mullins (1983), Gregory (1997), and Schipper and Thompson (1983) report when firms announce they are undertaking a series of

acquisitions in pursuit of some strategic objectives, their share price rises significantly. In aggregate, these kinds of announcements create value suggesting M&A generally creates value, and the announcement is taken as a serious signal of value creation.

### Findings from Surveys of Executives

The findings of scholars in large-sample surveys are supplemented by studies by scholars and practitioners who study smaller samples and typically draw some or all of their findings from questions of managers directly. Ingham, Kran, and Lovestam (1992) surveyed chief executive officers in 146 large firms in the United Kingdom. Of them, 77 percent believed profitability increased in the short run after merger and 68 percent believed the improved profitability lasted for the long run.

Surveys by practitioners are often rather casually reported, limiting our ability to replicate the study and understand the methodological strengths and weaknesses. For this reason, scholars tend to give practitioner surveys rather less attention. Nevertheless, a sample of these surveys is investigated for the sake of comparison with the scholarly studies. It is interesting to consider whether managers would tell something different from the large-sample scientific studies.

The absence of statistical tests in these surveys limits the assertions one can make, but a qualitative review of results offers results surprisingly similar to the scientific studies. The similarity between these findings, and the findings from the scholarly studies is striking. In the bulk of deals, it appears investments in acquisitions at least pay their cost of capital.

Facts and opinions differ. Where the respondents were better informed (e.g., their own deals, with first-hand information), M&A seems to pay. But for the broader judgment, the respondents fall back on a very different opinion. There is one other explanation for the disparate findings. For reasons of ego executives tell the world nicer things about their own deals than about the deals of others. Either way, one's frame of reference (shaped by information or ego) shapes a very different and more optimistic view about M&A profitability.

#### Findings from Clinical Studies

Clinical studies of M&A cases offer insights into the possible origins of the returns experience for outliers. Here are conclusions from four of these studies. First, the ATT/NCR merger is analyzed. Lys and Vincent (1995) examined the 1991 acquisition of NCR Corporation by AT&T. This acquisition decreased the wealth of AT&T shareholders by between \$3.9 billion and \$6.5 billion. They offered three explanations consistent with these results. The first was a set of managerial objectives that were not consistent with maximizing shareholder wealth. The second was managerial overconfidence, or hubris. And the third was "escalation of commitments," a psychological phenomenon spurring decision makers to move forward despite information to the contrary.

Secondly, the Renault/Volvo merger is of interest because the attempt temporarily erased 22 percent of Volvo's market value before Volvo's board of directors withdrew

from the deal. Bruner (1999) examined the failed attempt to merge AB Volvo with Renault in 1993. The study suggests the value destruction was associated with disbelief in merger synergies, and with the transfer of control to Renault.

Third, there is the example of the Campeau's Acquisition of Federated merger. Kaplan (1989) found the value of Federated's assets increased under Campeau's ownership up to the point of bankruptcy filing. He does not identify the source of value creation, but suggested cost cuts, sale of underutilized assets, and tax benefits.

Fourth, Dupont's Acquisition of Conoco is discussed. Ruback (1982) assessed the net value creation to the shareholders of the buyer and target jointly. Whereas shareholders of the target (Conoco received gains of \$3.2 billion, shareholders of DuPont sustained losses of \$800 million. Therefore, the net value created in the deal was \$2.4 billion. Ruback explored various possible explanations for the net gain, and was unable to identify a specific source. The study highlights the difficulty facing all researchers in explaining wealth creation or destruction in individual deals. Clinical studies illuminate possible drivers of returns from acquisition. These and other studies have emphasized the role of strategic, financial, and organizational issues.

#### Conclusions of Reviewers Through Time

Several scholars have considered the findings of scientific studies over the years. Mueller (1979), in testimony before the U.S. Senate said, "And the predominant conclusion, what it comes to, from looking at this literature, is that the firms themselves are performing no better on average than they would have been in the absence of the



mergers, and the stockholders who hold shares in those firms are doing no better than if they had shares in a firm that wasn't."

Jensen and Ruback (1983), based on an analysis of 16 studies, concluded the return to bidders in successful mergers was zero, and in successful acquisitions was +4.0%. They wrote, "The evidence indicates that corporate acquisitions generate positive gains, that target firm shareholders benefit, and that bidding firm shareholders do not lose."

Weidenbaum and Vogt (1987), based on an analysis of 10 studies, wrote, "I conclude that, based on historical data, negative returns to shareholders for acquisitions are more prevalent than the prevailing folklore on the subject admits. Clearly, there are winners and losers in the acquisition game. Most studies confirm that, in general, target firm shareholders are winners. The evidence presented here indicates that, on average, acquiring firm shareholders are not as fortunate. At best, these shareholders are no worse off, but often they lose during acquisitions."

Datta, Pinches, and Narayanan (1992), considered 41 studies and concluded that bidders earn a return of less than one-half of one percent. They wrote, "The synthesis of ex ante event studies presented in this paper provides robust evidence that, on average, shareholders of bidding or acquiring firms do not realize significant returns from mergers and acquisitions."

### The Overall Picture: Some Conclusions

What should a practical person conclude from this discussion? One view is that M&A does pay. This answer is certainly justified for shareholders of target firms. Also, studies of targets and buyers combined seem to suggest these transactions create some joint value. But for bidders alone, there is no clear value creation in the sense of earning returns significantly in excess of the opportunity cost of capital. Actually only 20-30% of all transactions seem to do so.

Another view is the M&A does not pay. This is true if you focus only on bidders, and define “pay” as creating material and significant abnormal value. This line of reasoning is behind statements that 60-70% of all M&A transactions “fail”. But economics conclude investors should be satisfied if they earn returns just equal to their cost of the lost opportunity (i.e., their required return). Therefore, the popular definition of failure is extreme. The reality is 60-70% of all M&A transactions are associated with financial performance that at least compensates investors for their opportunity cost. Against this standard it appears buyers typically get at least what they deserve. Gaughan (2004) notes that in approximately 1994, the U.S. embarked on the fifth merger wave in its history. Many of the largest deals were colossal failures because empire-building CEOs were unrestrained by lazy boards of directors.

Another view is it depends whether M&A transactions pay or not. Value is created by focus, relatedness, and adherence to strategy. Diversification (especially conglomerate), size maximization, empowered building, and hubris destroy value. The implication of this is good deals are not achieved by pricing alone: strategy and skills of post-merger integration matter immensely. Some rich insights can be derived from an

examination of types of deals. The key implication of these insights is managers can make choices that materially influence the profitability of M&A. Cleverness gets its due and so does stupidity.

Another view is researchers don't know whether M&A pays or not. True since research strictly only rejects null hypotheses, and never confirms alternative explanations. It is hard to accept this view. While one admires its rigor and skepticism, surely the mass of tests indicates at least something about tendencies.

Another view is all of the above are true. Each of the preceding positions has at least one leg (if not two) to stand on. While this position may be honest, this alternative gives equal weight to the various arguments, and is not very satisfying to the practical person who must decide. The decision maker must have a view.

Finally, another view is none of the above explain whether M&A pays or not. Perhaps the veritable potpourri of conflicting studies leads one to pure agnosticism. Such a conclusion is harsh, and hardly the foundation for an executive who must lead an enterprise in the hurly-burly of business life.

Reading of the studies leads one to choose "Yes, M&A pays but..." The economists' perspective that an investment is deemed to "pay" if it earns at least the opportunity cost of capital is logical. Abstracting from the studies, the majority of the transactions uphold this test. But the buyer in M&A transactions must prepare to be disappointed. It is true most transactions are associated with results that are hardly consistent with optimistic expectations. Synergies, efficiencies, and value-creating growth seem hard to obtain. It is in this sense the deal doers' reach exceeds their grasp.

### The Capital Asset Pricing Model (CAPM)

The capital asset pricing model (CAPM), originally proposed by Sharpe (1964) and Lintner (1965) following the suggestions of mean variance optimization in Markowitz (1952), has provided a simple and compelling theory of asset market pricing for more than 25 years. The theory predicts the expected return on an asset above the risk-free rate is proportional to the non-diversifiable risk, which is measured by the covariance of the asset return with a portfolio composed of all the available assets in the market. Two implicit assumptions are: (1) all investors choose mean-variance efficient portfolios with a one-period horizon, although they need not have identical utility functions; (2) all investors have the same subjective expectations on the means, variances, and covariances of returns; and (3) the market is fully efficient in that there are no transaction costs, indivisibilities, taxes, or constraints on borrowing or lending at a risk-free rate. Empirical tests of the CAPM have tended to focus on assumption 1 while strengthening 2 to include the assumption the common distributions are constant over time and the entire market is the market for equities. These tests generally have found the risk premium on individual assets can be explained by variables other than the estimated covariance. In particular, the variance, firm size, and the month of January seem to be variables that help to explain expected returns. For example, Jensen (1972) for a survey of many of these early studies and Roll and Ross (1980) and Chen (1983) for more surveys. One interpretation for the failure of the CAPM to fully explain observed risk premia, due to Roll (1977), is any empirical covariance is computed from an incomplete market for assets. Such an objection nearly makes the CAPM untestable. Another

explanation is, alternative theories of asset pricing may be supportable such as the arbitrage pricing theory of Ross (1976) or the consumption beta formulation introduced by Breeden (1979).

According to Black (1993), Eugene Fama says “beta as the sole variable explaining returns on stocks is dead.” He says the relation between average return and beta is completely flat. Black (1993) indicated Fama is misstating the results in Fama and French (1992). Indeed, Fama and French, in the text of that article, misinterpret their own data (and the findings of others). Black, Jensen, and Scholes (1972) find in the period from 1931 through 1965, low-beta stocks in the United States did better than the capital asset pricing model (CAPM) would have predicted, while high-beta stocks did worse. Several authors find this pattern continued in subsequent years, at least through 1989. Fama and French extend it through 1990. All these authors find the estimated slope of the line relating average return and risk is lower than the slope of the line the CAPM says relates expected return and risk. If one chooses starting and ending points carefully, one can find a period of more than two decades where the line is essentially flat. How can this be interpreted? Why is the line so flat? Why have low-beta stocks done so well relative to their expected returns under the CAPM? Black (1972) shows borrowing restrictions (like margin requirements) might cause low-beta stocks to do relatively well. Indeed, Fama and French refer often to the Sharpe-Lintner-Black (SLB) model which includes these borrowing restrictions. This model predicts only the slope of the line relating expected return and beta is positive. Fama and French claim to find evidence against this model. They say their results “seem to contradict” the evidence the slope of the line relating expected return and beta is positive. This is a misstatement, according to

Black. Black (1972) indicated that even in the period Fama and French choose to highlight, they cannot rule out the hypothesis the slope of the line is positive. Their results for beta and average return are perfectly consistent with the SLB model. Moreover, if the line is really flat, it implies dramatic investment opportunities for those who use beta. A person who normally holds both stocks and bonds or stocks and cash can shift to a portfolio of similar total risk, but higher expected return by emphasizing low-beta stocks. Beta is a valuable investment tool if the line is as steep as the CAPM predicts. It is even more valuable if the line is flat. No matter how steep the line is, beta is alive and well.

Empirical testing of the capital asset pricing model (CAPM) has a long history. The most widely known studies are tests of the Sharpe (1964), Lintner (1965), Black, Jensen, and Scholes (1972), Fama and MacBeth (1973), Merton (1973), and Jensen (1972). These studies employ cross-sectional regressions of mean returns on estimated betas, and suffer from a measurement error problem because of their reliance on estimated (rather than actual) betas. To avoid this measurement error problem, tests of CAPM have been based on estimation of the multivariate regression model. As noted by Gibbons (1982), the linearity of the relationship between expected return and risk implies a set of non-linear restrictions on the parameters of the multivariate regression model relating individual returns to the market return. These non-linear restrictions can be tested in a variety of standard ways, Gibbons considers the Wald (W) test and the likelihood ratio (LR) test, while Stambaugh (1982) suggested the Lagrange Multiplier (LM) test. All of these are valid asymptotically (as the number of time-series observations increases),

but they may differ substantially from each other, and from their asymptotic distributions, even when the sample size is moderately large.

The foundation of CAPM is Markowitz's (1952) article on portfolio selection. According to this article a portfolio may be divided into two stages. The first stage starts with observation and experience ending with beliefs about the future performances of available securities. The second stage starts with the relevant beliefs about future performances and ends with the choice of portfolio. First the investor does (or should) maximize discounted expected, or anticipated, returns. This rule is rejected both as a hypothesis to explain, and as a way to guide investment behavior. Next the investor does (or should) consider expected return as desirable and variance of return as undesirable. Markowitz indicated that this rule has many sound points, both as a maxim for, and hypothesis about, investment behavior.

One type of rule concerning choice of portfolio is the investor does (or should) maximize the discounted (or capitalized) value of future returns. Since the future is not known with certainty, it must be "expected" or "anticipated" returns which are discounted. Variations of this type of rule can be suggested. Researchers could let "anticipated" returns include an allowance for risk or the rate at which returns from particular securities vary with risk are capitalized.

The hypothesis (or maxim) the investor does (or should) maximize discounted return must be rejected. If one ignores market imperfections, the foregoing rule never implies there is a diversified portfolio which is preferable to all non-diversified portfolios. Diversification is both observed and sensible; a rule of behavior which does not imply the superiority of diversification must be rejected both as a hypothesis and as a maxim.

The foregoing rule fails to imply diversification no matter how the anticipated returns are formed; whether the same or different discount rates are used for different securities; no matter how these discount rates are decided upon or how they vary over time. The hypothesis implies the investor places all his funds in the security with the greatest discounted value. If two or more securities have the same value, then any of these or any combination of these is as good as any other.

The main result of the CAPM is a statement of the relation between the expected risk premiums on individual assets and their “systematic risk.” The relationship is:

$$E(\tilde{R}_j) = E(\tilde{R}_M)\beta_j \quad (1)$$

where the tildes denote random variables and

$$E(\tilde{R}_j) = \frac{E(\tilde{P}_t) - P_{t-1} + E(\tilde{D}_t)}{P_{t-1}} - r_{Ft} = \text{expected excess returns on the } j\text{th asset}$$

$\tilde{D}_t$  = dividends paid on the  $j$ th security at time  $t$

$r_{Ft}$  = the riskless rate of interest

$E(\tilde{R}_M)$  = expected excess returns on a “market portfolio” consisting of an investment in every asset outstanding in proportion to its value

$$\beta_j = \frac{\text{cov}(\tilde{R}_j, \tilde{R}_M)}{\sigma^2(\tilde{R}_M)} = \text{the “systematic” risk of the } j\text{th asset.}$$

Relation 1 says that the expected excess return on any asset is directly

proportional to its  $\beta$ ,  $\alpha_j$  is defined as  $\alpha_j = E(\tilde{R}_j) - E(\tilde{R}_M)\beta_j$ , and then (1) implies that the  $\alpha$  on every asset is zero.

If empirically true, the relation given by (1) has wide-ranging implications for problems in capital budgeting, cost benefit analysis, portfolio selection, and for other economic problems requiring knowledge of the relation between risk and return.

Evidence presented by Jensen (1968) on the relationship between the expected return and



systematic risk of a large sample of mutual funds suggests: (1) might provide an adequate description of the relation between risk and return for securities. On the other hand, evidence presented by Lintner (1965) seems to indicate the model does not provide a complete description of the structure of security returns.

All previous direct tests of the model have been conducted using cross-sectional methods; primarily regression of  $\tilde{R}_j$ , the mean excess return over a time interval for a set of securities on estimates of the systematic risk,  $\hat{\beta}_j$  of each of the securities. The equation  $\bar{R}_j = \gamma_0 + \gamma_1 \hat{\beta}_j + \bar{\mu}_j$  was estimated, and contrary to the theory,  $\gamma_0$  seemed to be significantly different from zero and  $\gamma_1$  significantly different from  $\bar{R}_M$ , the slope predicted by the model. Because of the structure of the process which appears to be generating the data, these cross-sectional tests of significance can be misleading and therefore do not provide direct tests of the validity of (1). More powerful time series test of the validity of the model, which is free of the difficulties associated with the cross-sectional tests could also be investigated. These results indicated the usual form of the asset pricing model as given by (1) does not provide an accurate description of the structure of security returns. The tests indicated that the expected excess returns on high-beta assets are lower than (1) suggests and the expected excess returns on low-beta assets are higher than (1) suggests. In other words, that high-beta stocks have negative  $\alpha$ 's and low-beta stocks have positive  $\alpha$ 's.

The data indicated the expected return on a security can be represented by a two-factor model such as  $E(\tilde{r}_j) = E(\tilde{r}_2)(1 - \beta_j) + E(\tilde{r}_M)\beta_j$  where the  $r$ 's indicate total returns and  $E(\tilde{r}_2)$  is the expected return on a second factor, which shall call the "beta factor,"

since its coefficient is a function of the asset's  $\beta$ . The definition of the beta factor,  $\tilde{r}_z$  is the return on a portfolio that has a zero covariance with the return on the market portfolio  $\tilde{r}_M$ .

There is evidence the expected excess return on an asset is not strictly proportional to its  $\beta$  and it is believed this evidence is sufficiently strong to warrant rejection of the traditional form of the model given by (1). A solution to this problem can be found through grouping procedures, and shows how cross-sectional methods are relevant to testing the expanded two-factor form of the model. Here one can find the evidence indicates the existence of a linear relation between risk and return and is therefore consistent with a form of the two-factor model which specifies the realized returns on each asset to be a linear function of the returns on the two factors  $\tilde{r}_z$  and  $\tilde{r}_M$ ,

$$\tilde{r}_j = \tilde{r}_z(1 - \beta_j) + \tilde{r}_M \beta_j + \tilde{w}_j \quad (2)$$

The fact the  $\alpha$ 's of high-beta securities are negative and the  $\alpha$ 's of low-beta securities are positive implies the mean of the beta factor is greater than  $r_F$ . The traditional form of the capital asset pricing model as expressed by (1), could hold exactly, even if asset returns were generated by (2), if the mean of the beta factor were equal to the risk-free rate. Black, Jensen, Scholes (1972) show the mean of the beta factor has had a positive trend over the period 1931-65 and was on the order of 1.0 to 1.3% per month in the two sample intervals examined in the period 1948-65. The beta factor seems to be an important determinant of security returns.

The impact of mergers on the alpha and betas are of interest and the results provide some evidence of merger synergy. Mergers are an inherently fascinating

financial phenomenon. The politics, personalities, and sums involved invariably bring corporate mergers to the forefront of the financial press. Financial scholars are naturally interested in the topic. Studies provide some consensus on the financial impact of such transactions. The general evidence, as reviewed by Jensen and Ruback (1983) indicated the shareholders of successfully acquired firms benefit. Unsuccessful acquisition attempts result in the dissipation of target shareholder gains unless another successful suitor is attracted to the firm. Bidders' returns are more difficult to measure, but successful bidders appear to gain and unsuccessful bidders appear to lose. If target shareholders gain, as reported in Kummer and Hoffmeister (1978) and successful bidders gain, then mergers would be positive return endeavors; that is, mergers are synergistic.

Surprisingly little work has been done on the evaluation of merger synergism. Hogarty (1970) asserted fifty years of merger studies generally show no evidence of any excess profitability among merging firms. Weston and Mansinghka (1971) concluded that conglomerate mergers work in the financial condition of the merged firms they studied improved following the merger.

Lewellen (1971) suggests mergers may provide value because the debt capacity of the merged firms is greater than the combination of the debt capacities of the unmerged firms. A wealth transfer from the firms' debtholders to shareholders was said to occur. However, Kim and McConnell (1977) did not (on average) find evidence of such wealth transfers. Post-merger increases in financial leverage may be used to nullify these wealth transfers. If mergers result in synergism, either financial (through increased debt capacity or reduced borrowing costs) or operating (through increased operating profits), the value of the post-merger firms should increase.

Evidence of significant changes in the estimated risk and return parameters of the portfolio in a capital asset pricing model (CAPM) context could be interpreted as evidence of merger synergy. Some research has been conducted on the effects of mergers on changes of firms' market model parameters. Mandelker (1974) found significant shifts in betas for acquiring firms in mergers, but observed that "rates of return adjusted efficiently to changes in risk" did not detect any differences in risk between conglomerates and portfolios of firms in similar industries.

If a merger is synergistic, the CAPM coefficients should be better for the merged firms than those of a portfolio containing the acquired and acquiring firms. "Better" could mean a number of things. If alpha increases and beta is unchanged, portfolio-holders benefit. A decrease in beta, with alpha unchanged, is better. If alpha increases and beta declines, that is better. Finally, if the ratio of alpha to beta increases, is even better.

Merger synergy of a sample of merged firms could be defined by examining the impact of mergers on the CAPM coefficients. It builds on the work of combining the pre-merger firms in a homemade portfolio. Shifts in the CAPM parameters for the pre-merger portfolio and post-merger firm are measured, and winners and losers are identified.

Hogarty (1970) examined a number of general aspects of mergers. The statistical analysis in this study indicated the stockholders of acquired firms gained on the average, while the owners of acquiring firms lost on the average. Hogarty (1970) found mergers have an approximately neutral effect on the aggregate worth of firms participated in them.

Weston and Mansinghka (1971) showed empirical studies dealing with conglomerate mergers. Most significant is their finding is the conglomerate firms as a group raised their average return on total assets (a measure relatively free from distortions

caused by pooling of interest accounting procedures) from a level significantly below two control samples in 1958-1960, to nonsignificantly different returns by 1968-1969.

### Theories Explaining Mergers

Several financial hypotheses have been alluded to in the literature and attempt to explain the reasons for mergers and acquisitions. These theories can be found in many similar forms throughout the literature. The following sections with discussion regarding each merger hypothesis are closely adapted, with permission, from Brown (2002).

- A. Monopoly hypothesis – increased market power from the merger
- B. Synergy hypothesis – increased business effectiveness of the newly combined entity
- C. Financial Motivation hypothesis – use of tax shields, lowered expected bankruptcy costs may induce merger
- D. Information hypothesis – acquiring firm's view that the market valuation of the target firm does not reflect all relevant information
- F. Inefficient Management hypothesis – mergers tend to drive out bad management
- G. Management Self-Interest hypothesis – assumes positive correlation between firm size and management compensation and gratification from managing a larger firm.
- H. Hubris hypothesis – acquiring firm overpays for target resulting in transfer of wealth from acquirer's shareholders to target's shareholders.

The following sections will discuss the research that has explored each of the above merger theories.

### Monopoly Hypothesis

The monopoly theory of mergers suggested horizontal, intra-market mergers would create abnormal returns for the shareholders of the acquiring and targeted firms. Increased market share allows the firm to initiate a new market strategy to reprice products and increase profitability. A merger can either positively or negatively impact the profitability of rival firms. If the merger decreases competition, all competitors in an industry can benefit from a reduction in competitors and possible repricing of products. However, according to Segall (1968), if the newly merged firm enjoys reduced costs or economies of scale from the merger, it can exploit these benefits to the detriment of its rivals' profitability. Many of the studies examining monopoly theory and mergers have focused on the returns to rival firms as indicators of monopoly effects resulting from merger.

Segall (1968) examined 58 mergers which occurred between 1950 and 1959. He examined changes in stock price and dividends for the target and acquiring firms. He subdivided his sample into classifications based on number and size of mergers undertaken and whether the mergers were intra- or inter-industry. His research indicated mergers were not profitable for either target or acquiring firms. With this finding, he indicated economic explanations for mergers for example, synergy theory or monopoly theory, did not provide a relevant explanation for mergers.

Eckbo's study (1983) of 259 horizontal and vertical mergers between 1963 and 1978 provided collusion and increased efficiency as hypotheses to explain positive abnormal returns for acquiring firms and their rivals within an industry. He suggested if a merger provided monopoly power to the acquiring firm, such a merger should, in turn, provide abnormal positive returns to its shareholders. It could provide abnormal positive returns to rival firms as the level of competition decreased and allowed monopoly profits in the industry. He examined abnormal returns around merger announcements and around antitrust complaint announcements to test his hypotheses. The results of the study did not provide significant evidence to support this theory. He determined the stock gains from horizontal bank mergers did not result from an increase in market power derived from the merger. He also did not find significantly different returns for horizontal versus vertical mergers.

### Synergy Hypothesis

Under synergy theory, a merger or acquisition should provide an increase in the present value for the shareholders of the acquiring firm. This theory suggested the newly-merged entity can enjoy operating synergies providing for greater profitability as a sum of the two parts than the two firms operating separately. Long-term greater profitability should contribute to maximizing shareholder wealth.

Hogarty (1970) compared stock prices, dividends and earnings per share of 43 corporations, which participated in higher levels of acquisition activities during the period between 1953 and 1964, prior to and after acquisition activities. The sample corporations

were involved in various manufacturing industries and varied in size from \$1.0 million to in excess of \$500 million in assets. He compared the performance of their shares and their earnings per share with an indexed average for their respective industries.

The study found evidence to support the concept stocks of firms that aggressively pursued mergers generally exhibited poorer performance than the average stock for their industry. It found a high level of variability in the stock performance of firms active in the acquisition market. Hogarty suggested although most acquirers do not experience an attractive return from acquisitions, a few experience abnormally high returns. The high returns for the successful few firms provide an incentive other firms to continue to pursue acquisition activities.

Nielsen and Melicher (1973) examined a sample of 128 industrial mergers which occurred between 1960 and 1969. They examined synergy through two aspects, greater operating efficiencies and financial benefits. The first aspect involves pure synergy theory discussed in this section of the dissertation while the second related to financial motivation theory as discussed in the next section of this dissertation. The study's variables included the type of merger, horizontal or vertical, and trends of various financial measures for the target and acquiring firm.

Stepwise regression analysis provided evidence four variables, percentage change in EPS, the size-adjusted change in the cash flow rate, the acquiring firm's pre-merger cash flow rate and the acquiring firm's pre-merger operating profit rate, as significant at the .01 level in explaining merger premiums. They also found higher premiums paid for high P/E offset any financial benefit from acquiring the high P/E targets. This finding does not support financial synergy as a motive for merger. The study found firms were



willing to pay above-average premiums for less profitable firms. This finding suggested the acquiring firms were anticipating improving the profitability of the target firm and enjoying the financial gains from this improvement. This finding appears to support inefficient management theory more than synergy theory, although the authors did not offer inefficient management theory as an explanation.

Bradley (1980) compared the pre- and post-offer value of the target and acquiring firms' stocks for 258 cash tender offers, 161 successful and 97 unsuccessful, which occurred between July 1962 and December 1977. The study included tender offers in which the acquiring firm made tender offers on less than 100% of the outstanding shares of the target firm. The study divided the tender offer process into three time periods: pre-announcement, post-announcement, and post-execution. It compared the share prices of the acquiring and target firms for each period to discern changes in their value.

The study found target shareholders realize a gain through the premium paid for their shares purchased by the acquiring firm. In addition, if target shareholders retain shares of the target firm, they realize a gain from an increase in share price relative to the pre-announcement market value of the firm. The study found the public nature of a tender offer resulted in additional entrants into the bidder market, which increased the premium paid to target shareholders. Bradley suggested that the acquiring firm is able to maximize the target firm's assets will be able to pay the highest premium in a competitive tender offer situation. Bradley suggested his findings support the synergy theory of mergers.

Firth (1980) examined the pre-offer and post-offer stock price reactions of 486 target and 563 acquiring firms which were involved in merger attempts between 1969 and

1975 in the United Kingdom. He estimated the returns to shareholders if the merger had not been announced and compared this to the actual returns to shareholders for the period 48 months prior to merger announcement to 36 months after the merger announcement.

Firth (1980) found the target firms' shareholders received a positive benefit from the acquisition premiums paid. However, he found the acquiring firms' shareholders generally suffered losses. Overall, mergers significantly reduced the value of the acquiring firm. This result contrasted with findings of researchers examining returns to shareholders in the United States, which have indicated potential abnormal returns to acquiring and target firms' shareholders. He suggested the elimination of any abnormal return to the acquiring shareholders may be due to four factors. First, the premium paid to the target shareholders may be an "overpayment". It essentially results in a transfer of wealth from acquiring to target shareholders. Then, an inverse relationship exists between return to acquiring shareholders and the premium paid. Second, the merger may have a negative impact on earnings per share. This impact would create a negative reaction from professional investors and analysts. Third, the merger may have a negative impact on assets per share with the same reasoning as the affect on earnings per share. Finally, the merger could affect the acquirer's capital structure affecting its debt capacity.

Mueller (1980) compared 287 matched pairs of acquiring and non-acquiring firms for the period between 1962 and 1972. His research indicated the merged firms exhibited inferior performance post-merger which suggested a merger reduces profitability and may not be in the best interests of shareholders.

Bradley, Desai and Kim (1983) reviewed 697 interfirm tender offers, successful and unsuccessful, occurring between 1963 and 1980. The final sample involved 371

target firms and 91 acquiring firms. They examined the abnormal returns in offers in which the acquiring firm held less than 70% of the outstanding shares prior to bidding and was attempting to increase its ownership by at least 15%. They suggested this criteria would limit their sample to bids in which a controlling ownership position was being sought.

This study indicated if a firm did not accept a second tender offer within five years of an unsuccessful tender offer that any increase in stock value due to the original offer was reversed. They indicated these findings support the synergy hypothesis rather than the information hypothesis. They suggested gains to target firms in unsuccessful bid situations occur due to anticipation of some future successful bid by another acquirer. If that bid does not occur, any abnormal returns to the target firms are eliminated over time. They suggested permanent gains are dependent upon acquisitions and revaluation based on anticipated gains from the mergers which supports the synergy theory for mergers.

Bradley, Desai and Kim (1988) reviewed 921 interfirm tender offers occurring between October 1958 and December 1984 and involved publicly-traded companies on either the NYSE or AMEX. They examined cumulative abnormal returns (CAR) to the share prices to determine whether any synergistic gains occurred, and, if so, to whom the abnormal returns accrued, the target or acquiring shareholders. They found an average 7.4% increase in the combined wealth of the target and acquiring shareholders. Their research suggested target shareholders receive the largest share of the gains from these synergies. This allocation occurs due to the competition among acquiring firms which increases the premium paid to the target shareholders. This increased premium can result in actual negative returns to the acquiring shareholders. The authors suggested

synergistic gains are largest in multiple-bidder situations as the bidder with the greatest ability to exploit those gains will be able to offer the highest premium for the target's shares and be the successful bidder.

### Financial Motivation Hypothesis

Financial motivation hypothesis suggests merged firms can enjoy greater benefits from the use of tax shields due to their ability to exert higher financial leverage post-merger than pre-merger. Lewellen (1971) suggested diversification of revenue streams, especially for two firms whose revenues are less than perfectly correlated, reduces risk and allows for greater use of debt. This increased borrowing capacity allows greater utilization of the tax deductibility of interest payments. With tax deductibility of interest, any increase in a firm's debt capacity will result in a subsequent increase in a firm's market valuation. However, diversification of revenues does not support intra-industry mergers as a financial motivation for merger, only inter-industry, unless the intra-industry mergers increase product lines or geographic diversification.

Kim and McConnell (1977) studied Lewellen's hypothesis using 39 mergers occurring between January 1, 1960 and December 31, 1973. The acquiring firm had to acquire 100% of the target firm's shares to be included. In addition, the target firm's assets had to be at least 10% of the asset size of the acquiring firm. The sample only included mergers in which the same bonds were outstanding 24 months prior to and 24 months after completion of the merger. The sample only used mergers that were classified as "conglomerate" by the Federal Trade Commission. The analysis used a

paired-comparison test and ordinary least squares to test abnormal returns for the sample as a whole and for sub-samples. The study developed sub-samples based on criteria such as acquiring versus target firm bonds, higher versus lower grade bonds, and relative size. The study measured leverage to determine whether firms increased their leverage after merger. It used three leverage measures: 1) book value of long-term debt to average market value of stock, 2) book value of total debt to market value of stock and 3) book value of total debt to total assets.

Kim and McConnell (1977) suggested their study supports Lewellen's theory. First, they did not find evidence a merger caused a wealth transfer from shareholders to bondholders. They did not find any statistically significant abnormal positive returns for bondholders. Second, using the leverage measurements, they found the post-merger firm used greater financial leverage than a combination of the two firms prior to the merger exhibited. With no positive or negative abnormal returns to bondholders, the authors suggested that any decrease in bondholder risk due to diversification of cash flow streams was negated by the increase in risk due to greater use of leverage in the newly merged firm.

Melicher and Nielsen (1977/1978) examined 116 mergers occurring during the 1960s to study the relationship between financial determinants and the premium paid. They examined financial determinants of the merger premiums paid. They found a significant, positive relationship existed between increases in leverage capacity and the premium paid in merger situations.

Asquith and Kim (1982) studied the pre-post merger announcement rates of returns of 50 firms for the period between January 1, 1960 and December 31, 1978. Their

sample included only firms classified by the Federal Trade commission as “conglomerates” indicating the mergers were inter- rather than intra-industry. Asquith and Kim suggested most research examined the returns to shareholders resulting from mergers, but not returns to bondholders. They suggested any abnormal returns to shareholders may be the result of wealth transfers from bondholders to shareholders, rather than any increase in firm value due to synergistic or financial effects.

The results of the study did not provide any evidence mergers affect the bondholders either negatively or positively. In addition, the authors did not find any evidence suggesting wealth transferred from shareholders to bondholders. The study showed abnormal returns accrued to the shareholders, but not at the expense of bondholders.

Eger (1983) examined 38 acquiring and 29 target firms involved in non-cash (all stock) mergers occurring during the period between 1958 and 1980. She compared bond returns 30 days prior to merger announcement to those 20 days after announcement. She found statistically significant evidence acquiring firms’ share prices declined during a period around the merger announcement date. She found evidence that bondholders gained at the expense of shareholders due to diversification reducing the bondholders’ risk. She suggested acquiring firms’ shareholder may be more likely to experience in mergers that involve only swapping of the target and acquiring firms’ shares.

Bruner (1988) studied 75 merger attempts occurring between 1955 and 1979 to determine whether capital structure offers an incentive for merger. Of the 75 merger attempts reviewed, 49 were successful. Bruner tested three hypotheses involving the capital structures of the target and acquiring firms. First, he proposed the acquiring firms

are “slack-rich”, or had low financial leverage, while the target firms are “slack-poor”, or have high financial leverage. Second, he examined whether the leverage of the acquiring firms changed significantly around the merger time. Finally, he attempted to determine whether any relationship existed between the financial leverage of the target and acquiring firms and the financial gains from the merger.

The results of the study suggested pre-merger acquiring firms exhibit lower financial leverage in comparison with a sample of other firms. It did not find evidence the acquirers decrease their financial leverage prior to attempting an acquisition. Acquiring firms' leverage increased and remained at the increased level at least a year after the merger. Target firms in successful mergers exhibited significantly higher leverage than the acquiring firms or other firms in a sample taken from the market. The study also suggested in successful mergers the acquiring firms have less financial leverage than their competitors and the target firms have more financial leverage than their peers do. Finally, the study found the total returns to the target shareholders varied significantly with the changes in the financial leverage of the target, but only after the merger announcement has been made, not at the date of announcement. It found the total returns of the acquiring firms were significantly associated with the changes in the leverage of the acquiring firms. Overall, the findings support the theory firms merge to exploit differences in capital structure.

### Information Hypothesis

The information theory suggests an acquiring firm may be able to develop information the market valuation of the target firm does not reflect. The acquiring firm then exploits this asymmetry in information by purchasing the target firm at what the acquiring firm considers to be an undervalued price. This theory then assumes less than strong-form efficiency in market valuation of stock prices.

The theory suggests the announcement of a bid may signal to the market that unknown information about the target existed. Such a signal would lead to an increase in the target share value without the actual occurrence of the merger as the market reacted to this new information. Then, information theory supports an abnormal return to target shareholders regardless of whether an announced merger is actually consummated. If the target firm's shares increase in value prior to merger and the acquiring firm absorbs this cost in acquisition, it does not, however, explain acquiring firm's motives for merger. In that circumstance, the acquiring firm's shareholders would not experience a positive abnormal return and would not have an incentive for merger.

Dodd and Ruback (1977) examined 386 tender offers occurred between 1958 and 1975. They found the shareholders of acquiring firms successfully completed the merger earned positive abnormal returns during the month of the merger announcement. In unsuccessful merger attempts, the shareholders of the target firm received abnormal returns and the change in stock price was permanent.

Bradley, Desai and Kim (1983), as mentioned previously, reviewed 697 interfirm tender offers, successful and unsuccessful, occurring between 1963 and 1980. This study indicated if a firm did not accept a second tender offer within five years of an



unsuccessful tender offer any increase in stock value due to the original offer was reversed. They indicated these findings support the synergy hypothesis rather than the information hypothesis. They suggested gains to target firms in unsuccessful bid situations occur due to anticipation of some future successful bid by another acquirer. If the bid does not occur, any abnormal positive returns to the target firms are eliminated over time. They suggested permanent gains are dependent upon acquisition of the target firm and revaluation based on anticipated gains from the merger which supports the synergy theory for mergers.

#### Inefficient Management Hypothesis

The inefficient management hypothesis suggests mergers tend to drive out bad management. This theory suggests acquiring firms recognize mismanagement in a target firm and attempt acquisition. After acquisition the acquiring firm can eliminate the target firm's poor management and more efficiently employ its assets. If the acquiring firm has 1) correctly identified such a problem, 2) made the correct remedies and 3) not overpaid for the target firm, such an acquisition should result in an abnormal return to the acquiring firm's shareholders. If the acquiring firm errs in any of these three steps, such an acquisition may result in positive abnormal return only for the target shareholders.

Manne (1965) proposed control of corporate assets is a valuable commodity for which an active market exists. He further suggested a fundamental premise for this market is that a strong, positive correlation exists between a firm's management's

efficiency and the market price of the shares. Then, an ill-managed firm would have poorly performing shares on a publicly-traded market. This situation would suggest acquiring firms would target an ill-managed firm and eliminate its poor management. Well-managed firms are especially prone to be targets because their shares are undervalued. Post-merger, the elimination of poor management would result in improved operations that the markets would reward with an abnormal return to shareholders.

Dodd and Ruback (1977) reviewed a sample of 19 clean-up offers by acquiring firms already controlled at least fifty (50%) percent of the target firm. They found the acquiring firms received abnormal returns, despite the prior control by the acquiring firm. This indicated the abnormal returns did not support gains due to synergy, monopoly or elimination of inefficient management.

#### Management Self-Interest Hypothesis

This theory suggests a positive relationship exists between firm size and compensation, tangible and intangible, that management receives from managing a larger firm. Tangible compensation includes increased current monetary compensation, future benefits including retirement and the use of company assets. Intangible benefits include the perceived power and recognition from managing a larger firm. Then, these benefits provide an incentive to management to grow the size of the firm, regardless of the impact on shareholder wealth. One method for management to use to insure rapid growth, especially in mature industries, is through mergers and acquisitions.

Melicher and Nielsen (1977/1978) examined 116 mergers occurring in the 1960s. They found a statistically significant, positive relationship existed between the premiums conglomerate acquiring firms paid and the relative size of the target firm. Acquiring firms were willing to pay higher premiums for relatively larger targets. This finding supports the size-maximizing hypothesis of management self-interest.

Hong, Kaplan and Mandelker (1978) studied the effect the accounting method used to account for the transaction had on stock prices. They compared the pooling-of-interest method with the purchase method for 205 mergers occurring between 1954 and 1964. Pooling-of-interest typically provides for better accounting profitability than the purchase method due to the recognition and expensing of goodwill that occurs with the purchasing method. Since goodwill is a non-cash expense, recognition of goodwill does not affect the cash flow of the acquiring firm. However, some writers had indicated pooling-of-interest could mislead shareholders and lead to inflated stock prices for acquiring firms using that method relative to the firms using purchasing. The study calculated average and cumulative abnormal stock price returns for the acquiring firms pre-post merger. It did not find statistically significant evidence to support the idea using the pooling-of-interest method led to abnormal stock prices.

Firth (1979) studied a sample of 224 successful acquisitions occurring during the period from 1972 to 1974 in the United Kingdom. He examined the cumulative abnormal returns on the acquired firms for a period from 48 months prior to merger announcement to 2 months after announcement. He tracked the same information for acquiring firms for 48 months pre- to 24 months post-announcement.

The study found acquiring firms did not experience a positive gain to their share prices post-merger and actually showed small losses. It showed the premium paid to the target firm's shareholders was a significant determinant of the losses to the acquiring firm's shareholders. Firth suggested the existence of acquisitions that detrimentally affect the value of acquiring firm's shares provided evidence to support the management self-interest hypothesis.

Firth (1980) examined the pre-post offer stock price reactions of 486 target and 563 acquiring firms which were involved in merger attempts between 1969 and 1975 in the United Kingdom. He estimated the returns to shareholders if the merger had not been announced and compared this to the actual returns to shareholders for the period 48 months prior to merger announcement to 36 months after the merger announcement. Similar to his 1979 study, Firth found evidence to support the management self-interest theory. He found post-merger the compensation level of the acquiring firm's directors increased while the market value of the acquiring firm decreased. The study presented evidence mergers benefited directors despite abnormal negative returns to shareholders.

Malatesta (1983) researched 336 completed mergers occurring between 1969 and 1974. He examined three hypotheses for mergers: 1) value-maximizing, 2) size-maximizing and 3) improved-management hypothesis. The study used ordinary least squares to develop a market model to estimate abnormal returns.

The study's results indicated target firm shareholders experience positive abnormal returns while acquiring firm shareholders experience negative abnormal returns. Acquiring firm shareholders experience negative abnormal returns prior to the merger. The findings did not support the acquisitions were positive net present value

projects for the acquiring firm. With this lack of support, Malatesta suggested the findings support only the total size-maximizing hypothesis, not value-maximizing or improved-management. He suggested management will pursue mergers to have control of a larger firm which should provide greater benefits to management, in essence, indicating an agency problem exists with management (Jensen & Meckling, 1976).

### Hubris Hypothesis

The hubris theory suggests the management of the acquiring firm overpays for the target resulting in transfer of wealth from the acquirer's shareholders to the target's shareholders. Roll (1986) suggested the acquiring firm's management's pride induces a false belief their ability to properly value the target firm is greater than other potential acquiring firms' or of the market. This belief results in ignoring the market valuation of the target firm and overpaying for it. The theory suggested an acquisition would result in a decrease in negative abnormal returns to the acquiring firm's shareholders and abnormal positive return to the target firm's shareholders. This theory supports the strong form of the efficient markets theory (i.e. the market valuation of the stock reflects all available information).

Auster and Sirower (2002) found that the perceived financial benefits of M&As often are not realized by corporate acquirers. They contend that management of acquiring firms give up value to target firms because M&A deals in a merger wave are reactive. Executives tend to focus exclusively on the deal at hand, which may not be the best or even an appropriate opportunity. Moreover, management may ignore information that

emerges during a thorough evaluation of the candidate. Managers may proceed with a deal due to escalating commitment to a single deal, even when information is learned during negotiation that the deal is unlikely to create value. When such management hubris yields disappointing performance, cultural reasons (often poorly defined) get the blame (Sirower and Stark, 2001).

Mueller and Sirower (2003) studied the hubris hypothesis (along with three other hypotheses) in relation to the firms gains and losses from merger. They tested the hubris hypothesis in relation to 168 large company mergers from 1978 through 1990. In their conclusions the authors discerned that the high overall variability in the gains from mergers, and our and others' difficulty in predicting these gains, as further support for the managerial discretion and hubris hypotheses. Mueller et al. (2003) poses the rhetorical question and then answers it directly: "Why do the managers of these firms undertake such gambles? One answer is hubris. They believe that they can see value in other firms that no one else can see."

#### Financial Determinants Hypothesis

Research on the empirical evidence on the determinants of premiums paid in mergers situations began in the 1970s. The following provides a chronological summary of merger research performed on the relationship between financial determinants and premium paid in non-banking industries. Mandelker (1974) examined the returns to shareholders of 241 acquiring firms for the period between 1941 and 1962. He found

shareholders of the target firms earned an abnormal return in the period preceding the merger.

Melicher and Nielsen (1977-1978) examined 116 mergers occurring during the 1960s to study the relationship between financial determinants and the premium paid. They used multiple and stepwise regression and ordinary least squares to examine eight variables. The variables included financial variables of the acquiring firm, whether the merger was horizontal or vertical, and measures of the relative price-earnings multiples and earnings per share between target and acquiring firms and the trends of those measures over a five year period preceding merger.

They found relative price-earnings multiples were significant and had a positive relationship with the premium. Their regression analysis indicated conglomerates were willing to pay higher premiums for targets with less volatile earnings per share and for targets whose earnings per share were not highly correlated with their own. These findings indicated firms may be willing to pay higher premiums to diversify their cash flows and reduce the volatility of those cash flows.

Walkling and Edmister (1985) reviewed 158 cash tender offers occurring between January 1972 and December 1977 to explain the share price premium paid. The model used eight variables which included financial ratios and variables explaining bargaining strength, control and type of merger. Bargaining strength and control variables included the percentage of target shares owned by the acquiring firm prior to the merger, whether opposing suitors were present, whether the transaction was contested or uncontested and whether the bidder sought control of more than 50% of the target's shares.

The results indicated acquiring firms paid higher premiums for the shares of target firms with decreasing leverage and low valuation ratios. It indicated bargaining strength and control variables were significant. The authors indicated target firms received significantly higher premiums when the bid was contested. Finally, the study showed premiums for successful tender offers were significantly higher than those for unsuccessful offers. These findings supported previous research which found a competitive market exists for control of firms and competition increases the premium paid for control of those firms.

Walkling and Long (1986) found similar results while determining target manager resistance did not have a significant impact on the premium paid. They examined the premiums paid in 158 cash tender offers occurring between January 1972 and December 1977. They performed regression analysis using seven independent variables representing the following: The leverage of the target firm, the market value to book value, whether the merger would be conglomerate or non-conglomerate, the amount of control sought, the percentage of the target shares owned by the bidder, whether target management resisted the offer and whether competing bidder firms were involved.

They found premiums were higher if the acquiring firm perceived potential gains from the acquisition as represented by lower leverage and lower market value to book value of the target firm. The study found firms with less management ownership of the target firm contested the offer more than those with higher levels of management ownership. Acquiring firms paid significantly lower premiums if it had a higher ownership of the target firm prior to the offer and if competing firms failed to materialize. The success of a tender offer was directly related to the bargaining strength of the



acquiring firm prior to making an offer as evidenced by the percentage ownership prior to making the offer. Success was related to the amount of the premium offered and whether the target firm's management contested the offer.

Haw, Pastena & Lilien (1987) examined the relationship between merger premiums and the target firm's financial position prior to the merger. They reviewed the merger premiums paid to financially healthy firms and firms that showed financially poor performance prior to merger. The study examined 562 firms which were acquired during the period between 1968 and 1979. After adjusting for their criteria, the final sample included 171. The study used the Altman Z score as a measure of financial health.

The study did not find a significant difference between the premiums paid to firms considered to be in good financial health versus those that were considered to be troubled financially. The study found statistically significant evidence firms with financial difficulties and possessing tax loss carryforwards (TLCs) commanded higher merger premiums than financially troubled firms without TLCs. They suggested the findings support the financial motivation theory for merger and acquiring firms are willing to pay higher premiums to gain access to TLCs.

Slmeky and Caves (1991) analyzed 100 mergers involving non-financial firms and occurring between 1986 and 1988 in the U.S. to examine value created by the mergers. They examined whether synergy or managerial effectiveness contributed to value creation in merger situations. The authors examined managerial behavior from the target and acquiring firm perspective. They discussed agency issues with management in either firm. Target firm's management, if improperly incented through compensation, may resist a tender offer to protect their own interests, i.e. their jobs and the perquisites of

those jobs. This attitude is especially detrimental to shareholder value if the firm has become a target due to a lack of managerial effectiveness at the target firm. Acquiring firm's management may pursue mergers due to excess free cash flow for which they do not perceive alternate investment opportunities. This situation can be exacerbated by incentives to increase the size of their firm or diversify the risk of the firm to protect or increase the benefits of the acquiring firm's management's positions.

The study regressed independent variables representing the type of merger, whether vertical or horizontal, the financial characteristics of the target and acquiring firm, management's ownership in the acquiring and target firm's shares, the presence of a competition in bidding and whether the transaction was all cash. They used the target's stock price twenty days prior to announcement of the merger as the independent variable.

Slmecky and Caves did not find a relationship between the business activities of the target and acquirer prior to merger or "fit" and the merger premium paid. They suggested this lack of relationship does not support the idea of real synergies occurring from mergers. They did find evidence of both agency and financial synergy. The study showed that external influence on management tended to force management of the target and acquiring firm to act more in alignment with shareholders' interests. The evidence for financial synergy resulted from the significantly positive relationship between the leverage levels of the two firms. They indicated an opportunity to infuse capital into a capital-constrained target provides a financial synergy that motivates merger.

Crawford and Lechner (1996) examined target characteristics as determinants of the probability of being acquired and of the premiums paid in merger situations, if acquired. Their sample included 305 corporations acquired between January 1971 and

December 1981. They used six independent variables, three financial and three tax-related, to perform regression analysis on the sample. The three tax variables included the market value of target less the tax basis of its assets, the target's net operating loss carryovers and the target's tax credit carryovers. The authors expected each of the tax variables to have a positive relationship with the probability of being acquired. The various tax variables provide economic incentives making the target firms more attractive to acquirers. The financial variables covered profitability, leverage and liquidity represented by the target's three year average return on equity, level of current liabilities and long-term debt divided by common equity and cash plus cash equivalents, respectively. They expected a negative relationship between profitability and leverage and the probability of being acquired. The authors did not predict the relationship between liquidity and the likelihood of being acquired.

They found three variables had a statistically significant relationship with the premium paid. The ratio of market value to tax basis of assets and liquidity had a positive relationship with the probability of being acquired while the target's leverage had a negative relationship. They found a significant negative relationship between the premiums paid and the probability of acquisition.

### Summary

This chapter discussed the prior research performed on the topic of mergers and acquisitions. Presented was a thorough review of relevant literature which provided substantial information and historical context for the capital asset pricing model (CAPM),

especially in the context of mergers and acquisitions. Finally, a summarization of the various theories for mergers and research exploring these theories was outlined.

## CHAPTER 3

### RESEARCH METHODOLOGY

#### Introduction

Sirower (1997) comments a large body of research in the management literature examines the performance of acquiring firms, but this work has been exploratory in nature and has yielded a stream of conflicting evidence. The conflicting empirical evidence has led some strategy scholars to conclude traditional large-sample empirical research does not contribute to an understanding of acquisition performance. In fact, past studies generally explain less than 10 percent of cross-sectional variance in performance. Given mergers and acquisitions are perhaps the most important discretionary method of implementing strategic change in organizations, managers require more evidence on the impact of M&A.

The traditional approach to acquisition performance has subsumed the resource-based view of the firm where factor prices get bid up to their “fair” value in a competitive market. With respect to acquisitions, secondary market participants around the world have already bid on the pre-acquisition value of target firms, so the required synergies implied by the premium must be performance gains above what is already expected for these firms to achieve.

According to the Waitzman (2002), M&As are still worth investigating. The article states the aggregate dollar total generated by middle-market deals , those that range from \$10 million to \$500 million , didn't decline as much as the above \$500 million deals did in 2002. Indeed, the total value of deals in the former category fell just 10.8% through Dec. 2, 2002 while the total value of \$500 million-and-up deals plunged 33.8% in the period. "In this environment of increased investor scrutiny, regulatory scrutiny and shareholder scrutiny, it's very difficult to get mega deals done," indicated Erik Anderson, an analyst at Dealogic. Too, the downturn in the stock market has made companies less eager to be sold for what they may see as depressed valuations. Excluding large deals, M&A activity in 2002 has been similar to the prebubble years 1995 and 1996, which, considering the market's upward rise and relative ease of doing pooling-of-interests deals in those years, makes this year's activity "remarkable."

#### Strategic Relatedness of Acquisitions and Horizontal Merger Efficiencies

According to Ravenscraft and Scherer (1987), at least three out of four essentially horizontal acquisitions yielded efficiencies apparently unattainable in the original conglomerate organizational framework. One example, Ravenscraft and Scherer (1987) indicated is the Youngstown merger which provided an infusion of competent, highly motivated management that cracked production bottlenecks, instituted better production scheduling, and began a drive to improve badly eroded labor relations. In addition, complementarities among adjacent plants were exploited, most notably to implement

greater rolling mill specialization and the use of lower-cost hot-metal capacity in making seamless steel tubes. Costs were reduced by closing a headquarters and paring field sales forces. Iron and coke procurement savings claimed as a consequence of the merger stemmed from apparent market failures reflecting the unwillingness or inability of steel makers to buy raw materials at arm's length from more conveniently located competitors with excess capacity.

With the merger of Lone Star Cement and Marquette Cement, headquarters staff costs were cut. Savings were realized by coordinating the production of geographically linked plants to utilize low-cost kilns more fully and achieve greater product specialization.

The Commodore Corporation closed Bendix Home Systems' headquarters, consolidating the central office's functions at a new, lower cost site. To tap a larger market, it offered product design changes Bendix had been unwilling to make. However, plant rationalization was inhibited by the typically large distances between Commodore and Bendix plants and the high costs of shipping manufactured homes.

According to Ravenscraft and Scherer (1987), Allied Products' efficiency gain from acquiring Great Lakes Screw was the least impressive of the four horizontal cases. Great Lakes' plant was closed following the acquisition. It is unclear why Allied could not have purchased only the machinery it moved to another plant, along with the patent Great Lakes held on an exclusive product. The acquisition of what was left of Great Lakes' customer goodwill was undoubtedly viewed as a benefit by Allied, although gains of this sort are zero-sum in a broader sense, offset by equal sales losses of either a

continuing Great Lakes operation or assuming shutdown to be unavoidable, Allied's remaining competitors.

It is probably coincidental despite their cost-reducing efforts, all four preponderantly horizontal sell-offs covered by the four case studies experienced severe financial stress following the transfer of control. All four, supplying products in the capital goods sector that are interest rate sensitive, were hit hard by the monetary policies and recession of the early 1980s. Youngstown was driven into bankruptcy by the post-merger collapse of demand for seamless oil well tubing, the most important product the merged companies manufactured in common. Low capacity utilization and financial pressures led Lone Star subsequently to sell off Marquette's principal plants in the Northeast. Commodore was forced into filing for bankruptcy in 1985, and Great Lakes Screw's plant was closed.

The non-horizontal acquisition of Cardco by Bethlehem Steel's Kmean Division was expected also to increase Cardco's sales and capacity utilization by tapping complementary distribution channels, although this had not been accomplished four years later. Whether Kmean would succeed better than Scovill and Bendix in solving quality control and labor productivity problems remained uncertain.

Vertical mergers include acquired companies having at least 5 percent of its sales to, or purchases from, another unit operated by the parent for at least five years before the acquisition. The literature regarding the effect of acquisition relatedness has relied on the basic intuition that related acquisitions should generate more synergy than unrelated acquisitions and related acquirers should then outperform unrelated acquirers. The literature, however, is inconclusive. On balance, no significant difference has been found



in returns to the shareholders of acquirers for strategically related versus unrelated acquisitions. In a comprehensive study, Lubatkin (1987) concluded his findings do not support the popular belief that “all things being equal, some product and market relatedness is better than none”. On the other hand, some research has actually found acquirers making unrelated acquisitions significantly outperform those making related acquisitions.

The following discussion will offer some insight on the nature of this problem and suggest conditions under which the relatedness of an acquisition will have an effect on performance. More important, an alternative theoretical approach to understanding the importance of relatedness in acquisitions will help to reconcile the current literature.

There are two major problems in the literature on the effect of acquisition relatedness that may explain insignificant or conflicting findings about the effect of this variable. First, there has been little consideration of the degree of relatedness of the acquisition; that is, acquisition relatedness has been measured as a dichotomous (0,1) variable. Second, there has been little consideration of other choice variables that may be driving performance such that acquisition relatedness does not have a direct effect on performance. The models of performance have been incomplete.

There are two distinct dimensions to the acquisition performance problem: (1) the payment of the acquisition premium, and (2) post acquisition realization of synergy. Consistent with the resource-based view, empirical tests of the relatedness hypothesis in acquisitions implicitly assume the rational economic position that the premium reflects value potential. Consideration has not been given to the required performance

improvements which are embedded in the acquisition premium, and relatedness has not been considered in the context.

There is no reason to believe joining two firms that are related in every way will create synergy. Unless the acquisition can pass one or both of the contestability conditions and has a firm command of the cornerstones of synergy, synergies will be unlikely. In short, the knowledge of whether an acquisition is strategically related or unrelated will say little if anything about synergy potential.

The objective here is not to discard the relatedness concept but to approach the meaning of relatedness with different reasoning and in the managerial context created by the resources which are committed to make the acquisition, particularly the acquisition premium. Rather than focus on potential synergies, the focus should be on why a firm would pursue a related versus unrelated acquisition strategy.

An unrelated acquisition strategy might be a signal there may not be valuable or sufficient reinvestment opportunities in the current lines of business of the firm. Profitable growth opportunities might be exhausted. Then, if a top management team is acquiring an unrelated company, it may be sending a strong signal about its confidence in the current business(es).

But is simply knowing whether the acquisition is related or unrelated enough to give an indication of strategic intent or a signal of future performance? It is within the contest of the acquisition premium this approach becomes particularly meaningful. Premiums translate into specific required performance improvements management teams must accomplish with the acquisition.

At low levels of the acquisition premium, the difference between a related and an unrelated acquisition is, at worst, management's forecast of the profitability of the current lines of business. At higher levels of the acquisition premium, both related and unrelated acquisitions are likely to be failures. For unrelated acquisitions, however, management teams are diverting even more available resources away from the current business, perhaps in desperation, in addition to establishing what are unachievable performance objectives in a new business. Further, given management is diverting resources, there will clearly be a low probability of the organizational integration so essential to achieving from an acquisition. Then, relatedness will moderate the strength of the negative relationship between the premium and acquiring firm performance.

#### Method of Payment

There is conflicting evidence in the acquisition literature of the management field regarding the effect of the method of payment: the use of cash verses stock as payment in acquisitions. An argument for the expectation cash acquisitions will outperform stock acquisitions has been given. Essentially, financing an acquisition with stock (equity) is equivalent to issuing stock. Then, there is an adverse selection problem because an acquirer must know the market knows this so an equity issue must be a last resort.

This adverse selection problem can be illustrated as follows: Suppose you have between \$50 and \$200 of cash in your wallet, and you and your friends are given the chance to bid for a wallet, with the highest bidder winning. But just before you hand over your bid, you are told that the wallet owner has the right, after examining the bids, to

decide whether to accept them. Immediately you will protest, "Hey, that's not fair!" Why? Because you know your bid will only be accepted when it is for an amount greater than the amount of cash actually in the wallet. This example is dangerous and shows the dangerous asymmetric information problem inherent in issuing equity. Although sometimes equity issues are appropriate (not the last resort), markets cannot tell the good guys from the bad guys, and equity issue will be met unfavorably by the market.

Cash acquisitions, in contrast, are normally financed with debt. Free cash flow theory suggests increasing debt levels will establish cash flow requirements that will limit the amount of cash that can be invested at below the cost of capital or wasted through organizational inefficiencies. From a managerial perspective, increasing debt levels should force the immediacy of post-merger synergy realization to prevent defaulting on the debt. Because the cost of equity does not appear as an expense on the income statement (although interest from debt does), managers frequently view equity issues as free money.

Further, since interest on debt is tax deductible, corporate financial officers (CFOs) should utilize debt where possible, but not beyond the point where the level of debt might interfere with ongoing operations if the company fell into financial distress. So presumably managers would choose to issue equity when they know operations are not sufficiently strong to carry the increased debt.

### The Performance Effects of Mergers versus Tender Offers

There has been a continuing stream of conflicting evidence on the performance effects of mergers versus tender offers in the management literature. Prior analysis, however, has not addressed the nature of the performance effects of a merger as opposed to a tender offer. Business leaders need to understand what it is about mergers or tender offers that can affect performance.

Mergers and tender offers are similar in both command a significant acquisition premium. This is likely the nature of the performance relationship. The execution of an acquisition through a “friendly” merger instead of a tender offer for the shares of the target company should not have an independent effect on performance. If there is an effect, the merger versus tender offer distinction is meaningful in relation to the acquisition premium.

Several authors have distinguished between contested and uncontested (unfriendly versus friendly) tender offers. In a contested acquisition, the management of the target firm resists the acquisition offer. The evidence is contested takeovers performed worse than uncontested takeovers. Further, contested takeovers bring “white knights” along with very high acquisition premiums. White knights experience significant losses in value. For example, when Kodak acquired Sterling Drug, its market value fell by \$2 billion, the full amount of the premium. Then, the underlying nature of the problem is the contestedness of the process and not simply the arbitrary distinction of merger versus tender offer.

The argument is a consideration of the method of the acquisition, mergers versus tender offers, is important only to the extent these options drive the acquisition premium.

Further, since many tender offers are mutually agreed on, it is more meaningful to consider whether an acquisition is contested rather than whether a form 14-D (for a tender offer) has been filed. This approach challenges the importance of the merger versus tender offer construct and proposes the meaningfulness of contestedness with regard to performance of the acquiring firm.

### Relative Size of the Acquisition

The relative size question has yielded mixed results in the acquisition literature in both the finance and strategy fields. As in the merger versus takeover question, the problem may be a lack of consideration of the nature of the relative size of the acquisition. Why should the relative size of any acquisition have an independent effect on performance and systematic risk of the acquiring firm? The argument and evidence has focused on the nature of the resource commitment to a particular venture and whether new ventures required major up-front commitments to improve their chances of success and whether the relative size of the venture to the size of the whole organization makes a significant impact.

A McKinsey & Company study found the failure rate of acquisitions fell from 61 percent overall to 54 percent when the acquisitions were less than 10 percent the size of the acquirer. An argument can be made that smaller relative size acquisitions, those less than 10 percent, have a higher chance of success because there will be a more detailed understanding of the businesses and quicker integration potential.

### Managerial Risk Taking Following Acquisition

Researchers can think of the required performance improvements as target reference points for managers with respect to preserving the value of the firm. Simulations clearly illustrated as the premium increases beyond certain levels, the likelihood of realizing the required improvements declines dramatically. It is the knowledge of the synergy trap and the results of the simulation analysis that allows up-front predictions about when managers are likely to miss their performance requirements and by how much.

This discussion has largely focused on generating predictions about the systematic risk of targets and acquirers based on the value consequences and the interaction of those consequences in paying an acquisition premium. Future changes in the nature of resource commitments might take the form of changes in risk taking. In the post-acquisition phase, the changes in managerial risk taking could take two forms: (1) increasing the size of the bet on the current competitive game (such as a major advertising campaign), or (2) committing resources to new, higher-risk competitive games (such as a major distribution system change or R&D venture), or both.

Why would the level of risk taking increase following an acquisition? Initially managers may have built increased risk into post merger integration plans to obtain a greater chance of positive returns from their resource allocation decision. But given the

likelihood that as the acquisition premium increases, managers will predictably miss their performance targets the issue is whether the level of risk taking will change over time.

A manager acting in an economically rational manner should, at any given point in time, evaluate the net present value of future decisions and not be affected by past decisions, which are sunk costs. This includes the extreme of facing the abandonment decision. Simply put, is it better to divest or to continue ownership?

A substantial amount of evidence has shown that the assumption of economic rationality is routinely violated by managers. It is well documented managers may exhibit an escalation of commitment to a failing course of action. There are at least two approaches to risk taking that would motivate predictions within this context.

One approach to the escalation of commitment phenomenon has been the self-justification hypothesis. Brockner, et. al (1986) has written escalation is determined, at least in part, "by decision makers' unwillingness to admit that their prior allocation of resources to the chosen course of action was in vain (the self-justification hypothesis)." Often managers do not want to admit defeat and will go to great lengths to show their decisions were ultimately justified. This explanation is comparable to the finance literature's managerial hubris concept, which says managers really believe they can achieve the required gains from the acquisition. Some research has even suggested managers may escalate their commitment to a failing acquisition such that the divestment decision is severely delayed.

The concept of escalating commitment has also been approached from the prospect theory perspective. Prospect theory predicts that individuals will generally be risk seeking when they are losing but risk averse when they are winning – classic



gambling behavior. Winning or losing is in relation to an arbitrary reference point. The acquisition premium provides a clear target reference point for managers to use.

Then, as managers miss what may actually be unachievable performance targets and fall below their target reference point into the domain of losses, they may increase their level of risk taking to attempt to upset these targets in the future. The analogy to this is a gambler sitting at a blackjack table who increases his bets as he loses. These higher-risk strategies may simply be perceived as necessary by managers given the distance they must cover to preserve value. For example, recall when synergies failed to materialize in AT&T's acquisition of NCR, and losses began to mount, AT&T spent millions on new sales teams in new markets and industries where it had little experience.

Since higher levels of the acquisition systematic risk will be associated with a greater likelihood of not achieving performance targets, it follows high levels of the premium will also be associated with increases in risk taking.

Very little research has been done in the area of the effect of acquisitions on risk taking. Lubatkin and O'Neill (1987) and Chatterjee and Lubatkin (1990) find larger decreases in systematic risk "than an investor can do on his own" for related mergers than unrelated mergers. Unrelated mergers, however, are found to have larger absolute levels of systematic risk according to Chatterjee and Lubatkin (1990). As with the majority of the management literature on acquisitions, these results are not without controversy. Seth (1990b) finds no significant decreases in systematic risk for either type of merger and concludes that attempting to decrease beta is not a source of value creation.

The concept of changes in risk-taking behavior has not been considered in the post-acquisition environment. In other words, how might a given manager in two

different post-acquisition performance environments react differently to a similar post-acquisition problem? Managerial actions do not lie in isolation of the performance environment, and so it is important to consider how the risk-taking posture of executive teams may emerge post-acquisition.

### Additional Variables Underlying Successful M&A

The review of the research done to date, reveals a number of other variables, which underlie descriptive models for successful M&A. These variables can be organized into a framework or model which has three dimensions and includes both external environmental variables as well as internal firm variables.

The first dimension is the need for any company (merged, acquired, spin-off, divestiture, etc.) to be profitable now and in the future, which includes internal firm variables such as the possession of intangible assets, and external environmental variables, which relate to domestic market size, growth rate, and industry concentration. These variables can be considered drivers since they drive the need for M&A. The second dimension is the marketplace and satisfying the customer now and in the future, which is related to manager characteristics and how the manager views the marketplace as domestic or global. This variable is related to the motivation of the manager or management team of the firm. Finally, there is a set of variables, which are firm characteristics related to employee satisfaction now and in the future. Other firm resource capabilities and allocation of resources to international structure such as information planning and control systems could be considered.

Figure 1 shows the framework of these variables and their relationship to the success of M&A. It is the purpose of this dissertation is to study the relationship of some of the profitability variables in relation with the systematic risk of the firm through the use of correlation and regression analysis.

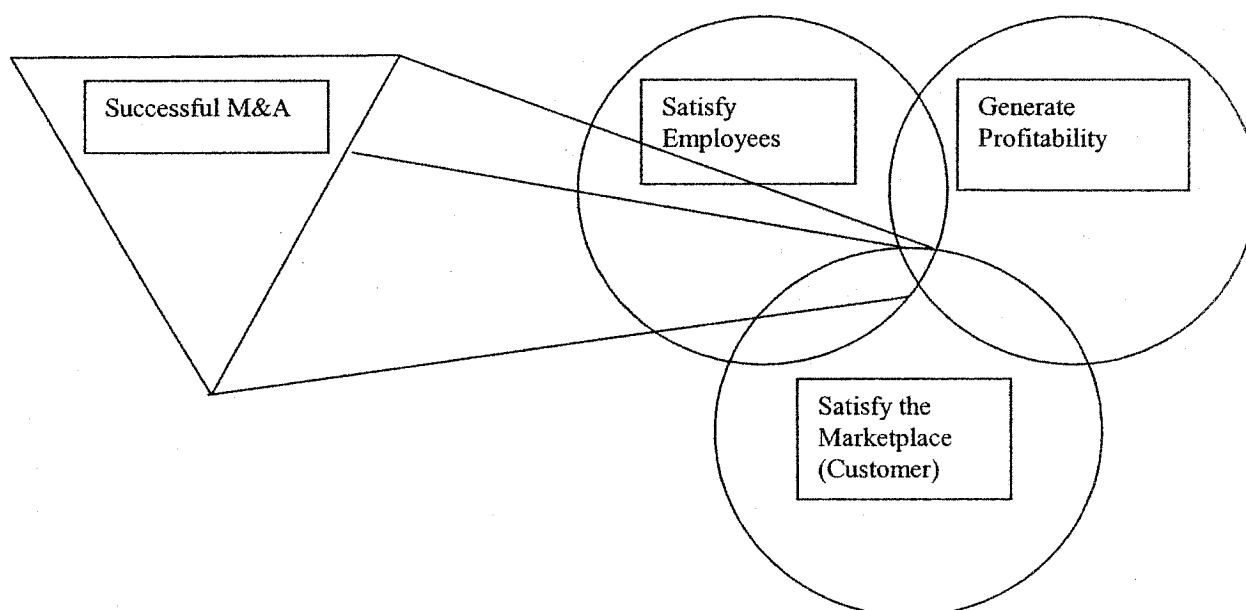


Figure 1

M&A Success Model

### Research Questions

This study addressed the key variables in determining acquirer systematic risk. It included various financial and other measures to model the systematic risk in a merger

situation. These variables are specified in Table 8 and were the main focus of this research. A specific area of focus for this dissertation was analyzing determinants of merger premiums in relation to Capital Asset Pricing Model (CAPM) beta and answering the following questions: Do the financial determinants of merger premiums also provide insight into the change in acquirer systematic risk? Does the acquirer's systematic risk increase, decrease, or remain unchanged do to merger?

### Hypotheses

Variables that correlate or relate with the change in systematic risk have not been fully researched in a holistic model to determine their relationships. Therefore, hypotheses were developed to test the effect of these variables individually and in combination on the systematic risk of the firm. These hypotheses provide a link between empirical findings and theoretical predictions concerning the merger and acquisition process. The following section provides a summary of each of the hypotheses that this study addresses. Each hypothesis corresponds to an independent variable.

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#### Hypothesis One:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer book value increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O1</sub>: There is a negative or no relationship between the change in the acquirer's book value and the change in the acquirer's systematic risk.

H<sub>A1</sub>: There is a positive relationship between the change in the acquirer's book value and the change in the acquirer's systematic risk.

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#### Hypothesis Two:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirers' total debt level increase the change in systematic risk also increases. The focus here is the impact of managerial risk taking.

H<sub>O2</sub>: There is a negative or no relationship between the change in the acquirer's total debt level and the change in the acquirer's systematic risk.

H<sub>A2</sub>: There is a positive relationship between the change in the acquirer's total debt level and the change in the acquirer's systematic risk.

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#### Hypothesis Three:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer PE ratio increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O3</sub>: There is a negative or no relationship between the change in the acquirer's P/E ratio and the change in the acquirer's systematic risk.

H<sub>A3</sub>: There is a positive relationship between the change in the acquirer's P/E ratio and the change in the acquirer's systematic risk.

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#### Hypothesis Four:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer ratio of operating income to assets increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O4</sub>: There is a negative or no relationship between the change in the acquirer's ratio of operating income to assets and the change in the acquirer's systematic risk.

H<sub>A4</sub>: There is a positive relationship between the change in the acquirer's ratio of operating income to assets and the change in the acquirer's systematic risk.

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#### Hypothesis Five:

This hypothesis suggests as changes (post-merger to pre-merger) in merger size to acquirer book value increase the change in systematic risk decreases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O5</sub>: There is a positive or no relationship between the change in the ratio of the dollar value of the merger to the acquirer book value and the change in the acquirer's systematic risk.

H<sub>A5</sub>: There is a negative relationship between the change in the ratio of the dollar value of the merger to the acquirer book value and the change in the acquirer's systematic risk.

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#### Hypothesis Six:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer return on assets increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O6</sub>: There is a negative or no relationship between the change in the return on assets of the acquiring firm and the change in the acquirer's systematic risk.

H<sub>A6</sub>: There is a positive relationship between the change in the return on assets of the acquiring firm and the change in the acquirer's systematic risk.

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#### Hypothesis Seven:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer asset size increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O7</sub>: There is a negative or no relationship between the change in asset size of the acquiring firm and the change in the acquirer's systematic risk.

H<sub>A7</sub>: There is a positive relationship between the change in asset size of the acquiring firm and the change in the acquirer's systematic risk.

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#### Hypothesis Eight:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer net income increase the change in systematic risk decreases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O8</sub>: There is a positive or no relationship between the change in the acquiring firm's net income and the change in the acquirer's systematic risk.

H<sub>A8</sub>: There is a negative relationship between the change in the acquiring firm's net income and the change in the acquirer's systematic risk.

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#### Hypothesis Nine:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer net sales to selling, general, and administrations expense ratio increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O9</sub>: There is a negative or no relationship between the change in the acquiring firm's net sales to selling, general, and administration expenses and the change in the acquirer's systematic risk.

H<sub>A9</sub>: There is a positive relationship between the change in the acquiring firm's net sales to selling, general, and administration expenses and the change in the acquirer's systematic risk.

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#### Hypothesis Ten:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer market value increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O10</sub>: There is a negative or no relationship between the change in the acquiring firm's market value and the change in the acquirer's systematic risk.

H<sub>A10</sub>: There is a positive relationship between the change in the acquiring firm's market value and the change in the acquirer's systematic risk.

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### Hypothesis Eleven:

This hypothesis suggests as changes (post-merger to pre-merger) in acquirer debt-to-asset ratio increase the change in systematic risk also increases. The focus of this hypothesis is the impact of company size and profitability.

H<sub>O11</sub>: There is a negative or no relationship between the change in the acquirer debt-to-asset ratio and the change in the acquirer's systematic risk.

H<sub>A11</sub>: There is a positive relationship between the change in the acquirer debt-to-asset ratio and the change in the acquirer's systematic risk.

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### Dependent Variable: Measure of Systematic Risk of the Firm

The dependent variable is the Capital Asset Pricing Model (CAPM) beta. The CAPM beta has volumes of scholarly works attributed directly to its development, verification, and research. Since both Chapters 1 and 2 of this Dissertation describe the CAPM, indicate the strengths and weaknesses of the CAPM, and mention competing models to the CAPM approach these points are not reiterated here and the reader is kindly recommended to read the sections in the previous two chapters related to the CAPM. In conclusion the CAPM beta is an appropriate cornerstone on which to base a study of systematic risk pertaining to one of the largest capital allocation decisions a firm can make, that of merging or acquiring another company.

### Independent Variables

The independent variables are tested for their relationship with systematic risk (as measured by CAPM beta) of the acquiring firm after merger. Each independent variable is tested individually using correlation analysis and then in combination in a regression equation, to discern the determinants of the change in the systematic risk of the acquiring firm. This dissertation focuses on the need of each company to be profitable. This is one of the three components defining a successful M&A (see Figure 1).

#### The Need to Be Profitable

From H1: Change in Acquirer Book Value (BVPS)

From H2: Change in Acquirer Debt Level (TD)

From H3: Change in Acquirer P/E Ratio (PE)

From H4: Change in Acquirer Ratio of Operating Income to Assets (OITA)

From H5: Change in \$ Value of the Merger to Acquirer Book Value (SBVPS)

From H6: Change in Acquirer Return on Assets (ROA)

From H7: Change in Acquirer Asset Size (TA)

From H8: Change in Acquirer Net Income (NI)

From H9: Change in Acquirer Net Sales to Selling, General, and Administration Expenses (SE)

From H10: Change in Acquirer Market Value (MV)

From H11: Change in Acquirer Debt-to-Asset Ratio (TDTA)

### Defining Variable: Industry

In order to keep this study focused and make the results available for practical use in a timely manner some defining variable must be decided. Limiting the scope to mergers considered by Securities Data Corporation (SDC) to have occurred in the manufacturing industry (defined by NAIC 33) helps define the sample.

### Data and Statistical Analysis Methodology

Initial analysis involves performing correlation analysis of each independent variable with the dependent variable. The change in systematic risk is then examined to determine whether there are any statistically significant relationships with the change in independent variables post to pre merger. This dissertation reviews the statistically significant variables for multicollinearity. Variables that demonstrate multicollinearity are removed from the analysis with other associated variables. Variables are analyzed based on the explanatory strength of the change in systematic risk.

A regression analysis is performed to develop a predictive model using those independent variables remaining after removing those that did not demonstrate a statistically significant relationship with the dependent variable and those that demonstrated a high level of multicollinearity with other independent variables.

The goal of this research is to test a number of independent variables which have been found through research of the literature having a relationship with the systematic risk of a firm. These variables are tested individually using correlation analysis to

ascertain if there is a relationship and the direction and magnitude of the relationship of each variable with a measure of systematic risk of the acquirer. The variables are also tested using a regression model to discover if a predictive-type model could be developed using these variables in combination.

The research and analysis is carried out in four stages: 1. Variable Investigation - Review of the literature to uncover descriptive models of merger success and an understanding of systematic risk. 2. Data Acquisition - Gather merger and acquisition data from the Securities Data Corporation's (SDC) database with the following limitations: a) Acquirers are public companies and actively traded on one of the three major US stock exchanges (NYSE, AMEX, Nasdaq). b) Deal Value must be disclosed. c) Acquirer has NAIC code 33 (Manufacturing). d) M&A transaction occurred 1/1/1995 to 12/31/1999 (Five years). The monthly market returns for each company in the M&A sample is gathered for a period three years before and three years after the merger and acquisition transaction (maximum data time range of 1/1/1992 to 12/31/2002 depending on the timing of each M&A deal). The weighted average index returns are gathered, and both the market and the weighted average index returns are gathered from the Center for Research of Securities Prices (CRSP) database. Any required financial or accounting data is gathered from the Standard and Poors' COMPUSTAT database. 3. Calculation of Beta - For each company, beta is calculated both before and after the M&A deal. This was completed by plotting the monthly weighted average market return minus the risk free rate on the x-axis and the monthly company returns minus the risk free rate on the y-axis. This analysis is completed for three years prior and three years post the M&A event. The 3 year T-note rate is used as the risk free rate. A regression line was then

applied to these graphs. The slope of the regression line was taken as beta. This analysis was completed both before and after the M&A deal so that a before and after beta can be realized and the change in beta calculated too. 4. Statistical Analysis - Data was analyzed using correlation and regression analysis. Correlation analysis was used to test the relationship between each independent and dependent variable and regression analysis was used to further test the relationship between the independent and dependent variables.

If “scientific inquiry” means anything, it is to frame a hypothesis and test it rigorously against the possibility the result is merely due to chance. Strictly speaking, one never proves the alternate hypothesis, one only disproves the null hypothesis. The event studies and accounting studies are excellent examples of the scientific method applied to social phenomena. Surveys and clinical studies are mutually not tests of hypotheses; they aim to describe, rather than test. The key test by which an event study or accounting study proves its findings is with the “t-statistic.” The derivation and history of this statistic are beyond the scope of this discussion. However the t-statistic indicates the probability the result was due to chance. Generally the higher the t value, the lower the probability of a chance occurrence. However the significance of t-values does vary with the number of observations for each variable. This is why the t-tables are used.

Assuming a large sample (say greater than 100) a one percent chance the result was due to chance is indicated by t-values of 2.0 (absolute value). A five percent chance that the result was due to chance is indicated by t-values of 1.67 (absolute value). Statistical studies never prove a phenomenon with complete certainty. At best, one can indicate that the result is probably not due to chance.

Statistical significance is not the same as economic materiality. To say the M&A transactions create or destroy value on average, one needs not only the proof of significance (i.e., that the result is not due to chance) but also materiality, because the wealth effect is something the shareholders or society should worry about. However, many of the significant abnormal returns reported in event studies are as low as one or two percent begging one to ask whether this is something shareholders or society should worry about. The answer is emphatically “yes.” Normally these returns occur over a few days. Abnormal returns of this magnitude in a short period of time are enough to cause concern or elation among institutions or other sophisticated investors whose performance in turn can be greatly affected by these kinds of events. One also needs to compare “apples to apples”: The M&A event returns must be annualized to compare them to other rates of return that investors experience. For instance, a one percent abnormal positive return to announcements by buyers which occurs over a week should be annualized by compounding one percent across 52 weeks to yield a 68 percent annualized gain  $((1.01)^{52}=1.678)$ . This is merely theoretical since reinvestment risk will frustrate attempts to invest in a way that reliability yields a 68 percent abnormal return each year. Nevertheless, in order to make fair comparisons of the materiality of M&A activity with other investing activity by corporations and institutions, it is necessary to adjust for differences in time frame.

### Expected Results of Hypotheses

Table 8 shows the expected results of the independent variables and the expected relationships with the proxy for systematic risk (beta).

**Table 8:**  
Independent Variables and Expected Relationships with the Dependent Variable

Hypothesis	Variable Description	Variable	Focus	Expected Direction of Relationship
1	Change in Acquirer Book Value	BVPS	Size/Profitability	Positive, Significant
2	Change in Acquirer Debt Level	TD	Managerial Risk	Positive, Significant
3	Change in Acquirer P/E Ratio	PE	Size/Profitability	Positive, Significant
4	Change in Acquirer Ratio of Operating Income to Assets	OITA	Size/Profitability	Positive, Significant
5	Change in \$ Value of the Merger to Acquirer Book Value	SBVPS	Size/Profitability	Negative, Significant
6	Change in Acquirer Return on Assets	ROA	Size/Profitability	Positive, Significant
7	Change in Acquirer Asset Size	TA	Size/Profitability	Positive, Significant
8	Change in Acquirer Net Income	NI	Size/Profitability	Negative, Significant
9	Change in Acquirer Net Sales to Selling, General, and Administration Expenses	SE	Size/Profitability	Positive, Significant
10	Change in Acquirer Market Value	MV	Size/Profitability	Positive, Significant
11	Change in Acquirer Debt-to-Asset Ratio	TDTA	Managerial Risk	Positive, Significant
N/A	Acquirer SIC code classification is 1 - 29	S129	Relatedness	Positive, Significant
N/A	Acquirer SIC code classification is 30-34	S3034	Relatedness	Positive, Significant
N/A	Acquirer SIC code classification is 35	S35	Relatedness	Positive, Significant
N/A	Acquirer SIC code classification is 36	S36	Relatedness	Positive, Significant
N/A	Acquirer SIC code classification is 37-39	S3739	Relatedness	Positive, Significant
N/A	Acquirer SIC code classification is 40-99	S4099	Relatedness	Negative, Significant
Other	Capital Asset Pricing Model Beta	BETA	N/A	Dependent Variable



## CHAPTER 4

### ANALYSIS AND PRESENTATION OF FINDINGS

#### Organization of Findings

This study examined determinants of change in systematic risk for acquirers in corporate mergers and acquisitions. The study included merger transactions over a five-year period (January 1, 1995 to December 31, 1999). This chapter presents descriptive statistics, correlation analyses, and regression results for the entire sample.

#### Description of the Total Sample

For the five-year time period between January 1, 1995 and December 31, 1999 4033 M&A transactions were recorded in the Securities Data Corporation (SDC) database with acquirers categorized in the manufacturing industry (NAIC 33). Of those 4033 transactions, 741 unique acquirers were actively traded on one of the three major US stock exchanges (NYSE, AMEX, Nasdaq). Those acquirers traded in the pink sheets (.pk), OTC BB (.ob) or only traded on the Toronto/Vancouver exchanges were eliminated. The 741 acquirer sample was comprised of 332 from the NYSE, 51 from the AMEX, and 358 from the Nasdaq. Of the 741 transactions, 720 had COMPUSTAT and

CRSP data available. Of the 720 transactions, 473 had monthly returns data and accounting data available for the full six years analyzed for each acquirer (three years before and after each M&A transaction for a maximum overall sample time period of 1992 to 2002). Considering the 741 transactions as the overall population of manufacturing related merger transactions where the acquirer is an actively traded company without restrictions, the 473 sub-sample comprises 63.8% of the overall population.

As noted in chapter 3 of this dissertation, industry is the defining variable. The original SDC M&A transaction sample was generated for all acquirers categorized in NAIC 33 (manufacturing). The analyzed sample of 473 was then subdivided into six independent “dummy” variables based on COMPUSTAT SIC categorization (S129, S3034, S35, S36, S3739, S4099). Appendix A can be referenced for the beta calculation summary for all 473 transactions. Appendix B can be referenced for variables variance summaries for all 473 transactions.

Please see Table 9 for a description of each variable analyzed in this study. COMPUSTAT uses mnemonics to define accounting and financial data. In order to avoid confusion, Table 9 indicates what the COMPUSTAT mnemonics were changed to for purposes of this dissertation. Also, Table 9 indicates any manipulation of the COMPUSTAT data completed to ensure all variables had the same relative units of measure. For example, COMPUSTAT provided market value data per month (MKVALM) so in order to maintain units consistent with the other variables, that monthly market value was converted to annual (MV). In Table 9, S129, S3034, S35, S36, S3739, and S4099 are the industry defining or “dummy” variables indicating the

acquirer's SIC code category. The eleven independent variables analyzed in this dissertation are listed in Table 9 as TA, BVPS, TD, MV, NI, PE, ROA, OITA, SE, TDTA, and SBVPS. BETA is the dependent variable and the proxy for systematic risk.

Table 9  
Variables and Units

COMPUSTAT Mnemonics	Dissertation Mnemonics	Description	COMPUSTAT Units	Dissertation Units
	S129	Acquirer SIC code classification is between SIC 1 through 29	N/A	N/A
	S3034	Acquirer SIC code classification is between SIC 30 through 34	N/A	N/A
	S35	Acquirer SIC code classification is between SIC 35	N/A	N/A
	S36	Acquirer SIC code classification is between SIC 36	N/A	N/A
	S3739	Acquirer SIC code classification is between SIC 37 through 39	N/A	N/A
	S4099	Acquirer SIC code classification is between SIC 40 through 99	N/A	N/A
AT	TA	Change in Total Assets surrounding the M&A transaction	Annual \$M	Annual \$M
BKVLPS	BVPS	Change in Book Value Per Share surrounding the M&A transaction	Annual \$M	Annual \$M
DLTT	TD	Change in the Total Long Term Debt surrounding the M&A transaction	Annual \$M	Annual \$M
MKVALM	MV	Change in the Market Value surrounding the M&A transaction	Monthly \$M	Annual \$M
NI	NI	Change in the Net Income surrounding the M&A transaction	Annual \$M	Annual \$M
PEM	PE	Change in the Ratio: (Month End Closing Stock Price / 12 Months Moving Average of Earnings Per Share) surrounding the M&A transaction	\$/ \$	\$/ \$
ROA	ROA	Change in Return on Assets surrounding the M&A transaction	Annual %	Annual %
OIADP/AT	OITA	Change in the Ratio: (Operating Income After Depreciation / Total Assets) surrounding the M&A transaction	Annual \$M / Annual \$M	Annual \$M / Annual \$M
SALE/XSGA	SE	Change in the Ratio: (Net Sales / (Selling, General, Administration Expenses)) surrounding the M&A transaction	Annual \$M / Annual \$M	Annual \$M / Annual \$M
DLTT/AT	TDTA	Change in the Ratio: (Total Long Term Debt / Total Assets) surrounding the M&A transaction	Annual \$M / Annual \$M	Annual \$M / Annual \$M
BKVLPS	SBVPS	Change in the Ratio: (M&A Size / Book Value Per Share) surrounding the M&A transaction	\$M / Annual \$M	\$M / Annual \$M
	BETA	Change in the Capital Asset Pricing Model Market Risk surrounding the M&A transaction	N/A	N/A

### Descriptive Statistics

Based on the analyzed sample of 473 M&A transactions, some descriptive statistics are of interest. First, Table 10 shows the M&A transaction sample distribution. Table 10, Panel A shows how many transactions occurred in each year for the time period analyzed from 1995 to 1999. Table 10 Panel B shows the distribution and description of the industry defining variables: S129 is for SIC code ranges 1-29, S3034 is for SIC code ranges 30-34, S35 is for SIC code range 35, S36 is for SIC code range 36, S3739 is for SIC code ranges 37-39, and S4099 is for SIC code ranges 40-99. It is interesting to note that 1998 and 1999 have the highest sample representation. Also the acquirers in the electronic and transportation manufacturing sectors have the highest representation.

Table 10:  
473 M & A Transaction Sample Distribution (Transaction Year and Acquirer SIC Code)

Panel A: 473 M & A Sample - Transaction Date		Panel B: 473 M & A Sample - SIC Code Distribution		
Year	Sample Distribution	SIC Code Description	SIC Code Ranges	Sample Distribution
1995	48	Agriculture, Forestry, and Fishing; Mining; Construction; Manufacturing (Food and Kindred; Tobacco; Textile Mill; Apparel; Lumber; Furniture; Paper; Printing; Chemicals; Petroleum)	1-29	44
1996	71	Manufacturing (Rubber and Plastics; Leather; Stone, Clay, Glass, and Concrete; Primary Metals; Fabricated Metal Except Machinery and Transportation Equipment)	30-34	61
1997	82	Manufacturing (Industrial and Commercial Machinery and Computer Equipment)	35	89
1998	162	Manufacturing (Electronic and Other Electrical Equipment and Components, Except Computer Equipment)	36	100
1999	110	Manufacturing (Transportation Equipment; Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks; Miscellaneous Manufacturing)	37-39	121
		Transportation, Communications, Electric, Gas, and Sanitary Services; Wholesales Trade; Retail Trade; Finance, Insurance, and Real Estate; Services; Public Administration	40-99	58

Table 11 documents the average, median, and standard deviation of the independent and dependent variables other than those related to industry. Please reference Table 9 for a description of and units for the variables displayed in Table 11. It is interesting to note that on average, the BETA, NI, and BVPS decreased after the M&A transaction while all other variables increased. Actually the BETA decreased

approximately 25% pre to post merger. On average, BETA was nearly equivalent to the overall market systematic risk before merger (.99) and decreased to a position of significantly less risk after merger (.74). Also, the marked increase in total assets (TA) and market value (MV) and decrease in the ratio of M&A size to book value per share (SBVPS) indicated that the merged entity not only increased in size but also added value to the firm through an increase in book value per share.

Table 11:  
473 M&A Sample - Financial Data Descriptive Statistics (Acquirer Before and After M&A Transaction)

Variable	Mean		Median		Std Dev	
	Before	After	Before	After	Before	After
BETA	0.99	0.74	0.90	0.70	0.60	0.40
TA	2763.9	4040.2	242.9	418.7	13110.1	17216.0
BVPS	7.8	9.4	5.1	7.4	15.3	8.1
TD	465.7	787.8	19.9	39.0	2409.3	4176.7
MV	34816.1	81463.9	4069.6	5204.1	129374.2	319423.8
NI	137.9	96.4	17.5	12.7	550.4	1390.9
PE	37.9	45.6	21.6	23.4	60.7	80.5
ROA	6.6	2.1	7.1	4.1	9.2	16.0
OITA	0.1	0.1	0.1	0.1	0.1	0.1
SE	5.9	5.9	4.4	4.3	4.9	5.7
TDTA	0.1	0.2	0.1	0.1	0.1	0.1
SBVPS	202.1	75.7	6.3	4.1	1362.0	296.1

For the dependent variable of BETA, Table 12 shows the descriptive statistics of the variance of the three year calculated post-transaction beta minus the three year calculated pre-transaction beta. The change (post to pre M&A) in the independent variables (TA, BVPS, TD, MV, NI, PE, ROA, OITA, SE, TDTA, and SBVPS) are shown in Table 12. The change (post to pre M&A) is defined as the three years data average immediately after the M&A transaction minus the average of three years of data immediately prior to the M&A transaction. Finally, Table 12 shows the industry defining variables, which are classified as dichotomous (0,1) “dummy” variables for purposes of statistical analysis.

Table 12  
Descriptive Statistics of all Variables.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
BETA	473	-4.192	.899	-.245	.417
TA	473	-12362.7	77881.86	1276.320	5648.556
BVPS	473	-277.022	29.741	1.608	14.807
TD	473	-6275.855	38220.47	322.116	2166.142
MV	473	-60499.6	2194818	46549.10	207135.7
NI	473	-21889.2	4819.000	-41.543	1226.278
PE	458	-631.614	1172.808	8.353	97.351
ROA	473	-237.817	72.945	-4.461	15.682
OITA	473	-.577	.394	-.040	.102
SE	473	-21.618	46.091	-.029	3.240
TDTA	473	-.390	.493	.028	.111
SBVPS	473	-21403.7	1101.715	-126.401	1119.582
S129	473	.000	1.000	.093	.291
S3034	473	.000	1.000	.129	.336
S35	473	.000	1.000	.188	.391
S36	473	.000	1.000	.211	.409
S3739	473	.000	1.000	.256	.437
S4099	473	.000	1.000	.123	.328
Valid N (listwise)	458				

Table 13 shows 15 of 18 variables with 95% confidence that their difference is between the lower and upper values. The three variables not statistically significant are the change in the net income (NI), change in the ratio of month end closing stock price divided by the 12 months moving average of earnings per share (PE), and the change in the ratio of net sales divided by selling, general, and administration expenses (SE).



Table 13  
One-Sample Test Statistics

One-Sample Test						
Test Value = 0						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
BETA	-12.808	472	.000	-.245	-.283	-.208
TA	4.914	472	.000	1276.320	765.968	1786.672
BVPS	2.361	472	.019	1.608	.270	2.945
TD	3.234	472	.001	322.116	126.403	517.829
MV	4.888	472	.000	46549.097	27834.20	65264.00
NI	-.737	472	.462	-41.543	-152.338	69.253
PE	1.836	457	.067	8.353	-.586	17.293
ROA	-6.187	472	.000	-4.461	-5.878	-3.044
OITA	-8.555	472	.000	-.040	-.049	-.031
SE	-.194	472	.846	-.029	-.322	.264
TDTA	5.519	472	.000	.028	.018	.038
SBVPS	-2.455	472	.014	-126.401	-227.556	-25.246
S129	6.958	472	.000	.093	.067	.119
S3034	8.360	472	.000	.129	.099	.159
S35	10.459	472	.000	.188	.153	.224
S36	11.249	472	.000	.211	.174	.248
S3739	12.738	472	.000	.256	.216	.295
S4099	8.122	472	.000	.123	.093	.152

### Correlation Analysis

For a full correlation analysis please reference Appendix C. Both one-tailed and two-tailed correlation results are documented in Appendix C. However, a correlation summary is recorded in Table 14. Note the variables change in acquirer price earnings

ratio (PE), change in the acquirer return on assets (ROA), change in acquirer ratio of operating income to assets (OITA), acquirer SIC code classification 1-29 (S129), acquirer SIC code classification 36 (S36), acquirer SIC code classification 37-39 (S3739), and acquirer SIC code classification 40-99 (S4099) are significantly correlated in explaining the change in systematic risk (BETA) surrounding M&A transactions.

Table 14  
Correlation Summary

Independent Variables	Total Sample Beta Correlation	Hypothesis, Prediction	Predicted Matches Actual?
TA	.099	7, Positive	Yes
BVPS	.021	1, Positive	Yes
TD	.014	2, Positive	Yes
MV	.020	10, Positive	Yes
NI	-.049	8, Negative	Yes
PE	-.097*	3, Positive	No
ROA	.085*	6, Positive	Yes
OITA	.185**	4, Positive	Yes
SE	.029	9, Positive	Yes
TDTA	-.026	11, Positive	No
SBVPS	.020	5, Negative	No
S129	.102*	N/A, Positive	Yes
S3034	.050	N/A, Positive	Yes
S35	-.041	N/A, Positive	No
S36	-.097*	N/A, Positive	No
S3739	.094*	N/A, Positive	Yes
S4099	-.097*	N/A, Negative	Yes

\*\*Significant at 0.01 level (One-Tailed Test)

\*Significant at 0.05 level (One-Tailed Test)

### Regression Analysis

The regression analysis is divided into two separate analyses. First, the overall

model is analyzed, except the acquirers in SIC code classification 37-39 (S3739) are excluded due to multicollinearity. The results of this first regression analysis are shown in Table 15. Second, the statistically significant variables are analyzed, except the acquirers in SIC code classification 37-39 (S3739) are again excluded due to multicollinearity. In this second regression analysis the change in acquirer net income (NI), the change in acquirer P/E Ratio (PE), the change in acquirer net sales to selling, general, and administration expenses (SE) are excluded due to insignificance in the one-sample test (Table 13). The results of this second regression analysis are shown in Table 16. Since the R-squared is less than 10% in both analyses, this means that the models developed contain variables which explain less than 10% of the change in systematic risk. While the R-squared is low, it's magnitude is not uncommon for these types of studies and leaves opportunity for future research to explore additional variables. Some of the variables with future research potential are mentioned in chapter 5 of this dissertation.

Table 15  
Regression of the Overall Model

Model	Unstandardized Coefficients (B)	t-statistic	Sig.
(Constant)	-.153	-3.938	.000
TA	.000	.065	.949
BVPS	.000	.231	.817
TD	.000	-.067	.947
MV	.000	1.684	.093
NI	.000	-2.809	.005
PE	-.001	-2.489	.013
ROA	.002	.520	.603
OITA	.682	1.613	.107
SE	-.002	-.335	.738
TDTA	.033	.183	.855
SBVPS	.000	.671	.502
S129	.060	.817	.415
S3034	-.016	-.241	.810
S35	-.097	-1.664	.097
S36	-.157	-2.758	.006
S4099	-.140	-2.072	.039

A: Dependent Variable: BETA

B: R-Square: 0.093

C: Adjusted R-Square: 0.060

Table 16  
Regression of the Statistically Significant Variables

Model	Unstandardized Coefficients (B)	t-statistic	Sig.
(Constant)	-.155	-4.076	.000
TA	.000	-.641	.522
BVPS	.000	.213	.831
TD	.000	.589	.556
MV	.000	1.451	.148
ROA	-.003	-1.838	.067
OITA	1.027	3.855	.000
TDTA	-.065	-.372	.710
SBVPS	.000	.806	.421
S129	.055	.772	.441
S3034	-.008	-.127	.899
S35	-.099	-1.720	.086
S36	-.150	-2.696	.007
S4099	-.165	-2.510	.012

A: Dependent Variable: BETA

B: R-Square: 0.074

C: Adjusted R-Square: 0.048

## CHAPTER 5

### CONCLUSIONS, IMPLICATIONS, AND SUMMARY

#### Summary of Findings

Based on the evidence of 473 corporate mergers and acquisitions, in the manufacturing industry, acquirer systematic risk was found to decrease on average (pre to post merger). The average pre-transaction acquirer systematic risk was found to be near that of the overall market (Average Pre-Transaction Beta = 0.9903). Post transaction results show a 0.2454 decrease in beta on average (Average Post-Transaction Beta = 0.7449). The Capital Asset Pricing Model (CAPM) beta was used as a proxy for systematic risk. Securities Data Corporation (SDC) M&A transaction data, Standard and Poor's COMPUSTAT, and The University of Chicago's Center for Research on Security Prices (CRSP) financial data were utilized. Since the beta decreased after merger, the systematic risk, potential for shareholder value, and stock price volatility of the acquirer, by definition of the CAPM, decline. Said differently, decreased systematic risk leads the investor to expect to enjoy less fluctuation in their post-merger investment (relative to the overall market). Specifically based on this study the post merger acquiring company would increase in value approximately 25% less than the market or decrease approximately 25% less than the market depending on the direction of the overall market. Finding that the systematic risk decreases over this 473 transaction sample not only adds

to the body of knowledge in the area of M&A research, but supports the theory that merger activity is a diversifying and risk reducing activity on average.

In addition, potential determinants of the decrease in systematic risk were studied. Confirming the determinants of systematic risk change is invaluable to corporate executives trying to decide what premium to pay for acquisitions. A review of historical literature shows M&A abnormal returns, premiums, and related stock prices have been widely studied. However, a gap in the research regarding analysis of variables determinant of change in systematic risk was identified. A number of factors or variables found historically to be associated with the variability in M&A results were studied in this dissertation in relation to systematic risk. Systematic risk is such an important component of corporate strategy, investment decisions, and finance that this analysis was long overdue. Determinants of change (pre vs. post merger) in acquirer systematic risk, within the manufacturing industry, were analyzed. After correlation and regression analysis, multiple variables were identified to be statistically significant in determining changes in systematic risk.

Table 14 indicates a summary of the one-tailed correlation analysis. The complete correlation analysis can be found in Appendix C for both the one and two tailed tests. It is interesting to note in Table 14 that seven variables are statistically significant in indicating the correlation to the dependent variable beta. Those variables are the change in acquirer price to earnings ratio (PE), the change in acquirer return on assets (ROA), the change in acquirer ratio of operating income to assets (OITA), the acquirers with SIC code classifications 1-29 (S129), the acquirers with SIC code classification 36 (S36), the acquirers with SIC code classifications 37-39 (S3739), and the acquirers with SIC code

classifications 40-99 (S4099). Based on the direction of the correlations, the following correlations can be made in relation to a decreased systematic risk for those acquirers with SIC codes 1-29, 36-39, 40-99: PE would increase, ROA would decrease, and OITA would decrease.

Table 15 and 16 summarize the regression analysis. The 11 independent variables and 5 defining variables explain approximately 10% of the relationship to the dependent variable systematic risk change (pre to post merger). The 11 independent variables are the change in acquirer book value (BVPS), change in acquirer debt level (TD), change in acquirer price to earnings ratio (PE), change in acquirer ratio of operating income to assets (OITA), change in value of the merger to acquirer book value (SBVPS), change in acquirer return on assets (ROA), change in acquirer asset size (TA), change in acquirer net income (NI), change in acquirer net sales to selling, general, and administration expenses (SE), change in acquirer market value (MV), change in acquirer debt-to-asset ratio (TDTA). The five defining variables are the ranges of acquirer SIC codes of 1-29 (S129), 30-34 (S3034), 35 (S35), 36 (S36), 37-39 (S3739), 40-99 (S4099). While 10% explanatory power is normal for M&A related studies, it is unfortunate that the variables analyzed didn't explain more of the relationship with systematic risk. Much investigation is left for future research.

### Limitations

First, only the acquirers within the manufacturing industry are analyzed in this study. It would be interesting to do a similar study on acquirers from the service industry

and analyze whether the results indicated in Chapter 4 of this dissertation are similar or different. Also, a ratio between target and acquirer financials may be appropriate for improving the study's relevancy and scope. Therefore, one limitation of this study is that its explanatory power is confined to acquirers in the manufacturing industry.

Second, time period of analysis is a limitation in two respects. In this study, beta is calculated before and after the merger transaction based on six years of returns data (three years before and three years after each M&A transaction). However, some literature related to beta calculations indicates an accurate calculation of beta should be based on anywhere from one to five years of data. Therefore, the three years used in this study is appropriate, yet may be a limitation if you consider five years of data to be more accurate in calculating beta. In addition, this research analyzed five years of M&A activity from 1995 to 1999. If one looks at the overall length of time companies have been engaged in M&A activity, then five years appears to be only a brief point on the overall M&A continuum. An analysis over a much longer period of time (longitudinal study) may be appropriate to further determine causality.

Third, this study depends on the secondary data of financial variables compiled from multiple databases (CRSP, COMPUSTAT, SDC). These databases are respected within the M&A field of research. However, there is probably some level of error within the data compiled in these databases. Also, first and foremost, financial variables are only as accurate and comparable "apples-to-apples" as accounting practices in the security industry are.

Fourth, the proxy for systematic risk in this study was CAPM beta. To examine how merger transactions may change the systematic risk of the firm, consider the CAPM



relationship equation (1):  $R_{jt} - R_{ft} = b_j (R_{mt} - R_{ft}) + \epsilon_t$ .  $R_{jt}$  is the random return on the  $j$ th security at time  $t$ ,  $R_{ft}$  is the risk-free rate at time  $t$ ,  $b_j$  is the measure of systematic risk of firm  $j$ ,  $R_{mt}$  is the market return at time  $t$ , and  $\epsilon_t$  is the mean zero error term. Also,  $b_j$  can be rewritten as in equation (2):  $b_j = (\rho_{jm} \sigma_j) / \sigma_m$ .  $\rho_{jm}$  is the correlation coefficient between security  $j$  and the market,  $\sigma_j$  is the standard deviation of firm  $j$ , and  $\sigma_m$  is the standard deviation of the market. Are there better measures for systematic risk? Based on arguments presented in previously mentioned academic literature, beta is an appropriate cornerstone to base a study of systematic risk on. However, maybe some of the other measures of systematic risk mentioned previously in this dissertation (i.e. Arbitrage Pricing Theory (APT)) would be more accurate as a systematic risk proxy?

Fifth, the results of a few of the variables did not match the hypothetical expectations. As indicated in Table 14, three variables did not match the hypothesis predicted correlation. The change in acquirer price to earnings ratio (PE) was predicted to have a positive correlation to the change in systematic risk but actually had a negative correlation, the change in acquirer debt to asset ratio (TDTA) was predicted to have a positive correlation to the change in systematic risk but actually had a negative correlation, and the change in value of the merger to acquirer book value (SBVPS) was predicted to have a negative correlation to the change in systematic risk but actually had a positive correlation. This unexplained phenomena is also an unexplained limitation to the study.

### Practitioner Application

Based on the mass of research, sound advice to the business practitioner is to be coldly realistic about the benefits of acquisition. Deals should be structured very carefully in order to avoid overpaying. The business practitioner should work very hard to achieve the economic gains hypothesized. Take nothing for granted. M&A is not a money machine, and may well not offer a major career-building event, either. The only solace is that one could say the same about virtually any other form of corporate investment. On balance, shareholders will earn a going rate of return on M&A activity. However, given the uncertainties in M&A, one must remember the ancient advice, “buyer beware”.

Beta decreases on average by approximately 25% for manufacturing industry acquirers studied in this dissertation. Therefore, on average, such companies can hope to reduce their systematic risk by “diversifying” through an acquisition. This is important because after the merger, the acquirer’s stock price should be less volatile on average than the overall market. Based on the second regression model (Table 16) and related correlation analysis (Table 14) in Chapter 4 (noting the statistically significant variables only), if the business practitioner can anticipate the change in acquirer price to earnings ratio (PE), return of assets (ROA), and ratio of operation income to assets (OITA) for acquirers with SIC codes 1-29 (S129), 36 (S36), 37-39 (S3739), and 40-99 (S4099), then the direction of change in systematic risk (BETA) surrounding M&A transactions can be correlated. Also, according to Table 16, change in acquirer assets (TA), change in acquirer book value (BVPS), change in acquirer debt level (TD), change in acquirer market value (MV), change in acquirer return on assets (ROA), change in acquirer ratio

of operating income to assets (OITA), change in acquirer debt to asset ratio (TDTA), change in value of the merger to acquirer (SBVPS) for acquirers with SIC codes of 1-29 (S129), 30-34 (S3034), 35 (S35), 36 (S36), 40-99 (S4099) explain 7.4% of the change in systematic risk surrounding M&A transactions.

According to Sidel (2004) M&A's are increasing again. Sidel indicated that "the worldwide volume of announced transactions edged up 10% [in 2003] to \$1.33 trillion from \$1.21 trillion in 2002.....some 27,612 deals were announced in 2003, compared with 26,270 in 2002". With so much M&A activity and the increasing trend, the business practitioner should be aware of the benefits, pitfalls, and impact to systematic risk of mergers because if he/she has not analyzed or experienced M&A yet, chances are good he/she will. For reference to the business practitioner, Table 17 is provided showing the worldwide merger advisors ranked by transaction values when announced. Credit is given to both target and acquiring company's advisors including net debt of the target companies.

Finally the practitioner should consider whether or not to have an in-house deal team if M&A is envisioned to be an ongoing part of the corporate development strategy. According to Frankel (2004) strategic transactions used to be managed by outside investment bankers, partnered with a senior company executive. But today, many companies find they can manage deals more efficiently in-house. Frankel (2004) indicates the essential skills for effective corporate development team members as financial analysis, legal acumen, industry expertise, negotiating, process management, and political savvy. The ten key roles of the corporate development team are corporate/division strategy, target list ownership, discussion and negotiation, due

diligence, integration planning, valuation and financial modeling, internal process management, closing, integration, corporate representative, and “traffic cop”. Frankel (2004) also indicates the five keys to effective corporate development teams as involving corporate development in the strategy process, developing partnerships between corporate development and line management, setting up a playbook, establishing continuity in due diligence, integration planning, and integration, and streamlining and standardizing the approval process. Lastly Frankel (2004) indicates the five ways corporate development teams fail as advocating for the deal instead of the company, failing to involve line management, not leveraging company resources, hogging the limelight, and just executing instead of strategizing!

Table 17  
Worldwide Merger Advisors

Advisor	2003			2002		
	Rank	Value, In Billions	No. of Deals	Rank	Value, In Billions	No. of Deals
Goldman Sachs	1	\$ 392.7	298	1	\$ 296.8	281
Morgan Stanley	2	\$ 239.5	239	3	\$ 192.8	261
Citigroup	3	\$ 219.6	307	2	\$ 201.9	341
Merrill Lynch	4	\$ 213.5	191	6	\$ 168.2	200
J.P. Morgan	5	\$ 206.4	291	5	\$ 174.2	309
Lazard	6	\$ 154.2	188	7	\$ 155.9	205
Credit Suisse First Boston	7	\$ 153.2	294	4	\$ 192.1	351
UBS	8	\$ 152.1	257	11	\$ 118.6	210
Lehman Brothers	9	\$ 147.2	180	8	\$ 131.1	188
Deutsche Bank	10	\$ 126.8	178	9	\$ 125.0	205

Note: Deals exclude spinoffs, withdrawn deals and open market repurchases  
Source: Thomson Financial

### Recommendations for Future Study

Based on the related historical literature, Table 18 contains additional variables or concepts, which could be explored in relation to understanding the determinants of change in systematic risk surrounding M&A transactions. Due to the limited scope of the current study, these variables and concepts are left to future study.

Future research avenues include analysis of other potential determinants of systematic risk change, a longitudinal study to establish causality, and similar research involving other industries. Table 18 shows 24 different potential variables or determinants that could be analyzed in relation to systematic risk to extend the research of this dissertation. M&A and systematic risk are fertile topics for research and there are plenty of avenues down which future research could travel.

**Table 18**  
**Future Research: Additional Areas to Investigate to Potentially Clarify the Determinants of Systematic Risk Changes Surrounding Merger Transactions**

Item	Variable or Concept	Description or Prediction in the Relationship to Systematic Risk
1	Reduce the time for beta calculation, before and after M&A transaction, from 3 years to 2 years.	By reducing the requirement for calculating beta the current sample size could be enlarged. 581 sample size had some data available both before and after merger. 473 sample size had the full 6 years of data (3 years prior and 3 post M&A transaction)
2	Method of Payment (Cash vs. Stock)	Negative Correlation for Cash
3	Hostile vs. Tender offer	Positive Correlation for Hostile
4	Managerial Post-Merger Risk Taking	Positive Correlation as defined by debt increase
5	Longitudinal Study	Track acquirer performance over time in order to determine causality
6	Horizontal Merger	Positive Correlation (Acquiring company has at least five years experience in the same two digit SIC industry code)
7	Ratio of the Target/Acquirer Size	Negative Correlation (as size increases, systematic risk decreases)
8	Market Value of the Target	Positive Correlation
9	Ratio \$ value of the Merger to Target's Book Value	Positive Correlation
10	Conglomerate Merger	Positive Correlation
11	Vertical Merger	Positive Correlation
12	Growth Rate of the Acquirer	Positive Correlation
13	Tobin's Q Ratio of Acquirer	Positive Correlation
14	ROA of the Target	Positive Correlation
15	Asset Size of the Target	Positive Correlation
16	Target Firm's Net Income	Positive Correlation
17	Target firm 3-year Growth Rate	Positive Correlation
18	Target Profitability	Positive Correlation
19	Target's Debt to Asset Ratio	Positive Correlation
20	P/E ratio of the target firm	Negatively correlated
21	Customer & Employee Impact Variables	See Figure 1 – specific variables TBD
22	Acquirer Equity to Debt Ratio	Negative Correlation
23	Acquirer Sales to R&D	After the effect of total sales has been removed (via ratio sales to R&D) the R&D intensity of the acquirer is predicted to be negatively correlated in explaining the merger's impact on the acquirer's systematic risk.
24	Acquirer Sales to Advertising Expense Ratio	After the effect of total sales has been removed (via ratio sales to advertising expense the Advertising intensity of the acquirer is predicted to be negatively correlated in explaining the merger's impact on the acquirer's systematic risk.

## APPENDIX A

## BETA CALCULATIONS SUMMARY

	Company	Ticker	M&A Date	Bb	Ba	Variance
1	ALCOA INC	AA	8/11/1999	0.976	0.700	-0.277
2	AAON INC	AAON	9/14/1999	0.524	0.432	-0.092
3	APPLE COMPUTER INC	AAPL	7/14/1999	1.173	1.237	0.064
4	ARCTIC CAT INC	ACAT	4/2/1998	0.584	0.294	-0.290
5	ACTEL CORP	ACTL	9/1/1998	2.377	1.082	-1.294
6	ADC TELECOMMUNICATIONS INC	ADCT	9/16/1998	2.205	1.770	-0.435
7	ANALOG DEVICES	ADI	10/8/1998	2.393	1.614	-0.779
8	ADVANCED DIGITAL INFO CORP	ADIC	9/9/1998	1.791	1.292	-0.499
9	AUTODESK INC	ADSK	8/21/1998	1.603	1.262	-0.341
10	AES CORP. (THE)	AES	11/20/1998	0.963	0.815	-0.148
11	AGCO CORP	AG	12/18/1997	1.279	0.625	-0.654
12	APPLIED INNOVATION INC	AINN	10/23/1998	1.590	0.992	-0.597
13	AAR CORP	AIR	10/14/1999	0.699	0.481	-0.218
14	ACCLAIM ENMNT INC	AKLM	3/7/1995	1.810	0.903	-0.907
15	ALCAN INC	AL	8/11/1999	1.187	0.793	-0.394
16	ALCATEL -ADS	ALA	3/2/1999	0.789	1.389	0.600
17	ALDILA INC	ALDA	10/26/1995	1.120	0.546	-0.574
18	ALAMO GROUP INC	ALG	5/29/1997	0.153	0.227	0.075
19	AMERICAN LOCKER GROUP INC	ALGI	8/11/1997	-0.185	0.714	0.899
20	ALLEN TELECOM INC	ALN	6/3/1997	1.047	0.718	-0.329
21	ASTRO-MED INC	ALOT	3/26/1998	0.458	0.204	-0.254
22	ALTERA CORP	ALTR	7/15/1996	2.535	1.853	-0.683
23	APPLIED MATERIALS INC	AMAT	11/26/1996	2.555	1.800	-0.755
24	AMERICAN TECH CERAMICS CORP	AMK	9/4/1998	0.897	0.428	-0.469
25	AMERON INTERNATIONAL CORP	AMN	9/1/1998	0.997	0.150	-0.847
26	AMERICAN SOFTWARE -CL A	AMSW A	12/18/1997	0.867	0.967	0.100
27	AMERICAN MANAGEMENT SYSTEMS	AMSY	9/21/1999	1.015	0.866	-0.149
28	AMX CORP	AMXC	3/31/1999	-0.028	0.829	0.858
29	ANDERSEN GROUP INC	ANDR	6/5/1995	-0.061	0.139	0.200
30	ANDREW CORP	ANDW	5/14/1997	1.891	1.251	-0.640
31	SMITH (A O) CORP	AOS	8/5/1997	0.676	0.570	-0.105
32	AMERICAN PWR CNVRSION	APCC	9/10/1999	2.337	1.387	-0.949
33	ARROW INTERNATIONAL	ARRO	3/23/1998	0.717	0.370	-0.347
34	AEROFLEX INC	ARXX	11/2/1999	0.981	1.229	0.248
35	ASA INTL LTD	ASAA	8/6/1998	0.606	0.386	-0.220
36	ASTEC INDUSTRIES INC	ASTE	8/4/1997	0.128	0.526	0.398
37	ALLIANT TECHSYSTEMS INC	ATK	11/5/1998	0.526	0.276	-0.250
38	ATMEL CORP	ATML	1/11/1996	2.572	1.623	-0.949
39	ACTION PERFORMANCE COS INC	ATN	12/16/1999	0.856	1.116	0.260
40	ATRION CORP	ATRI	11/16/1999	-0.032	0.380	0.412
41	ARTESYN TECHNOLOGIES INC	ATSN	7/27/1998	1.553	1.142	-0.411
42	AXSYS TECHNOLOGIES INC	AXYS	8/10/1998	0.590	0.611	0.021
43	BARNES GROUP INC	B	10/15/1999	0.342	0.396	0.053
44	BOEING CO	BA	12/17/1996	0.990	0.919	-0.072



	Company	Ticker	M&A Date	Bb	Ba	Variance
45	BOMBAY CO INC	BBA	6/17/1998	0.879	0.797	-0.083
46	BLACK BOX CORP	BBOX	3/31/1999	1.118	0.994	-0.124
47	BUTLER MFG CO	BBR	6/24/1997	0.433	0.231	-0.202
48	BRUNSWICK CORP	BC	10/13/1997	1.149	0.649	-0.500
49	BARD (C.R.) INC	BCR	5/24/1995	0.885	0.843	-0.042
50	BLACK & DECKER CORP	BDK	1/27/1998	1.081	0.793	-0.289
51	BECTON DICKINSON & CO	BDX	10/14/1998	0.954	0.926	-0.028
52	BALDOR ELECTRIC	BEZ	8/7/1995	0.408	0.368	-0.040
53	BRIGGS & STRATTON	BGG	4/16/1997	0.681	0.534	-0.147
54	BERGER HOLDINGS LTD	BGRH	5/19/1999	0.932	0.451	-0.482
55	BAKER-HUGHES INC	BHI	5/11/1998	0.818	0.946	0.128
56	BELL INDUSTRIES INC	BI	8/31/1995	0.528	0.574	0.046
57	BIO-RAD LABORATORIES INC	BIO	2/17/1998	0.782	0.310	-0.473
58	BALDWIN TECHNOLOGY -CL A	BLD	11/13/1998	0.662	0.234	-0.429
59	BALL CORP	BLL	4/23/1997	0.552	0.683	0.131
60	BLOUNT INTL INC	BLT	10/21/1996	0.444	0.548	0.104
61	BMC SOFTWARE INC	BMC	11/2/1998	2.030	1.662	-0.368
62	BIOMET INC	BMET	1/29/1997	1.047	1.198	0.151
63	BADGER METER INC	BMI	8/16/1996	0.208	0.461	0.254
64	BMC INDUSTRIES INC/MN	BMM	4/7/1997	0.772	0.589	-0.182
65	BAUSCH & LOMB INC	BOL	2/1/1999	0.765	0.725	-0.039
66	INTERPORE INTERNATIONAL	BONZ	2/12/1998	0.468	0.661	0.193
67	BORLAND SOFTWARE CORP	BORL	11/17/1997	1.545	0.526	-1.018
68	BOSTON ACOUSTICS INC	BOSA	5/17/1996	0.375	0.197	-0.178
69	BRADY CORP	BRC	12/9/1999	0.183	0.725	0.542
70	BROOKTROUT INC	BRKT	10/1/1999	1.431	1.405	-0.026
71	BUSH INDUSTRIES -CL A	BSH	2/18/1998	1.018	0.498	-0.520
72	BOSTON SCIENTIFIC CORP	BSX	1/20/1997	1.396	1.112	-0.284
73	BTU INTERNATIONAL INC	BTUI	8/10/1999	2.079	0.658	-1.421
74	BVR TECHNOLOGIES LTD	BVRT	1/14/1999	1.144	0.839	-0.305
75	BELDEN INC	BWC	6/11/1998	0.917	0.509	-0.408
76	BAYOU STEEL CORP -CL A	BYX	2/17/1998	0.900	0.824	-0.076
77	CASCADE CORP	CAE	8/14/1998	0.351	0.334	-0.017
78	CONAGRA FOODS INC	CAG	2/13/1995	0.725	0.617	-0.107
79	CATALINA LIGHTING INC	CALA	12/2/1998	1.148	0.687	-0.461
80	CATERPILLAR INC	CAT	10/16/1998	1.348	0.873	-0.475
81	BRILLIANCE CHINA AUTO -ADR	CBA	4/26/1998	1.330	1.270	-0.060
82	COOPER INDUSTRIES LTD	CBE	9/4/1998	0.945	0.626	-0.319
83	C-COR.NET CORP	CCBL	9/4/1997	0.963	0.793	-0.169
84	CONCURRENT COMPUTER CP	CCUR	11/6/1995	1.275	0.970	-0.304
85	CADENCE DESIGN SYS INC	CDN	11/20/1997	2.093	1.232	-0.861
86	CABLE DESIGN TECH CP -CL A	CDT	12/1/1998	1.183	0.796	-0.387
87	CECO ENVIRONMENTAL CORP	CECE	8/9/1999	0.744	0.754	0.010
88	COGNITRONICS CORP	CGN	12/15/1998	0.924	0.991	0.067
89	COGNEX CORP	CGNX	6/8/1998	1.819	1.450	-0.369
90	CHECKPOINT SYSTEMS INC	CKP	8/11/1999	1.396	0.752	-0.644

	Company	Ticker	M&A Date	Bb	Ba	Variance
91	CLARCOR INC	CLC	9/24/1996	0.568	0.442	-0.126
92	CLEVELAND-CLIFFS INC	CLF	1/10/1995	0.601	0.561	-0.040
93	CANDELA CORP	CLZR	12/15/1999	1.200	0.893	-0.307
94	COLORADO MEDTECH INC	CMED	9/8/1998	0.791	0.696	-0.095
95	COMPUTER NETWORK TECH CORP	CMNT	3/10/1997	1.360	1.078	-0.282
96	CREDENCE SYSTEMS CORP	CMOS	8/18/1998	2.003	1.572	-0.431
97	COMVERSE TECHNOLOGY INC	CMVT	8/21/1997	1.668	1.588	-0.080
98	CONMED CORP	CNMD	5/6/1997	0.656	0.543	-0.113
99	CNS INC	CNXS	10/20/1998	1.522	0.429	-1.093
100	COACHMEN INDUSTRIES INC	COA	10/23/1998	0.749	0.701	-0.049
101	COBRA ELECTRS CORP	COBR	8/25/1998	1.082	0.408	-0.674
102	COGNOS INC	COGN	10/7/1998	1.684	0.811	-0.873
103	COLLINS INDUSTRIES INC	COLL	8/28/1996	0.904	0.096	-0.808
104	3COM CORP	COMS	7/27/1995	2.126	1.391	-0.735
105	COREL CORP	CORL	1/12/1996	1.552	0.934	-0.618
106	CPAC INC	CPAK	4/7/1997	0.120	0.268	0.148
107	COMPUWARE CORP	CPWR	3/15/1999	1.775	1.610	-0.166
108	CRANE CO	CR	12/15/1998	0.881	0.776	-0.105
109	CROWN ANDERSEN INC	CRAN	8/27/1996	0.254	0.214	-0.040
110	CHROMCRAFT REVINGTON INC	CRC	10/10/1996	0.199	0.204	0.004
111	CREATIVE TECHNOLOGY LTD	CREAF	11/22/1998	1.073	1.342	0.269
112	CARPENTER TECHNOLOGY	CRS	9/25/1997	0.479	0.322	-0.157
113	CISCO SYSTEMS INC	CSCO	4/22/1996	2.310	1.715	-0.595
114	CSP INC	CSPI	10/9/1998	0.024	0.106	0.082
115	COMSHARE INC	CSRE	9/9/1998	1.354	0.719	-0.635
116	CTS CORP	CTS	5/12/1997	0.256	0.758	0.502
117	CUBIC CORP	CUB	5/12/1997	0.415	0.539	0.124
118	CUMMINS INC	CUM	1/3/1997	0.964	0.733	-0.230
119	CYPRESS SEMICONDUCTOR CORP	CY	9/1/1998	2.306	1.130	-1.176
120	CYBEROPTICS CORP	CYBE	6/24/1996	1.607	1.140	-0.467
121	DATA I/O CORP	DAIO	5/13/1997	0.858	-0.027	-0.885
122	DIEBOLD INC	DBD	10/23/1995	0.865	0.934	0.068
123	DONALDSON CO INC	DCI	1/16/1998	0.453	0.618	0.165
124	DANA CORP	DCN	5/4/1998	1.130	0.755	-0.375
125	DUCOMMUN INC	DCO	1/28/1999	0.642	0.444	-0.198
126	DU PONT (E I) DE NEMOURS	DD	9/28/1998	1.037	0.861	-0.175
127	DEERE & CO	DE	12/3/1997	1.304	0.766	-0.538
128	DELL INC	DELL	7/17/1998	2.073	1.847	-0.225
129	DIGI INTERNATIONAL INC	DGII	3/27/1995	1.097	0.720	-0.377
130	DANAHER CORP	DHR	4/27/1998	0.792	0.798	0.005
131	DIONEX CORP	DNEX	7/30/1996	0.583	0.516	-0.067
132	DOVER CORP	DOV	5/12/1999	0.962	0.688	-0.274
133	DATARAM CORP	DRAM	6/15/1999	1.179	0.484	-0.695
134	DRS TECHNOLOGIES INC	DRS	4/8/1998	0.361	0.329	-0.032
135	DATASCOPE CORP	DSCP	9/14/1999	0.892	0.620	-0.272
136	DATA SYSTEMS & SOFTWARE INC	DSSI	3/26/1999	1.369	0.838	-0.531

	Company	Ticker	M&A Date	Bb	Ba	Variance
137	DREW INDUSTRIES INC	DW	10/21/1999	0.256	0.310	0.055
138	DIXON TICONDEROGA CO	DXT	3/24/1999	0.286	0.397	0.111
139	ENGINEERED SUPPORT SYSTEMS	EASI	3/30/1995	0.486	0.502	0.016
140	ENGELHARD CORP	EC	3/2/1999	0.965	0.761	-0.204
141	ELECTROGLAS INC	EGLS	3/14/1996	1.711	0.991	-0.720
142	EASTMAN KODAK CO	EK	4/16/1996	1.024	0.532	-0.492
143	ELECTROLUX AB -ADR	ELUX	1/10/1996	0.555	0.947	0.393
144	CALLAWAY GOLF CO	ELY	4/2/1997	1.658	0.735	-0.924
145	EMC CORP/MA	EMC	8/9/1999	1.951	1.831	-0.121
146	EMERSON ELECTRIC CO	EMR	11/12/1996	1.014	0.743	-0.271
147	ELECTRONIC ARTS INC	ERTS	6/4/1997	2.060	1.570	-0.490
148	EVANS & SUTHERLAND CMP CORP	ESCC	9/19/1996	1.093	0.512	-0.581
149	ESCO TECHNOLOGIES INC	ESE	9/4/1996	0.640	0.155	-0.486
150	ESPEY MFG & ELECTRONICS CORP	ESP	3/8/1996	0.145	0.081	-0.064
151	EATON CORP	ETN	2/1/1999	0.911	0.607	-0.304
152	EXAR CORP	EXAR	12/8/1995	1.445	0.950	-0.494
153	VISX INC/DE	EYE	2/10/1997	1.603	1.145	-0.458
154	FAIRCHILD CORP -CL A	FA	12/27/1998	0.673	0.680	0.007
155	FURNITURE BRANDS INTL INC	FBN	5/27/1997	0.609	1.002	0.393
156	FALCON PRODUCTS INC	FCP	5/6/1999	0.196	0.048	-0.148
157	FOCUS ENHANCEMENTS INC	FCSE	9/2/1998	0.818	0.758	-0.060
158	FREQUENCY ELECTRONICS INC	FEI	11/9/1999	0.526	0.807	0.281
159	FRANKLIN ELECTRIC CO	FELE	10/19/1998	0.084	0.275	0.191
160	FLOW INTL CORP	FLOW	7/17/1996	1.014	0.452	-0.562
161	FLOWERVE CORP	FLS	11/18/1999	0.868	0.406	-0.462
162	FLEXSTEEL INDS	FLXS	11/4/1998	0.497	0.302	-0.194
163	FMC CORP	FMC	8/28/1997	0.637	0.590	-0.047
164	GILLETTE CO	G	9/12/1996	0.892	0.807	-0.085
165	LANGER INC	GAIT	12/7/1998	0.077	0.386	0.309
166	GREENBRIAR CORP	GBR	10/5/1998	-0.066	0.297	0.363
167	GEHL CO	GEHL	7/9/1999	0.716	0.534	-0.181
168	GLENAYRE TECHNOLOGIES INC	GEMS	9/25/1996	1.962	0.948	-1.014
169	GRIFFON CORP	GFF	2/6/1996	0.689	0.630	-0.059
170	GEORGIA GULF CORP	GGC	2/10/1998	0.833	0.588	-0.246
171	GRACO INC	GGG	5/18/1998	0.383	0.517	0.134
172	GRAHAM CORP	GHM	6/1/1998	0.492	0.421	-0.071
173	GREAT LAKES CHEMICAL CORP	GLK	5/3/1996	0.820	0.444	-0.376
174	CORNING INC	GLW	11/14/1999	0.826	1.024	0.199
175	GENERAL MOTORS CORP	GM	2/9/1998	1.237	0.884	-0.353
176	GTECH HOLDINGS CORP	GTK	3/30/1999	1.142	0.720	-0.422
177	GATEWAY INC	GTW	5/15/1997	1.990	1.374	-0.616
178	GENCORP INC	GY	1/7/1998	0.689	0.645	-0.044
179	HAEMONETICS CORP	HAE	1/25/1996	0.596	0.452	-0.143
180	HARMAN INTERNATIONAL INDS	HAR	6/16/1998	0.865	0.444	-0.421
181	HASBRO INC	HAS	9/25/1998	0.682	0.895	0.213
182	HILLENBRAND INDUSTRIES	HB	1/19/1998	0.710	0.621	-0.088

	Company	Ticker	M&A Date	Bb	Ba	Variance
183	HARLEY-DAVIDSON INC	HDI	3/9/1995	1.105	0.960	-0.145
184	HEICO CORP	HEI	6/1/1998	0.425	0.461	0.036
185	HEI INC	HEII	4/25/1997	0.660	0.580	-0.080
186	HELEN OF TROY CORP LTD	HELE	9/30/1999	0.418	0.867	0.450
187	HELIX TECHNOLOGY CORP	HELX	4/25/1996	1.612	1.184	-0.428
188	HON INDUSTRIES	HNI	11/12/1998	0.396	0.685	0.289
189	HOLLY CORP	HOC	4/10/1995	0.267	0.203	-0.064
190	HOLOGIC INC	HOLX	7/19/1996	1.463	0.567	-0.896
191	HONEYWELL INTERNATIONAL INC	HON	12/20/1999	1.101	0.991	-0.111
192	HEWLETT-PACKARD CO	HPQ	7/21/1998	1.691	1.219	-0.472
193	HERLEY INDUSTRIES INC/DE	HRLY	8/24/1998	0.571	0.622	0.051
194	HARRIS CORP	HRS	11/1/1999	1.069	0.856	-0.213
195	HARSCO CORP	HSC	3/4/1998	0.616	0.300	-0.316
196	HUFFY CORP	HUF	10/26/1998	0.308	0.285	-0.024
197	HURCO COMPANIES INC	HURC	3/3/1998	0.557	0.259	-0.298
198	HAVERTY FURNITURE	HVT	7/31/1998	0.751	0.458	-0.293
199	HEXCEL CORP	HXL	8/5/1998	0.853	0.977	0.124
200	INTL BUSINESS MACHINES CORP	IBM	10/26/1998	1.298	1.164	-0.134
201	ICO INC	ICOC	8/14/1995	0.665	0.526	-0.140
202	INTERDIGITAL COMMUN CORP	IDCC	9/8/1998	5.121	0.928	-4.192
203	IDEX CORP	IEX	10/20/1998	0.346	0.571	0.225
204	II-VI INC	IIVI	9/22/1999	0.890	0.371	-0.519
205	INTERMAGNETICS GENERAL CORP	IMGC	6/11/1998	1.181	0.767	-0.414
206	IMCO RECYCLING INC	IMR	9/4/1998	0.761	0.453	-0.308
207	INTERPHASE CORP	INPH	10/15/1998	1.032	0.783	-0.249
208	INTEL CORP	INTC	3/26/1998	1.704	1.449	-0.255
209	INTER-TEL INC -SER A	INTL	6/21/1998	1.587	1.179	-0.408
210	INTUIT INC	INTU	10/7/1999	1.950	2.024	0.074
211	INTERVOICE INC	INTV	4/27/1999	1.488	1.172	-0.316
212	INNOVEX INC	INVX	7/1/1999	2.016	1.432	-0.584
213	IOMEGA CORP	IOM	6/29/1998	2.592	0.814	-1.778
214	INGERSOLL-RAND CO LTD	IR	3/28/1995	1.252	0.927	-0.325
215	INTL REMOTE IMAGING SYSTEMS	IRI	7/24/1995	0.662	0.337	-0.325
216	INFORMATION RESOURCES INC	IRIC	11/3/1997	0.955	0.815	-0.139
217	ITRON INC	ITRI	5/6/1998	1.738	0.693	-1.045
218	ILLINOIS TOOL WORKS	ITW	9/9/1999	1.096	0.785	-0.311
219	INVACARE CORP	IVC	1/10/1997	0.610	0.677	0.067
220	JOHNSON CONTROLS INC	JCI	11/12/1998	0.950	0.687	-0.263
221	JDS UNIPHASE CORP	JDSU	11/4/1999	1.931	1.943	0.012
222	JLG INDUSTRIES INC	JLG	5/11/1999	1.603	0.680	-0.924
223	JMAR TECHNOLOGIES INC	JMAR	9/10/1998	0.637	0.288	-0.349
224	JOHNSON & JOHNSON	JNJ	7/21/1998	0.891	0.902	0.011
225	JUNO LIGHTING INC	JUNO	11/1/1995	0.623	0.354	-0.269
226	KIMBALL INTERNATIONAL -CL B	KBALB	8/10/1999	0.561	0.569	0.008
227	KAYDON CORP	KDN	12/18/1996	0.750	0.624	-0.125
228	KEITHLEY INSTR INC	KEI	12/28/1998	0.587	0.205	-0.382

	Company	Ticker	M&A Date	Bb	Ba	Variance
229	KEMET CORP	KEM	10/13/1998	1.496	0.738	-0.758
230	KLA-TENCOR CORP	KLAC	8/21/1997	2.493	1.997	-0.496
231	KENNAMETAL INC	KMT	10/10/1997	1.025	0.652	-0.373
232	KNAPE & VOGT MFG CO	KNAP	9/1/1998	0.387	0.196	-0.191
233	KOPIN CORP	KOPN	11/30/1995	1.513	1.129	-0.384
234	KOSS CORP	KOSS	7/23/1997	0.372	0.143	-0.229
235	KATY INDUSTRIES INC	KT	1/2/1996	0.502	0.259	-0.243
236	K-TRON INTERNATIONAL INC	KTII	7/10/1998	-0.069	0.091	0.160
237	KYOCERA CORP -ADR	KYO	8/24/1998	0.279	0.570	0.292
238	LAKELAND INDUSTRIES INC	LAKE	9/13/1999	-0.099	0.729	0.828
239	LIFETIME HOAN CORP	LCUT	12/9/1999	0.624	0.163	-0.460
240	LOWRANCE ELECTRONICS INC	LEIX	12/10/1997	0.921	0.584	-0.337
241	CONCORD CAMERA CORP	LENS	9/18/1998	1.549	0.713	-0.836
242	LITTELFUSE INC	LFUS	2/24/1995	0.527	0.444	-0.083
243	LYNCH CORP	LGL	9/10/1999	0.420	0.199	-0.221
244	LAZARE KAPLAN INTERNATIONAL	LKI	3/22/1999	0.428	0.328	-0.101
245	LINDSAY MANUFACTURING CO	LNN	2/13/1995	0.427	0.454	0.027
246	LANOPTICS LTD	LNOP	12/18/1996	1.004	0.616	-0.388
247	LAM RESEARCH CORP	LRCX	3/24/1997	2.606	1.782	-0.824
248	LATTICE SEMICONDUCTOR CORP	LSCC	6/12/1998	2.052	1.515	-0.536
249	LSI LOGIC CORP	LSI	7/28/1997	2.656	1.369	-1.287
250	LONE STAR TECHNOLOGIES	LSS	9/26/1996	0.609	0.646	0.037
251	LTX CORP	LTX	6/26/1996	2.288	1.364	-0.923
252	LUFKIN INDUSTRIES INC	LUFK	8/6/1998	0.301	0.443	0.142
253	LUXOTTICA GROUP SPA -ADR	LUX	3/2/1995	0.452	0.644	0.192
254	LA-Z-BOY INC	LZB	9/28/1999	0.485	0.527	0.041
255	MACROMEDIA INC	MACR	7/31/1997	2.498	1.551	-0.947
256	MICHAEL ANTHONY JEWELERS INC	MAJ	10/8/1996	0.494	0.135	-0.359
257	MAPICS INC	MAPX	2/10/1999	0.904	0.673	-0.231
258	MASCO CORP	MAS	11/12/1998	0.963	0.802	-0.161
259	MAXCO INC	MAXC	7/31/1996	0.658	0.148	-0.510
260	MESTEK INC	MCC	12/17/1999	0.095	0.118	0.023
261	MICROCHIP TECHNOLOGY INC	MCHP	5/18/1998	2.353	1.427	-0.926
262	MEDTRONIC INC	MDT	11/2/1998	1.140	1.058	-0.082
263	MEDSTONE INTERNATIONAL INC	MEDS	3/29/1996	1.299	0.527	-0.772
264	METHODE ELECTRONICS -CL A	METHA	1/18/1996	1.043	0.670	-0.373
265	MICROWAVE FILTER CO INC	MFCO	11/6/1998	0.289	0.606	0.317
266	MAGNA INTERNATIONAL -CL A	MGA	8/7/1996	1.112	0.535	-0.577
267	MIDDLEBY CORP	MIDD	11/2/1998	0.823	0.518	-0.305
268	MILLIPORE CORP	MIL	12/16/1996	0.860	0.793	-0.068
269	MILLER (HERMAN) INC	MLHR	3/31/1998	0.410	0.893	0.482
270	MUELLER INDUSTRIES	MLI	10/19/1999	1.078	0.971	-0.107
271	MENTOR CORP	MNTR	3/1/1999	1.018	0.760	-0.258
272	MOLEX INC	MOLX	8/4/1997	0.895	0.948	0.053
273	MOVADO GROUP INC	MOV	3/31/1998	0.116	0.836	0.720
274	MET-PRO CORP	MPR	6/4/1998	0.424	0.310	-0.114

	Company	Ticker	M&A Date	Bb	Ba	Variance
275	MERRIMAC INDUSTRIES INC	MRM	12/26/1995	0.660	0.140	-0.520
276	MRV COMMUNICATIONS INC	MRVC	9/26/1996	2.430	1.748	-0.682
277	MINE SAFETY APPLIANCES CO	MSA	12/19/1996	0.103	0.332	0.229
278	MATERIAL SCIENCES CORP	MSC	12/20/1996	0.521	0.299	-0.222
279	MICROSEMI CORP	MSCC	1/21/1998	1.390	0.755	-0.635
280	MICROSOFT CORP	MSFT	5/5/1999	1.633	1.336	-0.298
281	MISONIX INC	MSON	1/13/1999	0.544	0.857	0.313
282	MATRIX SERVICE CO	MTRX	3/3/1999	0.626	0.335	-0.292
283	MARLTON TECHNOLOGIES	MTY	9/3/1998	0.341	0.360	0.019
284	M-WAVE INC	MWAV	8/3/1999	0.873	0.391	-0.483
285	MAXIM INTEGRATED PRODUCTS	MXIM	6/28/1996	2.286	1.895	-0.391
286	MAXXAM INC	MXM	10/17/1997	1.015	0.458	-0.557
287	MAXWELL TECHNOLOGIES INC	MXWL	1/5/1998	0.814	0.587	-0.227
288	MAYTAG CORP	MYG	2/11/1999	0.826	0.580	-0.246
289	INCO LTD	N	3/27/1996	0.939	0.850	-0.090
290	NAVISTAR INTERNATIONL	NAV	10/27/1999	1.146	1.367	0.222
291	NACCO INDUSTRIES -CL A	NC	11/18/1996	0.833	0.815	-0.017
292	NCI BUILDING SYSTEMS INC	NCS	11/15/1999	0.841	0.650	-0.190
293	NORDSON CORP	NDSN	7/24/1995	0.362	0.372	0.009
294	NEWPORT CORP	NEWP	3/9/1998	0.694	0.504	-0.190
295	NEC CORP -ADR	NIPNY	4/13/1995	0.355	0.592	0.237
296	NORTHROP GRUMMAN CORP	NOC	5/5/1997	0.814	0.501	-0.313
297	MICRONETICS INC	NOIZ	3/17/1999	1.562	0.146	-1.416
298	NOVITRON INTL INC	NOVI	11/5/1998	0.221	0.011	-0.210
299	NOVELL INC	NOVL	10/30/1995	1.651	1.570	-0.081
300	NISSAN MOTOR CO LTD -SP ADR	NSANY	1/31/1997	0.246	0.679	0.433
301	NATIONAL SEMICONDUCTOR CORP	NSM	7/28/1997	1.855	1.269	-0.586
302	NS GROUP INC	NSS	1/26/1995	1.135	0.927	-0.208
303	NORTEL NETWORKS CORP	NT	10/18/1999	1.387	1.572	0.185
304	NORTHERN TECH INTL	NTI	12/21/1995	0.450	0.257	-0.193
305	NUCOR CORP	NUE	7/29/1998	0.998	0.759	-0.239
306	NATIONAL R V HOLDINGS INC	NVH	7/25/1996	0.915	0.704	-0.210
307	NOVELLUS SYSTEMS INC	NVLS	1/11/1996	1.849	1.890	0.040
308	QUANEX CORP	NX	12/9/1999	0.780	0.478	-0.302
309	ONEIDA LTD	OCQ	7/6/1999	0.568	0.381	-0.186
310	ORTHOFIX INTERNATIONAL N V	OFIX	5/8/1995	0.823	0.397	-0.426
311	O I CORP	OICO	7/1/1998	0.170	0.089	-0.081
312	OM GROUP INC	OMG	12/22/1997	0.502	0.501	-0.001
313	OPTI INC	OPTI	6/3/1998	1.800	0.716	-1.084
314	ORBITAL SCIENCES CORP	ORB	7/31/1995	1.063	1.328	0.265
315	ORBOTECH LTD	ORBK	9/1/1998	0.668	1.531	0.863
316	ORBIT INTERNATIONAL CP	ORBT	9/1/1998	0.231	0.243	0.012
317	ORACLE CORP	ORCL	4/14/1999	2.173	1.604	-0.569
318	OSHKOSH TRUCK CORP	OSK	7/25/1995	0.328	0.306	-0.022
319	OCCIDENTAL PETROLEUM CORP	OXY	10/6/1997	0.775	0.528	-0.247
320	PRECISION CASTPARTS CORP	PCP	5/17/1999	0.771	0.665	-0.106

	Company	Ticker	M&A Date	Bb	Ba	Variance
321	PARKER-HANNIFIN CORP	PH	7/14/1998	0.945	0.656	-0.289
322	POLARIS INDS INC	PII	5/21/1998	0.646	0.678	0.033
323	PARKER DRILLING CO	PKD	10/29/1998	1.088	0.902	-0.186
324	PARK ELECTROCHEMICAL CORP	PKE	5/8/1996	0.889	0.580	-0.309
325	PERKINELMER INC	PKI	8/25/1997	0.924	0.694	-0.230
326	PARK OHIO HOLDINGS CORP	PKOH	9/3/1996	0.876	0.485	-0.391
327	PHOTRONICS INC	PLAB	9/15/1999	1.928	1.760	-0.168
328	PALL CORP	PLL	10/10/1996	1.132	0.494	-0.638
329	PLANAR SYSTEMS INC	PLNR	5/13/1998	0.736	0.742	0.006
330	PLEXUS CORP	PLXS	3/16/1999	0.417	1.089	0.672
331	PARAMETRIC TECHNOLOGY CORP	PMTI	11/4/1997	2.428	1.599	-0.829
332	PALOMAR MED TECHNOLOGIES INC	PMTI	5/4/1999	0.597	0.573	-0.024
333	PENTAIR INC	PNR	4/29/1999	0.545	0.562	0.017
334	POWELL INDUSTRIES INC	POWL	12/28/1999	0.223	-0.065	-0.288
335	PPT VISION INC	PPTV	9/16/1998	0.867	0.511	-0.356
336	PROGRESS SOFTWARE CORP	PRGS	9/17/1997	1.242	0.774	-0.468
337	PEOPLESOFT INC	PSFT	10/11/1999	2.459	1.584	-0.875
338	PAR TECHNOLOGY CORP	PTC	11/1/1999	0.686	0.284	-0.402
339	PHOENIX TECHNOLOGIES LTD	PTEC	4/16/1998	1.397	0.949	-0.448
340	PRINTRONIX INC	PTNX	5/15/1998	1.255	0.451	-0.804
341	ROYAL APPLIANCE MFG CO	RAM	10/20/1998	0.882	1.075	0.193
342	RAVEN INDUSTRIES INC	RAVN	11/24/1997	0.109	0.047	-0.061
343	ROBBINS & MYERS INC	RBN	6/25/1998	0.242	0.344	0.101
344	RELIABILITY INC	REAL	3/12/1997	1.684	1.195	-0.489
345	RPC INC	RES	3/9/1998	0.362	0.182	-0.180
346	ROANOKE ELECTRIC STEEL CORP	RESC	7/22/1998	0.127	0.351	0.225
347	RESPIRONICS INC	RESP	11/11/1997	0.830	0.575	-0.255
348	RAINBOW TECHNOLOGIES INC	RNBO	4/18/1996	0.969	0.802	-0.166
349	ROCHESTER MEDICAL CORP	ROCM	12/6/1999	0.562	0.243	-0.319
350	ROGERS CORP	ROG	8/19/1999	0.619	0.368	-0.251
351	ROPER INDUSTRIES INC/DE	ROP	8/18/1998	0.630	0.524	-0.106
352	ROWE COMPANIES	ROW	11/5/1997	1.200	0.402	-0.798
353	RPM INTERNATIONAL INC	RPM	1/22/1999	0.447	0.432	-0.015
354	RTI INTL METALS INC	RTI	11/8/1999	0.749	0.671	-0.078
355	RAYTHEON CO	RTN	4/3/1995	0.690	0.589	-0.101
356	RUSS BERRIE & CO INC	RUS	1/28/1999	0.409	0.809	0.400
357	GRUPO CASA SABA -SPON ADR	SAB	4/2/1997	1.204	0.438	-0.766
358	INVIVO CORP	SAFE	12/17/1999	0.785	0.762	-0.024
359	SATCON TECHNOLOGY CORP	SATC	7/29/1998	0.808	0.611	-0.196
360	SYMBOL TECHNOLOGIES	SBL	4/21/1998	1.294	1.029	-0.265
361	SBS TECHNOLOGIES INC	SBSE	10/16/1998	1.127	0.851	-0.276
362	SCHNITZER STEEL INDS -CL A	SCHN	9/16/1996	0.581	0.640	0.059
363	SCITEX CORP LTD -ORD	SCIX	5/6/1998	0.891	0.801	-0.090
364	SCIENTIFIC-ATLANTA INC	SFA	10/6/1995	1.933	1.334	-0.599
365	SALTON INC	SFP	8/30/1999	1.283	0.954	-0.329
366	SILICON GRAPHICS INC	SGI	2/23/1996	1.746	1.241	-0.504

	Company	Ticker	M&A Date	Bb	Ba	Variance
367	SCIENTIFIC GAMES CORP	SGMS	5/19/1997	1.370	0.752	-0.618
368	SHAW GROUP INC	SGR	11/19/1998	0.916	0.553	-0.363
369	SKF AB -ADR	SKFR	2/26/1997	0.594	0.554	-0.041
370	SKYLINE CORP	SKY	11/16/1998	0.819	0.355	-0.464
371	SARA LEE CORP	SLE	9/15/1997	0.966	0.610	-0.355
372	SOLETRON CORP	SLR	9/13/1999	1.913	1.369	-0.544
373	SELAS CORP OF AMERICA	SLS	3/9/1999	0.554	0.248	-0.305
374	STANDARD MOTOR PRODS	SMP	10/22/1999	0.687	0.349	-0.338
375	STANDARD MICROSYSTEMS CORP	SMSC	10/8/1998	1.554	0.835	-0.718
376	SEMTECH CORP	SMTC	2/2/1999	1.840	1.440	-0.399
377	SNAP-ON INC	SNA	2/1/1995	0.719	0.592	-0.127
378	SAND TECHNOLOGY INC -CL A	SNDT	5/2/1997	1.584	0.990	-0.594
379	SYNOPSIS INC	SNPS	10/15/1997	1.855	1.367	-0.489
380	SPAN-AMERICA MEDICAL SYS INC	SPAN	7/23/1997	-0.121	0.245	0.366
381	SPARTAN MOTORS INC	SPAR	7/17/1995	0.763	0.404	-0.359
382	SPECTRUM CONTROL INC	SPEC	9/30/1998	0.820	0.271	-0.549
383	SPX CORP	SPW	7/20/1998	0.622	0.512	-0.110
384	STANDARD REGISTER CO	SR	4/13/1999	0.535	0.316	-0.219
385	SPECTRUM SIGNAL PROCESSING	SSPI	5/2/1997	1.437	1.176	-0.261
386	SPS TECHNOLOGIES INC	ST	7/20/1999	0.399	0.570	0.172
387	STERIS CORP	STE	12/18/1995	1.688	1.157	-0.531
388	SCIENTIFIC TECHNOLOGIES INC	STIZ	5/29/1996	0.792	0.645	-0.147
389	ST JUDE MEDICAL INC	STJ	10/23/1996	1.020	0.703	-0.318
390	STORAGE TECHNOLOGY CP	STK	10/23/1997	1.564	1.326	-0.238
391	STANLEY FURNITURE CO INC	STLY	6/24/1997	0.305	0.440	0.135
392	SUPREME INDS INC	STS	4/12/1999	0.540	0.468	-0.071
393	STEEL TECHNOLOGIES	STTX	9/30/1998	1.000	0.360	-0.640
394	SUMMA INDUSTRIES INC	SUMX	2/14/1997	1.433	0.224	-1.208
395	SUN MICROSYSTEMS INC	SUNW	8/23/1999	2.481	1.668	-0.813
396	SUPERIOR INDUSTRIES INTL	SUP	10/29/1997	0.994	0.665	-0.330
397	STEWART & STEVENSON SERVICES	SVC	9/22/1997	0.965	0.726	-0.239
398	STANLEY WORKS	SWK	4/23/1998	0.952	0.728	-0.224
399	STANDEX INTERNATIONAL CORP	SXI	10/28/1997	0.283	0.332	0.049
400	STRYKER CORP	SYK	4/24/1996	1.309	0.836	-0.473
401	SYMANTEC CORP	SYMC	7/5/1995	2.297	1.252	-1.045
402	SYMMETRICOM INC	SYMM	10/28/1999	1.254	1.143	-0.112
403	SYNALLOY CORP	SYNC	8/1/1996	0.689	0.448	-0.242
404	TANDY BRANDS ACCESSORIES INC	TBAC	1/3/1995	0.588	0.471	-0.118
405	TECUMSEH PRODUCTS CO -CL A	TECUA	11/26/1997	0.365	0.339	-0.026
406	TEKTRONIX INC	TEK	3/19/1998	1.651	0.935	-0.716
407	TERADYNE INC	TER	9/6/1995	2.098	1.930	-0.168
408	THREE-FIVE SYSTEMS INC	TFS	8/21/1998	1.496	0.549	-0.946
409	TELEFLEX INC	TFX	6/10/1999	0.586	0.542	-0.044
410	THOR INDUSTRIES INC	THO	10/16/1996	0.842	0.279	-0.563
411	THOMAS INDUSTRIES INC	TII	12/14/1999	0.541	0.358	-0.183
412	TIMKEN CO	TKR	4/21/1998	0.783	0.802	0.019



	Company	Ticker	M&A Date	Bb	Ba	Variance
413	TELLABS INC	TLAB	6/3/1998	2.367	1.792	-0.575
414	TOYOTA MOTOR CORP -ADR	TM	3/28/1996	0.145	0.524	0.379
415	THERMO ELECTRON CORP	TMO	8/21/1998	1.140	0.961	-0.179
416	THOMAS & BETTS CORP	TNB	1/27/1999	0.717	0.669	-0.048
417	TENNANT CO	TNC	2/26/1998	0.243	0.195	-0.048
418	TECHNITROL INC	TNL	3/23/1995	0.787	1.017	0.230
419	TECHNOLOGY RESEARCH CORP	TRCI	12/9/1999	0.797	0.299	-0.498
420	TRIDENT MICROSYSTEMS INC	TRID	4/22/1998	1.535	0.832	-0.703
421	TRIMBLE NAVIGATION LTD	TRMB	8/12/1998	1.235	0.825	-0.411
422	TRINITY INDUSTRIES	TRN	9/10/1998	0.734	0.505	-0.228
423	TRANS-INDUSTRIES INC	TRNI	11/7/1995	0.178	0.755	0.577
424	TSR INC	TSRI	10/28/1998	1.277	0.939	-0.337
425	TRANSTECHNOLOGY CORP	TT	9/13/1996	0.645	0.261	-0.385
426	TORO CO	TTC	11/30/1998	0.534	0.396	-0.138
427	TETRA TECHNOLOGIES INC/DE	TTI	8/3/1998	0.805	0.380	-0.425
428	TEXAS INDUSTRIES INC	TXI	5/22/1997	0.635	0.780	0.145
429	TEXAS INSTRUMENTS INC	TXN	7/23/1999	1.957	1.671	-0.286
430	TEXTRON INC	TXT	8/23/1999	0.848	0.882	0.035
431	TYCO INTERNATIONAL LTD	TYC	11/23/1998	0.991	1.055	0.064
432	TYLER TECHNOLOGIES INC	TYL	8/18/1999	0.597	1.436	0.839
433	UNIVERSAL ELECTRONICS INC	UEIC	9/12/1996	0.686	0.812	0.126
434	UNITED HERITAGE CORP	UHCP	9/29/1995	1.249	0.146	-1.102
435	UNITED INDUSTRIAL CORP	UIC	8/31/1998	0.482	0.409	-0.073
436	UNISYS CORP	UIS	6/15/1999	1.172	1.380	0.208
437	ULTRALIFE BATTERIES INC	ULBI	3/15/1996	0.856	0.763	-0.092
438	UTAH MEDICAL PRODUCTS INC	UTMD	1/25/1996	0.467	0.400	-0.068
439	UNITED TECHNOLOGIES CORP	UTX	2/22/1999	1.071	0.925	-0.145
440	VICOR CORP	VICR	11/14/1997	1.590	0.920	-0.670
441	VIRCO MANUFACTURING	VIR	4/24/1998	0.474	0.489	0.015
442	VITAL SIGNS INC	VITL	10/8/1998	0.597	0.590	-0.007
443	VALLEY FORGE SCIENTIFIC CORP	VLFG	5/12/1999	0.972	0.691	-0.282
444	VALMONT INDUSTRIES	VMI	6/18/1998	0.558	0.397	-0.161
445	VOLVO AB SWE -ADR	VOLVY	8/6/1999	0.940	0.830	-0.110
446	VARCO INTERNATIONAL INC	VRC	3/22/1995	0.879	1.319	0.440
447	VERITAS SOFTWARE CO	VRTS	1/13/1997	1.615	1.924	0.309
448	VISHAY INTRTECHNOLOGY	VSH	6/26/1996	1.472	0.923	-0.549
449	VULCAN INTL CORP	VUL	5/1/1997	0.121	0.106	-0.015
450	WESTERN DIGITAL CORP	WDC	3/27/1997	2.176	1.145	-1.031
451	WEATHERFORD INTL LTD	WFT	5/21/1999	0.586	1.022	0.436
452	WEGENER CORP	WGNR	1/28/1998	0.923	0.568	-0.355
453	WINNEBAGO INDUSTRIES	WGO	12/29/1997	0.716	0.423	-0.293
454	WHIRLPOOL CORP	WHR	3/1/1999	0.933	0.650	-0.283
455	WHX CORP	WHX	1/23/1998	0.829	0.492	-0.337
456	ENCORE WIRE CORP	WIRE	3/24/1995	0.540	0.595	0.054
457	WOLVERINE TUBE INC	WLV	9/22/1998	0.802	0.471	-0.330
458	WMS INDUSTRIES INC	WMS	4/18/1995	1.224	1.085	-0.138

	Company	Ticker	M&A Date	Bb	Ba	Variance
459	WABASH NATIONAL CORP	WNC	12/10/1999	0.842	0.781	-0.061
460	WORTHINGTON INDUSTRIES	WOR	9/11/1998	0.988	0.618	-0.370
461	WEST PHARMACEUTICAL SVSC INC	WST	3/10/1999	0.337	0.125	-0.213
462	WESTERBEKE CORP	WTBK	7/1/1997	0.091	-0.064	-0.155
463	WATTS INDUSTRIES -CL A	WTS	4/16/1996	0.509	0.501	-0.008
464	WIRELESS TELECOM GROUP INC	WTT	4/29/1997	2.197	0.829	-1.368
465	XILINX INC	XLNX	4/23/1998	2.255	1.832	-0.423
466	DENTSPLY INTERNATL INC	XRAY	12/11/1996	0.781	0.445	-0.336
467	X-RITE INC	XRIT	1/21/1998	0.658	0.683	0.025
468	XEROX CORP	XRX	2/6/1996	1.065	1.091	0.025
469	YORK INTL	YRK	2/18/1997	0.707	0.523	-0.184
470	ZEBRA TECHNOLOGIES CP -CL A	ZBRA	7/9/1998	1.590	0.914	-0.675
471	ZYGO CORP	ZIGO	4/9/1996	1.250	1.164	-0.086
472	ZOLTEK COS INC	ZOLT	2/4/1999	1.189	1.026	-0.163
473	ZOOM TECHNOLOGIES INC	ZOOM	7/24/1996	1.823	0.836	-0.987

## APPENDIX B

## VARIABLES VARIANCE SUMMARY

	Acquirer	Ticker	M&A Date	SIC	BETA	TA	BVPS
1	ALCOA INC	AA	8/11/1999	3350	-0.28	15291.00	5.41
2	AAON INC	AAON	9/14/1999	3585	-0.09	38.66	2.42
3	APPLE COMPUTER INC	AAPL	7/14/1999	3571	0.06	1745.33	5.57
4	ARCTIC CAT INC	ACAT	4/2/1998	3790	-0.29	38.37	1.42
5	ACTEL CORP	ACTL	9/1/1998	3674	-1.29	152.63	5.52
6	ADC TELECOMMUNICATIONS INC	ADCT	9/16/1998	3661	-0.43	1945.53	1.55
7	ANALOG DEVICES	ADI	10/8/1998	3674	-0.78	2411.12	3.55
8	ADVANCED DIGITAL INFO CORP	ADIC	9/9/1998	3572	-0.50	369.86	-277.02
9	AUTODESK INC	ADSK	8/21/1998	7372	-0.34	347.96	1.09
10	AES CORP. (THE)	AES	11/20/1998	4991	-0.15	24599.33	6.12
11	AGCO CORP	AG	12/18/1997	3523	-0.65	341.69	3.08
12	APPLIED INNOVATION INC	AINN	10/23/1998	3661	-0.60	27.41	1.12
13	AAR CORP	AIR	10/14/1999	5080	-0.22	63.77	0.31
14	ACCLAIM ENMNT INC	AKLM	3/7/1995	7372	-0.91	-46.20	-2.89
15	ALCAN INC	AL	8/11/1999	3350	-0.39	8244.00	5.14
16	ALCATEL -ADS	ALA	3/2/1999	3661	0.60	-6791.22	-2.36
17	ALDILA INC	ALDA	10/26/1995	3949	-0.57	15.62	7.08
18	ALAMO GROUP INC	ALG	5/29/1997	3523	0.07	21.08	2.56
19	AMERICAN LOCKER GROUP INC	ALGI	8/11/1997	2540	0.90	5.29	3.34
20	ALLEN TELECOM INC	ALN	6/3/1997	3663	-0.33	86.08	0.39
21	ASTRO-MED INC	ALOT	3/26/1998	3829	-0.25	-1.20	0.21
22	ALTERA CORP	ALTR	7/15/1996	3674	-0.68	800.09	1.67
23	APPLIED MATERIALS INC	AMAT	11/26/1996	3559	-0.75	3639.59	1.51
24	AMERICAN TECH CERAMICS CORP	AMK	9/4/1998	3670	-0.47	26.06	2.57
25	AMERON INTERNATIONAL CORP	AMN	9/1/1998	3270	-0.85	68.74	5.99
26	AMERICAN SOFTWARE -CL A	AMSWA	12/18/1997	7372	0.10	2.26	-0.31
27	AMERICAN MANAGEMENT SYSTEMS	AMSY	9/21/1999	7370	-0.15	161.80	3.33
28	AMX CORP	AMXC	3/31/1999	3669	0.86	12.36	-0.17
29	ANDERSEN GROUP INC	ANDR	6/5/1995	6799	0.20	-8.35	1.67
30	ANDREW CORP	ANDW	5/14/1997	3357	-0.64	209.59	2.13
31	SMITH (A O) CORP	AOS	8/5/1997	3621	-0.11	68.28	6.44
32	AMERICAN PWR CNVRSION	APCC	9/10/1999	3620	-0.95	775.06	3.40
33	ARROW INTERNATIONAL	ARRO	3/23/1998	3841	-0.35	92.90	3.86
34	AEROFLEX INC	ARXX	11/2/1999	3674	0.25	197.04	2.41
35	ASA INTL LTD	ASAA	8/6/1998	7373	-0.22	3.08	1.33
36	ASTEC INDUSTRIES INC	ASTE	8/4/1997	3531	0.40	176.24	3.87
37	ALLIANT TECHSYSTEMS INC	ATK	11/5/1998	3760	-0.25	345.83	3.50
38	ATMEL CORP	ATML	1/11/1996	3674	-0.95	1346.08	0.96
39	ACTION PERFORMANCE COS INC	ATN	12/16/1999	5090	0.26	131.29	3.83
40	ATRION CORP	ATRI	11/16/1999	4923	0.41	1.39	8.99
41	ARTESYN TECHNOLOGIES INC	ATSN	7/27/1998	3679	-0.41	223.61	2.46
42	AXSYS TECHNOLOGIES INC	AXYS	8/10/1998	3640	0.02	7.79	4.09
43	BARNES GROUP INC	B	10/15/1999	3490	0.05	236.38	2.08
44	BOEING CO	BA	12/17/1996	3721	-0.07	15610.67	-0.74
45	BOMBAY CO INC	BBA	6/17/1998	5712	-0.08	11.30	0.55
46	BLACK BOX CORP	BBOX	3/31/1999	7370	-0.12	441.90	15.58
47	BUTLER MFG CO	BBR	6/24/1997	3448	-0.20	118.77	9.83
48	BRUNSWICK CORP	BC	10/13/1997	3510	-0.50	939.20	2.76
49	BARD (C.R.) INC	BCR	5/24/1995	3841	-0.04	407.37	2.70
50	BLACK & DECKER CORP	BDK	1/27/1998	3540	-0.29	-1314.30	-7.91
51	BECTON DICKINSON & CO	BDX	10/14/1998	3841	-0.03	1591.61	2.42
52	BALDOR ELECTRIC	BEZ	8/7/1995	3621	-0.04	120.09	2.04
53	BRIGGS & STRATTON	BGG	4/16/1997	3510	-0.15	61.84	0.48
54	BERGER HOLDINGS LTD	BGRH	5/19/1999	3444	-0.48	13.72	0.71
55	BAKER-HUGHES INC	BHI	5/11/1998	3533	0.13	2982.81	-3.13
56	BELL INDUSTRIES INC	BI	8/31/1995	7373	0.05	130.59	2.96
57	BIO-RAD LABORATORIES INC	BIO	2/17/1998	3826	-0.47	359.09	2.85
58	BALDWIN TECHNOLOGY -CL A	BLD	11/13/1998	3555	-0.43	-45.32	-0.91
59	BALL CORP	BLL	4/23/1997	3411	0.13	1054.53	0.85
60	BLOUNT INTL INC	BLT	10/21/1996	3420	0.10	146.04	-3.23
61	BMC SOFTWARE INC	BMC	11/2/1998	7372	-0.37	1990.44	4.18
62	BIOMET INC	BMET	1/29/1997	3842	0.15	669.94	1.63

	Acquirer	Ticker	M&A Date	SIC	BETA	TA	BVPS
63	BADGER METER INC	BMI	8/16/1996	3824	0.25	34.06	4.14
64	BMC INDUSTRIES INC/MN	BMM	4/7/1997	3470	-0.18	200.95	0.97
65	BAUSCH & LOMB INC	BOL	2/1/1999	2834	-0.04	39.73	3.61
66	INTERPORE INTERNATIONAL	BONZ	2/12/1998	3842	0.19	28.59	0.25
67	BORLAND SOFTWARE CORP	BORL	11/17/1997	7372	-1.02	71.47	-0.81
68	BOSTON ACOUSTICS INC	BOSA	5/17/1996	3651	-0.18	11.40	0.95
69	BRADY CORP	BRC	12/9/1999	3990	0.54	115.27	3.87
70	BROOKTROUT INC	BRKT	10/1/1999	3661	-0.03	33.82	1.88
71	BUSH INDUSTRIES -CL A	BSH	2/18/1998	2511	-0.52	172.82	3.45
72	BOSTON SCIENTIFIC CORP	BSX	1/20/1997	3841	-0.28	2624.16	1.53
73	BTU INTERNATIONAL INC	BTUI	8/10/1999	3559	-1.42	1.58	0.66
74	BVR TECHNOLOGIES LTD	BVRT	1/14/1999	3690	-0.30	-18.52	-0.04
75	BELDEN INC	BWC	6/11/1998	3357	-0.41	350.45	4.65
76	BAYOU STEEL CORP -CL A	BYX	2/17/1998	3312	-0.08	35.33	1.21
77	CASCADE CORP	CAE	8/14/1998	3537	-0.02	46.78	1.52
78	CONAGRA FOODS INC	CAG	2/13/1995	2000	-0.11	1204.83	1.10
79	CATALINA LIGHTING INC	CALA	12/2/1998	3640	-0.46	20.62	-3.09
80	CATERPILLAR INC	CAT	10/16/1998	3531	-0.47	9814.00	5.28
81	BRILLIANCE CHINA AUTO -ADR	CBA	4/26/1998	3711	-0.06	922.97	10.08
82	COOPER INDUSTRIES LTD	CBE	9/4/1998	3640	-0.32	-1507.57	1.87
83	C-COR.NET CORP	CCBL	9/4/1997	3663	-0.17	75.55	1.93
84	CONCURRENT COMPUTER CP	CCUR	11/6/1995	3571	-0.30	-82.81	-4.67
85	CADENCE DESIGN SYS INC	CDN	11/20/1997	7372	-0.86	963.62	2.48
86	CABLE DESIGN TECH CP -CL A	CDT	12/1/1998	3357	-0.39	309.41	3.70
87	CECO ENVIRONMENTAL CORP	CECE	8/9/1999	3564	0.01	38.99	0.14
88	COGNITRONICS CORP	CGN	12/15/1998	3661	0.07	13.67	2.36
89	COGNEX CORP	CGNX	6/8/1998	3823	-0.37	177.53	3.41
90	CHECKPOINT SYSTEMS INC	CKP	8/11/1999	3669	-0.64	252.43	-1.16
91	CLARCOR INC	CLC	9/24/1996	3564	-0.13	159.89	2.58
92	CLEVELAND-CLIFFS INC	CLF	1/10/1995	1000	-0.04	130.80	12.12
93	CANDELA CORP	CLZR	12/15/1999	3845	-0.31	49.43	3.26
94	COLORADO MEDTECH INC	CMED	9/8/1998	3845	-0.09	32.45	1.66
95	COMPUTER NETWORK TECH CORP	CMNT	3/10/1997	3576	-0.28	80.89	1.80
96	CREDENCE SYSTEMS CORP	CMOS	8/18/1998	3825	-0.43	403.10	5.56
97	COMVERSE TECHNOLOGY INC	CMVT	8/21/1997	3661	-0.08	1403.00	2.75
98	CONMED CORP	CNMD	5/6/1997	3845	-0.11	539.64	4.16
99	CNS INC	CNXS	10/20/1998	3842	-1.09	-12.65	-0.39
100	COACHMEN INDUSTRIES INC	COA	10/23/1998	3716	-0.05	78.00	4.57
101	COBRA ELECTRS CORP	COBR	8/25/1998	3663	-0.67	28.71	4.51
102	COGNOS INC	COGN	10/7/1998	7372	-0.87	282.96	1.80
103	COLLINS INDUSTRIES INC	COLL	8/28/1996	3713	-0.81	0.56	1.59
104	3COM CORP	COMS	7/27/1995	7373	-0.73	3063.53	5.89
105	COREL CORP	CORL	1/12/1996	7372	-0.62	-29.75	-2.47
106	CPAC INC	CPAK	4/7/1997	2842	0.15	15.75	3.41
107	COMPUWARE CORP	CPWR	3/15/1999	7372	-0.17	963.76	1.39
108	CRANE CO	CR	12/15/1998	3490	-0.10	112.75	3.31
109	CROWN ANDERSEN INC	CRAN	8/27/1996	3564	-0.04	0.41	0.99
110	CHROMCRAFT REVINGTON INC	CRC	10/10/1996	2511	0.00	64.86	4.41
111	CREATIVE TECHNOLOGY LTD	CREAF	11/22/1998	3577	0.27	195.57	3.06
112	CARPENTER TECHNOLOGY	CRS	9/25/1997	3312	-0.16	859.65	12.37
113	CISCO SYSTEMS INC	CSCO	4/22/1996	3576	-0.60	8562.50	1.02
114	CSP INC	CSPI	10/9/1998	7373	0.08	4.23	0.16
115	COMSHARE INC	CSRE	9/9/1998	7372	-0.64	-25.14	-0.89
116	CTS CORP	CTS	5/12/1997	3670	0.50	268.48	1.73
117	CUBIC CORP	CUB	5/12/1997	3812	0.12	30.50	0.64
118	CUMMINS INC	CUM	1/3/1997	3510	-0.23	1535.90	5.67
119	CYPRESS SEMICONDUCTOR CORP	CY	9/1/1998	3674	-1.18	954.79	1.61
120	CYBEROPTICS CORP	CYBE	6/24/1996	3827	-0.47	31.21	3.87
121	DATA I/O CORP	DAIO	5/13/1997	3825	-0.89	-9.57	-0.92
122	DIEBOLD INC	DBD	10/23/1995	3578	0.07	341.51	3.11
123	DONALDSON CO INC	DCI	1/16/1998	3564	0.16	222.19	1.83
124	DANA CORP	DCN	5/4/1998	3714	-0.37	4531.07	2.52

	Acquirer	Ticker	M&A Date	SIC	BETA	TA	BVPS
125	DUCOMMUN INC	DCO	1/28/1999	3728	-0.20	82.26	4.79
126	DU PONT (E I) DE NEMOURS	DD	9/28/1998	2820	-0.18	760.33	4.14
127	DEERE & CO	DE	12/3/1997	3523	-0.54	4922.60	5.98
128	DELL INC	DELL	7/17/1998	3571	-0.23	9677.33	1.60
129	DIGI INTERNATIONAL INC	DGII	3/27/1995	3576	-0.38	61.04	2.25
130	DANAHER CORP	DHR	4/27/1998	3823	0.01	2256.15	7.19
131	DIONEX CORP	DNEX	7/30/1996	3823	-0.07	-3.68	0.14
132	DOVER CORP	DOV	5/12/1999	3559	-0.27	1344.51	4.45
133	DATARAM CORP	DRAM	6/15/1999	3572	-0.69	17.89	1.10
134	DRS TECHNOLOGIES INC	DRS	4/8/1998	3812	-0.03	299.24	5.02
135	DATASCOPE CORP	DSCP	9/14/1999	3845	-0.27	65.26	4.17
136	DATA SYSTEMS & SOFTWARE INC	DSSI	3/26/1999	5045	-0.53	-52.69	-5.25
137	DREW INDUSTRIES INC	DW	10/21/1999	3442	0.05	40.55	3.02
138	DIXON TICONDEROGA CO	DXT	3/24/1999	3950	0.11	0.20	2.06
139	ENGINEERED SUPPORT SYSTEMS	EASI	3/30/1995	3585	0.02	25.77	1.31
140	ENGELHARD CORP	EC	3/2/1999	2810	-0.20	411.85	1.87
141	ELECTROGLAS INC	EGLS	3/14/1996	3559	-0.72	79.98	3.14
142	EASTMAN KODAK CO	EK	4/16/1996	3861	-0.49	-2507.33	-0.68
143	ELECTROLUX AB -ADR	ELUX	1/10/1996	3630	0.39	-1095.72	1.18
144	CALLAWAY GOLF CO	ELY	4/2/1997	3949	-0.92	313.84	2.87
145	EMC CORP/MA	EMC	8/9/1999	3572	-0.12	6585.40	2.25
146	EMERSON ELECTRIC CO	EMR	11/12/1996	3600	-0.27	4106.03	3.51
147	ELECTRONIC ARTS INC	ERTS	6/4/1997	7372	-0.49	730.31	3.44
148	EVANS & SUTHERLAND CMP CORP	ESCC	9/19/1996	3690	-0.58	56.21	0.62
149	ESCO TECHNOLOGIES INC	ESE	9/4/1996	3569	-0.49	35.05	1.96
150	ESPEY MFG & ELECTRONICS CORP	ESP	3/8/1996	3679	-0.06	-3.25	1.79
151	EATON CORP	ETN	2/1/1999	3714	-0.30	2175.67	6.36
152	EXAR CORP	EXAR	12/8/1995	3674	-0.49	-4.57	0.43
153	VISX INC/DE	EYE	2/10/1997	3845	-0.46	209.82	2.77
154	FAIRCHILD CORP -CL A	FA	12/27/1998	3452	0.01	282.31	5.37
155	FURNITURE BRANDS INTL INC	FBN	5/27/1997	2510	0.39	148.02	3.67
156	FALCON PRODUCTS INC	FCP	5/6/1999	2590	-0.15	174.58	-0.04
157	FOCUS ENHANCEMENTS INC	FCSE	9/2/1998	3576	-0.06	4.04	-0.14
158	FREQUENCY ELECTRONICS INC	FEI	11/9/1999	3825	0.28	18.36	1.10
159	FRANKLIN ELECTRIC CO	FELE	10/19/1998	3621	0.19	26.33	2.93
160	FLOW INTL CORP	FLOW	7/17/1996	3569	-0.56	62.39	1.01
161	FLOWERVE CORP	FLS	11/18/1999	3561	-0.46	1531.36	1.24
162	FLEXSTEEL INDS	FLXS	11/4/1998	2510	-0.19	15.51	2.94
163	FMC CORP	FMC	8/28/1997	2800	-0.05	-244.77	6.90
164	GILLETTE CO	G	9/12/1996	3420	-0.09	5871.80	1.81
165	LANGER INC	GAIT	12/7/1998	3842	0.31	5.55	-0.07
166	GREENBRIAR CORP	GBR	10/5/1998	8300	0.36	-10.40	-115.37
167	GEHL CO	GEHL	7/9/1999	3531	-0.18	68.43	6.08
168	GLENAYRE TECHNOLOGIES INC	GEMS	9/25/1996	3661	-1.01	201.58	2.12
169	GRIFFON CORP	GFF	2/6/1996	3442	-0.06	185.68	2.61
170	GEORGIA GULF CORP	GGC	2/10/1998	2810	-0.25	457.96	1.87
171	GRACO INC	GGG	5/18/1998	3561	0.13	6.65	0.27
172	GRAHAM CORP	GHM	6/1/1998	3443	-0.07	5.99	3.48
173	GREAT LAKES CHEMICAL CORP	GLK	5/3/1996	2890	-0.38	18.26	-0.19
174	CORNING INC	GLW	11/14/1999	3357	0.20	9290.53	5.27
175	GENERAL MOTORS CORP	GM	2/9/1998	3711	-0.35	77881.86	15.54
176	GTECH HOLDINGS CORP	GTK	3/30/1999	7370	-0.42	-37.55	0.54
177	GATEWAY INC	GTW	5/15/1997	3571	-0.62	2476.54	4.05
178	GENCORP INC	GY	1/7/1998	3060	-0.04	-67.33	1.43
179	HAEMONETICS CORP	HAE	1/25/1996	3841	-0.14	81.05	0.97
180	HARMAN INTERNATIONAL INDS	HAR	6/16/1998	3651	-0.42	156.10	2.46
181	HASBRO INC	HAS	9/25/1998	3944	0.21	1147.72	-0.08
182	HILLENBRAND INDUSTRIES	HB	1/19/1998	2590	-0.09	1261.58	2.64
183	HARLEY-DAVIDSON INC	HDI	3/9/1995	3751	-0.14	998.14	1.56
184	HEICO CORP	HEI	6/1/1998	3724	0.04	227.55	5.39
185	HEI INC	HEII	4/25/1997	3674	-0.08	8.71	0.48
186	HELEN OF TROY CORP LTD	HELE	9/30/1999	3634	0.45	132.18	3.43

	Acquirer	Ticker	M&A Date	SIC	BETA	TA	BVPS
187	HELIX TECHNOLOGY CORP	HELX	4/25/1996	3560	-0.43	34.62	1.23
188	HON INDUSTRIES	HNI	11/12/1998	2522	0.29	404.46	4.68
189	HOLLY CORP	HOC	4/10/1995	2911	-0.06	91.28	3.53
190	HOLOGIC INC	HOLX	7/19/1996	3844	-0.90	136.17	7.59
191	HONEYWELL INTERNATIONAL INC	HON	12/20/1999	3728	-0.11	11621.33	3.00
192	HEWLETT-PACKARD CO	HPQ	7/21/1998	3570	-0.47	6005.00	1.14
193	HERLEY INDUSTRIES INC/DE	HRLY	8/24/1998	3812	0.05	50.44	3.65
194	HARRIS CORP	HRS	11/1/1999	3812	-0.21	-1494.43	-1.13
195	HARSCO CORP	HSC	3/4/1998	3390	-0.32	606.42	2.48
196	HUFFY CORP	HUF	10/26/1998	3751	-0.02	-129.44	-2.97
197	HURCO COMPANIES INC	HURC	3/3/1998	3823	-0.30	6.98	3.52
198	HAVERTY FURNITURE	HVT	7/31/1998	5712	-0.29	45.18	2.20
199	HEXCEL CORP	HXL	8/5/1998	3290	0.12	506.26	-0.65
200	INTL BUSINESS MACHINES CORP	IBM	10/26/1998	7370	-0.13	7078.00	1.97
201	ICO INC	ICOC	8/14/1995	2821	-0.14	214.26	0.41
202	INTERDIGITAL COMMUN CORP	IDCC	9/8/1998	6794	-4.19	50.47	0.37
203	IDEX CORP	IEX	10/20/1998	3561	0.23	229.05	5.45
204	II-VI INC	IIVI	9/22/1999	3827	-0.52	73.79	2.86
205	INTERMAGNETICS GENERAL CORP	IMGC	6/11/1998	3490	-0.41	33.73	1.63
206	IMCO RECYCLING INC	IMR	9/4/1998	3341	-0.31	249.05	3.62
207	INTERPHASE CORP	INPH	10/15/1998	3576	-0.25	3.20	0.83
208	INTEL CORP	INTC	3/26/1998	3674	-0.26	22023.33	2.69
209	INTER-TEL INC -SER A	INTL	6/21/1998	3661	-0.41	88.28	1.74
210	INTUIT INC	INTU	10/7/1999	7372	0.07	2074.46	6.55
211	INTERVOICE INC	INTV	4/27/1999	3661	-0.32	75.84	-0.48
212	INNOVEX INC	INVX	7/1/1999	3674	-0.58	53.37	-0.34
213	IOMEGA CORP	IOM	6/29/1998	3572	-1.78	74.41	1.91
214	INGERSOLL-RAND CO LTD	IR	3/28/1995	3560	-0.33	3995.63	5.63
215	INTL REMOTE IMAGING SYSTEMS	IRI	7/24/1995	3826	-0.33	24.39	0.26
216	INFORMATION RESOURCES INC	IRIC	11/3/1997	8700	-0.14	25.12	-0.46
217	ITRON INC	ITRI	5/6/1998	3663	-1.05	-0.66	-4.77
218	ILLINOIS TOOL WORKS	ITW	9/9/1999	3540	-0.31	4576.61	8.37
219	INVACARE CORP	IVC	1/10/1997	3842	0.07	463.35	3.64
220	JOHNSON CONTROLS INC	JCI	11/12/1998	2531	-0.26	4153.87	11.75
221	JDS UNIPHASE CORP	JDSU	11/4/1999	3663	0.01	13672.75	11.51
222	JLG INDUSTRIES INC	JLG	5/11/1999	3531	-0.92	506.02	3.28
223	JMAR TECHNOLOGIES INC	JMAR	9/10/1998	3559	-0.35	13.19	0.30
224	JOHNSON & JOHNSON	JNJ	7/21/1998	2834	0.01	13212.00	2.80
225	JUNO LIGHTING INC	JUNO	11/1/1995	3640	-0.27	63.98	3.35
226	KIMBALL INTERNATIONAL -CL B	KBALB	8/10/1999	2520	0.01	109.10	1.67
227	KAYDON CORP	KDN	12/18/1996	3562	-0.13	158.62	4.48
228	KEITHLEY INSTR INC	KEI	12/28/1998	3825	-0.38	30.54	2.56
229	KEMET CORP	KEM	10/13/1998	3670	-0.76	596.77	5.55
230	KLA-TENCOR CORP	KLAC	8/21/1997	3827	-0.50	1252.05	3.74
231	KENNAMETAL INC	KMT	10/10/1997	3540	-0.37	1295.65	10.52
232	KNAPE & VOGT MFG CO	KNAP	9/1/1998	2540	-0.19	-45.70	-3.66
233	KOPIN CORP	KOPN	11/30/1995	3674	-0.38	8.98	-0.17
234	KOSS CORP	KOSS	7/23/1997	3651	-0.23	6.87	1.65
235	KATY INDUSTRIES INC	KT	1/2/1996	2842	-0.24	87.27	-0.14
236	K-TRON INTERNATIONAL INC	KTII	7/10/1998	3823	0.16	-7.35	4.37
237	KYOCERA CORP -ADR	KYO	8/24/1998	3663	0.29	4368.23	10.29
238	LAKELAND INDUSTRIES INC	LAKE	9/13/1999	3842	0.83	17.44	2.13
239	LIFETIME HOAN CORP	LCUT	12/9/1999	3420	-0.46	21.42	0.92
240	LOWRANCE ELECTRONICS INC	LEIX	12/10/1997	3812	-0.34	-1.63	-1.51
241	CONCORD CAMERA CORP	LENS	9/18/1998	3861	-0.84	97.06	2.09
242	LITTELFUSE INC	LFUS	2/24/1995	3613	-0.08	30.34	1.92
243	LYNCH CORP	LGL	9/10/1999	2670	-0.22	-359.39	-23.07
244	LAZARE KAPLAN INTERNATIONAL	LKI	3/22/1999	5094	-0.10	20.51	-0.07
245	LINDSAY MANUFACTURING CO	LNN	2/13/1995	3523	0.03	24.67	2.54
246	LANOPTICS LTD	LNOP	12/18/1996	3576	-0.39	-14.24	-2.66
247	LAM RESEARCH CORP	LRCX	3/24/1997	3559	-0.82	447.18	-0.29
248	LATTICE SEMICONDUCTOR CORP	LSCC	6/12/1998	3674	-0.54	716.85	2.89

	Acquirer	Ticker	M&A Date	SIC	BETA	TA	BVPS
249	LSI LOGIC CORP	LSI	7/28/1997	3674	-1.29	1710.47	2.37
250	LONE STAR TECHNOLOGIES	LSS	9/26/1996	3317	0.04	-7.30	4.17
251	LTX CORP	LTX	6/26/1996	3825	-0.92	29.25	0.18
252	LUFKIN INDUSTRIES INC	LUFK	8/6/1998	3533	0.14	40.30	2.93
253	LUXOTTICA GROUP SPA -ADR	LUX	3/2/1995	3851	0.19	1477.34	0.81
254	LA-Z-BOY INC	LZB	9/28/1999	2510	0.04	589.27	4.20
255	MACROMEDIA INC	MACR	7/31/1997	7372	-0.95	318.38	4.09
256	MICHAEL ANTHONY JEWELERS INC	MAJ	10/8/1996	3911	-0.36	-1.24	1.36
257	MAPICS INC	MAPX	2/10/1999	7372	-0.23	6.83	0.47
258	MASCO CORP	MAS	11/12/1998	2430	-0.16	3916.07	2.05
259	MAXCO INC	MAXC	7/31/1996	3390	-0.51	6.54	4.38
260	MESTEK INC	MCC	12/17/1999	3585	0.02	69.01	4.70
261	MICROCHIP TECHNOLOGY INC	MCHP	5/18/1998	3674	-0.93	646.11	2.87
262	MEDTRONIC INC	MDT	11/2/1998	3845	-0.08	5308.52	2.55
263	MEDSTONE INTERNATIONAL INC	MEDS	3/29/1996	3845	-0.77	7.04	1.42
264	METHODE ELECTRONICS -CL A	METHA	1/18/1996	3678	-0.37	123.24	3.14
265	MICROWAVE FILTER CO INC	MFCO	11/6/1998	3679	0.32	-0.58	0.09
266	MAGNA INTERNATIONAL -CL A	MGA	8/7/1996	3714	-0.58	3886.16	24.94
267	MIDDLEBY CORP	MIDD	11/2/1998	3580	-0.31	34.79	1.25
268	MILLIPORE CORP	MIL	12/16/1996	3826	-0.07	186.74	-2.57
269	MILLER (HERMAN) INC	MLHR	3/31/1998	2520	0.48	163.62	0.98
270	MUELLER INDUSTRIES	MLI	10/19/1999	3350	-0.11	273.15	8.19
271	MENTOR CORP	MNTR	3/1/1999	3842	-0.26	149.84	1.87
272	MOLEX INC	MOLX	8/4/1997	3678	0.05	582.74	2.31
273	MOVADO GROUP INC	MOV	3/31/1998	3873	0.72	63.46	3.62
274	MET-PRO CORP	MPR	6/4/1998	3564	-0.11	14.72	1.96
275	MERRIMAC INDUSTRIES INC	MRM	12/26/1995	3663	-0.52	1.16	0.62
276	MRV COMMUNICATIONS INC	MRVC	9/26/1996	3576	-0.68	271.25	2.84
277	MINE SAFETY APPLIANCES CO	MSA	12/19/1996	3842	0.23	27.78	0.92
278	MATERIAL SCIENCES CORP	MSC	12/20/1996	3470	-0.22	228.91	2.92
279	MICROSEMI CORP	MSCC	1/21/1998	3674	-0.64	92.69	3.27
280	MICROSOFT CORP	MSFT	5/5/1999	7372	-0.30	44072.00	3.26
281	MISONIX INC	MSON	1/13/1999	3826	0.31	13.74	1.27
282	MATRIX SERVICE CO	MTRX	3/3/1999	1700	-0.29	-13.49	0.50
283	MARLTON TECHNOLOGIES	MTY	9/3/1998	7389	0.02	26.85	0.32
284	M-WAVE INC	MWAV	8/3/1999	3672	-0.48	9.51	1.04
285	MAXIM INTEGRATED PRODUCTS	MXIM	6/28/1996	3674	-0.39	595.54	1.90
286	MAXXAM INC	MXM	10/17/1997	3334	-0.56	444.50	16.58
287	MAXWELL TECHNOLOGIES INC	MXWL	1/5/1998	3612	-0.23	67.34	2.81
288	MAYTAG CORP	MYG	2/11/1999	3630	-0.25	499.19	-4.77
289	INCO LTD	N	3/27/1996	3330	-0.09	3294.49	4.63
290	NAVISTAR INTERNATIONAL	NAV	10/27/1999	3711	0.22	1311.67	-16.65
291	NACCO INDUSTRIES -CL A	NC	11/18/1996	3537	-0.02	156.58	28.68
292	NCI BUILDING SYSTEMS INC	NCS	11/15/1999	3448	-0.19	416.93	7.91
293	NORDSON CORP	NDSN	7/24/1995	3569	0.01	155.74	1.39
294	NEWPORT CORP	NEWP	3/9/1998	3821	-0.19	302.04	8.03
295	NEC CORP -ADR	NIPNY	4/13/1995	3571	0.24	-1215.70	-0.26
296	NORTHROP GRUMMAN CORP	NOC	5/5/1997	3812	-0.31	2506.33	16.69
297	MICRONETICS INC	NOIZ	3/17/1999	3679	-1.42	5.07	0.76
298	NOVITRON INTL INC	NOVI	11/5/1998	3826	-0.21	-1.62	-0.63
299	NOVELL INC	NOVL	10/30/1995	7372	-0.08	493.40	0.97
300	NISSAN MOTOR CO LTD -SP ADR	NSANY	1/31/1997	3711	0.43	-12362.71	-5.04
301	NATIONAL SEMICONDUCTOR CORP	NSM	7/28/1997	3674	-0.59	-339.67	-2.95
302	NS GROUP INC	NSS	1/26/1995	3312	-0.21	88.97	4.24
303	NORTEL NETWORKS CORP	NT	10/18/1999	3661	0.18	11369.00	0.87
304	NORTHERN TECH INTL	NTI	12/21/1995	2670	-0.19	5.39	1.22
305	NUCOR CORP	NUE	7/29/1998	3312	-0.24	1103.64	8.76
306	NATIONAL R V HOLDINGS INC	NVH	7/25/1996	3716	-0.21	80.76	6.70
307	NOVELLUS SYSTEMS INC	NVLS	1/11/1996	3559	0.04	398.12	2.26
308	QUANEX CORP	NX	12/9/1999	3350	-0.30	-15.19	4.60
309	ONEIDA LTD	OCQ	7/6/1999	3910	-0.19	175.32	-0.19
310	ORTHOFIX INTERNATIONAL N V	OFIX	5/8/1995	3841	-0.43	69.01	1.89



	Acquirer	Ticker	M&A Date	SIC	BETA	TA	BVPS
311	O I CORP	OICO	7/1/1998	3826	-0.08	0.27	1.53
312	OM GROUP INC	OMG	12/22/1997	3341	0.00	723.82	10.32
313	OPTI INC	OPTI	6/3/1998	3674	-1.08	-81.09	-4.67
314	ORBITAL SCIENCES CORP	ORB	7/31/1995	3663	0.27	438.39	1.08
315	ORBOTECH LTD	ORBK	9/1/1998	3823	0.86	226.25	5.53
316	ORBIT INTERNATIONAL CP	ORBT	9/1/1998	3812	0.01	-11.36	-0.03
317	ORACLE CORP	ORCL	4/14/1999	7372	-0.57	5063.73	0.63
318	OSHKOSH TRUCK CORP	OSK	7/25/1995	3711	-0.02	270.21	0.89
319	OCCIDENTAL PETROLEUM CORP	OXY	10/6/1997	1311	-0.25	-1549.00	-0.12
320	PRECISION CASTPARTS CORP	PCP	5/17/1999	3320	-0.11	1270.23	6.31
321	PARKER-HANNIFIN CORP	PH	7/14/1998	3490	-0.29	1833.86	6.98
322	POLARIS INDS INC	PII	5/21/1998	3790	0.03	148.83	3.15
323	PARKER DRILLING CO	PKD	10/29/1998	1381	-0.19	606.30	0.48
324	PARK ELECTROCHEMICAL CORP	PKE	5/8/1996	3672	-0.31	158.17	4.14
325	PERKINELMER INC	PKI	8/25/1997	3826	-0.23	913.27	1.96
326	PARK OHIO HOLDINGS CORP	PKOH	9/3/1996	5072	-0.39	331.10	7.38
327	PHOTRONICS INC	PLAB	9/15/1999	3674	-0.17	388.96	2.47
328	PALL CORP	PLL	10/10/1996	3569	-0.64	388.03	1.02
329	PLANAR SYSTEMS INC	PLNR	5/13/1998	3679	0.01	24.57	0.10
330	PLEXUS CORP	PLXS	3/16/1999	3672	0.67	443.07	6.41
331	PARAMETRIC TECHNOLOGY CORP	PMTC	11/4/1997	7372	-0.83	458.14	0.19
332	PALOMAR MED TECHNOLOGIES INC	PMTI	5/4/1999	3845	-0.02	-31.89	0.48
333	PENTAIR INC	PNR	4/29/1999	3550	0.02	1071.38	5.59
334	POWELL INDUSTRIES INC	POWL	12/28/1999	3613	-0.29	54.80	3.58
335	PPT VISION INC	PPTV	9/16/1998	3823	-0.36	-3.18	-0.88
336	PROGRESS SOFTWARE CORP	PRGS	9/17/1997	7372	-0.47	86.20	1.14
337	PEOPLESOFT INC	PSFT	10/11/1999	7372	-0.87	1500.90	3.04
338	PAR TECHNOLOGY CORP	PTC	11/1/1999	3578	-0.40	-1.44	-1.50
339	PHOENIX TECHNOLOGIES LTD	PTEC	4/16/1998	7372	-0.45	66.22	-0.17
340	PRINTRONIX INC	PTNX	5/15/1998	3577	-0.80	28.70	3.63
341	ROYAL APPLIANCE MFG CO	RAM	10/20/1998	3630	0.19	12.85	0.28
342	RAVEN INDUSTRIES INC	RAVN	11/24/1997	3080	-0.06	3.18	1.18
343	ROBBINS & MYERS INC	RBN	6/25/1998	3443	0.10	235.56	6.50
344	RELIABILITY INC	REAL	3/12/1997	3825	-0.49	9.85	2.33
345	RPC INC	RES	3/9/1998	1389	-0.18	67.64	1.39
346	ROANOKE ELECTRIC STEEL CORP	RESC	7/22/1998	3312	0.22	169.01	4.36
347	RESPIRONICS INC	RESP	11/11/1997	3842	-0.26	247.13	2.19
348	RAINBOW TECHNOLOGIES INC	RNBO	4/18/1996	3577	-0.17	51.37	1.04
349	ROCHESTER MEDICAL CORP	ROCM	12/6/1999	3841	-0.32	-4.23	-1.32
350	ROGERS CORP	ROG	8/19/1999	2821	-0.25	83.06	4.46
351	ROPER INDUSTRIES INC/DE	ROP	8/18/1998	3823	-0.11	350.46	4.38
352	ROWE COMPANIES	ROW	11/5/1997	2510	-0.80	91.07	1.47
353	RPM INTERNATIONAL INC	RPM	1/22/1999	2851	-0.01	372.87	1.05
354	RTI INTL METALS INC	RTI	11/8/1999	3490	-0.08	89.01	3.85
355	RAYTHEON CO	RTN	4/3/1995	3812	-0.10	15664.95	12.17
356	RUSS BERRIE & CO INC	RUS	1/28/1999	3942	0.40	58.41	4.05
357	GRUPO CASA SABA -SPON ADR	SAB	4/2/1997	5122	-0.77	280.41	2.48
358	INVIVO CORP	SAFE	12/17/1999	3845	-0.02	27.74	5.04
359	SATCON TECHNOLOGY CORP	SATC	7/29/1998	3621	-0.20	24.46	-0.28
360	SYMBOL TECHNOLOGIES	SBL	4/21/1998	3577	-0.26	1065.37	2.51
361	SBS TECHNOLOGIES INC	SBSE	10/16/1998	3577	-0.28	90.25	5.39
362	SCHNITZER STEEL INDS -CL A	SCHN	9/16/1996	5093	0.06	250.57	9.62
363	SCITEX CORP LTD -ORD	SCIX	5/6/1998	3555	-0.09	-196.95	-3.92
364	SCIENTIFIC-ATLANTA INC	SFA	10/6/1995	3663	-0.60	307.25	1.09
365	SALTON INC	SFP	8/30/1999	3634	-0.33	603.17	16.42
366	SILICON GRAPHICS INC	SGI	2/23/1996	3571	-0.50	1475.35	2.13
367	SCIENTIFIC GAMES CORP	SGMS	5/19/1997	3570	-0.62	95.20	-1.36
368	SHAW GROUP INC	SGR	11/19/1998	3490	-0.36	956.60	6.71
369	SKF AB -ADR	SKFR	2/26/1997	3562	-0.04	-466.74	-1.30
370	SKYLINE CORP	SKY	11/16/1998	2451	-0.46	9.63	4.54
371	SARA LEE CORP	SLE	9/15/1997	2000	-0.36	-1192.33	-2.38
372	SOLETRON CORP	SLR	9/13/1999	3672	-0.54	9534.94	4.57

	Acquirer	Ticker	M&A Date	SIC	BETA	TA	BVPS
373	SELAS CORP OF AMERICA	SLS	3/9/1999	3842	-0.31	-8.25	-1.27
374	STANDARD MOTOR PRODS	SMP	10/22/1999	3690	-0.34	-57.97	-0.53
375	STANDARD MICROSYSTEMS CORP	SMSC	10/8/1998	3674	-0.72	10.05	-0.10
376	SEMTECH CORP	SMTC	2/2/1999	3674	-0.40	595.63	3.15
377	SNAP-ON INC	SNA	2/1/1995	3420	-0.13	401.94	2.66
378	SAND TECHNOLOGY INC -CL A	SNDT	5/2/1997	7372	-0.59	-6.73	-0.53
379	SYNOPSIS INC	SNPS	10/15/1997	7372	-0.49	752.18	6.43
380	SPAN-AMERICA MEDICAL SYS INC	SPAN	7/23/1997	3842	0.37	-1.82	0.93
381	SPARTAN MOTORS INC	SPAR	7/17/1995	3711	-0.36	26.04	0.10
382	SPECTRUM CONTROL INC	SPEC	9/30/1998	3679	-0.55	47.12	2.56
383	SPX CORP	SPW	7/20/1998	3612	-0.11	2846.17	3.92
384	STANDARD REGISTER CO	SR	4/13/1999	2761	-0.22	91.68	-2.40
385	SPECTRUM SIGNAL PROCESSING	SSPI	5/2/1997	3674	-0.26	6.28	0.20
386	SPS TECHNOLOGIES INC	ST	7/20/1999	3452	0.17	330.88	9.12
387	STERIS CORP	STE	12/18/1995	3842	-0.53	669.77	4.32
388	SCIENTIFIC TECHNOLOGIES INC	STIZ	5/29/1996	3827	-0.15	16.60	1.58
389	ST JUDE MEDICAL INC	STJ	10/23/1996	3845	-0.32	644.87	0.81
390	STORAGE TECHNOLOGY CP	STK	10/23/1997	3572	-0.24	-143.65	-0.37
391	STANLEY FURNITURE CO INC	STLY	6/24/1997	2511	0.13	34.51	4.72
392	SUPREME INDS INC	STS	4/12/1999	3713	-0.07	11.05	1.70
393	STEEL TECHNOLOGIES	STTX	9/30/1998	3310	-0.64	74.26	3.44
394	SUMMA INDUSTRIES INC	SUMX	2/14/1997	3089	-1.21	68.71	3.09
395	SUN MICROSYSTEMS INC	SUNW	8/23/1999	3571	-0.81	11548.59	1.91
396	SUPERIOR INDUSTRIES INTL	SUP	10/29/1997	3714	-0.33	107.51	5.57
397	STEWART & STEVENSON SERVICES	SVC	9/22/1997	5084	-0.24	-358.17	-1.73
398	STANLEY WORKS	SWK	4/23/1998	3420	-0.22	247.60	0.94
399	STANDEX INTERNATIONAL CORP	SXI	10/28/1997	3443	0.05	81.36	3.12
400	STRYKER CORP	SYK	4/24/1996	3842	-0.47	1454.61	1.48
401	SYMANTEC CORP	SYMC	7/5/1995	7372	-1.05	286.72	1.18
402	SYMMETRICOM INC	SYMM	10/28/1999	3661	-0.11	27.55	1.23
403	SYNALLOY CORP	SYNC	8/1/1996	3317	-0.24	8.13	1.59
404	TANDY BRANDS ACCESSORIES INC	TBAC	1/3/1995	2300	-0.12	42.00	2.46
405	TECUMSEH PRODUCTS CO -CL A	TECUA	11/26/1997	3585	-0.03	164.20	10.79
406	TEKTRONIX INC	TEK	3/19/1998	3825	-0.72	139.63	3.05
407	TERADYNE INC	TER	9/6/1995	3825	-0.17	666.62	2.64
408	THREE-FIVE SYSTEMS INC	TFS	8/21/1998	3674	-0.95	147.16	5.55
409	TELEFLEX INC	TFX	6/10/1999	9997	-0.04	565.59	7.72
410	THOR INDUSTRIES INC	THO	10/16/1996	3790	-0.56	72.40	2.24
411	THOMAS INDUSTRIES INC	TII	12/14/1999	3560	-0.18	58.73	5.12
412	TIMKEN CO	TKR	4/21/1998	3562	0.02	404.90	0.89
413	TELLABS INC	TLAB	6/3/1998	3661	-0.58	1937.42	4.03
414	TOYOTA MOTOR CORP -ADR	TM	3/28/1996	3711	0.38	26501.29	2.42
415	THERMO ELECTRON CORP	TMO	8/21/1998	3826	-0.18	-284.52	1.18
416	THOMAS & BETTS CORP	TNB	1/27/1999	3640	-0.05	-400.12	-4.62
417	TENNANT CO	TNC	2/26/1998	3580	-0.05	32.88	3.70
418	TECHNITROL INC	TNL	3/23/1995	3679	0.23	206.26	2.62
419	TECHNOLOGY RESEARCH CORP	TRCI	12/9/1999	3613	-0.50	-1.59	-0.07
420	TRIDENT MICROSYSTEMS INC	TRID	4/22/1998	3674	-0.70	41.83	1.87
421	TRIMBLE NAVIGATION LTD	TRMB	8/12/1998	3829	-0.41	165.79	-0.86
422	TRINITY INDUSTRIES	TRN	9/10/1998	3743	-0.23	376.77	5.32
423	TRANS-INDUSTRIES INC	TRNI	11/7/1995	3990	0.58	5.30	1.70
424	TSR INC	TSRI	10/28/1998	7371	-0.34	8.03	2.08
425	TRANSTECHNOLOGY CORP	TT	9/13/1996	3537	-0.38	181.31	6.68
426	TORO CO	TTC	11/30/1998	3523	-0.14	258.47	3.73
427	TETRA TECHNOLOGIES INC/DE	TTI	8/3/1998	2810	-0.43	102.39	2.91
428	TEXAS INDUSTRIES INC	TXI	5/22/1997	3241	0.14	934.02	13.77
429	TEXAS INSTRUMENTS INC	TXN	7/23/1999	3674	-0.29	5573.00	3.22
430	TEXTRON INC	TXT	8/23/1999	9997	0.03	-879.67	7.63
431	TYCO INTERNATIONAL LTD	TYC	11/23/1998	9997	0.06	55423.60	8.26
432	TYLER TECHNOLOGIES INC	TYL	8/18/1999	7373	0.84	67.27	0.49
433	UNIVERSAL ELECTRONICS INC	UEIC	9/12/1996	3651	0.13	-8.22	-0.44
434	UNITED HERITAGE CORP	UHCP	9/29/1995	5140	-1.10	23.62	1.00

	Acquirer	Ticker	M&A Date	SIC	BETA	TA	BVPS
435	UNITED INDUSTRIAL CORP	UIC	8/31/1998	3690	-0.07	52.11	1.60
436	UNISYS CORP	UIS	6/15/1999	7373	0.21	-555.97	5.19
437	ULTRALIFE BATTERIES INC	ULBI	3/15/1996	3690	-0.09	23.59	0.23
438	UTAH MEDICAL PRODUCTS INC	UTMD	1/25/1996	3845	-0.07	0.71	0.44
439	UNITED TECHNOLOGIES CORP	UTX	2/22/1999	3724	-0.15	9861.33	8.05
440	VICOR CORP	VICR	11/14/1997	3679	-0.67	110.88	2.23
441	VIRCO MANUFACTURING	VIR	4/24/1998	2531	0.01	64.17	2.22
442	VITAL SIGNS INC	VITL	10/8/1998	3841	-0.01	50.19	3.37
443	VALLEY FORGE SCIENTIFIC CORP	VLFG	5/12/1999	3845	-0.28	-0.03	-0.01
444	VALMONT INDUSTRIES	VMI	6/18/1998	3440	-0.16	192.66	1.66
445	VOLVO AB SWE -ADR	VOLVY	8/6/1999	3711	-0.11	3121.71	3.92
446	VARCO INTERNATIONAL INC	VRC	3/22/1995	3533	0.44	325.55	0.43
447	VERITAS SOFTWARE CO	VRTS	1/13/1997	7372	0.31	2853.08	5.46
448	VISHAY INTRTECHNOLOGY	VSH	6/26/1996	3670	-0.55	893.59	2.47
449	VULCAN INTL CORP	VUL	5/1/1997	3060	-0.02	48.63	29.74
450	WESTERN DIGITAL CORP	WDC	3/27/1997	3572	-1.03	199.06	-4.02
451	WEATHERFORD INTL LTD	WFT	5/21/1999	3533	0.44	2400.77	2.53
452	WEGENER CORP	WGNR	1/28/1998	3663	-0.35	-2.54	0.00
453	WINNEBAGO INDUSTRIES	WGO	12/29/1997	3716	-0.29	69.67	2.92
454	WHIRLPOOL CORP	WHR	3/1/1999	3630	-0.28	-1240.00	-5.92
455	WHX CORP	WHX	1/23/1998	3330	-0.34	-337.85	-60.57
456	ENCORE WIRE CORP	WIRE	3/24/1995	3350	0.05	77.55	2.36
457	WOLVERINE TUBE INC	WLV	9/22/1998	3350	-0.33	152.43	3.39
458	WMS INDUSTRIES INC	WMS	4/18/1995	3990	-0.14	-1.44	1.12
459	WABASH NATIONAL CORP	WNC	12/10/1999	3715	-0.06	88.42	3.44
460	WORTHINGTON INDUSTRIES	WOR	9/11/1998	3310	-0.37	-5.53	0.01
461	WEST PHARMACEUTICAL SVSC INC	WST	3/10/1999	3060	-0.21	48.20	-2.30
462	WESTERBEKE CORP	WTBK	7/1/1997	3621	-0.16	6.98	1.46
463	WATTS INDUSTRIES -CL A	WTS	4/16/1996	3490	-0.01	47.05	1.23
464	WIRELESS TELECOM GROUP INC	WTT	4/29/1997	3825	-1.37	18.19	0.83
465	XILINX INC	XLNX	4/23/1998	3674	-0.42	1558.79	4.03
466	DENTSPLY INTERNATL INC	XRAY	12/11/1996	3843	-0.34	317.45	2.02
467	X-RITE INC	XRIT	1/21/1998	3861	0.03	39.18	0.32
468	XEROX CORP	XRX	2/6/1996	3577	0.03	-5578.00	1.18
469	YORK INTL	YRK	2/18/1997	3585	-0.18	721.85	3.48
470	ZEBRA TECHNOLOGIES CP -CL A	ZBRA	7/9/1998	3560	-0.68	265.05	6.70
471	ZYGO CORP	ZIGO	4/9/1996	3827	-0.09	57.64	3.63
472	ZOLTEK COS INC	ZOLT	2/4/1999	2820	-0.16	4.31	-1.45
473	ZOOM TECHNOLOGIES INC	ZOOM	7/24/1996	3661	-0.99	11.44	1.74

Acquirer	TD	MV	NI	PE
1 ALCOA INC	4572.000	186973.83	213.00	9.22
2 AAON INC	-8.658	1513.32	10.41	-4.72
3 APPLE COMPUTER INC	-640.333	74698.85	792.67	8.71
4 ARCTIC CAT INC	0.000	-1597.63	-0.64	6.26
5 ACTEL CORP	0.000	2964.40	7.94	31.73
6 ADC TELECOMMUNICATIONS INC	6.834	86766.27	-194.48	-0.62
7 ANALOG DEVICES	550.898	154827.18	230.31	25.37
8 ADVANCED DIGITAL INFO CORP	-0.557	8423.49	27.03	16.46
9 AUTODESK INC	0.000	2442.06	6.27	-15.09
10 AES CORP. (THE)	13753.667	162020.81	241.67	11.82
11 AGCO CORP	152.190	-1936.72	-105.99	83.85
12 APPLIED INNOVATION INC	0.250	-280.25	3.94	-58.82
13 AAR CORP	40.421	-2923.98	-53.66	-5.77
14 ACCLAIM ENMNT INC	22.232	-2484.33	-149.00	-5.30
15 ALCAN INC	1723.000	38785.95	-99.00	2.40
16 ALCATEL -ADS	2182.395	884849.77	-3958.85	21.55
17 ALDILA INC	-12.667	-1963.93	-3.72	-5.00
18 ALAMO GROUP INC	-8.480	-185.45	-2.85	10.16
19 AMERICAN LOCKER GROUP INC	0.158	256.89	2.27	-6.69
20 ALLEN TELECOM INC	80.765	-2904.67	-25.31	321.88
21 ASTRO-MED INC	-0.188	-276.40	-1.22	26.40
22 ALTERA CORP	-19.533	49690.49	129.72	-10.39
23 APPLIED MATERIALS INC	404.674	158754.25	233.86	35.25
24 AMERICAN TECH CERAMICS CORP	0.808	573.81	4.72	-3.64
25 AMERON INTERNATIONAL CORP	22.691	85.02	9.38	-4.87
26 AMERICAN SOFTWARE -CL A	0.967	-215.74	-14.18	-392.35
27 AMERICAN MANAGEMENT SYSTEMS	-18.000	-2494.06	-3.53	-19.23
28 AMX CORP	-0.271	49.30	-4.53	-27.03
29 ANDERSEN GROUP INC	-1.564	10.73	1.12	-114.96
30 ANDREW CORP	7.349	-1997.08	3.76	-1.25
31 SMITH (A O) CORP	67.772	24.99	-22.50	1.25
32 AMERICAN PWR CNVRSION	0.000	14387.70	-0.25	1.34
33 ARROW INTERNATIONAL	-11.963	-846.97	8.14	6.93
34 AEROFLEX INC	-9.221	8214.98	9.86	63.26
35 ASA INTL LTD	0.969	19.87	0.56	-16.94
36 ASTEC INDUSTRIES INC	68.205	3732.43	16.70	-6.87
37 ALLIANT TECHSYSTEMS INC	194.925	4498.45	12.00	-30.35
38 ATMEL CORP	612.522	12941.09	-66.01	296.88
39 ACTION PERFORMANCE COS INC	23.632	-234.30	-7.30	-20.89
40 ATRION CORP	9.449	-34.32	-3.55	-13.55
41 ARTESYN TECHNOLOGIES INC	37.216	4153.83	-2.76	-1.41
42 AXSYS TECHNOLOGIES INC	-12.777	444.88	-4.48	-20.08
43 BARNES GROUP INC	144.778	-1212.19	-8.52	1.37
44 BOEING CO	3548.667	294290.25	252.67	55.49
45 BOMBAY CO INC	0.000	-1411.82	1.62	-71.23
46 BLACK BOX CORP	73.198	6176.90	27.19	-3.59
47 BUTLER MFG CO	17.316	-132.60	-2.17	3.96
48 BRUNSWICK CORP	257.567	489.80	-104.53	-4.47
49 BARD (C.R.) INC	209.367	6299.45	70.40	0.34
50 BLACK & DECKER CORP	-635.667	6039.04	3.17	-4.63
51 BECTON DICKINSON & CO	275.156	36327.14	78.35	4.89
52 BALDOR ELECTRIC	19.328	4362.62	19.70	-2.04
53 BRIGGS & STRATTON	43.307	-629.04	15.36	0.23
54 BERGER HOLDINGS LTD	7.015	47.32	-0.60	10.24
55 BAKER-HUGHES INC	1398.087	72897.92	64.96	100.64
56 BELL INDUSTRIES INC	22.282	564.02	-13.97	-18.01
57 BIO-RAD LABORATORIES INC	188.133	1114.22	6.43	29.28
58 BALDWIN TECHNOLOGY -CL A	-16.396	-554.59	7.37	-11.17
59 BALL CORP	743.000	3800.65	36.80	1.90
60 BLOUNT INTL INC	268.925	5569.64	-3.04	-0.20

Acquirer	TD	MV	NI	PE	
61	BMC SOFTWARE INC	0.000	59885.09	-114.54	28.30
62	BIOMET INC	0.000	31738.92	69.31	10.12
63	BADGER METER INC	3.807	763.00	5.12	-4.96
64	BMC INDUSTRIES INC/MN	160.118	-2575.19	-27.24	-2.60
65	BAUSCH & LOMB INC	31.367	-294.31	6.47	-19.82
66	INTERPORE INTERNATIONAL	1.029	640.18	2.57	-20.79
67	BORLAND SOFTWARE CORP	-0.712	16.90	52.54	-10.97
68	BOSTON ACOUSTICS INC	8.283	277.98	3.41	-1.32
69	BRADY CORP	0.879	1513.01	5.08	5.14
70	BROOKTROUT INC	0.000	-415.37	-7.10	-36.35
71	BUSH INDUSTRIES -CL A	92.645	-1045.73	-8.12	70.22
72	BOSTON SCIENTIFIC CORP	860.880	68720.58	74.79	-136.91
73	BTU INTERNATIONAL INC	-0.936	187.89	-3.91	-18.71
74	BVR TECHNOLOGIES LTD	-0.395	-332.56	-6.40	
75	BELDEN INC	171.338	-2706.46	-14.13	-1.05
76	BAYOU STEEL CORP -CL A	36.068	-333.62	-16.02	-16.01
77	CASCADE CORP	31.703	-525.22	-9.36	4.23
78	CONAGRA FOODS INC	166.733	76128.42	127.87	15.29
79	CATALINA LIGHTING INC	-13.235	-165.58	-2.64	-16.63
80	CATERPILLAR INC	5705.000	21179.33	-452.67	4.33
81	BRILLIANCE CHINA AUTO -ADR	-1.041	1771.53	86.48	-23.98
82	COOPER INDUSTRIES LTD	-524.300	-10999.62	38.87	-4.37
83	C-COR.NET CORP	0.331	3196.31	5.45	45.62
84	CONCURRENT COMPUTER CP	-43.898	921.43	-18.81	19.10
85	CADENCE DESIGN SYS INC	46.898	44622.07	-31.69	74.79
86	CABLE DESIGN TECH CP -CL A	26.017	2406.08	17.33	-8.20
87	CECO ENVIRONMENTAL CORP	18.814	-19.14	-0.62	116.02
88	COGNITRONICS CORP	-0.226	379.44	0.68	-18.45
89	COGNEX CORP	0.000	5834.53	-2.16	10.00
90	CHECKPOINT SYSTEMS INC	109.242	-3530.08	-29.92	27.07
91	CLARCOR INC	48.003	1748.26	11.32	-1.08
92	CLEVELAND-CLIFFS INC	-3.333	815.99	27.93	-1.83
93	CANDELA CORP	1.667	577.24	5.97	-9.89
94	COLORADO MEDTECH INC	0.037	850.24	1.01	11.84
95	COMPUTER NETWORK TECH CORP	2.114	163801.83	6.90	48.34
96	CREDENCE SYSTEMS CORP	-6.130	10505.15	-12.62	25.24
97	COMVERSE TECHNOLOGY INC	460.000	85555.28	158.04	22.52
98	CONMED CORP	344.379	2154.59	10.57	-34.10
99	CNS INC	0.000	-2257.56	-22.57	18.91
100	COACHMEN INDUSTRIES INC	-2.802	-353.12	-14.74	23.92
101	COBRA ELECTRS CORP	5.126	167.53	3.90	-19.18
102	COGNOS INC	-2.475	12860.92	18.55	-3.14
103	COLLINS INDUSTRIES INC	-8.558	292.78	9.40	-120.03
104	3COM CORP	22.971	112103.88	224.16	178.20
105	COREL CORP	16.038	-3437.81	-104.41	11.91
106	CPAC INC	-1.005	-104.70	-0.13	-4.74
107	COMPUWARE CORP	42.325	-17551.05	-221.44	-13.14
108	CRANE CO	-2.225	2692.11	15.23	-1.72
109	CROWN ANDERSEN INC	-0.912	-20.97	-1.30	-14.26
110	CHROMCRAFT REVINGTON INC	2.115	548.35	3.98	-1.65
111	CREATIVE TECHNOLOGY LTD	-21.347	2728.19	-3.40	-15.77
112	CARPENTER TECHNOLOGY	179.048	2020.97	10.17	0.51
113	CISCO SYSTEMS INC	0.000	1309735.38	1195.64	43.32
114	CSP INC	0.000	-16.55	-0.24	-249.73
115	COMSHARE INC	-1.910	-1336.94	7.10	46.68
116	CTS CORP	113.824	10131.32	40.15	11.71
117	CUBIC CORP	5.333	759.41	-1.55	59.58
118	CUMMINS INC	902.033	846.17	-163.30	299.65
119	CYPRESS SEMICONDUCTOR CORP	293.027	22165.46	-70.99	17.29
120	CYBEROPTICS CORP	0.000	456.76	-1.51	-6.87
121	DATA I/O CORP	-1.500	-219.83	-8.30	29.14
122	DIEBOLD INC	13.867	18235.01	53.67	4.63

	Acquirer	TD	MV	NI	PE
123	DONALDSON CO INC	84.729	4100.53	25.21	-1.82
124	DANA CORP	1459.333	10309.07	-138.07	4.74
125	DUCOMMUN INC	24.108	-564.65	-4.82	-4.85
126	DU PONT (E I) DE NEMOURS	646.333	40970.02	1669.67	70.82
127	DEERE & CO	229.367	19235.75	-126.97	7.61
128	DELL INC	463.000	967993.17	1118.33	31.66
129	DIGI INTERNATIONAL INC	3.708	-212.12	-16.54	20.86
130	DANAHER CORP	507.673	64802.39	137.54	7.89
131	DIONEX CORP	0.226	4926.52	10.08	8.98
132	DOVER CORP	523.238	12902.31	-175.87	7.56
133	DATARAM CORP	5.311	805.63	-9.41	11.35
134	DRS TECHNOLOGIES INC	63.630	1899.57	6.83	4.63
135	DATASCOPE CORP	0.000	1897.24	8.35	-3.31
136	DATA SYSTEMS & SOFTWARE INC	5.931	-92.21	2.36	111.52
137	DREW INDUSTRIES INC	8.042	-264.18	-14.90	37.33
138	DIXON TICONDEROGA CO	-7.330	-290.40	-3.15	-39.65
139	ENGINEERED SUPPORT SYSTEMS	9.066	509.97	4.24	-4.90
140	ENGELHARD CORP	-170.606	787.61	59.99	-13.91
141	ELECTROGLAS INC	0.000	650.14	-38.68	41.58
142	EASTMAN KODAK CO	-2051.000	61601.59	831.00	561.97
143	ELECTROLUX AB -ADR	-951.664	33833.54	-36.54	-5.65
144	CALLAWAY GOLF CO	0.000	-3497.82	-62.78	-1.39
145	EMC CORP/MA	-416.654	794111.07	-187.49	81.85
146	EMERSON ELECTRIC CO	672.633	138683.62	419.93	4.32
147	ELECTRONIC ARTS INC	0.000	31716.69	9.78	45.75
148	EVANS & SUTHERLAND CMP CORP	-7.121	729.08	-18.52	-6.75
149	ESCO TECHNOLOGIES INC	28.448	693.86	21.77	-12.61
150	ESPEY MFG & ELECTRONICS CORP	0.000	-25.30	-0.96	56.11
151	EATON CORP	1020.333	-5378.18	-68.33	4.84
152	EXAR CORP	0.000	25.63	-4.84	8.99
153	VISX INC/DE	0.000	21250.68	52.10	-501.36
154	FAIRCHILD CORP -CL A	41.435	-212.95	-73.82	-39.40
155	FURNITURE BRANDS INTL INC	-33.673	6745.81	67.42	-3.05
156	FALCON PRODUCTS INC	133.217	-807.18	-9.43	16.79
157	FOCUS ENHANCEMENTS INC	2.277	174.54	-2.58	
158	FREQUENCY ELECTRONICS INC	-0.729	630.46	1.48	-65.23
159	FRANKLIN ELECTRIC CO	-4.071	1589.41	4.55	1.79
160	FLOW INTL CORP	25.860	534.54	0.08	24.00
161	FLOWSERVE CORP	928.204	1294.44	-26.31	124.78
162	FLEXSTEEL INDS	-0.035	-41.85	3.69	-5.92
163	FMC CORP	-0.133	-4455.90	-56.67	-13.52
164	GILLETTE CO	1472.233	437643.94	652.63	18.07
165	LANGER INC	4.890	58.68	-0.67	-2.74
166	GREENBRIAR CORP	6.134	-794.17	0.21	-12.78
167	GEHL CO	28.023	-120.65	-8.20	16.90
168	GLENAYRE TECHNOLOGIES INC	1.071	-5433.03	-98.03	25.94
169	GRIFFON CORP	75.544	976.64	3.70	1.29
170	GEORGIA GULF CORP	292.037	-6547.08	-84.72	2.60
171	GRACO INC	19.811	4097.47	28.71	-1.78
172	GRAHAM CORP	-0.941	-49.69	-2.10	-8.39
173	GREAT LAKES CHEMICAL CORP	471.769	-24282.92	-187.16	17.02
174	CORNING INC	3019.267	225709.66	-2462.47	58.09
175	GENERAL MOTORS CORP	38220.466	7951.32	-2495.57	96.61
176	GTECH HOLDINGS CORP	-73.800	-2926.19	19.71	-11.08
177	GATEWAY INC	-12.941	128175.18	165.40	26.64
178	GENCORP INC	-64.667	-234.99	37.33	-218.74
179	HAEMONETICS CORP	32.476	-1014.48	-28.59	143.27
180	HARMAN INTERNATIONAL INDS	30.676	3589.05	-10.37	36.82
181	HASBRO INC	818.256	705.54	-128.81	10.22
182	HILLENBRAND INDUSTRIES	98.406	2488.29	20.38	-3.79
183	HARLEY-DAVIDSON INC	271.902	30785.01	135.81	-13.05
184	HEICO CORP	52.132	2399.03	12.96	-14.17

Acquirer	TD	MV	NI	PE
185 HEI INC	1.892	179.90	-3.16	157.52
186 HELEN OF TROY CORP LTD	4.550	-1173.97	5.81	-3.63
187 HELIX TECHNOLOGY CORP	-0.039	3331.43	-0.45	108.07
188 HON INDUSTRIES	26.197	4600.90	23.95	-2.28
189 HOLLY CORP	2.934	-209.79	1.68	-12.60
190 HOLOGIC INC	0.000	2030.89	7.09	-23.80
191 HONEYWELL INTERNATIONAL INC	3127.667	125894.51	-727.00	72.52
192 HEWLETT-PACKARD CO	831.667	404344.21	-180.67	13.13
193 HERLEY INDUSTRIES INC/DE	-1.109	824.76	6.40	-10.75
194 HARRIS CORP	-331.267	-11699.38	-132.30	69.24
195 HARSCO CORP	435.647	-5816.65	-78.66	-5.61
196 HUFFY CORP	-26.430	-1050.52	-4.30	-19.20
197 HURCO COMPANIES INC	-9.541	-119.28	-4.34	-44.81
198 HAVERTY FURNITURE	25.166	1573.99	12.26	-0.01
199 HEXCEL CORP	447.188	-2196.13	-153.32	-30.70
200 INTL BUSINESS MACHINES CORP	4943.333	1475006.13	2609.33	9.83
201 ICO INC	83.526	829.52	4.07	-24.24
202 INTERDIGITAL COMMUN CORP	-0.497	4183.33	-9.82	258.28
203 IDEX CORP	-8.961	1542.86	-1.19	-0.29
204 II-VI INC	21.704	1217.10	1.98	7.31
205 INTERMAGNETICS GENERAL CORP	-16.642	1054.27	9.44	10.39
206 IMCO RECYCLING INC	93.981	-801.31	-4.55	70.79
207 INTERPHASE CORP	-2.300	239.87	1.70	-3.09
208 INTEL CORP	378.667	2194817.89	1157.33	21.33
209 INTER-TEL INC -SER A	0.000	2280.56	-6.97	5.53
210 INTUIT INC	-16.677	83497.13	109.19	-239.00
211 INTERVOICE INC	21.953	1039.05	-47.07	-361.50
212 INNOVEX INC	20.003	-2093.26	-35.96	
213 IOMEGA CORP	-23.494	-11463.60	-69.44	-247.75
214 INGERSOLL-RAND CO LTD	1758.239	30894.47	376.11	-7.72
215 INTL REMOTE IMAGING SYSTEMS	8.881	64.62	-3.95	-4.12
216 INFORMATION RESOURCES INC	-1.046	-1413.86	4.22	55.68
217 ITRON INC	38.666	-2322.01	-20.04	-91.60
218 ILLINOIS TOOL WORKS	552.092	84090.84	243.39	-0.45
219 INVACARE CORP	250.183	992.07	16.58	73.97
220 JOHNSON CONTROLS INC	600.167	29177.77	217.10	-3.05
221 JDS UNIPHASE CORP	17.746	363403.43	-21889.24	
222 JLG INDUSTRIES INC	196.024	-2682.18	-47.22	2.15
223 JMAR TECHNOLOGIES INC	-0.236	665.49	-6.94	11.07
224 JOHNSON & JOHNSON	687.000	868523.10	2014.00	8.88
225 JUNO LIGHTING INC	-3.160	165.33	3.46	-2.93
226 KIMBALL INTERNATIONAL -CL B	0.342	-3950.38	-19.44	15.00
227 KAYDON CORP	-9.896	7059.06	32.17	1.92
228 KEITHLEY INSTR INC	-9.264	2703.49	17.29	-29.09
229 KEMET CORP	5.009	8554.93	81.21	15.17
230 KLA-TENCOR CORP	-6.667	59722.95	72.47	55.30
231 KENNAMETAL INC	657.178	935.40	9.36	-28.99
232 KNAPE & VOGT MFG CO	-12.767	-727.16	1.35	-5.27
233 KOPIN CORP	1.992	533.85	-6.94	
234 KOSS CORP	-0.121	132.53	2.50	-3.60
235 KATY INDUSTRIES INC	55.512	-327.14	5.65	-25.72
236 K-TRON INTERNATIONAL INC	-11.430	133.38	4.49	-1.20
237 KYOCERA CORP -ADR	216.492	86307.50	326.06	24.72
238 LAKELAND INDUSTRIES INC	-4.422	46.71	0.32	-0.75
239 LIFETIME HOAN CORP	0.000	-582.96	-7.62	13.85
240 LOWRANCE ELECTRONICS INC	5.218	-21.21	-0.64	-13.75
241 CONCORD CAMERA CORP	14.445	2652.78	5.63	-28.13
242 LITTELFUSE INC	-29.071	3132.32	13.70	-120.10
243 LYNCH CORP	-214.746	-938.42	-3.86	-76.80
244 LAZARE KAPLAN INTERNATIONAL	-0.569	-585.59	-2.47	27.59
245 LINDSAY MANUFACTURING CO	0.123	1844.22	8.81	2.28
246 LANOPTICS LTD	0.000	-636.98	-12.45	

	Acquirer	TD	MV	NI	PE
247	LAM RESEARCH CORP	251.545	14271.08	-106.94	38.57
248	LATTICE SEMICONDUCTOR CORP	260.000	15986.14	-44.38	9.73
249	LSI LOGIC CORP	451.064	50629.17	-107.30	36.11
250	LONE STAR TECHNOLOGIES	-54.500	3742.27	6.30	-240.96
251	LTX CORP	-10.979	1208.69	-22.97	228.48
252	LUFKIN INDUSTRIES INC	3.273	-331.15	-2.99	3.71
253	LUXOTTICA GROUP SPA -ADR	442.464	20711.13	85.66	-1.41
254	LA-Z-BOY INC	125.528	5623.33	1.68	1.67
255	MACROMEDIA INC	0.000	18179.09	6.10	442.56
256	MICHAEL ANTHONY JEWELERS INC	-3.432	-244.46	-1.71	13.16
257	MAPICS INC	-0.503	-1108.65	-15.48	4.22
258	MASCO CORP	1647.417	57150.45	374.63	2.42
259	MAXCO INC	4.689	-66.84	-3.24	-61.46
260	MESTEK INC	-3.679	198.66	-16.80	-0.69
261	MICROCHIP TECHNOLOGY INC	-16.006	26157.37	60.15	6.57
262	MEDTRONIC INC	-2.881	474405.83	567.78	32.24
263	MEDSTONE INTERNATIONAL INC	0.000	145.72	0.79	68.34
264	METHODE ELECTRONICS -CL A	-0.036	2831.92	6.50	-0.45
265	MICROWAVE FILTER CO INC	-0.196	13.92	-0.11	-3.76
266	MAGNA INTERNATIONAL -CL A	236.503	26102.02	232.65	-1.78
267	MIDDLEBY CORP	4.407	-93.68	-1.67	144.20
268	MILLIPORE CORP	197.170	3647.67	-46.92	24.09
269	MILLER (HERMAN) INC	70.419	8788.92	-8.13	-26.00
270	MUELLER INDUSTRIES	-36.844	2463.71	10.42	-0.54
271	MENTOR CORP	-0.003	156.26	21.33	-8.21
272	MOLEX INC	8.128	37824.21	72.75	8.17
273	MOVADO GROUP INC	1.513	395.79	4.75	1.46
274	MET-PRO CORP	5.847	-161.08	0.98	-5.90
275	MERRIMAC INDUSTRIES INC	0.000	46.56	-0.78	-2.24
276	MRV COMMUNICATIONS INC	61.212	5727.70	-3.87	2.81
277	MINE SAFETY APPLIANCES CO	0.651	752.47	3.49	-4.17
278	MATERIAL SCIENCES CORP	138.619	-542.85	-1.97	0.00
279	MICROSEMI CORP	-28.559	3853.53	0.60	135.20
280	MICROSOFT CORP	0.000	2144470.71	4819.00	-5.90
281	MISONIX INC	1.010	175.66	-2.56	-14.88
282	MATRIX SERVICE CO	-1.927	-86.86	12.32	-8.29
283	MARLTON TECHNOLOGIES	6.486	-9.50	-2.04	-1.00
284	M-WAVE INC	-1.318	177.15	3.40	-87.24
285	MAXIM INTEGRATED PRODUCTS	-0.071	56952.41	143.66	-3.27
286	MAXXAM INC	253.933	-335.83	30.67	-10.53
287	MAXWELL TECHNOLOGIES INC	0.908	993.03	-2.44	-46.99
288	MAYTAG CORP	212.534	-6034.21	-53.28	-5.45
289	INCO LTD	466.119	4726.42	-90.28	-43.45
290	NAVISTAR INTERNATIONL	861.000	8157.27	-304.67	1.76
291	NACCO INDUSTRIES -CL A	-90.487	1919.44	24.14	-8.75
292	NCI BUILDING SYSTEMS INC	179.621	170.09	-20.95	-0.28
293	NORDSON CORP	29.781	-453.62	0.56	-2.99
294	NEWPORT CORP	-10.364	13939.23	4.73	45.33
295	NEC CORP -ADR	428.309	44687.74	-122.48	-631.61
296	NORTHROP GRUMMAN CORP	140.333	28750.66	249.33	-14.56
297	MICRONETICS INC	0.388	198.54	0.47	16.87
298	NOVITRON INTL INC	-0.030	-70.05	0.92	-1.31
299	NOVELL INC	-0.174	-43291.11	-90.31	-58.49
300	NISSAN MOTOR CO LTD -SP ADR	-6275.855	-50394.47	-647.46	
301	NATIONAL SEMICONDUCTOR CORP	-88.733	28800.97	-206.83	11.02
302	NS GROUP INC	-46.936	1226.28	2.96	29.61
303	NORTEL NETWORKS CORP	1158.000	589112.09	-11617.67	1172.81
304	NORTHERN TECH INTL	0.000	209.69	1.23	2.65
305	NUCOR CORP	294.650	-9668.83	-49.58	-1.01
306	NATIONAL R V HOLDINGS INC	-9.978	2064.83	20.90	1.88
307	NOVELLUS SYSTEMS INC	43.333	13427.68	-36.62	-1.99
308	QUANEX CORP	-52.426	-20.95	-11.24	-3.58



Acquirer	TD	MV	NI	PE	
309	ONEIDA LTD	176.959	-407.87	-16.33	19.33
310	ORTHOFIX INTERNATIONAL N V	7.911	470.67	-2.01	24.04
311	O I CORP	0.000	-30.46	0.08	-1.95
312	OM GROUP INC	333.451	6780.32	32.99	1.65
313	OPTI INC	-4.039	-666.68	4.70	3.72
314	ORBITAL SCIENCES CORP	90.418	6930.76	-21.97	-4.92
315	ORBOTECH LTD	3.012	11002.90	18.79	23.43
316	ORBIT INTERNATIONAL CP	-0.841	-73.22	7.90	5.41
317	ORACLE CORP	-45.155	1093429.28	1389.06	-0.51
318	OSHKOSH TRUCK CORP	138.954	621.30	-0.30	118.29
319	OCCIDENTAL PETROLEUM CORP	7.000	9853.62	412.67	-15.51
320	PRECISION CASTPARTS CORP	363.300	4040.51	15.23	-3.35
321	PARKER-HANNIFIN CORP	391.253	18201.05	95.86	-0.05
322	POLARIS INDS INC	15.237	1894.03	20.70	4.82
323	PARKER DRILLING CO	424.247	-1612.03	-23.39	-40.56
324	PARK ELECTROCHEMICAL CORP	55.705	1376.41	2.87	-2.25
325	PERKINELMER INC	198.967	15203.71	74.77	33.84
326	PARK OHIO HOLDINGS CORP	193.459	803.57	-1.19	-0.46
327	PHOTRONICS INC	158.387	3019.46	-21.94	77.95
328	PALL CORP	47.653	5633.81	-27.74	15.27
329	PLANAR SYSTEMS INC	9.206	174.34	-3.24	59.78
330	PLEXUS CORP	72.580	12015.40	10.74	45.32
331	PARAMETRIC TECHNOLOGY CORP	-0.067	15028.13	-26.73	13.99
332	PALOMAR MED TECHNOLOGIES INC	-10.434	-1544.94	40.41	
333	PENTAIR INC	436.086	5413.65	-18.10	5.47
334	POWELL INDUSTRIES INC	5.564	594.86	4.82	5.03
335	PPT VISION INC	0.000	-185.16	-7.30	
336	PROGRESS SOFTWARE CORP	-0.095	3030.93	18.28	15.67
337	PEOPLESOFT INC	22.667	25078.19	77.50	11.35
338	PAR TECHNOLOGY CORP	2.257	-662.39	-3.56	-13.01
339	PHOENIX TECHNOLOGIES LTD	0.000	1805.50	-10.86	72.16
340	PRINTRONIX INC	10.617	-477.78	-7.35	10.28
341	ROYAL APPLIANCE MFG CO	13.935	-555.34	6.62	-15.52
342	RAVEN INDUSTRIES INC	-0.189	-253.73	-0.21	-3.78
343	ROBBINS & MYERS INC	120.961	170.22	-4.00	1.42
344	RELIABILITY INC	-1.481	130.51	-2.51	6.30
345	RPC INC	1.172	1310.38	6.32	8.98
346	ROANOKE ELECTRIC STEEL CORP	81.936	445.21	-4.82	14.33
347	RESPIRONICS INC	87.142	2601.18	-1.59	52.37
348	RAINBOW TECHNOLOGIES INC	-1.318	659.75	0.27	12.30
349	ROCHESTER MEDICAL CORP	-1.107	-399.35	-1.39	
350	ROGERS CORP	-6.839	2871.07	5.61	8.06
351	ROPER INDUSTRIES INC/DE	161.644	4965.46	21.33	-1.37
352	ROWE COMPANIES	46.577	282.39	2.53	-3.18
353	RPM INTERNATIONAL INC	137.581	-2306.35	-4.64	-0.84
354	RTI INTL METALS INC	-1.027	-2087.69	-42.02	95.24
355	RAYTHEON CO	4665.103	81762.63	75.74	8.55
356	RUSS BERRIE & CO INC	0.000	725.07	-6.93	-3.30
357	GRUPO CASA SABA -SPON ADR	63.743	-3888.84	-10.49	-18.14
358	INVIVO CORP	0.237	169.40	2.87	-6.36
359	SATCON TECHNOLOGY CORP	0.255	1202.59	-12.78	
360	SYMBOL TECHNOLOGIES	188.743	43652.57	-57.83	17.61
361	SBS TECHNOLOGIES INC	-4.449	1901.37	11.87	-53.77
362	SCHNITZER STEEL INDS -CL A	80.308	-239.43	-0.33	10.19
363	SCITEX CORP LTD -ORD	18.464	-2470.26	22.71	-53.86
364	SCIENTIFIC-ATLANTA INC	-0.332	4912.65	22.51	2.06
365	SALTON INC	308.266	1725.93	46.38	-7.67
366	SILICON GRAPHICS INC	183.420	-12983.03	-262.66	43.77
367	SCIENTIFIC GAMES CORP	92.445	-1498.70	19.92	25.18
368	SHAW GROUP INC	258.290	8715.82	27.18	-23.15
369	SKF AB -ADR	-158.679	-10168.61	-194.26	-58.98
370	SKYLINE CORP	0.000	-211.37	-7.34	1.29

	Acquirer	TD	MV	NI	PE
371	SARA LEE CORP	418.333	93673.96	-9.67	-10.40
372	SOLETRON CORP	3457.535	114715.47	-1069.21	15.69
373	SELAS CORP OF AMERICA	-3.652	-367.98	-11.79	43.24
374	STANDARD MOTOR PRODS	18.093	-1033.99	-8.57	47.75
375	STANDARD MICROSYSTEMS CORP	-2.047	101.95	22.04	20.77
376	SEMTECH CORP	334.884	21676.48	28.37	36.23
377	SNAP-ON INC	81.898	8393.52	8.98	3.33
378	SAND TECHNOLOGY INC -CL A	0.436	0.00	-2.56	
379	SYNOPTIS INC	3.125	23789.43	93.70	-37.85
380	SPAN-AMERICA MEDICAL SYS INC	-0.214	-40.11	-0.04	6.66
381	SPARTAN MOTORS INC	10.406	-1484.42	-12.55	15.33
382	SPECTRUM CONTROL INC	3.274	783.15	0.56	6.54
383	SPX CORP	1308.700	16729.77	54.97	53.72
384	STANDARD REGISTER CO	120.655	-4911.46	-78.52	0.95
385	SPECTRUM SIGNAL PROCESSING	0.009	-379.62	-2.31	-136.15
386	SPS TECHNOLOGIES INC	117.128	68.66	-9.11	1.57
387	STERIS CORP	136.753	14502.54	34.04	-19.91
388	SCIENTIFIC TECHNOLOGIES INC	-0.053	102.64	0.83	-4.91
389	ST JUDE MEDICAL INC	232.497	11367.34	-37.28	43.61
390	STORAGE TECHNOLOGY CP	-271.120	10367.56	14.16	20.13
391	STANLEY FURNITURE CO INC	1.530	1141.95	12.67	-0.64
392	SUPREME INDS INC	-1.823	-501.91	-2.06	-3.03
393	STEEL TECHNOLOGIES	20.539	-607.86	-0.35	15.74
394	SUMMA INDUSTRIES INC	23.811	460.82	5.60	-4.09
395	SUN MICROSYSTEMS INC	1456.333	713274.79	64.11	52.48
396	SUPERIOR INDUSTRIES INTL	-9.939	-970.24	15.61	-4.47
397	STEWART & STEVENSON SERVICES	-139.674	-7552.34	-53.17	-5.06
398	STANLEY WORKS	-93.967	38.31	129.53	-75.19
399	STANDEX INTERNATIONAL CORP	42.158	-1528.94	-5.66	-2.18
400	STRYKER CORP	816.665	31341.72	-4.97	261.33
401	SYMANTEC CORP	-18.751	5968.99	51.82	-24.22
402	SYMMETRICOM INC	-0.408	297.12	3.23	21.57
403	SYNALLOY CORP	0.481	-244.52	-5.40	188.90
404	TANDY BRANDS ACCESSORIES INC	18.417	-128.38	-0.13	34.11
405	TECUMSEH PRODUCTS CO -CL A	2.933	-1430.07	-23.27	0.75
406	TEKTRONIX INC	-56.235	7241.94	75.06	49.64
407	TERADYNE INC	0.133	20995.78	64.87	1.47
408	THREE-FIVE SYSTEMS INC	0.000	3518.14	-1.95	31.20
409	TELEFLEX INC	-6.743	6166.56	45.67	-2.87
410	THOR INDUSTRIES INC	0.000	1165.69	8.31	0.03
411	THOMAS INDUSTRIES INC	1.259	1106.52	8.85	-1.68
412	TIMKEN CO	160.280	-6149.49	-118.62	7.56
413	TELLABS INC	0.180	154593.68	203.56	-10.28
414	TOYOTA MOTOR CORP -ADR	5816.013	475266.52	2057.64	-12.76
415	THERMO ELECTRON CORP	-196.456	-15664.30	-260.40	18.94
416	THOMAS & BETTS CORP	-30.291	-14079.48	-182.07	-7.27
417	TENNANT CO	-9.883	787.33	-4.05	4.06
418	TECHNITROL INC	34.726	4168.81	27.06	-0.05
419	TECHNOLOGY RESEARCH CORP	0.619	-108.51	0.14	47.10
420	TRIDENT MICROSYSTEMS INC	-0.193	-1331.03	-9.31	-18.59
421	TRIMBLE NAVIGATION LTD	68.485	789.82	1.22	-65.19
422	TRINITY INDUSTRIES	24.133	-5568.62	-99.53	-7.16
423	TRANS-INDUSTRIES INC	-1.674	242.83	3.12	-28.28
424	TSR INC	0.000	-22.11	1.59	-15.68
425	TRANSTECHNOLOGY CORP	68.606	759.14	4.89	0.06
426	TORO CO	96.341	760.14	7.62	7.80
427	TETRA TECHNOLOGIES INC/DE	20.006	-527.11	-3.02	5.09
428	TEXAS INDUSTRIES INC	524.120	2704.33	-6.22	-3.41
429	TEXAS INSTRUMENTS INC	-250.000	593439.84	79.33	-3.21
430	TEXTRON INC	-2724.667	-29832.16	-386.33	7.72
431	TYCO INTERNATIONAL LTD	17858.554	921412.88	3262.25	46.77
432	TYLER TECHNOLOGIES INC	-7.994	524.12	18.90	218.49

	Acquirer	TD	MV	NI	PE
433	UNIVERSAL ELECTRONICS INC	0.080	204.19	4.82	-44.16
434	UNITED HERITAGE CORP	0.000	552.31	0.85	
435	UNITED INDUSTRIAL CORP	-6.076	750.04	-0.90	-17.22
436	UNISYS CORP	-928.533	16731.54	261.10	-60.45
437	ULTRALIFE BATTERIES INC	-0.463	-106.00	-4.67	
438	UTAH MEDICAL PRODUCTS INC	4.865	-580.61	-2.61	-3.60
439	UNITED TECHNOLOGIES CORP	2686.000	160964.13	916.33	0.80
440	VICOR CORP	0.000	217.72	-2.81	16.07
441	VIRCO MANUFACTURING	16.511	532.27	-4.65	5.00
442	VITAL SIGNS INC	-1.566	648.22	-1.61	-6.86
443	VALLEY FORGE SCIENTIFIC CORP	0.000	-124.49	0.25	-233.27
444	VALMONT INDUSTRIES	140.604	-224.10	-0.03	-2.68
445	VOLVO AB SWE -ADR	1793.518	-60499.59	-1164.38	66.62
446	VARCO INTERNATIONAL INC	82.919	6660.89	15.75	-15.59
447	VERITAS SOFTWARE CO	326.695	235891.41	-364.53	24.98
448	VISHAY INTRTECHNOLOGY	307.099	2520.21	-16.98	53.75
449	VULCAN INTL CORP	0.000	149.92	0.96	-8.34
450	WESTERN DIGITAL CORP	406.727	-1346.04	-421.42	11.51
451	WEATHERFORD INTL LTD	980.602	37554.84	-23.81	76.57
452	WEGENER CORP	-4.088	-321.61	-1.71	-120.78
453	WINNEBAGO INDUSTRIES	-6.170	1282.47	26.63	-2.80
454	WHIRLPOOL CORP	22.000	-2247.28	-157.33	11.83
455	WHX CORP	300.912	-2027.12	8.74	-1.62
456	ENCORE WIRE CORP	18.985	1573.51	11.26	1.68
457	WOLVERINE TUBE INC	118.617	-3138.62	-32.66	36.84
458	WMS INDUSTRIES INC	-31.472	-701.00	-20.35	81.06
459	WABASH NATIONAL CORP	99.512	-2650.78	-112.41	-42.95
460	WORTHINGTON INDUSTRIES	-76.034	-8423.89	-55.62	-0.53
461	WEST PHARMACEUTICAL SVSC INC	83.800	-1246.17	-17.57	81.49
462	WESTERBEKE CORP	1.588	9.39	-0.13	-0.84
463	WATTS INDUSTRIES -CL A	9.489	-2379.71	9.02	-1.16
464	WIRELESS TELECOM GROUP INC	2.144	-630.89	-1.56	-3.78
465	XILINX INC	-250.000	147791.16	78.56	79.30
466	DENTSPLY INTERNATL INC	97.163	6277.18	23.08	-2.09
467	X-RITE INC	0.000	-2337.79	-5.09	-9.04
468	XEROX CORP	3173.333	220394.05	1025.00	21.48
469	YORK INTL	380.019	-4500.12	59.13	1.56
470	ZEBRA TECHNOLOGIES CP -CL A	0.383	5830.61	37.05	-0.23
471	ZYGO CORP	-0.365	1825.94	0.62	162.94
472	ZOLTEK COS INC	9.001	-4587.58	-25.57	
473	ZOOM TECHNOLOGIES INC	0.000	-297.18	-7.79	6.52

Acquirer	OITA	SE	TDTA	SBVPS	S129	S3034
1 ALCOA INC	-0.03	-0.15	0.09	-377.08	0	1
2 AAON INC	0.13	0.46	-0.23	-3.46	0	0
3 APPLE COMPUTER INC	0.10	-0.39	-0.16	-40.50	0	0
4 ARCTIC CAT INC	0.00	0.25	0.00	-9.14	0	0
5 ACTEL CORP	-0.06	-0.11	0.00	-1.55	0	0
6 ADC TELECOMMUNICATIONS INC	-0.10	-0.25	0.00	-92.58	0	0
7 ANALOG DEVICES	-0.02	0.17	0.01	-23.05	0	0
8 ADVANCED DIGITAL INFO CORP	-0.06	-0.67	-0.13	0.81	0	0
9 AUTODESK INC	-0.07	0.02	0.00	-28.47	0	0
10 AES CORP. (THE)	-0.02	46.09	0.01	-326.05	0	0
11 AGCO CORP	-0.06	-0.55	0.02	-2.77	0	0
12 APPLIED INNOVATION INC	0.02	0.88	0.00	-0.77	0	0
13 AAR CORP	-0.06	-0.99	0.04	-0.08	0	0
14 ACCLAIM ENMNT INC	-0.56	-1.47	0.20	312.77	0	0
15 ALCAN INC	-0.02	3.30	0.03	-42.45	0	1
16 ALCATEL -ADS	-0.03	-2.27	0.09	55.95	0	0
17 ALDILA INC	-0.10	0.35	-0.17	-0.60	0	0
18 ALAMO GROUP INC	-0.03	-0.73	-0.09	-0.44	0	0
19 AMERICAN LOCKER GROUP INC	0.23	2.42	-0.02	-1.31	1	0
20 ALLEN TELECOM INC	-0.10	-0.88	0.15	-0.02	0	0
21 ASTRO-MED INC	-0.03	-0.35	0.00	-0.01	0	0
22 ALTERA CORP	0.01	0.59	-0.05	-127.08	0	0
23 APPLIED MATERIALS INC	-0.05	-0.37	0.00	-152.47	0	0
24 AMERICAN TECH CERAMICS CORP	0.06	0.01	-0.04	-0.15	0	0
25 AMERON INTERNATIONAL CORP	0.00	0.02	0.01	-0.24	0	1
26 AMERICAN SOFTWARE -CL A	-0.05	-0.15	0.01	0.28	0	0
27 AMERICAN MANAGEMENT SYSTEMS	0.02	-0.04	-0.04	-3.18	0	0
28 AMX CORP	-0.14	-0.01	-0.02	0.24	0	0
29 ANDERSEN GROUP INC	0.06	0.31	0.01	-0.17	0	0
30 ANDREW CORP	-0.04	0.91	-0.02	-16.73	0	1
31 SMITH (A O) CORP	-0.01	-2.48	0.04	-6.64	0	0
32 AMERICAN PWR CNVRSION	-0.12	0.01	0.00	-39.34	0	0
33 ARROW INTERNATIONAL	-0.01	-0.16	-0.04	-0.75	0	0
34 AEROFLEX INC	-0.04	-0.94	-0.21	-4.16	0	0
35 ASA INTL LTD	-0.12	-0.99	0.03	-0.04	0	0
36 ASTEC INDUSTRIES INC	0.07	1.00	0.13	-2.06	0	0
37 ALLIANT TECHSYSTEMS INC	0.03	0.57	0.05	-11.57	0	0
38 ATMEL CORP	-0.10	-0.39	0.26	-44.01	0	0
39 ACTION PERFORMANCE COS INC	-0.10	-0.93	0.07	-2.87	0	0
40 ATRION CORP	0.02	0.49	0.15	-0.11	0	0
41 ARTESYN TECHNOLOGIES INC	-0.11	1.29	-0.01	-7.27	0	0
42 AXSYS TECHNOLOGIES INC	-0.14	-1.49	-0.23	-0.69	0	0
43 BARNES GROUP INC	-0.08	-0.37	0.17	-0.43	0	1
44 BOEING CO	-0.01	5.74	0.05	53.77	0	0
45 BOMBAY CO INC	0.02	0.32	0.00	-0.29	0	0
46 BLACK BOX CORP	-0.11	0.74	0.07	-2.47	0	0
47 BUTLER MFG CO	-0.05	-0.46	0.00	-0.81	0	1
48 BRUNSWICK CORP	0.02	0.48	0.04	-2.22	0	0
49 BARD (C.R.) INC	-0.03	-0.11	0.14	-3.37	0	0
50 BLACK & DECKER CORP	0.03	0.17	-0.06	26.95	0	0
51 BECTON DICKINSON & CO	-0.01	0.00	0.00	-0.92	0	0
52 BALDOR ELECTRIC	0.04	0.47	0.02	-2.23	0	0
53 BRIGGS & STRATTON	-0.02	-1.51	0.04	-0.35	0	0
54 BERGER HOLDINGS LTD	0.00	-0.55	0.07	-0.31	0	1
55 BAKER-HUGHES INC	-0.02	3.43	0.11	120.14	0	0
56 BELL INDUSTRIES INC	-0.01	0.99	-0.07	-3.02	0	0
57 BIO-RAD LABORATORIES INC	-0.01	0.19	0.25	-0.38	0	0
58 BALDWIN TECHNOLOGY -CL A	-0.03	-0.03	-0.06	0.71	0	0
59 BALL CORP	0.01	-0.44	0.19	-0.20	0	1
60 BLOUNT INTL INC	0.02	0.88	0.35	-122.33	0	1

Acquirer	OITA	SE	TDTA	SBVPS	S129	S3034
61 BMC SOFTWARE INC	-0.24	-0.58	0.00	-216.62	0	0
62 BIOMET INC	-0.02	0.08	0.00	-13.56	0	0
63 BADGER METER INC	0.05	0.24	0.03	-0.21	0	0
64 BMC INDUSTRIES INC/MN	-0.15	-2.56	0.40	-1.22	0	1
65 BAUSCH & LOMB INC	-0.02	-0.17	0.02	-3.44	1	0
66 INTERPORE INTERNATIONAL	0.10	0.33	0.02	-2.03	0	0
67 BORLAND SOFTWARE CORP	0.28	0.38	-0.01	8.73	0	0
68 BOSTON ACOUSTICS INC	0.11	1.08	0.17	-0.15	0	0
69 BRADY CORP	-0.02	-0.01	0.00	-0.63	0	0
70 BROOKTROUT INC	-0.12	-0.56	0.00	-0.88	0	0
71 BUSH INDUSTRIES -CL A	-0.11	-0.95	0.17	-1.10	1	0
72 BOSTON SCIENTIFIC CORP	-0.12	-0.04	0.22	-228.97	0	0
73 BTU INTERNATIONAL INC	-0.12	-0.28	-0.03	-0.08	0	0
74 BVR TECHNOLOGIES LTD	-0.07	-1.90	-0.01	0.07	0	0
75 BELDEN INC	-0.14	-0.14	0.12	-1.05	0	1
76 BAYOU STEEL CORP -CL A	-0.07	-0.29	0.09	-7.75	0	1
77 CASCADE CORP	-0.02	-0.51	0.13	-0.14	0	0
78 CONAGRA FOODS INC	0.02	-0.86	-0.01	-35.10	1	0
79 CATALINA LIGHTING INC	-0.03	-1.21	-0.13	0.01	0	0
80 CATERPILLAR INC	-0.05	-1.08	0.11	-56.90	0	0
81 BRILLIANCE CHINA AUTO -ADR	0.04	1.31	0.00	-0.70	0	0
82 COOPER INDUSTRIES LTD	0.02	0.23	-0.03	-2.55	0	0
83 C-COR.NET CORP	0.02	1.50	0.00	-1.27	0	0
84 CONCURRENT COMPUTER CP	-0.05	-0.20	-0.26	74.20	0	0
85 CADENCE DESIGN SYS INC	-0.14	0.13	0.03	-223.29	0	0
86 CABLE DESIGN TECH CP -CL A	-0.04	0.16	-0.14	-5.61	0	1
87 CECO ENVIRONMENTAL CORP	-0.01	3.53	0.27	-3.55	0	0
88 COGNITRONICS CORP	-0.08	-0.09	-0.01	-0.03	0	0
89 COGNEX CORP	-0.13	-0.62	0.00	-2.42	0	0
90 CHECKPOINT SYSTEMS INC	0.01	-0.05	0.04	5.47	0	0
91 CLARCOR INC	-0.01	-0.71	0.06	-1.74	0	0
92 CLEVELAND-CLIFFS INC	0.03	9.66	-0.03	-0.55	1	0
93 CANDELA CORP	0.05	0.03	-0.01	-5.69	0	0
94 COLORADO MEDTECH INC	-0.02	-0.19	0.00	-1.04	0	0
95 COMPUTER NETWORK TECH CORP	0.00	0.06	0.02	-1.79	0	0
96 CREDECE SYSTEMS CORP	-0.12	-0.13	-0.01	-2.73	0	0
97 COMVERSE TECHNOLOGY INC	0.05	0.13	0.03	-226.90	0	0
98 CONMED CORP	-0.05	-0.36	0.43	-2.79	0	0
99 CNS INC	-0.42	-1.17	0.00	0.23	0	0
100 COACHMEN INDUSTRIES INC	-0.12	-2.45	-0.03	-0.80	0	0
101 COBRA ELECTRS CORP	0.08	-1.05	0.06	-0.36	0	0
102 COGNOS INC	-0.05	-0.05	-0.01	-16.18	0	0
103 COLLINS INDUSTRIES INC	0.14	-0.23	-0.17	-2.26	0	0
104 3COM CORP	-0.11	-0.14	-0.02	-187.62	0	0
105 COREL CORP	-0.40	-0.79	0.10	40.54	0	0
106 CPAC INC	-0.03	-0.15	-0.05	-0.29	1	0
107 COMPUWARE CORP	-0.18	0.14	0.02	-97.49	0	0
108 CRANE CO	0.00	-0.86	-0.03	-71.81	0	1
109 CROWN ANDERSEN INC	-0.05	-0.29	-0.05	-0.01	0	0
110 CHROMCRAFT REVINGTON INC	-0.07	0.04	0.00	-2.93	1	0
111 CREATIVE TECHNOLOGY LTD	-0.02	-2.12	-0.04	-15.33	0	0
112 CARPENTER TECHNOLOGY	-0.04	-0.69	-0.01	-8.20	0	1
113 CISCO SYSTEMS INC	-0.13	-0.61	0.00	-21403.72	0	0
114 CSP INC	0.02	1.59	0.00	0.00	0	0
115 COMSHARE INC	0.00	0.32	-0.02	0.25	0	0
116 CTS CORP	0.06	0.09	0.18	-13.81	0	0
117 CUBIC CORP	-0.01	0.74	0.01	-0.19	0	0
118 CUMMINS INC	-0.03	0.90	0.18	-0.42	0	0
119 CYPRESS SEMICONDUCTOR CORP	-0.06	-0.74	0.07	-1.91	0	0
120 CYBEROPTICS CORP	-0.11	-0.31	0.00	-1.65	0	0
121 DATA I/O CORP	-0.16	-0.26	-0.04	0.51	0	0
122 DIEBOLD INC	0.06	0.48	0.01	-0.98	0	0

	Acquirer	OITA	SE	TDTA	SBVPS	S129	S3034
123	DONALDSON CO INC	-0.02	-0.23	0.13	-5.70	0	0
124	DANA CORP	-0.05	-0.52	0.05	-45.85	0	0
125	DUCOMMUN INC	-0.10	2.09	0.09	-1.88	0	0
126	DU PONT (E I) DE NEMOURS	-0.05	-2.89	0.01	-423.23	1	0
127	DEERE & CO	-0.03	-0.67	-0.03	-28.42	0	0
128	DELL INC	-0.04	0.96	0.02	-8950.92	0	0
129	DIGI INTERNATIONAL INC	-0.12	-0.57	0.02	-1.05	0	0
130	DANAHER CORP	0.00	-1.11	0.04	-55.88	0	0
131	DIONEX CORP	0.15	0.25	0.00	-0.55	0	0
132	DOVER CORP	-0.07	-0.38	0.08	-36.67	0	0
133	DATARAM CORP	-0.32	-2.30	0.09	-7.73	0	0
134	DRS TECHNOLOGIES INC	-0.01	0.58	-0.08	-3.31	0	0
135	DATASCOPE CORP	0.03	0.30	0.00	-0.64	0	0
136	DATA SYSTEMS & SOFTWARE INC	-0.14	-0.41	0.16	0.84	0	0
137	DREW INDUSTRIES INC	-0.11	-1.86	0.02	-0.73	0	1
138	DIXON TICONDEROGA CO	-0.06	-0.34	-0.09	-0.13	0	0
139	ENGINEERED SUPPORT SYSTEMS	0.13	2.58	0.00	-0.62	0	0
140	ENGELHARD CORP	0.00	1.39	-0.08	-14.15	1	0
141	ELECTROGLAS INC	-0.32	-1.60	0.00	-0.97	0	0
142	EASTMAN KODAK CO	0.03	0.39	-0.09	9.58	0	0
143	ELECTROLUX AB -ADR	0.01	0.37	-0.07	-0.30	0	0
144	CALLAWAY GOLF CO	-0.38	-1.31	0.00	-7.30	0	0
145	EMC CORP/MA	-0.15	-1.56	-0.12	-737.26	0	0
146	EMERSON ELECTRIC CO	0.00	-0.07	0.04	-52.48	0	0
147	ELECTRONIC ARTS INC	-0.06	-0.26	0.00	-22.79	0	0
148	EVANS & SUTHERLAND CMP CORP	0.00	0.50	-0.05	-0.03	0	0
149	ESCO TECHNOLOGIES INC	0.01	-0.45	0.07	-0.15	0	0
150	ESPEY MFG & ELECTRONICS CORP	-0.05	-3.80	0.00	-0.01	0	0
151	EATON CORP	-0.03	0.20	0.07	-10.70	0	0
152	EXAR CORP	-0.10	-2.23	0.00	-0.39	0	0
153	VISX INC/DE	0.39	1.47	0.00	-26.94	0	0
154	FAIRCHILD CORP -CL A	0.00	0.24	-0.07	-13.06	0	1
155	FURNITURE BRANDS INTL INC	0.06	0.75	-0.08	-10.48	1	0
156	FALCON PRODUCTS INC	-0.04	0.83	0.46	0.11	1	0
157	FOCUS ENHANCEMENTS INC	-0.03	-0.38	0.16	2.39	0	0
158	FREQUENCY ELECTRONICS INC	0.01	-0.21	-0.01	-1.05	0	0
159	FRANKLIN ELECTRIC CO	0.03	0.51	-0.04	-1.16	0	0
160	FLOW INTL CORP	0.01	-0.01	0.06	-0.48	0	0
161	FLOWERVE CORP	-0.08	0.83	0.30	-1.32	0	0
162	FLEXSTEEL INDS	0.04	0.09	0.00	-0.16	1	0
163	FMC CORP	0.01	0.19	0.01	-8.15	1	0
164	GILLETTE CO	-0.02	0.18	0.06	-1486.66	0	1
165	LANGER INC	-0.10	0.09	0.24	0.03	0	0
166	GREENBRIAR CORP	0.05	3.90	0.24	-0.20	0	0
167	GEHL CO	-0.07	-0.14	0.07	-0.39	0	0
168	GLENAYRE TECHNOLOGIES INC	-0.20	-1.00	0.00	-3.41	0	0
169	GRIFFON CORP	-0.05	-0.08	0.13	-2.16	0	1
170	GEORGIA GULF CORP	-0.27	6.94	0.00	-150.47	1	0
171	GRACO INC	0.19	0.62	0.08	-9.26	0	0
172	GRAHAM CORP	-0.12	-0.19	-0.03	-0.07	0	1
173	GREAT LAKES CHEMICAL CORP	-0.12	-1.09	0.22	0.25	1	0
174	CORNING INC	-0.14	-0.89	0.07	-693.04	0	1
175	GENERAL MOTORS CORP	-0.01	-2.13	0.08	-58.79	0	0
176	GTECH HOLDINGS CORP	0.03	0.69	-0.06	-2.96	0	0
177	GATEWAY INC	-0.06	-3.59	-0.02	-107.02	0	0
178	GENCORP INC	-0.02	28.83	-0.04	-21.90	0	1
179	HAEMONETICS CORP	-0.11	0.01	0.08	-0.31	0	0
180	HARMAN INTERNATIONAL INDS	0.00	0.35	-0.01	-0.90	0	0
181	HASBRO INC	-0.06	-0.14	0.21	0.24	0	0
182	HILLENBRAND INDUSTRIES	-0.01	-0.12	0.00	-4.15	1	0
183	HARLEY-DAVIDSON INC	-0.02	-0.12	0.17	-43.17	0	0
184	HEICO CORP	0.03	0.16	0.08	-14.58	0	0

Acquirer	OITA	SE	TDTA	SBVPS	S129	S3034
185 HEI INC	-0.18	-1.12	0.08	-0.05	0	0
186 HELEN OF TROY CORP LTD	-0.02	-0.79	-0.07	-1.89	0	0
187 HELIX TECHNOLOGY CORP	-0.15	-1.22	0.00	-3.83	0	0
188 HON INDUSTRIES	-0.02	-0.45	-0.03	-9.66	1	0
189 HOLLY CORP	-0.02	-1.82	-0.07	-1.02	1	0
190 HOLOGIC INC	-0.02	-0.10	0.00	-18.42	0	0
191 HONEYWELL INTERNATIONAL INC	0.00	-1.01	0.08	-71.14	0	0
192 HEWLETT-PACKARD CO	-0.05	0.63	0.01	-85.92	0	0
193 HERLEY INDUSTRIES INC/DE	0.05	-0.03	-0.11	-3.46	0	0
194 HARRIS CORP	-0.04	0.73	-0.02	1.17	0	0
195 HARSCO CORP	-0.03	-0.20	0.17	-0.96	0	1
196 HUFFY CORP	-0.03	0.74	-0.06	1.18	0	0
197 HURCO COMPANIES INC	-0.08	-0.61	-0.17	-0.95	0	0
198 HAVERTY FURNITURE	0.04	0.06	0.03	-0.42	0	0
199 HEXCEL CORP	-0.02	-0.15	0.25	0.33	0	1
200 INTL BUSINESS MACHINES CORP	0.00	0.46	0.05	-109.36	0	0
201 ICO INC	0.02	1.34	0.07	-1.31	1	0
202 INTERDIGITAL COMMUN CORP	0.09	-0.33	-0.02	-1.07	0	0
203 IDEX CORP	-0.04	-0.42	-0.14	-2.43	0	0
204 II-VI INC	-0.04	0.28	0.14	-5.46	0	0
205 INTERMAGNETICS GENERAL CORP	0.07	-0.25	-0.15	-1.28	0	1
206 IMCO RECYCLING INC	-0.08	13.60	0.06	-0.39	0	1
207 INTERPHASE CORP	-0.04	-0.10	-0.04	-0.09	0	0
208 INTEL CORP	-0.15	-1.27	0.00	-1510.28	0	0
209 INTER-TEL INC -SER A	0.00	-0.26	0.00	-2.82	0	0
210 INTUIT INC	0.00	0.28	-0.03	-66.37	0	0
211 INTERVOICE INC	-0.20	-0.17	0.12	16.10	0	0
212 INNOVEX INC	-0.37	-3.06	0.14	0.42	0	0
213 IOMEGA CORP	-0.07	-1.10	-0.03	-0.97	0	0
214 INGERSOLL-RAND CO LTD	0.02	0.90	0.18	-64.78	0	0
215 INTL REMOTE IMAGING SYSTEMS	-0.09	-0.47	0.26	-0.87	0	0
216 INFORMATION RESOURCES INC	0.03	0.47	0.00	0.23	0	0
217 ITRON INC	-0.02	0.22	0.23	2.25	0	0
218 ILLINOIS TOOL WORKS	-0.02	-0.46	-0.02	-134.02	0	0
219 INVACARE CORP	-0.02	0.49	0.12	-10.76	0	0
220 JOHNSON CONTROLS INC	0.00	0.23	0.00	-0.80	1	0
221 JDS UNIPHASE CORP	-0.44	-0.02	-0.01	-4230.31	0	0
222 JLG INDUSTRIES INC	-0.19	-0.46	0.24	-25.17	0	0
223 JMAR TECHNOLOGIES INC	-0.18	-0.40	-0.06	-1.33	0	0
224 JOHNSON & JOHNSON	0.00	0.02	-0.01	-351.82	1	0
225 JUNO LIGHTING INC	-0.05	-0.17	-0.04	-0.88	0	0
226 KIMBALL INTERNATIONAL -CL B	-0.05	0.39	0.00	-1.07	1	0
227 KAYDON CORP	0.04	0.79	-0.04	-25.75	0	0
228 KEITHLEY INSTR INC	0.13	0.44	-0.13	-1.79	0	0
229 KEMET CORP	0.01	2.53	-0.08	-3.85	0	0
230 KLA-TENCOR CORP	-0.10	-0.77	-0.02	-1.40	0	0
231 KENAMETAL INC	-0.05	0.42	0.26	-27.82	0	0
232 KNAPE & VOGT MFG CO	0.03	-0.58	-0.01	1.15	1	0
233 KOPIN CORP	-0.05	-0.39	0.03	0.70	0	0
234 KOSS CORP	0.09	0.76	-0.02	-3.10	0	0
235 KATY INDUSTRIES INC	0.05	0.48	0.11	0.00	1	0
236 K-TRON INTERNATIONAL INC	0.01	0.00	-0.15	-0.52	0	0
237 KYOCERA CORP -ADR	-0.04	-0.36	0.01	-0.27	0	0
238 LAKELAND INDUSTRIES INC	-0.04	0.00	-0.21	-0.06	0	0
239 LIFETIME HOAN CORP	-0.13	-0.54	0.00	-0.24	0	1
240 LOWRANCE ELECTRONICS INC	0.05	0.21	0.13	0.22	0	0
241 CONCORD CAMERA CORP	0.08	2.42	0.09	-4.34	0	0
242 LITTELFUSE INC	0.06	0.07	-0.19	-2.08	0	0
243 LYNCH CORP	-0.15	-4.76	-0.39	0.65	1	0
244 LAZARE KAPLAN INTERNATIONAL	0.00	-7.60	-0.03	0.00	0	0
245 LINDSAY MANUFACTURING CO	0.06	0.60	0.00	-2.50	0	0
246 LANOPTICS LTD	-0.41	-1.22	0.00	0.62	0	0

Acquirer	OITA	SE	TDTA	SBVPS	S129	S3034
247 LAM RESEARCH CORP	-0.15	-0.21	0.16	3.03	0	0
248 LATTICE SEMICONDUCTOR CORP	-0.13	-0.47	0.24	-3.51	0	0
249 LSI LOGIC CORP	-0.07	-0.52	0.05	-14.49	0	0
250 LONE STAR TECHNOLOGIES	0.02	2.31	-0.15	-1.30	0	1
251 LTX CORP	-0.19	-0.29	-0.10	-0.71	0	0
252 LUFKIN INDUSTRIES INC	-0.01	-2.56	0.01	-0.03	0	0
253 LUXOTTICA GROUP SPA -ADR	-0.17	-0.81	0.22	-1735.94	0	0
254 LA-Z-BOY INC	-0.03	0.44	0.05	-14.78	1	0
255 MACROMEDIA INC	-0.04	-0.22	0.00	-7.18	0	0
256 MICHAEL ANTHONY JEWELERS INC	-0.04	-2.45	-0.05	-2.06	0	0
257 MAPICS INC	-0.11	0.08	0.00	165.80	0	0
258 MASCO CORP	0.01	0.89	0.03	-2.96	1	0
259 MAXCO INC	0.02	-2.29	0.04	-0.28	0	1
260 MESTEK INC	-0.05	-0.45	-0.02	-0.11	0	0
261 MICROCHIP TECHNOLOGY INC	-0.04	0.07	-0.04	-26.20	0	0
262 MEDTRONIC INC	-0.05	0.07	0.00	-1020.22	0	0
263 MEDSTONE INTERNATIONAL INC	0.07	1.26	0.00	-0.37	0	0
264 METHODE ELECTRONICS -CL A	-0.06	-0.24	0.00	-2.29	0	0
265 MICROWAVE FILTER CO INC	-0.01	0.26	-0.04	-0.03	0	0
266 MAGNA INTERNATIONAL -CL A	-0.05	0.70	0.01	-5.14	0	0
267 MIDDLEBY CORP	-0.02	-0.47	-0.14	-0.32	0	0
268 MILLIPORE CORP	-0.05	-0.06	0.21	18.05	0	0
269 MILLER (HERMAN) INC	-0.03	-0.01	0.05	-1.24	1	0
270 MUELLER INDUSTRIES	-0.03	-1.20	-0.07	-3.87	0	1
271 MENTOR CORP	-0.01	0.26	0.00	-15.10	0	0
272 MOLEX INC	0.00	-0.01	0.00	-2.86	0	0
273 MOVADO GROUP INC	-0.01	-0.21	-0.04	-0.29	0	0
274 MET-PRO CORP	-0.01	-0.13	0.08	-0.24	0	0
275 MERRIMAC INDUSTRIES INC	-0.03	-0.05	0.00	-0.01	0	0
276 MRV COMMUNICATIONS INC	-0.11	-0.15	0.19	-44.36	0	0
277 MINE SAFETY APPLIANCES CO	0.00	0.17	0.00	-0.10	0	0
278 MATERIAL SCIENCES CORP	-0.05	1.02	0.31	-0.79	0	1
279 MICROSEMI CORP	-0.07	-1.90	-0.31	-4.52	0	0
280 MICROSOFT CORP	-0.13	0.43	0.00	-3284.95	0	0
281 MISONIX INC	-0.14	-0.27	0.03	-0.27	0	0
282 MATRIX SERVICE CO	0.06	-2.32	-0.01	-0.04	1	0
283 MARLTON TECHNOLOGIES	-0.02	0.85	0.08	-0.03	0	0
284 M-WAVE INC	0.15	6.00	-0.09	-0.12	0	0
285 MAXIM INTEGRATED PRODUCTS	0.09	1.76	0.00	-25.99	0	0
286 MAXXAM INC	-0.02	1.68	0.02	87.99	0	1
287 MAXWELL TECHNOLOGIES INC	-0.08	-0.96	0.00	-1.07	0	0
288 MAYTAG CORP	-0.02	0.85	0.03	364.96	0	0
289 INCO LTD	-0.03	0.75	-0.03	-56.36	0	1
290 NAVISTAR INTERNATIONL	-0.02	-3.45	0.08	-61.49	0	0
291 NACCO INDUSTRIES -CL A	0.01	0.16	-0.07	-0.56	0	0
292 NCI BUILDING SYSTEMS INC	-0.08	0.28	0.22	-0.73	0	1
293 NORDSON CORP	-0.04	0.00	0.04	-4.40	0	0
294 NEWPORT CORP	-0.01	0.42	-0.14	-2.54	0	0
295 NEC CORP -ADR	0.00	0.46	0.02	1.37	0	0
296 NORTHROP GRUMMAN CORP	0.02	-0.19	-0.05	-11.72	0	0
297 MICRONETICS INC	0.03	0.88	-0.05	-0.12	0	0
298 NOVITRON INTL INC	0.04	-0.21	0.00	0.01	0	0
299 NOVELL INC	-0.27	-0.80	0.00	-32.67	0	0
300 NISSAN MOTOR CO LTD -SP ADR	0.02	-0.01	-0.05	6.99	0	0
301 NATIONAL SEMICONDUCTOR CORP	-0.08	-0.53	-0.01	18.09	0	0
302 NS GROUP INC	0.03	4.68	-0.19	-0.03	0	1
303 NORTEL NETWORKS CORP	-0.32	-0.76	0.02	-150.79	0	0
304 NORTHERN TECH INTL	0.01	0.24	0.00	-0.26	1	0
305 NUCOR CORP	-0.07	-2.85	0.06	-3.69	0	1
306 NATIONAL R V HOLDINGS INC	0.17	1.18	-0.28	-0.93	0	0
307 NOVELLUS SYSTEMS INC	-0.09	-0.57	0.08	-11.65	0	0
308 QUANEX CORP	0.01	1.09	-0.07	-0.46	0	1



Acquirer	OITA	SE	TDTA	SBVPS	S129	S3034
309 ONEIDA LTD	-0.05	0.03	0.25	0.05	0	0
310 ORTHOFIX INTERNATIONAL N V	-0.11	-0.88	0.06	-10.14	0	0
311 O I CORP	0.04	0.31	0.00	-0.14	0	0
312 OM GROUP INC	-0.02	-1.50	0.16	-4.97	0	1
313 OPTI INC	-0.05	-2.48	-0.03	3.96	0	0
314 ORBITAL SCIENCES CORP	0.00	-1.36	0.04	-0.70	0	0
315 ORBOTECH LTD	-0.01	-0.05	0.01	-3.30	0	0
316 ORBIT INTERNATIONAL CP	0.02	-0.22	0.00	0.00	0	0
317 ORACLE CORP	0.07	0.46	-0.03	-2329.43	0	0
318 OSHKOSH TRUCK CORP	-0.03	0.41	0.18	-0.12	0	0
319 OCCIDENTAL PETROLEUM CORP	0.02	2.53	0.03	1.20	1	0
320 PRECISION CASTPARTS CORP	0.00	0.57	0.01	-22.74	0	1
321 PARKER-HANNIFIN CORP	-0.02	0.60	0.04	-4.08	0	1
322 POLARIS INDS INC	-0.04	-1.17	0.02	-11.20	0	0
323 PARKER DRILLING CO	0.00	7.26	0.36	-4.04	1	0
324 PARK ELECTROCHEMICAL CORP	-0.05	0.97	0.09	-1.43	0	0
325 PERKINELMER INC	-0.02	-0.91	0.05	-24.26	0	0
326 PARK OHIO HOLDINGS CORP	0.00	0.13	0.20	-12.10	0	0
327 PHOTRONICS INC	-0.07	-0.72	0.13	-3.85	0	0
328 PALL CORP	-0.03	0.13	0.02	-9.57	0	0
329 PLANAR SYSTEMS INC	-0.03	0.07	0.07	-0.01	0	0
330 PLEXUS CORP	-0.10	-4.45	0.09	-25.18	0	0
331 PARAMETRIC TECHNOLOGY CORP	-0.14	-0.24	0.00	-17.90	0	0
332 PALOMAR MED TECHNOLOGIES INC	0.36	0.24	-0.24	42.06	0	0
333 PENTAIR INC	-0.03	1.47	0.09	-5.88	0	0
334 POWELL INDUSTRIES INC	-0.03	1.08	0.02	-0.24	0	0
335 PPT VISION INC	-0.31	-0.80	0.00	0.29	0	0
336 PROGRESS SOFTWARE CORP	0.05	0.20	0.00	-6.09	0	0
337 PEOPLESOFT INC	-0.09	-0.01	0.01	-131.99	0	0
338 PAR TECHNOLOGY CORP	-0.06	-0.20	0.03	0.07	0	0
339 PHOENIX TECHNOLOGIES LTD	-0.06	-0.15	0.00	0.87	0	0
340 PRINTRONIX INC	-0.08	-1.19	0.10	-0.63	0	0
341 ROYAL APPLIANCE MFG CO	0.03	0.88	0.08	-0.60	0	0
342 RAVEN INDUSTRIES INC	-0.03	0.14	-0.01	-0.70	0	1
343 ROBBINS & MYERS INC	-0.04	0.39	0.11	-0.66	0	1
344 RELIABILITY INC	-0.17	-0.38	-0.06	-2.63	0	0
345 RPC INC	-0.02	2.22	0.01	-1.35	1	0
346 ROANOKE ELECTRIC STEEL CORP	-0.10	-0.49	0.16	-0.51	0	1
347 RESPIRONICS INC	-0.06	0.31	0.21	-28.50	0	0
348 RAINBOW TECHNOLOGIES INC	-0.06	0.23	-0.03	-1.29	0	0
349 ROCHESTER MEDICAL CORP	-0.07	0.10	-0.05	0.59	0	0
350 ROGERS CORP	-0.03	-0.87	-0.05	-0.87	1	0
351 ROPER INDUSTRIES INC/DE	-0.05	-0.26	0.13	-3.14	0	0
352 ROWE COMPANIES	-0.02	-0.93	0.31	-1.09	1	0
353 RPM INTERNATIONAL INC	-0.02	-0.22	-0.01	-1.83	1	0
354 RTI INTL METALS INC	-0.15	-9.85	0.00	-0.36	0	1
355 RAYTHEON CO	-0.05	0.93	0.19	-65.11	0	0
356 RUSS BERRIE & CO INC	0.01	0.12	0.00	-0.36	0	0
357 GRUPO CASA SABA -SPON ADR	-0.05	2.40	0.12	-5.80	0	0
358 INVIVO CORP	-0.02	0.01	-0.02	-10.12	0	0
359 SATCON TECHNOLOGY CORP	-0.11	0.79	0.00	0.16	0	0
360 SYMBOL TECHNOLOGIES	-0.05	0.38	0.05	-232.77	0	0
361 SBS TECHNOLOGIES INC	-0.05	-0.45	-0.19	-1.43	0	0
362 SCHNITZER STEEL INDS -CL A	-0.04	-3.95	0.08	-1.17	0	0
363 SCITEX CORP LTD -ORD	0.10	0.48	0.03	0.86	0	0
364 SCIENTIFIC-ATLANTA INC	0.02	0.19	0.00	-9.87	0	0
365 SALTON INC	0.06	0.66	0.40	-2.17	0	0
366 SILICON GRAPHICS INC	-0.18	-0.35	0.02	-30.01	0	0
367 SCIENTIFIC GAMES CORP	0.07	1.62	0.17	-139.90	0	0
368 SHAW GROUP INC	-0.03	0.92	0.10	-3.34	0	1
369 SKF AB -ADR	-0.04	0.32	-0.02	0.24	0	0
370 SKYLINE CORP	-0.06	1.02	0.00	-0.32	1	0

	Acquirer	OITA	SE	TDTA	SBVPS	S129	S3034
371	SARA LEE CORP	0.04	-0.10	0.05	1101.71	1	0
372	SOLETRON CORP	-0.09	-2.39	0.12	-647.82	0	0
373	SELAS CORP OF AMERICA	-0.07	-1.32	-0.04	0.03	0	0
374	STANDARD MOTOR PRODS	0.00	0.50	0.07	0.01	0	0
375	STANDARD MICROSYSTEMS CORP	0.10	-0.38	-0.01	0.03	0	0
376	SEMTECH CORP	-0.20	-0.57	0.49	-7.85	0	0
377	SNAP-ON INC	0.03	0.27	0.03	-1.74	0	1
378	SAND TECHNOLOGY INC -CL A	-0.58	-5.43	0.08	0.96	0	0
379	SYNOPSIS INC	-0.01	0.16	0.00	-67.10	0	0
380	SPAN-AMERICA MEDICAL SYS INC	-0.02	-0.44	-0.01	-0.07	0	0
381	SPARTAN MOTORS INC	-0.13	-3.65	0.08	-0.06	0	0
382	SPECTRUM CONTROL INC	-0.03	0.93	-0.02	-0.87	0	0
383	SPX CORP	-0.04	0.18	0.19	-71.96	0	0
384	STANDARD REGISTER CO	-0.09	-0.60	0.16	0.29	1	0
385	SPECTRUM SIGNAL PROCESSING	-0.07	-0.41	0.00	-0.39	0	0
386	SPS TECHNOLOGIES INC	-0.03	0.60	0.05	-0.39	0	1
387	STERIS CORP	-0.01	1.38	0.18	-531.13	0	0
388	SCIENTIFIC TECHNOLOGIES INC	-0.25	-0.54	-0.01	-1.60	0	0
389	ST JUDE MEDICAL INC	-0.07	-1.05	0.11	-14.23	0	0
390	STORAGE TECHNOLOGY CP	0.01	-0.41	-0.14	3.23	0	0
391	STANLEY FURNITURE CO INC	0.10	1.22	-0.05	-1.11	1	0
392	SUPREME INDS INC	-0.06	-0.95	-0.05	-1.70	0	0
393	STEEL TECHNOLOGIES	0.00	-0.56	-0.02	-0.25	0	1
394	SUMMA INDUSTRIES INC	0.03	2.44	0.27	-1.80	0	1
395	SUN MICROSYSTEMS INC	-0.14	-0.14	0.09	-383.32	0	0
396	SUPERIOR INDUSTRIES INTL	-0.04	2.04	-0.03	-2.75	0	0
397	STEWART & STEVENSON SERVICES	-0.08	-3.31	-0.09	1.24	0	0
398	STANLEY WORKS	0.00	-0.23	-0.07	-1.49	0	1
399	STANDEX INTERNATIONAL CORP	-0.02	-0.07	0.04	-0.93	0	1
400	STRYKER CORP	-0.05	-0.18	0.22	-5.10	0	0
401	SYMANTEC CORP	0.05	0.02	-0.14	-121.22	0	0
402	SYMMETRICOM INC	-0.05	-0.05	-0.02	-0.42	0	0
403	SYNALLOY CORP	-0.14	-2.37	-0.01	-0.25	0	1
404	TANDY BRANDS ACCESSORIES INC	-0.07	-0.06	0.21	-21.73	1	0
405	TECUMSEH PRODUCTS CO -CL A	-0.02	-3.03	0.00	-0.26	0	0
406	TEKTRONIX INC	-0.05	-0.42	-0.05	-4.44	0	0
407	TERADYNE INC	0.04	0.64	-0.02	-32.55	0	0
408	THREE-FIVE SYSTEMS INC	-0.06	-2.17	0.00	-1.64	0	0
409	TELEFLEX INC	0.00	0.54	-0.08	-0.05	0	0
410	THOR INDUSTRIES INC	0.01	2.19	0.00	-1.36	0	0
411	THOMAS INDUSTRIES INC	-0.04	-0.15	-0.04	-1.24	0	0
412	TIMKEN CO	-0.08	-0.59	0.05	-0.52	0	0
413	TELLABS INC	-0.07	0.36	0.00	-1923.66	0	0
414	TOYOTA MOTOR CORP -ADR	0.02	-1.95	0.01	-2.78	0	0
415	THERMO ELECTRON CORP	-0.02	-0.66	-0.03	-1.66	0	0
416	THOMAS & BETTS CORP	-0.13	-1.14	0.05	10.93	0	0
417	TENNANT CO	-0.02	0.12	-0.05	-0.39	0	0
418	TECHNITROL INC	0.05	-0.33	0.03	-34.70	0	0
419	TECHNOLOGY RESEARCH CORP	0.03	0.30	0.04	0.01	0	0
420	TRIDENT MICROSYSTEMS INC	-0.20	-1.63	0.00	-0.59	0	0
421	TRIMBLE NAVIGATION LTD	0.05	0.35	0.10	0.36	0	0
422	TRINITY INDUSTRIES	-0.08	-6.78	-0.01	-1.58	0	0
423	TRANS-INDUSTRIES INC	0.15	-0.14	-0.14	-0.25	0	0
424	TSR INC	0.05	1.96	0.00	-1.07	0	0
425	TRANSTECHNOLOGY CORP	0.01	-0.07	0.02	-0.04	0	0
426	TORO CO	-0.01	0.08	0.07	-0.84	0	0
427	TETRA TECHNOLOGIES INC/DE	-0.04	0.37	0.04	-0.29	1	0
428	TEXAS INDUSTRIES INC	-0.10	-2.57	0.18	-1.65	0	1
429	TEXAS INSTRUMENTS INC	-0.01	-0.36	-0.06	-113.33	0	0
430	TEXTRON INC	-0.02	0.82	-0.12	-6.93	0	0
431	TYCO INTERNATIONAL LTD	-0.02	-0.62	0.12	-2609.64	0	0
432	TYLER TECHNOLOGIES INC	0.01	0.96	-0.05	-1.98	0	0

Acquirer	OITA	SE	TDTA	SBVPS	S129	S3034
433 UNIVERSAL ELECTRONICS INC	0.18	0.41	0.00	0.17	0	0
434 UNITED HERITAGE CORP	0.19	0.06	0.00	-0.14	0	0
435 UNITED INDUSTRIAL CORP	-0.02	0.38	-0.03	-0.03	0	0
436 UNISYS CORP	-0.02	0.43	-0.14	-458.67	0	0
437 ULTRALIFE BATTERIES INC	-0.08	-0.13	-0.02	-0.07	0	0
438 UTAH MEDICAL PRODUCTS INC	-0.12	-1.49	0.16	-3.36	0	0
439 UNITED TECHNOLOGIES CORP	0.01	0.28	0.07	-222.79	0	0
440 VICOR CORP	-0.13	-0.71	0.00	-3.42	0	0
441 VIRCO MANUFACTURING	-0.11	-0.95	0.02	-0.35	1	0
442 VITAL SIGNS INC	-0.02	-0.04	-0.02	-0.53	0	0
443 VALLEY FORGE SCIENTIFIC CORP	0.09	0.39	0.00	0.02	0	0
444 VALMONT INDUSTRIES	-0.04	0.03	0.23	-1.40	0	1
445 VOLVO AB SWE -ADR	-0.03	-0.09	0.06	-67.82	0	0
446 VARCO INTERNATIONAL INC	0.06	1.50	-0.05	-0.27	0	0
447 VERITAS SOFTWARE CO	-0.21	0.05	0.16	-1546.50	0	0
448 VISHAY INSTRTECHNOLOGY	-0.01	-0.09	0.03	-50.57	0	0
449 VULCAN INTL CORP	0.03	1.66	0.00	-0.06	0	1
450 WESTERN DIGITAL CORP	-0.38	-0.64	0.39	757.95	0	0
451 WEATHERFORD INTL LTD	-0.03	-2.58	0.11	-2.77	0	0
452 WEGENER CORP	-0.13	-0.72	-0.16	0.00	0	0
453 WINNEBAGO INDUSTRIES	0.11	5.57	-0.03	-4.24	0	0
454 WHIRLPOOL CORP	0.06	0.87	0.03	12.16	0	0
455 WHX CORP	0.02	-5.05	0.28	16.57	0	1
456 ENCORE WIRE CORP	0.05	1.57	0.06	-23.07	0	1
457 WOLVERINE TUBE INC	-0.09	-10.40	0.14	-0.56	0	1
458 WMS INDUSTRIES INC	-0.18	-7.77	-0.12	-3.63	0	0
459 WABASH NATIONAL CORP	-0.10	-21.62	0.11	-0.84	0	0
460 WORTHINGTON INDUSTRIES	-0.02	-4.07	-0.05	-0.03	0	1
461 WEST PHARMACEUTICAL SVSC INC	-0.05	-0.76	0.14	0.35	0	1
462 WESTERBEKE CORP	-0.04	-0.65	0.06	-0.04	0	0
463 WATTS INDUSTRIES -CL A	0.00	0.03	0.00	-0.28	0	1
464 WIRELESS TELECOM GROUP INC	-0.46	-1.28	0.06	-6.50	0	0
465 XILINX INC	-0.10	-0.04	-0.30	-58.34	0	0
466 DENTSPLY INTERNATL INC	-0.01	-0.20	0.07	-13.41	0	0
467 X-RITE INC	-0.15	-0.49	0.00	-2.06	0	0
468 XEROX CORP	0.03	0.12	0.14	-24.98	0	0
469 YORK INTL	-0.03	-0.90	0.09	-2.26	0	0
470 ZEBRA TECHNOLOGIES CP -CL A	-0.01	-0.01	0.00	-26.02	0	0
471 ZYGO CORP	0.04	0.56	-0.01	-1.63	0	0
472 ZOLTEK COS INC	-0.11	-1.91	0.07	0.33	1	0
473 ZOOM TECHNOLOGIES INC	-0.35	-4.28	0.00	-0.68	0	0

Acquirer	S35	S36	S3739	S4099
1 ALCOA INC	0	0	0	0
2 AAON INC	1	0	0	0
3 APPLE COMPUTER INC	1	0	0	0
4 ARCTIC CAT INC	0	0	1	0
5 ACTEL CORP	0	1	0	0
6 ADC TELECOMMUNICATIONS INC	0	1	0	0
7 ANALOG DEVICES	0	1	0	0
8 ADVANCED DIGITAL INFO CORP	1	0	0	0
9 AUTODESK INC	0	0	0	1
10 AES CORP. (THE)	0	0	0	1
11 AGCO CORP	1	0	0	0
12 APPLIED INNOVATION INC	0	1	0	0
13 AAR CORP	0	0	0	1
14 ACCLAIM ENMNT INC	0	0	0	1
15 ALCAN INC	0	0	0	0
16 ALCATEL -ADS	0	1	0	0
17 ALDILA INC	0	0	1	0
18 ALAMO GROUP INC	1	0	0	0
19 AMERICAN LOCKER GROUP INC	0	0	0	0
20 ALLEN TELECOM INC	0	1	0	0
21 ASTRO-MED INC	0	0	1	0
22 ALTERA CORP	0	1	0	0
23 APPLIED MATERIALS INC	1	0	0	0
24 AMERICAN TECH CERAMICS CORP	0	1	0	0
25 AMERON INTERNATIONAL CORP	0	0	0	0
26 AMERICAN SOFTWARE -CL A	0	0	0	1
27 AMERICAN MANAGEMENT SYSTEMS	0	0	0	1
28 AMX CORP	0	1	0	0
29 ANDERSEN GROUP INC	0	0	0	1
30 ANDREW CORP	0	0	0	0
31 SMITH (A O) CORP	0	1	0	0
32 AMERICAN PWR CNVRSION	0	1	0	0
33 ARROW INTERNATIONAL	0	0	1	0
34 AEROFLEX INC	0	1	0	0
35 ASA INTL LTD	0	0	0	1
36 ASTEC INDUSTRIES INC	1	0	0	0
37 ALLIANT TECHSYSTEMS INC	0	0	1	0
38 ATMEL CORP	0	1	0	0
39 ACTION PERFORMANCE COS INC	0	0	0	1
40 ATRION CORP	0	0	0	1
41 ARTESYN TECHNOLOGIES INC	0	1	0	0
42 AXSYS TECHNOLOGIES INC	0	1	0	0
43 BARNES GROUP INC	0	0	0	0
44 BOEING CO	0	0	1	0
45 BOMBAY CO INC	0	0	0	1
46 BLACK BOX CORP	0	0	0	1
47 BUTLER MFG CO	0	0	0	0
48 BRUNSWICK CORP	1	0	0	0
49 BARD (C.R.) INC	0	0	0	1
50 BLACK & DECKER CORP	1	0	0	0
51 BECTON DICKINSON & CO	0	0	1	0
52 BALDOR ELECTRIC	0	1	0	0
53 BRIGGS & STRATTON	1	0	0	0
54 BERGER HOLDINGS LTD	0	0	0	0
55 BAKER-HUGHES INC	1	0	0	0
56 BELL INDUSTRIES INC	0	0	0	1
57 BIO-RAD LABORATORIES INC	0	0	1	0
58 BALDWIN TECHNOLOGY -CL A	1	0	0	0
59 BALL CORP	0	0	0	0
60 BLOUNT INTL INC	0	0	0	0

Acquirer	S35	S36	S3739	S4099
61 BMC SOFTWARE INC	0	0	0	1
62 BIOMET INC	0	0	1	0
63 BADGER METER INC	0	0	1	0
64 BMC INDUSTRIES INC/MN	0	0	0	0
65 BAUSCH & LOMB INC	0	0	0	0
66 INTERPORE INTERNATIONAL	0	0	1	0
67 BORLAND SOFTWARE CORP	0	0	0	1
68 BOSTON ACOUSTICS INC	0	1	0	0
69 BRADY CORP	0	0	1	0
70 BROOKTROUT INC	0	1	0	0
71 BUSH INDUSTRIES -CL A	0	0	0	0
72 BOSTON SCIENTIFIC CORP	0	0	1	0
73 BTU INTERNATIONAL INC	1	0	0	0
74 BVR TECHNOLOGIES LTD	0	1	0	0
75 BELDEN INC	0	0	0	0
76 BAYOU STEEL CORP -CL A	0	0	0	0
77 CASCADE CORP	1	0	0	0
78 CONAGRA FOODS INC	0	0	0	0
79 CATALINA LIGHTING INC	0	1	0	0
80 CATERPILLAR INC	1	0	0	0
81 BRILLIANCE CHINA AUTO -ADR	0	0	1	0
82 COOPER INDUSTRIES LTD	0	1	0	0
83 C-COR.NET CORP	0	1	0	0
84 CONCURRENT COMPUTER CP	1	0	0	0
85 CADENCE DESIGN SYS INC	0	0	0	1
86 CABLE DESIGN TECH CP -CL A	0	0	0	0
87 CECO ENVIRONMENTAL CORP	1	0	0	0
88 COGNITRONICS CORP	0	1	0	0
89 COGNEX CORP	0	0	1	0
90 CHECKPOINT SYSTEMS INC	0	1	0	0
91 CLARCOR INC	1	0	0	0
92 CLEVELAND-CLIFFS INC	0	0	0	0
93 CANDELA CORP	0	0	1	0
94 COLORADO MEDTECH INC	0	0	1	0
95 COMPUTER NETWORK TECH CORP	1	0	0	0
96 CREDENCE SYSTEMS CORP	0	0	1	0
97 COMVERSE TECHNOLOGY INC	0	1	0	0
98 CONMED CORP	0	0	1	0
99 CNS INC	0	0	1	0
100 COACHMEN INDUSTRIES INC	0	0	1	0
101 COBRA ELECTRS CORP	0	1	0	0
102 COGNOS INC	0	0	0	1
103 COLLINS INDUSTRIES INC	0	0	1	0
104 3COM CORP	0	0	0	1
105 COREL CORP	0	0	0	1
106 CPAC INC	0	0	0	0
107 COMPUWARE CORP	0	0	0	1
108 CRANE CO	0	0	0	0
109 CROWN ANDERSEN INC	1	0	0	0
110 CHROMCRAFT REVINGTON INC	0	0	0	0
111 CREATIVE TECHNOLOGY LTD	1	0	0	0
112 CARPENTER TECHNOLOGY	0	0	0	0
113 CISCO SYSTEMS INC	1	0	0	0
114 CSP INC	0	0	0	1
115 COMSHARE INC	0	0	0	1
116 CTS CORP	0	1	0	0
117 CUBIC CORP	0	0	1	0
118 CUMMINS INC	1	0	0	0
119 CYPRESS SEMICONDUCTOR CORP	0	1	0	0
120 CYBEROPTICS CORP	0	0	1	0
121 DATA I/O CORP	0	0	1	0
122 DIEBOLD INC	1	0	0	0

Acquirer	S35	S36	S3739	S4099
123 DONALDSON CO INC	1	0	0	0
124 DANA CORP	0	0	1	0
125 DUCOMMUN INC	0	0	1	0
126 DU PONT (E I) DE NEMOURS	0	0	0	0
127 DEERE & CO	1	0	0	0
128 DELL INC	1	0	0	0
129 DIGI INTERNATIONAL INC	1	0	0	0
130 DANAHER CORP	0	0	1	0
131 DIONEX CORP	0	0	1	0
132 DOVER CORP	1	0	0	0
133 DATARAM CORP	1	0	0	0
134 DRS TECHNOLOGIES INC	0	0	1	0
135 DATASCOPE CORP	0	0	1	0
136 DATA SYSTEMS & SOFTWARE INC	0	0	0	1
137 DREW INDUSTRIES INC	0	0	0	0
138 DIXON TICONDEROGA CO	0	0	1	0
139 ENGINEERED SUPPORT SYSTEMS	1	0	0	0
140 ENGELHARD CORP	0	0	0	0
141 ELECTROGLAS INC	1	0	0	0
142 EASTMAN KODAK CO	0	0	1	0
143 ELECTROLUX AB -ADR	0	1	0	0
144 CALLAWAY GOLF CO	0	0	1	0
145 EMC CORP/MA	1	0	0	0
146 EMERSON ELECTRIC CO	0	1	0	0
147 ELECTRONIC ARTS INC	0	0	0	1
148 EVANS & SUTHERLAND CMP CORP	0	1	0	0
149 ESCO TECHNOLOGIES INC	1	0	0	0
150 ESPEY MFG & ELECTRONICS CORP	0	1	0	0
151 EATON CORP	0	0	1	0
152 EXAR CORP	0	1	0	0
153 VISX INC/DE	0	0	1	0
154 FAIRCHILD CORP -CL A	0	0	0	0
155 FURNITURE BRANDS INTL INC	0	0	0	0
156 FALCON PRODUCTS INC	0	0	0	0
157 FOCUS ENHANCEMENTS INC	1	0	0	0
158 FREQUENCY ELECTRONICS INC	0	0	1	0
159 FRANKLIN ELECTRIC CO	0	1	0	0
160 FLOW INTL CORP	1	0	0	0
161 FLOWSERVE CORP	1	0	0	0
162 FLEXSTEEL INDS	0	0	0	0
163 FMC CORP	0	0	0	0
164 GILLETTE CO	0	0	0	0
165 LANGER INC	0	0	1	0
166 GREENBRIAR CORP	0	0	0	1
167 GEHL CO	1	0	0	0
168 GLENAYRE TECHNOLOGIES INC	0	1	0	0
169 GRIFFON CORP	0	0	0	0
170 GEORGIA GULF CORP	0	0	0	0
171 GRACO INC	1	0	0	0
172 GRAHAM CORP	0	0	0	0
173 GREAT LAKES CHEMICAL CORP	0	0	0	0
174 CORNING INC	0	0	0	0
175 GENERAL MOTORS CORP	0	0	1	0
176 GTECH HOLDINGS CORP	0	0	0	1
177 GATEWAY INC	1	0	0	0
178 GENCORP INC	0	0	0	0
179 HAEMONETICS CORP	0	0	1	0
180 HARMAN INTERNATIONAL INDS	0	1	0	0
181 HASBRO INC	0	0	1	0
182 HILLENBRAND INDUSTRIES	0	0	0	0
183 HARLEY-DAVIDSON INC	0	0	1	0
184 HEICO CORP	0	0	1	0

Acquirer	S35	S36	S3739	S4099
185 HEI INC	0	1	0	0
186 HELEN OF TROY CORP LTD	0	1	0	0
187 HELIX TECHNOLOGY CORP	1	0	0	0
188 HON INDUSTRIES	0	0	0	0
189 HOLLY CORP	0	0	0	0
190 HOLOGIC INC	0	0	1	0
191 HONEYWELL INTERNATIONAL INC	0	0	1	0
192 HEWLETT-PACKARD CO	1	0	0	0
193 HERLEY INDUSTRIES INC/DE	0	0	1	0
194 HARRIS CORP	0	0	1	0
195 HARSCO CORP	0	0	0	0
196 HUFFY CORP	0	0	1	0
197 HURCO COMPANIES INC	0	0	1	0
198 HAVERTY FURNITURE	0	0	0	1
199 HEXCEL CORP	0	0	0	0
200 INTL BUSINESS MACHINES CORP	0	0	0	1
201 ICO INC	0	0	0	0
202 INTERDIGITAL COMMUN CORP	0	0	0	1
203 IDEX CORP	1	0	0	0
204 II-VI INC	0	0	1	0
205 INTERMAGNETICS GENERAL CORP	0	0	0	0
206 IMCO RECYCLING INC	0	0	0	0
207 INTERPHASE CORP	1	0	0	0
208 INTEL CORP	0	1	0	0
209 INTER-TEL INC -SER A	0	1	0	0
210 INTUIT INC	0	0	0	1
211 INTERVOICE INC	0	1	0	0
212 INNOVEX INC	0	1	0	0
213 IOMEGA CORP	1	0	0	0
214 INGERSOLL-RAND CO LTD	1	0	0	0
215 INTL REMOTE IMAGING SYSTEMS	0	0	1	0
216 INFORMATION RESOURCES INC	0	0	0	1
217 ITRON INC	0	1	0	0
218 ILLINOIS TOOL WORKS	1	0	0	0
219 INVACARE CORP	0	0	1	0
220 JOHNSON CONTROLS INC	0	0	0	0
221 JDS UNIPHASE CORP	0	1	0	0
222 JLG INDUSTRIES INC	1	0	0	0
223 JMAR TECHNOLOGIES INC	1	0	0	0
224 JOHNSON & JOHNSON	0	0	0	0
225 JUNO LIGHTING INC	0	1	0	0
226 KIMBALL INTERNATIONAL -CL B	0	0	0	0
227 KAYDON CORP	1	0	0	0
228 KEITHLEY INSTR INC	0	0	1	0
229 KEMET CORP	0	1	0	0
230 KLA-TENCOR CORP	0	0	1	0
231 KENAMETAL INC	1	0	0	0
232 KNAPE & VOGT MFG CO	0	0	0	0
233 KOPIN CORP	0	1	0	0
234 KOSS CORP	0	1	0	0
235 KATY INDUSTRIES INC	0	0	0	0
236 K-TRON INTERNATIONAL INC	0	0	1	0
237 KYOCERA CORP -ADR	0	1	0	0
238 LAKELAND INDUSTRIES INC	0	0	1	0
239 LIFETIME HOAN CORP	0	0	0	0
240 LOWRANCE ELECTRONICS INC	0	0	1	0
241 CONCORD CAMERA CORP	0	0	1	0
242 LITTELFUSE INC	0	1	0	0
243 LYNCH CORP	0	0	0	0
244 LAZARE KAPLAN INTERNATIONAL	0	0	0	1
245 LINDSAY MANUFACTURING CO	1	0	0	0
246 LANOPTICS LTD	1	0	0	0

Acquirer	S35	S36	S3739	S4099
247 LAM RESEARCH CORP	1	0	0	0
248 LATTICE SEMICONDUCTOR CORP	0	1	0	0
249 LSI LOGIC CORP	0	1	0	0
250 LONE STAR TECHNOLOGIES	0	0	0	0
251 LTX CORP	0	0	1	0
252 LUFKIN INDUSTRIES INC	1	0	0	0
253 LUXOTTICA GROUP SPA -ADR	0	0	1	0
254 LA-Z-BOY INC	0	0	0	0
255 MACROMEDIA INC	0	0	0	1
256 MICHAEL ANTHONY JEWELERS INC	0	0	1	0
257 MAPICS INC	0	0	0	1
258 MASCO CORP	0	0	0	0
259 MAXCO INC	0	0	0	0
260 MESTEK INC	1	0	0	0
261 MICROCHIP TECHNOLOGY INC	0	1	0	0
262 MEDTRONIC INC	0	0	1	0
263 MEDSTONE INTERNATIONAL INC	0	0	1	0
264 METHODE ELECTRONICS -CL A	0	1	0	0
265 MICROWAVE FILTER CO INC	0	1	0	0
266 MAGNA INTERNATIONAL -CL A	0	0	1	0
267 MIDDLEBY CORP	1	0	0	0
268 MILLIPORE CORP	0	0	1	0
269 MILLER (HERMAN) INC	0	0	0	0
270 MUELLER INDUSTRIES	0	0	0	0
271 MENTOR CORP	0	0	1	0
272 MOLEX INC	0	1	0	0
273 MOVADO GROUP INC	0	0	1	0
274 MET-PRO CORP	1	0	0	0
275 MERRIMAC INDUSTRIES INC	0	1	0	0
276 MRV COMMUNICATIONS INC	1	0	0	0
277 MINE SAFETY APPLIANCES CO	0	0	1	0
278 MATERIAL SCIENCES CORP	0	0	0	0
279 MICROSEMI CORP	0	1	0	0
280 MICROSOFT CORP	0	0	0	1
281 MISONIX INC	0	0	1	0
282 MATRIX SERVICE CO	0	0	0	0
283 MARLTON TECHNOLOGIES	0	0	0	1
284 M-WAVE INC	0	1	0	0
285 MAXIM INTEGRATED PRODUCTS	0	1	0	0
286 MAXXAM INC	0	0	0	0
287 MAXWELL TECHNOLOGIES INC	0	1	0	0
288 MAYTAG CORP	0	1	0	0
289 INCO LTD	0	0	0	0
290 NAVISTAR INTERNATIONL	0	0	1	0
291 NACCO INDUSTRIES -CL A	1	0	0	0
292 NCI BUILDING SYSTEMS INC	0	0	0	0
293 NORDSON CORP	1	0	0	0
294 NEWPORT CORP	0	0	1	0
295 NEC CORP -ADR	1	0	0	0
296 NORTHROP GRUMMAN CORP	0	0	1	0
297 MICRONETICS INC	0	1	0	0
298 NOVITRON INTL INC	0	0	1	0
299 NOVELL INC	0	0	0	1
300 NISSAN MOTOR CO LTD -SP ADR	0	0	1	0
301 NATIONAL SEMICONDUCTOR CORP	0	1	0	0
302 NS GROUP INC	0	0	0	0
303 NORTEL NETWORKS CORP	0	1	0	0
304 NORTHERN TECH INTL	0	0	0	0
305 NUCOR CORP	0	0	0	0
306 NATIONAL R V HOLDINGS INC	0	0	1	0
307 NOVELLUS SYSTEMS INC	1	0	0	0
308 QUANEX CORP	0	0	0	0



Acquirer	S35	S36	S3739	S4099
309 ONEIDA LTD	0	0	1	0
310 ORTHOFIX INTERNATIONAL N V	0	0	1	0
311 O I CORP	0	0	1	0
312 OM GROUP INC	0	0	0	0
313 OPTI INC	0	1	0	0
314 ORBITAL SCIENCES CORP	0	1	0	0
315 ORBOTECH LTD	0	0	1	0
316 ORBIT INTERNATIONAL CP	0	0	1	0
317 ORACLE CORP	0	0	0	1
318 OSHKOSH TRUCK CORP	0	0	1	0
319 OCCIDENTAL PETROLEUM CORP	0	0	0	0
320 PRECISION CASTPARTS CORP	0	0	0	0
321 PARKER-HANNIFIN CORP	0	0	0	0
322 POLARIS INDS INC	0	0	1	0
323 PARKER DRILLING CO	0	0	0	0
324 PARK ELECTROCHEMICAL CORP	0	1	0	0
325 PERKINELMER INC	0	0	1	0
326 PARK OHIO HOLDINGS CORP	0	0	0	1
327 PHOTRONICS INC	0	1	0	0
328 PALL CORP	1	0	0	0
329 PLANAR SYSTEMS INC	0	1	0	0
330 PLEXUS CORP	0	1	0	0
331 PARAMETRIC TECHNOLOGY CORP	0	0	0	1
332 PALOMAR MED TECHNOLOGIES INC	0	0	1	0
333 PENTAIR INC	1	0	0	0
334 POWELL INDUSTRIES INC	0	1	0	0
335 PPT VISION INC	0	0	1	0
336 PROGRESS SOFTWARE CORP	0	0	0	1
337 PEOPLESOFT INC	0	0	0	1
338 PAR TECHNOLOGY CORP	1	0	0	0
339 PHOENIX TECHNOLOGIES LTD	0	0	0	1
340 PRINTRONIX INC	1	0	0	0
341 ROYAL APPLIANCE MFG CO	0	1	0	0
342 RAVEN INDUSTRIES INC	0	0	0	0
343 ROBBINS & MYERS INC	0	0	0	0
344 RELIABILITY INC	0	0	1	0
345 RPC INC	0	0	0	0
346 ROANOKE ELECTRIC STEEL CORP	0	0	0	0
347 RESPIRONICS INC	0	0	1	0
348 RAINBOW TECHNOLOGIES INC	1	0	0	0
349 ROCHESTER MEDICAL CORP	0	0	1	0
350 ROGERS CORP	0	0	0	0
351 ROPER INDUSTRIES INC/DE	0	0	1	0
352 ROWE COMPANIES	0	0	0	0
353 RPM INTERNATIONAL INC	0	0	0	0
354 RTI INTL METALS INC	0	0	0	0
355 RAYTHEON CO	0	0	1	0
356 RUSS BERRIE & CO INC	0	0	1	0
357 GRUPO CASA SABA -SPON ADR	0	0	0	1
358 INVIVO CORP	0	0	1	0
359 SATCON TECHNOLOGY CORP	0	1	0	0
360 SYMBOL TECHNOLOGIES	1	0	0	0
361 SBS TECHNOLOGIES INC	1	0	0	0
362 SCHNITZER STEEL INDS -CL A	0	0	0	1
363 SCITEX CORP LTD -ORD	1	0	0	0
364 SCIENTIFIC-ATLANTA INC	1	0	0	0
365 SALTON INC	0	1	0	0
366 SILICON GRAPHICS INC	1	0	0	0
367 SCIENTIFIC GAMES CORP	1	0	0	0
368 SHAW GROUP INC	0	0	0	0
369 SKF AB -ADR	1	0	0	0
370 SKYLINE CORP	0	0	0	0

Acquirer	S35	S36	S3739	S4099
371 SARA LEE CORP	0	0	0	0
372 SOLECTRON CORP	0	1	0	0
373 SELAS CORP OF AMERICA	0	0	1	0
374 STANDARD MOTOR PRODS	0	1	0	0
375 STANDARD MICROSYSTEMS CORP	0	1	0	0
376 SEMTECH CORP	0	1	0	0
377 SNAP-ON INC	0	0	0	0
378 SAND TECHNOLOGY INC -CL A	0	0	0	1
379 SYNOPSIS INC	0	0	0	1
380 SPAN-AMERICA MEDICAL SYS INC	0	0	1	0
381 SPARTAN MOTORS INC	0	0	1	0
382 SPECTRUM CONTROL INC	0	1	0	0
383 SPX CORP	0	1	0	0
384 STANDARD REGISTER CO	0	0	0	0
385 SPECTRUM SIGNAL PROCESSING	0	1	0	0
386 SPS TECHNOLOGIES INC	0	0	0	0
387 STERIS CORP	0	0	1	0
388 SCIENTIFIC TECHNOLOGIES INC	0	0	1	0
389 ST JUDE MEDICAL INC	0	0	1	0
390 STORAGE TECHNOLOGY CP	1	0	0	0
391 STANLEY FURNITURE CO INC	0	0	0	0
392 SUPREME INDS INC	0	0	1	0
393 STEEL TECHNOLOGIES	0	0	0	0
394 SUMMA INDUSTRIES INC	0	0	0	0
395 SUN MICROSYSTEMS INC	1	0	0	0
396 SUPERIOR INDUSTRIES INTL	0	0	1	0
397 STEWART & STEVENSON SERVICES	0	0	0	1
398 STANLEY WORKS	0	0	0	0
399 STANDEX INTERNATIONAL CORP	0	0	0	0
400 STRYKER CORP	0	0	1	0
401 SYMANTEC CORP	0	0	0	1
402 SYMMETRICOM INC	0	1	0	0
403 SYNALLOY CORP	0	0	0	0
404 TANDY BRANDS ACCESSORIES INC	0	0	0	0
405 TECUMSEH PRODUCTS CO -CL A	1	0	0	0
406 TEKTRONIX INC	0	0	1	0
407 TERADYNE INC	0	0	1	0
408 THREE-FIVE SYSTEMS INC	0	1	0	0
409 TELEFLEX INC	0	0	0	1
410 THOR INDUSTRIES INC	0	0	1	0
411 THOMAS INDUSTRIES INC	1	0	0	0
412 TIMKEN CO	1	0	0	0
413 TELLABS INC	0	1	0	0
414 TOYOTA MOTOR CORP -ADR	0	0	1	0
415 THERMO ELECTRON CORP	0	0	1	0
416 THOMAS & BETTS CORP	0	1	0	0
417 TENNANT CO	1	0	0	0
418 TECHNITROL INC	0	1	0	0
419 TECHNOLOGY RESEARCH CORP	0	1	0	0
420 TRIDENT MICROSYSTEMS INC	0	1	0	0
421 TRIMBLE NAVIGATION LTD	0	0	1	0
422 TRINITY INDUSTRIES	0	0	1	0
423 TRANS-INDUSTRIES INC	0	0	1	0
424 TSR INC	0	0	0	1
425 TRANSTECHNOLOGY CORP	1	0	0	0
426 TORO CO	1	0	0	0
427 TETRA TECHNOLOGIES INC/DE	0	0	0	0
428 TEXAS INDUSTRIES INC	0	0	0	0
429 TEXAS INSTRUMENTS INC	0	1	0	0
430 TEXTRON INC	0	0	0	1
431 TYCO INTERNATIONAL LTD	0	0	0	1
432 TYLER TECHNOLOGIES INC	0	0	0	1

Acquirer	S35	S36	S3739	S4099
433 UNIVERSAL ELECTRONICS INC	0	1	0	0
434 UNITED HERITAGE CORP	0	0	0	1
435 UNITED INDUSTRIAL CORP	0	1	0	0
436 UNISYS CORP	0	0	0	1
437 ULTRALIFE BATTERIES INC	0	1	0	0
438 UTAH MEDICAL PRODUCTS INC	0	0	1	0
439 UNITED TECHNOLOGIES CORP	0	0	1	0
440 VICOR CORP	0	1	0	0
441 VIRCO MANUFACTURING	0	0	0	0
442 VITAL SIGNS INC	0	0	1	0
443 VALLEY FORGE SCIENTIFIC CORP	0	0	1	0
444 VALMONT INDUSTRIES	0	0	0	0
445 VOLVO AB SWE -ADR	0	0	1	0
446 VARCO INTERNATIONAL INC	1	0	0	0
447 VERITAS SOFTWARE CO	0	0	0	1
448 VISHAY INTRTECHNOLOGY	0	1	0	0
449 VULCAN INTL CORP	0	0	0	0
450 WESTERN DIGITAL CORP	1	0	0	0
451 WEATHERFORD INTL LTD	1	0	0	0
452 WEGENER CORP	0	1	0	0
453 WINNEBAGO INDUSTRIES	0	0	1	0
454 WHIRLPOOL CORP	0	1	0	0
455 WHX CORP	0	0	0	0
456 ENCORE WIRE CORP	0	0	0	0
457 WOLVERINE TUBE INC	0	0	0	0
458 WMS INDUSTRIES INC	0	0	1	0
459 WABASH NATIONAL CORP	0	0	1	0
460 WORTHINGTON INDUSTRIES	0	0	0	0
461 WEST PHARMACEUTICAL SVSC INC	0	0	0	0
462 WESTERBEKE CORP	0	1	0	0
463 WATTS INDUSTRIES -CL A	0	0	0	0
464 WIRELESS TELECOM GROUP INC	0	0	1	0
465 XILINX INC	0	1	0	0
466 DENTSPLY INTERNATL INC	0	0	1	0
467 X-RITE INC	0	0	1	0
468 XEROX CORP	1	0	0	0
469 YORK INTL	1	0	0	0
470 ZEBRA TECHNOLOGIES CP -CL A	1	0	0	0
471 ZYGO CORP	0	0	1	0
472 ZOLTEK COS INC	0	0	0	0
473 ZOOM TECHNOLOGIES INC	0	1	0	0

## APPENDIX C

### CORRELATION ANALYSIS

		BETA	TA	BVPS	TD	MV	NI	PE
BETA	Pearson Correlation	1	0.009	0.021	0.014	0.020	-0.049	-0.097*
	Sig. (1-tailed)		0.420	0.324	0.385	0.332	0.142	0.019
	N	473	473	473	473	473	473	458
TA	Pearson Correlation	0.009	1	0.073	0.846**	0.512**	-0.011	0.103*
	Sig. (1-tailed)	0.420		0.057	0.000	0.000	0.406	0.014
	N	473	473	473	473	473	473	458
BVPS	Pearson Correlation	0.021	0.073	1	0.061	0.017	-0.019	0.001
	Sig. (1-tailed)	0.324	0.057		0.093	0.358	0.339	0.492
	N	473	473	473	473	473	473	458
TD	Pearson Correlation	0.014	0.846**	0.061	1	0.161**	-0.022	0.058
	Sig. (1-tailed)	0.385	0.000	0.093		0.000	0.318	0.107
	N	473	473	473	473	473	473	458
MV	Pearson Correlation	0.020	0.512**	0.017	0.161**	1	0.083*	0.104*
	Sig. (1-tailed)	0.332	0.000	0.358	0.000		0.035	0.013
	N	473	473	473	473	473	473	458
NI	Pearson Correlation	-0.049	-0.011	-0.019	-0.022	0.083*	1	-0.424**
	Sig. (1-tailed)	0.142	0.406	0.339	0.318	0.035		0.000
	N	473	473	473	473	473	473	458
PE	Pearson Correlation	-0.097*	0.103*	0.001	0.058	0.104*	-0.424**	1
	Sig. (1-tailed)	0.019	0.014	0.492	0.107	0.013	0.000	
	N	458	458	458	458	458	458	458
ROA	Pearson Correlation	0.085*	-0.074	-0.006	0.010	-0.070	0.661**	-0.197**
	Sig. (1-tailed)	0.032	0.055	0.452	0.417	0.063	0.000	0.000
	N	473	473	473	473	473	473	458
OITA	Pearson Correlation	0.185**	-0.046	0.009	0.012	-0.069	0.223**	-0.204**
	Sig. (1-tailed)	0.000	0.157	0.423	0.397	0.068	0.000	0.000
	N	473	473	473	473	473	473	458
SE	Pearson Correlation	0.029	0.111**	0.021	0.162**	0.011	0.024	-0.077
	Sig. (1-tailed)	0.267	0.008	0.323	0.000	0.405	0.302	0.051
	N	473	473	473	473	473	473	458
TDTA	Pearson Correlation	-0.026	0.052	0.007	0.111**	-0.022	-0.006	0.061
	Sig. (1-tailed)	0.285	0.127	0.443	0.008	0.317	0.451	0.098
	N	473	473	473	473	473	473	458
SBVPS	Pearson Correlation	0.020	-0.225**	-0.013	-0.045	-0.499**	0.039	-0.026
	Sig. (1-tailed)	0.329	0.000	0.391	0.166	0.000	0.199	0.287
	N	473	473	473	473	473	473	458
S129	Pearson Correlation	0.102*	-0.039	0.005	-0.027	-0.031	0.038	-0.031
	Sig. (1-tailed)	0.013	0.199	0.454	0.276	0.248	0.205	0.254
	N	473	473	473	473	473	473	458
S3034	Pearson Correlation	0.050	-0.022	0.049	-0.006	-0.059	0.003	-0.042
	Sig. (1-tailed)	0.138	0.313	0.146	0.448	0.102	0.473	0.188
	N	473	473	473	473	473	473	458
S35	Pearson Correlation	-0.041	-0.024	-0.075	-0.018	0.033	0.028	-0.006
	Sig. (1-tailed)	0.187	0.303	0.052	0.351	0.239	0.274	0.445
	N	473	473	473	473	473	473	458
S36	Pearson Correlation	-0.097*	-0.037	0.008	-0.048	0.034	-0.137**	0.064
	Sig. (1-tailed)	0.018	0.213	0.428	0.147	0.228	0.001	0.087
	N	473	473	473	473	473	473	458
S3739	Pearson Correlation	0.094*	0.030	0.040	0.050	-0.082*	0.020	0.011
	Sig. (1-tailed)	0.021	0.260	0.193	0.139	0.037	0.334	0.409
	N	473	473	473	473	473	473	458
S4099	Pearson Correlation	-0.097*	0.092*	-0.029	0.045	0.115**	0.075	-0.014
	Sig. (1-tailed)	0.017	0.023	0.267	0.164	0.006	0.053	0.381
	N	473	473	473	473	473	473	458

\* Correlation is significant at the 0.05 level (1-tailed).

\*\* Correlation is significant at the 0.01 level (1-tailed)

		ROA	OITA	SE	TDTA	SBVPS	S129	S3034
BETA	Pearson Correlation	0.085*	0.185**	0.029	-0.026	0.020	0.102*	0.050
	Sig. (1-tailed)	0.032	0.000	0.267	0.285	0.329	0.013	0.138
	N	473	473	473	473	473	473	473
TA	Pearson Correlation	-0.074	-0.046	0.111**	0.052	-0.225**	-0.039	-0.022
	Sig. (1-tailed)	0.055	0.157	0.008	0.127	0.000	0.199	0.313
	N	473	473	473	473	473	473	473
BVPS	Pearson Correlation	-0.006	0.009	0.021	0.007	-0.013	0.005	0.049
	Sig. (1-tailed)	0.452	0.423	0.323	0.443	0.391	0.454	0.146
	N	473	473	473	473	473	473	473
TD	Pearson Correlation	0.010	0.012	0.162**	0.111**	-0.045	-0.027	-0.006
	Sig. (1-tailed)	0.417	0.397	0.000	0.008	0.166	0.276	0.448
	N	473	473	473	473	473	473	473
MV	Pearson Correlation	-0.070	-0.069	0.011	-0.022	-0.499**	-0.031	-0.059
	Sig. (1-tailed)	0.063	0.068	0.405	0.317	0.000	0.248	0.102
	N	473	473	473	473	473	473	473
NI	Pearson Correlation	0.661**	0.223**	0.024	-0.006	0.039	0.038	0.003
	Sig. (1-tailed)	0.000	0.000	0.302	0.451	0.199	0.205	0.473
	N	473	473	473	473	473	473	473
PE	Pearson Correlation	-0.197**	-0.204**	-0.077	0.061	-0.026	-0.031	-0.042
	Sig. (1-tailed)	0.000	0.000	0.051	0.098	0.287	0.254	0.188
	N	458	458	458	458	458	458	458
ROA	Pearson Correlation	1	0.718**	0.119**	-0.171**	0.133**	0.056	0.022
	Sig. (1-tailed)		0.000	0.005	0.000	0.002	0.113	0.313
	N	473	473	473	473	473	473	473
OITA	Pearson Correlation	0.718**	1	0.191**	-0.168**	0.080*	0.064	0.016
	Sig. (1-tailed)	0.000		0.000	0.000	0.041	0.083	0.365
	N	473	473	473	473	473	473	473
SE	Pearson Correlation	0.119**	0.191**	1	-0.010	-0.005	0.046	0.031
	Sig. (1-tailed)	0.005	0.000		0.413	0.458	0.159	0.250
	N	473	473	473	473	473	473	473
TDTA	Pearson Correlation	-0.171**	-0.168**	-0.010	1	0.011	0.023	0.117**
	Sig. (1-tailed)	0.000	0.000	0.413		0.403	0.308	0.006
	N	473	473	473	473	473	473	473
SBVPS	Pearson Correlation	0.133**	0.080*	-0.005	0.011	1	0.036	0.027
	Sig. (1-tailed)	0.002	0.041	0.458	0.403		0.215	0.278
	N	473	473	473	473	473	473	473
S129	Pearson Correlation	0.056	0.064	0.046	0.023	0.036	1	-0.123**
	Sig. (1-tailed)	0.113	0.083	0.159	0.308	0.215		0.004
	N	473	473	473	473	473	473	473
S3034	Pearson Correlation	0.022	0.016	0.031	0.117**	0.027	-0.123**	1
	Sig. (1-tailed)	0.313	0.365	0.250	0.006	0.278	0.004	
	N	473	473	473	473	473	473	473
S35	Pearson Correlation	-0.012	-0.017	-0.023	0.003	-0.100*	-0.154**	-0.185**
	Sig. (1-tailed)	0.395	0.357	0.307	0.472	0.015	0.000	0.000
	N	473	473	473	473	473	473	473
S36	Pearson Correlation	-0.109**	-0.045	-0.043	-0.058	0.016	-0.166**	-0.199**
	Sig. (1-tailed)	0.009	0.167	0.176	0.106	0.361	0.000	0.000
	N	473	473	473	473	473	473	473
S3739	Pearson Correlation	0.057	0.047	-0.052	-0.036	0.047	-0.188**	-0.226**
	Sig. (1-tailed)	0.109	0.156	0.130	0.219	0.155	0.000	0.000
	N	473	473	473	473	473	473	473
S4099	Pearson Correlation	0.003	-0.059	0.078*	-0.024	-0.024	-0.120**	-0.144**
	Sig. (1-tailed)	0.474	0.100	0.046	0.298	0.304	0.005	0.001
	N	473	473	473	473	473	473	473

\* Correlation is significant at the 0.05 level (1-tailed).

\*\* Correlation is significant at the 0.01 level (1-tailed)

		S35	S36	S3739	S4099
BETA	Pearson Correlation	-0.041	-0.097*	0.094*	-0.097*
	Sig. (1-tailed)	0.187	0.018	0.021	0.017
	N	473	473	473	473
TA	Pearson Correlation	-0.024	-0.037	0.030	0.092*
	Sig. (1-tailed)	0.303	0.213	0.260	0.023
	N	473	473	473	473
BVPS	Pearson Correlation	-0.075	0.008	0.040	-0.029
	Sig. (1-tailed)	0.052	0.428	0.193	0.267
	N	473	473	473	473
TD	Pearson Correlation	-0.018	-0.048	0.050	0.045
	Sig. (1-tailed)	0.351	0.147	0.139	0.164
	N	473	473	473	473
MV	Pearson Correlation	0.033	0.034	-0.082*	0.115**
	Sig. (1-tailed)	0.239	0.228	0.037	0.006
	N	473	473	473	473
NI	Pearson Correlation	0.028	-0.137**	0.020	0.075
	Sig. (1-tailed)	0.274	0.001	0.334	0.053
	N	473	473	473	473
PE	Pearson Correlation	-0.006	0.064	0.011	-0.014
	Sig. (1-tailed)	0.445	0.087	0.409	0.381
	N	458	458	458	458
ROA	Pearson Correlation	-0.012	-0.109**	0.057	0.003
	Sig. (1-tailed)	0.395	0.009	0.109	0.474
	N	473	473	473	473
OITA	Pearson Correlation	-0.017	-0.045	0.047	-0.059
	Sig. (1-tailed)	0.357	0.167	0.156	0.100
	N	473	473	473	473
SE	Pearson Correlation	-0.023	-0.043	-0.052	0.078*
	Sig. (1-tailed)	0.307	0.176	0.130	0.046
	N	473	473	473	473
TDTA	Pearson Correlation	0.003	-0.058	-0.036	-0.024
	Sig. (1-tailed)	0.472	0.106	0.219	0.298
	N	473	473	473	473
SBVPS	Pearson Correlation	-0.100*	0.016	0.047	-0.024
	Sig. (1-tailed)	0.015	0.361	0.155	0.304
	N	473	473	473	473
S129	Pearson Correlation	-0.154**	-0.166**	-0.188**	-0.120**
	Sig. (1-tailed)	0.000	0.000	0.000	0.005
	N	473	473	473	473
S3034	Pearson Correlation	-0.185**	-0.199**	-0.226**	-0.144**
	Sig. (1-tailed)	0.000	0.000	0.000	0.001
	N	473	473	473	473
S35	Pearson Correlation	1	-0.249**	-0.282**	-0.180**
	Sig. (1-tailed)	.	0.000	0.000	0.000
	N	473	473	473	473
S36	Pearson Correlation	-0.249**	1	-0.304**	-0.194**
	Sig. (1-tailed)	0.000	.	0.000	0.000
	N	473	473	473	473
S3739	Pearson Correlation	-0.282**	-0.304**	1	-0.219**
	Sig. (1-tailed)	0.000	0.000	.	0.000
	N	473	473	473	473
S4099	Pearson Correlation	-0.180**	-0.194**	-0.219**	1
	Sig. (1-tailed)	0.000	0.000	0.000	.
	N	473	473	473	473

\* Correlation is significant at the 0.05 level (1-tailed).

\*\* Correlation is significant at the 0.01 level (1-tailed)

		BETA	TA	BVPS	TD	MV	NI	PE
BETA	Pearson Correlation	1	0.009	0.021	0.014	0.020	-0.049	-0.097*
	Sig. (2-tailed)		0.840	0.647	0.769	0.663	0.285	0.038
	N	473	473	473	473	473	473	458
TA	Pearson Correlation	0.009	1	0.073	0.846**	0.512**	-0.011	0.103*
	Sig. (2-tailed)	0.840		0.114	0.000	0.000	0.812	0.028
	N	473	473	473	473	473	473	458
BVPS	Pearson Correlation	0.021	0.073	1	0.061	0.017	-0.019	0.001
	Sig. (2-tailed)	0.647	0.114		0.185	0.717	0.678	0.985
	N	473	473	473	473	473	473	458
TD	Pearson Correlation	0.014	0.846**	0.061	1	0.161**	-0.022	0.058
	Sig. (2-tailed)	0.769	0.000	0.185		0.000	0.636	0.215
	N	473	473	473	473	473	473	458
MV	Pearson Correlation	0.020	0.512**	0.017	0.161**	1	0.083	0.104*
	Sig. (2-tailed)	0.663	0.000	0.717	0.000		0.070	0.026
	N	473	473	473	473	473	473	458
NI	Pearson Correlation	-0.049	-0.011	-0.019	-0.022	0.083	1	-0.424**
	Sig. (2-tailed)	0.285	0.812	0.678	0.636	0.070		0.000
	N	473	473	473	473	473	473	458
PE	Pearson Correlation	-0.097*	0.103*	0.001	0.058	0.104*	-0.424**	1
	Sig. (2-tailed)	0.038	0.028	0.985	0.215	0.026	0.000	
	N	458	458	458	458	458	458	458
ROA	Pearson Correlation	0.085	-0.074	-0.006	0.010	-0.070	0.661**	-0.197**
	Sig. (2-tailed)	0.065	0.110	0.904	0.833	0.127	0.000	0.000
	N	473	473	473	473	473	473	458
OITA	Pearson Correlation	0.185**	-0.046	0.009	0.012	-0.069	0.223**	-0.204**
	Sig. (2-tailed)	0.000	0.314	0.845	0.794	0.135	0.000	0.000
	N	473	473	473	473	473	473	458
SE	Pearson Correlation	0.029	0.111*	0.021	0.162**	0.011	0.024	-0.077
	Sig. (2-tailed)	0.534	0.016	0.645	0.000	0.809	0.604	0.102
	N	473	473	473	473	473	473	458
TDTA	Pearson Correlation	-0.026	0.052	0.007	0.111*	-0.022	-0.006	0.061
	Sig. (2-tailed)	0.569	0.255	0.886	0.016	0.635	0.901	0.195
	N	473	473	473	473	473	473	458
SBVPS	Pearson Correlation	0.020	-0.225**	-0.013	-0.045	-0.499**	0.039	-0.026
	Sig. (2-tailed)	0.657	0.000	0.783	0.333	0.000	0.399	0.574
	N	473	473	473	473	473	473	458
S129	Pearson Correlation	0.102*	-0.039	0.005	-0.027	-0.031	0.038	-0.031
	Sig. (2-tailed)	0.026	0.398	0.909	0.551	0.496	0.411	0.508
	N	473	473	473	473	473	473	458
S3034	Pearson Correlation	0.050	-0.022	0.049	-0.006	-0.059	0.003	-0.042
	Sig. (2-tailed)	0.277	0.626	0.292	0.897	0.204	0.946	0.375
	N	473	473	473	473	473	473	458
S35	Pearson Correlation	-0.041	-0.024	-0.075	-0.018	0.033	0.028	-0.006
	Sig. (2-tailed)	0.373	0.606	0.104	0.702	0.478	0.547	0.890
	N	473	473	473	473	473	473	458
S36	Pearson Correlation	-0.097*	-0.037	0.008	-0.048	0.034	-0.137**	0.064
	Sig. (2-tailed)	0.035	0.425	0.857	0.294	0.455	0.003	0.175
	N	473	473	473	473	473	473	458
S3739	Pearson Correlation	0.094*	0.030	0.040	0.050	-0.082	0.020	0.011
	Sig. (2-tailed)	0.042	0.520	0.386	0.278	0.074	0.668	0.819
	N	473	473	473	473	473	473	458
S4099	Pearson Correlation	-0.097*	0.092*	-0.029	0.045	0.115*	0.075	-0.014
	Sig. (2-tailed)	0.035	0.045	0.534	0.327	0.012	0.105	0.763
	N	473	473	473	473	473	473	458

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed)



		ROA	OITA	SE	TDTA	SBVPS	S129	S3034
BETA	Pearson Correlation	0.085	0.185**	0.029	-0.026	0.020	0.102*	0.050
	Sig. (2-tailed)	0.065	0.000	0.534	0.569	0.657	0.026	0.277
	N	473	473	473	473	473	473	473
TA	Pearson Correlation	-0.074	-0.046	0.111*	0.052	-0.225**	-0.039	-0.022
	Sig. (2-tailed)	0.110	0.314	0.016	0.255	0.000	0.398	0.626
	N	473	473	473	473	473	473	473
BVPS	Pearson Correlation	-0.006	0.009	0.021	0.007	-0.013	0.005	0.049
	Sig. (2-tailed)	0.904	0.845	0.645	0.886	0.783	0.909	0.292
	N	473	473	473	473	473	473	473
TD	Pearson Correlation	0.010	0.012	0.162**	0.111*	-0.045	-0.027	-0.006
	Sig. (2-tailed)	0.833	0.794	0.000	0.016	0.333	0.551	0.897
	N	473	473	473	473	473	473	473
MV	Pearson Correlation	-0.070	-0.069	0.011	-0.022	-0.499**	-0.031	-0.059
	Sig. (2-tailed)	0.127	0.135	0.809	0.635	0.000	0.496	0.204
	N	473	473	473	473	473	473	473
NI	Pearson Correlation	0.661**	0.223**	0.024	-0.006	0.039	0.038	0.003
	Sig. (2-tailed)	0.000	0.000	0.604	0.901	0.399	0.411	0.946
	N	473	473	473	473	473	473	473
PE	Pearson Correlation	-0.197**	-0.204**	-0.077	0.061	-0.026	-0.031	-0.042
	Sig. (2-tailed)	0.000	0.000	0.102	0.195	0.574	0.508	0.375
	N	458	458	458	458	458	458	458
ROA	Pearson Correlation	1	0.718**	0.119**	-0.171**	0.133**	0.056	0.022
	Sig. (2-tailed)	.	0.000	0.010	0.000	0.004	0.226	0.627
	N	473	473	473	473	473	473	473
OITA	Pearson Correlation	0.718**	1	0.191**	-0.168**	0.080	0.064	0.016
	Sig. (2-tailed)	0.000	.	0.000	0.000	0.082	0.166	0.731
	N	473	473	473	473	473	473	473
SE	Pearson Correlation	0.119**	0.191**	1	-0.010	-0.005	0.046	0.031
	Sig. (2-tailed)	0.010	0.000	.	0.826	0.916	0.319	0.499
	N	473	473	473	473	473	473	473
TDTA	Pearson Correlation	-0.171**	-0.168**	-0.010	1	0.011	0.023	0.117*
	Sig. (2-tailed)	0.000	0.000	0.826	.	0.807	0.616	0.011
	N	473	473	473	473	473	473	473
SBVPS	Pearson Correlation	0.133**	0.080	-0.005	0.011	1	0.036	0.027
	Sig. (2-tailed)	0.004	0.082	0.916	0.807	.	0.430	0.557
	N	473	473	473	473	473	473	473
S129	Pearson Correlation	0.056	0.064	0.046	0.023	0.036	1	-0.123**
	Sig. (2-tailed)	0.226	0.166	0.319	0.616	0.430	.	0.007
	N	473	473	473	473	473	473	473
S3034	Pearson Correlation	0.022	0.016	0.031	0.117*	0.027	-0.123**	1
	Sig. (2-tailed)	0.627	0.731	0.499	0.011	0.557	0.007	.
	N	473	473	473	473	473	473	473
S35	Pearson Correlation	-0.012	-0.017	-0.023	0.003	-0.100*	-0.154**	-0.185**
	Sig. (2-tailed)	0.790	0.713	0.614	0.944	0.030	0.001	0.000
	N	473	473	473	473	473	473	473
S36	Pearson Correlation	-0.109*	-0.045	-0.043	-0.058	0.016	-0.166**	-0.199**
	Sig. (2-tailed)	0.017	0.334	0.352	0.211	0.722	0.000	0.000
	N	473	473	473	473	473	473	473
S3739	Pearson Correlation	0.057	0.047	-0.052	-0.036	0.047	-0.188**	-0.226**
	Sig. (2-tailed)	0.218	0.312	0.259	0.438	0.310	0.000	0.000
	N	473	473	473	473	473	473	473
S4099	Pearson Correlation	0.003	-0.059	0.078	-0.024	-0.024	-0.120**	-0.144**
	Sig. (2-tailed)	0.948	0.200	0.091	0.597	0.609	0.009	0.002
	N	473	473	473	473	473	473	473

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed)

		S35	S36	S3739	S4099
BETA	Pearson Correlation	-0.041	-0.097*	0.094*	-0.097*
	Sig. (2-tailed)	0.373	0.035	0.042	0.035
	N	473	473	473	473
TA	Pearson Correlation	-0.024	-0.037	0.030	0.092*
	Sig. (2-tailed)	0.606	0.425	0.520	0.045
	N	473	473	473	473
BVPS	Pearson Correlation	-0.075	0.008	0.040	-0.029
	Sig. (2-tailed)	0.104	0.857	0.386	0.534
	N	473	473	473	473
TD	Pearson Correlation	-0.018	-0.048	0.050	0.045
	Sig. (2-tailed)	0.702	0.294	0.278	0.327
	N	473	473	473	473
MV	Pearson Correlation	0.033	0.034	-0.082	0.115*
	Sig. (2-tailed)	0.478	0.455	0.074	0.012
	N	473	473	473	473
NI	Pearson Correlation	0.028	-0.137**	0.020	0.075
	Sig. (2-tailed)	0.547	0.003	0.668	0.105
	N	473	473	473	473
PE	Pearson Correlation	-0.006	0.064	0.011	-0.014
	Sig. (2-tailed)	0.890	0.175	0.819	0.763
	N	458	458	458	458
ROA	Pearson Correlation	-0.012	-0.109*	0.057	0.003
	Sig. (2-tailed)	0.790	0.017	0.218	0.948
	N	473	473	473	473
OITA	Pearson Correlation	-0.017	-0.045	0.047	-0.059
	Sig. (2-tailed)	0.713	0.334	0.312	0.200
	N	473	473	473	473
SE	Pearson Correlation	-0.023	-0.043	-0.052	0.078
	Sig. (2-tailed)	0.614	0.352	0.259	0.091
	N	473	473	473	473
TDTA	Pearson Correlation	0.003	-0.058	-0.036	-0.024
	Sig. (2-tailed)	0.944	0.211	0.438	0.597
	N	473	473	473	473
SBVPS	Pearson Correlation	-0.100*	0.016	0.047	-0.024
	Sig. (2-tailed)	0.030	0.722	0.310	0.609
	N	473	473	473	473
S129	Pearson Correlation	-0.154**	-0.166**	-0.188**	-0.120**
	Sig. (2-tailed)	0.001	0.000	0.000	0.009
	N	473	473	473	473
S3034	Pearson Correlation	-0.185**	-0.199**	-0.226**	-0.144**
	Sig. (2-tailed)	0.000	0.000	0.000	0.002
	N	473	473	473	473
S35	Pearson Correlation	1	-0.249**	-0.282**	-0.180**
	Sig. (2-tailed)		0.000	0.000	0.000
	N	473	473	473	473
S36	Pearson Correlation	-0.249**	1	-0.304**	-0.194**
	Sig. (2-tailed)	0.000		0.000	0.000
	N	473	473	473	473
S3739	Pearson Correlation	-0.282**	-0.304**	1	-0.219**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	473	473	473	473
S4099	Pearson Correlation	-0.180**	-0.194**	-0.219**	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	473	473	473	473

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed)

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