



Abnormal Returns in the Acquisition Market: The Case of Bank Holding Companies, 1990–1993

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Abstract

Recent evidence suggests that announcements of bank holding company acquisitions result in wealth transfers from the bidding to target shareholders. Empirically, this is demonstrated through findings of negative average abnormal returns to bank holding company acquirers and positive average abnormal returns to targets on announcement. Using a sample of acquisitions from the early 1990s—a period marked by the removal of significant geographic entry barriers—this paper reexamines the issue by applying a general statistical model to the event study framework to more precisely measure abnormal returns. In particular, we model returns according to the GARCH process to control for time-varying volatility. With respect to the unconditional distributions of acquirer and target abnormal returns, our findings are consistent with prior research. Further investigation into the conditional distribution of acquirer returns finds that, on announcement, interstate acquisitions using the purchase method of accounting actually increased shareholder wealth for acquirers (on average) by 1.44%. However, over a longer event horizon, the most important determinants of acquirer abnormal returns appear to be the relative size of the transaction and the method of accounting.

1. Introduction

Historically, legal restrictions on the ability of bank holding companies to expand geographically have had a major influence upon the structure of commercial banking in the United States. Over the last decade, however, states systematically have liberalized their interstate banking laws to allow greater access to out-of-state institutions. This policy change, coupled with a generally profitable banking climate, has resulted in a record level of merger activity in the 1990s.

In theory, benefits from banking consolidation are accrued through either cost reductions, revenue enhancement, or portfolio diversification. Also, in an efficient capital market, the net present value of all future expected benefits from an acquisition are incorporated into the stock prices of the acquirer and target on announcement. Some evidence supports this “wealth maximization hypothesis” through the finding of positive abnormal returns around announcement days for bank holding company acquirers (e.g., Desai and Stover, 1985; James and Weir, 1987).¹ However, recent event studies have found a negative and statistically significant announcement effect (e.g., Hannan and Wolken, 1989; and Baradwaj, Dubofsky, and Fraser, 1992). This indicates that, on

average, the market perceives bank managers as overpaying for their targets, which is inconsistent with wealth maximization. This finding is robust to variation in the target-to-bidder asset ratio, the method of payment, as well as whether the acquisition is characterized as intrastate or interstate (Baradwaj et al., 1992). Efforts to explain the negative impact on returns typically center on Jensen and Meckling's (1976) theory of agency costs, whereby managers may engage in mergers that benefit themselves at the expense of the firm's stockholders. In fact, Allen and Cebenoyan (1991) find that stocks of bank holding company acquirers with both greater insider and institutional share ownership outperform their peers around the announcement.

Evidence concerning returns to target bank holding companies is limited. Similar to findings for other corporate mergers and acquisitions, target bank holding companies appear to earn positive and statistically significant abnormal returns around the announcement (e.g., Hannan and Wolken, 1989; and Cornett and De, 1991b). However, these new combinations do not appear to create new wealth; but rather they simply transfer wealth from the acquiring shareholders to the target shareholders (Hannan and Wolken, 1989).

In view of the conflicting empirical results concerning returns to bank holding company acquirers and the limited evidence regarding targets, this paper uses event study methods to reexamine the wealth maximization hypothesis using an updated sample of bank holding company acquisitions announced between 1990 and 1993. Because this daily sample follows the lifting of many interstate banking restrictions, the effect of acquisitions on bank holding company returns can be examined in the absence of most market distortions created by legal barriers to entry. We also examine the impact of acquisition announcements on bank holding company returns using a statistical framework that is more general than that used in previous studies. In particular, we use the generalized autoregressive conditional heteroscedasticity (GARCH) model to construct measures of abnormal returns and error variances around the event announcement by conditioning on the past behavior of returns. The empirical studies noted previously, based on the work of Brown and Warner (1980, 1985), project returns and sample variances over the event window without using the information contained in the time-series properties of individual and market returns.

The paper is organized as follows. Section 2 describes the data. Section 3 demonstrates how abnormal returns are constructed using the bivariate-GARCH scheme. Section 4 examines cross-sectional variation in standardized abnormal returns. Conclusions are presented in the final section.

2. Data

The primary data employed in this paper are daily stock returns of bank holding companies involved in acquisitions during the sample period from January 1990 through December 1993. We obtained a complete listing of acquisition announcements and completions through SNL Securities' *Bank Mergers and Acquisitions*, along with cross-sectional data concerning the terms of each sample transaction and characteristics of the banking firms. Ownership data, which are used to measure the extent of managerial and institutional ownership, are collected from *Compact Disclosure*. The daily stock return data are

obtained from the Center for Research in Security Prices (CRSP). Both the individual return series and the CRSP value-weighted index used to proxy the market return are adjusted for distributions, such as stock splits and dividends.²

To refine the sample, we impose additional selection criteria. First, the sample includes only bank holding companies that had publicly traded common stock on either the NYSE, ASE, or the NASDAQ exchange at the time of an acquisition. Second, the “acquirer sample” includes only acquisitions for which the asset size of the target institution is at least 10% that of the acquirer.³ Third, mergers-of-equals (as defined by SNL Securities) are excluded. Fourth, uncompleted acquisitions, branch or thrift purchases, or takeovers of failing institutions are omitted from the sample. Last, multiple acquisition announcements by the same institution are allowed, except in cases where estimation could be compromised by the inclusion of an event.⁴ Ultimately, the “acquirer sample” includes 54 acquisition announcements by 52 banking organizations. However, because the vast majority of targets during this period were small, the “target sample” includes only 19 such announcements. Our analysis of the target bank holding companies is limited further by the fact that only 10 of these institutions match up with the 54 deals included in the “acquirer sample.” A complete list of the sample transactions and their announcement dates can be found in table 1.

Table 1. Sample of acquisitions, 1990–1993

Acquirer	Target	Announcement
A. Acquirer Sample		
First Colonial (IL)	York State Bank (IL)	2/5/1990
First Hawaiian (HI)	First Interstate (HI)	2/6/1990
Key Centurian (WV)	Spectrum Financial (WV)	4/24/1990
Norwest Corporation (MN)	United Denver (CO)	7/26/1990
Firststar Corporation (WI)	Banks of Iowa (IA)	8/6/1990
Firstbank of Illinois (IL)	Central Banc System (IL)	2/11/1991
River Forest Bancorp (IL)	Aetna Bancorp (IL)	2/19/1991
Wilmington Trust (DE)	Sussex Trust (DE)	4/12/1991
Wesbanco (WV)	Albright Bancorp (WV)	4/12/1991
Union Planters Corp. (TN)	Fidelity Bancshares (TN)	5/15/1991
Wachovia Corporation (NC)*	South Carolina National (SC)	6/24/1991
NCNB Corporation (NC)	C&S/Sovran (VA)	7/22/1991
Worthen Banking Corp. (AR)	First National Bank (AR)	7/22/1991
BankAmerica (CA)*	Security Pacific (CA)	8/12/1991
Associated Banc Corp. (WI)	F&M Financial Services (WI)	8/19/1991
First of America (MI)	Security Bancorp (MI)	9/12/1991
Society Corporation (OH)*	Ameritrust Corp. (OH)	9/13/1991
United Bankshares (WV)	Summit Holding Corp. (WV)	10/21/1991
Vallicorp Holdings (CA)*	Pacific Bancorp (CA)	10/29/1991
CNB Bancshares (IN)	Indiana Bancshares (IN)	10/31/1991
Mercantile Bancorp (MO)	Ameribanc (MO)	11/12/1991
City Holding Company (WV)	Home Bancorp (WV)	11/21/1991
Peoples First Corp. (KY)	Bank of Murray (KY)	11/29/1991
Amcore Financial (IL)	Dixon Bancorp (IL)	12/17/1991
First Bank System (MN)	Bank Shares, Inc. (MN)	1/16/1992
Dauphin Deposit Corp (PA)	FB&T Corporation (PA)	1/27/1992

Table 1. (continued)

Acquirer	Target	Announcement
ONBAN Corp (NY)	Merchants/Union (NJ)	2/24/1992
First Empire State (NY)	Central/Endicott (NJ)	2/24/1992
Boatman's Bancshares (MO)	Sunwest Financial (NM)	3/5/1992
Key Corp. (NY)*	Pugent Sound Bancorp (WA)	3/9/1992
Banc One (OH)	Team Bancshares (TX)	3/23/1992
BancorpSouth (MS)	Volunteer Bcshares (TN)	4/2/1992
Synovus Financial (GA)	First Comml. Bcshares (AL)	4/7/1992
Barnett Banks (FL)	First Florida (FL)	5/18/1992
First Midwest Corp. (IL)	West Central Illinois (IL)	6/1/1992
Westamerica Corp (CA)*	Napa Valley Bancorp (CA)	7/28/1992
Integra Financial (PA)*	Equimark Corp (PA)	7/30/1992
Hawkeye Bancorp (IA)	First Dubuque Corp. (IA)	8/27/1992
United Missouri Bcshares (MO)	CNB Financial Corp. (KS)	9/10/1992
First Union Corp (NC)	Dominion Bancshares (VA)	9/21/1992
Nationsbank Corp. (NC)*	MNC Financial Inc. (MD)	2/18/1993
F&M National Corp. (VA)	Harvest Bancorp (VA)	3/15/1993
BT Financial Corp. (PA)	FirstSouth Bancorp (PA)	3/16/1993
Trans Financial (KY)	Trans Kentucky (KY)	3/25/1993
Meridian Bancorp (PA)	Commonwealth Bcshares (PA)	3/30/1993
Bank South Corp (GA)	Barnett Banks (GA)	4/15/1993
Chemical Finl Corp.(MI)	Key State Bank (MI)	5/13/1993
First Security Corp. (UT)	First National Financial (NM)	5/18/1993
First Commercial Corp.(AR)	TX Comm & Stone Fort (TX)	6/8/1993
Corestates Financial (PA)*	Constellation Bancorp (NJ)	8/2/1993
Mercantile Bancorp (MO)*	United Postal Bancorp (MO)	8/17/1993
Wesbanco (WV)	First Fidelity Bancorp (WV)	8/26/1993
Suffolk Bancorp (NY)	Hamptons Bancshares (NY)	9/7/1993
Marshall and Ilsley (WI)	Valley Bancorp (WI)	9/20/1993
B. Target Sample		
Magna Group (IL)	Landmark Bancshares (MO)	10/23/90
Wachovia Corporation (NC)*	South Carolina National (SC)	6/24/1991
BankAmerica (CA)*	Security Pacific (CA)	8/12/1991
Society Corporation (OH)*	Ameritrust Corp. (OH)	9/13/1991
Vallicorp Holdings (CA)*	Pacific Bancorp (CA)	10/29/1991
NBD Bancorp (MI)	Summcorp (IN)	12/20/1991
Corestates Financial (PA)	First Peoples (NJ)	2/14/1992
Key Corp. (NY)*	Pugent Sound Bancorp (WA)	3/9/1992
Banc One Corp. (OH)	Valley National Corp. (AZ)	4/14/1992
Westamerica Corp (CA)*	Napa Valley Bancorp (CA)	7/28/1992
Integra Financial (PA)*	Equimark Corp (PA)	7/30/1992
Bank of New York (NY)	National Community Banks (NJ)	1/29/1993
Nationsbank Corp. (NC)*	MNC Financial Inc. (MD)	2/18/1993
Banc One Corp. (OH)	FirsTier Financial (NE)	4/19/1993
PNC Bank Corp. (PA)	First Eastern Corp (PA)	7/27/1993
Corestates Financial (PA)*	Constellation Bancorp (NJ)	8/2/1993
Mercantile Bancorp (MO)*	United Postal Bancorp (MO)	8/17/1993
Comerica (MI)	Pacific Western (CA)	9/9/1993
AmSouth Bancorp (AL)	Fortune Bancorp (FL)	9/13/1993

* Included in acquirer sample.

3. Constructing abnormal returns

In this section, we discuss how security abnormal returns are calculated around the event day (i.e., the day on which an acquisition is announced). For the period around a given event date (the event window), *abnormal returns* are defined to be the daily realized return for each security, net of the estimated expected return, conditional on the market return; that is, an abnormal return is measured as the residual from the market model. The market model controls for systematic fluctuations in individual securities. Rather than directly estimating a regression of individual returns on the market return, which restricts the return's "beta" to be constant, we estimate the joint probability density function of individual bank holding company returns and the market return, conditional on past realizations of the process. From the joint density, we infer the conditional moments implied by the market model. Thus, the slope coefficient can vary with past information.

We estimate the joint density of individual and market returns in the following manner. Let Z_{it} denote the vector containing the daily return of bank holding company i and the market return on day t :

$$Z_{it} = \begin{pmatrix} r_{it} \\ r_{mt} \end{pmatrix} \tag{1}$$

We assume that, conditional on past realizations of this process, Z_{it} is bivariate normal:

$$Z_{it}|I_{t-1} \sim N(\mu_t, H_t) \tag{2}$$

where

$$I_{t-1} = (Z_{it-1}, Z_{it-2}, \dots), \quad \mu_t = \begin{pmatrix} \mu_{it} \\ \mu_{mt} \end{pmatrix}, \quad \text{and} \quad H_t = \begin{pmatrix} h_{iit} & h_{imt} \\ h_{mit} & h_{mmt} \end{pmatrix}$$

Furthermore, we parameterize the process, conditional on I_{t-1} , as

$$r_{it} = \mu_{it} + u_{it} = a_{i0} + a_{i1}r_{it-1} + u_{it} \tag{3}$$

$$r_{mt} = \mu_{mt} + u_{mt} = a_{m0} + a_{m1}r_{mt-1} + u_{mt}$$

and

$$h_{iit} = c_{i0} + c_{i1}u_{it-1}^2 + c_{i2}h_{iit-1} \tag{4}$$

$$h_{mmt} = c_{m0} + c_{m1}u_{mt-1}^2 + c_{m2}h_{mmt-1}$$

$$h_{imt} = c_{im}(h_{iit} \times h_{mmt})^{1/2}$$

That is, the elements of Z_{it} are AR(1) processes with a multivariate GARCH(1, 1) covariance structure (Engle, 1982; Bollerslev, 1986). To ensure tractability of the estimation procedure, we impose diagonality of the GARCH coefficient matrices, as in Bollerslev, Engle, and Wooldridge (1988), to reduce the number of parameters. We also use Bollerslev's (1990) constant correlation covariance structure to guarantee the invertibility of the conditional covariance matrix. We estimate the parameters of the joint

density by maximizing the following likelihood function using the algorithm of Berndt, Hall, Hall, and Hausmen (1974) over the estimation period:

$$L(\theta) = -0.5 \ln |H_t| - 0.5 u_t' H_t^{-1} u_t \quad (5)$$

The abnormal return is appropriate for evaluating the impact of acquisition announcements on shareholder wealth. This is the return net of that predicted by the market model, which relies on the distribution of r_{it} conditional on r_{mt} . However, the moments of this conditional distribution can be inferred directly from the preceding parameters of the joint (marginal) density. For example, the conditional mean for the one-step-ahead return is

$$E(r_{it}|r_{mt}, I_{t-1}) = (\mu_{it} - \beta_{it}\mu_{mt}) + \beta_{it}r_{mt} \quad (6)$$

where

$$\beta_{it} = h_{imt}/h_{mmt}$$

and the one-step-ahead conditional variance is

$$E[r_{it} - E(r_{it}|r_{mt}, I_{t-1})]^2 = h_{iit} - (h_{imt}^2/h_{mmt}) \quad (7)$$

K -step ahead analogs to (6) and (7) will be used to determine abnormal returns around an event. Assume that we have a pre-event sample on Z_{it} for company i ranging from $t = 1, \dots, T$ and that the event occurs at time $T + k$. We then define the abnormal return on the event day as the realized daily return on that day less the expected return conditional on the realized market return at $T + k$ and past realizations up to time T :

$$AR_{iT+k} = r_{iT+k} - E(r_{iT+k}|r_{mT+k}, I_T) \quad (8)$$

We also estimate cumulative abnormal returns (CAR) as

$$CAR_{iT+k} = \sum_{j=1}^k AR_{iT+j} \quad (8')$$

To control for heteroscedasticity across companies, we report standardized abnormal returns (SAR):

$$SAR_{iT+k} = \frac{AR_{iT+k}}{\sqrt{\text{var}(AR_{iT+k}|r_{mT+k}, I_T)}} \quad (9)$$

$$SCAR_{iT+k} = \frac{CAR_{iT+k}}{\sqrt{\text{var}(CAR_{iT+k}|r_{mT+k}, I_T)}} \quad (9')$$

We directly estimate the marginal parameters in (2), (3), and (4) based on the sample size T , then use these parameters to construct (9) and (9'). The appendix makes explicit the link between standardized returns and the estimated parameters.

The typical method, as outlined in Brown and Warner (1980, 1985), marginalizes over I_{t-1} to estimate $\hat{\beta}$ and abnormal returns. Consequently, this approach makes efficient use of sample information for forecasting only if: $a_{i1} = a_{m1} = 0$; $c_{i1} = c_{m1} = 0$; and

$c_{i2} = c_{m2} = c_{im} = 0$. In light of the extensive findings that these coefficients are not 0 for a wide variety of high-frequency financial market data, Brown and Warner's method can ignore potentially important persistence in the return processes when constructing abnormal returns around events. This persistence also has implications for hypothesis testing as our model may be able to control for (at least some) event-induced variance. In short, by conditioning on past realizations of equity returns, our approach can adequately control for systematic fluctuations in returns when examining the impact of economic events.

We estimate the model described by eq. (3) and (4) for each bank holding company security over a sample ranging from 250 trading days to 10 trading days prior to its acquisition announcement (241 observations). The results (not reported to economize on space) suggest that accounting for serial dependence in variance is potentially important. Despite the relatively short time-series sample, in at least half the cases, GARCH effects are statistically significant, and (of these) most show a high degree of persistence in variance.

Tables 2 and 3 report the mean standardized abnormal returns for an 11-day event window (5 days prior to the event through 5 days beyond) and standardized cumulative abnormal returns for the 11-day period for acquirers and targets, respectively.⁵ Our primary interest lies in explaining the cross-sectional behavior of these realized returns. This is the purpose of the next section.

4. Cross-sectional variation in SAR values

For each day in the event window, we test a number of hypotheses regarding the impact of the event (i.e., the acquisition announcement) on standardized abnormal returns. The first set of tests relies on the unconditional distribution of these returns. These results are presented for both the acquirers and targets. Given the inference from these results, a second set of tests for the acquirer sample relies on regressions estimating the distribution of standardized abnormal returns conditional on a number of firm characteristics. These regressions control for other factors that cause variation in abnormal returns and therefore are better able to distinguish among specific hypotheses.

Acquirer abnormal returns

We first test the null hypothesis that the event has no impact on either the mean or the variance of the distribution generating security returns. Under this null hypothesis, the measures of standardized abnormal returns are independent and normally distributed with 0 mean and unit variance. Therefore, the statistic

$$z = \bar{Y}_{T+k} \times N^{1/2} \tag{10}$$

where \bar{Y}_{T+k} is the sample mean SAR or SCAR across bank holding companies over a predetermined interval is a standard normal random variable.⁶ Using this test, we find

evidence (reported in table 2) of statistically significant negative average abnormal performance of -0.6233% on the announcement day. Cumulative standardized returns also are negative over the entire event window.

The statistic in (10) tests the joint hypothesis that neither the first or second moments are affected by the event. However, if we wish to test the null hypothesis that only mean abnormal returns are 0, we must allow for the possibility of event-induced variance. To examine this possibility, we construct the following statistic under the null hypothesis that the population abnormal return variance is equal to 1:

$$\chi_{N-1}^2 = (N-1)\sigma_{T+k}^2 \quad (11)$$

where $\sigma_{T+k}^2 = 1/(N-1) \sum_{i=1}^N (Y_{iT+k} - \bar{Y}_{T+k})^2$ is the sample variance of each measure of abnormal returns. The estimated variances and chi-squared statistics for values of SAR for each of the 11-days in the event window and the 11-day SCAR are also reported in table 2. We find that there is increased variance on both the announcement day and one day following the news. This result indicates that inferences based on the statistic (10) may be incorrect in that it may reject the null hypothesis (0 mean abnormal returns) too often due to the presence of event-induced variance.

Under the single null hypothesis that abnormal returns are drawn from a distribution having a 0 mean, the following statistic suggested by Boehmer, Musumeci, and Poulsen (1991) follows the t -distribution:

$$t = \bar{Y}_{T+k} / \sqrt{(1/N)\sigma_{T+k}^2} \quad (12)$$

This test allows for the presence of increased variance around announcement. Using the t -test defined by statistic (12), announcement day returns and those for the entire event window (the 11-day SCAR) remain negative and statistically significant. These findings,

Table 2. GARCH standardized abnormal returns for 54 acquiring bank holding companies

SAR (Event Date)	Mean	z-Statistic	t-Statistic	Variance	Chi-Sqrd.
SAR(-5)	-0.0429	-0.3153	-0.3119	1.0027	53.14
SAR(-4)	-0.1892	-1.3903	-1.6055	0.7364	39.03
SAR(-3)	-0.1660	-1.2199	-1.1809	1.0473	55.51
SAR(-2)	-0.1445	-1.0619	-0.9167	1.3178	69.84
SAR(-1)	0.0427	0.3138	0.3664	0.7192	38.12
SAR(0)	-0.6233	-4.5803**	-2.5088**	3.2713	173.38**
SAR(1)	0.1657	1.2176	0.7482	2.5998	137.79**
SAR(2)	-0.0356	-0.2616	-0.2680	0.9362	49.62
SAR(3)	0.2190	1.6093	1.6229	0.9650	51.15
SAR(4)	0.0667	0.4901	0.5057	0.9228	48.91
SAR(5)	-0.1471	-1.0810	-1.2466	0.7382	39.12
CSAR (Event Dates)					
CSAR(-5, 5)	-0.3015	-2.2158**	-1.9209*		

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

which are similar to those reported in the most recent studies of returns to bank holding company acquirers, reject the wealth maximization hypothesis.⁷

Target abnormal returns

Next, we examine the distribution of target abnormal returns around announcement using the statistics (10)–(12). Our primary finding—reported in table 3—is that our sample of target bank holding companies earned substantial positive (and statistically significant) abnormal returns both on the announcement day and for the full 11-day event window. In fact, target shares appreciated nearly 5% (on average) on announcement. However, this small sample of 19 bank holding company targets exhibited significant variation in these abnormal returns—as measured by the announcement day sample variance of 23. These findings are both consistent with theories of corporate acquisitions as well as previous research concerning returns to bank holding company targets.

As mentioned earlier, 10 bank holding company acquisitions appeared in both the “acquirer sample” and the “target sample.” Table 4 reports the standardized abnormal returns earned by the acquirers and targets for these 10 combinations both on announcement and over the 11-day event window. On announcement, the 10 bank holding company acquirers lost 1.82% of their value on average, nearly three times the full sample mean. By contrast, the 10 targets earned 4.18% on average. Moreover, to describe the net effect on shareholders for these acquisitions, we multiply the target values of SAR by the ratio of the target’s total assets to those of the acquirer to obtain approximate market weights and then add this product to the acquirer SAR values. The results suggest the possibility, as in Hannan and Wolken (1989), that the acquisitions are predicted to transfer wealth from acquirers to targets, rather than create wealth. However, this is not firm

Table 3. GARCH standardized abnormal returns for 19 target bank holding companies

SAR (Event Date)	Mean	<i>z</i> -Statistic	<i>t</i> -Statistic	Variance	Chi-Sqrd.
SAR(− 5)	0.0138	0.0600	0.0822	0.5047	9.085*
SAR(− 4)	− 0.0498	− 0.2171	− 0.2054	1.0585	19.05
SAR(− 3)	0.7897	3.4421**	1.5772	4.5123	81.22**
SAR(− 2)	0.3325	1.4493	0.7035	4.0205	72.37**
SAR(− 1)	0.0539	0.2348	0.2559	0.7979	14.36
SAR(0)	4.7736	20.808**	4.2221**	23.010	414.17**
SAR(1)	0.0701	0.3057	1.1548	3.6942	66.50**
SAR(2)	− 0.3085	− 1.3447	− 1.1146	1.3789	24.82
SAR(3)	0.1794	0.7822	0.9275	0.6738	12.13
SAR(4)	− 0.4093	− 1.7841*	− 1.8256*	0.9049	16.29
SAR(5)	− 0.2269	− 0.9892	− 1.0730	0.8053	14.50
CSAR (Event Dates)					
CSAR(− 5, 5)	1.1832	5.1575**	2.0502**		

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

Table 4. Acquirer and target standardized abnormal returns for 10 overlapping BHC acquisitions

BHC Acquisition	Acquirer SAR(0)	Target SAR(0)	Relative Size	Total SAR(0)	Acquirer CSAR(11)	Target CSAR(11)	Relative Size	Total CSAR(11)
Wachovia / South Carolina Nat.	-2.13	-0.15	0.28	-2.17	-0.76	0.00	0.28	-0.76
BankAmerica / Security Pacific	3.09	4.26	0.71	6.12	0.02	0.21	0.71	0.17
Society / Ameritrust	-2.92	0.97	0.70	-2.24	-1.69	-0.94	0.70	-2.34
Vallicorp Pacific Bancorp	-2.15	11.86	0.42	2.87	-0.12	-2.26	0.42	-1.08
Key Corp / Pulent Sound	-2.26	7.01	0.21	-0.78	-0.72	2.95	0.21	-0.10
Westamerica / Napa Valley	-3.27	-2.60	0.45	-4.43	-1.91	0.20	0.45	-1.82
Integra / Equimark	-4.45	-0.25	0.35	-4.54	-2.94	3.45	0.35	-1.74
Nationsbank / MNC Financial	0.32	6.78	0.14	1.29	0.03	1.93	0.14	0.31
Corestates / Constellation	-2.94	13.81	0.10	-1.56	-0.40	0.05	0.10	-0.40
Mercantile / United Postal	-1.51	0.07	0.12	-1.50	-0.58	-0.24	0.12	-0.61
Average	-1.8220	4.1760	0.3482	-0.6951	-0.9070	0.5350	0.3482	-0.8369

evidence on this issue, given the inability to perform precise tests in view of the small sample size.

Cross-sectional regressions

Because our findings of negative returns to bank holding company acquirers are inconsistent with wealth maximization, we further explore cross-sectional variation in these returns. In fact, the main problem with statistical tests (10)–(12) is that cross-sectional mean abnormal returns do not control for other exogenous factors that might cause variation in the SAR values. Therefore, we estimate regressions of the following form:

$$Y_{iT+k} = \sum d_i X_i + \varepsilon_i \quad i = 1, \dots, N \quad (13)$$

where X_i contains weakly exogenous variables. These variables include the ratio of target-to-bidder assets (RELASSET); method of payment, described as the percentage of cash used in the transaction (PERCASH); the percentage of insider ownership (INSIDE); the percentage of ownership by large, outside blockholders (OUTSIDE); and dummy variables indicating whether the deal was an interstate acquisition (INTERSTATE) and the accounting method used in the transaction (PURCHASE).⁸ These variables are chosen since they account for many effects considered in the literature. We now briefly discuss the rationale for including these variables.

Inclusion of the ratio of target firm assets to those of the acquirer allows for the possibility that the relative size of the acquisition affects returns (Asquith, Bruner, and Mullins 1983). Two hypotheses concerning the relationship between the method of payment used to finance an acquisition and bidder returns have been presented in the literature. Cornett and De (1991b) note that both the “bidder overvaluation hypothesis” and the “wealth redistribution hypothesis” posit that financial markets view stock-financed purchases (relative to other forms of finance) negatively. First, if the acquiring firm’s management has superior inside information that the existing assets of the bidder are overvalued, it is more likely to use stock. Second, stock-financed acquisitions may significantly reduce the leverage ratio of the combined firm, making outstanding debt less risky and redistributing wealth from stockholders to bondholders. Both hypotheses predict a positive relationship between abnormal returns and PERCASH.

We also include independent variables that attempt to measure agency costs and therefore the possibility that acquisition announcements have a negative impact on returns because of perceived conflicts of interest between insiders and stockholders of the acquiring holding companies. In general, managerial ownership acts as an incentive for managers to align their interests with those of shareholders, thereby mitigating agency costs. However, the monotonicity of the relationship between increased managerial ownership and firm value has been questioned. In particular, it is believed that over “low” ranges of managerial ownership a conflict-of-interest exists, whereby managers’ personal preferences are not aligned with those of shareholders. This effect is thought to be mitigated over some “intermediate” range of managerial ownership. However, “high”

levels of managerial ownership may result in an entrenchment effect due to the increasing ability of managers to make decisions without significant shareholder pressure to maximize firm value.

To allow for these potential nonlinearities in incentive compatibility, we construct three variables to measure insider ownership (Morck, Schliefer, and Vishnay, 1988). Let w denote the percentage of equity in the acquiring firm owned by management (insiders). Three insider variables are included in the regressions:

$$\begin{aligned} \text{INSIDE1} &= w, & \text{for } w < 0.05 \\ &= 0.05, & \text{for } w > 0.05 \\ \text{INSIDE2} &= 0, & \text{for } w < 0.05 \\ &= w - 0.05, & \text{for } 0.05 < w < 0.25 \\ \text{INSIDE3} &= 0, & \text{for } w < 0.25 \\ &= w - 0.25, & \text{for } w > 0.25 \end{aligned}$$

INSIDE1, for example, captures cross-sectional variation in inside ownership for those acquirers with very little inside ownership. A positive relationship between an insider variable and returns implies that, over that particular range of insider ownership, greater managerial ownership increases abnormal returns as incentive compatibility is enhanced.

Because institutions serve to reduce free riding by creating shareholder coalitions with sufficient power and incentive to actively monitor managerial action, it is likely that the greater the percentage of institutional ownership experienced by a firm, the greater the firm value. The variable OUTSIDE is included to account for this reduction in agency costs (Allen and Cebenoyan, 1991).

In testing for differences in the average announcement effects between intrastate and interstate acquisitions, two competing hypotheses arise. While potential risk reduction opportunities available in an interstate merger (via loan portfolio diversification) suggest that they would provide more opportunities for positive abnormal returns, any (substantial) cost savings or operating synergies resulting from these combinations are likely to be less than for intrastate acquisitions. However, due to the relaxation of many interstate and intrastate banking restrictions in the 1980s, these mergers may reflect similar phenomena (Baradwaj et al., 1992).

The method of accounting used in the transaction can have a material impact on the acquiring firms' shareholders. Using "pooling of interests" accounting, institutions simply combine the assets of the target onto their balance sheet, while under the "purchase" method any premium paid to the target (above book value) is put on the acquirer's balance sheet as goodwill and amortized over time. Currently, write-downs of goodwill tend to reduce reported earnings but also reduce the firm's corporate income tax liability, potentially resulting in a positive reaction to the purchase method of accounting. However, this tax benefit was not available prior to August 1993 and therefore is unlikely to account for a different impact on returns in our sample.⁹ Nevertheless, there are other possibilities for a differential effect. First, using a sample of tax-free nonfinancial mergers,

Davis (1990) found that the purchase method produced positive cumulative abnormal returns for acquirers and that this method was pursued by relatively highly leveraged acquirers as well as those in a stronger bargaining position relative to the target. Second, U.S. Securities and Exchange Commission rules prohibit firms consummating a pooling-of-interests merger from share repurchases. Third, corporate managers that are willing to accept goodwill may be signaling to the market that they do not expect future earnings to be significantly affected.

To summarize, we estimate the following regression using ordinary least squares:

$$\begin{aligned} SAR_{iT+k} = & d_0 + d_1RELASSET_i + d_2PERCASH_i + d_3INSIDE1_i \\ & + d_4INSIDE2_i + d_5INSIDE3_i + d_6OUTSIDE_i \\ & + d_7INTERSTATE_i + d_8PURCHASE_i + \varepsilon_{iT+k} \end{aligned} \tag{14}$$

where ε_{iT+k} is assumed to be independent and identical and normally distributed with 0 mean and finite variance. Estimation results announcement day and 11-day cumulative returns are reported in table 5.

The results in table 5 are helpful in understanding why abnormal returns are expected to be negative upon announcement of a merger. The variables measuring relative asset size, method of payment, and ownership structure have little power in predicting variation in

Table 5. Cross-sectional regression GARCH standardized abnormal returns for 54 acquiring bank holding companies

	SAR(0)	CSAR(+ 5, - 5)
CONSTANT	- 1.4081 (- 1.2859)	- 0.0746 (- 0.1023)
RELASSET	- 0.9650 (- 0.6175)	- 1.3655 (- 1.3123)
PERCASH	- 0.0009 (- 0.1047)	0.0029 (0.4989)
INTERSTATE	1.2003** (2.0727)	0.1822 (0.4725)
INSIDE1	0.0980 (0.5001)	- 0.0279 (- 0.2137)
INSIDE2	- 0.0141 (- 0.2581)	- 0.0712** (- 1.9557)
INSIDE3	0.0069 (0.0605)	0.1210 (1.5987)
OUTSIDE	- 0.0129 (- 0.7691)	0.0012 (0.1091)
PURCHASE	1.6506** (2.3730)	0.6307 (1.3617)
R^2	0.3511	0.2462

The Statistics are in parentheses.

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

abnormal returns across mergers on the day of announcement (see the middle column of table 5). However, the interstate merger and method-of-accounting variables are both positive and significantly different from 0, while the constant term is negative (but significant only at a 19% level of significance). The latter implies a (weakly) significant negative impact on announcement day returns of 1.41% for intrastate mergers that use the pooling method of accounting. However, the sum of the coefficients on these dummy variables and the constant term imply that mergers across state lines that use the purchase method of accounting have an expected positive announcement effect on returns of about 1.44%, which is significantly different from those mergers not in these categories. Analysis of this subsample provides evidence for the wealth maximization hypothesis. The negative impact of the intrastate/pooling sample evidently outweighs the latter in the computation of the unconditional average SAR reported in table 2.

The cumulative effects of the announcement, reported in the final column of table 5 tell a somewhat different story. In the regression with CSAR as the dependent variable, the constant term is small and insignificant, as is the dummy variable for interstate mergers. These results are consistent with those reported by Baradwaj et al. (1992). The method of accounting dummy remains positive, but is only marginally significant, and the coefficient on relative asset size is negative and also marginally significant (the marginal significance levels for these two tests are each about 17%, for a two-tailed test). This evidence suggests that, ultimately, the market view of intrastate mergers is not as negative as on announcement of the acquisition. However, the purchase method of accounting is perceived to be positive over a longer horizon, although quantitatively smaller than on the date of announcement. This result is consistent with the findings of Davis (1990) for nonfinancial mergers. The market also perceives that the larger are the assets of the target relative to acquirer, the more likely the merger will have a negative impact on the value of the acquiring firm. This may be due to uncertainty surrounding the integration of the two firms.¹⁰

To ensure that our inferences are robust to the statistical model, we considered a number of alternative measurements and specifications of the cross-sectional regressions. These alternatives included (1) expanding the event window from 10 trading days prior to announcement to 30 days, (2) including dummy variables to account for potential year effects of the announcements, and (3) including a dummy variable for whether or not an acquirer's returns had GARCH effects to examine whether time-varying volatility could play some role in explaining cross-sectional variation in returns. None of these changes significantly altered our inferences. Furthermore, given the importance of the interstate and accounting method variables on announcement, we split the sample along these lines. No additional information was gained from doing this.

Overall, we interpret the evidence from the cross-sectional regressions as supporting the wealth-maximization hypothesis. Although for certain mergers (intrastate and pooling) returns significantly fall on announcement, this negative impact is much weaker for cumulative returns. The effects of direct proxies for agency costs have no quantitative importance in explaining variation in abnormal returns. In fact, what seems to be most important for announcement day and cumulative return variation across bank holding company acquisitions is the method of accounting.

5. Conclusion

This paper tests the wealth maximization hypothesis for a sample of large bank holding company acquisitions announced between 1990 and 1993. To this end, a general statistical model, which relies on the joint density of individual and market returns, is used to construct abnormal returns. This model both accounts for conditional heteroscedasticity in the asset return series and allows the market model parameters to be time varying.

Examining the unconditional distribution of standardized abnormal security returns for our “acquirer sample,” we find statistically significant negative returns both on announcement day and for the full 11-day event window. By contrast, target institutions earn large, positive returns over the same period. Because the former results are in violation of wealth maximization hypothesis, we also examine cross-sectional variation in these abnormal returns. On announcement, we find that interstate acquisitions and the use of purchase accounting are viewed positively by the market. In fact, a combination with both of these attributes increased shareholder wealth for acquirers (on average) by 1.44%. However, for the 11-day cumulative abnormal returns, we find that the relative size of the transaction and the method of accounting are important. Specifically, the acquisition of small bank holding companies using purchase accounting creates value for the shareholders of the acquirer.

Appendix: Calculating abnormal returns

This appendix illustrates how standardized abnormal returns are constructed in (9) and (9'). In particular, we show how event-day abnormal returns depend on the estimated parameters of the marginal joint density given in eqs. (2)–(4).

To determine (9), we need both the conditional mean of daily returns k days following the estimation period and the conditional variance of abnormal returns. Using standard rules of probability as in the derivation of eq. (6) and (7), the conditional mean is

$$E(r_{iT+k}|r_{mT+k}|I_T) = \left[E(r_{iT+k}|I_T) - \frac{\text{cov}(r_{iT+k}, r_{mT+k}|I_T)}{\text{var}(r_{mT+k}|I_T)} \times E(r_{mT+k}|I_T) \right] + \frac{\text{cov}(r_{iT+k}, r_{mT+k}|I_T)}{\text{var}(r_{mT+k}|I_T)} \times r_{mT+k} \tag{A1}$$

and the conditional variance is

$$\text{var}(AR_{iT+k}|r_{mT+k}|I_T) = \text{var}(r_{iT+k}|I_T) - \frac{\text{cov}(r_{iT+k}, r_{mT+k}|I_T)^2}{\text{var}(r_{mT+k}|I_T)} \tag{A2}$$

Using specification (3) in the text, the conditional means in (A1) can be expressed as

$$Er_{iT+k}|I_T = a_{i0}(1 + a_{i1} + a_{i1}^2 + \dots + a_{i1}^{k-1}) + a_{i1}r_{iT} \tag{A3}$$

$$Er_{mT+k}|I_T = a_{m0}(1 + a_{m1} + a_{m1}^2 + \dots + a_{m1}^{k-1}) + a_{m1}r_{mT} \tag{A4}$$

Note that the parameters in (A3) and (A4) are estimated by eqs. (3) and (4) so that the conditional means can be constructed from the sample.

To determine the variance terms in eqs. (A1) and (A2), note from eq. (3) that

$$\text{var}(r_{iT+k}|I_T) = E_T[r_{iT+k} - E(r_{iT+k}|I_T)]^2 \quad (\text{A5})$$

$$r_{iT+k} - E(r_{iT+k}|I_T) = a_{i1}^{k-1}u_{iT+1} + a_{i1}^{k-2}u_{iT+2} + \cdots + a_{i1}u_{iT+k-1} + u_{iT+k} \quad (\text{A6})$$

$$\text{var}(r_{mT+k}|I_T) = E_T[r_{mT+k} - E(r_{mT+k}|I_T)]^2 \quad (\text{A7})$$

$$\begin{aligned} r_{mT+k} - E(r_{mT+k}|I_T) &= a_{m1}^{k-1}u_{mT+1} + a_{m1}^{k-2}u_{mT+2} \\ &+ \cdots + a_{m1}u_{mT+k-1} + u_{mT+k} \end{aligned} \quad (\text{A8})$$

From eq. (4),

$$h_{iT+1} = E_T u_{iT+1}^2 = c_{i0} + c_{i1}u_{iT}^2 + c_{i2}h_{iT} \quad (\text{A9})$$

$$h_{mT+1} = E_T u_{mT+1}^2 = c_{m0} + c_{m1}u_{mT}^2 + c_{m2}h_{mT} \quad (\text{A10})$$

$$h_{imT+1} = E_T[u_{iT+1}u_{mT+1}] = c_{im}(h_{iT+1} \times h_{mT+1})^{1/2} \quad (\text{A11})$$

Equations (A7) and (A8) imply

$$\begin{aligned} \text{var}(r_{mT+k}|I_T) &= (a_{m1}^{k-1})^2 E_T u_{mT+1}^2 + (a_{m1}^{k-2})^2 E_T u_{mT+2}^2 \\ &+ \cdots + a_{m1}^2 E_T u_{mT+k-1}^2 + E_T u_{mT+k}^2 \end{aligned} \quad (\text{A12})$$

But, by the law of iterated expectations,

$$E_T u_{mT+k}^2 = E_T[E_{T+k-1} u_{mT+k}^2] = E_T h_{mT+k} \quad \text{for all } k \quad (\text{A13})$$

Therefore, eq. (A12) can be rewritten

$$\text{var}(r_{mT+k}|I_T) = (a_{m1}^{k-1})^2 h_{mT+1} + (a_{m1}^{k-2})^2 E_T h_{mT+2} + \cdots + E_T h_{mT+k} \quad (\text{A14})$$

To solve for the conditional expectations in (A14), we iterate on (A10). This implies

$$E_T h_{mT+k} = c_{m0}[1 + (c_{m1} + c_{m2}) + \cdots + (c_{m1} + c_{m2})^{k-1}] + (c_{m1} + c_{m2})^k h_{mT+1} \quad (\text{A15})$$

Substituting (A15) into (A14) yields the variance of the market return conditional on I_T as a function of the estimated parameters from (4) and (A10). The determination of company-specific variance depends on (A5), (A6), and (A9) analogously.

The final step is to estimate the covariance term that shows up in both (A1) and (A2).

$$\text{cov}(r_{iT+k}, r_{mT+k}|I_T) = E_T[(r_{iT+k} - E r_{iT+k}|I_T)(r_{mT+k} - E r_{mT+k}|I_T)] \quad (\text{A16})$$

Equations (A16), (A6), (A8), and (A11) and the law of iterated expectations imply

$$\begin{aligned}
 \text{cov}(r_{iT+k}, r_{mT+k} | I_T) &= E_T(a_{i1}^{k-1} a_{m1}^{k-1} u_{iT+1} u_{mT+1}) + E_T(a_{i1}^{k-2} a_{m1}^{k-2} u_{iT+2} u_{mT+2}) \\
 &\quad + \cdots + E_T(u_{iT+k} u_{mT+k}) \\
 &= a_{i1}^{k-1} a_{m1}^{k-1} h_{im,T+1} + a_{i1}^{k-2} a_{m1}^{k-2} E_T h_{im,T+2} \\
 &\quad + \cdots + E_T h_{im,T+k}
 \end{aligned} \tag{A17}$$

Plugging in the specification from (A11) yields

$$E_T h_{im,T+k} = E_T c_{im} (h_{iT+k} h_{mT+k})^{1/2} = c_{im} E_T (h_{iT+k}^{1/2}) E_T (h_{mT+k}^{1/2}) \tag{A18}$$

Next, due to the square root function, we cannot write this conditional expectation linearly in $E_T h_{iT+k}$, as previously. As a result, we use the following approximation:

$$E_T h_{im,T+k} = c_{im} (E_T h_{iT+k})^{1/2} (E_T h_{mT+k})^{1/2} \tag{A19}$$

Now, (A15) and the analog for company-specific variance can be used in (A19) to get the appropriate covariance (A17) as a function of estimated parameters.

To summarize, use (A3), (A4), (A14), and (A17) in (A1), then the result in (3) to get abnormal returns. Then use (A14), its company-specific analog, and (A17) in (A2) to get the conditional variance, which then is used in (9) to standardize the abnormal returns.

As expressed in (8'), cumulative abnormal returns are simply the sum of abnormal returns over a predefined interval. Using (A1) we have

$$\begin{aligned}
 \text{CAR}_{iT+k} &= (r_{iT+1} - E r_{iT+1} | I_T) + \cdots + (r_{iT+k} - E r_{iT+k} | I_T) \\
 &\quad - \beta_{iT+k} (r_{mT+1} - E r_{mT+1} | I_T) - \cdots - \beta_{iT+k} (r_{mT+k} - E r_{mT+k} | I_T)
 \end{aligned} \tag{A20}$$

where β_{iT+k} is the ratio of the covariance of individual and market returns to the variance of market returns conditional on I_T as described in (A1). Moreover, (A6) and (A8) for relevant values of k imply

$$\begin{aligned}
 \text{CAR}_{iT+k} &= (1 + a_1 + \cdots + a_1^{k-1}) u_{iT+1} + (1 + a_1 + a_1^2 \\
 &\quad + \cdots + a_1^{k-2}) u_{iT+2} \\
 &\quad + \cdots + (1 + a_1) u_{T+k-1} + u_{iT+k} - [(\beta_{iT+1} + \beta_{iT+2} a_{m1} \\
 &\quad + \beta_{iT+3} a_{m1}^2 + \cdots + \beta_{iT+k} a_{m1}^{k-1}) u_{mT+1} \\
 &\quad + (\beta_{iT+2} + \beta_{iT+3} a_{m1} + \beta_{iT+4} a_{m1}^2 + \cdots + \beta_{iT+k} a_{m1}^{k-2}) u_{mT+2} \\
 &\quad + \cdots + (\beta_{T+k-1} + \beta_{iT+k} a_{m1}) u_{mT+k-1} + \beta_{iT+k} u_{mT+k}]
 \end{aligned} \tag{A21}$$

Because the forecast errors are serially and mutually uncorrelated, covariance terms reduce to 0. Thus,

$$\begin{aligned}
\text{var}(\text{CAR}_{iT+k}|I_T) &= E_T \text{CAR}_{iT+k}^2 \\
&= (1 + a_1 + \dots + a_1^{k-1})^2 E_T u_{iT+1}^2 + (1 + a_1 + \dots + a_1^{k-2})^2 E_T u_{iT+2}^2 \\
&\quad + \dots + (1 + a_1)^2 E_T u_{iT+k-1}^2 + E_T u_{iT+k}^2 \\
&\quad + (\beta_{iT+1} + \beta_{iT+2} a_{m1} + \dots + \beta_{iT+k} a_{m1}^{k-1})^2 E_T u_{mT+1}^2 \\
&\quad + \dots + \beta_{iT+k}^2 E_T u_{mT+k}^2
\end{aligned} \tag{A22}$$

Again, (A15) for appropriate values of k (along with the other results derived earlier) implies that the variance of cumulative abnormal returns can be written in terms of the estimated parameters of the joint density.

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Notes

1. More recently, Cornett and De (1991a) find positive abnormal returns to bidding shareholders involved in interstate bank holding company acquisitions.
2. The CRSP defines the *return series* as “the change in the total value of an investment in a common stock over some period of time per dollar of initial investment.” The CRSP value-weighted index consists of securities from the New York, American, and NASDAQ stock exchanges.
3. Inclusion of all acquisitions may create situations in which the effects on acquirers’ stock prices are so small as to be dominated by “noise” in that price. This, in turn, could bias our results toward finding 0 abnormal returns. See Asquith, Bruner, and Mullins (1983).
4. Of course, this applies exclusively to the “acquirer sample.”
5. The results presented in these tables are robust to both lengthening and shortening the estimation period.
6. It should be clear why *standardized* abnormal returns are used: While it is probable that idiosyncratic returns from different companies are drawn from different distributions, we are interested in how the acquisition announcement causes these distributions to *change*.
7. Although results using SAR values generated by the simple OLS approach also rejected wealth maximization over this period, that approach yielded a larger mean announcement day SAR of -0.7334% .
8. PURCHASE = 1 if the transaction involved purchase accounting or 0 if the pooling method was used. There are 24 transactions in our sample involving purchase accounting. INTERSTATE = 1 if the merging holding companies were located in different states or 0 if the same state. There are 17 interstate acquisitions in our sample.
9. This provision was enacted as part of the Omnibus Budget Reconciliation Act of 1993.
10. In this same regression, the coefficient on INSIDE2 is significantly negative but quantitatively unimportant. As an aside, we also note that, when the coefficient on the method-of-accounting variable is restricted to be

0, the method-of-payment variable is significantly positive. This may indicate that the importance of cash or swap transactions in corporate acquisitions (Travlos, 1987) is due to other factors such as accounting treatment.

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