

Journal Pricing and Mergers: A Portfolio Approach

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Despite their influence on the careers of economists, the production and pricing of scholarly journals have received scant attention from the profession.¹ By contrast, the issue of journal quality and scholarly research productivity have been studied in far greater detail (a search in the EconLit database using the term “journal” generates several dozen papers on this topic). Although there may be a number of reasons for this “imbalance,” it is likely that the tenure process, combined with the low (if not zero) effective cost of journals on campuses have influenced our research agenda. In other words, while professors worry about their job security (publish *well*, or perish), others—their librarians—are charged with maintaining “free” access to all relevant journals. Of course, this

pattern is observed not just in economics but across academic disciplines.

In recent years, however, easy access to journals has been threatened.² Beset by persistent journal price inflation (especially in the so-called STM fields, or science, technology, and medicine) and stagnant budgets, many university libraries have been forced to reallocate dollars from monographs to journals, to postpone the purchase of new journal titles, and in some cases, to cancel titles.³ As a consequence, libraries often relied on interlibrary loans to satisfy faculty demands. This situation and its possible causes has been studied at great length in the library science literature. With few exceptions, a consensus has evolved there which focuses on the growing importance of commercial publishers in the market for scholarly journals: *Over the past decade or more, commercial firms have aggressively raised prices at a rate disproportionate to any increase in costs or quality. This appears to be especially true for the largest commercial firms.*⁴ Although the analysis underlying these conclusions is generally not of the multivariate sort, it is suggestive enough to warrant further investigation.

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¹ The exceptions are Janusz A. Ordovery and Robert D. Willig (1978), Lisa Lieberman et al. (1992), George A. Chressanthis and June D. Chressanthis (1994), McCabe (2000), and Theodore C. Bergstrom (2001). Ordovery and Willig model the pricing of a single title to institutional and individual subscribers; Bergstrom’s paper discusses the differences between commercial and nonprofit economics journals. The other three papers are discussed below.

² Increasingly, journals are available in both print and digital versions, and for some new titles only a digital format is available. See Carol Tenopir and Donald King (2000 Ch. 15). Starting in 1998, commercial publishers began placing their content online. Although major research libraries have generally responded by adding digital access, this shift is still in its early stages, especially in cases where library collections are more specialized, e.g., the typical biomedical library. For this reason, as well as the fact that more than two-thirds of the sample period occurred in a print-only environment, the emphasis of this paper is on the behavior of publishers and libraries in a print environment. The economic implications of digital access are considered briefly at the conclusion of the paper and are a subject of ongoing research.

³ See Martha Kyrillidou (1999).

⁴ See Tenopir and King (2000 Ch. 13), for a review of this literature. An alternative explanation for journal price inflation has been offered by Lieberman et al. (1992). They argue that entry by new titles over time has lowered circulation for existing journals, forcing the latter to raise prices to cover fixed costs.

This paper is the first to assess an aspect of this consensus that has significance for antitrust policy, namely, the impact of mergers on journal pricing. Specifically, do mergers between commercial publishers affect prices? And if so, what are the implications for market definition, i.e., are there many small and unrelated journal niche markets or do journals compete in a handful of broadly defined portfolio markets? To address these questions, a unique panel data set was assembled that includes cost, price, and quality information for nearly 2,000 biomedical titles as well as holdings information for these same journals at 194 biomedical libraries.⁵ This paper reports the results from a difference-in-differences analysis of the price variables.⁶ The results suggest that price increases were substantial during the sample period (1988–2001), that past merger contributed to these increases, and that these effects occurred in a broadly defined portfolio market. Furthermore, the merger-related price increases occurred in cases that would not normally raise antitrust concerns, i.e., the combined portfolio market shares of the merging firms were less than 30 percent.⁷

These results raise at least two policy questions: (1) Do antitrust authorities need a new paradigm for academic publishing and other portfolio-type markets? (2) How will the growing transition to electronic distribution affect the status quo? I briefly address these questions at the conclusion of the paper.⁸

⁵ This data collection effort began in 1998 while I was still employed by the U.S. Justice Department's Antitrust Division. At that time, the Division was reviewing a number of proposed mergers between commercial publishers of STM journals, including (1) Reed Elsevier, Wolters Kluwer, and Thomson; (2) Wolters Kluwer and Waverly; and (3) Harcourt and Mosby.

⁶ McCabe (2000) estimates a structural model to address these and other questions. The results are consistent with those reported in this paper.

⁷ For one recent publishing merger—the purchase of West by Thomson in 1996—the DOJ adopted a content-based approach in its investigation. In that case, divestitures were required only where substantial content overlap existed between individual titles. Under this standard a merger of two firms controlling *all* titles in a particular market portfolio would be allowed so long as no content overlap was observed.

⁸ One important policy issue which is outside the scope of the present paper involves the relative merits of commer-

The paper is organized as follows. Journal demand, publisher pricing strategies, and the implications for merger analysis are first discussed. Empirical evidence is then considered. The empirical model and the underlying hypotheses are discussed, followed by a description of the data, and then the estimation results. Finally, I conclude by discussing the policy issues mentioned earlier.

I. Journal Demand

Most discussions of mergers start with market definition and thus demand. Because of our interest in related policy questions, consider how antitrust practitioners approach this problem. To assess the potential impact of a proposed merger, antitrust authorities define a market just large enough so that a hypothetical monopolist in the market would find it profitable to raise prices some percentage amount above current prices. That is, market demand in the defined market is sufficiently inelastic to justify the price increase.

In scholarly publishing, experience as a user suggests that each *unique* journal title constitutes a distinct market for the purposes of antitrust analysis. For example, no one would argue that articles in *Brain Research* could be easily substituted for ones in the *New England Journal of Medicine*, much less those in the *American Economic Review*. If each title corresponds to an antitrust market, then owners of individual titles already have the capacity to achieve monopoly returns; a corollary is that mergers do not matter. Furthermore, even if markets are defined somewhat more broadly, say, to include titles whose content overlaps, the likelihood seems small that merging firms would control a sufficient number of the resulting markets to warrant serious antitrust scrutiny.

These priors about market definition imply that demands for individual titles are largely unrelated. However, this intuition proved to be incorrect, at least for the major purchasers of STM journals, the libraries. Discussions with dozens of librarians revealed the following: purchase of academic journals by libraries is

cial and nonprofit publishing of peer-reviewed research. See McCabe (2000) and Bergstrom (2001).

generally based on two factors—annual subscription price and expected usage. To assemble and maintain their collections, most libraries appear to construct a cost per use ratio for each title.⁹ Given a budget for a relevant academic field, e.g., biomedicine, they then proceed to rank journals from lowest to highest in that field according to this ratio, and identify a cutoff above which titles need to be canceled; conversely, if their holdings in the relevant field do not exhaust the budget, additional titles can be purchased until the budget constraint is met. From year to year, as budgets and titles' usage change, collections are adjusted accordingly.¹⁰ Over the past decade or so the general trend is for increases in library budgets to lag journal price inflation; a consequence is that many libraries have been forced to reallocate dollars from monographs to journals, to postpone the purchase of new journal titles, and in some cases, to cancel titles.

The most interesting aspect of library journal acquisition, of course, is that individual titles within a given field are considered simultaneously. So, for example, biomedical libraries group titles from various subfields, e.g., neurology, biochemistry, clinical medicine, etc., into a single "portfolio" and broadly apply the cost per use criterion. Thus, titles compete with each other for budget dollars across an entire field, rather than across a narrow subfield, as intuition might otherwise suggest (an intuition based on the perspective of the typical user of journal materials). Furthermore, since journal content is highly differentiated even within subfields, libraries try to provide access to as many STM journals as possible through a combination of subscriptions and interlibrary exchanges.

⁹ This claim is generally true for medical libraries; though other types of academic libraries may not be as precise in their processes, they appear to behave in similar fashion. In any case, this is an empirical question that can be tested using holdings data. See McCabe (2000).

¹⁰ This type of constrained optimization problem is commonly referred to in the operations research literature as a "knapsack" problem. Note that in practice a library's budget constraint may be "soft"; it may be expanded slightly to accommodate the marginal journal that does not quite "fit" the budget. For an introduction to this issue in the operations research literature, see Hans G. Daellenbach and John A. George (1978).

II. Publishers' Pricing Strategies

Given this demand structure, how do publishing firms price their journals? First, there exist at least two types of journal companies—commercial and nonprofit—and each has a distinct management strategy. In general, the latter are mostly intent on disseminating knowledge, whereas the former are primarily interested in profits. Here I assume that the nonprofit firms set prices to cover costs (and are thus ignored in the discussion that follows).

Commercial journal publishers, like firms in any industry, will take into account the structure of demand and the likely strategies of competitors when setting prices. As described earlier, libraries—which constitute the bulk of demand for STM journals—attempt to purchase the most "usage" given their budgets for serials. In practice this amounts to ranking journals on a cost/use basis and identifying a threshold cost/use value above which titles are no longer added (the budget is exhausted).

Given this portfolio demand, McCabe (2002) proposes a pricing model in which publisher pricing strategies are determined by the distribution of budgets and a title's relative quality. Since all journals in a particular demand portfolio compete for the same budget dollars, relative quality determines demand for individual titles (if prices are equal, higher-quality journals experience greater demand). And the budget distribution influences whether, for example, high-quality titles choose "low" prices and sell to most libraries or set "high" prices and sell only to the largest budget institutions.

Furthermore, in the model, firms controlling larger portfolios of journals may have an incentive to charge higher prices, all else equal. The intuition for this result is similar to that in more traditional product markets. Greater portfolio size, perhaps due to a merger, enables a publisher to better internalize pricing externalities. So, in some instances, as a firm's size increases, the firm's *average* price does as well.¹¹ Of

¹¹ Note, however, that in raising its average journal price, the large firm may find it optimal to lower the prices of some of its titles. The best response function for an individual title, i.e., whether price is a strategic complement or a strategic substitute, depends on its relative quality, the distribution of library budgets, and the pricing strategies of the other titles.

course, these price changes affect the pricing of other firms as well. However, in simulations of various merger scenarios the merged firm's average prices increased the most.

III. Publisher Mergers

The Institute for Scientific Information (ISI) tracks citations in peer-reviewed titles for over 8,000 STM journals in various fields. Some guesses place the world population of academic journals close to 30,000. Not surprisingly, the number of publishers, both commercial and nonprofit, is large as well. With respect to biomedical journals, ISI tracks titles published by at least 70 companies. Since 1990 a flurry of merger activity has been observed in the STM publishing market, particularly in the past four years. Since 1997 alone, at least five major commercial publishers have been purchased by competitors. In addition, numerous small-scale transactions involving one or two journal titles occur every year.

These recent natural experiments, as well as two mergers in the early 1990's, provide an excellent opportunity to assess the impact of firm size on journal pricing. In June 1990, Wolters Kluwer added Lippincott's 15 ISI-ranked biomedical titles to its collection of 75 biomedical journals. In May 1991, Reed Elsevier purchased Pergamon and its large portfolio of STM titles, including some 57 ISI-ranked biomedical journals. At the time, Elsevier's biomedical portfolio numbered 190 titles. In September 1997 and October 1998, Churchill Livingstone's 17 ISI-ranked biomed titles, and Mosby's 27 ranked titles, respectively, were added to Harcourt's portfolio of 118 ISI-ranked titles. During 1998, Wolters Kluwer, then in control of 112 ISI biomed titles, added ranked journals from three firms: Plenum's 22 titles (July), Thomson's 41 titles (February), and Waverly's 37 titles (May). Note that since publishers typically set subscription prices once per year (and normally sometime during the summer and early fall months for the upcoming calendar year) mergers that are consummated between, say, October of year T and October of year $T + 1$ may have a simultaneous impact on prices in subsequent years. In the case of the 1997–1998 mergers, four of the five transactions were simultaneous in this sense,

with the potential for affecting prices as early as 1999.¹² The one exception is the Harcourt/Churchill Livingstone merger which may have affected prices one year earlier. Thus, in the case of Wolters Kluwer, assessing the *separate* impact of the Plenum, Thomson, and Waverly transactions on Wolters Kluwer's premerger journal portfolio is not feasible. Although this is not necessarily true in the case of Harcourt, the empirical evidence suggests that the pricing of Harcourt's premerger journal portfolio was not affected by either of its two acquisitions until 1999.

IV. The Empirical Model

Most previous empirical studies of journal pricing have not attempted to assess the impact of mergers on journal pricing. Chressanthis and Chressanthis (1994) specified a reduced-form hedonic model to study the determinants of economic journal pricing. Their results suggest that prices are related to journal characteristics (e.g., prices are increasing in journal quality and size). Lieberman et al. (1992) estimated a supply and demand system using data for 225 ISI-ranked science journals. They find that supply is downward sloping, consistent with the notion that publishing is characterized by scale economies at the individual title level. Based on this evidence they argue (indirectly) that entry by new titles has lowered circulation for existing journals, forcing the latter to raise prices to cover fixed costs. Furthermore, they identify a significant inflation residual that is unexplained by the model. McCabe (2000) does examine the effect of mergers using a structural model. I examine the impact of two early-1990's mergers on biomedical journal pricing (the Reed Elsevier/Pergamon and Wolters Kluwer/Lippincott deals) and identify significant price increases. I also show that journal demand elasticities are very small in absolute terms, and using this result offer an explanation for the observed residual price inflation based on a model of dynamic profit maximization.

In this paper, a difference-in-differences ap-

¹² Information on the date of the final price lists for the merging companies was obtained from a major third-party journal vendor that provides institutional subscribers with billing services.

proach is employed to detect whether seven mergers in the 1990's raised journal prices. This approach involves specifying a separate fixed effect for each title (to "difference" the data), a series of time dummies for each of the years in the sample, and a set of merger dummies (which measure the differences in the differenced data). Although this nonstructural approach does not allow us to identify the separate contributions of market power and other confounding factors, e.g., coincident changes in demand elasticities or costs, it is less data intensive and permits us to examine the recent mergers using price data through 2001.¹³ Indeed, consistent evidence of merger-related price increases provides support for a market power explanation.

Annual institutional subscription price data was collected for 14 years—1988 through 2001. Since the mergers of interest occurred in distinct two-year periods, 1990–1991 and 1997–1998, it is natural to estimate the empirical model separately for the periods 1988–1994 ("Period 1"), and 1995–2001 ("Period 2"), respectively. The estimating equation is:

$$(1) \ln Price_{ijt} = \beta_i + \beta_1 \cdot Time Dummy_t \\ + \beta_2 \cdot Premerger Dummy_{jt} \\ + \beta_3 \cdot Postmerger Dummy_{jt} \\ + \mu_{it}.$$

The three subscripts, i , j , and t , refer to journal i , publisher j , and year t . $Price_{ijt}$ is the annual institutional subscription price for journal i , published by firm j , in year t . The β_i term represents the fixed effect for journal i . The $Time Dummy_t$ variable equals one in year t and zero in other years. The μ_{it} term is an independently and identically distributed (i.i.d.) disturbance. For a publisher j involved in a merger, $Premerger Dummy_{jt}$ equals one in each of the years prior to and including the year in which the transaction was consummated, *except* for the first year of each period, and zero for later years (the initial year of each period is the

reference year for both dummy variables). In contrast, the $Postmerger Dummy_{jt}$ equals one in each year following the year in which the transaction closed, and zero for earlier years.¹⁴ A pair of merger dummies is specified rather than a lone variable to allow for the possibility that some publishers may increase prices at different rates over time compared to the average observed in the journal market. So, for example, although the effect of a merger may be to increase a firm's average price level in the postmerger period, this price level may be greater than, equal to, or even less than the average for the rest of the journal market. By specifying a premerger dummy as well, this relative change can be captured. Finally, note that slightly different populations of titles are used in each estimation. For Period 1, no title first published after 1988 is considered. For Period 2, no title first published after 1995 is considered. The latter set generally includes all the Period 1 titles, except in cases where specific titles have ceased publication.

V. Data

For the period 1988–1998, the Department of Justice (DOJ) collected publisher and price data for some 3,000 journals. This database has been updated through 2001 to reflect the past three years. The historical price data is reported in past print issues of the individual journals. This paper is focused on a subset of these several thousand journals, namely, biomedical titles. The reasons for this choice are several. First, based on discussions with various librarians, biomedical libraries are most likely to evaluate their purchases using the portfolio approach described earlier; furthermore, these libraries typically make no distinctions among various biomedical disciplines, permitting us to consider all biomedical titles as part of a single, large portfolio.

During the sample period, almost 2,000 ISI-ranked biomedical journals were published;

¹³ Much of the nonprice data necessary to estimate a structural model is not yet available.

¹⁴ The one exception here involves Harcourt's acquisition of Churchill Livingstone in 1997, where the *Postmerger Dummy_{jt}* equals one during 1999–2001. As mentioned earlier, specifying a separate 1998 merger dummy that corresponds to this specific transaction does not reveal any impact on the two firms' pricing.

TABLE 1—DESCRIPTIVE STATISTICS

Period 1, 1988–1994				
Variable	Mean	Standard Deviation	Minimum	Maximum
Price	401	511	25	9,538
Premerger Reed Elsevier/Pergamon, 1989–1991	0.1050	0.3066	0	1
Postmerger Reed Elsevier/Pergamon, 1992–1994	0.1070	0.3091	0	1
Premerger Wolters Kluwer/Lippincott, 1989–1990	0.0265	0.1606	0	1
Postmerger Wolters Kluwer/Lippincott, 1991–1993	0.0526	0.2233	0	1
Number of observations: 5,131				
Period 2, 1995–2001				
Dependent Variable: In Price Variable	Mean	Standard Deviation	Minimum	Maximum
Price	829	1,050	70	17,444
Premerger Wolters Kluwer/Thomson/Waverly/Plenum, 1996–1998	0.0869	0.2817	0	1
Postmerger Wolters Kluwer/Thomson/Waverly/Plenum, 1999–2001	0.08767	0.2828	0	1
Premerger Harcourt/Churchill Livingstone/Mosby, 1996–1998	0.06657	0.2493	0	1
Postmerger Harcourt/Churchill Livingstone/Mosby, 1999–2001	0.06689	0.2498	0	1

Number of observations: 6,399

price data were available for about 1,800 of these titles (complete time series were available for most but not all journals). Of this latter group, almost 1,400 were published by organizations with at least three ISI-ranked titles. For the analysis presented here, only journals sold by commercial firms with portfolios consisting of ten or more titles were considered (thus excluding journals distributed by small private publishers as well as the nonprofits). During the sample period the number of firms ranged from 12 (in 2001) to as many as 19 firms (in 1988); together they controlled almost 1,000 ISI-ranked titles.¹⁵ Table 1 reports mean values, as well as minimum and maximum values, for Price and the two Merger Dummies in Period 1 and Period 2.

The sample period, 1988–2001, is useful in at least two respects. First, it is sufficiently long to assess whether inflation continues to plague the journal market [and dovetails nicely with Lieberman et al.'s (1992) sample, which includes data from 1978–1988]. Second, as described above, the period contains a number of natural experiments that enables us to identify the impact of mergers on pricing. Growth via merger should be distinguished from organic

internal growth arising from the introduction of new titles. The latter may produce benefits (such as coverage of emerging fields of study) that helps to offset any intentional competitive harm; harm associated with acquisitions, on the other hand, is less likely to be balanced by substantial benefits—journals are simply reshuffled, and any fixed-cost savings seem to be small.¹⁶

VI. Estimation Results

The estimation results are reported in Tables 2, 3, and 4. In each case, the fixed-effect estimates are suppressed. In Table 2, “combined merger effects” are presented, i.e., the aggregate pre- and postmerger pricing behavior of the merging parties’ titles. The time dummy results are significant at the 1-percent level and imply that average prices increased almost 90 percent in both Period 1 and 2. The Period 1 merger effects are substantial and very precisely estimated. The Reed Elsevier/Pergamon merger resulted in postmerger prices (1992–1994) that exceeded the average in the market by 17 percent. Compared to these two firms’ premerger prices—about 7 percent higher than the market

¹⁵ Since about 10 percent of these titles are not sold in the United States, this paper examines the pricing of about 900 titles.

¹⁶ Furthermore, if publishing mergers do result in cost savings, economic theory implies that postmerger prices should *decline*, everything else equal.

TABLE 2—COMBINED MERGER EFFECTS

Period 1			
Dependent Variable: In Price Variable	Estimate	Prob > T	Error
Time Dummy 1989	0.0849	0.0001	0.0090
Time Dummy 1990	0.1922	0.0001	0.0092
Time Dummy 1991	0.3660	0.0001	0.0091
Time Dummy 1992	0.4284	0.0001	0.0091
Time Dummy 1993	0.5583	0.0001	0.0091
Time Dummy 1994	0.6242	0.0001	0.0090
Premerger Reed Elsevier/Pergamon	0.0657	0.0001	0.0152
Postmerger Reed Elsevier/Pergamon	0.1599	0.0001	0.0153
Premerger Wolters Kluwer/Lippincott	0.0302	0.2048	0.0238
Postmerger Wolters Kluwer/Lippincott	0.0811	0.0002	0.0219
Number of observations: 5,131			
R^2 : 0.9722			
Period 2			
Dependent Variable: In Price Variable	Estimate	Prob > T	Error
Time Dummy 1996	0.1785	0.0001	0.0064
Time Dummy 1997	0.2947	0.0001	0.0064
Time Dummy 1998	0.3886	0.0001	0.0064
Time Dummy 1999	0.4777	0.0001	0.0065
Time Dummy 2000	0.5576	0.0001	0.0064
Time Dummy 2001	0.6372	0.0001	0.0064
Premerger Wolters Kluwer/Thomson/Waverly/Plenum	-0.0606	0.0001	0.0115
Postmerger Wolters Kluwer/Thomson/Waverly/Plenum	-0.0402	0.0005	0.0115
Premerger Harcourt/Churchill Livingstone/Mosby	-0.0871	0.0001	0.0127
Postmerger Harcourt/Churchill Livingstone/Mosby	-0.0611	0.0001	0.0127
Number of observations: 6,399			
R^2 : 0.9841			

TABLE 3—COMBINED MERGER EFFECTS, DELAYED IMPACT

Period 2			
Dependent Variable: In Price Variable	Estimate	Prob > T	Error
Time Dummy 1996	0.1780	0.0001	0.0063
Time Dummy 1997	0.2942	0.0001	0.0063
Time Dummy 1998	0.3881	0.0001	0.0063
Time Dummy 1999	0.4854	0.0001	0.0063
Time Dummy 2000	0.5653	0.0001	0.0063
Time Dummy 2001	0.6235	0.0001	0.0068
Premerger Wolters Kluwer/Thomson/Waverly/Plenum	-0.0610	0.0001	0.0109
Postmerger Wolters Kluwer/Thomson/Waverly/Plenum	0.0026	0.8547	0.0140
Premerger Harcourt/Churchill Livingstone/Mosby	-0.0832	0.0001	0.0120
Postmerger Harcourt/Churchill Livingstone/Mosby	-0.0291	0.0598	0.0155
Number of observations: 6,399			
R^2 : 0.9851			

on average—the postmerger results suggest that the merger increased prices about 10 percent. The Wolters Kluwer/Lippincott combination is associated with a postmerger (1991–1994) price premium of about 8.5 percent. In contrast, the

premerger prices of the two firms are not statistically different from the market average. Thus, this merger also appears to have had a relatively large effect on the parties' pricing. How do these merger effects compare to changes in the

TABLE 4—COMPONENT MERGER EFFECTS

Period 1			
Dependent Variable: In Price Variable			
Variable	Estimate	Prob > T	Error
Time Dummy 1989	0.0850	0.0001	0.0089
Time Dummy 1990	0.1923	0.0001	0.0091
Time Dummy 1991	0.3660	0.0001	0.0090
Time Dummy 1992	0.4283	0.0001	0.0090
Time Dummy 1993	0.5582	0.0001	0.0090
Time Dummy 1994	0.6243	0.0001	0.0090
Premerger Reed Elsevier	0.0609	0.0003	0.0170
Postmerger Reed Elsevier	0.1121	0.0001	0.0171
Premerger Pergamon	0.0757	0.0033	0.0258
Postmerger Pergamon	0.2835	0.0001	0.0258
Premerger Wolters Kluwer	0.0342	0.1942	0.0264
Postmerger Wolters Kluwer	0.0552	0.0234	0.0243
Premerger Lippincott	0.0113	0.8118	0.0477
Postmerger Lippincott	0.1685	0.0001	0.0433
Number of observations: 5,131			
R^2 : 0.9728			
Period 2—Delayed Impact			
Dependent Variable: In Price Variable			
Variable	Estimate	Prob > T	Error
Time Dummy 1996	0.1780	0.0001	0.0063
Time Dummy 1997	0.2942	0.0001	0.0063
Time Dummy 1998	0.3881	0.0001	0.0063
Time Dummy 1999	0.4854	0.0001	0.0063
Time Dummy 2000	0.5653	0.0001	0.0063
Time Dummy 2001	0.6235	0.0001	0.0068
Premerger Wolters Kluwer	-0.0667	0.0001	0.0140
Postmerger Wolters Kluwer	-0.0017	0.9263	0.0181
Premerger Plenum	-0.1292	0.0001	0.0289
Postmerger Plenum	-0.0372	0.3193	0.0373
Premerger Thomson	0.0129	0.5831	0.0234
Postmerger Thomson	0.0889	0.0025	0.0294
Premerger Waverly	-0.0723	0.0015	0.0227
Postmerger Waverly	-0.0420	0.1480	0.0290
Premerger Harcourt	-0.0750	0.0001	0.0135
Postmerger Harcourt	-0.0031	0.8587	0.0174
Premerger Churchill Livingstone	-0.1138	0.0051	0.0406
Postmerger Churchill Livingstone	-0.1555	0.0022	0.0507
Premerger Mosby	-0.1056	0.0001	0.0260
Postmerger Mosby	-0.0822	0.0142	0.0335
Number of observations: 6,399			
R^2 : 0.9842			

general price level in the postmerger period? Based on the time dummy estimates for 1991 and 1994, the annual rate of price inflation averaged about 9 percent in the market, or about 29 percent over the three-year period. Thus, the two mergers resulted in changes that were similar in magnitude to the annual inflation rate. In practice this meant, for example, that by 1994,

subscribers to Reed Elsevier/Pergamon titles were faced with prices about 50 percent higher than three years earlier; in lieu of the merger, this increase would have been smaller, only about 38 percent.

The Period 2 results exhibit a similar pattern but the merger effects are not as substantial. According to the estimates, each of the mergers,

Wolters Kluwer/Thomson/Waverly/Plenum (“WK”) and Harcourt/Churchill Livingstone/Mosby (“HC”), are associated with changes of 2–3 percent *relative* to the premerger period (note that in each case, the firm’s pre- and postmerger prices are lower than the average price level, measured by the time dummies). To explore whether the magnitude of the “true” merger effects might be underestimated due to a delay in their impact, the model was reestimated assuming that the aggregate effects of the mergers were not observable until 2001, or the last year in the sample.¹⁷ The results for this specification are reported in Table 3. The relative merger effects are now about twice as large, or about 6 percent.¹⁸ Furthermore, by 2001, titles sold by WK or HC were priced at or close to the average journal in this market. Based on the time dummy estimates, the latter experienced a 27-percent increase in the 1998–2001 period.

To examine how these mergers affected the respective “components” of each deal, e.g., Harcourt or Lippincott titles, the model was estimated with pre- and postmerger dummies for each merging firm. In the case of the Period 1, the pre- and postmerger periods were defined as before. However, for the Period 2 mergers, the postmerger period was assumed to be delayed, beginning in 2001.¹⁹ The results are reported in Table 4. For both Period 1 and 2, and using an *F*-test, we can reject the null hypothesis that these pre- and postmerger component variables are equal, respectively, at the 1-percent level.

¹⁷ If instead the postmerger period is assumed to be 2000–2001, the results are basically an average of the two sets of reported estimates. Note that the Period 1 merger effects decline when the postmerger period is “postponed.” If merger effects are more immediate, then classifying some of the postmerger years as premerger data necessarily reduces the relative price changes.

¹⁸ What accounts for the delay in Period 2 merger effects? Perhaps the best explanation is that economic conditions in the early 1990’s differed substantially from those experienced almost a decade later. At the outset of the sample period, library customers and their journal budgets had not yet suffered years of double-digit price increases. Thus, journal demand may have been less responsive to sudden price shocks, permitting a more aggressive postmerger strategy. An alternative explanation might be that different firms do things differently, but this notion seems less plausible, especially since Wolters Kluwer acquired firms in both periods.

¹⁹ As before, if we assume that the postmerger period begins in 1999, the relative price changes are smaller.

Furthermore, we can also reject, at the 1-percent level, the null hypothesis that each firm’s pre- and postmerger parameters are equal. In other words, there are significant differences in the pre- and postmerger price levels of the respective firms. Although the Table 2 and Table 3 results suggested that the aggregate merger effects were larger in Period 1, the Table 4 estimates indicate that this story breaks down at the component level.²⁰ For example, during Period 1, Pergamon titles were priced about 23 percent higher after their merger with Reed Elsevier; however, Elsevier’s prices were only about 5 percent higher. In Period 2, four of the seven firms enjoyed price increases greater than Elsevier’s Period 1 experience. Note that this type of heterogeneity is consistent with the model of journal pricing described in McCabe (2002). Furthermore, in *10 of the 11* pre- and postmerger comparisons, the point estimates imply that a merger is associated with higher prices (relative to the premerger period). The one exception is Churchill Livingstone. *Thus, the combined merger effects reported in Tables 2 and 3 result from price increases across almost all of the component firms.*

However, this conclusion, that academic publishing mergers are generally associated with price increases, needs to be at least partially qualified. Since the empirical approach adopted here is not structural, some of the “merger effects” may be related to other contemporaneous factors, such as a decline in firm-level demand elasticities or an increase in journal quality [see McCabe (2000) for details]. The latter possibility can be examined using this paper’s empirical framework. Assuming that journal citation rates are a good proxy for journal usage, a cost/use ratio can be constructed for each title using the annual subscription price and the citation rate.²¹ If prices increase after a merger, but the cost/use ratio does not, then it is likely that the increase

²⁰ However, one pattern observed at the aggregate level is preserved. In Table 4, Period 1 firms raised prices at a rate exceeding that of the market while, in five of seven instances, the Period 2 firms raised prices to more closely track the market’s rate of change.

²¹ ISI’s *Journal Performance Indicators* (2000) database was used as the source for the citation data. For a particular journal in year *X*, usage is defined as the number of citations in year *X* to articles published in that journal during years $X - 4$ through year *X*.

can be explained by the equilibrium pricing strategies discussed earlier—higher-quality titles are sold at higher prices—without relying on an appeal to market power. Since citation data was available only through 1999, this possibility can only be tested for the Period 1 mergers. When *cost/use* is specified in place of *price* as the dependent variable in equation (1) the results indicate that this ratio increases significantly when the combined merger effects are considered. The aggregate postmerger increases for Reed Elsevier/Pergamon and Wolters Kluwer/Lippincott are 6 and 8 percent, respectively. However, when the component-level effects are examined, the two acquired companies, Pergamon (+32 percent) and Lippincott (+37 percent), appear to be the source of this increase. The two acquiring firms' ratios are essentially unchanged following the merger. So, although these two mergers are associated with price increases at the aggregate and component levels, some of this change may not be merger related.

VII. Policy Implications and Future Directions

A. Antitrust Paradigms

When the proposed 1998 merger between Reed Elsevier and Wolters Kluwer collapsed, opposition from antitrust authorities in Europe and the United States was cited as a primary cause. Although no formal complaints were filed by agencies on either side of the Atlantic, regulators had sent a variety of signals indicating their serious concerns. Negotiations with the European Union (EU) had progressed the farthest and it appeared that the proposed deal would proceed only if the parties agreed to significant divestitures. It was widely reported at the time that the EU's preferred set of divestitures upset the financial logic of the merger and resulted in its demise.

What is interesting here is that the EU's main focus was *not* on academic journals, but rather legal publishing (in Europe), and that its theory of anticompetitive harm was based on traditional antitrust principles, i.e., excessive overlap in content (and therefore similar to the DOJ's approach to the 1996 merger of legal publishers Thomson and West). The U.S. focus, of course, was far different, in part because European legal

publishing was not germane and because the model of harm relied upon was novel.

Though one can only speculate on how a U.S. antitrust case might have proceeded, it is clear that the combined Reed Elsevier/Wolters Kluwer entity would have controlled large journal portfolios in a number of broad fields, including biomedicine. Assuming that these broad fields constituted antitrust markets, some of these portfolios would have crossed the U.S. government's concentration threshold (based on the Antitrust Guidelines) with shares in excess of 30–35 percent.²² Based on the results discussed here, such a merger is likely to have resulted in substantial price increases over time. If the United States had filed a complaint and had been successful with this market definition, an important *legal* precedent would have been set, one that would have made it easier to employ a portfolio theory in mergers involving combined market shares less than the threshold, e.g., the subsequent merger of Wolters Kluwer and Waverly, *and/or* a large firm buying a relatively small portfolio of journals. The recent reluctance of the Antitrust Division to oppose the Period 2 mergers evaluated in this paper can be partially attributed to “insufficient” market shares. However, since future deals may be relatively small in scope, opposition to journal mergers will need to adopt novel approaches in the definition of both markets and concentration thresholds.²³

B. A Digital Future

Scholarly journals render at least three services: research communication, archiving, and quality certification. Digital technol-

²² Shares can be measured in a number of ways—in terms of the number of journals, citations, or revenue. The share number calculated here is based on commercial firms with ten or more titles in their portfolios. Although this threshold is somewhat arbitrary, the omitted firms have typically not responded to merger-related price changes, e.g., by introducing new titles, and thus can be safely ignored in an antitrust analysis.

²³ The July 2001 merger between Reed Elsevier and Harcourt easily passes the portfolio market-share threshold in the biomedical area. In fact, if citations are used and firms with more than ten titles are considered, the two companies control more than 50 percent of the market for biomedical titles.

ogy offers the potential to transform the first two by providing instantaneous access to current and past research. With modest investments in computer hardware and software, global scientific communities can dramatically lower the costs of exchanging information.²⁴ Though these innovations might seem to threaten the future of the traditional journal, the latter's role as a quality filter may be sufficient to preserve its existence, albeit in modified form. Although it is possible to conceive of new mechanisms for evaluating journal quality, e.g., measuring the number of "hits" generated by a journal website, it seems likely that the existing expert-based system for assessing new research will survive.²⁵

Commercial publishers have begun to exploit these new opportunities by bundling their individual journal titles and providing libraries with electronic access to "article databases."²⁶ In doing so, the economics of commercial publishing may change in subtle ways. Portfolio size will still matter, but the number of "journals" may matter less than the total article population. Digital technology will make it feasible to control, monitor, and price access in new and myriad ways, suggesting that sophisticated price discrimination schemes could be observed someday. The prospect of bundling and price discrimination, of course, will inevitably raise antitrust issues. A few, large portfolios might reduce transactions costs for libraries yet have

the potential for influencing new entry as well as pricing.²⁷

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²⁴ The Los Alamos physics server is perhaps the best example to date of this digital future (go to <http://xxx.lanl.gov/>). This website, funded by U.S. government sources, has become the standard method of exchange for physics working papers.

²⁵ One important justification for this claim is that professional advancement within (academic) institutions relies on and supports the existing approach to quality assessment.

²⁶ For example, Elsevier's database product, *ScienceDirect* (www.sciencedirect.com), contains articles from its more than 1,100 peer-reviewed journals in all STM disciplines. To gain access to the entire database or some customized subset, a library is required to maintain its Elsevier paper subscriptions. The access price is typically calculated as a percentage markup on the library's Elsevier "paper budget." Recently, Elsevier has begun to offer smaller bundles of titles that correspond to broad *disciplinary* markets, such as biomedicine.

²⁷ For example, in the print context, cancellation of expensive journals has provided libraries with some modest ability to influence publisher pricing. If and when libraries begin to rely primarily on large, digital bundles for providing access to peer-reviewed research, the credibility of a threat to cancel an entire bundle will be far lower, reducing the effectiveness of this strategy. The impact of this change becomes particularly acute once a bundle grows beyond 50 percent of a specific market. It is easy to show that once this threshold is passed, perhaps due to a merger, that the profitability of the bundle is greatly enhanced. See McCabe (2002).