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The following paper, which is summarized in the *Bulletin* for July 1994, was completed during the winter of 1993–94. The analyses and conclusions set forth are those of the author and do not necessarily indicate concurrence by the Board of Governors, the Federal Reserve Banks, or members of their staffs.

A Summary of Merger Performance Studies in Banking, 1980–93, and an Assessment of the “Operating Performance” and “Event Study” Methodologies

Mergers reached record levels in the banking industry as well as in the industrial sector in the second half of the 1980s. The general economic conditions of the period and changes in the enforcement of the antitrust laws regarding mergers may have eased the way for some combinations, but there is good reason to believe that the increased merger activity is likely to persist on its own and result in a restructuring of the industry.¹

The effect of mergers on firm performance is the subject of ongoing debate, and studies of the question have been growing in number. To assess the current state of knowledge, the present work examines the thirty-nine studies I found to have been published from 1980 to 1993 on the effects of bank mergers on efficiency, profitability, or stockholder wealth.² The first of these studies appeared in 1983; most of them have been published since 1987. This recent burgeoning of research is reminiscent of the period around 1970. At that time, passage of the 1970 amendments to the Bank Holding Company Act and liberalization of bank holding company laws by many states, particularly those with unit banking laws, set off a substantial increase in bank holding company formations, acquisitions, and expansion; that activity in turn stimulated many studies of the performance effects of bank holding company

affiliations and acquisitions.³ By 1980, however, the holding company movement had slowed, and through the mid-1980s, bank mergers generated little research interest. Then another combination of legislative and marketplace developments led to a resurgence of interest in the performance effects of bank mergers.⁴

This overview is intended to determine whether, in the aggregate, the research since 1980 permits any general conclusions regarding the performance effects of bank mergers. It is not intended to be a study-by-study critique of the research. However, about half of the thirty-nine studies published in the 1980–93 period used a fundamentally different methodology than the other half: Nineteen used the “operating performance” (or “observed performance”) approach, which observes the financial performance of a firm following a merger; and twenty-one used the “event study” approach, which measures the reaction of the stock price of acquirers and targets to a merger announcement (one study used both methods). Hence, after presenting what, on balance, appear to be the conclusions represented by the entire body of studies in the period, the present work concludes with a broad assessment of the two methodological approaches. In the appendix, the methodological details and results of each study are summarized in a table, which is followed by the bibliography of the thirty-nine studies.

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1. For data on the changes in the U.S. banking structure through 1993 and a discussion, see Donald T. Savage, “Interstate Banking: A Status Report,” *Federal Reserve Bulletin*, vol. 79 (December 1993), pp. 1075–89.

The various forces affecting antitrust policy toward mergers in the 1980s are discussed in some detail in Stephen A. Rhoades and Jim Burke, “Economic and Political Foundations of Section 7 Enforcement in the 1980s,” *Antitrust Bulletin*, vol. 35 (Summer 1990), pp. 373–446.

For a discussion of the factors underlying the merger tendency and a projection of U.S. banking structure, see Timothy H. Hannan and Stephen A. Rhoades, “Future U.S. Banking Structure: 1990 to 2010,” *Antitrust Bulletin*, vol. 37 (Fall 1992), pp. 737–98.

2. A summary of studies of the effects of bank mergers on operating performance from the 1960s and 1970s is in Rhoades (1986).

The merger performance studies summarized in the present staff study are cited in the text and footnotes in short (author, date) form; the bibliography for them appears at the end of the appendix.

Operating Performance Studies

The use of the operating performance (OP) methodology was concentrated in the last few years of the 1980–93 survey period, and by that time OP was the methodology of choice for bank

3. Details on the rapid growth of multibank holding companies around this time can be found in Gregory Boczar, *The Growth of Multibank Holding Companies: 1956–1973*, Staff Studies 85 (Board of Governors of the Federal Reserve System, 1975).

Many of the studies are reviewed by Timothy J. Curry, “The Performance of Bank Holding Companies,” in *The Bank Holding Company Movement to 1978: A Compendium* (Board of Governors of the Federal Reserve System, 1978), pp. 95–120. Also see Peter S. Rose, *The Changing Structure of American Banking* (Columbia University Press, 1987), especially chap. 8.

4. The main contributing developments were the removal of legal restrictions on geographic expansion (both inter- and intrastate) and a substantial increase in bank mergers.

merger performance studies.⁵ The substantial increase in the total number of merger performance studies during this period and the increased interest in the OP methodology probably reflect the interest in cost cutting and efficiency in the banking industry, particularly through merger, beginning in the late 1980s.⁶ And because the OP methodology permits the researcher to focus specifically on costs and efficiency, it may appear to be an attractive approach. The general methodology of the OP studies is to analyze changes in accounting profit rates or cost ratios, or both, from before merger to after. All but two OP studies compare the performance of merging banks with a control group of nonmerging banks (Crane and Linder, 1993, which is a case study of one merger, and Frieder and Apilado, 1983, are the two exceptions). Most of the OP studies analyze both cost ratios and profit rates, although a few analyze cost ratios only; one study (also unique in other respects) analyzes profit rates only (Frieder and Apilado, 1983).

Variations among OP Studies

In spite of the more or less common methodology employed in the OP studies, a great deal of variation exists among studies in sample coverage, geographic coverage, size of mergers examined, statistical tests, and so on. For example, sample size varies from 1, in a case study by Crane and Linder (1993), to 4,900 (Peristiani, 1993b); nonetheless, most OP studies use fairly large samples. In addition, many samples achieve more or less nationwide coverage (for example, Srinivasan and Wall, 1992; Spindt and Tarhan, 1991), whereas a few focus on certain regions of the country (for example, Linder and Crane, 1993). Most studies analyze mergers over several years; the earliest year covered is 1968 (Rhoades, 1986), and the most recent year is 1991 (Crane and Linder, 1993). Two studies, however, analyze mergers from only one year (Spindt and Tarhan,

1991; and Crane and Linder, 1993, which was the one-merger study).

Some studies focus on large mergers (for example, Berger and Humphrey, 1992; Rhoades, 1990), and others (such as O'Keefe, 1992) on smaller mergers, but most analyze a rather wide range of merger sizes. Most studies analyze the merger performance of the target and acquirer as a combined entity (although some do not combine the target and acquirer for measuring pre-merger performance); a few studies focus on the acquiring bank or the target bank, or both, and they do so for the period before and after acquisition (for example, Rose, 1987b; Spong and Shoenhair, 1992). Studies have focused on performance during varying periods of time both before and after merger. For example, Rose (1987b) analyzes as many as eight postmerger years; Linder and Crane (1993) analyze one postmerger year.

The studies conduct various kinds of statistical tests. For example, some employ univariate *t* tests to compare performance ratios before and after merger and between acquiring, target, and nonmerging firms. Other studies use multiple regression analysis to control for other factors in testing whether performance levels or changes can be explained by whether the bank was or was not involved in a merger. Most studies of efficiency performance are based strictly on expense ratios, but three studies estimate translog production functions to measure X-efficiency, scale efficiency, and an efficiency frontier for evaluating expense ratios, or efficiency ranking, of merged firms (Berger and Humphrey, 1992; DeYoung, 1993; Peristiani, 1993b). The many studies using expense ratios as an indicator of efficiency vary considerably in terms of the ratios used, among which are total expenses to assets, noninterest expenses to assets, revenues to employees, and total expenses to total revenues.

Main Findings of the OP Studies

Findings of the OP studies are generally consistent. Almost all the studies that find no gain in efficiency also find no improvement in profitability if they include both measures. In contrast, the six studies that show at least some indication of a performance improvement do not obtain consistent efficiency and profitability results, or they are unique in some respect, or both. For example, the Frieder and Apilado study (1983) analyzes a profitability measure but not an efficiency

5. Of the nineteen OP studies appearing between 1980 and 1993, fifteen appeared in the 1990–93 period; and of the fifteen merger performance studies in 1992 and 1993, thirteen used the OP methodology. Actually, only fourteen papers on merger performance appeared in 1992 and 1993, but the Cornett and Tehranian study (1992) used both methodologies.

6. An indication of the emphasis on efficiency can be found in *Business Week*, "Banking Gets Leaner and Meaner" (Oct. 16, 1989), pp. 106–7; "Banks Will Learn to Salt It Away" (Jan. 8, 1990), p. 112–13; "If Mergers Were Simple, Banking's Troubles Might be Over" (April 22, 1991), pp. 77–79; and "Two Banks Out to Tie the Knot—Or a Noose" (Oct. 7, 1991), pp. 124, 126.

measure, and the profitability measure is based on differences between actual and *hypothetical* net income. Both Spindt and Tarhan (1991) and Cornett and Tehranian (1992) find some improvement in return on equity resulting from merger but no improvement in return on assets or cost efficiency. Spong and Shoenhair (1992) find evidence of an improvement in overhead cost efficiency as a result of merger but no significant improvement in return on assets or equity. Peristiani (1993b) finds some improvement in return on assets following merger but generally no improvement in cost ratios and efficiency measures. Finally, the Crane and Linder (1993) study of the Fleet-Bank of New England merger finds a reduction in noninterest expenses relative to assets, but the findings are not compared with a control group.

In summary, despite the substantial diversity among the nineteen OP studies, the findings point strongly to a lack of improvement in efficiency or profitability as a result of bank mergers. These findings are robust within studies, across studies, and over time.

Other Findings

The major purpose of the OP studies, as noted, is to assess the performance effects of mergers, typically by comparing merging with nonmerging banks. Some of the studies, however, present more detailed comparisons. Probably the most important of these other comparisons focuses on in-market (horizontal) mergers. A widespread view is that in-market bank mergers have the greatest potential for yielding efficiency gains because they provide the opportunity for closing overlapping (directly competing) offices as well as permitting, like other mergers, the combining of back-office operations, computer systems, and administrative functions.

Seven of the OP studies analyze the effect on performance when merging firms have directly competing offices (Berger and Humphrey, 1992; O'Keefe, 1992; Srinivasan and Wall, 1992; Srinivasan, 1992; Peristiani, 1993a,b; Rhoades, 1993). None of these studies finds that the elimination of deposit market overlap as a result of in-market mergers yields efficiency improvements relative to other firms. This may mean that many of the directly competing offices that are closed following such mergers, and the offices into which they are merged, are operating at or close enough to minimum efficient scale that cost reductions following merger are too small to significantly

reduce cost ratios, such as expenses to assets. It may also mean that although closing offices reduces costs, it nonetheless causes a loss of customers, which lowers assets or revenues; as a consequence, efficiency indicators such as cost-to-asset and cost-to-revenue ratios remain steady or actually deteriorate.

Three studies examine the performance effects of mergers involving internally acquired banks (that is, the merging parties were already owned by the same bank holding company before merger) as well as externally acquired banks. Results are mixed regarding the effects on performance of internal as compared with external mergers (Spindt and Tarhan, 1991; Linder and Crane, 1993; Peristiani, 1993a). Rose (1992) focuses on interstate bank mergers and, in a comparison of pre-merger and postmerger indicators, generally finds no improvement in operating efficiency, profitability, or market share.

Several studies that analyze the target bank relative to the acquirer in terms of pre-merger efficiency or profitability, or both, generally find the target to be inferior to the acquirer (Spindt and Tarhan, 1991; Crane and Linder, 1993; DeYoung, 1993; Rhoades, 1993). Rose (1987b) finds, however, that acquired firms are more profitable than acquirers. Two studies that compare the performance of acquired and nonmerging banks find that acquired banks perform no differently than nonmerging banks before merger (Rhoades, 1986; Rhoades, 1990). Rose (1987b) finds that acquired firms have lower returns than nonmerging firms.

The issue of corporate control is not the main focus of these OP studies. To the extent that the studies are relevant to the corporate control issue, they suggest that target firms tend to be average (not poor) performers, and that acquiring firms tend to be better performers than the target firms. The results are mixed, however, and only a few studies provide relevant findings.

Weaknesses of Some OP Studies

One potential weakness of most of the OP studies is that they measure efficiency with some kind of *noninterest* expense ratio, most frequently noninterest expenses to assets.⁷ A possible problem with such a measure is that it does not account for

7. The discussion is intended to suggest weaknesses in the way some of the OP studies are done rather than to critique problems inherent in the underlying methodology. Problems with the methodology will be addressed later.

merger-related changes in product mix that would shift expenses from noninterest to interest expenses, or vice versa. Thus, for example, a merger-related reduction in retail offices may result in a reduction in noninterest expenses to assets, but the merged firm may substitute higher-interest money market deposits for the low-interest core, or retail, deposits generated at retail offices. As a consequence, noninterest expenses would decline, suggesting a fundamental improvement in efficiency, whereas in fact the rise in *interest* expenses resulting from the change in product mix may have offset the gain.

The possibility of significant changes in product mix following merger is not an inherently fatal flaw of OP studies, for two reasons. First, such changes could be accounted for when using a cost ratio by including product-mix ratios—such as large deposits to total deposits, and loans to assets—within a multiple regression model. Second, that major changes in product mix result frequently and uniquely from merger seems unlikely. Thus, most merging banks plan branch closings in such a way that they minimize the loss of retail deposits, which does not suggest a change in strategy in that area. Moreover, if a bank had decided to shift from retail deposits to money market deposits, one would have little reason to suspect that a merger would be particularly useful in achieving this purpose and, therefore, little reason to believe that this shift would likely be a frequent outcome of mergers.

In view of these considerations, it is reasonable to analyze bank mergers for their effect on noninterest expense ratios so as to assess the argument that mergers reduce noninterest expenses; nonetheless, analyzing interest expenses, which account for about 70 percent of total bank expenses, is also useful. Arguably the most reliable studies are those that account for interest expenses (or total expenses) as well as noninterest expenses. All five studies that analyze a total expense ratio report finding no efficiency gain (Cornett and Tehranian, 1992; O’Keefe, 1992; Berger and Humphrey, 1992; DeYoung, 1993; Rhoades, 1993).

Overall, the OP studies provide substantial evidence that (1) bank mergers do not generally yield performance improvement in terms of profitability or cost efficiency and (2) in-market mergers do not have performance effects different from those of other mergers. Some mixed evidence suggests that acquired firms tend to be average performers rather than poor performers.

Event Studies

Sixteen of the twenty studies conducted during the 1980s on the performance effects of bank mergers used the event study methodology. The event study was used much less frequently during the early 1990s to examine bank merger performance, and in 1992 and 1993, only two of fifteen studies used that methodology. The reason for the drop-off is unclear, but at least one explanation suggests itself. That is that event studies are designed to indicate the financial market’s expectation as to the overall performance results of mergers, whereas recent interest has focused on the *efficiency* effects of mergers.

The basic event study methodology is more standardized across studies than is the OP methodology. Essentially, the event study analyzes the stock return (based on price changes and dividends) of acquiring banks or target banks, or both, relative to a portfolio of stocks representing the market. Differences in returns of the acquiring firm or target firm relative to market returns are usually calculated over a period ranging from one day to many days or weeks leading up to and following the “event” of the merger announcement. In making the calculation, the investigators seek to determine whether the announcement of the merger causes the stock return of the acquiring or target bank to perform differently than the general market return for stocks. In event studies, differences in the stock returns between acquiring banks or target banks and the market are used as estimates of “abnormal” or “excess” returns, using the following model:

$$(1) \quad AR_{it} = R_{it} - (a_i + b_i R_{mt}),$$

where

AR_{it} = abnormal returns to bank stock i at time t

R_{it} = actual returns to bank stock i at time t

a_i = ordinary least squares (OLS) estimate of the intercept of the estimated market model

b_i = OLS estimate of the market model slope coefficient reflecting change in the market return relative to the return for bank i

R_{mt} = actual returns to a market portfolio of bank stocks at time t , as proxied by, for

example, the value-weighted index of bank stocks from the Center for Research on Security Prices (CRSP).

In equation 1, R_{it} and R_{mt} can be obtained from various sources such as CRSP tapes. However, the parameters of equation 1, a_i and b_i , must be estimated from a market model, as follows:

$$(2) \quad R_{it} = a_i + b_i R_{mt} + e_{it},$$

where R_{it} , R_{mt} , a_i , and b_i are as defined above, and e_{it} is the residual. With actual data on R_{it} and R_{mt} , usually for many days or weeks around the merger announcement, equation 2 is estimated using OLS. The resulting estimated values for a_i and b_i are substituted into equation 1 with data for R_{it} and R_{mt} to calculate the abnormal return (AR_{it}), usually for a fairly limited number of days around the announcement date. These calculations indicate whether the stock return of the acquiring or target bank is greater than, equal to, or less than the return to the market portfolio of bank stocks.

Variations among Event Studies

The underlying procedures for estimating the performance effects of mergers are more standardized in event studies than in OP studies. Nevertheless, the event studies exhibit a great deal of variation with respect to sample size, number of merger announcements studied, period of time over which the market model is estimated, period of time over which abnormal returns are calculated, and so on. For example,

- Although sample sizes are generally small, they range from 11 (Pettway and Trifts, 1985) to 138 (Hawawini and Swary, 1990).
- The period of time over which market models are estimated varies substantially, from a low of 41 days (Wall and Gup, 1989) to highs of 239 days (Desai and Stover, 1985) and 108 *weeks* (Neely, 1987).
- The period of time over which abnormal returns are calculated varies widely. Cornett and Tehranian (1992) and James and Wier (1987a) present and analyze returns for only the announcement date and the day before, whereas Trifts and Scanlon (1987) present results for -40 to $+20$ *weeks* around announcement, Dubofsky and Fraser (1989) present data for -50 to $+20$ days, and Pettway and Trifts (1985) present and discuss abnormal returns data for -10 to $+50$ days.

- Most event studies estimate the market model over a period preceding the merger announcement, but some studies estimate the model for a period that extends from before the announcement to after it (James and Wier, 1987a,b; Trifts and Scanlon, 1987; de Cossio, Trifts, and Scanlon, 1988; Baradwaj, Dubofsky, and Fraser, 1992); Cornett and De (1991) estimate the market model for a period strictly after the announcement date.
- The vast majority of studies use a standard market model to provide the basis for calculating abnormal returns, but a few use a variant of the standard market model. Thus, Sushka and Bendeck (1988), Dubofsky and Fraser (1989), and Hawawini and Swary (1990) use a “market-adjusted returns” or “mean-adjusted returns” model.
- Most market models are estimated and abnormal returns calculated with daily data on stock returns, but some studies use weekly return data (Neely, 1987; Trifts and Scanlon, 1987; de Cossio, Trifts, and Scanlon, 1988; Wall and Gup, 1989; Hawawini and Swary, 1990).
- Most studies calculate abnormal returns around the announcement date of the merger, but one study focuses on the acquisition date (Lobue, 1984) and another on the date that the Federal Reserve approved the merger (Sushka and Bendeck, 1988).
- Finally, all the event studies analyze the effect of an announcement on returns to the bidding firm, but only about one-half of the studies analyze the effect on the stock return of the target firm.

Main Findings of Event Studies

Findings are not consistent across event studies. For example, seven studies find that a merger announcement had a significantly negative influence on the returns to stockholders of the bidding firm. Seven other studies find no effect on bidder returns, three studies find positive effects, and four find mixed effects. The differences in findings are not readily explicable from the differences in approach noted above or from differences in the years covered by the analyses. In contrast to the frequently negative or neutral returns to bidders from merger announcements, eight of nine studies that analyze the merger announcement effect on the target bank find a positive return to target stockholders, and one study finds no abnormal return (De and Duplichan, 1987).

Four studies calculate the net wealth effect of the returns to bidders and targets combined (de Cossio, Trifts, and Scanlon, 1988; Baradwaj, Fraser, and Furtado, 1990; Hannan and Wolken, 1989; Hawawini and Swary, 1990). One finds a small net wealth effect, one finds no wealth effect, and two find net gains to certain types of merger announcements but not to others.

In summary, the event studies generally find that stockholders of target firms have gains. However, the evidence regarding returns to bidders, as well as that regarding the net returns to bidders and targets combined, is too inconsistent to permit any clear conclusion. On balance, then, evidence from the twenty-one event studies, especially the ones since 1989, undercut the hypothesis that the financial markets expect mergers to improve bank performance.

Other Findings of Event Studies

Although the main focus of the event studies is on the general announcement effect of bank mergers on returns to bank stockholders, several event studies present more detailed findings. For example, some find a difference in the direction (that is, positive vs. negative) of abnormal returns before and after announcement (Pettway and Trifts, 1985). Other studies find differences in returns for different types of merger proposals. For example, Sushka and Bendeck (1988) obtain results for external proposals that differ from those for internal proposals; Baradwaj, Fraser, and Furtado (1990) find differences between hostile and nonhostile takeover bids; and Dubofsky and Fraser (1989) find that returns to bidders before a key 1981 court decision regarding the Federal Reserve's antitrust standards differ from returns to bidders after the court decision.⁸

Abnormal returns in response to interstate and intrastate merger announcements are investigated by several studies, but generally no difference is found (Hannan and Wolken, 1989; Hawawini and Swary, 1990; Baradwaj, Dubofsky, and Fraser, 1992; Cornett and Tehranian, 1992). In addition to investigating differences in abnormal returns following the announcement of different types of mergers, or for different time periods, nearly half the event studies use multiple regression analysis, with abnormal returns as the dependent variable,

to analyze the determinants of abnormal returns. The determinants most commonly investigated are the number of bidders and targets (for example, James and Wier, 1987a,b) and the relative size of the target and bidder (for example, Kaen and Tehranian, 1989). Results are mixed.

Weaknesses of Some Event Studies

The event studies, like the OP studies, have some weaknesses.⁹ First, the period around the announcement event for which abnormal returns are analyzed varies greatly from study to study, and the results often appear to be sensitive to the time period chosen. Significant positive abnormal returns to the bidder during the day or two immediately around the announcement date are commonly found. However, when abnormal returns are cumulated for ten or twenty days after the announcement, the absence of significant abnormal returns is also common.

Second, because event studies require complete stock price data, many studies analyze mergers involving only large, publicly traded banks as bidders or targets. Many merging banks (bidders or targets) are, of course, not publicly traded, so results based on publicly traded stocks are not necessarily representative of all bank mergers.

Third, the fact that in many studies the bidders are not bidding on the targets included in the same study or do not consummate a merger following announcement of a merger seems problematic.¹⁰

Overall, the results from the event studies are mixed. Stockholders in the target firms typically gain, but stockholders in the bidding firms generally experience negative abnormal returns or no significant abnormal returns. These results by themselves do not provide much evidence of efficiency gains from bank mergers. In addition, the fact that the stockholders of the typically larger bidding firms often suffer negative abnormal returns around the time of announcement would in itself seem to raise serious doubt about the likelihood of any important efficiency gains from bank mergers. Or perhaps, because the abnormal returns surrounding announcement do not, as noted, focus strictly on efficiency effects, any efficiency effects are being masked by other factors. For example, managerial hubris regarding

9. Problems inherent in the underlying methodology of these studies will be discussed later.

10. An exception is De and Duplichan (1987). That study excludes mergers that were not consummated after announcement.

8. *Mercantile Texas Corp. v. Board of Governors*, 638 F.2d 1255 (5th Cir. 1981), and *Republic of Texas Corp. v. Board of Governors*, 649 F.2d 1026 (5th Cir. 1981).

the ability to improve the target after merger may result in overbidding, which affects the returns to bidders around announcement. Given their mixed results and some of the weaknesses just noted, the event studies appear to provide little support for the hypothesis that bank mergers generally result in efficiency improvements.

Overall Assessment of Merger Performance Studies

The nineteen operating performance (OP) studies provide consistent evidence that bank mergers have not generally resulted in efficiency gains. The twenty-one event studies yield mixed results showing generally positive abnormal returns to stockholders of targets and negative or no abnormal returns to stockholders of bidders following announcement of a merger. Even a simple weighing of the two sets of results would lead one toward an overall conclusion that bank mergers do not generally tend to result in efficiency gains. One is led even more strongly in that direction upon taking into account the weakness of the event study methodology relative to the OP methodology as a means of studying the efficiency effects of bank mergers. This conclusion from a fairly large body of empirical evidence is, interestingly, consistent with the views of a number of bank analysts who were interviewed on this issue in 1991. They generally reported that in their own experience with bank mergers, most of them have not resulted in efficiency gains.¹¹

Shortcomings of Event Studies

The usefulness of event studies relative to OP studies is seriously undermined by two factors. First, and least subject to debate, is that the financial market response to a merger announcement, in terms of abnormal returns to stockholders, reflects expectations about all the elements (not only efficiency) that may influence the general performance results of a merger as well as differences in expectations between investors and bidders. For example, abnormal returns should reflect the market expectations about market

power, or position, gains as well as efficiency. The returns should also reflect differences in judgment between bidders and investors regarding the potential gains from a merger and the appropriate purchase price. Because bidders are insiders to the deal and investors are outsiders, presumably with less information, and because a bidder's management may be overcome with hubris whereas outside investors would not be so influenced, a great deal of room exists for mistakes to be made or differences in judgment to arise. All these factors will be reflected in the stock returns. Thus, it is highly questionable to interpret merger announcement effects strictly with respect to operating efficiency. In contrast, OP studies can focus directly on the efficiency effects of mergers and thus yield results that are more directly relevant to the merger efficiency question.

Second, event studies are based on short-term movements in stock prices. Short-term movements in stock prices may reflect speculation by sophisticated investors who seek short-term trading gains by outguessing other sophisticated market players.¹² If an investor trades in and out of a stock to achieve such short-run gains or for hedging purposes, the long-term performance of the firm is of little relevance to the investor. And because an investor may move quickly in and out of a stock, the investor's performance and reputation (in the case of a brokerage firm) is not necessarily influenced by the long-term performance of a stock. Consequently, to the extent that stock price changes surrounding a merger announcement event reflect short-run trading, as opposed to long-term investments, abnormal returns would appear to be of limited use for assessing the performance effects of mergers.¹³

The possibility that a large volume of stock purchases each day are not made primarily as long-term investments is suggested by the substantial increase in trading volume and turnover of shares during the past twenty years or so. By almost any measure, stock trading has increased in

11. See Stephen A. Rhoades, "The Efficiency Effects of Bank Mergers: Rationale for a Case Study Approach and Preliminary Findings," in *Proceedings of the 29th Annual Conference on Bank Structure and Competition* (Federal Reserve Bank of Chicago, May 1993), pp. 377-99; the interviews are reported on pp. 379-80.

12. Such speculative activity has been discussed at length in Anthony Bianco, "Playing with Fire," *Business Week* (September 6, 1985), pp. 78-90. Concern about increased short-term, speculative trading has led to proposals for a securities transaction tax, as noted in Craig S. Hakkio, "Should We Throw Sand in the Gears of Financial Markets?" Federal Reserve Bank of Kansas City, *Economic Review*, vol. 79 (Second Quarter 1994), pp. 17-30.

13. Even if investments in the stocks of merging firms were based on expectations about firms' future performance, given the notorious frailty of economic projections, it would not appear that expectations (as reflected in abnormal returns) provide a very reliable foundation for assessing performance effects of mergers.

terms of the turnover of stocks. For example, between 1970 and 1992, the average number of shares traded daily on the New York Stock Exchange (NYSE) increased more than seventeenfold, from 11.6 million to 202.3 million. Over the same period, the average number of shares listed on the exchange rose only about sevenfold, from 15,573.7 million to 107,730.5 million. Also, the “turnover rate” of stocks on the NYSE more than doubled, from 0.19 to 0.48, between 1970 and 1992.¹⁴ Finally, the increased transmission speed and reduced cost of information resulting from technological change have provided the opportunity for the continued growth of short-term trading.

Shortcomings of OP Studies

The OP studies have the advantage of focusing on actual observed operating results of a merger rather than the expectations around the announcement date. The OP studies have, in other words, the advantage of “hindsight over foresight,” as stated by Caves in a detailed analysis of the issue.¹⁵ Nevertheless, two possible problems are inherent in the OP methodology. First, the OP studies typically analyze operating performance for periods of one to six years after a merger occurs. During these years, many factors unique to the merged firm, other than the merger itself, may affect the firm’s efficiency or general performance. And, over a longer period, these other factors are potentially a more serious problem, although it does not appear to be necessary to study the postmerger performance of banks for an extended period to gain an understanding of the performance effects.¹⁶ These other factors might include product mix changes or other mergers. However, other factors can be explicitly taken into account by sample design (for example, excluding mergers that are followed by other mergers) or by including appropriate variables in the multiple regression models often estimated in OP studies.

14. The turnover rate is the ratio of the volume of shares traded in a year to the average number of shares listed during the year. See New York Stock Exchange, *Fact Book: 1992 Data* (1993), pp. 82–3.

15. Richard E. Caves, “Mergers, Takeovers, and Economic Efficiency: Foresight vs. Hindsight,” *International Journal of Industrial Organization*, vol. 7 (March 1989), pp. 151–74. A brief assessment of these differences between the two types of studies is in Rhoades (1986).

16. According to a number of bank analysts, all gains from a bank merger should generally be realized within three years, with 50 percent of any gains coming after one year (Rhoades, “The Efficiency Effects of Bank Mergers,” cited earlier).

But not taking other factors into account is not necessarily a serious problem. For example, if we accept the proposition that bank mergers in fact generally improve the efficiency or general operating performance of merged firms, the failure of OP studies to find the improvement in the several years after the merger would imply that efficiency and general performance gains from mergers are somehow systematically squandered. Thus, there would be no *lasting* efficiency or general performance benefits from mergers. However, if we have no reason to believe that merging banks would generally undertake actions after merger that would systematically negate whatever general performance or efficiency gains relative to other banks they might have achieved via merger, then the findings of OP studies are telling even if they do not carefully account for product mix and other changes following merger.

A second possible problem inherent in OP studies of efficiency (usually measured by expense ratios), and especially of general performance (often measured by return on assets), is that these are accounting measures rather than economic measures.¹⁷ At a conceptual level, such criticism has merit. At a practical level, however, it suggests that no readily available data exist with which to calculate the performance of American businesses and that the millions of pages of accounting data provided in myriad forms to managers, investors, and the government are of little use for measuring cost efficiency or profitability. Apparently, however, American businesses, investors, and government do find such data useful for making decisions and investments and allocating resources. In fact, return on assets is often selected by market analysts as a good measure of a bank’s overall performance.¹⁸ Bank regulators, who have a great interest in the financial soundness of banks, rely heavily on return on assets and other accounting measures to assess the performance of banks. Under the circumstances, using accounting measures to assess the efficiency and general performance of merging banks appears to be reasonable.

17. For criticisms of the use of accounting data in measuring profits, see Franklin M. Fisher and John J. McGowan, “On the Misuse of Accounting Rates of Return to Infer Monopoly Profits,” *American Economic Review*, vol. 73 (March 1983), pp. 82–97; and George J. Benston, “The Validity of Profits-Structure Studies with Particular Reference to the FTC’s Line of Business Data,” *American Economic Review*, vol. 75 (March 1985), pp. 37–67.

18. See, for example, the following issues of *Business Week*: April 18, 1977, p. 97; April 9, 1984, p. 83; and April 8, 1985, p. 106.

On balance, the problems inherent in the event study methodology for studying the effects of bank mergers appear to be substantially more troublesome than those inherent in the OP methodology. One is therefore justified in giving greater weight to the findings of the OP studies, which are that bank mergers generally do not deliver gains in efficiency or general operating performance.¹⁹

Summary and Conclusion

The thirty-nine studies of the effects of bank mergers on efficiency, profitability, or stockholder wealth that appeared from 1980 to 1993 provide little support for the view that bank mergers result in improvements in performance. The nineteen operating performance studies indicate, with very few exceptions, that bank mergers do not yield improvements in efficiency or profitability and that in-market mergers do not have more favorable effects on performance than other mergers. The twenty-one event studies (one study included both methodologies) generally indicate that net gains accrue to stockholders of target firms after the announcement of a merger. Evidence on returns to bidders, and net returns to bidders and targets combined, is mixed and thus does not provide any clear evidence of performance improvements from bank mergers. In view of the shortcomings of the

19. One might argue that even if performance does not generally improve following a merger, mergers nevertheless have positive effects on efficiency and performance, and the performance of one or both firms involved in the merger might have deteriorated without the beneficial effects of the merger. First, what would have happened had a merger not occurred is impossible to know. Second, the argument proposes the unlikely generalization that merging firms would experience deteriorating efficiency and general performance relative to other firms were it not for the merger. This argument may apply to a few mergers, but it provides a highly improbable explanation for the overall findings of the merger performance studies.

event study methodology in this context, more weight should be accorded the operating performance studies in evaluating the overall evidence.

Two caveats are to be noted. First, findings from cross-sectional statistical studies such as those examined here allow us to conclude that, in general, bank mergers do not lead to improvements in efficiency or profitability. However, this does not mean that mergers never yield such improvements. Second, almost all the mergers analyzed in these studies were undertaken before 1989, and mergers after that time might yield different results.

Finally, the findings by economists that bank mergers do not generally result in efficiency gains are not necessarily inconsistent with the argument by some bankers that mergers achieve significant cost cutting. Both groups may be right. However, they are usually talking about different concepts. The difference may arise from the fact that economists focus on the efficiency effects of mergers, which are typically measured by an expense ratio such as total expenses to total assets.²⁰ In contrast, bankers typically focus on the dollar volume, or percentage, of costs that will be cut. If dollar costs are cut following a merger but assets or revenues decline more or less proportionately (as a firm shrinks after merger, which is not uncommon), the banker would rightly claim that costs were cut and the economist would rightly claim that efficiency, in terms of costs to revenues or assets, did not improve. Nonetheless, from the standpoint of public policy considerations and the real long-term performance of the industry, an efficiency measure is the relevant benchmark.

20. Moreover, a meaningful assessment of the cost, efficiency, or general performance results of a merger must analyze changes in relation to a control group to account for general industry trends in performance.

Appendix: Summary and Bibliography of Studies

Studies of the Effects of Bank Mergers, 1980–93

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Frieder and Apilado (1983)	1973–77	106	106 affiliates of 4 large BHCs in a large southern state. Lead banks of the BHCs are excluded. Unique sample and data that cannot be replicated	Unique methodology involving hypothetical measures of key variables. Compares actual earnings per share of a BHC that made an acquisition with hypothetical earnings per share of the BHC constructed on the assumption that an acquisition did not take place. Affiliates of the BHCs have been affiliated for 1 year or more, providing varying postacquisition periods. Uses differences between hypothetical and actual adjusted net income measures to estimate magnitude of any merger effect. Analyzes effect on combined entity. Presumably the affiliates analyzed were established banks acquired by the BHC rather than de novo banks formed and “acquired” by the BHC, but this is not clear
Lobue (1984)	Not noted	37	Stock of acquiring firms is traded on the NYSE or OTC. Six of the acquisitions are of nonbank firms. Sample includes only acquiring firms	Event study. Analyzes abnormal returns on the stock of the acquiring firm relative to the market return. Calculation of abnormal returns is based on a log-transformed standard market model estimated over an unspecified period. Abnormal returns relative to the market are analyzed for 24 months before, to 18 months after, the effective acquisition date. Returns are analyzed for different groupings of firms based on size of merging firms, state branching laws, etc.
Desai and Stover (1985)	1976–82	18	Acquiring firms are identified from Moody’s Bank and Finance Manuals and other sources and are listed on the CRSP daily return files. They have made no acquisitions for at least 2 years before 1976. Analysis focuses only on the acquiring firm	Event study. Analyzes cumulative abnormal returns, relative to the market, for a 2-day period including the event day and 1 day after. Returns are measured only for the acquiring firm. Analysis is based on stock market returns to the market and the acquiring firm using a standard market model estimated over the period from 270 days to 31 days before announcement date. Analyzes stock market reaction to both the announcement and Federal Reserve approval

NOTE. In this table, the studies appear in chronological order by date of publication. Two works not covered by the present study analyze the efficiency effects of simulated rather than actual mergers or merger announcements. See Donald T. Savage, “Mergers, Branch Closings, and Cost Savings” (Board of Governors of the Federal Reserve System, 1991); and Sherrill Shaffer, “Can Megamergers Improve Bank Efficiency?” *Journal of Banking and Finance*, vol. 17 (April 1993), pp. 423–36. Savage finds declines in efficiency based on large in-market mergers; Shaffer finds that about one-half of simulated large mergers would reduce efficiency and the other half would increase efficiency.

AMEX	American Stock Exchange
BHC	Bank holding company
CRSP	Center for Research on Security Prices
FDIC	Federal Deposit Insurance Corporation
NASDAQ	National Association of Securities Dealers Automated Quotes
NYSE	New York Stock Exchange
OLS	Ordinary least squares
OTC	Over the counter
S&P	Standard and Poor’s
WSJ	<i>Wall Street Journal</i>

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Hypothetical effect of mergers on earnings per share	Hypothetical measures of earnings per share and adjusted net income, with and without acquisition	Univariate <i>t</i> tests	BHC bank affiliates have a positive effect on hypothetical BHC profitability each year after acquisition, from 1 year to 8 or more years
Wealth effects	Abnormal returns on stock	Residual analysis	Acquiring firms, on average, have positive cumulative abnormal returns
Wealth effects	Abnormal returns on stock	Residual analysis	<p>Acquiring firms have positive significant cumulative abnormal returns on the announcement day and 1 day after</p> <p>The size of the target relative to the acquirer does not affect the return to the acquirer</p> <p>Acquiring firms have positive significant cumulative abnormal returns during the 2-day event window associated with approval of the acquisition by the Federal Reserve Board</p>

1. For event studies, may include merger announcements for mergers never consummated.

2. In event studies, a standard market model refers to the regression model, $R_{it} = a_i + b_i R_{mt}$, used to estimate the coefficients, a and b , needed to compute the abnormal return, $AR_{it} = R_{it} - (a_i + b_i R_{mt})$. See text p. 4 for details.

3. Measures that reflect performance in terms of profitability, efficiency, or abnormal returns to shareholders. Does not include measures such as loans/assets or capital/assets.

4. In event studies, residual analysis and prediction error analysis are treated as synonymous.

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Pettway and Trifts (1985)	1972–81	11	Merged firms are all failing banks that the FDIC assisted in a purchase and assumption merger. Acquiring firms are listed on a major exchange or OTC, are on CRSP tapes, and are frequently traded. Sample includes only the acquiring firms	Event study. Analyzes abnormal returns on the stock of the acquiring firm relative to the market. Analysis covers from 10 days before merger to 50 days after. Prediction errors or abnormal returns for individual firms are calculated using a standard market model estimated over the period from 60 days to 10 days before merger. (The merger and its announcement occur simultaneously in FDIC-assisted mergers.) The residuals are not cumulated by the usual cumulative abnormal returns method. Instead, an average geometric residual return is calculated
Rhoades (1986)	1968–78, even years	413	Banks acquired by BHCs. Also includes about 3,600 nonacquired banks located in the same markets as acquired banks and with operations in no other markets	Analyzes operating performance changes. Compares average performance during 3 years before with 4th–6th years after acquisition of acquiring and nonacquiring firms. Analysis focuses on the acquired bank rather than the combined entity both before and after acquisition
De and Duplichan (1987)	1982–85	28 (22 targets and 24 bidders)	Strictly interstate mergers that were ultimately consummated. Bidders and targets have stock traded on a major exchange or OTC and have more than \$100 million in assets. Acquisition announcements by grandfathered banks or BHC are excluded	Event study. Analyzes abnormal and cumulative abnormal returns, relative to the market, of acquiring and acquired firms for up to 30 days before and after the announcement date. Analysis is based on a standard market model estimated with <i>weekly</i> return data for 52 weeks before the announcement date. Return data are from CRSP, the S&P Stock Price Record, and the S&P 500 composite index

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Wealth effects	Average geometric residual return	Residual analysis	<p>Acquiring firms have positive significant average abnormal returns during 10 days before merger</p> <p>Negative significant average abnormal returns are experienced during 50 days after merger for 11 FDIC-assisted purchase and assumption mergers; positive returns occur for 3 days after merger</p>
Performance changes	<p>Net income/total assets</p> <p>Noninterest expenses/total assets</p>	<p>Multiple regression (staff study)</p> <p>Probit analysis (chapter)</p>	<p>Efficiency does not improve after merger compared to that of nonacquired firms</p> <p>Profit rates do not improve after merger relative to those of nonacquired firms</p> <p>Before merger the profitability and efficiency of acquired firms are no different from those of nonmerging firms</p> <p>Growth of market share of merged firm does not improve after merger when compared with that of nonacquired firms</p>
Wealth effects	Abnormal returns on stock	Residual analysis	Neither acquiring nor acquired have significant abnormal returns during the 30 days before announcement or after

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
James and Wier (1987a)	1973–83	79	19 mergers resulting from FDIC failed-bank auctions in which the winning bidder has actively traded common stock and 60 other randomly selected unassisted acquisitions in which the bidder has actively traded stock	Event study. Analyzes abnormal returns of the acquiring firm, relative to the market, for different periods, with emphasis on 2 days—the announcement day and day before. In the case of the 19 failed-bank auctions, analysis focuses on stock returns of winning bidders. Analysis is based on stock market returns to the market and acquiring firms using a standard market model that accounts for risk. The model is estimated for 80 days to 11 days before announcement and 11 days to 80 days after. Also uses OLS to analyze differences in market reaction to assisted and unassisted mergers and the effect of the number of bidders and potential bidders on abnormal returns
James and Wier (1987b)	1972–83	60	Random sample of acquiring banks with actively traded stocks that are in the Compustat Banking and Finance File. Acquiring firms that made other acquisitions in the 6 months before acquisition are excluded	Event study. Analysis of abnormal returns on the stock, relative to the market, of acquiring banks covers the 2-day and 5-day periods up to the announcement date. Analysis of abnormal returns is based on a standard market model estimated over the period from 80 days to 15 days before announcement and 15 days to 80 days after. Also uses OLS to examine the effect, on returns to the acquirer, of the number of bidders, number of targets, and the ratio of size of acquired firm to the size of the target. Finally, examines relation between abnormal gains and attainment of concentration and market share
Neely (1987)	1979–85	26	Stock of acquiring and acquired banks is traded on NYSE, AMEX, or OTC. Acquirers are BHCs, and no regulatory mergers are included	Event study. Analyzes abnormal returns, relative to the market, for acquiring and acquired firms during the period from 10 weeks before to 30 weeks after the acquisition announcement. Analysis is based on a standard market model estimated over the period from 119 weeks to 11 weeks before merger. S&P data are used to construct the market return index for banks. Attempts to distinguish between acquisitions of banks and of BHCs in terms of stock price effect

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Wealth effects	Abnormal returns on stock	Residual analysis Multiple regression	<p>Acquiring firms in FDIC-assisted and unassisted mergers have positive significant abnormal returns on the day before announcement and the day of announcement</p> <p>No pattern for returns to acquirers is apparent for the 50 days after merger</p> <p>The number of bidders has a significant negative relation with abnormal returns to acquirers</p> <p>For unassisted mergers (but not for assisted mergers), the number of potential bidders is negatively related, and the number of alternate targets is positively related, to abnormal returns to acquirers</p>
Wealth effects	Abnormal returns on stock	Residual analysis Multiple regression	<p>Acquiring firms have small but significant positive returns during the 2-day and 5-day periods up to the announcement date. Returns after announcement are not examined</p> <p>The number of targets is positively related to abnormal returns to acquirers, and the number of potential bidders is negatively related to acquirers' returns</p> <p>Returns to acquirers are positively related to ratio of target to bidder size</p> <p>Attainment of market share and concentration by acquirers are minimal, so achievement of market power is not an important source of observed gains</p>
Wealth effects	Abnormal returns on stock	Residual analysis	<p>Acquiring firms generally have normal returns</p> <p>Acquired firms have positive significant cumulative abnormal returns before announcement and after</p>

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Rose (1987a)	1970–85	106	106 merged banks plus 106 nonmerging banks that were matched, in terms of size and geographic market, with the merged banks. Wide variation in size and geographic location	Analyzes operating performance changes. Compares average performance of merging and nonmerging firms both before and after merger. Analysis covers the 1-year and 3-year periods before merger and various periods from 1 year to 8 years after merger. Acquiring and acquired firms are treated as a combined entity. Also reports findings of a survey of merging firms that asked respondents to specify motives for mergers
Rose (1987b)	1970–80	40 acquiring banks, 138 acquired banks	Acquiring banks are each paired with a nonmerging bank of similar size and location. Mergers have wide geographic representation. All acquirers are national banks. The acquired banks are independently selected in the same manner as the acquiring banks and are not necessarily acquired by the acquiring banks in the sample	Comparison of operating performance differences. All comparisons cover each of the 5 years before and after merger. Analyzes differences between merging and nonmerging banks after merger. Also analyzes differences between merging and nonmerging banks in changes from pre- to postmerger period
Trifts and Scanlon (1987)	1982–85	17 acquired and 14 acquiring	All cases involve interstate merger. Each acquiring and acquired bank has stock traded on NYSE, AMEX, or OTC. Sample includes both acquiring and acquired firms from 11 mergers and a total of 17 acquired banks and 14 acquiring banks	Event study. Analyzes abnormal returns on the stock price plus dividends, relative to the market, of acquiring and acquired firms for 40 weeks before announcement and 20 weeks after. Analysis is based on a standard market model estimated over the period from 61 weeks to 41 weeks before announcement and 21 weeks to 41 weeks after. Alternative market indexes of banks were used in the market models (S&P 500 and an index of bank stocks based on S&P data) and yielded the same results

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Performance changes	Return on assets Return on equity	Univariate <i>t</i> tests	<p>Returns on assets and equity do not improve after merger when compared with those of nonmerging firms</p> <p>Returns on assets and equity of combined merging firms and nonmerging firms do not differ before merger</p> <p>Growth in assets and deposits do not improve after merger when compared with that of nonmerging firms</p> <p>Market share of merged firms in local markets does not improve after merger when compared with that of nonmerging firms</p> <p>Growth in net earnings after tax does not improve after merger when compared with that of nonmerging firms</p>
Performance effects	Return on assets Return on equity Operating revenue/ operating expenses Revenues/employees Assets/employees	Paired comparison with <i>t</i> tests Multiple regression Canonical analysis	<p>Operating efficiency (operating revenue/operating expenses) of acquiring firms does not improve after merger when compared with that of nonmerging firms</p> <p>Employee productivity (assets/employees) of acquiring firms does not improve after merger when compared with that of nonmerging firms</p> <p>Profitability of acquiring firms does not improve after merger when compared with that of nonmerging firms</p> <p>Multiple mergers do not effect performance</p> <p>Acquired firms have lower rates of return than nonmerging firms before merger</p> <p>Acquired firms are more profitable than acquirers before merger</p> <p>Acquiring firms have lower operating efficiency and employee productivity than nonmergering firms</p>
Wealth effects	Abnormal returns on stock	Residual analysis	<p>Acquiring firms have negative significant cumulative abnormal returns during the 20 weeks after announcement but no cumulative abnormal returns for the 40 weeks before announcement or for the entire 60-week period</p> <p>Acquired firms have positive cumulative abnormal returns for the 40 weeks before announcement and the entire 60-week period</p> <p>No abnormal returns to acquired firms for the 20 weeks after announcement</p> <p>Returns differ substantially among merger proposals</p> <p>Returns tend to be larger for merger proposals in which the size difference between acquiring and acquired firms is relatively small</p>

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
de Cossio, Trifts, and Scanlon (1988)	1982–85	41 intrastate, 21 interstate	Stock of acquiring and acquired banks is traded on NYSE, AMEX, or OTC. Excludes banks making multiple mergers. 18 of 41 intrastate mergers include both bidder and target firms. 11 of 21 interstate mergers include both bidder and target firms	Event study. Analyzes the abnormal return on the stock, relative to the market, of acquiring and acquired firms for 30 weeks before announcement and 20 weeks after. Analysis is based on a standard market model estimated over the period from 50 weeks to 31 weeks before announcement and 21 weeks to 40 weeks after. Analyzes both inter- and intrastate announcements
Sushka and Bendeck (1988)	1972–85	41	Stock of acquiring banks is listed on NYSE or AMEX. Sample includes only acquiring firms	Event study. Analyzes abnormal returns on the stock of the acquiring firm relative to the market return. Calculation of abnormal returns is based on a mean-adjusted returns model and on a standard market model, and each yields the same results. The adjusted returns model is based on the period from 340 days to 120 days before Federal Reserve approval. The analysis covers 5 days to 14 days before merger approval by the Federal Reserve and 1 day to 14 days after merger approval. Time period assessed seems to vary. Does not investigate effects on acquired firms. Analysis examines four types of merger: emergency, nonemergency, external, and internal
Baradwaj, Fraser, and Furtado (1990)	1980–87	23 hostile, 30 nonhostile	Acquiring or target bank is publicly traded. One-third of the hostile offers were successful. Hostile offers based on reports of unsolicited bids in the WSJ from 1980 to 1987. The 30 nonhostile mergers serve as a control group and were drawn from another study	Event study. Analyzes abnormal and cumulative abnormal returns of acquiring and acquired firms for various periods from 5 days before to 5 days after announcement. Compares abnormal returns for hostile bids with those for nonhostile bids. Analysis is based on a standard market model estimated for 150 days (from day 210 to day 61) before the announcement. Also compares characteristics of banks subject to hostile bid with those subject to nonhostile bid

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Wealth effects	Abnormal returns on stock	Residual analysis	<p>Acquired firms experience positive significant abnormal returns over the entire period for both inter- and intrastate announcements</p> <p>Acquiring firms do not have abnormal returns over the entire period for either inter- or intrastate merger proposals</p> <p>Combining the dollar value of effects on acquiring and acquired firms shows net gains for intrastate merger proposals and no net gain or loss for interstate proposals</p> <p>Merger proposals involving large targets (relative to bidders) show greater gains than proposals involving relatively small targets</p>
Wealth effects	Abnormal returns on stock	Prediction error analysis	<p>Acquiring firms have negative significant abnormal returns in the 23 external merger proposals but generally normal returns for other kinds of proposals during the period surrounding Federal Reserve approval of a merger proposal</p> <p>Merger proposals involving banks internal to a BHC have no significant abnormal returns</p> <p>Merger proposals involving banks external to the BHC have negative significant abnormal returns</p>
Wealth effects	Abnormal returns on stock	Residual analysis	<p>Acquired firms have positive significant abnormal returns for various periods from 5 days before announcement to 5 days after</p> <p>Acquiring firms have negative significant abnormal returns during the period from 5 days before announcement to 5 days after</p> <p>Hostile bidders have a smaller negative return than nonhostile bidders</p> <p>Targets of hostile bids have significantly higher returns than targets of nonhostile bids</p> <p>Generally little difference in returns between successful and unsuccessful hostile bidders and between successful and unsuccessful hostile targets</p> <p>Estimates of net dollar value of wealth effects for bidders and targets combined indicate a positive significant net wealth effect from hostile takeover announcements and no significant net wealth effect from nonhostile announcements</p>

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Bertin, Ghazanfari, and Torabzadeh (1989)	1982–87	33	Acquiring firms are all involved in an FDIC-assisted purchase and assumption of a failing bank. Analysis focuses only on acquiring firms. Stock of all firms is subject to continuous daily trading on an exchange	Event study. Analyzes abnormal returns on the stock of acquiring firms relative to the market. Analysis of abnormal returns covers 20 days before announcement to 20 days after, using stock price and dividend data from the WSJ. Also conducts OLS analysis of determinants of abnormal returns. Analysis is based on a standard market model estimated over the period from 121 days to 21 days before announcement
Dubofsky and Fraser (1989)	1973–83	101	Acquiring banks are selected on the basis of announcements appearing in the WSJ, and their stock must be actively traded (on an exchange or OTC) on the announcement date. Merger must involve a target bank that is at least one-tenth the size of the acquiring bank in terms of assets. Excludes combinations of equals	Event study. Analyzes abnormal returns on the stock of the acquiring firms during the 2 days covered by the announcement day and the day before announcement. Analysis is based on the market-adjusted returns method rather than a standard market model. Focuses only on acquiring firms. Focuses on different announcement effects before and after various dates. Also examines excess returns for various periods up to 50 days before announcement and 20 days after for mergers before and after the date (July 1, 1981) when two District Court decisions concluded that the Federal Reserve cannot apply stricter standards to mergers than does antitrust law. Conducts OLS tests to determine effects of several variables on abnormal returns
Hannan and Wolken (1989)	1982–87	69 targets, 43 bidders	Stock of acquiring and acquired firms is traded on NYSE, AMEX, or OTC, the announcement appeared in the WSJ, and the firms were not involved in a merger during preceding 6 months or the month after announcement. The 43 bidders are included only if they bid on 1 of the 69 target firms in the sample	Event study. Analyzes abnormal and cumulative abnormal returns, relative to the market, of the acquiring and acquired firms for up to 15 days before merger and 15 days after. Analysis is based on a standard market model estimated over the period from 90 days to 15 days before the announcement. Stock price data are from International Data Service's Daily Stock Price tape. The market return data are based on the Wilshire Index

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Wealth effects	Abnormal returns on stock	Residual analysis Multiple regression	<p>Acquiring firms generally do not have significant abnormal or cumulative abnormal returns before merger or after</p> <p>There are a couple of significant positive returns during the 4 days before merger</p> <p>Higher outside board membership and location in a statewide branching state are associated with higher cumulative abnormal returns</p>
Wealth effects	Abnormal returns on stock	Residual analysis Multiple regression	<p>Acquiring firms have positive significant abnormal returns during the 2-day announcement period for announcements before July 1, 1981, and negative significant returns during the 2-day announcement period for announcements after July 1, 1981</p> <p>Cumulative excess returns over the period from 50 days before announcement to 20 days after suggest some gain from announcement to acquirers before July 1, 1981, and some loss due to announcement after July 1, 1981</p> <p>OLS tests show that no variables affect abnormal returns before July 1, 1981. After that date, a couple of variables affect returns, but they may not be conclusive</p>
Wealth effects	Abnormal returns on stock	Residual analysis	<p>Acquiring firms have negative significant cumulative abnormal returns both before announcement and after</p> <p>Acquired firms have positive significant cumulative abnormal returns both before announcement and after</p> <p>A calculation of the dollar value of the change in stock prices indicates no net change in value of the stock of the 2 firms combined</p> <p>Results generally do not differ significantly between large and small organizations for bidders or targets</p> <p>Net combined dollar value of wealth effects do not differ between inter- and intrastate acquisition proposals</p> <p>Net combined dollar value of wealth effects are significantly positive for acquisitions involving less capitalized targets and significantly negative for those involving more capitalized targets</p>

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Kaen and Tehranian (1989)	1979–87	31 in New Hampshire (8 bidders made all the proposals)	Mergers by banks in New Hampshire after a statewide branching law was passed in 1979. Announcement dates were determined primarily from the <i>Union Leader</i> newspaper. Excludes 2 mergers because other merger announcements were made within 2 days of the announcements of these 2 mergers. Stock returns for the 8 bidders are based on data in the <i>Union Leader</i> , and the market return data are from the NASDAQ Bank Index	Event study. Analyzes abnormal returns on the stock of the acquiring firms during various periods from 10 days before announcement to 10 days after. Analysis is based on a standard market model estimated over the period from 136 days to 16 days before the announcement. Also analyzes returns for 2 different subperiods and uses OLS to analyze differences in returns due to method of payment and due to relative size of target and acquirer
Wall and Gup (1989)	1981–83	23	Acquiring banks are taken from those on the Automated Data Processing FASTOCK stock price file and with stock prices reported in the <i>American Banker</i> . Acquisitions are intrastate and involve BHCs, and acquired firm is at least 10 percent of the size of the acquirer	Event study. Analyzes abnormal returns on the stock, relative to the market, of acquiring firms for the period from 2 weeks before announcement to 4 weeks after. Analysis is based on a standard market model estimated over the period from 44 weeks to 3 weeks before announcement. Does not investigate effect on acquired firms. Additional tests seek to determine what variables influence the cumulative abnormal return
Hawawini and Swary (1990)	1971–86	123 (78 bidders, 123 targets)	Stock of acquiring and acquired banks is publicly traded, with stock price data on CRSP, OTC daily tapes, or the S&P Stock Price Record	Event study. Analyzes abnormal returns on the stock of acquiring and acquired banks during various periods from 5 weeks before, to 5 weeks after, the week of the announcement of a merger and other announcements. Analysis is based on a standard market model, as well as a mean-adjusted returns approach, estimated over the period from 57 weeks to 6 weeks before the announcement week. Also analyzes abnormal returns due to announcement of regulator's decision and announcement of interstate legislation. OLS tests conducted to determine what factors explain abnormal returns
Rhoades (1990)	1981–87	68	Acquiring and acquired firms have more than \$1 billion in assets. Covers 322 nonmerging firms with more than \$1 billion in assets and located in same states as acquiring firms for pre-acquisition tests. Postacquisition tests include 13 acquired and 97 nonacquired firms	Analyzes operating performance changes. Compares performance of merging and nonmerging firms both before and after merger. Analysis is based on average performance over the period from 3 years before merger to 3 years after. Focuses on performance of the acquired firm and treats it as a separate entity from the acquirer both before and after merger

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Wealth effects	Abnormal returns on stock	Residual analysis Multiple regression	<p>Acquiring firms have a negative significant abnormal return on the day before announcement and a negative significant cumulative abnormal return on the announcement date and the day after</p> <p>The 5 mergers based on cash payment tend to show a positive return while the 26 mergers based on stock payment tend to show a negative return</p> <p>OLS tests confirm other findings and also show that a higher ratio of target size to acquirer size is associated with higher abnormal returns</p>
Wealth effects	Abnormal returns on stock	Residual analysis	Acquiring firms generally have negative significant cumulative abnormal returns during 4 weeks after announcement
Wealth effects	Abnormal returns on stock	Residual analysis Multiple regression	<p>Acquired firms have positive significant abnormal returns over the 11 weeks centered on the announcement week</p> <p>Acquiring firms have negative significant abnormal returns over the 11 weeks centered on the announcement week</p> <p>Crude estimates of net dollar value of wealth effects for bidders and targets combined indicate a possible small net increase in wealth for shareholders</p> <p>Intrastate merger proposals tend to have a more positive effect on wealth than interstate proposals</p>
Efficiency and profitability effects	Return on assets Noninterest expenses/assets	Logit analysis Multiple regression	<p>Profit rates of acquired firms do not improve following merger when compared to those of nonacquired firms</p> <p>Noninterest cost efficiency does not improve relative to that of nonacquired firms</p> <p>Pre-acquisition profitability and efficiency of acquired firms are no different than for non-acquired firms</p>

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Allen and Cebenoyan (1991)	1979–86	138	Only acquiring firms; they are BHCs with stock listed on NYSE or AMEX and stock prices on CRSP.	Event study. Analyzes abnormal returns on the stock of the acquiring firm relative to the market. Analysis covers 11 days, apparently before the merger announcement. Abnormal returns are calculated using a standard market model estimated over the period from 136 days to 16 days before the announcement. Analyzes various differences, including stock price reaction to mergers, between 4 sets of firms with different degrees of management ownership and concentration of stock ownership. Emphasis is on differences in stock returns due to the degree of management ownership and concentration of stock ownership
Cornett and De (1991)	1982–86	37 targets involving 152 bids by 59 bidders	Includes only interstate mergers. Acquiring or acquired bank must be traded on a major exchange or over the counter. 36 of the 37 merger proposals occurred. Acquiring banks were excluded if a second acquisition was made within 15 days of initial bid. Acquiring banks, or bidders, did not necessarily bid on any of the 37 target banks in the sample	Event study. Analyzes abnormal returns of bidding and target banks for 2 days—the announcement date and the day before, with data presented for 15 days before and 15 days after announcement. Analysis is based on a standard market model estimated over the period from 16 days to 75 days <i>after</i> the announcement event and relies on CRSP data. Also analyzes announcement effect of state legislation allowing entry by out-of-state banks and uses OLS to analyze the effect of the number of potential bidders on abnormal returns around merger announcement
Spindt and Tarhan (1991)	1986	297 (61 intra-BHC, 236 newly acquired)	Broad sample of mergers includes intra-BHC and newly acquired firms. A control group of matched nonmerging firms (similar in size and state) is used to account for industry trends	Analyzes operating performance changes. Analysis is based on the performance of firms in each of the 2 years before and after merger. Analysis treats acquiring firms as separate entities before merger and as a combined entity with the successor after merger. Differences in performance between the merging and nonmerging firms are the basis for analysis. Also compares performance of mergers (of affiliates) internal to the BHC with mergers of banks not previously owned

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Wealth effects	Abnormal returns on stock	Residual analysis	<p>Acquiring firms do not have abnormal returns during the 11 days before announcement</p> <p>Firms with both higher management ownership and concentration of stock ownership have higher cumulative abnormal returns than firms that were lower in either category</p>
Wealth effects of interstate mergers	Abnormal returns on stock	Residual analysis Multiple regression	<p>Acquiring and target firms have positive significant returns on the day of announcement but generally negative returns for the next 15 days</p> <p>The negative returns to the bidder during 15 days after announcement negate the gains on announcement day, although the cumulative abnormal return to the targets remain positive over the 15 days in spite of negative abnormal returns after announcement</p> <p>Acquiring banks are not affected by legislation allowing out-of-state entry, but acquired banks have a positive return on announcement day</p> <p>The existence of more potential bidders does not reduce returns to acquirers</p>
Performance effects	Net income/equity Net income/assets Employee expenses/ revenue	Univariate sign tests	<p>Before merger, externally merged firms generally exhibit poorer performance in terms of rates of return and the ratio of employee expenses to assets than successor firms. Internally merged firms show no difference in performance when compared with the successor firms</p> <p>Return on assets of newly acquired (external) firms generally does not improve after merger</p> <p>Return on equity of newly acquired (external) firms generally tends to improve after merger</p> <p>Ratio of employee expenses to assets of newly acquired (external) firms generally does not improve after merger</p> <p>Internally merged firms generally do not show performance improvements after merger</p>

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Baradwaj, Dubofsky, and Fraser (1992)	1981–87	108	Stock of acquiring firms is listed on CRSP daily file or CRSP NASDAQ historical file. The target firm is at least 10 percent of the size of the acquirer. Analysis focuses only on the acquiring firm	Event study. Analyzes abnormal returns to the stock of the acquiring firm relative to the market as measured by a CRSP value-weighted portfolio. Abnormal returns are calculated on the basis of a standard market model estimated for the period from 60 days to 11 days before announcement and 11 days to 60 days after. Analysis covers various periods from 5 days before to 5 days after the announcement. Compares abnormal returns of inter- and intrastate mergers. Also compares stock effects of merger announcement before and after the June 10, 1985, Supreme Court decision validating constitutionality of state laws permitting interstate banking
Berger and Humphrey (1992)	1981–89	57 (involves 69 mergers, but multiple mergers in the same or contiguous years are combined)	Acquiring and acquired firms have more than \$1 billion in assets. Includes all nonmerging firms in U.S. with more than \$1 billion in assets, for an average sample size of about 300 banks	Analyzes operating performance changes. Analysis compares performance rank from before merger to after. Acquiring and acquired firms are treated as a combined entity before merger and after. A translog total cost function is estimated for each year (1980–90) for merging and nonmerging banks, and each bank's cost function residual over time is compared with the average residuals for each of the members of the peer group (large merging and nonmerging firms). The residual, which represents X-efficiency performance, and other performance measures are used to rank merging firms relative to their peers before and after merger. Pre- and postmerger performance is measured over varying time periods. Controls for deposit overlap and difference in performance between acquiring and acquired firms before merger

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Wealth effects	Abnormal returns on stock	Residual analysis Multiple regression	<p>Acquiring firms have negative significant abnormal returns 5 days before announcement and 5 days after for both inter- and intrastate mergers</p> <p>Negative abnormal returns to inter- and intrastate acquirers exist before and after the June 10, 1985, court decision on state interstate banking laws</p>
Efficiency and profitability effects	X-efficiency rank Total efficiency rank Return on assets Average total costs/ assets Noninterest expenses/ assets	Multiple regression	<p>Cost efficiency, on average, does not improve following merger</p> <p>Some mergers improve efficiency and some worsen efficiency</p> <p>Profit rates, on average, do not improve following merger</p> <p>Some mergers improve profit rates and others worsen profit rates</p> <p>Firms making in-market mergers do not have efficiency improvements when compared with other mergers or firms</p> <p>Mergers in which the acquiring firms are more efficient than the acquired do not lead to efficiency improvements when compared with other mergers or firms</p>

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Cornett and Tehranian (1992)	1982–87	30	Acquiring and acquired firms are publicly traded with stock return data from CRSP tapes and Moody's Bank Manuals. Also includes, as a proxy for the industry, all banks with stock traded on the NYSE or AMEX (30 to 36 banks, depending upon year)	Uses both the event study and operating performance methodologies. Event study analyzes stock prices for the day before and the day of announcement using a standard market model estimated over the period from 136 days to 16 days before announcement. Analysis of operating performance covers 3 years before and 3 years after merger. Also compares performance and abnormal returns of inter- and intrastate mergers. Operating performance of combined acquirer and acquired is compared to the mean performance of all banks with stock traded on the NYSE or AMEX
Linder and Crane (1993)	1982–87	47 (25 intra-BHC, 22 newly acquired)	Acquiring and acquired banks are located in New England states. A control group of all nonmerging banks in the same state is used to account for industry trends. On average, the acquired firm is 35 percent as large as the acquirer, although this is not clear in the data. Includes intra-BHC mergers as well as newly acquired firms	Analyzes operating performance changes. Analysis is based on the performance of firms during 1 year before merger and 1 year and 2 years after, as well as changes over the period. Performance of merging firms is compared with that of a comparable industry group. Analysis treats acquiring and acquired firms as a single entity both before merger and after. Efforts are made to adjust data for mergers occurring after the merger under analysis. Compares findings between newly acquired banks and intra-BHC mergers
O'Keefe (1992)	1984–90	469 (123 assisted, 346 nonassisted)	Covers acquiring banks that made FDIC-assisted acquisitions and the acquired bank was absorbed into the acquirer. A group of non-assisted acquirers is included for comparison. Acquiring firms are generally small. The majority of these mergers involve firms in the same market. Acquisitions are excluded if another acquisition by the acquirer is made within a period of 3 years before acquisition or after	Analyzes performance changes from the 2 years before merger to the 2 years after. Emphasis is on comparison of assisted with unassisted mergers. Only noninterest expenses to assets are compared with an industry control group. Acquiring and acquired firms are treated as a combined entity after acquisition

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Performance and wealth effects	<p>Abnormal returns on stock</p> <p>Expenses/revenues</p> <p>Cash flow/market value of assets</p> <p>Return on equity</p> <p>Return on assets</p>	<p>Various univariate tests</p> <p>Residual analysis</p>	<p>Efficiency overall (total expenses/revenues) does not improve relative to that of the industry, although employee productivity improves</p> <p>Ratio of cash flow to market value of assets improves relative to that of the industry</p> <p>Return on equity improves relative to that of the industry</p> <p>Return on assets does not improve relative to that of the industry</p> <p>Acquiring firms have negative abnormal returns in the 2 days covered by the announcement day and the day before</p> <p>Acquired firms have positive abnormal returns in the 2 days covered by the announcement day and the day before, and the combined firm has positive aggregate returns</p> <p>Inter- and intrastate mergers experience similar abnormal returns</p>
Performance effects	<p>Operating income (and components of operating income)/ assets</p> <p>Noninterest expenses/ assets</p> <p>Growth in income and assets</p>	<p>Univariate <i>t</i> tests</p> <p>Multiple regression</p>	<p>Operating income/assets and growth in operating income of merging banks, as a group, do not improve after merger relative to those of nonmerging firms</p> <p>Cost efficiency (noninterest) of merging banks, as a whole, declines relative to that of nonmerging firms</p> <p>Intra-BHC mergers generally have greater performance improvement, in terms of operating income/assets and growth in operating income, than newly acquired (not de novo) firms</p> <p>Operating income/assets of intra-BHC mergers improves relative to that of nonmerging firms</p> <p>Cost efficiency (noninterest) and growth of intra-BHC mergers decline relative to those of nonmerging firms</p> <p>Growth in assets of merging firms, as a group, is slower than that of nonmerging firms</p>
Performance effects	<p>Noninterest expenses/ assets</p> <p>Interest expenses/ assets</p> <p>Return on assets</p> <p>Return on equity</p>	<p>Graphical trend analysis</p>	<p>Efficiency for the assisted and unassisted merged firms, in terms of both interest and noninterest expenses to assets, does not change, a result similar to industry trends in noninterest expenses</p> <p>Assisted and unassisted mergers generally yield similar results</p> <p>No efficiency changes for those merged firms operating in the same county before merger</p> <p>Return on assets for the assisted and unassisted merged firm does not change</p> <p>Return on equity for the assisted and unassisted merged firm does not change</p>

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Rose (1992)	1980–89	279	Limited to interstate acquisitions. A control group of banks apparently not involved in an interstate acquisition, of similar size and located in the same county or metropolitan statistical area as the acquired bank, is included for comparison. The sample should have a rather wide variation in geographic location and size of institution	Analyzes operating performance changes. Studies performance of acquired and acquiring banks both before acquisition and after. Analysis usually covers each of 5 years before acquisition and after. Performance of acquiring banks is analyzed separately. However, for some analyses all acquired banks owned by the same BHC are consolidated as a single entity and comparable hypothetical sets of peer banks are constructed for comparison. The detailed tabular comparisons of performance before merger with performance after, by year, do not appear to account for peers, so findings may be difficult to interpret. A multiple regression model that analyzes a smaller number of performance measures does control for performance of peers
Spong and Shoenhair (1992)	1985–87	179	Limited to interstate acquisitions, a selection that should involve fairly large firms operating in different geographic areas. Also includes a control group of banks not under interstate ownership that are similar in terms of size and location	Analyzes observed performance changes. Analysis is based on data for 1 year before merger and 1 year to 3 years after. Only the acquired firms are studied. A peer group is used for comparison to control for industry trends. Analysis is based on comparisons of means and medians of the acquired firms with the control group for various performance measures
Srinivasan and Wall (1992)	1982–86	240	Acquiring and acquired firms each have more than \$100 million in assets. An industrywide sample of nonmerging firms is used to control for industry trends in univariate tests but not in multiple regressions, where time dummy variables are used instead. On average, the acquired firm is 32 percent as large as the acquirer	Analyzes operating efficiency and dollar value of expense changes. Analysis is based on average efficiency and expenses for the 2 years before merger and 1 year to 4 years after merger. The analysis treats the acquiring and acquired firms as a single entity both before merger and after. The analysis accounts for the degree of overlap of deposits in local markets. Multiple acquisitions in 1 year by a firm are treated as a single merger. 20 outliers, in terms of expense ratios, are excluded
Srinivasan (1992)	1982–86	Two samples: 77 in southeast, 240 in entire U.S	Acquiring and acquired banks have more than \$100 million in assets. Nonmerging banks are also included	Analyzes operating efficiency changes. Focuses on efficiency changes from 2 years before merger to each of 4 years after merger. Acquiring and acquired firms are treated as a combined entity before merger and after. Changes in efficiency of merged banks are compared with nonmerging banks. Accounts for degree of market overlap of merger partners

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Efficiency and profitability effects	Operating expenses/ total revenue Noninterest operating expenses/total expenses Noninterest expenses per employee Return on assets Return on equity	Multiple regression	Multiple regression results, which include a control group of banks, indicate the following: Changes in operating efficiency (operating expenses/total revenue), return on equity, and market share for various types of loans and deposits do not differ from those of nonmerging firms Tabular results suggest that return on equity of merging firms, but not return on assets or efficiency, improves somewhat relative to that of a control group
Performance effects	Return on assets Return on equity Overhead costs/assets Personnel expenses/ assets	Tabular comparisons	Cost efficiency (overhead) tends to improve somewhat relative to that of peers Returns on assets and equity generally decline relative to those of peers based on mean and do not decline or increase relative to those of peers based on median
Efficiency effects	Noninterest expenses/ total assets Noninterest expenses in terms of dollar volume	Wilcoxon signed rank tests Multiple regression Univariate <i>t</i> tests	Cost efficiency does not improve relative to that of nonmerging firms Greater office overlap tends to be associated with lower costs after merger but apparently not with efficiency gains
Efficiency effects	Noninterest expenses/ operating income Also analyzes components of noninterest expenses, i.e., salaries, premises, and other expenses	Univariate <i>t</i> tests Multiple regression	Efficiency of merged firms does not improve relative to that of nonmerging firms Changes in efficiency of firms making in-market mergers do not differ from those of firms in other mergers Firms in mergers of equals tend to have efficiency gains when compared with firms in other mergers Overall efficiency findings are similar for banks in southeast and U.S. as a whole

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Crane and Linder (1993)	1991	1	Fleet–Bank of New England merger	Case study analyzing operating performance changes. The study examines the firm's projections for cost cutting (both real reductions and financial reductions) and uses publicly available data to analyze performance before merger and after. Examines expenses for 1 year after merger. Analysis is based on the combined banks in the BHCs rather than the BHC. Changes are not compared with a control group
DeYoung (1993)	1987–88	348	348 mergers approved by the Comptroller of the Currency and covering a wide range of bank sizes. About 31 percent of mergers involve purchase and assumptions of failed banks and 43 percent involve banks already affiliated within the same BHC. Sample includes all other commercial banks for comparison	Analyzes operating changes in efficiency. Compares pre- and postmerger costs of merging banks to efficiency benchmarks estimated from a “thick” cost frontier that was estimated for all U.S. commercial banks using a multiproduct translog production function. Cost efficiency is measured for 1 year before merger and the 4th year after merger. Efficiency is assessed in terms of total expenses to total assets. Analyzes (1) pre-merger cost efficiency by comparing costs of the target and acquirer, separately, with the pre-merger thick frontier benchmark and (2) the postmerger efficiency of the merged firm with the postmerger benchmark. Also compares the postmerger position of the merged firm relative to the postmerger benchmark with the pre-merger position of the acquirer relative to the pre-merger benchmark to determine whether efficiency improved
Peristiani (1993a)	1981–88	Two samples, large number in each	One sample, for tabular analysis, and one, for statistical analysis, covering all banks involved in multiple mergers. Includes about 2,000 mergers and a control group of nonmerging banks	Analyzes operating performance changes. Examines performance during 1 year before merger and 2 years to 4 years after. Compares performance of internal BHC mergers, intrastate mergers, and FDIC-assisted mergers. Also separately examines mergers before 1986 and the top 200 mergers based on target size. Analysis focuses on the target and acquirer separately before merger and on the survivor after merger

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Efficiency effects	Noninterest expenses	None	<p>Noninterest expenses declined about as projected—30 percent over the year following merger, compared with a 10 percent decline in assets</p> <p>No data reported on total expense results</p> <p>The acquiring bank was more efficient than the acquired at the time of merger</p>
Efficiency effects	Improvement in X-efficiency rank based on total costs/total assets	Univariate <i>t</i> tests Multiple regression	<p>Efficiency gains do not generally result from merger</p> <p>Efficiency gains are most likely when both the target and acquirer are inefficient before merger rather than when the acquirer is more efficient than the target</p> <p>Acquiring banks, on average, are somewhat more efficient than targets</p> <p>Both acquiring and target firms exhibit substantial inefficiency relative to “best-practice” firms</p>
Efficiency and profitability effects	<p>Net income/total assets</p> <p>Noninterest expense ratio. Denominator not clear but probably assets</p>	Univariate <i>t</i> tests	<p>Efficiency does not improve in internal BHC mergers nor for all mergers when compared with that of a control group of nonmerging banks</p> <p>In-market mergers produce no improvement</p> <p>Profit rates for overall sample do not change significantly relative to those of a control group</p> <p>Results vary somewhat over different groups compared, but overall findings hold</p>

Studies of the Effects of Bank Mergers, 1980–93—Continued

Study	Years studied	Number of mergers or announcements ¹	Characteristics of sample	Methodology ²
Peristiani (1993b)	1981–88	4,900 (2,000 intra-BHC mergers, 2,900 external mergers)	All bank mergers, including about 1,000 FDIC-assisted mergers. Multiple mergers by a bank in 1 year are treated as single merger. Includes a control group of nonmerging banks of similar size and in the same states as merging banks	Analyzes operating performance changes in terms of expense/income ratio and efficiency. Compares changes in profit rates and expense ratios from 1 year before merger to the average of the 4 years after for merged firms and a control group. Also estimates a multiple product translog cost function to derive measures of scale and X-efficiency. Compares changes in scale and X-efficiency from 1 year before merger to the average of 2 to 4 years after for merged firms and a control group. Distinguishes between intra-BHC, intrastate, and FDIC-assisted mergers. Focuses primarily on the combined entity before merger and after. Also uses OLS to analyze determinants of mergers including a deposit overlap variable
Rhoades (1993)	1981–86	898	Includes banks or BHCs engaged in horizontal, or in-market, mergers. Also includes about 10,000 nonmerging banks	Analyzes operating performance changes. Two methodologies are used. One analyzes changes in expense ratios from the 3 years before merger to the 4th through 6th years after. The other analyzes changes in efficiency quartile from the 3 years before merger to the 4th through 6th years after. In acquisitions by BHCs, the tests compare efficiency of the combined entity (before merger and after) with nonmerging firms. The tests account for the degree of office overlap and are conducted for each of the years 1981–86

Hypothesis or issue addressed	Performance measures ³	Type of test ⁴	Findings
Efficiency and profitability effects	Return on assets Noninterest expense ratio. Denominator not clear but probably assets Change in scale efficiency Change in X-efficiency	Univariate <i>t</i> tests Multiple regression	Noninterest expense ratios do not improve relative to those of a control group for firms in multiple mergers. Expense ratios of firms in single mergers increase relative to those of the control group Return on assets of the combined merged firm improves, from a low pre-merger level, relative to that of the control group, although the return on assets for the acquirer alone declines X-efficiency does not improve, and may even decline, relative to that of the control group Scale efficiency improves for firms in multiple mergers, and declines for firms in single mergers, relative to that of the control group Branch, or deposit, overlap between the acquiring and acquired firms is not related to changes in efficiency or profitability
Efficiency effects	Total expenses/assets Noninterest expenses/assets	Multiple regression Logit analysis	Ratio of total expenses to assets does not change for firms doing in-market mergers when compared with that of nonmerging firms Ratio of noninterest expenses to assets does not change for firms doing in-market mergers when compared with that of nonmerging firms A greater degree of office overlap of merging firms is not associated with an improvement in efficiency relative to that of nonmerging firms Acquiring banks are, on average, more efficient than acquired banks

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