Market Optimism and Merger Waves∗

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Abstract

One of the most conspicuous features of mergers is that they come in waves, and that these waves are correlated with increases in share prices and price/earnings ratios. We argue that stock market booms and merger waves are both driven by increases in optimism in financial markets, and discuss two behavioral hypotheses about mergers – the managerial discretion and overvaluation hypotheses – that claim that merger waves are driven by market optimism. We also develop the hypothesis and present evidence that optimism in bond markets can cause mergers. We also briefly consider and reject two neoclassical hypotheses that claim to account for mergers waves. Empirical support for the managerial theory is provided by evidence that the amounts of assets acquired by companies increase as optimism in financial markets increases, and that the returns to acquiring companies' shareholders are inversely related to market optimism at the time of mergers. Our measures of market optimism are also shown to explain managerial choices of finance for mergers. Thus, we find that optimism in financial markets explains the amount of assets acquired through mergers at a point in time, the choice of means for financing the mergers, and the returns to the acquirers' shareholders following the mergers.

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Two well-established stylized facts about mergers in the United States are that they come in waves, and that these waves occur during major advances in share prices.[1] The first major wave occurred at the end of the 19th century. Subsequent waves occurred at the ends of the 1920s and 1960s. Each of these waves was accompanied by dramatic surges in stock prices. Each wave came to a close when stock prices plummeted. This pattern has been repeated in the two most recent waves. Figure 1 presents a three-month moving average of the amounts of assets acquired since the beginning of the 1980s and Shiller's aggregate price-earnings ratio (P/E).[2] A steady rise in the aggregate P/E is apparent until its peak in 2000. This rise is matched by the rise in merger activity. Some students of mergers interpret the blips in mergers during the 1980s as a wave, but it seems obvious to us that the rise in mergers during the 1980s was part of the long wave that culminated at the end of the century, and not a separate wave. The 21st century begins with a sharp fall in both share prices and merger activity, but starting around 2003 both indexes begin to rise reaching new peaks in 2007. As the financial crisis takes hold, both share prices and mergers decline precipitously. Any general theory of mergers must account for both their wave pattern and the association of the peaks in merger activity with peaks in share prices and price-earnings ratios. We offer such an account.

An enormous number of hypotheses have been advanced to explain mergers. They typically do not purport to explain merger waves, however, but rather specific sorts of mergers – horizontal mergers to achieve economies of scale or market power, vertical mergers to reduce transaction costs or raise entry barriers, and so on.[3] Why should the acquisition of market power become particularly attractive when share prices rise, and lose its attraction when they fall? Why is the pursuit of efficiency through cost-reducing mergers not more attractive during recessions, when competitive pressures are intense, than in times of economic prosperity when share prices are high? Although traditional explanations for

mergers can account for many individual transactions, none provides a convincing explanation for *waves* in *aggregate* merger activity.

We contend that to understand merger waves one must understand the *psychology* of both the managers who undertake them, and the financial markets, which pass judgment on them. Managers are expected to undertake all wealth-generating mergers. These benefit their shareholders and benefit managers through their holdings of their own company's shares, through stock options, and from bonuses and salary increases as a reward for good performance. In addition to these, however, we posit that managers sometimes undertake wealth-destroying acquisitions, because they provide private benefits to themselves even though they harm their shareholders. With an efficient capital market, the market value of a firm announcing a wealth-destroying merger should fall when the merger is announced by the amount of the wealth to be destroyed. Such an immediate drop in share price could induce the board of directors to oppose the merger, or might even make the potential acquirer itself a target of a hostile takeover bid. Managers can be expected to avoid undertaking wealth-destroying mergers, when they produce such negative and immediate responses.

Thus, if the capital market was efficient at every moment of time, we would expect to see few wealth-destroying mergers. Much of the finance literature on mergers assumes capital market efficiency and thus posits that managers only undertake wealth-creating mergers.[4] We do not assume capital market efficiency in its strongest form, however. Instead, we assume that capital markets can be gripped by periods of over-optimism or pessimism, and that wealth-destroying mergers increase in periods of over-optimism. Mergers, which might be greeted with an immediate, sharp fall in the bidder's share price in normal times, are judged more favorably during periods of over-optimism. It is thus during these periods that managers choose to announce the preponderance of wealth destroying mergers, and this increase in the proportion of this type of mergers explains the appearance of

merger waves. We present evidence linking merger activity to measures of optimism in both equity and bond markets.

The importance of the psychology of managers and financial markets in our theory places it among the *behavioral* theories of economics and finance.[5] Shleifer and Vishny (2003) (hereafter S&V) have offered an alternative behavioral theory of mergers, which makes some of the same predictions as ours does. Although some of the evidence we present is consistent with the S&V theory, some is not. We discuss their theory below along with the tests to discriminate between them.

Our behavioral theory and that of S&V can be contrasted with the neoclassical theories of merger waves of Jovanovic and Rousseau (2002, J&R) and Harford (2005). J&R extend the *q*-theory of investment to mergers. Mergers occur during stock market booms, because average *q*s are higher then. Harford posits that industry shocks cluster at certain times producing merger waves. Being neoclassical, both theories assume that managers maximize their shareholders' wealth, and thus implicitly that they increase this wealth. This prediction is at odds with much of the literature on the effects of mergers on acquirers' shareholders, and with the results of the effects of mergers presented in this article. We do not, therefore, explicitly test these neoclassical theories, but only comment upon them from time to time where our evidence pertains to them.

We proceed as follows. Because of the important role it plays in our theory, we begin with a review of the literature on the psychology of financial markets. In Section II, we present the logic underlying the managerial theory of mergers. S&V's overvaluation hypothesis is discussed in Section III. Section IV develops the main hypotheses to be tested. The data and methodologies employed are discussed in Section V. Section VI presents the results for the tests of the theory. Conclusions are drawn in the final section.

I. The Psychology of Financial Markets

A. Stock Markets

If π_{it} is firm *i*'s profits in period *t*, k_i its cost of capital, and *i*'s managers either pay out its profits as dividends and interest or reinvest them at returns equal to k_i, then the value of the firm at time zero is given by

$$V_{i0} = \sum_{t=0}^{\infty} \frac{\pi_{it}}{(1+k_i)^t} \tag{1}$$

Thus, today's share price should have a definite relationship to a firm's future earnings and dividends. In a pioneering study, Robert Shiller (1981) showed that swings in stock prices in the United States over the 20th century were far greater than could be accounted for by subsequent movements in earnings and dividends.[6] During the late 1920s shareholders were far more optimistic about future earnings and dividends than was warranted by both the *actual* dividends and earnings that were to come, and those that one might have expected based on past dividends and earnings experience. During the 1930s shareholders became far more pessimistic than would prove to be warranted.

The extent to which this over-optimism and pessimism can go is dramatically revealed by the data from the late 1990s. Assuming an average rate of growth of g_i from now to infinity, (1) becomes

$$V_{i0} = \sum_{t=0}^{\infty} \frac{\pi_{io}(1+g_i)^t}{(1+k_i)^t} = \frac{\pi_{io}}{k_i - g_i} \tag{2}$$

if $k_i > g_i$. This implies a price/earnings ratio for firm *i* equal to $1/(k_i - g_i)$. As can be seen from Figure 1, at the peak of the 1990s stock market boom, the aggregate P/E topped 40. If we assume a k_i of 0.12, roughly the average return on stocks over the period 1928-2004,[7] then a P/E of 40 implies an expected, perpetual growth rate of 0.095 – more than four times the

average growth rate over the same period. At the 1990s stock market peak, shareholders appeared to believe that the average firm's profits would grow indefinitely at a rate far above any that had ever been seen before.

This extreme optimism typifies stock market booms. Galbraith (1961, p. 8) observed that an "indispensable element of fact" during stock market bubbles is that individuals "build a world of speculative make-believe. This is a world inhabited not by people who have to be persuaded to believe but by people who want an excuse to believe." These excuses to believe take the form of "theories" as to why share prices should rise to unprecedented levels, why the economy has entered a "new era" (Shiller, 2000, Ch. 5). Prominent among these are "theories" about wealth increases from mergers. Shiller gives an example from the stock market boom and merger wave at the beginning of the 20th century. "The most prominent business news in the papers in recent years had been about the formation of numerous combinations, trusts, and mergers in a wide variety of businesses, stories such as the formation of U.S. Steel out of a number of smaller steel companies. Many stock market forecasters in 1901 saw these developments as momentous, and the term *community of interest* was commonly used to describe the new economy dominated by them" (Shiller, 2000, p. 101, italics in original). Shiller quotes a *New York Times'* editorial from April 1901, which prophesizes that the U.S. Steel merger will avoid "much economic waste" and effect "various economies coincident to consolidation." It predicts similar benefits from mergers in railroads. Such optimism explains why U.S. Steel's share price soon soared to $55 from the $38 it was floated at in 1901. By 1903 it had plunged to $9 (*Economist,* 1991, p. 11). Similar over-optimism appears to have been a major cause of the first great merger wave.

> The literature provides convincing evidence that the abnormally large volume of mergers formed in 1897-1900 stemmed from a wave of frenzied speculation in asset values. Several students of the early merger movement agree that the excessive demand for securities was an impelling force in the mass promotion of mergers after 1896 (Markham, 1955, p. 162).

A second example of the over-optimism that can feed merger waves comes from the 1960s. During this wave, the so-called conglomerates undertook a series of diversification mergers. Each new merger announcement was greeted by an increase in the conglomerate's share price. One explanation for this given in both the popular and academic literatures was that the conglomerates were engaging in "P/E magic."[8] Because of the market's optimism, conglomerates traded at P/Es as high as 30. A conglomerate would announce that it was acquiring, say a steel company, with a P/E of 10. The steel company's low P/E obviously suggests that the market anticipated slower future earnings growth than for the conglomerate. Upon the merger announcement, however, the market would reevaluate the earnings of the steel company using the conglomerate's P/E. Thus, if the steel company had earnings of $10 million and a market value of $100 million, these earnings would create $300 million in value for the conglomerate, easily allowing it to buy the steel company at a hansom premium and still have a positive gain from the transaction. The obvious question to be asked is whether the conglomerates would be able to generate growth in the steel firm's earnings to justify a P/E of 30. The conglomerates' performance once the stock market bubble burst indicates that they were not able to generate this growth.[9] The conglomerates' P/E magic of the sixties resembles the kind of Ponzi scheme that Shiller (2000, pp.64-66) claims characterizes all stock market bubbles.

The over-optimism of stock market booms figures prominently, but in somewhat different ways in the two behavioral theories of mergers discussed later.

B. Bond Markets

Bonds carry commitments for fixed payments to bondholders, and they must receive their interest payments before funds are distributed to shareholders. Bonds thus entail less risk than stocks. Periods of optimism or pessimism can also affect bond markets, however. Optimistic bond holders will perceive less risk in corporate securities, and be willing to

accept less of a premium over the Federal Funds Rate to hold a particular bond. Thus, the *Spread* between the Federal Funds Rate and the Commercial & Industrial Loan Rate (the interest rate blue chip companies pay to borrow funds, hereafter C&ILR) can be regarded as a measure of the degree of optimism, or the degree of perceived risk in the bond market.

Figure 2 plots merger activity, the **real, i.e. CPI adjusted,** C&ILR and the Spread since 1980. Although it exhibits a secular downward trend, the C&ILR rises during both merger waves. Thus, these waves cannot be explained by a *fall* in borrowing costs. In contrast, the Spread rises during the first wave, but then falls and remains relatively constant during the second indicating continuing optimism in the bond market toward the end of the decade. This optimism in the bond market, we believe, reinforced the optimism apparent in the equity market and helps explain the second merger wave. It also explains the greater use of debt to finance mergers in the second wave, which we document below. Consistent with our interpretation of the Spread as a measure of optimism, it climbs steeply once the financial crisis hits in 2008, while the Federal Funds Rate (not shown) falls just as precipitously.[10] That the two variables appear to measure different phenomena is also evidenced by the correlation coefficient between them of -0.71, significant at the 1% level.

Companies must pay the C&ILR to borrow funds or something higher, if they are perceived to have higher risk. By this measure financing costs actually rose during both of the recent waves as can be seen in Figure 2. Harford (2005) argues that merger waves occur when many industries experience simultaneous shocks, *and borrowing costs fall.* However, Harford did not use the C&ILR or some similar measure of interest rates to measure borrowing costs, but rather the Spread with the Federal Funds Rate – our measure of optimism in the bond market. Thus his tests of the neoclassical industry shocks hypothesis actually incorporate some of the behavioral elements included in our theory.

II. The Managerial Theory of Mergers

Robin Marris (1964, 1998) was the first to posit growth as an objective for managers, and presented considerable evidence that managers' pecuniary and "psychic" incomes were both linked to the growth of their firm. Recent evidence has confirmed the link between managerial compensation and growth specifically with respect to growth through mergers.[11] One study of bank mergers found that managerial incomes increased following mergers even when their share prices fell (Bliss and Rosen, 2001).

The constraint on managers' pursuit of growth is the threat of takeover, which can be assumed to be inversely related to Tobin's *q*. Thus, managers' utility can be expressed as a function of the growth of their firms, *g*, and *q*, $U = U\ g,q$, where $\partial U/\partial g > 0$, $\partial^2 U/\partial g^2 < 0$, $\partial U/\partial q > 0$, and $\partial^2 U/\partial q^2 < 0$.[12] Defining *M* as the assets acquired through mergers, setting $g = g(M)$, and maximizing $U\ g,q$ with respect to *M* yields the following first order condition:

$$(\partial U / \partial g)(\partial g / \partial M) = -(\partial U / \partial q)(\partial q / \partial M) \qquad (3)$$

Since $\partial U/\partial g > 0$, $\partial g / \partial M > 0$, and $\partial U/\partial q > 0$, (3) cannot be satisfied if $\partial q/\partial M > 0$. For any merger that increases *q* *no tradeoff* between growth and security from takeovers exists. Growth-maximizing managers undertake *all* mergers that *increase q*. Their behavior differs from managers who maximize shareholder wealth only with respect to mergers that *decrease q*. Figure 3 (left panel) depicts the relationship in eq. 3 for mergers that lower *q*. When no mergers of this type are undertaken, *q* is at its maximum and the risk of takeover is minimized. When - $\partial U/\partial q\ \ \partial q/\partial M\ _N > 0$, managers undertake M_N of value destroying mergers.

During a stock market boom investors are more willing to accept new news as good news. Merger announcements, that would under normal conditions result in large *declines* in acquirers' share prices, produce only modest declines during a stock market boom, or even share price increases. Thus, the relationship between q and M shifts from its normal level, say line N in Figure 3 (right panel), to something like B in a boom. This shifts $-\partial U/\partial q \quad \partial q/\partial M$ to the right, as in Figure 3. The firm acquires more assets through mergers, M_B, since q does not drop by as much or *perhaps even rises* when a wealth-destroying merger is announced.

III. The Overvalued Shares Hypothesis (OVH)

Our main focus is on the managerial theory of mergers. Because both it and the overvaluation theory of S&V (2003) relax the assumptions that mergers create wealth and capital markets are efficient, however, we briefly describe their theory here so that later we can point out where the predictions of the two differ.

Some firms' share prices are assumed to be *overvalued* in stock market booms. Their managers know their shares are overvalued, and wish to protect their shareholders from the wealth loss that will come when the market lowers its estimates to their warranted levels. They accomplish this by exchanging their overvalued shares for the real assets of another company. Targets' managers are assumed to have short time horizons, so they too gain by "cashing in" their stakes in their firms at favorable terms. Under the S&V theory, mergers do not destroy wealth they merely transfer it from the unlucky shareholders who wind up holding the acquirers' overvalued shares, when the market corrects its mistake, to the acquirers' shareholders.

The same is true of the explanation for merger waves put forward by Rhodes-Kropf and Viswanathan (2004, hereafter RKV). While S&V emphasize the motivation of the

managers of the acquiring companies, RKV focus on the shareholders of the targets. They are willing to accept the overvalued shares of bidders during a wave, according to RKV, because during a stock market boom targets' shareholders have difficulty distinguishing whether a bidder's shares have a high price because they are overvalued or because of possible synergies from the merger. RKV devote little space to the motivations of the bidders' managers claiming only that they expect synergies form the mergers, but "make mistakes" (RKV, 2004, p. 2709). Given all of the evidence that mergers on average destroy wealth, it is difficult to believe that bidders' managers are unaware of the risks they are taking on behalf of their shareholders when they offer high premiums to acquire companies during a merger wave.

IV. Testing the Managerial Theory of Mergers

A. The Causes of Mergers

The managerial theory assumes that managers can always obtain private benefits from increasing their firm's size of through mergers. In times of normal optimism, when financial markets come close to exhibiting rational expectations, announcements of wealth destroying acquisitions are greeted with sharp declines in share price and are either not attempted or cancelled soon after the announcements. When optimism in financial markets is high, wealth-destroying mergers increase in frequency, because they do not elicit such negative responses from the market.

Optimism in financial markets can be thought of as taking two forms – firm-specific optimism about the prospects of particular firms, and general optimism that prevails across the entire market. Thus, in normal times, a given firm may be overvalued because of great optimism about its prospects or management, and the announcement of a wealth-destroying merger is greeted favorably. Alternatively, a company may not be overvalued, but great optimism in the market exists, and the announcement of a wealth-destroying merger is again

greeted favorably. During stock market booms many individual firms are overvalued and general optimism prevails across the equity market. During such times wealth-destroying mergers appear in great numbers.

We employ two measures of general optimism in financial markets, the aggregate P/E and the Spread between the Federal Funds Rate and the C&ILR. At any point in time, there will be a level of the S&P 500 that is warranted by the future growth in profits and dividends. Values of the S&P 500 above this level represent general over optimism, values below pessimism (negative optimism). As discussed above, the Spread captures attitudes toward risk in bond markets and thus measures optimism in bond markets.

When constructing a measure of a firm's overvaluation, we encounter a methodological difficulty. If we can identify overvalued firms, so too presumably can the capital market and the firms cease to be overvalued. This conundrum notwithstanding, several studies have constructed measures of overvaluation (Verter, 2002; Ang and Cheng, 2003; Dong, Hirshleifer, Richardson and Teoh, 2005; and Rhodes-Kropf, M., David. T. Robinson, and S. Viswanathan, 2005, hereafter RKRV). These measures typically involve ratios of market to book value of equity or their reciprocal. We assume that all firms in an industry[13] have the same costs of capital and expected growth rates, and use equation 2 to estimate $1/(k_i - g_i)$ for a typical firm by regressing the market values of all firms in the industry on their profits for a period of time when, based on the aggregate S&P P/E ratio, shares in aggregate do not appear to be overpriced. Call this estimate of $1/(k_i - g_i)$, α. Using this α we predict firm *i*'s market value in year *t* as

$$V_{it} = \alpha \pi_{it} \tag{4}$$

We then create a measure of a firm's overvaluation in any year, O_{it} , as

$$O_{it} = V_{it} - V_{it} \tag{5}$$

We use this measure of overvaluation to test the overvaluation theory of mergers.

In addition to O_{it} , the P/E, and the Spread (S), several control variables are included in our model of acquisitions. The dependent variable is defined as the amount of assets acquired in period *t* by firm *i*, M_{it} , measured as the amount paid for the target. Holding M_{it} constant, the larger the size of a potential acquirer, the less impact the acquisition has on its market value. Thus, the curve relating *q* to *M* in Figure 3 should be flatter, the larger the size of the acquiring firm (TA) relative to the target, *M*. We measure the size of the acquirer as the natural log of the lagged value of its total assets, $\ln(TA_{it-1})$. A second justification for including size in the equation is that the costs of taking over a firm and replacing its managers should grow with the size of the company. Managers of large companies have more discretion, therefore, to make bad acquisitions. For these reasons, we expect assets acquired through mergers to vary positively with firm size.

For a firm that over invests, the marginal return on investment is below its neoclassical cost of capital. Raising funds externally, therefore, will seem more expensive than using internal cash flows. Cash flow has, therefore, been a key variable in tests of managerial theories of the determinants of corporate investment and R&D.[14] Lagged cash flow, CF_{it-1}, is thus included as an additional explanatory variable.

Cash flow is unlikely to be large enough to finance large acquisitions, and thus these companies must resort to equity and bond markets. A company is likely to have more difficulty floating bonds to finance a merger, the larger its leverage is. We thus include lagged leverage, L_{it-1}, in the model.

J&R's *q*-theory of mergers assumes that the market correctly evaluates a firm's market value based on its expected future profits, that Tobin's *q* proxies for managerial talent, and thus companies with high *q*s undertake more mergers. Alternatively, if the market

may overvalue a company's shares, *q* might serve as an alternative measure of overvaluation to the one we construct. As we shall see below, Tobin's *q* and our measure of overvaluation are highly correlated. When both are included in the determinants equation, our measure is significant and with the correct sign, *q* is insignificant. Thus, we did not include *q* in the model.

We thus come up with the following model to explain the amount of asserts acquired through mergers.

$$M_{it} = a + bO_{it} + cP/E_t + dS_t + e\ln(TA_{it-1}) + fCF_{it-1} + gL_{it-1} + \mu_{it} \qquad (6)$$

with predictions, $b > 0$, $c > 0$, $d < 0$, $e > 0$, $f > 0$, and $g < 0$.

Because the Spread is part of the borrowing costs of firms, a negative coefficient on this variable might simply be interpreted as evidence that firms invest less in mergers, when borrowing costs are high. To test whether the Spread in (6) really is capturing something other than borrowing costs, we estimate it adding the Federal Funds Rate in *t*, FF_t.

$$M_{it} = a + bO_{it} + cP/E_t + dS_t + e\ln(TA_{it-1}) + fCF_{it-1} + gL_{it-1} + hFF_t + \mu_{it} \qquad (7)$$

If the Spread is merely measuring a firm's cost of capital, then S_t and FF_t should have the *same* coefficients, $d = h$, since both are parts of a firm's borrowing costs and sum to C&ILR. A firm should be indifferent between a one percentage point rise in the Federal Funds Rate and in the Spread, if it is only concerned with borrowing costs. If Spread also measures optimism in the bond market, however as we assume, *d* should be greater than *h*.

B. The Choice of Finance

Having decided to undertake an acquisition, a firm's managers must decide how to finance it. There are three options – issue shares, increase debt by selling bonds or borrowing from banks, or use internally available cash. Issuing shares is attractive, if the firm is overvalued by the equity market, and the managers recognize that it is. The overvaluation

will correct itself someday, and by issuing shares today the managers can effectively lower their costs of buying another firm. Increasing debt is less attractive, if the company is already highly levered, because of the possible negative reaction from financial markets to an increase in the leverage risk of the firm. If ample cash is available, firms can be expected to use it to finance an acquisition. Thus, several of the variables that predict *whether* a company undertakes a merger, are expected to explain *how* it finances it.

To test these hypotheses, we use EF_{it}, the fraction of assets acquired by *i* in *t* by issuing new shares, as the dependent variable. Using this scaled dependent variable suggests also scaling overvaluation and cash flows. An overvaluation of $100 million will have a greater effect on the choice of finance for a firm with total assets of $1,000 million than for a firm with total assets of $50,000 million. Thus, we employ $(O/TA)_{it}$, the ratio of the dollar amount of an acquirer's overvaluation to its total assets in *t*, and $(CF/MV)_{it}$, the ratio of the acquirer's cash flow to its market value in *t*, to explain EF_{it}.

A company with an assets value of $50 billion will have less difficulty financing a $100 million acquisition out of cash flow than a $10 billion acquisition. Very large acquisitions must entail resort to equity or debt markets. Thus, the size of the target relative to the total assets of the acquirer, $(M/TA)_{it}$, is also included in the model**. We also include lagged leverage, L_{it-1}, as an explanatory variable on the grounds that more levered firms are viewed as being riskier investments, and thus face higher costs of equity implying a smaller use of equity to finance acquisitions.**

Finally, we also include two macro variables to explain the volume of assets acquired. The more optimism there is in the equity market, the more equity will be favored as a source of finance. The aggregate P/E should be positively related to the use of equity, as should borrowing costs, C&ILR. The higher interest rates on debt are, the more attractive is the use of equity. These considerations give us the following model:

$$EF_{it} = a' + b'(O/TA)_{it} + c'P/E_t + d'\ C\&ILR_t + e'(M/TA)_{it} + f'CF_{it-1} + g'L_{it-1} + \varepsilon_{it} \qquad (8)$$

with predictions $b' > 0$, $c' > 0$, $d' > 0$, $e' < 0$, $f' < 0$, and $g' < 0$.

C. The Consequences of Mergers

The managerial theory predicts that wealth-destroying mergers increase in frequency during periods of high optimism in financial markets. Since some mergers increase wealth, this prediction alone does not imply that mergers on average will be wealth destroying at any particular point in time. The only strong prediction is that mergers taking place during periods of high financial market optimism should be worse for shareholders than those occurring in more normal times.

The finance literature has measured the effects of mergers on shareholder wealth by estimating returns to acquiring and target shareholders. The literature is unanimous in finding positive abnormal returns to target shareholders, but disagrees over the effects of mergers on the acquirers' shareholders.[15] One group of studies estimates returns for very short windows around merger announcements and finds near zero returns for acquirers. These studies conclude that mergers are wealth creating, because the targets' shareholders obtain positive returns.[16] A second group also estimates very small abnormal returns to acquirers over short windows, but finds acquirers experiencing *negative* returns, and concludes that some non-neoclassical hypothesis explains mergers.[17] Here it should be noted that small positive movements in acquirers' returns around merger announcements can reflect continued over optimism on the part of the market. The mergers would be wealth destroying and thus consistent with the managerial theory, if long run returns were negative.

The third group estimates abnormal returns over event windows spanning two to five years after the mergers. Agrawal, Jaffe and Mandelker (1992, AJM) is of particular interest. From 1955-87, the cumulative abnormal return to acquirers over five-year windows was a significant -10 percent. Significant negative post-merger returns were estimated for the

1950s, 1960s and 1980s, but insignificantly *positive* returns were estimated for the 1970s. This pattern is consistent with the hypothesis that merger waves are fueled by stock market speculation and that acquiring companies undertake more wealth-destroying mergers during periods of market optimism. The depressed share prices of the 1970s imply a period without over optimism, or perhaps market pessimism and the number of wealth-destroying mergers declined dramatically. Other studies finding negative abnormal returns for acquirers during periods of rising stock prices, but not in other periods, include Loderer and Martin (1992) (negative returns for mergers during the conglomerate merger wave of 1966-1969); Higson and Elliott (1998) (UK mergers between 1975-1980, and 1985-1990, when share prices were rising); and Gregory (1997) (UK mergers between 1984 and 1992, another period of generally rising share prices).

All in all, these findings are quite consistent with the predictions of the managerial theory. At merger announcements acquirers' shareholders experience little or no gains. As the market learns more about the acquirers and the mergers, they often earn significant negative returns. This is particularly likely for mergers announced when stock prices are high and climbing. Only a couple of studies have reported positive post-merger abnormal returns for acquirers, and these are always for mergers announced when the market is not advancing or for tender offers – mergers that are unlikely to fit the managerial theory.[18]

Our test of the managerial theory follows the existing literature and estimates returns to acquirers' stock holders at merger announcements, and for post-announcement windows of one, two and three years using non-merging companies in the same industry with similar size and market to book ratios as the control group. The managerial theory predicts that the returns to acquirers over long windows are significantly lower for mergers completed during wave periods when financial markets are highly optimistic than in normal periods. We thus predict that the abnormal return, AR_{it+n}, for firm *i* over the period $t+n$, where *n* is at least one

year, is a function of our two measures of market optimism at the time of the acquisition, the aggregate P/E, P/E_t, and the interest rate spread, S_t. In contrast, at the time the mergers are announced, we expect no relationship between acquirers' returns and these variables.

Acquirers might earn negative abnormal returns following mergers undertaken during a merger wave either because their shares were overvalued at the time of the merger or because the mergers created inefficiencies that destroyed shareholder wealth, or both. To separate these two effects, we must take into account the impact of overvaluation on shareholder returns. We do this by including our measure of overvaluation for firm *i* at the time of the acquisition, $(O/TA)_{it}$. We also include leverage, L_{it-1} as an additional control variable which gives us

$$AR_{it+n} = f(P/E_t, S_t, O/TA_{it}, L_{it-1}) + \mu_{it} \qquad (9)$$

with predictions for long windows of $\partial AR/\partial P/E < 0$, $\partial AR/\partial S > 0$, and $\partial AR/\partial (O/TA) < 0$. No predictions are made for the effect of leverage.

V. Methodology and Data Description

Our principal data source is *Global Mergers and Acquisitions* from *Thompson Financial Securities Data***.** It contains merger and spin-off data from a variety of sources such as Reuters Textline, the Wall Street Journal, Dow Jones etc. The database covers all transactions valued at $1 million or more. We define a merger as a transaction where more than 50 percent of the target's equity is acquired. Balance sheet and income statement data come from the Osiris database by Bureau Van Dyck and are complemented by Compustat Global Vantage.

The first column in Table 1 presents the total numbers of mergers and acquisitions (M&As) in our sample from 1985 to 2008. Consistent with Figure 1, the number of transactions increases steadily from 1985 to 2000 (with a slight decline in 1999). A relatively

dormant period can be observed over 2001-2003. M&A activity increases again to high levels over the 2004-2007 period and declines in 2008.

The second column in Table 1 reports the average values of our measures of overvaluation deflated by company total assets for the acquiring companies in our sample. They begin negative and rise during the first wave peaking at a value of 1.67 in 1999. Thus, at the peak of the first merger wave, over half of the market value of an acquiring company was, by our estimates, due to an overvaluation by the market. Average overvaluation falls precipitously as the first merger wave ends reaching around 0.5 in 2002. It then rises again, but does not regain the level reached at the peak of the first wave.

Our data source reports the fraction of each acquisition financed by issuing equity. It attributes most of the rest of the finance of a merger to cash. This is misleading. When a company wishes to finance a merger by issuing debt, it typically first sells bonds and then uses the cash raised to finance the merger. To get a better estimate of the relative amounts of debt and cash used to finance mergers we thus assumed that the proceeds from issuing debt raised by a company making an acquisition in a given year were used to finance the merger, so long as the amount of debt issued was not greater than the amount left to be financed after taking account of the use of stock. Thus, if a company acquired another firm with a deal value of $100 million, financed half of the acquisition by issuing equity, and also issued $40 million in bonds in the same year, we assume that the fraction financed by stock was 0.5, the fraction financed by debt was 0.4, and the remaining 0.1 fraction was financed out of cash. If this company had issued $60 million in debt in the year of the merger, we assume that the fractions are: stock = 0.5, debt = 0.5, and cash = 0.

The last three columns of Table 1 report our estimates of the sources of finance for mergers using this method of estimation starting in 1985, the first year for which we have data. During the 1980s debt was the most preferred source of finance. These were the years

of the leveraged buyout, and the time when Michael Milken became famous and rich by inventing the "junk bond." Our estimates reflect the popularity of debt finance for mergers in the 1980s. During the years of the first merger wave, the fractions of acquisitions financed by issuing equity rose peaking at over 52 percent in 2000. In the second wave, however, equity finance again gave way to debt for financing mergers with debt finance peaking in 2007 at over 50 percent.

The shifting importance of debt and equity as a means of finance for M&As revealed in Table 1 suggests that any general theory of merger waves should be consistent with the use of either source of finance at different points in time. We view this as another plus for the managerial theory vis-à-vis the S&V overvaluation theory, which can only account for mergers financed by issuing shares, since it is only equity that is assumed to be overvalued.

Our hypotheses predict the signs on the relevant variables, but not the functional form of the relationship. We experimented with polynomials up to the third order, but report results for the higher order terms, only when they are significant. The models are estimated using the Tobit procedure, since we postulate that they explain not only whether or not a company makes an acquisition, but also the acquisition's *size*. More discretion leads managers to undertake bigger mergers. Results from probit regressions differed from the Tobit results only with respect to the sizes of the variables' coefficients – the same variables that explain *whether or not* a firm undertakes a merger explain the *amount* of assets acquired. The close similarity between the probit and Tobit results also implies that there was little to gain from adopting Heckman's (1976) two-stage estimation procedure for censored data.

Here it is perhaps also worth reminding the reader that the two behavioral hypotheses are not assumed to explain *all* mergers, but rather the increases in mergers during stock market booms. The error term in the model can be assumed, therefore, to capture other causes of mergers that are not part of the two behavioral hypotheses.

Summary statistics are presented in Table 2a. The variables are as follows. *DV* is the deal value, the total consideration paid by the acquirer excluding fees and expenses. We divide *DV* by the total assets of the acquirer and call this variable *Assets Acquired.* Tobin's *q* is a firm's market value divided by its total assets. Market value is the sum of the market value of its common stock, the book values of total short and long term debt (9+34, *Compustat* numbers for the items appear in parentheses), and preferred stock, defined as available, as redemption value (56), liquidating value (10), or par value (130). The market value of common stock is the end-of-fiscal year number of shares (54) times end-of-fiscal year share price (199). Leverage, *L,* is the ratio of total debt to total assets. Cash flow, *CF,* is after tax profits before extraordinary items (18) plus depreciation (14). All variables are deflated by the *CPI* (1985=1.00).

The average deal value was $359.5 million. This corresponds to almost 25 percent of the total assets of the acquiring company in the average transaction. Acquiring companies are larger than companies in our control group (with total assets amounting to almost $3.6 billion versus $1.2 billion). Mean Tobin's *q* for acquirers is equal to 1.95, and is slightly lower than the average *q* for the control group (2.13). Acquirers have higher levels of cash flows than non-acquirers, and their average is slightly higher than for the control group.

Table 2b presents correlation coefficients for the main variables. Assets acquired are significantly positively correlated with q, OV/TA, P/E, and significantly negatively correlated with the spread, S, cash flows and leverage. Tobin's *q* is highly correlated with overvaluation as expected, r = 0.95. Somewhat unexpectedly, *q* is negatively correlated with cash flows. It also has large negative correlations with company size and leverage.

VI. Results of the Tests

A. The Determinants of Mergers

The first equation in Table 3 presents the results for the basic, determinants model. The three key variables of the behavioral theories – the P/E, Spread, and overvaluation – are all highly significant with the predicted signs.[19] Leverage and log size are also highly significant. Highly levered firms tend to acquire fewer assets. The positive coefficient on size can be regarded as support for the managerial theory, under the assumption that large size offers more protection to managers undertaking wealth destroying mergers. Cash flow is also highly significant with the predicted positive coefficient.

The second equation in Table 3 adds the Federal Funds Rate. Its coefficient is negative and significant as expected, if it acts as a measure of borrowing costs. As noted above, the coefficient on Spread should be equal to that on FF, if Spread was also serving solely as a measure of borrowing costs. Spread's coefficient is *twelve* times that of FF (in absolute terms), however, indicating that Spread measures something different, like optimism in the bond market. The signs and significance of the other variables in the model are unaffected by the addition of the Federal Funds Rate. The results in Table 3 indicate that significantly more assets are acquired when optimism in both the bond and stock markets is high, and that firms with overvalued shares acquire significantly more assets than companies with correctly priced shares.

B. The Determinants of the Means of Finance

Table 4 reports the estimated coefficients of equation 8. As predicted, optimism in the equity market, as measured by the aggregate P/E ratio, is associated with greater reliance on the use of equity to finance mergers, and high borrowing costs, C&ILR, also lead managers to prefer equity to debt. Firm specific optimism as measured by the ratio of overvaluation to total assets, OV/TA, is also highly significant with the predicted sign.

We obtain a significantly positive coefficient on the size of the target relative to the total assets of the acquirer, M/TA, which indicates that acquirers resort more heavily to issuing equity to finance relatively large mergers. The coefficient on cash flow is negative as predicted and highly significant. Companies with high cash flows rely on equity to a lesser extent. Leverage also has a negative and significant coefficient, as it did in Table 3**. Taken together these two results imply that highly levered companies tend to acquire smaller amounts of assets, and once they decide to merge they shy away from using equity, reflecting the constraints they face in the financial markets.**

The results in Table 4 confirm our hypothesis about the importance of optimism in the stock market affecting the choice of finance for acquisitions. They might also be regarded as consistent with the overvaluation theory. Overvalued companies favor the use of equity to finance M&As. The results for cash flows and interest rates also meet expectations. Companies with large cash flows use less equity to finance mergers, and high interest rates lead to a greater use of equity.

C. The Effects of Market Optimism on Shareholder Returns

We expect the same measures of optimism within equity and bond markets and about individual firms that determine the amount of assets that firms acquire through mergers to also affect the success of the mergers. To test this prediction we first calculate the abnormal returns to acquiring companies' shareholders as the difference between the buy-and-hold returns of acquirers and those of a control group, defined as non-acquiring firms belonging to the same two-digit industry as the acquirer, which are of similar size (the same size-decile) and of similar market-to-book ratio (same market-to-book decile). We estimated abnormal returns for four windows – the month of the merger, and one, two and three years after the merger. If the equity market is efficient, it should not be possible to predict the future abnormal returns of a company. *None* of the variables we use to predict the abnormal returns

of acquirers should be significant. In fact *all* of them are when the abnormal returns are estimated over the longer windows.

The inclusion of quadratic terms in the P/E and spread variables gave the best fit for the one-, two- and three-year windows. We also included them in the equation estimated for the one-month window, although none of the four variables was significant for this short window (see Table 5, eq. 1). Indeed, only the overvaluation variable is significant for the short window. This finding supports both of the behavioral theories. Under each, managers expect that the market will not react unfavorably to the announcement of a merger, even though the merger is not wealth-creating or even wealth-destroying. The fact that companies, which are overvalued at the time they announce mergers, make *higher* returns at the announcements indicates that the market's (over)optimism persists, at least for a while, after the mergers are announced.

The overvaluation variable continues to pick up a positive and significant coefficient in the equation estimating one-year returns after the merger. It becomes negative and significant, however, for the two- and three-year windows with the coefficient for the three-year window more than double the size of the two-year coefficient. Thus, our results imply that it takes the market more than a year after mergers are announced to begin to correct its overvaluation of the acquirers at the merger announcements, and that the correction process is continuing (at least) three years later.

Both the linear and quadratic terms for our two measures of market optimism are significant and consistent with our hypotheses. The returns to acquirers' shareholders *fall* as optimism in the stock market at the time of the acquisitions, as measured by the price/earnings ratio, rises. They also decline as optimism in the bond market grows (the interest rate spread declines). The opposite signs on the squared terms for both of these variables indicate that these effects taper off as optimism in the two markets increases. The

implied differences in returns to acquirers are large. After one year, acquirers earn 7 percent lower abnormal returns when the P/E is 30 at the time of an acquisition than when it is 15. After 2 or 3 years, the difference is around 30 percent. The negative coefficients on overvaluation for the two- and three-year windows indicate that some of the wealth loss to acquiring companies' shareholders following mergers is due to the market's correction of its overvaluation of them at the time of the mergers. The significant coefficients on the P/E and spread reveal, however, that overvaluation of acquirers does not account for *all* of the wealth losses to acquirers' shareholders. Mergers when optimism in the stock and bond markets is high result in wealth losses to acquirers' shareholders over and above any market corrections of firm-specific overvaluation.

We saw in Table 3 that highly levered firms tend to be less active in the M&A market. The results in Table 5 indicate that when highly levered firms do undertake a merger, they are more successful than less levered acquirers.

VII. Conclusions

Three prominent "stylized facts" about mergers in the United States are that they come in waves, the crests of the waves are associated with stock market rallies, and the shareholders of acquiring companies suffer significant wealth losses over long post-merger windows from mergers undertaken during merger waves. This article explains the links among these three phenomena by emphasizing the importance of *optimism.* Optimism in financial markets drives share prices and price/earnings ratios to levels that are unsustainable at historic growth rates. Aggressive managers take advantage of the market's optimism to undertake unprofitable mergers. Mergers that in normal times would be met with sharp share price declines are greeted more favorably, because of the market's optimism. We have presented evidence that the amount of assets acquired by companies increases with increasing

optimism in both the equity and bond markets. Individual companies that are overvalued also engage in more M&A activity than other firms.

During the merger wave at the end of the 20th century, when optimism in the equity market and company overvaluations were at record highs, the favored source of finance for mergers was equity. During the 1980s, however, issuing debt to raise cash to finance mergers was more common. The same was true during the merger wave of the 1960s, when the companies that became "conglomerates" through unrelated acquisitions expanded their debt by far greater amounts than companies that were less active in acquiring other firms (Weston and Mansinghka, 1971). New debt was also preferred to new equity during the merger wave from 2004 to 2008. This was a period of low interest rates and, by our measure, high optimism in debt markets. These developments fueled not only this merger wave, but, of course, speculation in the housing market, and eventually produced the financial crisis and a collapse in housing prices and M&A activity. Our models of assets acquired through mergers and the choice of finance illuminate the links among these developments.

Additional evidence for the managerial theory of mergers was provided by the model to explain abnormal returns to acquiring companies. Mergers undertaken when optimism in equity and bond markets is high are followed by significantly lower returns to shareholders of acquiring companies than for mergers undertaken in more normal times. Thus, our results demonstrate that optimism in financial markets explains the amount of assets acquired through mergers at different points in time, the means for financing them, and the returns to the acquirers' shareholders following the mergers.

These findings are inconsistent with recent "neoclassical" theories of merger waves. These theories assume that capital markets are efficient and thus, by assumption, rule out over optimism in financial markets and the overvaluation of individual companies as causes

of mergers and merger waves. Our findings of negative returns to acquirers' shareholders are also inconsistent with the assumption that managers maximize shareholder wealth.

Some of our findings are consistent with the S&V overvaluation theory of mergers. Company overvaluations are positively related to assets acquired, and negatively related to post-merger returns after two and three years. An advantage of the managerial theory over the overvaluation theory is, however, that it can also account for mergers financed by debt or cash. We also show that the wealth losses to acquirers are greater not only for firms that are overvalued, but also when there is optimism in the equity and bond markets – the key determinants of mergers under the managerial theory.

The wealth destruction following mergers can be quite large. Moeller, Schlingemann, and Stulz (2005) estimated abnormal returns to acquirers during the 1998-2001 merger wave of -12 percent, producing a wealth loss to acquirers of some $240 billion. For the two merger waves that we cover the average abnormal returns to acquirers after two years were almost -18 percent. Moreover, it is not only the shareholders of acquirers who suffer from bad mergers. The entire economy suffers to the extent that managers in the pursuit of growth through mergers avoid other avenues of growth like R&D and innovations that have positive social benefits.

References:

Agrawal, Anup and Jeffrey F. Jaffe. (2000). "The Post-Merger Performance Puzzle." in *Advances in Mergers and Acquisitions,* 1, Amsterdam: Elsevier, 7-41.

Agrawal, Anup, Jeffrey F. Jaffe and G. N. Mandelker. (1992). "The Post-Merger Performance of Acquiring Firms: A Re-examination of an Anomaly."*Journal of Finance,* 47(4), 1605-21.

Andrade, Gregor, and Erik Stafford. (2004). "Investigating the Economic Role of Mergers." *Journal of Corporate Finance,* 10, 1-36.

Ang, J. and Y. Cheng. (2003). "Direct Evidence on Stock Market Driven Acquisitions Theory."Florida University Working Paper.

Asquith, Paul. (1983). "Merger Bids, Uncertainty, and Stockholder Returns."*Journal of Financial Economics,* 11 (1-4), 51-83

Barsky, Robert and Bradford De Long. (1993). "Why Does Stock market Fluctuate?" *Quarterly Journal of Economics,* 108(2), 291-311.

Becher, D. (2000). "The Valuation Effects of Bank Mergers." *Journal of Corporate Finance,* 6, 189–214.

Bhagat, Sanjai, Dong, Ming, Hirshleifer, David and Robert Noah. (2005). "Do Tender Offers Create -Value? New Methods and Evidence." *Journal of Financial Economics,* 76(1), 3-60.

Bhagat, Sanjay, Andrei Shleifer and Robert W. Vishny. (1990). "Hostile Takeovers in the 1980s: The Return to Corporate Specialization." *Brookings Papers on Economic Activity*, 1-84.

Bliss, R. T. and R. J. Rosen (2001). "CEO Compensation and Bank Mergers." *Journal of Financial Economics,* 61, 107-38.

Bradley, M., Desai, A. and E.H. Kim. (1988). "Synergistic Gains from Corporate Acquisitions and Their Division between the Stockholders of Target and Acquiring Firms." *Journal of Financial Economics*, 21(1), 3-40.

Caves, R. E. (1989). "Mergers, Takeovers, and Economic Efficiency." *International Journal of Industrial Organization*, 7, 151-174.

Chappell, H. W. and D. C. Cheng. (1984). Firms, Acquisition Decisions and Tobin's q Ratio," *Journal of Economics and Business*, 36, 29-42.

Clarke, Roger and Christos Ioannidis. (1996). "On the Relationship between Aggregate Merger Activity and the Stock Market: Some Further Empirical Evidence." *Economics Letters*, 53: 349-356.

Damodaran, Aswath. (2005). "Estimating Equity Risk Premiums." Working Paper, Stern School of Business.

Datta, Deepak K., George E. Pinches and V.K. Narayanan. (1992). "Factors Influencing Wealth Creation From Mergers and Acquisitions: A Meta Analysis." *Strategic Management Journal*, 13, 67-84.

Denis Debra K. and John J. McConnell. (1986). "Corporate Mergers and Security Returns." *Journal of Financial Economics*, 16, 143-87.

Dodd, Peter and Richard Ruback. (1977). "Tender Offers and Stockholder Returns: An Empirical Analysis." *Journal of Financial Economics*, 5, 351-74.

Dong, Ming, David Hirschleifer, Scott Richardson, Siew Hong Teoh. (forthcoming). "Does Investor Misvaluation Drive the Takeover Market?" *Journal of Finance*.

Doukas, John. (1995). "Overinvestment, Tobin's Q and Gains from Foreign Acquisitions." *Journal of Banking and Finance*, 19, 1285-1303

Eckbo, Espen and Karin S. Thorburn. (2000). "Gains to Bidder Firms Revisited: Domestic and Foreign Acquisitions in Canada." *Journal of Financial and Quantitative Analysis* 35, 1-25.

Economist. (1991). "A Survey of International Finance (From Morgan's Nose to Milken's Wig)." April 27th.

Economist. (2000). "How Mergers Go Wrong", July 20th.

Economist. (2005). "Love is in the Air." February 3rd.

Ellert, James. (1976). "Mergers, Antitrust Law Enforcement and Stockholder Returns." *Journal of Finance*, 31, 2, 715-732.

Erard, B. and H. Schaller. (2002). "Acquisitions and Investment." *Economica*, 69, 391-414.

Fama, Eugene and Kenneth French. (1997). “Industry Costs of Equity.” *Journal of Financial Economics* 43, 153–193.

Fama, Eugene. (1998). “Market Efficiency, Long-Term Returns and Behavioral Finance.” *Journal of Financial Economics* 49, 283-306.

Fisher, A. B. (1984). “The Decade's Worst Mergers.” *Fortune*, April 30, 1984, pp. 262- 270.

Geroski, Paul A. (1984). “On the Relationship between Aggregate Merger Activity and the Stock Market.” *European Economic Review*, 25, 223-33.

Golbe, Devra L., and Lawrence J White. (1993). “Catch a Wave: The Time Series Behavior of Mergers.” *The Review of Economics and Statistics*, 75, 493-499.

Grabowski, Henry and Dennis C. Mueller. (1972). “Managerial and Stockholder Welfare Models of Firm Expenditures.” *Review of Economics and Statistics* 54, 9-24.

Gregory, A. (1997). “An Examination of the Long Run Performance of UK Acquiring Firms.” *Journal of Business Finance and Accounting*, 24, 971-1002.

Gugler, Klaus, Dennis C. Mueller and B. Burcin Yurtoglu (2005). “Tests of Neoclassical Theories of Merger Waves.” Working Paper, University of Vienna.

Gugler, Klaus, Dennis. C. Mueller and B.Burcin Yurtoglu. (2004). “Marginal q, Average q, Cash Flow and Investment.” *Southern Economic Journal*, 70, 512–531.

Harford, Jarrod (2005). “What Drives Merger Waves?” *Journal of Financial Economics, Journal of Financial Economics,* 77(3), 529-560.

Harford, Jarrod. (1999). “Corporate Cash Reserves and Acquisitions.” *Journal of Finance*, 54, 1969-97.

Harford, Jarrod and K. Li. (2007). “Decoupling CEO Wealth and Firm Performance: The Case of Acquiring CEOs.” *Journal of Finance*, 62, 917-49.

Hay, Donald A. and Guy S Liu. (1998). “When Do Firms Go in for Growth by Acquisitions?”*Oxford Bulletin of Economics and Statistics*, 60(2), 143-64.

Heckman, J. (1976). “The Common Structure of Statistical Models of Truncation, Sample Selection, and Limited Dependent Variables and a Simple Estimator for such Models.” *The Annals of Economic and Social Measurement* 5: 475-492.

Higson, C. and J. Elliott. (1998). "Post-takeover Returns: The UK Evidence." *Journal of Empirical Finance*, 5 (1), 27-46.

Houston J.F. and M.D. Ryngaert. (1994). "The Overall Gains from Large Bank Mergers." *Journal of Banking and Finance*, 18 (6), 1155-1176

Hubbard, Robert Glenn and Darius Palia. (1995). "Benefits of Control, Managerial Ownership, and the Stock Returns of Acquiring Firms." *Rand Journal of Economics*, 26, 782-792.

Jarrell Gregg. A and A. B. Poulsen. (1989). "The Returns to Acquiring Firms in Tender Offers: The Empirical Evidence since 1980." *Financial Management*, 18, 371-407.

Jarrell, Gregg. A., James A. Brickley and Jeffrey M. Netter. (1988). "The Market for Corporate Control: The Empirical Evidence Since 1980." *Journal of Economic Perspectives*, 2(1), 49-68.

Jensen, Michael C. and R.S. Ruback. (1983). "The Market for Corporate Control: The Scientific Evidence." *Journal of Financial Economics*, 11, 5-50.

Jovanovic Boyan and Peter L. Rousseau. (2002). "The Q-Theory of Mergers." *American Economic Review Papers and Proceedings*, May, 198-204.

Kang, Jun-Koo. (1993). "The International Market for Corporate Control: Mergers and Acquisitions of U.S. Firms by Japanese Firms." *Journal of Financial Economics*, 34, 345-71.

Khorana, Ajay and Marc Zenner. (1998). "Executive Compensation of Large Acquirors in the 1980s." *Journal of Corporate Finance*, 4, 209-240.

Lang, Larry H. P., René M. Stulz and Ralph Walking. (1989). "Managerial Performance, Tobin's *q*, and the Gains from Successful Tender Offers." *Journal of Financial Economics* 24, 137-54.

Langetieg, T. (1978). "An Application of a Three-Factor Performance Index to Measure Stockholder Gains from Merger." *Journal of Financial Economics* 6, 365-384.

LeRoy and Porter (1981). "The Present-Value Relation: Tests Based on Implied Variance Bounds." *Econometrica*, 27, 555-74.

LeRoy, Stephen. (1989). "Efficient Capital Markets and Martingales." *Journal of Economic Literature*, 27, 1583-1622.

Linn, Scott C. and Zhen Zhu. (1997). "Aggregate Merger Activity: New Evidence on the Wave Hypothesis." *Southern Economic Journal*, 64, 130-46.

Lintner, John. (1971). "Expectations, Mergers and Equilibrium in Purely Competitive Securities Markets." *American Economic Review*, 61, 101-11.

Loderer, Claudio and K. Martin. (1997). "Executive Stock Ownership and Performance: Tracking Faint Traces." Journal of Financial Economics 45 (2), 223-255.

Magenheim, Ellen B. and Dennis C. Mueller. (1987). "On Measuring the Effect of Acquisitions on Acquiring Firm Shareholders, or are Acquiring Firm Shareholders Better off after an Acquisition Than They Were Before?" in John C. Coffee, Jr., Louis Lowenstein, and Susan Rose-Ackerman, eds., *Takeovers and Contests for Corporate Control,* Oxford: Oxford University Press, 171-93.

Malatesta, P.H. (1983). "The Wealth Effect of Merger Activity and the Objective Functions of Merging Firms." *Journal of Financial Economics*, 11, 155-81.

Mandelker, G., (1974). "Risk and Return: The Case of Merging Firms." *Journal of Financial Economics*, 1, December, 303-35.

Manne, Henry G. (1965). "Mergers and the Market for Corporate Control." *Journal of Political Economy*, 73, 110-120.

Maquieira, Carlos P., William L. Megginson and Nail, Lance. (1998). "Wealth Creation versus Wealth Redistributions in Pure Stock-for-Stock Mergers." *Journal of Financial Economics*, 48(1), 3-33.

Markham, Jesse W. (1955). "Survey of the Evidence and Findings on Mergers." in *Business Concentration and Price Policy*, N.B.E.R., Princeton University Press, Princeton.

Marris, Robin. (1963). "A Model of the 'Managerial' Enterprise." *Quarterly Journal of Economics*, 77, 185-209.

Marris, Robin. (1964). *The Economic Theory of Managerial Capitalism*, Glencoe: Free Press.

Marris, Robin. (1998). *Managerial Capitalism in Retrospect*. Palgrave-Macmillan, London.

Mead, W. J. (1969). "Instantaneous Merger Profit as Conglomerate Merger Motive," *Western Economic Journal*, 7, 295-306.

Melicher, R. W., J. Ledolter, and L. J. D'Antonio. (1983). "A Time Series Analysis of Aggregate Merger Activity." *Review of Economics and Statistics* 65, 423-430.

Melicher, Ronald W. and David F. Rush. (1973). “The Performance of Conglomerate Firms: Recent Risk and Return Experience.” *Journal of Finance*, 28, 381-88.

Melicher, Ronald W. and David F. Rush. (1974). “Evidence on the Acquisition-Related Performance of Conglomerate Firms.” *Journal of Finance*, 29, 141-49

Mitchell, M. L. and E. Stafford. (2000). “Managerial Decisions and Long-Term Stock Performance.” *Journal of Business* 73, 287-320.

Mitchell, Mark L., and J. Harold Mulherin. (1996). “The Impact of Industry Shocks on Takeover and Restructuring Activity.” *Journal of Financial Economics,* 41(2), 193-229.

Moeller, Sara B., Frederik P. Schlingemann and René M. Stulz. (2005). “Wealth Destruction on a Massive Scale? A Study of Acquiring-Firm Returns in the Recent Merger Wave.” *Journal of Finance*, 60 (2), 757-782.

Mueller, Dennis C. (1969). “A Theory of Conglomerate Mergers.” *Quarterly Journal of Economics*, 83, November, 643-59.

Mueller, Dennis C. (1977). "The Effects of Conglomerate Mergers: A Survey of the Empirical Evidence,*" Journal of Banking and Finance*, 1, 315-47. Reprinted in Cheng-few Lee, ed., *Financial Analysis and Planning: Theory and Application, A Book of Readings*, Reading, Mass.: Addison-Wesley, 1983, pp. 450-82. Reprinted in G. Marchildon, ed., *Mergers and Acquisitions*, London: Edward Elgar, 1991.

Mueller, Dennis C. (2003). *The Corporation: Investment, Mergers, and Growth*, Routledge, London.

Mueller, Dennis C. and Mark L. Sirower. (2003). “The Causes of Mergers: Tests Based on the Gains to Acquiring Firms' Shareholders and the Size of Premia.” *Managerial and Decision Economics*, 24 (5), 373-416.

Mulherin, J.H. and A. Boone. (2000). “Comparing Acquisitions and Divestitures.” *Journal of Corporate Finance* 6, 117-139.

Nelson, Ralph, L. (1959). *Merger Movements in American Industry*, 1895-1956, Princeton: Princeton University Press.

Nelson, Ralph L. (1966). "Business Cycle Factors in the Choice Between Internal and External Growth." in W. Alberts and J. Segall, eds., *The Corporate Merger,* Chicago: University of Chicago Press.

Pautler, Paul A. (2003). "Evidence on Mergers and Acquisitions." *The Antitrust Bulletin*, Spring, 48 (1), 119-221.

Perfect, S.B. and K.W. Wiles. (1994). "Alternative Constructions of Tobin's q: An Empirical Comparison." *Journal of Empirical Finance*, 1, 313-341.

Philippatos, George C. and Philip L. Baird, III. (1996). "Postmerger Performance, Managerial Superiority and the Market for Corporate Control." *Managerial and Decision Economics*, 17, 45-55.

Rau, R., and Theo Vermaelen. (1998). "Glamour, Value and the Post-acquisition Performance of Acquiring Firms." *Journal of Financial Economics*, 49, 223-253.

Resende, Marcelo. (1999). "Wave Behaviour of Mergers and Acquisitions in the UK: A Sectoral Study." *Oxford Bulletin of Economics and Statistics*, 61(1), 85-94.

Rhodes-Kropf, M. and S. Viswanathan. (2004). "Market Valuation and Merger Waves." *Journal of Finance*, 59, 2685–2718.

Rhodes-Kropf, M., David. T. Robinson, and S. Viswanathan. (2005). "Valuation Waves and Merger Activity: The Empirical Evidence." *Journal of Financial Economics*, 77 (3), 561-603.

Roe, Mark J. (1993). "Takeover Politics." in: Margaret M. Blair (Ed.) *The Deal Decade*, The Brookings Institution, Washington, D.C.

Röller, Lars-Hendrik, Johan Stennek and Frank Verboven. (2001). "Efficiency Gains from Mergers." *European Economy*, 5, 31-128.

Scherer, F.M. and David Ross. (1990). *Industrial Market Structure and Economic Performance*, 3rd ed., Boston: Houghton Mifflin.

Schwartz, S. (1984). "An Empirical Test of A Managerial, Life-Cycle, and Cost of Capital Model of Merger Activity." *Journal of Industrial Economics*, 32(3), 265-75.

Schwert, G.W. (2000). "Hostility in Takeovers: In the Eyes of the Beholder?" *Journal of Finance*, 55 (6), 2599-2640.

Schwert, William G. (1996). “Markup Pricing in Mergers and Acquisitions.” *Journal of Financial Economics*, 153-192.

Shiller, Robert J. (1981). "Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?" *American Economic Review*, 71(3), 421-36.

Shiller, Robert J. (2000). *Irrational Exuberance*, Princeton: Princeton University Press.

Shleifer, Andrei. (2000). *Inefficient Markets: An Introduction to Behavioral Finance*, Oxford: Oxford University Press.

Shleifer, Andrei and Robert W. Vishny. (2003). “Stock Market Driven Acquisitions.” *Journal of Financial Economics*, 70 (3), 295-489.

Smith, Richard, and Kim, Joo-Hyun. (1994). “The Combined Effects of Free Cash Flow and Financial Slack on Bidder and Target Stock Returns.” *Journal of Business* 67, 281-310.

Steiner, P. O. (1975). *Mergers: Motives, Effects, Control*, Ann Arbor: University of Michigan Press.

Summers, Lawrence. (1986). “Does the Stock Market Rationally Reflect Fundamental Values?” *Journal of Finance*, 41(3), 591-601.

Thaler, Richard H. (1991). *Quasi-Rational Economics*, New York: Russell Sage Foundation.

Thaler, Richard H., ed. (1993). *Advances in Behavioral Finance*, New York: Russell Sage Foundation.

Verter, Geoffrey . (2002). “Timing Merger Waves.” Working Paper, Harvard University.

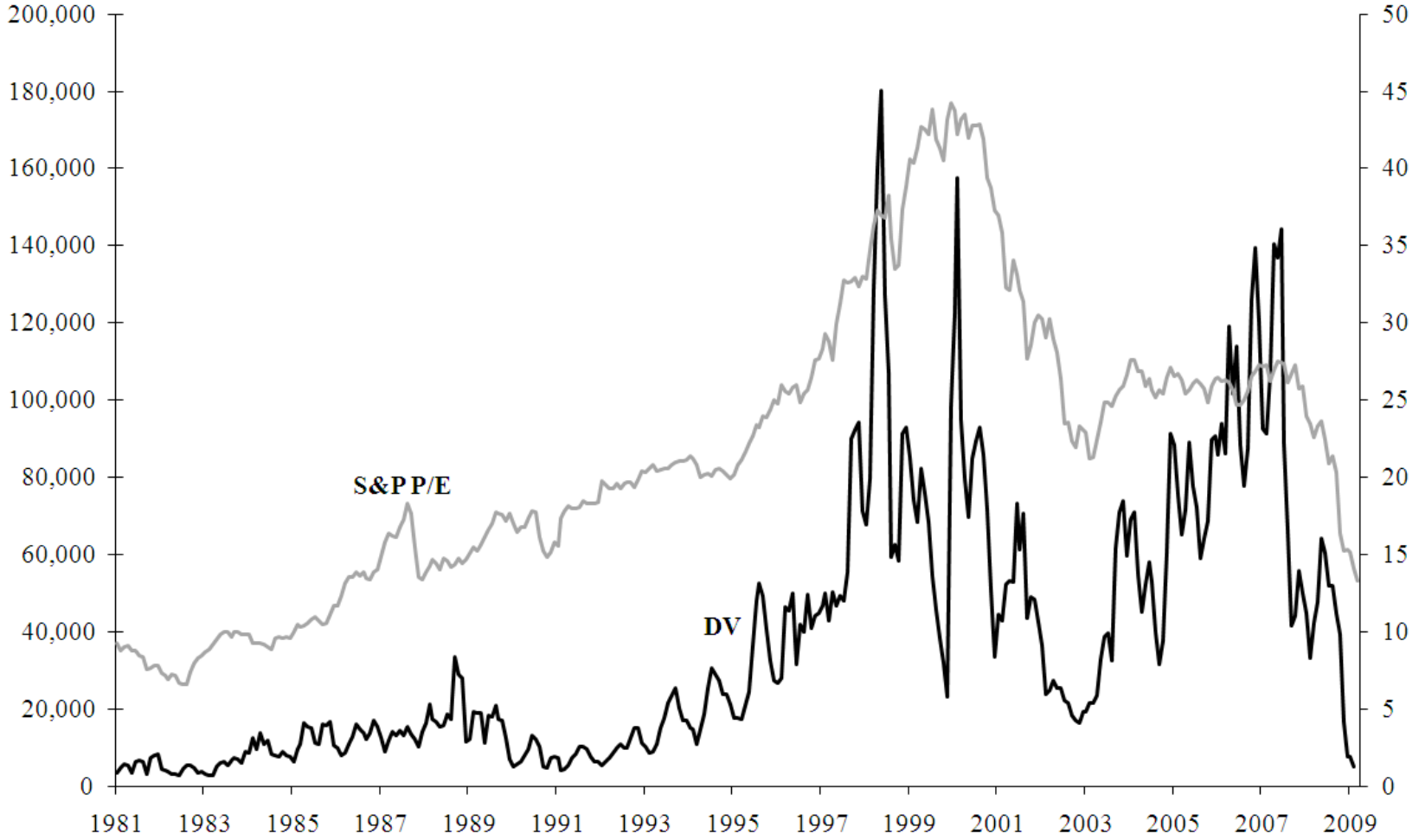
Vogt, S. C. (1994). “The Cash Flow/Investment Relationship: Evidence from U.S. Manufacturing Firms.” *Financial Management*, 23, 3-20.

Weston, J. Fred and S. K. Mansinghka. (1971). “Tests of the Efficiency Performance of Conglomerate Firms.” *Journal of Finance*, 26(Sept.), 919-36.

Wooldridge, J. M. (2002). “Econometric Analysis of Cross Section and Panel Data”, MIT Press.

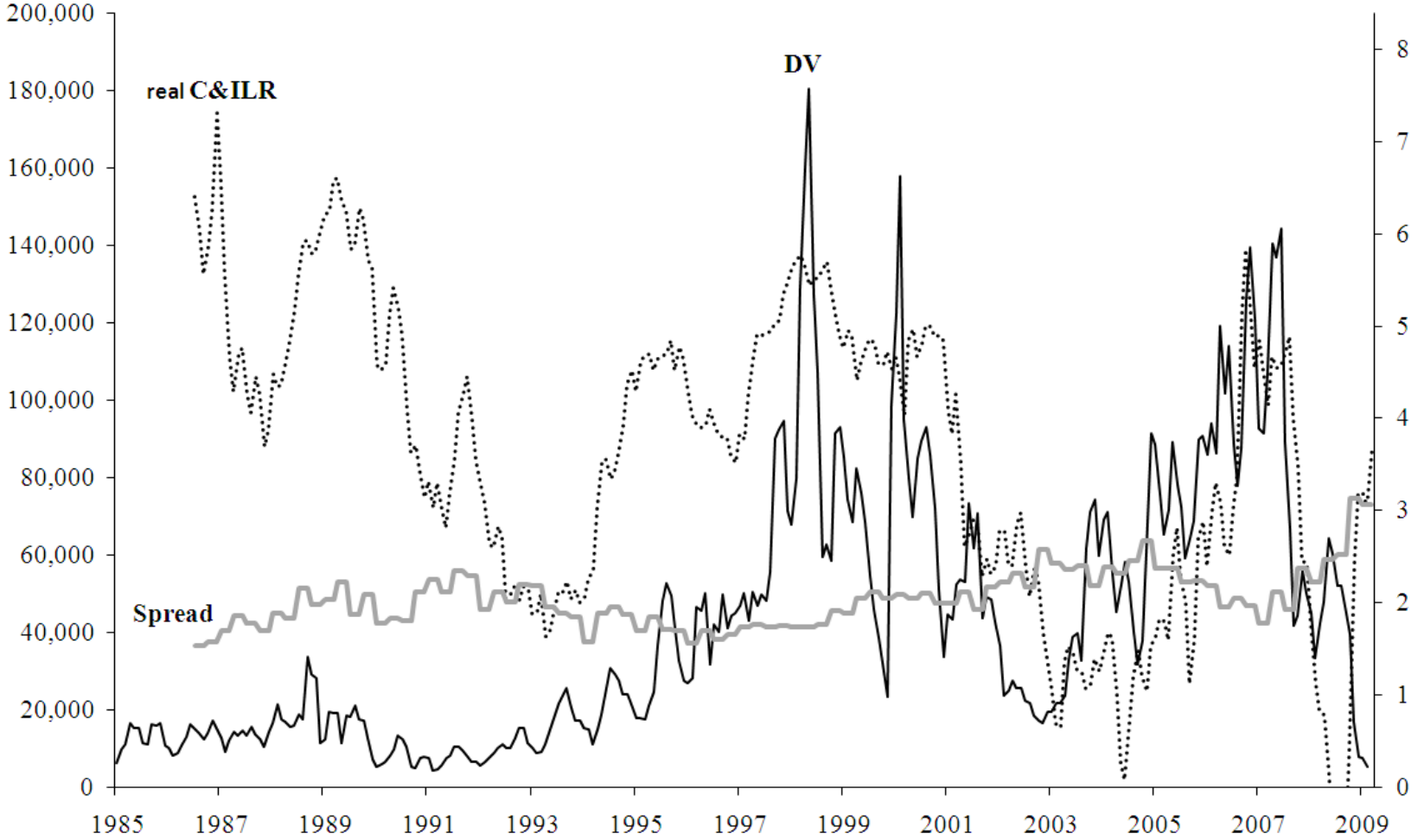
Zweig, Phillip L. (1995). “The Case Against Mergers.” Business Week (October 30), 122-30.

Figure 1: M&A and P/E



Sources: DV is total deal values of Mergers and Acquisitions per month, in Million USD. The data are from SDC database. The figure shows a 3-month moving average. S&P P/E is the monthly price-earnings ratio for the S&P 500 index. It is provided by Robert Shiller (http://www.econ.yale.edu/~shiller/data.htm).

Figure 2: M&A, real Commercial and Industrial Loan Rate (C&ILR), and Spread



Sources: DV is total deal values of Mergers and Acquisitions per month, in Million USD. The data are from SDC database. Real C&ILR is the CPI-inflation-adjusted Commercial and Industrial Loan Rate. Spread is the difference between C&ILR and the Federal Funds Rate. Spread and C&ILR are from http://www.federalreserve.gov.

Figure 3: The managerial trade-off

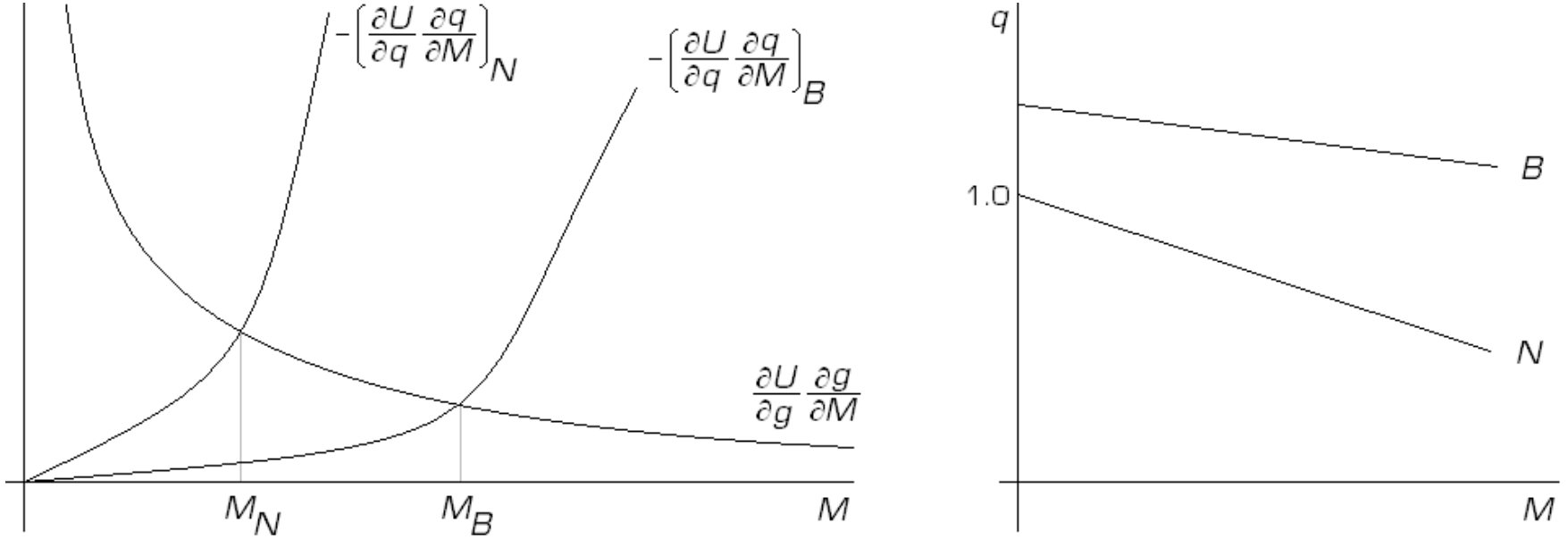


Table 1: Number of M&A, Overvaluation and Means of Finance

			Means of Finance		
	M&A	**O/TA**	**Stock**	**Debt**	**Cash**
1985	68	0.056	0.192	0.651	0.157
1986	154	0.086	0.224	0.553	0.223
1987	146	-0.163	0.410	0.377	0.213
1988	183	-0.075	0.229	0.564	0.207
1989	252	0.068	0.307	0.450	0.243
1990	261	-0.132	0.387	0.398	0.214
1991	314	0.481	0.416	0.345	0.239
1992	411	0.515	0.402	0.379	0.219
1993	472	0.572	0.381	0.376	0.243
1994	583	0.267	0.358	0.464	0.177
1995	634	0.585	0.433	0.390	0.177
1996	806	0.622	0.429	0.365	0.206
1997	939	0.781	0.406	0.397	0.197
1998	1,070	0.822	0.400	0.428	0.172
1999	1,011	1.665	0.465	0.366	0.169
2000	1,017	0.772	0.523	0.306	0.170
2001	850	0.847	0.435	0.320	0.245
2002	803	0.534	0.279	0.417	0.304
2003	847	1.460	0.285	0.440	0.274
2004	1,038	1.435	0.226	0.468	0.306
2005	1,171	1.216	0.238	0.453	0.309
2006	1,264	1.279	0.207	0.486	0.307
2007	1,224	1.236	0.211	0.506	0.283
2008	979	0.338	0.169	0.458	0.373
Total	16,497	0.636	0.334	0.432	0.234

Note: The number of mergers and acquisitions is from the SDC database and includes all transaction where more than 50 percent of the target's equity is acquired. O is overvaluation as described in section IV. A. (see equation (5)). O/TA is overvaluation relative to the total assets of the firm. Stock refers to the average fraction of the deal value paid in shares, Debt refers to the average fraction of the deal value financed by debt. Cash refers to the average fraction of the deal value paid in cash.

Table 2a: Summary statistics, mean values

	Acquirers	Controls
Deal Value (DV, Thsd USD)	359,515	
Assets Acquired (DV/TA)	0.247	
Total Assets (TA, Thsd USD)	3,656,185	1,266,801
ln(TA)	12.68	11.18
Tobin's q	1.95	2.13
Cash Flow (CF/TA)	0.0769	0.0565
Leverage	0.26	0.24
N	10,729	50,495

Note: Only firm years with deals are used to calculate mean values for acquirers. Cash Flow is net income plus depreciation divided by total assets (TA). Leverage is the ratio of total debt to total assets. Overvaluation is O_{it} from equation (5) expressed as a fraction of market value (O/MV). DV is the deal value (i.e. the total amount paid for the target). Assets acquired is the Deal Value divided by total assets.

Table 2b: Correlation Coefficients

	Assets A.	O	P/E	S	ln(TA)	CF	L	q
O	0.061	1						
	0.000							
P/E	0.066	0.082	1					
	0.000	0.000						
S	-0.026	0.030	-0.124	1				
	0.000	0.000	0.000					
ln(TA)	-0.008	-0.322	-0.032	0.056	1			
	0.049	0.000	0.000	0.000				
CF	-0.023	-0.378	-0.049	-0.076	0.393	1		
	0.000	0.000	0.000	0.000	0.000			
L	-0.014	-0.121	-0.014	0.013	0.339	0.044	1	
	0.000	0.000	0.001	0.001	0.000	0.000		
q	0.057	0.951	0.072	0.022	-0.302	-0.342	-0.127	1
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
FF	0.010	-0.050	0.069	-0.706	-0.039	0.066	-0.004	-0.040
	0.010	0.000	0.000	0.000	0.000	0.000	0.370	0.000

Note: Only firm years with deals are used to calculate mean values for acquirers. Cash Flow (*CF*) is net income plus depreciation divided by total assets (TA). Leverage is the ratio of total debt to total assets. Overvaluation is O_{it} from equation (5) expressed as a fraction of the total assets (O/TA). DV is the deal value (i.e. the total amount paid for the target). Assets acquired is the Deal Value divided by total assets. P/E is the value of the Standard and Poor's 500 price-earnings ratio. S is the spread between the Federal Funds Rate (FF) and the Commercial & Industrial Loan Rate. The p-values are reported below the correlation coefficients.

Table 3: Explaining the Amounts of Assets Acquired

Table 3 reports the Tobit estimates of the coefficients of Eq. 6 and Eq. 7. The dependent variable is the Assets acquired (Deal Value divided by total assets). Overvaluation (O) is O_{it} from equation (5) expressed as a fraction of total assets. P/E is the value of the Standard and Poor's 500 price-earnings ratio. S is the spread between the Federal Funds Rate (FF) and the Commercial & Industrial Loan Rate. Ln(TA) is the natural logarithm of total assets. Cash Flow (CF) is net income plus depreciation divided by total assets (TA). Leverage (L) is the ratio of total debt to total assets. Industry dummies according to the SIC (2-digit) are included and the table shows the F-test result for being jointly different from zero. Acquirers are excluded from the control group two years before and two years after the deal.

	(6)		**(7)**	
	Coeff.	**(t-value)**	**Coeff.**	**(t-value)**
O	0.0183	(12.8)	0.0180	(12.6)
P/E	0.0092	(19.8)	0.0093	(19.9)
S	-0.1200	(-9.4)	-0.2018	(-11.5)
ln(TA)	0.0799	(43.6)	0.0796	(43.4)
CF	0.1165	(6.0)	0.1190	(6.1)
L	-0.0501	(-3.1)	-0.0501	(-3.1)
FF			-0.0168	(-6.9)
constant	-1.0900	-(8.6)	-1.0367	(-20.5)
Industry dummies	F(67, 44,962) = 23.1		F(67, 44,961) = 23.0	
N (M_{it}>0)	45,035 (10,465)		45,035 (10,465)	
R^2	0.1108		0.1119	

Table 4: Explaining the Choice of Finance

Table 4 presents the Tobit estimates of the coefficients of equation 8. The dependent variable is EF_{it}, the fraction of assets acquired by *i* in *t* by issuing new shares. C&ILR is the Commercial and Industrial Loan Rate (from http://www.federalreserve.gov/releases/E2/e2chart.htm). M is the size of the target relative to total assets of the acquirer. The remaining variables are defined in the notes to Table 3.

	(8)	
	Coeff.	**(t-value)**
O	0.088	(9.2)
P/E	0.018	(6.8)
C&ILR	0.093	(8.1)
M	0.949	(18.4)
CF	-1.099	(-10.6)
L	-0.631	(-7.8)
constant	-1.384	(-14.2)
N	7,681	
R^2	0.0800	

Table 5: Explaining Abnormal Returns

Table 5 shows the estimates for equation 9 for the cases of abnormal returns after one month, one, two and three years after the merger announcement date. The average abnormal returns for acquirers for the four windows are calculated against a control group of all companies which did not make an acquisition in the year prior to the month of the acquisition and over the length of the window, i.e. $AR_{i,t} = R^{ing}{}_{i,t} - \bar{R}_t^{non}$. where $AR_{i,t}$ is the abnormal return of acquiring firm *i* during period *t*; $R^{ing}{}_{i,t}$ is the total return of acquiring firm *i* during period *t*, and $\bar{R}_t^{non}$ is the average total return of all non-acquiring firms during period *t*. We use the total return index from Datastream, which is adjusted for dividend payments and share splits. The explanatory variables are defined as in Table 3. P/E^2 and S^2 are P/E squared and S squared, respectively.

	(9) 1 month		**(9) 1 year**		**(9) 2 years**		**(9) 3 years**	
	Coef.	**t-value**	**Coef.**	**t-value**	**Coef.**	**t-value**	**Coef.**	**t-value**
P/E	-0.0004	(-0.4)	-0.0162	(-4.1)	-0.0720	(-12.0)	-0.0902	(-11.6)
P/E^2	0.0000	(-0.4)	0.0002	(3.0)	0.0012	(11.6)	0.0016	(12.1)
S	-0.0064	(-0.2)	0.5894	(2.5)	2.2546	(6.2)	1.9370	(4.1)
S^2	0.0047	(0.5)	-0.2114	(-3.6)	-0.6479	(-7.4)	-0.6147	(-5.4)
O	0.0010	(2.1)	0.0044	(2.4)	-0.0165	(-5.8)	-0.0324	(-8.9)
L	0.0065	(1.5)	0.0863	(4.8)	0.1678	(6.1)	0.2345	(6.6)
constant	0.0086	(0.2)	-0.0958	(-0.4)	-0.9361	(-2.4)	-0.3018	(-0.6)
N	15,001		14,350		13,315		12,248	
R^2	0.003		0.0263		0.0489		0.0677	

Notes:

[1] Ralph Nelson (1959, 1966) was the first to document the link between merger activity and share prices, and numerous subsequent studies have confirmed this finding. See, for example, Melicher, Ledolter and D'Antonio (1983), Geroski (1984) for the US, and Geroski (1984) and Clarke and Ioannidis (1996) for the UK.

[2] Shiller's index is constructed from P/E data for the S&P 500 (see Shiller, 2000, and the data section on his webpage, http://www.econ.yale.edu/~shiller). A very similar pattern exists if we substitute the Dow Jones Industrials Index or the S&P 500 Index.

[3] For surveys of this literature, see Steiner (1975), Scherer and Ross (1990, pp. 153-198), Mueller (2003, ch. 8), Weston, Chung and Hoag (1990), and Röller, Stennek and Verboven (2001), and Pautler (2003).

[4] See the survey by Jensen and Ruback (1983).

[5] See, Thaler (1991, 1993) and Shleifer (2000).

[6] For additional evidence see, LeRoy and Porter (1981), Summers (1986), Barsky and De Long (1993). LeRoy (1989) offers a survey.

[7] See, Damodaran (2005).

[8] For an account of the hypothesis by an academic, see Mead (1969).

[9] Several studies have traced the relative performance of the conglomerates during and after the stock market boom of the 1960s. See, for example, Melicher and Rush (1973, 1974). We discuss additional evidence below based on share performance over long windows.

[10] When testing his industry shocks theory of merger waves, Harford (2005) uses the Spread as a measure of the ease of financing mergers. This is partly an alternative interpretation of the variable, partly an overlapping one. Borrowing funds may be more readily available due to greater optimism in the bond market.

[11] See, Khorana and Zenner (1998) and Harford and Li (2007).

[12] A further justification for including q in the managers' utility function would be that managers own shares in the firm.

[13] We assign each firm to one of the 48 industry groupings. These are the same groupings used by Fama and French (1997) and by Harford (2005).

[14] See, Grabowski and Mueller (1972), Vogt (1994), Hay and Liu (1998), and Gugler, Mueller and Yurtoglu (2004).

[15] For surveys, see Mueller (1977, 2003), Jensen and Ruback (1983), Jarrell, Brickley and Netter (1988), Caves (1989), Jarrell and Poulsen (1989), Scherer and Ross (1990, pp. 167-174), Datta et al. (1992) and Agrawal and Jaffee (2000).

[16] This is generally true of the early literature reviewed in Jensen and Ruback (1983). More recent studies reaching this conclusion include, Dennis and McConnell (1986), Bradley, Desai and Kim (1988), Bhagat, Shleifer and Vishny (1990), Kang (1993), Doukas (1995), Bhagat, Hirshleifer and Noah (2005), and Eckbo and Thorburn (2000).

[17] See, for example, Lang, Stulz and Walking (1989), Houston and Ryngaert (1994), Smith and Kim (1994), Hubbard and Palia (1995), Maquieira, Megginson and Nail (1998) and Becher (2000). Moeller, Schlingemann and Stulz (2005), however, report huge short-run losses to acquirers for the 1990s merger wave.

[18] For a discussion of why "friendly" mergers will be favored over hostile takeovers by managers pursuing growth, see Mueller and Sirower, (2003).

[19] Visual inspection of Figures 1 and 2 shows that some of our independent variables seem to be non-stationary. However, because we are referring to a fixed-T, large-N asymptotics the time series

properties of the variables are irrelevant as long as our model is correctly specified. See for instance Wooldridge (2002), p.175.