Corporate Takeovers and Interest Rates

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Abstract

This study analyzes the effect of corporate takeover announcements on the volatility of interest rate changes and on the level of interest rates over the period 1962 through 1984. The findings suggest that intercorporate takeovers increase the volatility of interest rate changes over this period. Because the increase in volatility is concentrated around the announcement of cash takeovers, the results imply that it is the mode of financing, rather than takeovers, per se, that is important for credit markets.

1. Introduction

Among the many accusations concerning the supposed deleterious effects of corporate takeovers is the complaint that takeovers adversely affect credit markets and interest rates. Numbered among the accusers have been economists, government officials, and corporate executives. Indeed, at one point, the Board of Governors of the Federal Reserve proposed that commercial banks be restricted in their ability to finance corporate takeovers. Among the defenders of takeover activity have been takeover specialists and various other economists.

Despite the heat of the debate, little light has been shed on the question of whether takeover activity has a noticeable effect on credit markets. Part of the explanation may be attributed to the ambiguity with which claims and counterclaims have been advanced. Antagonists complain that takeover activity has a destabilizing influence on credit markets and/or that takeover activity "crowds-out" more productive users of capital. Protagonists argue that takeovers merely shift capital from one pocket to another, with no net reduction in the availability of credit.

Examples of expressions of concern about the effects of takeovers on credit markets are plentiful. For example,

Will merger mania derail the expansion? Many economists fear that the recent surge in short-term business loans is pushing up interest rates to killer heights, worry that it could. And their fears were intensified when both money market and bond rates

soared above last fall's peak in recent weeks. (Business Week, April 16, 1984, p. 176)

Wall Street's latest merger boom has found banks willing to open their credit spigots wide, and some fear the credit markets could be flooded. Some economists and nonbankers say heavy borrowing could conflict with President Reagan's economic program by keeping interest rates high and diverting funds from investment in new productive facilities. They also say the high rates could cause trouble for other borrowers. There could be a crowding out of less creditworthy companies if acquisition minded concerns exercise their credit lines and later refinance at lower rates in the bond market, said Thomas S. Johnson, executive vice president at Chemical Bank. (Wall Street Journal, July 14, 1981, p. 2)

Statements to the contrary also are available. Jensen (1984) writes:

First, the increases in shareholder wealth I've discussed indicate that takeover activities are productive investments; credit lines are not wasted. Second, companies that make acquisitions with stock or other securities, or with cash on hand or capital acquired from the sale of assets, do not use bank credit.

More important, even when companies accomplish takeovers with bank loans, they do not waste credit because most, if not all, of it is still available for real investment such as new plant and equipment.

The primary purpose of this paper is to examine empirically the relationship between corporate takeovers and interest rates. To do so, it is first necessary to distill the general and often vague arguments which have been advanced in the public debate regarding interest rates and takeovers into distinct hypotheses. In the sections that follow, we consider two general hypotheses which derive directly from the public debate over takeovers and interest rates.

The first hypothesis is that takeovers have a destabilizing effect on credit markets as evidenced by an increase in the volatility of interest rate changes. This hypothesis responds to the notion that takeover activity leads to greater market uncertainty which, in turn, reduces the stability of financial rates. The second hypothesis is that takeovers increase the level of interest rates. This hypothesis follows from the "crowding out" effect which is often attributed to takeover financing.

The obvious alternative hypotheses are that takeover activity has no effect on either the volatility of the change in interest rates or the level of interest rates. In the remainder of this paper, we examine the behavior of interest rates around the dates on which takeovers are announced to determine which hypotheses are supported by the data. We conduct our tests with daily interest rate data on 6- and 3-month T-bills and overnight repurchase agreements. For the period 1962 through 1984, our tests indicate that changes in interest rates on the T-bills were significantly more volatile during the two-day interval surrounding take-over announcements than on non-announcement days. Additionally, on the presumption that cash takeovers are more likely to involve the use of bank credit than noncash take-overs, we split the sample into two groups: those involving all cash or cash plus some securities and those involving the exchange of securities only. The tests indicate that volatility of interest rate changes for 6- and 3-month T-bills is significantly greater over the two-day interval surrounding takeover announcements than is the volatility on non-announcement days for the sample of cash takeovers only. However, our tests reveal no perceptible effect of takeover announcements on the volatility of interest rate changes on overnight repurchase agreements for the full sample of take-overs nor for the cash and noncash subsamples. For a further look at the data, the sample is split into pre- and post-October 1979 subsets. It was at that time that the Federal Reserve Board of Governors announced a policy shift that subsequently lead to a now well-documented increase in the general volatility of interest rates. As a consequence, it may be that intercorporate takeovers have had a differential effect on the volatility of the change in interest rates in

the pre- and post-1979 subperiods. These pre- and post-1979 subsamples were further split into cash and non-cash takeovers. For noncash takeovers, in neither subperiod and for none of the three financial instruments considered is the volatility of interest rates changes significantly greater during the two-days surrounding takeover announcements than on non-announcement days. For the sample of cash takeovers, however, the results are not as clear cut. First, with overnight repurchase agreements, the volatility of the change in interest rates is not significantly higher on takeover announcement days than on non-announcement days. For T-bills, the results differ between the two subperiods considered. In the pre-1979 period, for both 6-month and 3-month bills, the volatility of interest rates changes is significantly higher on days surrounding takeover announcements than on non-announcement days. However, in the post-1979 period, only for 6-month bills is the volatility of the change in interest rates significantly higher on days surrounding takeover announcements than on non-announcement days.

Finally, our results do not support the hypothesis that takeovers systematically contribute to higher interest rates. Abnormal changes in interest rates are calculated using both a naive and an ARIMA model of interest rate forecasts. In none of the samples employed is it possible to reject the null hypothesis that the level of interest rates is not significantly different from the rate predicted by either model during the two-day interval surrounding take-over announcements.

Our initial tests are based on announcements of inter corporate tender offers and mergers. Separately, we repeat the tests for a sample of leveraged buyouts (LBOs) which occurred primarily during the post-1979 period. There is no evidence that LBOs have a significant effect on either the level of interest rates or the volatility of changes in interest rates.

In the following section, we describe the procedure employed to generate a sample of takeover announcements, present some descriptive statistics for the sample, and describe the interest rate data to be used in the empirical tests that follow. In the third section, we detail the empirical procedure used in the tests of interest rate volatility and present related empirical results. In section four, we explain the procedure used to test for changes in the level of interest rates and present the results of those tests. In section five, we describe the LBO sample and briefly report results of the tests for changes in the volatility and the level of interest rates around announcement dates of LBOs. The final section contains some concluding remarks.

2. Data

Two sets of data are employed in this paper. The first is a sample of corporate takeovers that were announced over the period July 1962 through December 1984. The second is a parallel set of daily interest rates.

2.2 Takeovers

In this paper, takeovers include intercorporate tender offers and mergers. The beginning point for the tender offer sample was provided by Michael Bradley and is described in Bradley, Desai, and Kim (1983). Bradley's sample contains almost every tender offer made over the period October 1958 through September 1980, where either the bidder or the target firm (or both) was listed on the New York Stock Exchange (NYSE) or the American Stock Exchange (AMEX) over the period July 1962 through December 1980 and for which an announcement date could be identified in the *Wall Street Journal* (WSJ). The database includes the dates of tender offer announcements, including the dates of multiple announcements (when they occurred), whether the offer was for cash, for securities, or for a combination of the two, the price to be paid for each target share, the number of target shares outstanding, the number of shares sought by the bidder, the number of shares purchased, and so forth. From this list, we deleted all instances in which the target firm was not included on the Center for Research in Security Prices (CRSP) daily returns file.⁽¹⁾

We extended the initial sample for the period 1981 through 1984. The primary source for the identification of tender offers was the 14D-1 forms reported in the *SEC News Digest*. Observations were retained in the sample if the target was contained in the CRSP daily returns file of NYSE and AMEX stocks and if an announcement concerning the tender offer could be located in the *Wall Street Journal Index* (WSJI). The WSJI was then searched for one year prior to, one year after, and the year in which the 14D-1 was filed to determine whether other takeover announcements involving the target firm occurred over this period. If so, these dates were also recorded. Additional data regarding the tender offer and the target firm were gathered from the WSJ, the *Standard and Poor's Security Owner's Stock Guide*, and the *SEC Official Summary* such that, at the end of the process, this tender offer data set was comparable to the one provided by Bradley.

A similar database was constructed for firms involved in mergers. The CRSP daily returns file identifies all firms which were delisted from the NYSE or the AMEX

as a result of a takeover. A list of these firms was compiled as the starting point for the generation of a sample of mergers. Then, all takeovers in which the target firm appeared on our tender offer list were deleted and the WSJI was searched for announcement dates concerning the merger.⁽²⁾ If no announcement date could be identified, the observation was dropped from the sample. The actual WSJ articles concerning the takeover were then read to determine that the transaction was indeed a merger. In some instances the transaction did not involve the merger of one firm into another, rather the delisting was the result of a going private transaction, typically by means of a leveraged buyout (LBO). A separate list of these transactions was constructed. Again, a variety of documents, including the WSJ, *Standard and Poor's Security Owner's Stock Guide*, and the *SEC Official Summary*, was searched to gather descriptive information on the firms in the sample. This process yielded multiple WSJ announcement dates, information on whether the transaction was for cash, securities, or both, and the total dollar amount involved in the transaction when it was available. As we noted, in some cases, the takeover involved more than one bidder and, in some cases, the same bidder made more than one bid. For our purposes, we focus our tests only on the first bid for any individual target firm. We do so because it is presumably at that time that the market first learns of the takeover attempt and it is at that time, if any, that the effect of the takeover on financial markets is likely to be observed in the data. One of the consequences of our search procedure is that the tender offer sample includes both successful and unsuccessful take-over attempts, whereas, in the merger sample, each target firm was eventually successfully acquired.⁽³⁾

Some statistics describing the data are presented in Tables 1 and 2. The takeovers are divided into two categories: those involving only securities and those involving cash only or cash plus some securities. The justification for this classification scheme is that critics who complain of the adverse effects of takeovers on financial markets often focus their attacks on takeovers financed with bank credit. And, it is the case that takeovers structured as cash deals are more likely to involve bank credit than are deals that are completed by means of an exchange of securities. In these latter cases, treasury stock (or some other security) of the bidder typically is exchanged for the currently outstanding shares of the target firm. As we suggested in the introduction, it is useful to consider separately the pre- and post-October 1979 subperiods. For this reason the data are also categorized according to whether the transaction occurred before or after October 1979.

Table 1
Frequency Distribution of Corporate Takeovers by Year

Year	Noncash Takeovers ^a	Cash Takeovers ^b
1962	12	4
1963	32	17
1964	33	8
1965	39	21
1966	60	21
1967	92	30
1968	83	37
1969	43	14
1970	39	8
1971	19	8
1972	34	9
1973	28	37
1974	15	40
1975	21	30
1976	21	30
1977	27	57
1978	23	73
1979	27	78
1980	30	49
1981	23	61
1982	15	66
1983	21	48
1984	10	67
Total	747	813

^a Noncash takeovers are those in which the target firm was acquired with securities.

^b Cash takeovers are those in which the target firm was acquired with cash or a combination of cash and securities. Of the 813 cash takeovers, 539 are from the tender offer data base. The remainder are mergers.

Table 1 gives the frequency distributions, by year of announcement, for noncash takeovers and for those that involved at least some cash. In total, the sample includes 747 noncash takeovers and 813 cash takeovers. In the pre-1979 period, the number of noncash takeovers exceeds the number of cash takeovers. In the post-1979 period this pattern is reversed. Table 2 classifies the data according to the total dollar amount to be paid to the shareholders of the target firm. As might be anticipated, the post-1979 takeovers involved significantly larger dollar amounts than those in the pre-1979 period.

2.2 Interest Rates

The interest rate sample consists of two sets of data. The first is calculated from daily bid prices on Treasury bills with maturities of 6 and 3 months. These data, covering the time period from January 1962 through December 1984, were provided by the Federal Reserve Banks of Chicago and San Francisco and the Federal Reserve Board of Governors. Using the time series of daily prices, a daily series of continuously compounded annual yields to maturity is generated for both 6- and 3-month bills. The continuously compounded yield to maturity is calculated by solving for r in

$$P_b = 100 e^{-rt/365}$$

Table 2

Frequency Distribution of Corporate Takeovers by Dollar Amount Offered for the Target Firm Classified According to Whether the Takeover Occurred Before or After October 1979^a

Dollar Amount (in Millions)	Cash Takeovers		Noncash Takeovers	
	July 1962 Through September 1979	November 1979 Through December 1984	July 1962 Through September 1979	November 1979 Through December 1984
≤ 50	304	98	380	29
> 50 < 100	79	53	109	10
> 100 ≤ 250	58	53	101	18
> 250 ≤ 500	19	39	34	18
> 500 ≤ 1000	11	28	7	11
> 1000	3	16	9	15
Total	474	287	640	101

^aFor cash takeovers, the dollar amount offered for the target firm was estimated as the price per share offered times the number of shares sought. In 52 cash takeovers, the total dollar amount offered could not be accurately estimated because the offer involved some unpriced securities.

For noncash takeovers, the dollar amount offered for the target firm was taken directly from the WSJ for 502 of the takeovers. For 233 takeovers, the dollar amount was estimated by multiplying the last price per share on the CRSP master file by the number of shares outstanding less the number of shares already held by the bidder.

where P_b is the bid price of the security as a percent of face value and t is the number of days to maturity of the bill.(4)

The second set of interest rate data is a daily time series of yields on repurchase agreements with overnight maturities. These data, provided by Data Resources, Inc., cover the period from June 1973 through December 1984. Yields on repurchase agreements are also annualized using continuous compounding so as to be consistent with the Treasury yield series.

3. Takeovers and Interest Rate Volatility

The effect of interest rate volatility on the performance of financial markets and institutions has been the focus of recent research. Several studies have examined the effects of interest rate changes on the earnings, risk, and market values of commercial banks. For example, Flannery and James (1984) and Aharony, Saunders, and Swary (1986) find evidence that interest rate changes are negatively related to bank stock returns. Moreover, both studies emphasize the fact that bank stock returns are negatively affected by unexpected changes in interest rates. This result supports the notion that interest rate changes, per se, need not have a substantial effect on financial firms. In an efficient market, the effects of anticipated changes in interest rates should already be impounded in the market price when the changes occur. Changes in the general volatility of interest rates may have little effect on financial firms if such changes are already anticipated by the market. Rather, it is the new information conveyed by unexpected changes in interest rates which should result in the revision of security prices and which could have a destabilizing influence on financial markets. Thus, to the extent that the announcement of corporate takeovers contribute to unexpected changes in interest rates, they will have an impact on the performance of financial markets and institutions.

3.1 Methodology

The methodology that we employ to investigate the effects of takeover announcements on interest rate changes is from Cornell (1979). Cornell's study is concerned with the effect of weekly money supply announcements on short term interest rates. His analysis shows that if money supply announcements result in unexpected changes in interest rates, the variance of interest rate changes on days during which money supply announcements occur should be greater than the variance of interest rate changes on other days. By comparing the variance of interest rate changes on announcement days to the variance of interest rate changes on non-announcement days, Cornell determines that money supply announcements do not result in significant unexpected changes in short term interest rates and, hence, convey little, if any, new information. Thus, there is little potential for such announcements to destabilize financial markets. In this study, we are interested in a similar question. That is, to what extent do the announcement of corporate takeovers convey information resulting in unexpected changes in interest rates? If announcements of corporate takeovers convey information to credit markets resulting in unexpected changes in interest rates, the variance of interest rate changes on announcement days will be greater than the variance of interest rate changes on non-announcement days.

To conduct the test, interest rate changes on 6- and 3-month T-bills are calculated for every trading day over the period beginning July 1962 and ending December 1984. For overnight repurchase agreements, interest rate changes are calculated for the period beginning June 1973 and ending December 1984. The variance of interest rate changes for the days on which takeover announcements appear in the *WSJ* and for the day prior to the announcements is calculated. If more than one takeover is announced on a given day, that day enters only once into the calculation of the announcement period interest rate volatility measure. The variance of interest rate changes on all other days is also computed. An F-test is then calculated to test the null hypothesis that the variance of daily interest rate changes on takeover announcement days is not greater than on non-announcement days. Rejection of the null hypothesis implies that the volatility of interest rate changes around takeover announcement days is significantly greater than the volatility of interest rate changes on other days.

In conducting our tests, we focus on the day on which a takeover announcement appears in the *WSJ* and the previous day. Our motive for doing so derives from

previous studies of the effect of corporate takeover announcements on the common stocks of the involved companies. These studies find that the major stock price effect occurs on the day on which an announcement appears in the *WSJ* and on the previous day.⁽⁵⁾

3.2 Results

Results of the volatility tests are presented in Table 3. Panel A contains results for the period July 1962 through December 1984, while panels B and C contain results for the pre- and post-October 1979 subperiods, respectively. Two general observations can be made. First, it is appropriate to note that our results are consistent with those of others that have documented a general increase in the volatility of interest rates in the post-October 1979 period. For example, for 3-month T-bills, during the post-1979 period, the daily volatility of changes in interest rates on non-announcement days is approximately 8 times the volatility of changes in interest rates on non-announcement days during the pre-1979 period. Second, for overnight repurchase agreements, it is not possible to reject the null hypothesis that interest rate changes are no more volatile on takeover announcement days than on non-announcement days for any sample period considered, regardless of whether we focus on the full sample of takeovers, those takeovers that involve only securities, or those takeovers that involve at least some cash. However, when T-bill rates are considered, the results become more interesting.

For the full sample of takeovers for the full period, 1962 through 1984, the null hypothesis is rejected at the 0.01 level for 6-month T-bills and at the 0.05 level for 3-month T-bills. However, when the sample is split into noncash takeovers and takeovers which involve at least some cash, it becomes clear that rejection of the null hypothesis can be attributed to the sample of cash takeovers. For both 6-month and 3-month T-bills, the null hypothesis is rejected at the 0.01 level for the sample of cash takeovers, whereas, for the sample of noncash takeovers, the null hypothesis cannot be rejected at even the 0.10 level.

When the sample is further split into pre- and post-October 1979 subsamples, the same pattern is revealed: to the extent that the null hypothesis can be rejected, it is only for the sample of cash takeovers. In the pre-1979 period, the null hypothesis can be rejected at the 0.01 level with 3-month bills and at the 0.05 level with 6-month bills. In the post-1979 period, the null hypothesis is rejected at the 0.01 level with 6-month bills, but it cannot be rejected at the 0.05 level with 3-month bills.

Table 3
An Analysis of Changes in Interest Rate Volatility Surrounding Corporate Takeover Announcements

	6-Month Treasury Bills			3-Month Treasury Bills			Overnight Repurchase Agreements		
	Announce- ment Period Volatility ^a	Non-Announce- ment Period Volatility ^b	F- Statistic ^c	Announce- ment Period Volatility ^a	Non-Announce- ment Period Volatility ^b	F- Statistic ^c	Announce- ment Period Volatility ^a	Non-Announce- ment Period Volatility ^b	F- Statistic ^c
A. Sample Period: July 1962 through December 1984									
All Takeovers	0.0269 (n=2296)	0.0160 (n=3314)	1.68**	0.0216 (n=2296)	0.0164 (n=3314)	1.31*	0.1972 (n=1293)	0.2122 (n=1618)	0.93
Noncash Takeovers	0.0100 (n=1216)	0.0160 (n=3314)	0.63	0.0117 (n=1216)	0.0164 (n=3314)	0.71	0.1594 (n=432)	0.2122 (n=1618)	0.75
Cash Takeovers	0.0394 (n=1335)	0.0160 (n=3314)	2.46**	0.0290 (n=1335)	0.0164 (n=3314)	1.77**	0.2047 (n=995)	0.2122 (n=1618)	0.96
B. Sample Period: July 1962 through September 1979									
All Takeovers	0.0051 (n=1692)	0.0049 (n=2609)	1.02	0.0079 (n=1692)	0.0064 (n=2609)	1.22	0.0522 (n=688)	0.0590 (n=908)	0.88
Noncash Takeovers	0.0037 (n=1038)	0.0049 (n=2609)	0.76	0.0049 (n=1038)	0.0064 (n=2609)	0.77	0.0614 (n=254)	0.0590 (n=908)	1.04
Cash Takeovers	0.0064 (n=854)	0.0049 (n=2609)	1.31*	0.0108 (n=854)	0.0064 (n=2609)	1.69**	0.0440 (n=513)	0.0590 (n=908)	0.75

Table 3 (continued)

C. Sample Period: November 1979 through December 1984							
All Takeovers	0.0896 (n=588)	0.0570 (n=715)	1.57*	0.0601 (n=588)	0.0537 (n=715)	1.12	0.3688 (n=588) 0.4040 (n=720) 0.91
Noncash Takeovers	0.0477 (n=172)	0.0570 (n=715)	0.84	0.0515 (n=172)	0.0537 (n=715)	0.96	0.3066 (n=172) 0.4040 (n=720) 0.76
Cash Takeovers	0.0993 (n=468)	0.0570 (n=715)	1.74**	0.0611 (n=468)	0.0537 (n=715)	1.14	0.3823 (n=468) 0.4040 (n=720) 0.94
D. Largest Cash Takeovers							
Pre-1979 Cash Takeovers > \$100 million	0.0061 (n=160)	0.0049 (n=2609)	1.24	0.0135 (n=160)	0.0064 (n=2609)	2.11**	0.0394 (n=128) 0.0590 0.67
Post-1979 Cash Takeovers > \$250 million	0.1923 (n=150)	0.0570 (n=715)	3.37**	0.0544 (n=150)	0.0570 (n=715)	0.95	0.3442 (n=150) 0.4040 (n=720) 0.85

a Announcement period volatility is the variance of daily interest rate changes on the day on which a takeover announcement appears in the *WSJ* and the previous day. The number in parentheses is the sample size where the sample includes all days on which a takeover announcement appears in the *WSJ* and the previous day. Because some announcement periods overlap, the sample size is less than twice the number of takeovers.

b Non-announcement period volatility is the variance of daily interest rate changes for days not included in a takeover announcement period. The number in parentheses is the number of days in the non-announcement period.

c F-statistic tests the null hypothesis that the variance of the change in interest rates on announcement days is not greater than the variance of the change in interest rates on non-announcement days.

*Indicates null hypothesis can be rejected at the .05 level of significance.

**Indicates null hypothesis can be rejected at the .01 level of significance.

Other than segregating the data into cash and noncash subsamples, our tests do not distinguish among takeovers. However, it is possible that credit markets are more strongly affected by "significant" takeovers. Unfortunately, an obvious definition of a significant takeover is not readily available. As a proxy, though, the tests were repeated on a pre-1979 sample of takeovers that involved more than \$100 million in cash and on a post-1979 sample of takeovers that involved more than \$250 million in cash. The pre-1979 sample contains 83 takeovers and the post-1979 sample contains 85 takeovers. The results are reported in panel D of Table 3. The results indicate that, in the pre-1979 period, the null hypothesis can be rejected (at the 0.01 level) with 3-month bills, but not with 6-month bills; in the post-1979 period, the null hypothesis can be rejected (at the 0.01 level) with 6-month bills, but not 3-month bills. The null cannot be rejected with overnight repurchase agreements in either time period. In sum, there is some support for the hypothesis that corporate takeovers that are consummated as a cash transaction (and may involve bank financing) increase the volatility of interest rate changes. However, the evidence is not consistent across instruments within time periods, nor is it consistent across time periods for the same financial instrument.(6)

4. Corporate Takeovers and the Level of Interest Rates

The major concern regarding the effect of takeovers on the level of interest rates is that funds used to finance corporate takeovers may be either wasted, or, at least, diverted from more productive uses. Proponents of this point of view contend that the increase in credit demand to finance takeover activities results in upward pressure on interest rates and the crowding out of "legitimate" borrowers. Of course, what this perspective fails to recognize is that funds paid to stockholders who sell their shares are immediately available for reinvestment elsewhere. There is no reason to presuppose that those funds would not be redirected toward the most productive alternatives--that is, investments providing the greatest risk-adjusted returns.

4.1 Methodology

The technique that we use to test the hypothesis that corporate takeovers affect the level of interest rates is commonly referred to as the event-time methodology and has been used in numerous studies of stock price behavior. In those studies, the technique has generally been used to detect abnormal stock returns which are associated with particular corporate events. Here, we employ the same methodology to test for abnormal

interest rates which may be associated with the announcement of corporate takeovers.

In order to apply the methodology, abnormal interest rates are examined on all days on which takeover announcements were reported in the *WSJ* and for the one day immediately prior to each report. Abnormal interest rates are computed as the difference between the actual interest rate and an estimate of the expected, or normal, interest rate. Formally, the abnormal interest rate from date $t-1$ to date t is defined as

$$e_t = i_t - E(i_t),$$

where i_t and i_{t-1} are the observed interest rates on days t and $t-1$, respectively, and $E(\cdot)$ is the expectations operator, conditional on information available at date $t-1$.

Two different methods are used to estimate normal, or expected, daily interest rates. The first, which we refer to as the naive model, assumes that interest rates evolve as a martingale. With this model, on any date $t-1$,

$$E(i_t) = i_{t-1},$$

which implies that the expected change in the interest rate from date $t-1$ to date t is zero and that the abnormal interest rate for day t can be computed as

$$e_t = i_t - i_{t-1}$$

The second procedure models interest rates as an ARIMA process. Using Box-Jenkins procedures, forecasts of daily interest rates are generated for the day of (day t) and the day prior to (day $t-1$) each takeover announcement using the time series of interest rates for the previous 100 days (from day $t-101$ to day $t-2$). Under this estimation procedure, the abnormal interest rate for day t is defined as

$$e_t = i_t - E_f(i_t),$$

where

$E_f(i_t)$ represents the ARIMA forecast of the interest rate on day t .

For all days of and for all days immediately prior to the *WSJ* announcements of corporate takeovers, abnormal interest rates on 6- and 3-month T-Bills and overnight repurchase agreements are computed using each of the estimation techniques outlined above. The average

abnormal interest rate for day t and day $t-1$ is computed separately for each financial instrument as

$$\bar{e}_t = \frac{1}{N} \sum_{j=1}^N e_{jt}$$

where N is the number of announcement days. Additionally, the two-day cumulative average abnormal interest rate change over the day before and the day of the announcement is computed as

$$ce_t = \sum_{T=t-1}^t \bar{e}_T$$

The statistical significance of the cumulative average abnormal interest rate for the two-day announcement period determined with a standard t -test.

4.2 Results

The results for the naive methodology of interest rate forecast are presented in Table 4 and the results for the ARIMA model of interest rate forecast are presented in Table 5. These results can be summarized very simply: Regardless of the time period, the financial instrument, or the type of takeover examined, the null hypothesis cannot be rejected, even for the largest takeovers.(7) For example, using the ARIMA model of interest rate forecast with for the full sample period with the sample of cash takeovers, the t -statistics for 6-month T-bills, 3-month T-bills and overnight repurchase agreements are 1.14, 1.58, and 0.49, respectively. These results are representative of those for other samples, other time periods, and the alternative forecast model. In short, our tests reveal no evidence that intercorporate takeovers contribute to an increase in the level of interest rates.(8)

5. Leveraged Buyouts

Our analysis of interest rates surrounding announcements of intercorporate tender offers and mergers provides only modest support for the notion that corporate takeovers have any effect on credit markets. There is, however, one other form of corporate reorganization that has been the subject of especially harsh criticism - and those are leveraged buyouts. In the typical leveraged buyout, a group of investors forms a shell corporation that issues high-yield or "junk" bonds to finance the purchase of a target company's stock. The new corporation then ends up with a balance sheet that is comprised primarily of debt financing. In many cases, the debt-to-total asset ratio of the LBO exceeds 90%. Because these transactions utilize debt more

intensively than other types of takeover mechanisms, it is possible that this type of takeover has an effect on credit markets that is more noticeable than with more traditional tender offers and mergers. For this reason, the tests are repeated separately for this set of takeovers.

Some descriptive statistics on the LBO sample are contained in Tables 6 and 7. As table 6 indicates, only 11 of the 64 LBOs occurred before 1979. For this reason, for purposes of conducting the tests, the pre- and post-1979 samples are combined. As table 7 indicates, in terms of the dollar amounts involved, the LBO sample is not much different from the post-1979 tender offer sample. The results of the statistical tests are not reported, but they indicate that LBOs have no significant effect on either the level of interest rates or the volatility of change in interest rates.

6. Conclusion

Intercorporate takeovers have been accused of having a number of adverse effects on the U.S. economy generally, in specific U.S. companies, and/or on the employees of target firms. For example, it has been argued (1) that takeovers divert the attention of target firms' managers from productive activities of the involved firm to defending the firm against hostile raiders who merely "loot" the target firm; (2) that the threat of a takeover forces managers to focus on short-run profits at the expense of long-term corporate health; (3) that takeover artists generate gains by abrogating implicit contracts among parties to the firm's productive activities; (4) that takeovers increase unemployment because the result of takeovers is the closing of many of the target's production facilities; and (5) that takeovers destabilize credit markets and increase interest rates. This paper focuses on the last of these complaints. Specifically, this paper analyzes the effect of corporate takeover announcements on the volatility of interest rate changes and on the level of interest rates over the period 1962 through 1984. The financial instruments used in the analysis are 6-month and 3-month treasury bills and overnight repurchase agreements. There is some evidence that intercorporate takeovers increase the volatility of interest rate changes over this period. Because the increase in volatility is concentrated around the announcement of cash takeovers (as opposed to noncash takeovers) the results imply that it is the mode of financing, rather than takeovers, per se, that is important for credit markets. However, some caution should be exercised when interpreting this evidence because it is not consistent across all financing instruments within a given time period nor is it consistent across all time periods for a given financial instrument.

Table 4
Analysis of Abnormal Interest Rates Surrounding Corporate Takeover
Announcements Using a Naive Model of Interest Rate Forecast

	6-Month Treasury Bills			3-Month Treasury Bills			Overnight Repurchase Agreements		
	Announcement Period Abnormal Interest Rate ^a	Sample Size ^b	t- Statistic ^c	Announcement Period Abnormal Interest Rate ^a	Sample Size ^b	t- Statistic ^c	Announcement Period Abnormal Interest Rate ^a	Sample Size ^b	t- Statistic ^c
A. Sample Period: July 1962 through December 1984									
All Takeovers	0.0055	1380	1.05	0.0076	1308	1.29	0.0122	735	0.58
Noncash Takeovers	0.0060	659	1.04	0.0083	659	1.34	-0.0033	225	-0.10
Cash Takeovers	0.0070	721	0.86	0.0097	721	1.04	0.0199	543	0.79
B. Sample Period: July 1962 through September 1979									
All Takeovers	0.0050	963	1.45	0.0041	963	0.95	0.0267	389	1.93
Noncash Takeovers	0.0055	565	1.40	0.0062	565	1.35	0.0467	131	1.62
Cash Takeovers	0.0028	457	0.49	0.0016	457	0.21	0.0206	278	1.48

Table 4 (continued)

C. Sample Period: November 1979 through December 1984									
All Takeovers	0.0455	335	0.26	0.0157	335	0.83	-0.0085	336	-0.20
Noncash Takeovers	0.0076	91	0.22	0.0175	91	0.50	-0.0767	91	-1.09
Cash Takeovers	0.0121	257	0.60	0.0230	257	1.05	0.0148	258	0.29
D. Largest Cash Takeovers									
Pre-1979 Cash Takeovers > \$100 million	0.0103	81	0.80	0.0108	81	0.50	-0.0127	65	-0.42
Post-1979 Cash Takeovers > \$250 million	0.0107	77	0.30	0.0165	77	0.43	-0.0237	77	-0.26

a The announcement period abnormal interest rate is a two-day (-1 and 0) abnormal interest rate.

b Sample size is the number of takeover announcements. If two or more announcements are made on the same day, they are treated as a single observation.

c t-statistic tests the null hypothesis that the average announcement period abnormal interest rate is not greater than zero.

*Indicates null hypothesis can be rejected at the .05 level of significance.

**Indicates null hypothesis can be rejected at the .01 level of significance.

Table 5
Analysis of Abnormal Interest Rates Surrounding Corporate Takeover
Announcements Using an ARIMA Model of Interest Rate Forecast

	6-Month Treasury Bills			3-Month Treasury Bills			Overnight Repurchase Agreements		
	Announcement Period Abnormal Interest Rate ^a	Sample Size ^b	t- Statistic ^c	Announcement Period Abnormal Interest Rate ^a	Sample Size ^b	t- Statistic ^c	Announcement Period Abnormal Interest Rate ^a	Sample Size ^b	t- Statistic ^c
A. Sample Period: July 1962 through December 1984									
All Takeovers	0.0139	1270	1.54	0.0197	1268	1.96	0.0122	700	0.08
Noncash Takeovers	0.0132	637	1.38	0.0179	637	1.71	-0.0315	210	-0.63
Cash Takeovers	0.0161	702	1.14	0.0252	699	1.58	0.0163	520	0.49
B. Sample Period: July 1962 through September 1979									
All Takeovers	0.0102	930	1.84	0.0079	941	1.02	0.0504	364	2.70**
Noncash Takeovers	0.0106	545	1.66	0.0124	548	1.55	0.0582	117	1.73
Cash Takeovers	0.0063	441	0.70	0.0039	449	0.29	0.0466	264	2.19*

Table 5 (continued)

C. Sample Period: November 1979 through December 1984									
All Takeovers	0.0173	333	0.57	0.0522	318	1.62	-0.0582	326	-1.03
Noncash Takeovers	0.0204	90	0.37	0.0481	86	0.83	-0.1512	90	-1.43
Cash Takeovers	0.0273	256	0.77	0.0630	244	1.67	-0.0236	249	-0.36
D. Largest Cash Takeovers									
Pre-1979 Cash Takeovers > \$100 million	0.0198	80	1.03	0.0310	80	1.02	0.0241	63	0.56
Post-1979 Cash Takeovers > \$250 million	0.0221	77	0.32	0.0469	74	0.65	0.0608	73	0.56

a The announcement period abnormal interest rate is a two day (-1 and 0) abnormal interest rate.

b Sample size is the number of takeover announcements. If two or more announcements are made on the same day, they are treated as a single observation.

c t-statistic tests the null hypothesis that the average announcement period abnormal interest rate is not greater than zero.

*Indicates null hypothesis can be rejected at the .05 level of significance.

**Indicates null hypothesis can be rejected at the .01 level of significance.

Table 6

Frequency Distribution of Leveraged Buyouts by Year

Year	Leveraged Buyouts
1974	1
1975	0
1976	0
1977	5
1978	5
1979	3
1980	7
1981	5
1982	12
1983	20
1984	12
Total	70

Table 7

Frequency Distribution of Leveraged Buyouts by
Dollar Amount Offered for the Target Firm Classified According to
Whether the Transaction Occurred Before or After October 1979^a

Dollar Amount (in Millions)	Leveraged Buyouts	
	July 1962 Through September 1979	November 1979 Through December 1984
≤ 50	11	24
> 50 ≤ 250	0	7
> 100 ≤ 250	0	7
> 250 ≤ 500	1	9
> 500 ≤ 1000	0	4
> 1000	0	1
Total	12	52

^aFor 6 leveraged buyouts, we could not determine the dollar amount of the transaction.

Additionally, there is no statistically significant evidence that takeover announcements are associated with an increase the level of interest rates. Thus, on that basis, there is no statistically significant evidence that corporate take-overs crowd out other users of capital by raising the general level of capital costs.

Footnotes

- 1 Our motive for doing so is to purge relatively small targets from the sample of tender offers. Our presumption is that tender offers for listed firms are more visible than tender offers for nonlisted firms and, as a consequence, are likely to have a greater impact, if any, on credit markets.
- 2 Mergers involving firms in the railroad industry were deleted because of the long time lapse between the initial announcement and the consummation of the takeover.
- 3 Although not always by the first bidder.
- 4 Assuming skip-day settlement, the number of days to maturity is determined as the number of days from the settlement date to the maturity date of the security.
- 5 If the announcement occurs during trading hours, the information will be impounded in the stock on the day prior to the WSJ publication day. If, however, the announcement occurs after the close of trading, the information will be impounded in stock prices on the WSJ publication day. Because the time of day at which the announcement actually occurs is unclear, a two-day interval is employed. See, for example, Asquith (1983), Bradley (1980), Bradley, Desai and Kim (1983), and Dennis and McConnell (1986).
- 6 We also split the sample into tender-offer takeovers and mergers. As might be expected, most tender offers are categorized as cash takeovers and most mergers are categorized as noncash takeovers. Also, not surprisingly, the results for the tender offer (merger) sample are similar to those for the cash (noncash) sample.
- 7 The one exception is that the null hypothesis can be rejected for cash takeovers in the pre-October 1979 period when the ARIMA model is used and the financial instrument is the overnight repurchase agreement.
- 8 We conducted a number of other tests not reported in the tables. First, we conducted sign tests to determine whether the number of positive abnormal interest rates is significantly different from the number of negative abnormal interest rates over the two-day event period. These tests also give no support to the hypothesis that takeovers increase interest rates. Second, for the post-1979 period, we also had available to us a daily interest rate series for 7-day, 30-day, 60-day and 90-day repurchase agreements. We replicated the battery of tests with these data, as well. The results are similar to those reported for overnight repurchase agreements as reported in Tables 3, 4, and 5. Finally, all of the tests reported used the first bid in each takeover. We also gathered information on second and later bids when they occurred. We regenerated all results using the date of the second and later bids, as our announcement day. Again, we were unable to reject the null hypothesis.

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