Mergers in Two-Sided Markets: An Application to the Canadian Newspaper Industry

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Abstract

In this paper we study mergers in two-sided industries. While mergers have been studied extensively in traditional industries, and there is a large and rapidly evolving literature on two-sided markets, there has been little work empirically examining mergers in these markets. We present a model that shows that mergers in two-sided markets may not necessarily lead to higher prices for either side of the market. We test our conclusions by examining a spate of mergers in the Canadian newspaper industry in the late 1990s. Specifically, we analyze prices for both circulation and advertising to try to understand the impact that these mergers had on consumer welfare. We find that greater concentration did not lead to higher prices for either newspaper subscribers or advertisers.

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1 Introduction

In this paper we analyze mergers in two-sided markets. We present a model that shows that firms owned by competing duopolists may choose to set higher prices than if both firms were to be owned by a monopolist setting

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prices jointly. More generally, we show that the effects on prices of a merger in two-sided markets can be ambiguous. We test this model empirically using data on a series of large mergers in the Canadian newspaper industry in the late 1990s. Our results indicate that these mergers did not lead to higher prices for either newspaper subscribers or advertisers.

Two-sided markets have recently been the focus of many research projects.[1] Due to the need for two-sided platforms to balance the interests of two different groups of consumers, it is often possible to observe firms in these industries behaving in ways that would be sub-optimal for traditional firms. Standard economic predictions do not always hold in these markets. For example it is possible to observe firms, even monopolies, consistently setting price below marginal cost on one side of the platform in order to increase revenues on the other side. While much work has been done on optimal price setting in these industries, to our knowledge there has been little work done in analyzing mergers in such markets.

We provide a model that analyzes price-setting in a two-sided market where the willingness-to-pay by one side of the platform depends on the number of consumers, and their characteristics, on the other side. We show that the profit-maximizing optimum for firms in this market involves setting price below marginal cost for one group of consumers in order to extract surplus from the other group. More importantly, we show that it is not necessarily the case that a monopolist will choose to set higher prices than competing duopolists *on either side* of the platform.

Our model shows the circumstances under which joint ownership of two separate firms actually leads to a lower optimum price than if the two firms are owned separately. The intuition for this result is that the joint owner internalizes the effect that raising its price will have on both firms. In equilibrium, firms use price as a screening mechanism to attract more valuable consumers. It turns out that the switching consumer, i.e. the reader who is indifferent between purchasing a newspaper from either firm, can have either a positive or negative net effect on a firm's profits and this in turn induces the monopolist to set a higher or lower price than competing duopolists.

We then test our results with an empirical application involving newspaper markets. In general, media industries are good examples of two-sided markets.[2] This is because the media owner has two sets of consumers: media subscribers such as radio listeners and television viewers, and ad-

[1] Seminal papers in this area include Rochet and Tirole (2003) and Armstrong (2006). Anderson and Gabszewicz (2005) survey this literature.

[2] Other examples of such industries include credit cards, operating systems and HMO networks.

vertisers. Advertisers' willingness-to-pay increases in the number of media subscribers.[3]

Our application involves studying the effect of a series of mergers in the Canadian newspaper industry. During the period 1995 to 1999 about 75% of Canada's daily newspapers changed ownership. Two newspaper chains in particular, Hollinger and Quebecor, acquired the majority of newspapers that changed hands. Not only did national concentration figures increase significantly, but county-level data indicate that multi-market contact also increased greatly over this period. However, we have not found any academic work studying the economic effects of the mergers. This is especially surprising for an industry that reaches 79% of adult Canadians every week and generates annual revenues of 3.3 Billion Canadian Dollars (about 2.9 Billion US Dollars).[4] In our paper we attempt to fill this gap by examining whether the mergers affected prices or consumer welfare in the daily newspaper market.

The issue of media ownership concentration is an especially delicate one because of concerns over the accurate dissemination of information to consumers and the need to allow room for differing opinions in television, radio and the print media. This issue recently received widespread attention in the United States with the proposal in 2003 by the Federal Communications Commission to relax ownership and cross-ownership laws in the media: raising the market cap on the reach of television stations owned by the same conglomerate, and allowing firms to own print and broadcast media in the same market.

There are two possible effects of an increase in consolidation that can cause concern- the potential for an exercise of market power by firms (the usual economic concern from large mergers) and the potential for reduced diversity of opinions and content from having fewer media sources. In this paper we examine the first of these issues. As we describe in the next section, the Canadian newspaper market experienced huge changes through a number of acquisitions in a surprisingly short time. Our goal is to examine whether these mergers led to price changes or had observable effects on

[3]However, it is not always clear how the number of advertisements affects subscribers' valuation of the media. While it is safe to assume that subscribers in television and radio markets value advertisements negatively, the same may not necessarily hold in newspaper markets. Nevertheless, it is always the case that the media owner needs to keep the interests of both sets of consumers in mind when setting prices.

[4]Figures are from the Canadian Newspaper Association and include totals for both daily and weekly newspapers. Revenue figures are the sum of advertising and circulation revenues.

newspaper readership.[5]

Our results do not support the notion that increased concentration led to higher prices, either for circulation or for advertising. This is consistent with our theoretical model of mergers in two-sided markets, where the effect of a merger on prices for either advertisers or consumers is ambiguous. In particular, newspapers with changed ownership saw smaller price increases, or greater price declines than newspapers with unchanged ownership. Additionally, newspapers in the two dominant chains (Hollinger and Quebecor in 1999, and Canwest and Quebecor in 2002) did not have significantly different price changes from the remaining newspapers. For example, we find that circulation prices at newspapers in the dominant chains rose by an average of between 11 and 14 cents, which was a smaller increase than the corresponding increase of around 15 cents for independent newspapers or those in smaller chains. Moreover, average advertising prices decreased by 12 cents per 1000 readers at newspapers in the Hollinger and Quebecor chains, compared with a corresponding rise of 8 cents in the remaining papers. Our results are robust to examining different lengths of time after the mergers; they also do not show a strong relation between local concentration (as indicated by county level data) and higher prices. These results are reassuring from the point of view of consumer surplus in that there is no clear economic effect of increased market power. There does not appear to have been an exercise of market power in the form of higher prices for either readers or advertisers.

Our work is related to a number of different literatures. As discussed above, we add to the work done in analyzing two-sided industries. We also add to the existing literature on mergers, much of which has examined traditional industries.

Whinston (2006) discusses both the theoretical and empirical evidence concerning the effect of horizontal mergers. In particular, he finds mixed theoretical support for the claim that mergers increase price, in part because of Williamson's claim that mergers might increase efficiency, and the fact that firms are proposing a merger increases the probability that this is the case. Likewise, Whinston shows there is mixed empirical evidence in the literature that mergers increase prices, i.e. certain studies find that mergers increase prices while other studies do not find this effect. Recent work by Nevo (2000) examines the effect of mergers on prices by estimating a

[5]In Canada, unlike in the United States, there are no special protections accorded to print media which would stop a merger in order to prevent a loss of diversity of editorial opinion. Thus, only strictly economic arguments could have been used to prevent the newspaper mergers in the late 1990's. We discuss this point in more detail in Section 4.

structural model of demand and conduct and simulating the effect of mergers on prices. The norm in this research is to assume that the merger will change the ownership patterns in the industry, but will not alter the type of equilibrium firms play (such as allowing the possibility of tacit collusion) or change the preferences of individuals. In contrast, our difference in difference approach can allow for a broader class of effects such as a consumer boycott of merged papers.

To our knowledge there has been very little work examining the effects of mergers in two-sided markets. Evans (2002) describes how potential mergers in two-sided markets may not give rise to the same antitrust concerns as those in traditional markets. Even if prices were to rise for both sides of the market as a consequence of the merger, consumers, on both sides, may still see an increase in surplus.

Evans and Noel (2007) point out the difficulties associated with using conventional methods to analyze mergers in two-sided markets. As they show, the Lerner Index does not hold in such markets, and merger simulation models, which are now routinely used in traditional markets, are misspecified when applied to two-sided or multi-sided markets. Evans and Noel also perform an analysis of the forthcoming merger between Google and DoubleClick- perhaps the first empirical analysis of mergers in two-sided industries. They show that relying on conventional methods would have led to significantly different results than using methods that explicitly incorporate the two-sided nature of this market. Nevertheless, they are limited to a calibration exercise due to lack of data.

Our paper adds to a vast body of work on media markets, but to a relatively small literature on the effects of concentration in these markets.[6] Two recent studies of concentration in media markets are George (2001), who studies the effect of ownership concentration on product variety in newspapers, and Berry and Waldfogel (1999) who study changes in the radio industry brought about by the US Telecommunications Act of 1996. The results of both papers suggest that consolidation in media markets increases product variety. However, neither paper examines the effects of greater concentration on prices.

The rest of the paper proceeds as follows: In Section 2 we construct a model of mergers in two-sided markets. In Section 3, we describe the data used for the project. In Section 4 we provide the historical background pertaining to the newspaper merger wave. Section 5 contains detailed results showing the effect that the mergers had on observable characteristics of the

[6]For references on studies of the newspaper industry, see Chandra (2008).

industry. Section 6 summarizes our findings and concludes.

2 A Model of Mergers in Two-Sided Markets

We now present a model that illustrates how mergers in two-sided markets may or may not lead to higher prices. To preserve the later analogy with our empirical application, consider the newspaper industry. The typical newspaper publisher has two sets of consumers- newspaper readers and advertisers. Advertisers' willingness-to-pay for advertising at any newspaper is generally a function of the number of readers at that newspaper, and their characteristics.

Before describing the model, we first develop some intuition for the ambiguous effect of mergers on prices in a two-sided market. When newspaper A raises it's price, consumers that stop buying the paper can either stop buying newspapers altogether (stoppers) or they can switch to purchasing newspaper B (switchers). When newspaper A and B merge, newspaper A will internalize the effect of the consumers that start purchasing newspaper B, i.e. the effect of the switchers.

Switchers can either be more or less valuable to advertisers than stoppers. We model stoppers, those consumers who are at the margin between purchasing a newspaper or none at all, as being more valuable to advertisers than switchers. When newspaper A sets its price, it needs to balance off losing valuable stoppers with the potential gain of getting rid of switchers. Depending on the relative importance of retaining consumers who stop reading newspapers versus getting rid of consumers who switch to newspaper B, the newspaper might make a loss on switchers, i.e. the consumers who are indifferent between newspaper A and newspaper B. When newspapers merge, they will choose to lower their price since they internalize the fact that a higher price will induce the switchers to buy newspaper B and lower its profits.

On the advertising side, our model has an even simpler prediction. Given the set of readers who buy either newspaper A or newspaper B, the newspaper is the monopoly supplier of its readers. All that advertisers care about is the number and characteristics of readers at a newspaper, not the price of advertising in the rival newspaper.[7] Thus the change in the advertising price per reader depends solely on the change in average reader characteristics. If there is an increase in circulation price, this will increase the average value

[7] In our model, advertisers will not derive any value from advertising in more than one paper, or switching to the paper located further away from them.

to advertisers of that newspaper. However, a merger has no direct effect on advertising price, just an indirect effect through the circulation price.

Consider the following Hotelling model. There are two newspapers located at the end points of the line segment on $[0, 1]$. Denote the newspaper at 0 by A and at 1 by B. There is a continuum of readers distributed uniformly along this line segment. The utility to a reader located at i from reading newspaper A is given by:

$$u_{iA\epsilon} = \delta - p_A - \alpha \cdot i + \epsilon$$

Here α represents the reduction in utility experienced by readers further away from the newspaper, p_A is the price of newspaper A, and ϵ represents an idiosyncratic taste for newspapers. We assume that ϵ follows a uniform distribution given by:

$$\varepsilon \sim U\left[0, \gamma\right]$$

This allows readers' preferences to vary along two dimensions: their relative taste for newspapers A and B, and their overall taste for newspaper reading. These two taste parameters are orthogonal to each other. The assumption that ε is different from zero is important, since if there is no ε then a newspaper can perfectly screen readers.

The utility from newspaper B is analogously given by:

$$u_{iB\epsilon} = \delta - p_B - \alpha \cdot (1 - i) + \epsilon$$

Readers will only purchase a newspaper if they gain positive utility from doing so. If both papers provide positive utility then readers will buy the paper providing greater utility. Thus we assume away multi-homing, consistent with consumer choices in the Newspaper industry.[8,9]

Publishers earn revenue from newspaper sales, as well as from advertising. Advertisers are located at the endpoints 0 and 1 and have a greater valuation of readers located closer to them. Specifically, assume that advertisers receive profits of q for each consumer that buys a product at their

[8] Gentzkow (2007) looks at the choice of consumer to read a newspaper online or in paper, or to do both. While multihoming (consuming multiple newspapers) may be salient for on and off-line newspapers, there is little evidence that consumers subscribe to more than one print newspaper.

[9] Note that we have not modeled newspaper readers' utility as dependent on the amount of advertising at a given paper. This is mostly to facilitate the algebraic analysis that follows.

store. The probability that a consumer located at i who reads the newspaper will buy the product from an advertiser located at 0 is

$$P^0(i) = \frac{\beta}{q} - \frac{w}{q} \cdot i$$

Thus readers located further away from the advertiser are less likely to visit the store. This implies that the advertiser's willingness to pay for a consumer located at i is given by $\beta - \omega \cdot i$. Analogously, the willingness to pay by an advertiser at 1 for the same reader is $\beta - \omega \cdot (1 - i)$.

Note that there are two important assumptions in this model:

1. Readers and Advertisers have correlated preferences, i.e. readers who have a stronger preference for newspaper A are more valuable for advertisers located at 0. This can be interpreted in a geographic sense, i.e. readers located closer to the city center get more value out of the city newspaper and are more likely to visit stores in the city. Or we can interpret this correlation in an intensity of preference sense, i.e. readers who spend more time with their newspaper are more likely to notice advertisements in the paper.

2. The preferences of readers and advertisers are not perfectly correlated. Suppose instead, that the preferences of readers and advertisers are perfectly correlated. Then the newspaper could screen readers perfectly, i.e. pick a price such that only the readers on which it will make positive profits choose to purchase this newspaper.

The profit of newspaper A from selling to a reader located at i is given by:

$$\Pi_A(i) = p_A - c + \beta - \omega \cdot i$$

where c is the newspaper's constant marginal cost and the newspaper can extract all of the advertisers's surplus.

The total profit to newspaper A is given by

$$\Pi_A = \int_0^1 [p_A - c + \beta - \omega \cdot i] P(i = A) di$$

Here, $P(i = A)$ represents the probability that the reader at i will purchase newspaper A. This probability is a weakly decreasing function of i.

There are three possible cases:

Case 1 *All readers buy a newspaper with probability* 1.

This implies that parameter values are such that there is no probability that a given reader will not purchase a newspaper. In a symmetric equilibrium this implies that the consumer indifferent between newspapers A and B is located at $i = 1/2$. Each newspaper sells to half the market with probability 1. This is illustrated by Panel 1 of Figure 1 below.

Case 2 *All readers buy a paper with positive probability, not necessarily equal to* 1.

This corresponds to parameter values which imply a decreasing probability, as a function of i, that readers will purchase from A and analogously for B. Nevertheless, it is still the case that the reader located at $i = 1/2$ is indifferent between purchasing newspaper A or B, even though this reader may choose not to buy a newspaper. This is illustrated by Panel 2 in the Figure.

Case 3 *Some readers buy a paper with probability zero.*

This implies parameter values such that a set of consumers will not purchase a paper from either A or B. This case is shown in Panel 3.

Note that Case 1 is simply a special case of Case 2, where all consumers will purchase the newspaper. Moreover, we do not consider Case 3 since it implies that the market shares of A and B do not overlap, i.e. A and B do not compete for readers. In this case joint ownership of the two newspapers will not change the profit maximizing price at either paper and therefore an analysis of mergers is not interesting. Therefore, we restrict attention to Case 2.

The probability that a reader at i purchases newspaper A is given by:

$$P(i = A) = \begin{cases} 1 & \text{if} \quad i \in \left[0, \frac{\delta - p_A}{\alpha}\right] \\ 1 - \frac{\alpha . i - \delta - p_A}{\gamma} & \text{if} \quad i \in \left[\frac{\delta - p_A}{\alpha}, \frac{1}{2} + \frac{p_B - p_A}{2\alpha}\right] \\ 0 & \text{if} \quad i \in \left[\frac{1}{2} + \frac{p_B - p_A}{2\alpha}, 1\right] \end{cases}$$

That is, a certain fraction of consumers will purchase newspaper A no matter what their value of ϵ. Beyond a point, the probability that consumers buy A decreases with their distance from A, finally reaching zero when their utility from B exceeds their utility from A.

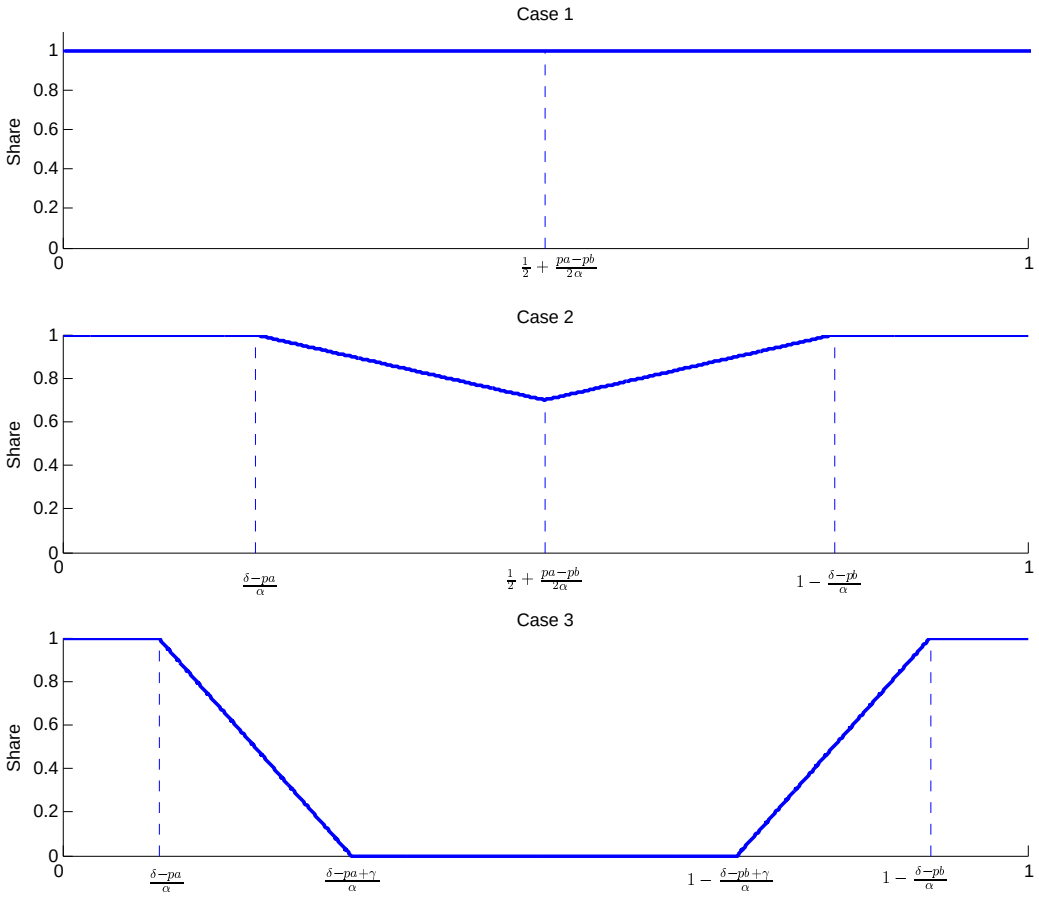

Figure 1: 3 different cases for the consumer shares.

We refer to consumers in the interval $\left[0, \frac{\delta - p_A}{\alpha}\right]$ as A's 'locked-in' consumers. We refer to consumers in $\left[\frac{\delta - p_A}{\alpha}, \frac{1}{2} + \frac{p_B - p_A}{2\alpha}\right]$ as A's 'likely' consumers. That is, they clearly prefer A to B, but do not necessarily purchase A, unless their value of ϵ is high enough. Similarly, B has locked-in and likely consumers.

Firm A's profit is given by the profit per reader over the range of readers, i, who purchase the newspaper, which can be separated into the region of i consisting of A's locked-in consumers, where all consumers purchase newspaper A, and a region consisting of A's likely consumers, where consumers purchase A with probability less than 1 (those with high taste for newspapers, ϵ).

$$\Pi_A = \int_0^{\frac{\delta - p_A}{\alpha}} (p_A - c + \beta - \omega i)\, di + \int_{\frac{\delta - p_A}{\alpha}}^{\frac{1}{2} + \frac{p_A - p_B}{2\alpha}} (p_A - c + \beta - \omega i) \left[1 - \frac{\alpha i - p_A - \frac{p_A - p_B}{2\alpha}\delta}{\gamma}\right] di \tag{1}$$

Figure 2 shows the effect of firm A raising its price. Section (i) of the graph shows the consumers who will reduce their probability of buying newspaper A (while still preferring A to B). Section (ii) shows the consumers who switch from being A's likely readers to being B's likely readers. After a merger, when choosing the price of newspaper A, the firm must consider the fact that Section (ii) consumers will switch over to newspaper B. So a merger will raise or lower prices depending on the profitability of those consumers in zone (ii) for newspaper B.

When newspapers A and B merge, the price of the newspaper A will now reflect the effect of p_A on profits of newspaper B. Specifically, the sign of the change in price depends on $\frac{\partial \Pi_B}{\partial p_A}$ given by:

$$\frac{\partial \Pi_B}{\partial p_A} = \frac{1}{2\alpha}\left(p_B - c + \beta - \omega\left(\frac{1}{2} + \frac{p_A - p_B}{2\alpha}\right)\right) \tag{2}$$

Thus, the sign of $\frac{\partial \Pi_B}{\partial p_A}$ depends on the the sign of $\left(p_B - c + \beta - \omega\left(\frac{1}{2} + \frac{p_A - p_B}{2\alpha}\right)\right)$, the profitability of the consumer who is indifferent between newspaper A and newspaper B. Call the consumer located at $\frac{1}{2} + \frac{p_A - p_B}{2\alpha}$ the *switching consumer*, i.e. the consumer who is indifferent between purchasing newspaper A and newspaper B. The case where the switching consumer yields positive profits to the firm is easy to understand. Suppose the market shares are as in case 1, i.e. all consumers purchase a newspaper. If the newspaper raises its price, it will lose the switching consumer but no other readers. Thus this

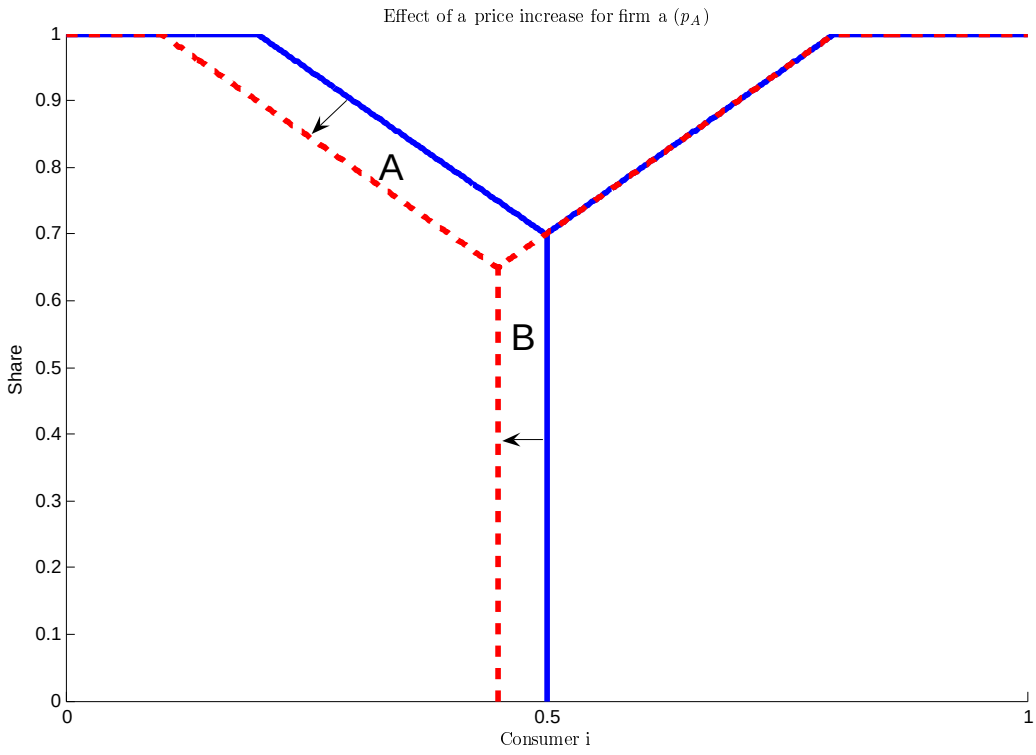

Figure 2: Effect of an increase of p_A on consumer shares.

price cannot be optimal if the switching consumer gives negative profits to the firm. In contrast if shares are as in case 2, then when the paper raises its price it trades off losing its least profitable consumer (the switching one) and losing consumers with lower i but lower taste for newspaper ϵ. The profit on the switching consumer will be greater or smaller than zero based on the relative value of these "low taste for newspaper consumers" to the advertisers. In particular, a necessary condition for the switching consumer to yield negative value to the newspaper that they purchase is that the switching cost of the newspaper, c, is higher that the price charged to readers, p_A.

Note that the possibility of newspapers being sold below cost has been raised by other authors, and there is substantial evidence, both theoretical and empirical, that many publishers do price their newspapers below marginal cost in order to maximize profits on the advertising side of the market.[10] This condition is often required in other two-sided markets as well. Rysman (2004) shows a similar condition in the market for Yellow Pages. Evans (2002) describes how some credit card companies offer credit cards for free to consumers, while earning significant margins from the merchant side of the business. Rochet and Tirole (2003) provide many examples of two-sided markets where one side serves as the loss leader or subsidized segment, and the other serves as the profit-making segment; these include operating systems, shopping malls, newspapers, network television, clubs and real estate.[11] More generally, other network industries– not just two-sided markets– often exhibit the feature that one product is discounted so as to increase revenues for a related product. For example, companies selling razor blades and razors, or video game consoles and individual games, commonly sell the 'hardware' at a loss in order to establish an installed base of consumers who will then be charged higher prices for the 'software'.

We can show that, depending on parameter values, it is possible for joint ownership of these newspapers to result in either higher or lower profit maximizing prices. The intuition can be expressed as follows, and is displayed visually by Figure 2. In the duopoly case, with two competing newspapers, each publisher sets its optimal price taking into account its revenues and costs. The benefit from lowering its price is the expected gain in circula-

[10] Examples of studies that have derived this condition and have supplied evidence include Compaine (1980), Kaiser (2007), Chaudhri (1998) and Argentesi and Filistrucchi (2007).

[11] The profitable segment typically accounts for the vast majority of the two-sided firm's revenues or profits. Newspapers typically derive 80 percent of their revenue from advertising, and in 2001 American Express derived 82 percent of its revenue from the merchant side of the business (see Evans (2002)).

tion and advertising revenue from two sources: (i) the increased probability that A's likely consumers actually purchase A and (ii) the switching of some readers from being B's likely consumers to being A's likely consumers. The cost of doing so is the increase in costs that A will incur from its expected increased sales to switching consumers, as well as the lower revenue from its stopping consumers. Note, however, that the switching consumers that will now purchase A are less valuable to advertisers, and therefore provide a lower advertising revenue to A, than the stopping consumers. At the profit-maximizing equilibrium, therefore, the gain to A in expected circulation and advertising revenue from slightly lowering its price does not outweigh the loss from delivery costs since the switching consumer does not bring in enough advertising revenue to justify making the sale. Note that neither publisher will internalize the effect on the other one from changing its price.

A monopolist, however, will internalize the effect that lowering its price at one paper will have on revenues and costs at the other paper. For certain parameter values, we can show that the monopolist will choose to set lower prices at each paper than competing duopolists. [12]

A final note on the demand side. Another change that could occur after a merger is that firms could change the quality of their newspaper denoted δ. Note that an increase in quality has the same impact on consumer shares as a decrease in price. Thus a firm might want to either lower or raise quality after a merger (in exactly the opposite way as the change in price) depending on the profitability of the switching consumer.

We now turn to the effect of a merger on advertising price. Typically, advertising prices are quoted on a per-thousand basis, i.e. it is assumed that total prices are proportional to the number of readers. The price per reader for newspaper A (denoted p_A^{ra}) is given by:

$$p_A^{ra} = \frac{\int_0^1 (\beta - \omega i) P(i = A) di}{\int_0^1 P(i = A) di} \tag{3}$$

[12] Fix the parameters $\alpha = 3$, $\delta = 4$ and $c = 5.5$. Given these parameters, if we look at $par_1 = \{\omega = 9, \gamma = 2.5, \beta = 6\}$ we find that the consumer located at $\frac{1}{2}$ yields negative profits for firms A and B. Therefore when both firms merge, the equilibrium price falls. Alternatively, for the parameter values $par_2 = \{\omega = 3, \gamma = 2, \beta = 4\}$ we find that the consumer located at $\frac{1}{2}$ yields positive profits and a merger would increase prices. The difference between these two parameter values is the fact that par_1 has an advertiser willingness to pay that is steeper than par_2, and thus the consumers located in the middle are less valuable than consumers located at either 0 or 1. MAPLE code for this exercise is available from the authors by request.

which can be rewritten as:

$$p_A^{ra} = \frac{\int_0^{\frac{\delta - p_A}{\alpha}} (\beta - \omega i)\, di + \int_{\frac{\delta - p_A}{\alpha}}^{\frac{1}{2} + \frac{p_A - p_B}{2\alpha}} (\beta - \omega i) \left[1 - \frac{\alpha i - p_A - \frac{p_A - p_B}{2\alpha}\delta}{\gamma}\right] di}{\frac{\delta - p_A}{\alpha} + \int_{\frac{\delta - p_A}{\alpha}}^{\frac{1}{2} + \frac{p_A - p_B}{2\alpha}} \left[1 - \frac{\alpha i - p_A - \frac{p_A - p_B}{2\alpha}\delta}{\gamma}\right] di} \quad (4)$$

The price per reader for advertisers will increase after the merger if the price charged to readers increases. If p_A increases, then p_A^{ra} will increase as well, since the average i of readers of newspaper A goes down. We already established that the price charged to readers could rise or fall after the merger depending on the profitability of the switching consumer. Thus the change in the price for advertisers is ambiguous as well.

3 Data

We use data from three sources.[13] Editor & Publisher Magazine – which is the weekly magazine of the newspaper industry – is our source of information on newspaper prices, advertising rates, aggregate circulation, and other newspaper characteristics (such as the number of pages per copy) for every daily newspaper in Canada. We have collected these data for the years 1995, 1996, 1998, 1999 and 2002. There are, on average 101 daily newspapers in each year, with a small amount of entry.[14]

Summary Statistics at the aggregate level are in Table 1; this contains all daily newspapers in Canada. Note that an observation in this table is a newspaper-year combination, we have data for the 5 years listed above. The data show that, during our sample period, the mean weekday newspaper circulation was 47206 and the median circulation was 18019. While it may appear that circulation on Saturdays and Sundays is considerably higher than on weekdays, it is important to keep in mind that not all newspapers publish on one or both days of the weekend, and those that do tend to be the larger circulating ones. Conditional on having a Saturday edition, average daily circulation is over 56,000 copies, and conditional on having a Sunday

[13] We have made (most) of our data available online so that it is available to other researchers. We have excluded the proprietary data that was purchased from ABC. The dataset and variable descriptions can be accessed at: http://strategy.sauder.ubc.ca/chandra/canadadata.html

[14] For example, during this period the *Lloydminster Times* became a daily paper (from a weekly paper), and the *National Post* was founded.

Variable	Obs	Mean	Std. Dev.	Min	Max
Weekday Circ.	515	47206	74041	1000	494719
Saturday Circ.	408	68366	106508	2675	739108
Sunday Circ.	139	110750	112708	13693	491105
Average Price ($)	515	0.58	0.15	0.21	1.04
Average Pages	491	39.7	26.3	8	140
Weekday Ad. Rate ($)	511	2.3	3.0	0.4	25.6
Saturday Ad. Rate	399	2.9	3.7	0.5	26.9
Sunday Ad. Rate	137	4.0	2.7	1.0	12.5
Evening Paper	515	0.52	0.50	0	1
French	515	0.11	0.31	0	1
Ad. Rate per 10K readers	511	0.98	0.86	0.22	7.70

Source: Editor and Publisher Magazine.

Table 1: Aggregate Summary Statistics

edition, average daily circulation is over 98,000.[15] The mean circulation price is $0.58 and the mean advertising price per column inch is $2.3 on weekdays. Just over half the newspapers in the sample are published in the evening, while 11% are French language papers.[16]

A supplementary source of data is obtained from county level circulation figures provided by the Audit Bureau of Circulations (ABC). ABC is an independent, not-for-profit organization that is widely recognized as the leading auditor of periodical information in North America and many other countries. Potential advertisers in the print media use the circulation data provided by ABC as the basis for determining where to allocate their advertising dollars. The ABC dataset contains extremely detailed information on the circulation of 73 Canadian newspapers for the years 1995-1999. These 73 newspapers constitute the major selling dailies in Canada,[17] and the only ones on which ABC collects information.

We have also matched to each county detailed demographic data: median

[15] Among those newspapers that publish an edition every day of the week, Saturday circulation is the highest, followed by Sunday circulation.

[16] Of the 11 French papers, there are 9 in Quebec, and 1 each in New Brunswick and Ontario.

[17] Along with the *Globe and Mail* as discussed below.

income, education distribution, population and languages spoken. Specifically, we use the Statistics Canada County Demographic data set for the 1996 Census Year. For each newspaper, we know the counties in which it circulates and the number of copies sold (weekday and Sunday separately). Using this dataset, we are able to determine exactly which newspapers compete with each other and how intense that competition is. Relying simply on aggregate data would not allow us to make these distinctions. In fact, ABC provided these data at the postal code level for a subset of newspapers but in order to have comparable observations across papers we have aggregated the postal code level data to the county level.[18] Conceptually, it would seem that merging these two geographies would lead to the loss of a great deal of data. However, since virtually all postal codes are completely contained within a single county, we can aggregate postal code data to the county level.[19]

Table 2 has summary statistics at the county level; observations in the first panel are newspaper-county combinations. The average weekday circulation is 4638 per newspaper per county. We also present measures of the Herfindahl index calculated according to county level market shares in weekday circulation. These measures are defined in section 5.1. Essentially, we compute the Herfindahl index in each county according to newspaper groups and then, for each newspaper, weight the value of the Herfindahl index in the counties in which it is present by its circulation in that county. This provides an indicator of the competitive environment faced by newspapers and chains, by giving more importance to markets where the newspaper has a greater fraction of its circulation. The mean weighted Herfindahl is 0.61.

Panel 2 of Table 2 provides aggregate circulation figures at the county level as well as demographic data on population and income. Total weekday circulation in the average county is 15909. We have observations on 1053 counties pooled across the four years of available data; this translates to observations on approximately 260 counties annually. The demographic data reveal a wide variation in county definitions across the country: the mean county population (15 years and older) is approximately 87,000; however some counties have populations of well over a million.[20]

[18]The level of detail at which circulation data are collected differs usually due to the size of the newspapers. For papers with very high circulation, providing and auditing accurate figures at the postal code level is extremely hard, which is why the data are sometimes only available at the county level.

[19]In fact more than 98% of postal codes within a forward sortation area (FSA) are in a single county.

[20]There are 3 such counties; they include substantial portions of the metropolitan areas

Variable	Obs	Mean	Std. Dev.	Min	Max
Newspaper-Counties:					
Weekday Circ.	3612	4638	16020	1	220930
Saturday Circ.	2007	4719	19020	3	305227
Sunday Circ.	2789	4233	16134	0	188326
Weekly Circulation	3612	31446	108994	9	1598203
Weighted Herfindahl (Group)	3612	0.61	0.19	0.34	1
Counties:					
Total Daily Circ.	1053	15909	38366	1	324940
Total Weekly Circ.	1053	107880	262910	62	2353779
Population (15 plus)	257	87590	201999	5680	1959935
Average Income	257	22352	3504	15548	35555
Median Income	257	17046	3108	10211	27136

Source: Audit Bureau of Circulation (ABC) and Statistics Canada.

Table 2: County level summary statistics

While it is the case that we do not have county level circulation data for a subset of Canadian dailies, as a practical matter there is no straightforward solution to this problem, since ABC simply does not collect or provide data for the 28 newspapers for which we only have aggregate circulation figures. In the county level analysis that follows, we will restrict our attention to the newspapers for which we do have county level data. For the most part, with one major exception, the 28 newspapers without county data are low circulating, small-town newspapers. The one exception is the *Globe and Mail*, at the time Canada's only national newspaper and the second largest newspaper in the country with an average daily circulation of over 300,000.[21] ABC does not collect county level circulation data for the *Globe and Mail*, but we were able to obtain circulation figures at the CMA level for this newspaper.[22] We analyze circulation figures specifically for the *Globe and Mail* in a supplementary note to this paper;[23] our results indicate that the *Globe and Mail* was not affected by the newspaper mergers; in fact, its circulation remained quite stable across each province over the period of our study.

We argue that the remaining newspapers for which we do not have county level data will not affect our results significantly. The average weekday circulation of all daily newspapers during our study period is approximately 46,000 while the median is approximately 18,000. By contrast, 18 of the 27 omitted newspapers have a daily circulation of less than 10,000. Of the remainder, the largest are the *Kingston Whig-Standard* and the *Peterborough Examiner* with approximate daily circulations of 27,000 and 22,000 respectively. We will proceed with the county level analysis under the assumption that the omitted newspapers did not see major changes in their circulation at the county level, controlling for changes in aggregate circulation; in essence, we will take their county level circulation and market shares as given, and examine those newspapers on which we do have data. This method does allow us to say more on this subject than if we were to restrict ourselves only to the (complete) aggregate data.

Finally, in Table 3, we provide figures on the spread of newspapers across

of Montreal, Toronto and Vancouver.

[21] The largest circulating newspaper was, and remains, *The Toronto Star* . Its circulation was approximately 465,000 over the study period; however it was almost entirely confined to Ontario.

[22] CMAs (Census Metropolitan Areas) are geographic areas comprising an urban core of at least 100,000 plus the surrounding urban areas.

[23] The supplementary note contains an analysis of the *Globe and Mail*'s circulation. It also analyzes the 9 cities in Canada which have more than one daily newspaper publishing from them. This note is available from the authors.

Variable	Mean	Std. Dev.	Min	Max	Median
Newspapers per County	3.4	1.6	1	13	3
Counties per Newspaper	12.3	17.0	1	92	5

Table 3: Dispersion of Newspapers across Counties

counties. The mean and median number of daily newspapers per county are respectively 3.4 and 3. The mean and median number of counties across which a newspaper circulates are respectively 12.3 and 5.

4 Background on the Canadian Mergers

In this section we provide some historical background on the wave of newspaper mergers in Canada in the late 1990s and also present aggregate statistics detailing the extent of consolidation in the industry.

The Canadian newspaper mergers can be traced to three large business acquisitions between 1996 and 2000:

•Through a series of deals in 1995 and 1996, Hollinger Inc. acquired a controlling stake in the Southam group of newspapers (which included 16 daily newspapers) as well as completed the purchase of 25 daily newspapers from the Thomson group and 7 independent dailies.[24,25]

•On March 1st, 1999, Quebecor Inc. acquired the Sun Media chain of newspapers, including 14 daily papers, in a $983 million deal. Quebecor surpassed a bid by Torstar for purchasing Sun Media, but in turn sold four of its existing dailies to Torstar.[26]

•On July 31st, 2000, Canwest purchased 28 daily newspapers from Hollinger Inc. The $3.5 billion purchase constituted the largest media deal in Canada's history. It allowed Canwest to go from having a zero stake in the Canadian newspaper market to becoming the country's biggest publisher, with 1.8 million daily readers.[27]

[24] "Hollinger takes control of Southam: Black leading press baron", *The Gazette*, May 25, 1996.

[25] "Newspapers Are Reshuffled Across Canada", *The New York Times*, May 13, 1996.

[26] "It's Official: Sun Now Quebecor's", *The Toronto Sun*, March 2, 1999.

[27] "New news empire is born: CanWest Global picks up dailies from Hollinger for $3.5

Table 4 shows that the market share of the top 3 newspapers chains in Canada rose from 56% to 78% from 1995 to 1999 with Hollinger's share rising from 0 to 44%.

By 2002, the 3-firm concentration ratio was back down to 67%. Note that over this time, aggregate newspaper circulation in Canada had been steadily declining. The 1995-1996 merger wave is a particularly interesting case study of the effects of media concentration for several reasons. In most western countries, media industries are subject to more stringent restrictions on mergers and concentration than are other industries. For instance, in the United States, the Federal Communications Commission is entrusted with regulating the communications and media sectors. In contrast, Canada does not have specific legislation regarding competition in media. Instead the Competition Bureau regulates newspapers as it does any other product market:[28,29]

Thus the issue of insuring diversity in media is substantially sidestepped by Canadian Competition law. This legal arrangement allowed for the unprecedented wave of consolidation in the Canadian newspaper industry in the mid 1990's. It is worth noting that the Canadian newspaper market was already quite concentrated in the early 1990's. Indeed only 9 cities in the country at that time had more than one daily newspaper. The merger wave affected almost all newspaper markets in Canada; between 1995 and 1999, 75 daily newspapers changed hands. Over the same period, the national Herfindahl index rose from 1600 to 2400, indicating a shift from an industry with a moderate level of concentration to one with a high level of concentration.

It may appear that national concentration numbers are less important in an industry where competition tends to be local; for both newspaper readers and advertisers. Therefore, we now document the scale of the acquisitions using county level data. Since these data are more disaggregated, they provide a clearer picture of how a given newspaper chain's circulation overlapped with those of its rivals. In particular, we examine whether there was greater evidence of multi-market contact following the mergers. If the acquisitions increased the number of contact points between large national chains, it may have led to an increase in the probability of tacit collusion; this theory is referred to as the mutual forbearance hypothesis.[30] Table

billion." *The Gazette*, August 1, 2000.

[28] "Media concentration is at crisis levels", *The Toronto Star*, May 2, 1997.

[29] "The Competition Bureau's Work in Media Industries: Background for the Senate Committee on Transport and Communications" Competition Bureau, page 6.

[30] See Busse (2000) and Prince and Simon (2006) for recent empirical studies.

Ownership	Daily Circulation	National Market Share
1995		
Southam	1285746	0.26
Thomson	997425	0.20
Torstar	494719	0.10
Sun Media	472054	0.09
Quebecor	421841	0.08
Trans Canada (JTC)	283472	0.06
Others	1058793	0.21
Aggregate National Circulation	5014050	
1999		
Hollinger/Southam	2211945	0.44
Quebecor/Sun Media	1160572	0.23
Thomson	536346	0.11
Torstar	460654	0.09
Trans Canada (JTC)	257316	0.05
Others	345218	0.07
Aggregate National Circulation	4972051	
2002		
Canwest	1575936	0.33
Quebecor	973059	0.20
Torstar	671231	0.14
Trans Canada (JTC)	415345	0.09
Hollinger	259523	0.05
Others	918383	0.19
Aggregate National Circulation	4813477	

Table 4: Newspaper Ownership by Group

5 analyzes the effect that the newspaper acquisitions had on multi-market contact. We use data from 1995 and 1999 and document the extent to which the two dominant chains at the end of this period– Hollinger and Quebecor– increased multi-market contact with each other and with the other two large chains over this period.[31]

The figures in parentheses in Table 5 refer to the number of counties in which the two dominant chains were present; for example, the Hollinger/Southam group increased its presence from 90 counties in 1995 to 199 in 1999. The remaining figures refer to the percentage of each chain's circulation counties in which a rival group was also present in the corresponding year. For example, Hollinger overlapped with Quebecor in 28% of the latter's counties in 1995; four years later that number had increased to 74%. The two smaller groups, JTC and Torstar, saw increases in multi-market contact with one of the dominant chains but not both. The fraction of JTC's counties that contained a Hollinger newspaper increased from 37% to 90%, but was unchanged with respect to Quebecor. The Toronto Star initially had hardly any overlap with Quebecor, but by 1999 it encountered a Quebecor paper in 50 of its 51 counties. This was entirely due to Quebecor's acquistions, as the Toronto Star entered just 4 counties over this period.

These results suggest a greater possibility of tacit collusion in the period following the acquisitions. This is due not just to greater concentration as measured by national market shares of circulation, but due to increased contact points in local markets. Each of the smaller chains greatly increased its multi-market contact with one of the larger chains, and the two large groups significantly increased the number of markets in which they competed against each other.

5 Results

We now examine empirically the effect on prices of the merger activity described in Section 4. We first present results using aggregate figures for newspapers across all markets and then examine more detailed, county level data.

[31] At this point in time Canwest did not control any newspapers. Additionally, Sun Media had been acquired by Quebecor.

		Hollinger	Quebecor	JTC	Torstar
Hollinger:	1995 (90)	-	0.28	0.37	0.49
	1999 (199)	-	0.74	0.90	0.55
Quebecor:	1995 (123)	0.38	-	0.97	0.09
	1999 (128)	0.73	-	0.98	0.98

Note: Figures in parentheses refer to the number of counties in which each chain–Hollinger or Quebecor– was present in the corresponding year.

Table 5: Fraction of Counties with Multi-Market Contact

5.1 Price and Quantity Changes

In this section we examine whether the newspaper mergers had observable effects on newspapers' aggregate characteristics. Our identification strategy is a difference-in-differences approach. We compare various groups of newspapers: those that changed hands versus those that did not; those in the dominant newspaper chains versus the rest; and those that competed in multi-newspaper cities versus those which operated essentially as local monopolies. Again, because the predictions of the model are ambiguous, i.e. they depend on parameters of the valuation of advertisers and consumers that are difficult to estimate, we use the difference-in-difference approach to evaluate the impact of mergers on prices. In particular, if mergers decrease prices, this suggests that the switching consumer yields negative value to the firm. Likewise, if mergers increase prices, then the switching consumer is profitable. If there is no effect of mergers on prices, either we are in a situation where newspapers A and B do not compete for the same readers, or we are in a situation where the switching consumer yields profits of about 0 to the firm. Note that an important testable prediction of the model is that the change in the circulation price will be in the same direction as the change in the advertising price. Thus, if these prices move in different directions, this would invalidate the model.

The standard method for difference-in-differences calculations involves comparing the changes in the means for two groups – the treatment and control groups – before and after the treatment. The difference in the means is identical to the value of the coefficient β_3 in the following regression:

$$y_{it} = \beta_0 + \beta_1 posttreatment_t + \beta_2 treated_i + \beta_3 posttreatment_t * treated_i + u_{it}$$

where *posttreatment* and *treated* are indicator variables for the time period following the experiment and being in the treatment group, respectively.

Notice that we are adopting the language of natural-experiments; however in reality we do not believe that the treatment and control groups are randomly chosen representative samples, since firms self-select into these groups. Nevertheless, since these labels have become commonplace in the quasi-experimental literature in economics, we shall continue to use them here.[32] Moreover, it is not clear that a truly natural experiment is useful for a Competition Authority deciding on whether to approve a merger. The collection of mergers that come before the Competition Authority are never exogenous since firms initiate mergers. Moreover, mergers which are likely to increase market power will also be more profitable for the merging firms. In this context, we present an empirical examination of whether newspapers with greater market power exercised that market power in the form of higher prices.

For ease of presentation, we will only report the values of β_3 and its standard error in the tables that follow, along with the changes in the means for each of the two groups.

Table 6 compares characteristics of newspapers that changed hands over the four year period of consolidation 1995-1999, to those that did not. Here, the newspapers with changed ownership are considered to be in the treatment group.

It appears to be the case that neither circulation nor advertising prices at acquired newspapers experienced changes that were significantly different from those that did not change ownership. In general, average circulation prices rose slightly and average advertising rates fell slightly for both groups of newspapers. The fall in advertising prices is related to slight declines in circulation for both groups of newspapers over this period. Upon examining advertising prices per 10,000 readers (i.e. normalizing by circulation), it appears that advertising rates per reader decreased for newspapers with new ownership, and this change is significantly different from the change for unacquired newspapers, whose per reader advertising prices rose slightly over the same period. We also examined whether the two groups of newspapers had different percentage changes in circulation by looking at the difference in the logs of daily circulation, but there was no significant difference. The fact that there is no significant difference in either circulation or prices between merged and unmerged newspapers suggests that quality of the newspapers

[32] See Meyer (1995) for a discussion.

	Unchanged Ownership		Changed Ownership		Diff-in-Diff	
Change in Variable	Mean	Std Dev	Mean	Std Dev	Mean	Std Err
Circ. Price	0.13	0.09	0.11	0.10	-0.02	0.02
Weekday Circ.	-5952	8525	-2932	4075	3020	1736
Ad rate	-0.13	0.94	-0.43	0.67	-0.30	0.20
Av Pages	0.50	7.07	-0.57	5.41	-1.07	1.52
Ad rate per 10K	0.08	0.38	-0.12	0.30	-0.19	0.08
Log Weekday Circ.	-0.10	0.06	-0.10	0.09	0.00	0.02
N	26		75			

Table 6: Difference in Differences estimates for newspapers with changed ownership, 1995 to 1999

is not likely to have changed either.

In Table 7, we extend the time period of the study by looking at differences between newspapers with changed and unchanged ownership over the period 1995 to 2002. This allows us to examine whether the ownership changes had a delayed effect; it also allows us to examine the effect of the Canwest takeovers of 2000. The results of Table 6 continue to hold; it is not the case that newly acquired newspapers had significantly different changes in either of the two prices as compared to newspapers with unchanged ownership.[33] However the results do indicate that the newspapers with new ownership had significantly greater percentage declines in circulation compared with newspapers that retained their ownership. It is surprising, though, that this change appears a few years following the takeovers, rather than immediately following them.

In Tables 8 and 9, we examine whether newspapers that were part of the two dominant chains in 1999 and 2002, had significantly different price changes (from their 1995 levels) than the remaining papers. The two dominant chains were Hollinger and Quebecor in 1999 (controlling 67% of the daily newspaper market) and Canwest and Quebecor in 2002 (with 53% of the market).

Once again, there are almost no significant differences in the changes for

[33]There are fewer observations with changed ownership in 2002 than in 1999. This is because we classify newspaper ownership only according to the 7 groups defined in Table 4. Some papers that were acquired by a chain in the 1996-1998 mergers reverted to independent ownership by 2002.

	Unchanged Ownership		Changed Ownership		Diff-in-Diff	
Change in Variable	Mean	Std Dev	Mean	Std Dev	Mean	Std Err
Circ. Price	0.17	0.12	0.14	0.11	-0.03	0.03
Weekday Circ.	-3257	13354	-5989	13355	-2732	2907
Ad rate	0.26	1.44	-0.10	0.67	-0.36	0.27
Av Pages	-2.13	12.71	0.48	5.97	2.61	2.43
Ad rate per 10K	0.13	0.49	0.08	0.56	-0.05	0.11
Log Weekday Circ.	-0.10	0.13	-0.19	0.29	-0.09	0.04
N	30		71			

Table 7: Difference in Differences estimates for newspapers with changed ownership, 1995 to 2002

	Others		Hollinger/ Quebecor		Diff-in-Diff	
Change in Variable	Mean	Std Dev	Mean	Std Dev	Mean	Std Err
Circ. Price	0.13	0.10	0.11	0.09	-0.03	0.02
Weekday Circ.	-5118	7949	-3141	4396	1977	1564
Ad rate	-0.27	0.92	-0.39	0.69	-0.12	0.27
Av Pages	-1.65	7.10	0.25	5.24	1.90	2.43
Ad rate per 10K	0.05	0.37	-0.12	0.31	-0.17	0.11
Log Weekday Circ.	-0.10	0.06	-0.10	0.08	0.00	0.04
N	29		72			

Table 8: Difference in Differences estimates for Hollinger and Quebecor, 1995 to 1999

	Others		Canwest/ Quebecor		Diff-in-Diff	
Change in Variable	Mean	Std Dev	Mean	Std Dev	Mean	Std Err
Circ. Price	0.15	0.10	0.14	0.13	-0.01	0.02
Weekday Circ.	-3370	10338	-7933	16716	-4564	2956
Ad rate	-0.03	1.03	0.07	0.88	0.10	0.19
Av Pages	-1.10	8.86	1.18	7.38	2.28	1.63
Ad rate per 10K	0.01	0.44	0.21	0.65	0.20	0.12
Log Weekday Circ.	-0.14	0.16	-0.19	0.35	-0.05	0.06
N	61		40			

Table 9: Difference in Differences estimates for Canwest and Quebecor, 1995 to 2002

the two groups. The one variable that is significant (or marginally significant) is the per reader advertising price. However even in this case it is not clear what effect the mergers had; the Hollinger and Quebecor newspapers' per reader advertising prices experienced a greater price decline than the remaining newspapers in 1999; but the Canwest and Quebecor papers of 2002 had somewhat (though marginally significant) higher price increases than the other papers. We also examined percent changes in the variables of interest, rather than simply looking at the change in levels. We do not present those results here, other than the percent changes in circulation, but the results do not point to significant differences between any of the pairs of newspaper groups.

5.2 Results using county level data

Finally, we discuss the results using Herfindahl indices generated from county level circulation data. As discussed above, we create weighted Herfindahl indices that, for each newspaper, weigh the standard Herfindahl index in each county that the newspaper circulates in, by its circulation in that county, thereby assigning greater importance to counties where the paper has larger audiences. Therefore, as with a regular Herfindahl index, this measure ranges between 0 and 1, and the higher it is, the less the competitive nature of a firm's market. We use these measures to examine whether newspapers that faced a lower level of competition from rival publishers tended to see greater changes in their advertising or circulation prices. We distin-

guish between two types of the weighted Herfindahl index: Own Weighted Herfindahl (OWH), which calculates market shares based on the circulation of individual newspapers, and Group Weighted Herfindahl (GWH), which treats the publishing group as the unit of analysis in each county, though still weighs the Herfindahl by each individual paper's circulation. That is, for newspaper i,

$$\underbrace{OWH_i}_{\text{Own Weighted Herfindahl}} = \frac{\sum_k \left[circ_{ik} * \sum_j s_{jk}^2 \right]}{\sum_k circ_{ik}}$$

where $circ_{ik}$ is i's circulation in county k and s_{jk} is the market share of newspaper j in county k. Similarly, for newspaper i,

$$\underbrace{GWH_i}_{\text{Group Weighted Herfindahl}} = \frac{\sum_k \left[circ_{ik} * \sum_g s_{gk}^2 \right]}{\sum_k circ_{ik}}$$

where s_{gk} is the market share of group g in county k.

As can be seen from Table 2, there is significant variation across newspapers in this index. For comparison purposes, we have also shown values of another index, the Own Weighted Herfindahl (OWH) which calculates county level Herfindahl indices based on individual newspapers' market shares rather than the market shares of newspaper chains. This measure is not expected to change much over time since individual papers did not experience significant changes in their market shares. The mean value of OWH is 0.55 and of GWH is 0.61; these values range from 0.33 to 1. Table 10 shows that the average Group Weighted Herfindahl increased from 0.68 to 0.72 from 1995 to 1999. However, this increase in GWH was solely due to merger activity since OWH did not change over this period.

We estimate different versions of the specification outlined in equation 5, which regresses log ad rate per reader of newspaper i in year t on the Herfindahl for this newspaper.

$$\underbrace{r_{it}}_{\text{Log Ad Rate Per Reader}} = \beta_h \underbrace{H_{it}}_{\text{Herfindahl}} + \underbrace{\alpha_i}_{\text{Newspaper Effect}} + \underbrace{\gamma_i t}_{\text{Newspaper Trend}} + \underbrace{\delta_t}_{\text{Year Effect}} + \epsilon_{it} \tag{5}$$

We add newspaper fixed effects (α_i) to control for newspaper characteristics, such as wealthier readers for *Le Devoir* than the *Journal de Montreal*, which

Table 10: Change in Concentration of Canadian Newspapers from 1995 to 1999.

Year	Mean Group Weighted Herfindahl	Mean Own Weighted Herfindahl
1995	0.68	0.64
1996	0.69	0.63
1998	0.72	0.64
1999	0.72	0.62

may affect ad rates. We also introduce year effects (δ_t) to account for changes in the newspaper industry over time. Finally, we add newspaper specific time trends (γ_i) to the model to control for trends in newspaper ad rates, such as decreases in the Montreal Gazette's ad rates over time.

Table 11 presents estimates of the effect of increases in concentration (as measured by the Herfindahl) on advertising rates. In all specifications, we include newspaper fixed effects. Surprisingly, it seems that concentration increases advertising rates since the effect of Herfindahl on ad rates are significantly positive. However, when we control for year we find that the estimated effect of concentration on rates falls dramatically, indicating that newspaper rates are increasing over time for other reasons than changes in competition. Moreover, when we add newspaper specific time trends into the model, we find that concentration has no significant effect on ad rates. In fact, in specification III in Table 11, the 95% confidence interval on the effect of an increase in the group Herfindahl by 0.1 (well below the mean increase in group Herfindahl over the time period) would be between a 3.0% decrease and a 1.7% increase in ad rates. Thus, even for the most pessimistic estimate we would only expect prices to rise by less than 2 %.

In a similar vein, we also examine if cover prices increased at newspapers in markets which became more concentrated. We use the same specification for ad rates, detailed in equation (5). Table 12 presents regressions of circulation price on concentration. There is no evidence that concentration would increase cover prices since the coefficient on the Herfindahl is not statistically different from zero in any specification. Moreover, these estimated coefficients are also economically small, since an increase in the Group Weighted Herfindahl by 0.1 would cause between a 4.5 cent increase and a 3.9 cent decrease in the cover price if we take the 95% confidence interval from column III. Thus we cannot find evidence that increased concentration harmed newspaper readers.

These results are consistent with the model that we presented, for either

Table 11: Did More Concentrated Newspapers Raise Ad Rates? *(Dependent Variable: Log Ad Rate Per 10 000 readers)*

Variable	I	II	III
Group Weighted Herfindahl†	0.434	-0.067	-0.066
	(0.137)	(0.104)	(0.123)
1996		0.088	0.038
		(0.015)	(0.010)
1998		0.193	0.042
		(0.016)	(0.010)
1999		0.201	
		(0.016)	
Newspaper Fixed Effects	X	X	X
Newspaper Specific Trend			X
Observations	292	292	292
R Squared	0.04	0.52	0.83
Estimated Parameters	1	4	76
Number of Newspapers	73	73	73

†: Group Weighted Herfindahl is defined as the Herfindahl for a newspaper taking into account other newspapers owned by the same firm.

the case where the switching consumer yields a profit of about zero to the firm or the case where readership of newspaper A and B does not overlap before the merger, which will induce no change in cover price and hence no change in the advertising rate. Moreover, we find that ad prices and consumer prices change in the same direction (in this case no change), which is a testable implication of the model.

We also attempted to gauge the fraction of the population that was impacted by the ownership changes. From 1995 to 1999, 229 out of the 256 counties in our dataset experienced an ownership change for at least one of the newspapers circulating in the county. The total population of these counties was approximately 97% of the national population. However, only 58% of readers were impacted by the mergers by having their newspaper acquire new ownership. This is due to the fact that the acquired newspapers were, on average, smaller (average circulation of approximately 35,000) than those that were not acquired (average circulation of approximately 75,000). This is driven in large part by the fact that Canada's 3 largest newspapers—the *Globe and Mail*, *The Toronto Star*, and *Le Journal de Montreal*—did

Table 12: Did More Concentrated Newspapers Raise Cover Price? *(Dependent Variable: Newspaper Cover Price)*

Variable	I	II	III
Group Weighted Herfindahl†	-0.158	0.139	0.028
	(0.179)	(0.181)	(0.215)
1996		0.013	0.035
		(0.027)	(0.018)
1998		-0.104	-0.039
		(0.028)	(0.018)
1999		-0.085	
		(0.028)	
Newspaper Fixed Effects	X	X	X
Newspaper Specific Trend			X
Observations	289	289	289
R Squared	0.00	0.12	0.68
Estimated Parameters	1	4	75
Number of Newspapers	73	73	73

†: Group Weighted Herfindahl is defined as the Herfindahl for a newspaper taking into account other newspapers owned by the same firm.

not change ownership over this period.

6 Conclusion

In this paper we discussed the effect of mergers in two-sided markets, and in particular we examined the consequences of the wave of mergers and ownership changes that took place in the Canadian newspaper industry in the mid 1990s. Our goal was to focus on the economic effects that are easily quantifiable—the effect on circulation and advertising prices—rather than on the subjective issue of diversity in media opinions.

We first built a model of the effect of mergers in a two-sided market. Since newspapers have an incentive to screen consumers who have low value to advertisers, it is possible that the switching consumer yields either positive or negative profits for the firm. Thus a merger in a two-sided market may raise or lower the prices charged to readers and advertisers. Moreover, in our model, consumer welfare may increase or decrease after a merger, while advertiser welfare is unchanged.

We then tested these predictions using data from immediately before and after the newspaper mergers, as well as more recent data, to infer whether changes in the competitive environment had observable effects on prices and circulation. The answer appears to be that the ownership changes did not lead to higher prices for either set of consumers. Our empirical results are, therefore, consistent with the predictions of our model: it is not obvious that increased concentration in two-sided markets would lead to higher prices on either side of the market.

An important caveat to our results is that we cannot identify the causal effect of the mergers, since firms self-selected into the treatment and control groups; indeed the possibility exists that firms with greater market power following the mergers would have had lower prices had they not merged, and that they exercised their market power to keep prices at about the same level as the remaining newspapers. However, from the point of view of consumers there does not appear to have been an obvious collusive effect of the mergers, or an exploitation of concentration to raise prices by chains with market power. Indeed, acquired papers, and those that were part of the dominant chains, saw smaller price rises or greater price declines than other papers. Interestingly, there is only weak evidence that the mergers impacted circulation; as it may have been expected that new ownership could have an initial adverse effect on circulation, through editorial changes or other policies which could alienate existing readers.

Our findings hold true throughout the period of study, whether we examine price changes immediately following mergers, or after a 3 year gap. When we examine more detailed, county level data, there is no support for the hypothesis that either advertising rates or circulation prices rose for newspapers in more concentrated markets following the mergers.

Overall we vindicate the Competition Bureau's decision to permit these mergers since we find that they left the welfare of both readers and advertisers unaffected. Given these results, critics of newsprint consolidation need to prove that diversity in the Canadian press was adversely affected by these mergers, since there was no effect of these mergers on prices.

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