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Sources of Gains in Corporate Mergers: Refined Tests from a Neglected Industry

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Abstract

Our work provides refined tests of the source of merger gains in a neglected industry: utilities. Utilities offer fertile ground for analysis of traditional theories: synergy, collusion, hubris, and anticipation. Utility mergers create wealth for the combined firm, consistent with both the synergy and collusion hypotheses. To distinguish between these hypotheses, we study rival stock returns across dimensions related to collusion: deregulation, geography, and horizontal and withdrawn deals. We also find that the impact of mergers on consumer prices is consistent with synergy rather than collusion. Analysis of industry rivals that become targets also rejects collusion and is consistent with anticipation.

I. Introduction

Over 30 years, the literature on mergers and acquisitions has established many stylized facts. On average, targets gain, bidders lose or break even, and the combined returns to the merged firms are positive. The source of gains in mergers has been, and still is, the subject of intense analysis. Leading explanations for abnormal merger returns include synergy, collusion, hubris, and anticipation. Work by Eckbo (1983) and Stillman (1983) casts extreme doubt on the idea that gains in unregulated firms are due to collusion. As is typical of the literature, however, their work excludes regulated industries. Nevertheless, regulated industries are precisely the place where research has documented collusion in mergers (e.g., Singal (1996) and Kim and Singal (1993)).

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The objective of our paper is to study the existence and source of gains in mergers in a focused, neglected setting: the utility industry. The analysis of this single industry provides many methodological advantages. First, most research, including the merger literature, excludes utilities. Thus, the industry provides an opportunity for a new test of old theories. Second, while the only industries where collusion has been documented are regulated industries, the utility industry has not been examined in detail. Nevertheless, regulators and experts in the industry continually cite collusion as a major concern and as a reason for blocking proposed deals. Third, the utility industry has a large number of homogeneous firms with particular features (e.g., geographic location) that enhance the study of collusion. Also, cross-sectional analyses of multiple industries generally produce sample sizes that limit a focused definition of rivals.[1] Fourth, deregulation of the utility industry has produced a tectonic shift that provides a natural experiment for the existence of synergies and collusion.

For most of the 20th century, the utility industry in the United States was subject to federal regulation. Like many other industries such as banking, telecommunications, and broadcasting, this regulation limited the geographic scope of operations of a given utility and thereby placed constraints on the breadth of merger activity in the utility industry. Federal deregulation in the 1990s removed many of the obstacles to geographic expansion by utilities. In reaction to this deregulation, many utility firms chose to expand via mergers with other utilities. But while deregulation provided the legal impetus for expansion via mergers, the actual underlying motivation for the increase of mergers in the utility industry is not clear. Are the mergers a competitive attempt to attain synergies or a collusive attempt to gain market power?

Consider the recently proposed merger between Ohio-based FirstEnergy Corp. and Pennsylvania-based Allegheny Energy. The merger would create the largest electric utility in the United States, with 6 million customers from 7 adjacent states in the Midwest and Northeast (Funk (2010)). The management and the boards of the merging firms argue that the complementary geography of the two will create synergies approaching $350 million per year (FirstEnergy Corp. (2010)). By contrast, state regulators express concern that the merger of the 2 neighboring rivals will increase market power and prices paid by electricity consumers (Stouffer (2010)).

State regulators are concerned about the collusive effects of utility mergers because of the unique supply and demand features of electricity (Borenstein (2000)). On the supply side, the electricity market is inherently localized because of the costs of transmitting electricity long distances, the infeasibility of storage, and the capacity constraints faced by power grids. For consumers, the demand for power is relatively inelastic. These supply and demand features can enable utilities to charge supercompetitive prices (Warwick (2002), Slocum (2001)) and have been found to facilitate market power in particular markets (Borenstein and Bushnell (1999)). Such concerns about market power have been heightened by the federal deregulation in 1992 (Thompson (1999)) and have led

[1] An exception is Eckbo (1983), which uses individual product definitions identified by antitrust authorities.

to the blockage of mergers at the federal (Peterson and Meersman (1997)) and state levels (Mansnerus (2006)).

The unique features of electricity that make collusion plausible also enable the ready identification of rivals in the utility industry. In antitrust, the relevant market for which to determine rivals is based on a given product in a given geographic region (Baker (2007)). For many industrial firms, identifying the relevant market is a thorny problem due to multiple products spanning many geographic markets (McAfee and Williams (1988)). By contrast, in the utility industry, capacity constraints and the limits on transfer and storage indicate that the relevant market is a well-specified region (Pierce (1996)). We make use of this ready identification of rivals to provide novel tests of the motivation of merger activity.

Our analysis entails 384 mergers in the electric and gas utility sector from 1980 to 2004. This time period centers on the Energy Policy Act (EPACT) of 1992, which deregulated the utility industry and facilitated merger activity by removing Depression-era barriers to ownership (Joskow (2000)). As we document later, the industry shock of deregulation induced significant merger activity. Hence, we have a large sample of several hundred mergers to conduct our analyses.

To test whether the mergers enable synergies or instead promote collusion, we follow the approach pioneered by Eckbo (1983) and Stillman (1983) and analyze the stock price effects of the takeovers on the rivals of the merging firms. As observed by Demsetz (1973), takeovers creating synergies would likely have negative effects on the profits of rival firms by enhancing the ability of the merging firms to compete in the industry. By contrast, takeovers driven by collusion would have positive effects on rivals by better allowing all remaining industry members to raise product prices after the merger. In our analysis, we specifically focus on whether geographically proximate rivals bear an increase or a decrease in equity value upon the announcement of a merger. We perform complementary analysis of rivals at the time of an announcement that a given merger has been withdrawn.

Our research design also allows us to distinguish between the collusion and anticipation hypotheses. The collusion hypothesis predicts that any positive effects of mergers on other utility firms would be centered on geographically proximate rivals. These firms would be the ones most likely to benefit from collusive behavior due to the structure of the industry and the limitations on production, storage, and transportation. By contrast, the anticipation hypothesis predicts that the positive gains would accrue to firms that are subsequently targeted.

Our sample period allows us to examine the effects of the natural experiment of industry deregulation in 1992 on the presence of collusion. Both Singal (1996) and Slovin, Sushka, and Hudson (1991) suggest the regulatory environment may affect the collusive ability of horizontal mergers. By studying rival gains in the period before and after utility deregulation, we can draw inferences on the pros and cons of a relaxed merger environment (Shleifer and Vishny (1990)).

In addition to using rival firms to contrast the synergy and collusion hypotheses, we also assess more directly the source of gains from utility mergers. Following the analysis of Houston, James, and Ryngaert (2001) on the banking

industry, we use management forecasts in Securities and Exchange Commission (SEC) merger filings to project the expected synergies in the sample mergers. We then estimate the extent to which these projected synergies are correlated with the gains to the merging firms.

We supplement the event study analysis of stock prices with the examination of the change in product prices around the sample mergers. Prior research on airlines (Kim and Singal (1993)), banking (Sapienza (2002)), and other industries (Weinberg (2008)) has found evidence of collusive pricing following mergers. We utilize state- and firm-level data to determine whether merger activity in the utility sector is directly associated with higher product prices, as would be predicted by a collusion hypothesis, or is instead associated with lower product prices, as would be predicted by the synergy hypothesis.

To preview our results, we find that utility mergers create wealth for the combined bidder and target, a result consistent with both the synergy and collusion hypotheses. In distinguishing between these hypotheses, we find that returns to rivals are positive in the regulated 1980–1992 period but become negative in the deregulated 1993–2004 period. Similar results hold for the subsample of horizontal mergers in the sample. Stock returns to rivals in the same region are no larger than to rivals not in the same region. Moreover, rival returns are positive at the announcement of withdrawn deals. Product price data at the state level are not increased by either merger activity or greater concentration over time. Firm-level product price data indicate a significant median price decline for both the merging firms and their rivals following mergers. Both the stock price and product price evidence are consistent with the synergy hypothesis and reject the collusion hypothesis. Analysis of industry rivals that subsequently become targets also rejects the collusion hypothesis and is consistent with the anticipation hypothesis.

Our results contribute to the literature by providing focused tests of the synergy, collusion, and anticipation hypotheses in an unexplored setting: utilities. Analyzing this regulated industry is important. Multi-industry event studies of industrial firms provide convincing evidence against collusion, yet single-industry analyses in (formerly) regulated settings find evidence that it exists. In general, utilities have not been examined. In our single-industry study, we find no disconnect between the stock price analysis and the product price results; both are consistent with the synergy hypothesis and inconsistent with collusion. Our results are also of interest to public policy. Many states are considering additional legislation to restrict utility mergers, and regulators continually cite collusion as a major concern. Our analysis indicates that deregulation has led to enhanced merger activity and that consumers have benefited by lower prices.

The remainder of the paper proceeds as follows. Section II discusses the plausibility of collusion in a regulated industry, with particular application to the utility sector. Section III describes our sample of utilities and the time-series behavior of the mergers that we study. Section IV reports the details on the characteristics of the sample mergers and the changes in these characteristics over time. Section V reports our tests of the synergy and collusion hypotheses that use event study analysis of stock prices. Section VI reports complementary tests using product prices. Section VII concludes.

II. Regulatory Policy and the Plausibility of Collusion in the Utility Industry

Our research design hinges on the maintained hypothesis that synergy and collusion are both plausible outcomes of mergers in the utility industry. While merger synergies have been well studied in financial economics, the possibility of mergers leading to collusion has been less well documented. Noted exceptions are Singal (1996) and Kim and Singal (1993), who study collusion in the regulated airline industry. Hence, in this section, we focus on the plausibility of collusion in the utility sector. We discuss the concerns expressed by regulators related to utility mergers, note the unique features of utility supply and demand that raise concerns about collusion, and analyze how the regulatory history of the industry enables a natural experiment with which to test for the collusive impact of merger activity.

A. Regulatory Actions against Utility Mergers

Regulators at both the state and federal level continually voice concerns about market power stemming from utility mergers. For example, the proposed merger between Northern States Power and Wisconsin Energy in 1995 was blocked by the Federal Energy Regulatory Commission (FERC) because "FERC said the merger would concentrate too much market power in the merged company" (Peterson and Meersman (1997)). FERC stopped the merger in spite of projections by the management of the 2 companies that the deal would facilitate cost savings of $10 billion over a 10-year period (Salpukas (1995)).

Utility mergers have also been blocked due to opposition at the state level. Exelon proposed acquiring Public Service Enterprise Group in 2004. The deal was later blocked by the New Jersey Board of Public Utilities due to concerns about market power and higher prices to consumers (Mansnerus (2006)). Similarly, the merger between Constellation Energy and FPL Group was canceled after regulatory opposition from the State of Maryland (Block (2006)). The recently proposed merger between FirstEnergy Corp. and Allegheny Energy will also undergo scrutiny by state regulators (Stouffer (2010)).

B. The Plausibility of Collusion in the Utility Industry

The concern that regulators have about utility mergers, market power, and collusion is rooted in theories in industrial organization. Mergers arguably create market power for the merging firms because the larger combined firm effectively faces less competition (Farrell and Shapiro (1990)). The same merger may better enable collusion across all remaining rivals in the merged firm's industry by lessening the costs of enforcing noncompetitive behavior (Stigler (1964)).

The regulatory concerns about mergers and collusion are further heightened by the unique supply and demand features of the utility industry. Electricity transmission is relatively costly to transfer long distances, often faces capacity constraints, and is difficult to store. Hence, utility markets are inherently localized. Moreover, utility demand is rather inelastic. Such features have been found to contribute to market power (Borenstein and Bushnell (1999)).

The particular features of supply and demand in the utility industry caused the U.S. Department of Justice to challenge the proposed merger between Pacific Enterprises and Enova in 1998. The grounds for this challenge are discussed in Federal Trade Commission and U.S. Department of Justice ((2006), p. 11):

> Pacific Enterprises (which owned Southern California Gas Co.) and Enova Corp. (which owned San Diego Gas & Electric Co.) agreed to combine the companies under a common holding company. The Department challenged the combination on the basis of likely anticompetitive effects arising from the ability of the combined companies to raise electricity prices by restricting the supply of natural gas. The Department concluded that the relevant market was the sale of electricity in California during periods of high demand. In high-demand periods, limitations on transmission capacity cause prices in California to be determined by power plants in California. Inter-temporal arbitrage was infeasible because there is only a very limited opportunity to store electric power. Thus, the Department concluded that a hypothetical electricity monopolist during just periods of high demand would raise prices significantly.

Hence, the unique features of the utility industry raise a flag with antitrust authorities when assessing the potential collusive aspects of a merger.

C. Utility Regulation

Utilities in the United States are regulated at both the state and federal levels (for background, see Joskow (2000)). At the state level, regulation was traditionally cost-based rate regulation. A utility was granted a localized monopoly but had rates regulated by a public commission. Beginning in the 1990s, however, deregulation has brought more competition at the state level. For example, states unbundled retail prices and allowed consumers the ability to choose among competing electricity suppliers.

At the federal level, the primary utility regulator is the FERC. For most of the 20th century, FERC maintained a fairly strict control of the utility industry. Wholesale prices were regulated. Moreover, dating back to policies instituted in the 1930s, FERC restricted the geographic breadth of operations of a given utility company. Hence, both horizontal and vertical mergers in the industry were severely limited.

The EPACT of 1992 significantly altered the federal regulation of the utility industry. FERC moved away from wholesale rate regulation and shifted to marginal cost pricing. This change gave utilities stronger incentives to deliver electricity at peak times where increasing demand drives up prices but effectively enabled utilities to better take advantage of market power and the inelastic demand of their customers (Warwick (2002), Slocum (2001)).

Subsequent to the EPACT of 1992, FERC also adopted a more liberal attitude toward mergers in the utility industry (Joskow (2000)). FERC began to allow horizontal mergers across a broader geographic scope. Moreover, FERC also allowed a greater number of vertical mergers between electric utilities and natural gas utilities.

D. Testable Implications

While our overall objective is to contrast synergistic and collusive motivations for mergers in the utility industry, the regulatory history of the industry provides a further natural experiment with which we can refine our tests. The deregulation entailed in the EPACT of 1992 enabled merger activity by relaxing the geographic constraints. It also better facilitated collusion by moving away from rate regulation. Hence, a testable implication of this regulatory change is that any evidence of the collusive aspects of merger activity should be more apparent in the post-1992 period following the passage of the EPACT.

This natural experiment that the EPACT provides is important because it responds to the query as to how collusion is plausible in a regulated industry. Presumably, if regulators are doing their jobs, then firms could not use mergers to collude and raise prices to consumers. Of course, such a premise is based on the assumption of active, proconsumer regulators, which may not accurately reflect what utility regulators actually do. Joskow (1974) questions whether regulators care directly about rate regulation and concludes instead that regulators emphasize price levels. Moreover, even if regulators have a rate regulation objective, Stigler and Friedland ((1962), pp. 11–12) observe that "a regulatory body cannot effectively control the daily detail of business operations," and regulation can be skirted because a firm can "manipulate its average price by suitable changes in the complex rate structure."

Similar observations on the plausibility of collusion in the utility industry have been made more recently by Warwick ((2002), p. 6.8):

> Market manipulation is difficult to detect and manage. Prices in electricity markets can be manipulated through a variety of mechanisms, including restricting power generation, restricting transmission access, and manipulating power exchanges. Restricting power supplies has the effect of increasing prices in the short run, because prices are a function of supply and demand. Generation can be restricted several ways. First, the utility that owns and controls transmission lines into a market can limit access to those lines. Second, generation owners can simply limit bids into the market. . . . Finally, a generator can declare that one or more power plants are out-of service, withholding capacity from the market.

In effect, regulators must examine large amounts of data across a myriad of markets clearing rapidly, making it difficult to detect noncompetitive behavior.

For our purposes, however, the important point is that the regulation of the industry, including rate making, has declined since the EPACT of 1992. Hence, the plausibility of collusion has increased in the post-1992 period.

III. Sample Formation and Merger Activity

A. Base Sample of Utilities

To study the sources of wealth gains from mergers in the utility sector, we develop a comprehensive sample of utility firms for the period from 1980 to 2004.

Our choice of time period centers on the EPACT of 1992, which deregulated the industry and facilitated mergers by relaxing Depression-era constraints on ownership (Joskow (2000)). Utility practitioners (Switzer and Straub (2006), p. 37), state that "the significant transformation of the industry began with the passage of EPACT in 1992." Academic studies of utility deregulation also emphasize this legislation. Rennie (2006) analyzes the effect of EPACT on the governance structure of utilities. Johnson, Niles, and Suydam (1998) and Besanko, D'Souza, and Thiagarajan (2001) measure the effects of the 1992 Act on the equity value of the members of the industry. Blacconiere, Johnson, and Johnson (2000) study changes in the value relevance of accounting information in the period before and after this deregulation.

Our base sample consists of all publicly traded, regulated utilities from the electric and natural gas sectors in existence in any year during the 1980 to 2004 period. Our main source for the sample is the Value Line Investment Survey, which is often used for industry classifications (Mitchell and Mulherin (1996), Mulherin and Boone (2000), and Andrade and Stafford (2004)). For each year, we begin with all of the firms in 3 Value Line industries: Electric Utilities, Natural Gas Distribution, and Natural Gas Diversified. From our review of firm descriptions in Value Line as well as other sources such as Hoover's, Moody's, and Yahoo Finance, we confirm that all of the firms in the Electric Utility and Natural Gas Distribution industries are regulated utilities. Our review indicates Value Line's Natural Gas Diversified industry includes a variety of vertically integrated natural gas firms. The subset of firms from this industry that we classify as regulated utilities are firms that had pipeline and distribution segments that fell under regulatory jurisdiction. This classification produces 183 distinct utility firms appearing in Value Line in at least 1 year in the 1980–2004 period and a total of 3,386 firm-year observations.

Because Value Line does not track every major U.S. publicly traded electric or gas utility for the entire period, we supplement our base sample using industry information from Center for Research in Security Prices (CRSP) Standard Industrial Classification (SIC) codes. We start with all firms on CRSP having SIC codes of 4900–4939 (electric and gas) or in the 1300s (oil and gas extraction) from 1980 to 2004. For each year, we impose a minimum market value constraint of $500 million (gross domestic product (GDP) adjusted, base year 2000), although our sampling is comparable using constraints of $250 million or $1 billion. We exclude firms incorporated outside of the United States, American depositary receipts (ADRs), and limited partnerships and use Hoover's, Moody's, Yahoo Finance, and financial statements to classify the regulated electric and gas utilities. This sampling from CRSP results in 20 additional firms (220 firm-years) that do not appear on Value Line at any time in the sample period and also adds 162 firm-years from 44 firms that appear on Value Line sample in some years but that are listed on CRSP in additional years. In sum, this supplemental sampling from CRSP adds 20 other firms and 382 additional firm-years. Hence, our base sample of regulated utilities entails 203 distinct firms and 3,768 firm-year observations during the 1980 to 2004 period.

Table 1 reports the time-series features of the utility base sample. Over the period of 1980 to 2004, there are 3,768 firm-years, which implies an average of

TABLE 1

The Sample of Utilities and Merger Activity by Year and by Type

Table 1 reports the full sample of utility firms and the sample of mergers. Classification as a utility is based on the Value Line Investment Survey and media sources. All Utilities reports the full sample of utilities by year for the 1980–2004 period. Electric Utilities and Gas Utilities stratify by the electric and gas sectors. All Merger reports the number of utility mergers by year of announcement, as taken from SDC. Utility and Utility is mergers between 2 utilities. Utility and Energy is mergers between a utility (either target or a bidder) and a nonutility energy firm. Utility and Nonenergy is mergers between a utility (either target or a bidder) and a firm in neither the utility nor nonutility energy sectors. The final 2 columns report the number of utility targets or utility bidders in a given year.

Year	All Utilities	Electric Utilities	Gas Utilities	All Merger	Utility and Utility	Utility and Energy	Utility and Nonenergy	Target Utility	Bidder Utility
1980	163	103	60	6	1	4	1	1	6
1981	165	103	62	8	3	3	2	4	7
1982	166	103	63	12	3	2	7	7	8
1983	166	103	63	15	5	7	3	10	10
1984	163	104	59	15	9	2	4	9	15
1985	164	105	59	14	7	4	3	11	10
1986	161	105	56	20	5	4	11	13	12
1987	161	105	56	8	7	1	0	7	8
1988	163	106	57	9	8	1	0	8	9
1989	165	104	61	19	14	4	1	16	17
1990	166	105	61	12	8	2	2	10	10
1991	165	105	60	12	5	6	1	6	11
1992	165	104	61	8	5	2	1	5	8
1993	162	99	63	12	8	2	2	8	12
1994	160	97	63	14	9	4	1	9	14
1995	160	95	65	21	12	7	2	12	21
1996	162	97	65	22	16	2	4	16	22
1997	158	96	62	30	15	10	5	16	29
1998	148	89	59	20	13	6	1	13	20
1999	141	85	56	49	34	13	2	35	48
2000	127	78	49	20	14	3	3	14	20
2001	114	72	42	18	11	6	1	11	18
2002	103	66	37	8	6	1	1	6	8
2003	101	64	37	8	7	0	1	8	7
2004	99	64	35	4	3	1	0	3	4
All years	3,768	2,357	1,411	384	228	97	59	258	354

151 utilities per year. Electric utilities comprise 63% of the firm-years, and natural gas utilities comprise the remaining 37%. The distribution between electric and gas utilities is similar over time.

A striking pattern in Table 1 is the sizeable decline in the number of sample firms over time. The decrease in firms from 163 to 99 between 1980 and 2004 is a reduction of 39%. Similar declines occur in both the electric and natural gas sectors. Note that this decrease is not due to any sampling bias, as our sampling procedure allows for both entry and exit over time.

The reduction in the number of firms suggests significant industry consolidation. Further scrutiny of Table 1 indicates that this consolidation comes after 1992, the year the EPACT was passed. Indeed, the bulk of the consolidation clusters in the 1997–2002 period. Such clustering in the utility sector is consistent with evidence from multi-industry studies such as Mitchell and Mulherin (1996), Mulherin and Boone (2000), and Harford (2005).

B. Merger Sample

From our base sample of utilities, we next develop estimates of the amount of merger activity over the 1980–2004 period. We use Securities Data Corp. (SDC) to determine the merger activity of the 203 utility firms in our base sample. We

include any successful or unsuccessful takeover attempt where a sample firm is either a target or a bidder. To be included in the sample, the bidder must attempt to acquire greater than 50% of the target. We exclude divestitures, spin-offs, and liquidations, as well as acquisitions of divisions and unit trusts.

The All Merger column of Table 1 reports the distribution of merger activity in the utility industry over time. As reported at the bottom of the table, the 203 utility firms in our sample were involved in 384 deals either as a bidder or target. Within the All Merger sample, the deals can be classified into 3 types based on target and bidder industry: There were 228 deals where both the target and the bidder are a regulated utility, 97 deals between a utility and a nonregulated energy company, and 59 deals between a utility and a nonenergy company.

The number of times a sample firm is either a target or bidder is reported in the last 2 columns of Table 1. In the merger sample, there are 258 announced deals where the target is a utility firm; the number of targets is greater than the number of sample firms because of multiple bids and nonpublic targets. There are a total of 354 deals where the bidder is a regulated utility, indicating that some bidding firms engage in multiple deals. Examining the data by year, the clearest trend is the heightened merger activity following deregulation in 1992.

Because there was also a large rate of merger activity in the overall economy during the same time period, a question arises as to whether the merger activity in the utility sector was abnormally large following industry deregulation or was merely a reflection of the increased overall merger activity. To address this question, we perform regression analysis of the rate of merger activity in the utility industry as compared to the entire economy over the 1980–2004 period. In results not reported in the tables but available from the authors, this analysis confirms the trends in Table 1. First, merger activity in the utility industry is positively and significantly related to aggregate merger activity. Second, this relation is stronger post-1992. This indicates that deregulation has led to a significant increase in the merger activity in the utility sector.

IV. Merger Characteristics over Time

To complement the results for the rate of merger activity, we analyze the size and scope of utility mergers over time. Variables definitions are shown in Table 2. Table 3 reports summary statistics on utility mergers. Results are for the full sample as well as for the 2 subperiods: 1980–1992 and 1993–2004. Significant differences between the 2 subperiods are denoted with asterisks in the far right column.

Panel A of Table 3 reports deal characteristics. The 1st variable is deal value, which averages $1.5 billion (year 2000 dollars) for the full sample. Deal value more than doubles in the 1993–2004 period, rising from just over $800 million to nearly $2 billion, and the increase is significant at the 1% level.

Other deal characteristics also change significantly over time. The fraction of cash deals averages 18% for the full sample, declining from 23% (1980–1992) to 14% (1993–2004). While the decline in the use of cash mirrors overall merger trends for this time period, the use of cash in utility deals appears lower than in other industries. For example, Andrade, Mitchell, and Stafford (2001) report that 30% of mergers in the 1990s use cash.

TABLE 2
Variable Definitions

Table 2 defines variables used in our analyses. Financial data are obtained from Compustat, while merger variables are collected from SDC, Factiva, Lexis-Nexis, as well as financial statements including 10-Ks, annual reports, and proxy statements.

Variable	Definition
Merger Characteristics	
Deal value	Reported value of the merger in millions of dollars, GDP deflated (base year, 2000)
All cash	Binary variable equal to 1 if deal financed with pure cash
Hostile	Binary variable equal to 1 if the deal is hostile
Withdrawn	Binary variable equal to 1 if the deal is withdrawn
Merger length	Number of days from merger announcement until termination date (completion or withdrawal)
Miles between firm headquarters	Number of miles between headquarter cities of targets and bidders (equal to 0 if in same city)
Same state	Binary variable equal to 1 if the bidder and target are headquartered in the same state
Same region	Binary variable equal to 1 if the bidder and target (and rival where applicable) are headquartered in the same region
Nonbordering state	Binary variable equal to 1 if the bidder and target are headquartered in 2 nonbordering states
Post-1992	Binary variable equal to 1 for all years after 1992
Organizational Measures	
Utility – Utility	Binary variable equal to 1 if both the bidder and target are utility firms (gas or electric)
Electric – electric	Binary variable equal to 1 if both the bidder and target are electric utility firms
Gas – electric	Binary variable equal to 1 if the bidder and target are each either a gas or electric utility firm (both not the same)
Gas – gas	Binary variable equal to 1 if the both the bidder and target are gas utility firms
Utility – Energy	Binary variable equal to 1 if either the bidder or target is a utility (but not both) and the counterparty is an energy firm
Utility – Nonenergy	Binary variable equal to 1 if either the bidder or target is a utility (but not both) and counterparty is a nonenergy firm
Utility Bidder	Binary variable equal to 1 if the bidder is a utility firm (either gas or electric)
Utility Target	Binary variable equal to 1 if the target is a utility firm (either gas or electric)

TABLE 3
Summary Statistics on Merger Characteristics

Table 3 reports summary statistics on the characteristics of the 384 sample mergers involving utility firms in the 1980–2004 period. Data are also reported for the 2 subperiods: 1980–1992 and 1993–2004. The asterisks in the 1993–2004 column reflect a significant difference in values between the 2 subperiods, with *, **, and *** indicating significance at the 10%, 5%, and 1% levels, respectively. See Table 2 for variable definitions.

	Full Sample	1980–1992	1993–2004
Panel A. Deal Characteristics			
Deal value ($mil, GDP adj)	1,502	801	1,970***
All cash	18%	23%	14%**
Hostile	7%	11%	4%***
Withdrawn	28%	39%	21%***
Merger length	203	169	226***
Panel B. Geographic Measures			
Miles between firm HQ	698	589	777**
Same state	35%	39%	33%*
Same region	52%	54%	51%
Nonbordering states	48%	45%	51%
Panel C. Industrial Organization			
Utility and Utility	59%	51%	65%***
Electric-electric	26%	19%	31%***
Electric-gas	14%	7%	19%***
Gas-gas	20%	25%	16%**
Utility and Energy	25%	27%	24%
Utility and Nonenergy	15%	23%	10%***
No. of obs.	384	158	226

The rate of hostile deals falls from 11% to 4% between the 2 subperiods, and the rate of withdrawn deals falls from 39% to 21%. Both declines are significant at the 1% level. In spite of such declines, the rate of hostility and deal withdrawal remains much higher than in other industries (e.g., Schwert (2000)). The average length of time a deal takes to complete increases from 169 to 226 days across periods, which is likely related to the increase in deal size and presumably complexity.

Panel B of Table 3 reports geographic characteristics of utility mergers. The 1st measure is the miles between headquarter cities of the bidder and target. The data indicate a significant increase in this distance in the 1993–2004 period. Correspondingly, fewer mergers are within the same state, and more mergers occur between firms in nonbordering states and in differing geographic regions. These results confirm that the relaxation in ownership restrictions by the EPACT of 1992 has been accompanied by mergers of greater geographic scope.

Panel C of Table 3 details industrial organization, classified into 3 types: deals between 2 utilities, deals between 1 utility and 1 energy firm, and deals between a utility and a nonenergy firm. The deals between 2 utilities are further stratified into electric-electric, electric-gas, and gas-gas deals. The data indicate that the fraction of deals between 2 utilities increases over time, from 51% in 1980–1992 to 65% in 1993–2004. The source of this increase is both an increase in mergers between 2 electric utilities as well as mergers between an electric and natural gas utility. The rate of mergers between utility and energy companies is similar across time. By contrast, mergers between utilities and nonenergy firms fell from 23% in the 1980–1992 period to 10% in the 1993–2004 period. Hence, deregulation of the utility industry has been followed by an increase in industry focus.

V. Event Study Analysis of the Merging Utility Firms and Their Rivals

A. Hypotheses

We next examine merging firms and their rivals to determine the existence and source of wealth gains in utility mergers. We develop tests to distinguish between the synergy and collusion hypotheses as well as consider Roll's (1986) hubris hypothesis and Song and Walkling's (2000) anticipation hypothesis. Our analysis can be distinguished from prior utility studies by our sample size (384 mergers), time period (25 years), and analysis of industry rivals.[2]

We first analyze the wealth effects for the target, bidder, and combined firm in our merger sample. The key question is what happens to the combined firm. Both the synergy and collusion hypotheses predict that the combined firm should increase in value at the merger announcement. By contrast, the hubris hypothesis

[2]McLaughlin and Mehran (1995) examine 18 deals (1980–1990); Bartunek, Jessell, and Madura (1993) analyze 57 mergers (1980–1991); Leggio and Lien (2000) study 76 mergers (1983–1996); Berry (2000) examines 21 deals over the 1995–1998 period; and Becker-Blease, Goldberg, and Kaen (2008) study 70 mergers from 1992 to 2001.

proposed by Roll (1986) argues that overconfident bidders will engage in mergers that do not create wealth and, in the absence of synergies, lead to a decline in the returns to the combined firm.

To distinguish the synergy and collusion hypotheses, we follow the Eckbo (1983)-Stillman (1983) approach of estimating stock returns to rival firms at the merger announcement. The insight of this approach is to use information in the rivals' stock price response to a merger announcement to infer the anticipated effect of the merger on product prices in the industry. The key distinction is that the collusion hypothesis predicts that announcement returns to rivals should be positive, as a given deal would increase industry concentration and facilitate collusive product pricing by all members in the industry. By contrast, the synergy hypothesis predicts a negative or neutral return to rivals, as the merger would provide a competitive advantage to the merging firms.

By focusing on a single industry, we provide tests of synergy versus collusion that are more detailed than those in multi-industry studies. Table 4 outlines the various tests to be performed that are based on industrial organization, geography, time period, and outcome. The structure of Table 4 borrows from and extends the tests in prior studies (see, e.g., Tables 1 in Eckbo (1983), (1985), Eckbo and Wier (1985), and Fee and Thomas (2004)).

TABLE 4

Merger Hypotheses for Rivals for Stock Prices and Product Prices

Table 4 reports the predictions of the synergy, collusion, and anticipation hypotheses for the stock price responses of rivals for the firms involved in a given merger. Predictions are reported for all rivals, as well as our more detailed partitions based on industrial organization, geographic region, future takeover activity, time period, and deal outcome.

Sample	Synergy	Collusion	Anticipation
All Rivals	Negative/0	Positive	Positive
Industrial Organization			
Horizontal	Negative/0	Positive	Positive
Geographic Region			
Same region	Negative/0	Positive	No prediction
Interaction of Industrial Organization and Region			
Horizontal × Same Region	Negative/0	Positive	No prediction
Future Takeover Activity			
Future target	No prediction	No prediction	Positive
Future bidder	No prediction	No prediction	Negative
Time Period			
Post-1992	Negative/0	Positive	No prediction
Outcome			
Withdrawn	Positive/0	Negative	No prediction

In the basic analysis, we estimate the returns to industry rivals at the announcement of a merger. As in prior research such as Eckbo (1983), we also stratify the tests based on industrial organization. If collusion is driving mergers, then the returns to rivals in horizontal mergers should be greater than the returns in nonhorizontal deals.

Our focus enables more refined tests based on geography. Relevant markets for antitrust concerns in the utility industry tend to be on a regional basis (Pierce (1996)). Consequently, the collusive effects of a merger are more likely in

cases where the bidder, target, and rival are all in the same region. Hence, we test collusion by contrasting the effects on rivals in takeovers where they are in the same region as the bidder and target with the effects where they are not. We also interact industrial organization and geography. Under the collusion hypothesis, the greatest gains to rivals should come from horizontal deals when rivals are in the same region.

Further tests to distinguish the synergy and collusion hypotheses are facilitated by the natural experiment of utility deregulation. Stillman ((1983), p. 230) argues that collusion would be less likely in a regulated environment. Indeed, Kim and Singal (1993) and Singal (1996) state that their findings of collusion in the airline industry are due to the deregulated setting that they study. In our analysis, this means that collusion would be more likely in the deregulated 1993–2004 period following the passage of the EPACT. Thus, another prediction of the collusion hypothesis is that announcement returns to rivals should be larger in the post-1992 period.

A final test of collusion is enabled by analyzing withdrawn deals (Eckbo (1983), Eckbo and Wier (1985)). If a deal is withdrawn and another bid does not materialize, the increased possibility of collusion is removed. Under collusion, the announcement of a merger withdrawal, particularly for regulatory concerns, will have a negative effect on industry rivals. By contrast, the synergy hypothesis predicts positive returns to rivals at merger withdrawal.

Our analysis of rivals also enables us to distinguish between the collusion and anticipation hypotheses. Both of these hypotheses predict that the announcement of a merger will have a positive effect on a rival. As detailed in Table 4, however, the hypotheses can be distinguished by the source of these positive gains. The collusion hypothesis predicts that the positive gains should accrue to geographically proximate rivals, while the anticipation hypothesis predicts these gains will accrue to rivals that subsequently become takeover targets themselves.

B. Event Study Analysis of Targets, Bidders, and the Combined Firm

In our analyses, we use standard event study techniques to calculate announcement returns. For the target and bidder, we estimate net-of-market returns for the (–1, +1) window, where day 0 is the merger announcement and the market is the CRSP value-weighted index. We also estimate combined firm returns, defined as the sum of target's returns multiplied by premerger value plus bidder's returns multiplied by premerger value, with the entire quantity scaled by the sum of premerger values. While we report net-of-market returns, our results are robust to alternative estimation methods such as a market model with a 90-day estimation period (–120, –31).

Table 5 reports the event study results for targets, bidders, and combined firms for the full sample as well as the 1980–1992 and 1993–2004 subperiods. Note that the number of observations varies across targets, bidders, and the combined firm because there is either a nonpublic or non-U.S. bidder or target in some deals. For combined returns, both the target and the bidder are U.S. publicly traded firms. For the full sample, the mean target return is 13%, bidder return is –0.8%, and combined return is 2.3%. All returns are significantly different from 0

at the 1% level. Median returns are qualitatively similar, except bidder returns are insignificant. Hence, on average, utility mergers create wealth for the full sample period.

TABLE 5

Event Study Analysis of the Merging Firms

Table 5 reports event study analysis of target, bidder, and combined returns for the sample utility mergers. The results are mean and median net-of-market returns for the (−1,+1) period, where the market is proxied by the CRSP value-weighted index and day 0 is the initial announcement date. Data are reported for the full period from 1980 to 2004 as well as for the 1980–1992 and 1993–2004 subperiods. Panel D reports *p*-values of the tests of differences in means and medians between subperiods.

	Mean	(*p*-value)	Median	(*p*-value)	No. of Obs.
Panel A. Full Sample: 1980–2004					
Targets	13.0%	(0.00)	8.4%	(0.00)	234
Bidders	−0.8%	(0.01)	−0.2%	(0.16)	337
Combined	2.3%	(0.00)	1.1%	(0.00)	197
Panel B. 1980–1992					
Targets	12.6%	(0.00)	7.8%	(0.00)	105
Bidders	−0.4%	(0.22)	−0.01%	(1.00)	138
Combined	3.1%	(0.00)	1.1%	(0.00)	85
Panel C. 1993–2004					
Targets	13.3%	(0.00)	8.6%	(0.00)	129
Bidders	−1.0%	(0.02)	−0.4%	(0.07)	199
Combined	1.6%	(0.00)	1.1%	(0.00)	112
Panel D. Differences in Means and Medians: 1980–1992 and 1993–2004 Subperiods					
Targets	0.72		0.60		
Bidders	0.27		0.26		
Combined	0.06		0.27		

Panels B and C of Table 5 report results for the 2 subperiods. Target returns average 13% in both periods, and there are no significant differences in means or medians across time (Panel D). Bidder returns are small and negative in both periods, and although the mean bidder return falls from –0.4% to –1% over time, neither mean nor median returns are statistically different across time. Combined returns are significantly positive in both periods; while the mean combined return falls, median returns are statistically equivalent across periods.

To ensure the robustness of the results of our basic event study analysis of target, bidder, and combined returns, we perform several additional tests. First, we rerun the analysis using November 1997 as the separating date between the regulated and deregulated period to reflect Harford's (2005) dating of the beginning of the merger wave in the utilities industry. Second, because observations within a merger wave are not necessarily independent, we run analyses excluding the clustering of merger activity in the utility industry between November 1997 and October 1999 documented by Harford. In results available from the authors, our findings from these robustness tests are qualitatively the same as those reported in Table 5.

Table 6 reports related event study analysis for the merging firms stratified by industrial organization. Panel A reports the analysis for the subsample of horizontal mergers, defined as deals between either 2 electric or 2 gas utilities. The results resemble the full sample in that targets gain, bidders have a small decline,

TABLE 6

Event Study Analysis of the Merging Firms by Industrial Organization

Table 6 reports analysis of target, bidder, and combined firm returns around utility mergers for horizontal and nonhorizontal deals. The results are mean net-of-market returns for the (−1,+1) period, where the market is proxied by the CRSP value-weighted index and day 0 is the initial announcement date. Data are reported for the full period (1980–2004) as well as for the 1980–1992 and 1993–2004 subperiods. Panel A reports horizontal mergers (deals between 2 electric utilities or 2 gas utilities), and Panel B reports nonhorizontal mergers (deals between an electric and a gas utility or between a utility and a nonutility). The *p*-values of tests that means are different from 0 are reported in parentheses, while the number of mergers for a given variable is reported in brackets. Panel C reports *p*-values of the tests of differences in means between horizontal and nonhorizontal mergers. The asterisks in the 1993–2004 column reflect a significant difference in returns between the 2 subperiods, with *, **, and *** indicating significance at the 10%, 5%, and 1% levels, respectively.

Returns	1980–2004	1980–1992	1993–2004
Panel A. Horizontal Mergers			
Targets	11.00% (0.00) [125]	11.13% (0.00) [51]	10.92% (0.00) [74]
Bidders	−0.66% (0.17) [161]	0.29% (0.43) [69]	−1.36%** (0.09) [92]
Combined firms	2.57% (0.00) [114]	3.61% (0.00) [50]	1.75%** (0.00) [64]
Panel B. Nonhorizontal Mergers			
Targets	15.30% (0.00) [109]	13.99% (0.00) [54]	16.59% (0.00) [55]
Bidders	−0.85% (0.01) [176]	−1.11% (0.04) [69]	−0.69% (0.09) [107]
Combined firms	1.81% (0.00) [83]	2.29% (0.06) [35]	1.46% (0.03) [48]
Panel C. p-Value of Differences between Horizontal and Nonhorizontal Mergers			
Targets	0.05	0.31	0.08
Bidders	0.73	0.03	0.45
Combined firms	0.33	0.34	0.74

and the combined firm has a significant wealth gain. Similar results hold for the nonhorizontal (vertical and conglomerate) deals in Panel B. The tests reported in Panel C indicate no significant difference between the combined returns of the horizontal and nonhorizontal mergers. These findings suggest that there is comparability in the synergies between horizontal and vertical transactions in the utility industry, which is consistent with the general evidence of Fan and Goyal (2006).

In analysis not reported but available from the authors, we estimate regressions that test for differences in returns across the 2 subperiods after controlling for changes in takeover characteristics over time. Prior research such as Andrade et al. (2001) and Schwert (2000) report that factors such as deal value, method of payment, deal hostility, and deal completion affect merger returns. Because our results in Table 3 indicate that the characteristics of utility mergers have changed after deregulation, we include these control variables. Multivariate tests indicate that after controlling for other deal characteristics, returns to targets, bidders, and the combined firm remain insignificantly different in the pre- and post-deregulation periods.

As a whole, targets experience a significant wealth increase, bidders have a small decline, and on average, utility mergers increase shareholder wealth. The decline to bidders (insignificant in the regulated period but significant post-deregulation) could be consistent with hubris. However, in the absence of synergies, the hubris hypothesis also predicts a nonpositive change for the combined firm, inconsistent with our findings. Thus, the results are potentially consistent with the synergy or collusion hypotheses. In the next section we distinguish between these two.

C. Event Study Analysis of Rivals

The seminal Eckbo (1983)-Stillman (1983) method of distinguishing between synergy and collusion is to consider the effect of a given merger on industry rivals. To form our sample of rivals, we select all regulated utilities that are in existence at the time of a given deal, excluding the target or the bidder. The analysis is based on the 203 deals in which the target firm is a publicly traded utility. For each deal, a portfolio of rival utilities is formed and the net-of-market return for a 3-day (–1, +1) window around each announcement date is estimated.

Table 7 reports the returns to rival firms. For the full sample, the mean rival return is a positive and significant 0.06%, while the median is a negative and significant 0.08%. To provide more refined evidence on returns to rivals, we segment the mergers in our sample into horizontal and nonhorizontal (i.e., vertical and conglomerate) deals. Horizontal mergers are those between 2 electric utilities or 2 natural gas utilities. Nonhorizontal mergers are between an electric utility and a gas utility or between a utility firm and a nonenergy or nonutility firm. The probability of collusion should be greater for horizontal mergers than for nonhorizontal mergers. Hence, the collusion hypothesis suggests that returns to industry rivals should be greater in horizontal deals.

In Panel A of Table 7, the mean return to rivals in horizontal deals is positive and significant, but the median is significantly negative. For nonhorizontal deals, mean and median returns to rivals are negative and significant. The final row reports the differences in mean and median returns between the horizontal and nonhorizontal deals. In both cases, returns to rivals in horizontal deals are larger than in nonhorizontal deals. These results are consistent with the notion that horizontal deals increase the ability to collude in the utility industry. Counter to this, however, median rival returns are negative. Moreover, as reported in Table 6, the merging firms in horizontal deals do not have significantly higher returns than those in nonhorizontal transactions. An alternate explanation for lower returns to rivals is that a nonhorizontal deal signals less opportunity for mergers within the industry and hence a lower possibility that a rival will become a target. We contrast this "anticipation" idea with the collusion hypothesis later.

We further stratify the analysis by geographic regions derived from the North American Electric Reliability Corporation (NERC).[3] We contrast the effects on

[3]There are 8 Regional Reliability Councils (Electric Reliability Council of Texas (ERCOT), Florida Reliability Coordinating Council (FRCC), Midwest Reliability Organization (MRO),

TABLE 7

Event Study Analysis of Rival Firms by Industrial Organization and Region

Table 7 reports event study analysis of rival returns for the sample of utility mergers during the 1980–2004 period. The results are mean and median net-of-market returns for the (−1,+1) period, where the market is proxied by the CRSP value-weighted index and day 0 is the initial announcement date. Rival firms are all publicly traded utilities in the base sample at the time of the merger that are not involved in the deal. Rival returns are winsorized at the 1% and 99% levels. Panel A reports rival returns by industrial organization, while Panel B details rival returns by geographic region. Panel C intersects organization and region. Regions are derived from the North American Electric Reliability Corporation (NERC) and corresponding Regional Reliability Councils: Midwest, Northeast, Mid-Atlantic, Southeast, Southwest, and West. Organization types are either horizontal (gas-gas or electric-electric) or nonhorizontal (gas-electric, electric-gas, or between utilities and nonutilities). The *p*-values of means and medians are reported in parentheses. The last row of each panel reports *p*-values of tests of differences in means and medians.

	Mean	Median	Rival Firm-Merger Yrs	No. of Mergers
All rival returns	0.06% (0.00)	−0.08% (0.00)	30,943	203
Panel A. Industrial Organization				
Horizontal rivals	0.15% (0.00)	−0.05% (0.02)	20,962	139
Nonhorizontal rivals	−0.13% (0.00)	−0.16% (0.00)	10,017	64
p-value of differences	<0.0001	<0.0001		
Panel B. Geographic Region				
Same region	0.04% (0.44)	−0.19% (0.01)	2,934	
Different regions	0.06% (0.00)	−0.07% (0.00)	28,009	
p-value of differences	0.68	0.20		
Panel C. Organization and Region				
Horizontal				
Same region	0.09% (0.13)	−0.14% (0.04)	2,251	92
Different regions	0.16% (0.00)	−0.04% (0.09)	9,341	47
p-value of difference	0.255	0.197		
Nonhorizontal				
Same region	−0.12% (0.29)	−0.24% (0.06)	683	29
Different regions	−0.13% (0.00)	−0.14% (0.00)	9,334	64
p-value of difference	0.919	0.258		

rivals in takeovers where the bidder, target, and rival are in the same region with the effects in cases where the bidder, target, and rival are not in the same region. The collusion hypothesis predicts that rival returns, especially in horizontal deals, should be greater in cases where the firms are all in the same region.

Panel B of Table 7 stratifies the data on rivals based on whether the rival is in the same geographic region as the target and bidder in a deal. For rivals in the same

Northeast Power Coordinating Council (NPCC), ReliabilityFirst Corporation (RFC), Southeastern Electric Reliability Council (SERC), Southwest Power Pool, Inc. (SPP), and Western Electricity Coordinating Council (WECC)). ERCOT (TX) and FRCC (FL) each contain 1 state and are combined with SPP and SERC, respectively, to form 6 regions: Midwest (MT, NE, ND, SD, and WI); Northeast (CT, ME, MA, NH, NY, RI, and VT); Mid-Atlantic (DC, DE, IN, MD, NJ, OH, PA, and WV); Southeast (AL, AR, FL, GA, IL, KY, LA, MI, MO, NC, SC, TN, and VA); Southwest (KS, OK, and TX); and West (AZ, CA, CO, ID, NV, NM, OR, UT, WA, and WY).

region, the mean return is positive but insignificant, while the median return is negative and significant. For rivals not in the same region, the mean return is positive and significant, while the median is negative and significant. As reported in the bottom row of the panel, neither the mean nor median returns to rivals are significantly different between the 2 subsamples. The fact that rivals in the same geographic region do not have higher returns is inconsistent with the collusion hypothesis.

Panel C of Table 7 reports analyses of rival returns stratified by both industrial organization and geography. For horizontal rivals in the same region, mean returns are positive but insignificant, while median returns are negative and significant for the full sample. Moreover, the returns of horizontal rivals in the same region are not significantly different than horizontal rivals in other regions. These results are inconsistent with the collusion hypothesis.

Table 8 provides further dissection of the returns to rivals. Panel A reports the returns to rivals in the 2 time periods stratified by the passage of the EPACT in 1992. Analysis of the 2 subperiods indicates that pooled results mask important differences in the years before and after deregulation. For 1980–1992, both mean and median rival returns are positive and significant. By contrast, mean and median returns to rivals are negative during the 1993–2004 period and are significantly lower than the comparable rival returns in the earlier period. These nonpositive returns to rivals in the deregulated period as well as a relative decline in returns to rivals over time are not consistent with the hypothesis that mergers facilitated by deregulation have fostered collusion in the utility industry.

As an additional test of the effect of utility mergers on rivals, we perform event studies on the returns to rivals around the announcement of withdrawn deals. In our sample, we have 71 withdrawn mergers. The collusion hypothesis predicts that the withdrawal of a deal would hurt rivals, as it would imply that concentration in the industry will not actually increase.[4] By contrast, the synergy hypothesis predicts that a withdrawn deal would positively affect industry rivals, as they would not have to compete with a larger, more competitive rival.

Panel B of Table 8 reports rival returns upon announcement that a merger is withdrawn. Mean and median returns to rivals are positive and significant. Similar results hold stratifying the data between horizontal and nonhorizontal deals. These positive rival returns at the announcement of withdrawn deals reject the collusion hypothesis and are consistent with the synergy hypothesis, as they indicate that the termination of the merger is good news for the rival firms.

The reason a deal is withdrawn is also important in distinguishing between collusion and synergy (Eckbo (1983)). Under collusion, rivals are hurt if a deal is withdrawn due to regulatory concerns but might gain if synergies were driving a merger. In tests not reported in the tables, we find that deals withdrawn for regulatory reasons have the same pattern as for the full sample of withdrawn deals.

[4] In unreported results, we examine merger returns around the withdrawal date. For the full sample, mean target returns are –2.52%, bidders 0.57%, and combined –0.11%; none are statistically significant. In the 1980–1992 period, mean target and combined returns are significant –3.43% and –1.19%, mean bidder is insignificant 0.48%. Post-deregulation, mean target return is –1.36%, bidder 0.69%, and combined 1.33%; none are statistically significant.

TABLE 8

Event Study Analysis of Rival Firms by Time, Status, and Takeover Activity

Table 8 reports event study analysis of rival returns for the sample of utility mergers during the 1980–2004 period. The results are mean and median net-of-market returns for the (−1,+1) period, where the market is proxied by the CRSP value-weighted index and day 0 is the initial announcement date. Rival firms are all publicly traded utilities in the base sample at the time of the merger that are not involved in the deal. Rival returns are winsorized at the 1% and 99% levels. Panel A reports rival returns by time period, while Panel B details withdrawn rival returns by organization. Panel C examines rival returns by future takeover activity. Time periods are 1980–1992 and 1993–2004. Future takeover (target or bidder) is based on activity within a 1-year window. Organization types are either horizontal (gas-gas or electric-electric) or nonhorizontal (gas-electric, electric-gas, or between utilities and nonutilities). The *p*-values of means and medians are reported in parentheses. The last row of each panel reports *p*-values of tests of differences in means and medians.

	Mean	Median	Rival Firm-Merger Yrs	No. of Mergers
All rival returns	0.06% (0.00)	−0.08% (0.00)	30,943	203
Panel A. Time Period				
1980–1992	0.15% (0.00)	0.08% (0.00)	14,315	86
1993–2004	−0.02%*** (0.34)	−0.23%*** (0.00)	16,628	117
p-value of differences	0.001	0.001		
Panel B. Withdrawn				
All withdrawn	0.26% (0.00)	0.07% (0.00)	13,382	71
Horizontal	0.25% (0.30)	0.07% (0.00)	9,600	46
Nonhorizontal	0.15% (0.00)	0.04% (0.09)	3,782	25
p-value of differences	0.00	0.06		
Panel C. Future Takeover Activity				
Target				
Future target	0.14% (0.10)	−0.17% (0.15)	1,597	
Not target	0.08% (0.00)	−0.07% (0.00)	29,650	
p-value of difference	0.38	0.30		
Bidder				
Future bidder	−0.17% (0.02)	−0.25% (0.00)	1,525	
Not bidder	0.09% (0.00)	−0.07% (0.00)	29,722	
p-value of difference	0.00	0.00		

These results provide additional evidence against the collusion hypothesis and for the synergy hypothesis.

Rather than stem from collusion, returns to rivals could reflect the fact the announcement of a utility merger implies more mergers are anticipated (Song and Walkling (2000), Cai, Song, and Walkling (2011)). To test this hypothesis, we stratify firms into those that do and do not become targets (bidders) after a merger. As a length of time to screen for future targets (bidders), we use a 1-year interval.[5]

[5]As a robustness measure, we rerun all analyses using a 3-month interval. All results remain qualitatively the same.

The results for rivals based on future takeover activity are reported in Panel C of Table 8. For rivals that become future targets within a year of a given deal, the mean return is positive and significant, while the median is insignificantly negative. For rivals that do not become a target within a year after a deal, the mean return is positive and significant, while the median return is significantly negative. Mean and median returns are not significantly different for targeted and nontargeted firms. For rivals that become bidders within a year of a deal, the mean and median returns are both negative and significant, and these returns are also significantly lower than the returns to rivals that do not become a bidder within a year after a given deal. Thus, univariate analyses are consistent with anticipation of bidding activity and inconsistent with collusion.

D. Regression Analysis of Rival Returns

To synthesize the analysis, Table 9 reports regression analyses of rival returns, controlling for industrial organization, future takeover status, time period, and other characteristics. We report 3 specifications that vary with the inclusion of

TABLE 9

Regression Analysis of Rival Returns

Table 9 reports regression analysis of returns for utility rival firms. Rival firms are all utility firms from our base sample that are in existence at the time of a given deal but are neither the bidder nor the target. Returns are net-of-market cumulative abnormal returns over a 3-day window (−1, +1) around the announcement date. The CRSP value-weighted index is used to calculate abnormal returns. Rivals returns are winsorized at the 1% and 99% levels. Horizontal mergers are deals between 2 same utility types (gas-gas or electric-electric). Future bidder (target) is a binary variable equal to 1 if the rival firm is a future bidder (target) within 1 year. Same region is a binary variable equal to 1 if the target, bidder, and rival firms are all in the same region. Horizontal × same region is an interaction variable equal to 1 if it is a horizontal deal and the bidder, target, and rivals are all in the same region, and 0 otherwise. See Table 2 for other variable definitions. The *p*-values of coefficients are in parentheses.

Variable	Rival 1	Rival 2	Rival 3
Intercept	−0.03	−0.04	0.07
	(0.27)	(0.23)	(0.07)
Horizontal deal	0.30	0.31	0.43
	(0.00)	(0.00)	(0.00)
Future target within 1 year	0.13	0.13	0.12
	(0.07)	(0.07)	(0.08)
Future bidder within 1 year	−0.24	−0.24	−0.23
	(0.00)	(0.00)	(0.00)
Target, bidder, rival in same region		0.07	0.22
		(0.49)	(0.06)
Horizontal × same region		−0.15	−0.35
		(0.21)	(0.01)
Withdrawn			0.06
			(0.05)
Hostile			−0.20
			(0.00)
Deal value ($ billions)			0.07
			(0.00)
All cash			−0.72
			(0.00)
Post-1992	−0.24		−0.49
	(0.00)		(0.00)
N	30,943	30,943	26,482
Adjusted R^2	0.004	0.004	0.022

controls for the timing of future takeover status, the region of the rival, and more general merger characteristics.

In the 1st specification, the coefficients on the horizontal deal variable and the future targets variable are positive and significant. The future bidder variable is significantly negative. The coefficient on the post-1992 variable is negative and significant, indicating rivals experience less positive returns after deregulation.

The 2nd regression adds an indicator variable for rivals in the same region as the target and the bidder and an interaction term of the horizontal and regional dummy variables. The regional dummy variable is positive and insignificant, while the interaction term is negative and insignificant. The 3rd regression adds control variables on deal characteristics including withdrawn deals, hostile deals, deal value, and method of payment. After the inclusion of these control variables, the coefficient on the regional dummy variable is positive and significant, while the coefficient on the term that interacts horizontal and region is negative and significant. Across specifications, the binary variable for horizontal deals is positive and significant. However, horizontal rivals in the same region as the target and bidder have smaller returns than those not in the same region, which is inconsistent with collusion. Moreover, rival returns decrease post-deregulation; relaxing regulation has not heightened the extent of collusion.[6]

E. Summary of the Event Study Analysis

This section summarizes results on the wealth effects in utility mergers for bidders, targets, and their rivals. We find that utility mergers create wealth for the combined firm, and this wealth creation is comparable in the 1980–1992 and 1993–2004 periods. These results are inconsistent with the hubris hypothesis and potentially consistent with the synergy or collusion hypotheses.

To distinguish between synergy and collusion, we study returns to rivals around utility deals. For all mergers, the mean (median) rival return is significantly positive (negative). For horizontal deals, the mean return is significantly positive, potentially consistent with collusion. This interpretation is countered by the fact that the median return is significantly negative. Furthermore, the combined return in horizontal deals is no larger than that in nonhorizontal deals. Returns to horizontal rivals in the same region as the target and bidder are no larger than returns to rivals not in the same region and, in a multivariate setting, within-region rivals have significantly lower returns. The announcement of withdrawn deals has a positive impact on rival returns. Overall, these results are inconsistent with collusion and most consistent with the synergy hypothesis. Results for rivals also appear consistent with anticipation and inconsistent with collusion; rival returns anticipate future deals.

[6]Similar to our robustness tests in Table 5, we rerun regressions in Table 9 to account for possible sensitivity to the timing and magnitude of merger waves. In results available from the authors, neither using November 1997 as the separating date for the regulated and deregulated period nor excluding the clustering of merger activity in the November 1997–October 1999 period documented by Harford (2005) qualitatively affects the tenor of our results.

F. Estimates of Merger Synergies

In addition to using rival firms to contrast hypotheses, we also assess more directly the source of gains from utility mergers. In particular, we follow the analysis of Houston et al. (2001) and select management forecasts in SEC merger filings to project the expected synergies in the sample mergers. Based on our earlier results and data availability, we focus on 99 completed utility deals (gas-gas, gas-electric, and gas-electric) from 1993 to 2004.

For these 99 deals, we categorize the reason(s) management provides for a deal. In 37 cases, management indicated cost savings (synergies) were a factor in the decision to merge. For 30 deals, specific estimates of the savings are provided. Following the approach in Houston et al. (2001) as to assumptions on growth rates and treatment of cash flows, the present value of mean savings for these 30 completed utility deals is $678.10 million (median $466.42 million). Converting these cost savings to a percentage of premerger value, we estimate that the average (median) deal should increase the combined value of the target and the bidder by 11.28% (10.74%).

Finally, we estimate the extent to which these projected synergies are correlated with the gains to the merging firms. The present value of savings (as a percentage of firm value) is significantly positively correlated to acquirer announcement cumulative abnormal returns (CARs) (p-value of 0.075). These cost savings, however, are insignificantly related to combined CARs yet significantly negatively related to target CARs. The results are consistent with the following interpretation: Bidders project estimated synergies net of the expected premia they will pay to the target. Markets react positively to these estimates, and returns to bidders increase with the size of estimated synergies. However, since the estimated synergies will be negatively related to the size of the premia paid, the correlation is negative between these estimated synergies and target announcement returns.

VI. Analysis of Utility Product Prices

A complementary method to test whether utility mergers are driven by collusion is to examine the effect of mergers on utility product pricing. If utility mergers are driven by collusion, then product prices should increase post-merger as the number of utilities declines and firms can more easily collude. Such collusive effects should be directly related to the concentration in a region. Further tests of collusion are enabled by the federal deregulation that frames our study as well as by differential deregulation and restructuring at the state level. If federal and state deregulation better enable collusion, we would expect utility prices to be higher after federal deregulation in 1992 and to increase more in those states that allowed deregulation and restructuring.[7]

[7]During our sample period, 19 states passed utility deregulation as reported in the Status of State Electric Industry Restructuring Activity reported by the Energy Information Administration (2003). In unreported results, states that deregulate had higher prices relative to those that do not, but prices in deregulated states fall at a rate comparable to states that do not. These results resemble findings reported in Fagan (2006).

Kim and Singal (1993) and Singal (1996) perform a related analysis in the airline industry. Prager and Hannan (1998) and Sapienza (2002) study banking. Weinberg (2008) provides a more general survey of the research on mergers and consumer prices. As compared to the prior studies of product pricing, one contribution of our analysis is that we have a much larger number of mergers in our sample. Our sample comprises several hundred mergers, while many of the prior single-industry studies have available data for only 10 or 20 deals.

We report 2 types of evidence on the relation between product prices and mergers. We first study the relation between product prices and mergers at the state level. The advantage of this analysis is that data are available for the full sample period. We also study firm-level data on product pricing for 75 mergers from the 1993–2004 time period with available data.

A. Summary Statistics on Industry Concentration and Utility Product Prices

We begin with the analysis of product pricing at the state level. To frame the analysis, we report summary statistics on industry concentration and product prices over time. To determine industry concentration, we compute traditional Herfindahl indices that sum the squared market shares of the relevant firms. To account for regional aspects, we calculate our measures across the 6 geographic regions taken from the North American Electric Reliability Corporation. Herfindahl indices can range from $1/n$ to 1 (n is the number of utilities in each region). An antitrust market with a Herfindahl index below 0.10 is considered unconcentrated. Values between 0.10 and 0.18 are moderately concentrated, and values above 0.18 are highly concentrated (Willig (1991)).

Panel A of Table 10 reports data on average industry concentration across our time periods in each geographic region. Industry concentration increases in every

TABLE 10

Summary Statistics by Region on Concentration and Product Pricing

Table 10 reports average Herfindahl indices as well as electricity pricing for our sample of utility firms by region from 1980 to 2004 and across our 2 subperiods (1980–1992 and 1993–2004). Regions are derived from the North American Electric Reliability Corporation (NERC) and corresponding Regional Reliability Councils: Midwest, Northeast, Mid-Atlantic, Southeast, Southwest, and West. The Herfindahl indices in Panel A are calculated by summing yearly firm sales across each region and averaging across time periods. Electric utility prices in Panel B are average total electricity prices across all sources measured dollars per million BTU adjusted for $ GDP. Data are obtained from the U.S. Energy Information Agency (http://www.eia.gov/electricity/data.cfm).

Period	Midwest	Northeast	Mid-Atlantic	Southeast	Southwest	West
Panel A. Herfindahl Index by Region over Time						
1980–2004	0.1061	0.1078	0.0751	0.0850	0.0897	0.1336
1980–1992	0.1023	0.0924	0.0648	0.0813	0.0672	0.1290
1993–2004	0.1101	0.1245	0.0863	0.0891	0.1141	0.1386
p-value diff	0.30	0.02	0.10	0.44	0.00	0.09
Panel B. Electric Utility Prices ($ per million BTU) by Region over Time						
1980–2004	20.20	32.57	23.84	21.32	21.68	20.28
1980–1992	22.48	33.82	26.49	24.04	24.30	21.99
1993–2004	17.72	31.21	20.96	18.37	18.85	18.42
p-value diff	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

region, particularly in the Northeast, Mid-Atlantic, Southwest, and West. Each of these regions exhibits a significant increase in the Herfindahl index across periods. This increase follows from our evidence on the heightened industry over time and suggests that it is possible that the mergers facilitating this consolidation enabled collusive consumer pricing in the utility sector.

Panel B of Table 10 examines electricity prices by geographic region. The data are from state-level information reported by the Energy Information Administration (EIA) for all sources (coal, natural gas, petroleum, nuclear fuel, and biomass). Our results indicate that on average, electricity product prices decrease over time and are significantly lower post-deregulation for all regions. This is again inconsistent with collusion and suggests that mergers are occurring for cost saving/synergistic reasons.

B. Multivariate Analyses of Product Prices at the State Level

Using the state-level data on product prices over time, we develop a multivariate model that examines the relation between electricity prices and measures of merger activity and regional concentration, while controlling for other factors that affect prices such as costs and regulatory setting. The dependent variable is electricity price at the state level by year as reported by the EIA.

To determine how prices at the state level are affected by mergers, we calculate the market value of all bidders and targets in a state in each year. We focus on the 203 deals where both merger participants are utilities and would thereby be expected to have the greatest impact on pricing. The proxy for merger activity is the sum of market value (pre-merger) of all targets (bidders) in a state divided by the sum of the market values of all utilities in that state by year.[8]

We also examine whether industry concentration affects pricing by studying changes in regional Herfindahl indices over time. To account for variation in the regulatory setting across states, we include a restructuring variable equal to 1 for the 19 states that passed utility deregulation during our sample period. Regional fixed effects are included to control for the potential regional impact, but the coefficients are not reported.

As control variables, we use 4 proxies for utility costs. The 1st cost measure is an overall index of the change in electricity prices for the entire United States from 1980 to 2004. The 2nd cost measure is state-level data on the change in electricity total average costs. Since this 2nd measure is only available from 1990 to 2004, it is included in regressions of the latter time period only. The 3rd measure examines capital costs, AAA yield spreads (Blacconiere et al. (2000)), defined as the difference between utility and aggregate AAA bond yields from Moody's Utility and Industrial Manuals. The 4th cost measure is the change in utility industrial production reported by the Federal Reserve. As additional controls, we follow prior research such as Fee and Thomas (2004) and include 2 Compustat measures of operating performance, net working capital to sales for all utilities in a given state per year and cash flow to sales.

[8]For robustness, we include alternate merger proxies: total number of targets (bidders) scaled by the number of utilities in a state per year as well as both measures at the regional level. All results remain qualitatively the same.

Table 11 reports the regression analysis of product prices. For the full time period (models 1–3), changes in state prices are positively related to overall changes in electricity prices in the United States. By contrast, prices are negatively related to performance measures (net working capital and cash flow to sales), indicating that as a utility's performance improves, costs decrease. Prices are negatively (but insignificantly) related to the market value of both targets and bidders in a state as well as whether a state restructures. Changes in prices are

TABLE 11

Regression Analysis of Product Prices at the State Level

Table 11 reports regression analysis of the change in electric utility pricing by state from 1980 to 2004. The dependent variable is the change in electric utility prices, where prices are measured as the average total electricity prices across all sources measured in dollars per million BTU per state per year. The change in U.S. electricity prices is calculated in the same manner across all states per year, while the change in electric utility costs (data only available for 1990–2005) is measured as the average total electricity costs across all sources measured dollars per million BTU per state per year (source: Energy Information Agency). Two measures are used for operating performance; net working capital to sales as well as cash flow to sales are generated for all utilities in that state (source: Compustat). Three additional measures are used to capture costs: the difference between utility bond yields and AAA bond yields (source: Moody's Utility and Industrial Manuals), the change in utility industrial production (source: Federal Reserve Bank of St. Louis), and state-level data on the change in electricity total average costs (available 1990–2004 only). Restructure is a binary variable equal to 1 for 19 states that passed some form of utility deregulation during our sample (collected from the Energy Information Administration (2003)). Herfindahl indices sum the squared market shares of the relevant firms in a region and examine changes over time. Market value of mergers per state is based on deals where both target and bidder are a utility (electric or gas) and scaled by the total market value of all utilities in that state (based on the target or bidder). Post-1992 is a binary variable equal to 1 for the years 1993–2004, while Restructure × Post-1992 is the interaction of each of these variables. Region fixed effects to control for the potential regional impact are included, but the coefficients are suppressed. The *p*-values are in parentheses.

	1980–2004			1980–1992			1993–2004		
Variable	1	2	3	4	5	6	7	8	9
Intercept	0.14 (0.03)	0.02 (0.62)	0.10 (0.19)	0.18 (0.09)	0.01 (0.82)	0.09 (0.41)	0.13 (0.09)	0.09 (0.19)	0.19 (0.05)
ΔU.S electricity prices	9.39 (0.00)	9.36 (0.00)	9.25 (0.00)	9.49 (0.00)	9.39 (0.00)	9.21 (0.00)	8.45 (0.00)	8.50 (0.00)	6.96 (0.00)
Net working capital / sales	–0.17 (0.00)		–0.17 (0.00)	–0.23 (0.00)		–0.26 (0.00)	–0.08 (0.10)		–0.12 (0.04)
Cash flow / sales	–0.28 (0.10)		–0.28 (0.10)	–0.37 (0.23)		–0.35 (0.26)	–0.30 (0.20)		–0.25 (0.26)
Utility bond yield – AAA yield		0.04 (0.41)	0.04 (0.39)		0.07 (0.18)	0.10 (0.09)		0.03 (0.76)	0.07 (0.52)
ΔUtility industrial production		0.07 (0.94)	0.04 (0.97)		0.24 (0.82)	0.23 (0.83)		–0.89 (0.53)	–1.49 (0.30)
ΔUtility cost									0.52 (0.00)
Restructure	–0.02 (0.61)	–0.02 (0.71)	–0.02 (0.61)	–0.01 (0.81)	–0.01 (0.92)	–0.01 (0.79)	–0.03 (0.41)	–0.03 (0.44)	–0.05 (0.27)
ΔHerfindahl index	–0.24 (0.00)	–0.22 (0.01)	–0.23 (0.01)	–0.01 (0.88)	0.07 (0.84)	0.14 (0.70)	–0.22 (0.01)	–0.23 (0.02)	–0.22 (0.01)
Market value target mergers	–0.03 (0.17)	–0.02 (0.25)	–0.03 (0.17)	–0.06 (0.03)	–0.05 (0.05)	–0.06 (0.03)	–0.01 (0.69)	–0.01 (0.69)	–0.01 (0.73)
Market value bidder mergers	–0.01 (0.29)	–0.01 (0.27)	–0.01 (0.29)	–0.00 (0.68)	–0.01 (0.61)	–0.00 (0.68)	–0.01 (0.46)	–0.01 (0.51)	–0.01 (0.43)
Post-1992	0.00 (0.93)	0.02 (0.52)	0.01 (0.72)						
Restructure × Post-1992	–0.00 (0.98)	–0.01 (0.92)	–0.00 (0.98)						
Region controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,250	1,200	1,200	650	624	624	600	576	576
Adj R^2	0.56	0.56	0.56	0.65	0.65	0.65	0.21	0.21	0.25

significantly and negatively related to changes in the Herfindahl index; as regions become more concentrated, product prices are lower. These results are in direct contradiction to the collusion hypothesis.

Table 11 also details regressions for the 1980–1992 and 1993–2004 time periods. For the pre-deregulation period (models 4–6), the results are similar to the full sample except that a trade-off exists between concentration and merger activity (change in Herfindahl index is not significant, while prices are significantly negatively related to target market values). Following deregulation (regressions 7–9), results are the same as the full period, except our direct utility cost measure is positively significant. While rising costs are linked to increases in utility prices, this increase is not driven by mergers. These results contradict the collusion hypothesis that utility mergers would lead to higher product prices and support the synergy hypothesis.

For robustness, we examine alternate measures of cost and operating performance: changes in producer price indexes by stage of processing for fuel (Blacconiere et al. (2000)), as well as changes in total average gas prices for all sources (wellhead, city gate, pipeline, commercial, residential, and electricity) for each state from 1980 to 2004 (Fagan (2006)).[9] Alternative operating measures include cost of goods sold to sales as well as employees to sales (Fee and Thomas (2004)). In all cases, results do not vary using these alternate measures.[10]

C. Firm-Level Utility Pricing

The previous section examines changes in electricity pricing using state-level data from the EIA. These data are available over our entire window (1980–2004) and for all of the mergers in the sample where both firms are utilities.

To supplement this analysis, we collect pricing data at the firm level. Our source for the firm-level data is "Average Rates and Typical Bills" published by the Edison Electric Institute (EEI). EEI collects electric rate data (cents per kilowatt-hour) beginning in 1990 (see Blumsack, Lave, and Apt (2008) for a detailed description). The EEI data are segmented by utility as well as by rate class: overall, residential, commercial, and industrial. For many utilities, data are reported at the subsidiary level and by state. To create firm-level prices, we aggregate data to the holding company level, weighting prices by total sales to obtain a weighted-average rate for each utility. We obtain prices for the year prior to the merger announcement as well as the year immediately after the completion or termination date; on average, there are 2 years between these prices. From the EEI data, we match pricing data around 75 mergers from 1993 to 2004.

Table 12 reports changes in prices around these 75 deals with available data. Panel A details price changes for bidders, while Panel B presents changes for rival portfolios (922 firm-year observations). Median price changes pre- to post-merger

[9] Total gas prices are the average of all gas pricing available in that year: City Gate prices start in 1984, pipeline prices end in 2001, and electricity (new) pricing begins in 1997.

[10] As a further robustness test, we aggregate our analyses to the regional level and our results remain consistent. In particular, our dependent variable is the change in regional pricing, while all explanatory variables are the same except we aggregate our direct cost and merger market value measures to the regional level.

TABLE 12

Firm-Level Changes in Electric Utility Rates Pre- to Post-Merger

Table 12 reports changes in electric utility rates around utility mergers from 1993 to 2004. The data are estimated from average electric utility rates for commercial, residential, and industrial customers (in cents per kilowatt-hour) for each utility pre- and post-merger. Rate changes are calculated for all firms, by deal outcome, industrial organization, and geographic region. Deal outcome is completed or withdrawn. Industrial organization form is either horizontal (gas-gas or electric-electric utility merger) or nonhorizontal (gas-electric utility merger). Geographic region is either same region (target, bidder, and rival in same region) or different region. Panel A reports rate changes for bidder firms, while Panel B presents rate changes for portfolios of rival firms. *N* represents the number of mergers in Panel A and the number of firm-merger years for rivals firms in Panel B. The *p*-values of the tests of differences in means and medians between each category are reported in the last row of each subsection.

Category	*N*	Mean	*p*-Value	Median	*p*-Value
Panel A. Change in Bidder Rates					
All	75	−0.02%	0.99	−0.37%	0.06
Completed	56	−0.50%	0.60	−0.36%	0.08
Withdrawn	19	1.40%	0.45	−0.43%	0.65
p-value of difference		0.33		0.95	
Horizontal	49	−0.40%	0.74	−0.37%	0.09
Nonhorizontal	26	0.71%	0.41	−0.35%	0.56
p-value of difference		0.35		0.46	
Same regions	56	0.67%	0.50	−0.37%	0.14
Different regions	19	−2.04%	0.20	−0.87%	0.36
p-value of difference		0.17		0.40	
Panel B. Change in Rival Portfolio Rates					
All	4,866	−0.59%	0.21	−1.74%	0.02
Completed	3,504	−1.00%	0.08	−2.48%	0.00
Withdrawn	1,362	0.49%	0.54	0.07%	1.00
p-value of difference		0.10		0.02	
Horizontal	3,377	−0.50%	0.41	−1.92%	0.07
Nonhorizontal	1.489	−0.79%	0.26	−1.22%	0.17
p-value of difference		0.75		0.46	
Same region	633	0.70%	0.57	0.07%	1.00
Different regions	4.233	−0.81%	0.11	−2.20%	0.01
p-value of difference		0.25		0.18	

are significantly negative for all bidders. Furthermore, median rate changes for completed (withdrawn) deals are significantly negative (effectively 0). These results demonstrate that a merger announcement alone does not drive the decline in rates; the merger must be completed to realize a change. Median rate changes are significantly negative for horizontal deals only. We see no differences in rates where the bidder and target are in the same region. These results are consistent with our prior price analysis supporting the efficiency theory and inconsistent with the predictions of collusion.

In Panel B of Table 12, we examine price changes to all rivals around each merger. As with bidder results, prices for rivals decrease significantly overall and around completed deals but are insignificantly positive for withdrawn deals. Results indicate, however, that the median rate change is significantly negative for rivals in horizontal deals and insignificant for rivals in the same geographic area. This suggests that the horizontal mergers are inducing rivals to compete and does not indicate that mergers are better at enabling collusion among the remaining firms.

It is possible the drop in electricity rates for bidders and rivals is an artifact of falling prices for all utilities. To test this, we examine year-to-year changes in pricing for all utilities to benchmark rate changes around mergers. In unreported results, we examine rate changes for all utilities each year at the firm (regional) level.

Rate changes are never significantly negative (except 1999) and are significantly positive in 4 years. It appears that while bidders and rivals decrease rates around mergers, firm or aggregate rates changes are flat or significantly positive.[11]

Table 13 examines changes in prices for utilities from 1993 to 2004 in a multivariate setting. To test the impact of price changes due to mergers, we include a binary variable equal to 1 in the terminal year (completed or withdrawn) that a firm is a bidder as well as the next 2 years.[12] As in Table 11, we control for industry costs (change in U.S. utility prices), firm performance measures (cash flow to sales and net working capital to sales), the variation in the regulatory setting across states (restructure binary variable), as well as firm size.

In the 1st specification, utility price changes are negatively related to whether a firm is a bidder, which is inconsistent with the collusion hypothesis. Three years after a merger, bidders have significantly lower changes in prices than firms that

TABLE 13

Regression Analysis of Product Prices at the Firm Level

Table 13 reports regression analysis of the change in utility pricing by firm from 1993 to 2004. The dependent variable is the change in electric utility prices, where prices are estimated from average electric utility rates for commercial, residential, and industrial customers (in cents per kilowatt-hour) for each utility yearly. The change in U.S. electricity prices is calculated in the same manner across all utilities per year. To control for bidders, a binary variable equals 1 the year the firm is a bidder (completed or withdrawn) plus the next 2 years. Two measures are used for operating performance: net working capital to sales as well as cash flow to sales (source: Compustat). Log size is the log of the firm's assets. Restructure is a binary variable equal to 1 for 19 states that passed some form of utility deregulation during our sample (collected from the Energy Information Administration (2003)). Region fixed effects to control for the potential regional impact are included, but the coefficients are suppressed. The *p*-values are in parentheses.

Variable	Model 1	Model 2
Intercept	−0.19 (0.91)	−0.90 (0.59)
Bidder (end year – end year +2)	−1.83 (0.01)	−1.86 (0.01)
Cash flows / sales	−7.06 (0.00)	−5.67 (0.03)
Net working capital / sales	−0.32 (0.83)	−0.27 (0.86)
log(size)	0.49 (0.01)	0.42 (0.04)
ΔU.S. electricity prices		17.08 (0.01)
Restructure		−0.64 (0.21)
Region controls	Yes	Yes
N	950	883
F	3.76	4.34
Prob > F	0.01	0.00
Adjusted R^2	0.02	0.03

[11] It is also possible changes in utility prices are related to changes in utility costs and not directly related to merger activity. As a further robustness, we repeat analyses in Table 12, scaling rate changes by changes in costs, where cost data are utility-level costs from historical FERC Form 1 filings. In all cases, results remain the same.

[12] Results are robust to setting the binary variable equal to 1 only in the year the firm terminates the deal. Results are also robust to setting it equal to 1 if the company was ever a bidder during the time period of our sample.

do not merge. Furthermore, prices are negatively related to performance measure (cash flow to sales). In the 2nd specification, utility price changes remain significantly negatively related to bidding (p-value of 0.01) but positively related to overall changes in U.S. electricity prices and firm size. In unreported tests, we include binary variables for horizontal, same geographic region, and withdrawn deals. The coefficients are inconsistent with collusion (horizontal and same region coefficients are negative, while withdrawn is positive).

In sum, these results suggest utility mergers lead to lower prices charged to consumers by merger participants as well as industry rivals. These findings support the notion that mergers are driven by synergies and economies of scale. While the potential to collude may exist, we find no evidence that mergers in the utility industry lead to a systematic increase in product pricing.

VII. Summary and Conclusions

The source of gains in mergers has been debated for nearly 3 decades. The existing literature provides convincing evidence that is inconsistent with collusion in nonregulated firms. In contrast, the literature that does provide evidence of collusion has focused on regulated firms. We provide new tests of the synergy, collusion, and anticipation hypotheses using stock and product pricing data from the utility industry in the United States. The utility industry has been omitted from prior analysis of synergy and collusion in mergers and thus provides out-of-sample tests of these hypotheses. Moreover, features of the industry allow ready identification of geographic rivals and thereby facilitate clean tests of the competing hypotheses.

Our analysis employs a comprehensive sample of 384 utility mergers in the 1980–2004 period. This centers the analysis on the Energy Policy Act of 1992, which deregulated the industry and facilitated merger activity by removing Depression-era obstacles to utility ownership. This research design also enables us to examine whether deregulation was accompanied by a greater likelihood of collusion following mergers. We find that utility mergers create wealth for the combined bidder and target. These positive wealth effects are consistent with both the synergy hypothesis and the collusion hypothesis.

To distinguish between the hypotheses, we examine stock price returns to industry rivals across several dimensions specifically linked to collusion: after deregulation, in the subsample of horizontal mergers, stratified by geography, and in withdrawn deals. We conclude with an analysis of the impact of utility mergers on consumer prices. The results are consistent with synergy and inconsistent with collusion. Furthermore, results from industry rivals that become targets support the anticipation hypothesis rather than the collusion hypothesis.

Our results are an important contribution to the literature on tests of the synergy, collusion, and anticipation hypotheses. In the extant literature there is a disconnection between the results in the multi-industry event studies of industrial firms and the single-industry event studies in (formerly) regulated settings. Many single-industry studies of product prices in industries such as airlines and banking find evidence of collusion. In our single-industry study, by contrast, we find no disconnect between stock price analysis and product price results; both are consistent with the synergy hypothesis and inconsistent with collusion.

Finally, our results have important policy implications. Federal and state regulators, concerned about collusive effects of utility mergers, continue to call for the defeat of proposed mergers (Leonard (2007)). These concerns have heightened in the post-regulatory period. Also, many states are considering imposing more stringent controls on the industry (Kelderman (2007), Kennedy (2007)). While collusion in the industry is plausible, our evidence indicates the role of utility mergers is to obtain synergies rather than foment collusion. Although we document a significant increase in utility mergers after deregulation, we find little or no evidence that this increase in merger activity induced collusive pricing in the industry. Hence, this particular case of a relaxed antitrust attitude has benefited consumers as well as shareholders.

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