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Semi-Collusion in Media Markets

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Abstract

This paper explores the effects that collusion can have in newspaper markets where firms compete for advertising as well as for readership. We compare three modes of competition: i) competition in the advertising and the reader market, ii) semi-collusion over advertising (with competition in the reader market), and iii) (full) collusion in both the advertising and the reader market. We find that semi-collusion leads to less advertising (but higher advertising prices) and lower copy prices which is beneficial for readers. Under certain circumstances, semi-collusion may even benefit advertisers as newspaper circulation is higher. In addition, total welfare may rise due to semi-collusion. Results under full collusion are ambiguous. However, even under full collusion newspaper copy prices may decrease and welfare may increase.

JEL Classification: L40, L82, D43, K21.

Keywords: Media Markets, Collusion, Two-Sided Markets.

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1 Introduction

Competition in media markets has been subject to intense debate in both academic circles as well as among policy makers. The recent crisis of many media industries has led policy makers to rethink the framework governing many media markets. In the US, so-called joint operating agreements (JOAs) permitted under the Newspaper Preservation Act of 1970 have been introduced. A JOA is an agreement among separate newspapers within the same market area to combine their entire business operations. A JOA allows newspapers to jointly set all their prices, including circulation and advertising rates (see Busterna and Piccard (1993) and Romeo et al. (2003)). Hence, under a JOA the participating newspapers can fully collude. Another suggestion for policy intervention heavily discussed in Germany has been to allow newspapers to cooperate in advertising markets while competing in reader markets. Thus, in contrast to the US, this proposal would allow for semi-collusion, but not for full collusion.[1]

Apart from legal attempts to allow for cooperation among newspapers there have been several antitrust cases involving media firms. For instance, the Bundeskartellamt, the German competition authority, declined the proposal of several newspapers to form a common agency with the purpose of coordinating pricing for job market adverts.[2] Again in Germany, the two largest private TV groups (ProSiebenSat1 and RTL) have been convicted for colluding on advertising prices. Both cases represented instances of semi-collusion.[3]

Given the current lack of economic theory on collusion in two-sided markets, the aim of the present paper is to analyze the impact of collusion in media markets focusing in particular on the newspaper market. What are the conse-

[1] In Germany, some newspapers have already established separate firms ("Anzeigengemeinschaft") that handle the ad management on their behalf. Often, however, the firms in a "Anzeigengemeinschaft" belong to one owner (e.g., Zeitungsgruppe Stuttgart).

[2] See Bundeskartellamt decision B6-22131-M-49/99.

[3] Further examples of collusion in two-sided markets are given by Ruhmer (2009).

quences of the various forms of collusion on prices for reader and advertisers? Is collusion necessarily detrimental for welfare?

To analyze these questions we design a model of the newspaper market in a two-sided market setting. There are two newspapers which compete on the reader market as well as on the advertiser market by setting copy prices and the number of adverts to print. Via these decisions newspapers balance revenues from newspaper sales and advertising. In this framework, we analyze the outcome under three different modes of competition: i) competition in the advertising and the reader market, ii) semi-collusion over advertising (with competition in the reader market), and iii) (full) collusion in both the advertising and the reader market.

We are interested in studying the implications of collusion. Compared to competition we find that semi-collusion on advertising reduces the copy price for newspapers. The reason for this result lies in the two-sided nature of media markets. Colluding on advertising yields higher revenues from advertising which makes readers more valuable for newspapers. Hence, they compete more fiercely for readers which leads to a reduction in the copy price and an increase in newspaper circulation. Thus, newspaper copy prices are—at least partially—subsidized by higher advertising revenues. On the welfare dimension we find that semi-collusion is beneficial for readers as the the copy price is lower. We find that newspaper profits increase due to semi-collusion. This result is in contrast to the hypothesis of Evans and Schmalensee (2007) who claim that supra-competitive profits from the collusive side are competed away on the non-collusive side of the market. We show that this happens only partially such that semi-collusion is profitable for firms. More surprisingly, however, is that advertisers' surplus may increase due to semi-collusion even if advertising rates are higher than under competition. The reason is that semi-collusion does not only lead to

higher advertising rates but also to a larger newspaper circulation, bringing advertisers' messages to a larger readership. Under certain circumstances, this effect of a larger readership may outweigh the negative impact of higher advert prices, thus making the advertisers better off. Defining total welfare as the sum of reader and advertiser surplus as well as newspaper profits we show that total welfare may also increase due to semi-collusion.

If firms collude both on advertising and on copy prices results are less clear. The copy price may increase or decrease depending on whether the subsidization of advertising revenues into the copy price outweighs the immediate collusive price effect. Also, newspaper circulation may be higher or lower than under competition. What is clear, however, is that copy prices under full collusion are higher and newspaper circulation is lower than under semi-collusion. The same applies to total welfare. Under certain circumstances, total welfare may be higher under full collusion than under competition. However, welfare is always higher under semi-collusion than under full collusion. Thus, some of the positive effects of collusion over advertising are lost when newspapers can in addition collude in the reader market.

Our paper builds on two strands of related literature. Firstly, our paper is related to the fastly developing literature on two-sided markets.[4] Media platforms such as newspapers are prominent examples of two-sided platforms because of the existence of two-sided indirect network effects. While the number of recipients has always a positive impact on the demand for advertising space, the amount of advertising is either positively or negatively related to the demand for copies. The latter depends on the readers' attitudes towards advertising. In case that recipients value ads as informative (or even enjoyable) a positive impact exists. A negative attitude towards advertising leads to negative indirect net-

[4]For surveys of this literature see Roson (2005), Rochet and Tirole (2003, 2006) and Rysman (2009). The implications for antitrust policy are discussed in Armstrong (2006), Evans (2003) and Evans and Schmalensee (2007).

work effects, respectively. Our paper demonstrates that collusion in two-sided markets may have different effects than in traditional, one-sided markets. In particular, under certain conditions, collusion may be welfare-improving. The theoretical literature on collusion in two-sided markets is scant. To our knowledge, the only exception is Ruhmer (2009) who studies the stability of collusion in two-sided markets. The paper shows that collusion is harder to sustain the stronger the network externalities between the two sides are. Argentesi and Filistrucchi (2007) empirically assess collusion in the market for Italian daily newspapers and find evidence for collusion on copy prices, but no evidence for collusion on advertising rates.[5]

Secondly, our paper is related to the literature on semi-collusion, where firms compete in one dimension (usually price or quantity), but collude in another dimension such as location (Friedman and Thisse, 1993), R&D (D'Aspremont and Jacquemin, 1987; Fershtman and Gandal, 1994), capacity (Osborne and Pitchik, 1987), or quality (Foros et al., 2002). As this literature has shown, semi-collusion may be profitable and efficient under some circumstances (see, e.g., Brod and Shivakumar (1999)), usually because problems resulting from overinvestment in R&D, quality or capacity or inefficient product differentiation are resolved. However, semi-collusion is not always profitable and can also be inefficient (see, e.g., Fershtman and Gandal (1994) or Mukherjee (2002)). What the literature on semi-collusion has in common is that firms compete in one parameter, but collude in another parameter *in the same market*. In contrast, we will consider a situation where firms compete in one market (namely the reader market), but collude in another market (the advertising market). Hence, semi-collusion only has an indirect effect on reader markets through the two

[5] Relatedly, Chandra and Collard-Wexler (2009) and Fan (2010) study the impact of mergers in the Canadian resp. U.S. newspapers markets. The results are mixed however. While Chandra and Collard-Wexler (2009) find no significant impact of consolidation on copy prices and ad rates, Fan (2010) finds support for higher copy prices.

markets' relatedness.

The rest of the paper is now organized as follows: In the next section we combine the theories of two-sided markets and semi-collusion by introducing a simple model. Next, we analyze the outcomes of our model for (i) competition in both markets, (ii) semi-collusion where firms compete in copy prices, but collude over advertising rates, and (iii) full collusion over both markets. Section 3 compares the results and Section 4 provides some evidence from a welfare analysis. Section 5 concludes.

2 The Model

Consider a duopoly of two heterogenous newspapers which compete in quantities in the advertising market and in prices in the reader market. We consider these assumptions natural, as there are usually space constraints with respect to advertising but little capacity constraints with respect to the number of newspaper copies printed.

Following Singh and Vives (1984), a representative viewer gains the following utility from newspaper consumption

$$U_r = q_i(1+\gamma s_i) + q_j(1+\gamma s_j) - \frac{1}{2}(q_i^2 + q_j^2 + 2\theta q_i q_j) - q_i p_i - q_j p_j, \quad (1)$$

where q_i denotes the number of copies sold and p_i is the copy price readers have to pay for newspaper i. The parameter γ measures the impact that advertisements, whose quantity is denoted by s_i, have on the readers' willingness to pay for copies. We assume that this influence is positive ($\gamma \geq 0$), as most advertisements (such as classified ads) are informative in nature.[6] Newspapers are

[6] Support is given in Kaiser and Wright (2006) and Kaiser and Song (2009) who provide empirical evidence for the German magazine market that readers value advertisement positively. We discuss the robustness of our results with respect to this assumption in the concluding Section 5.

assumed to be differentiated in the readers' view, where the degree of product differentiation in the reader market is given by $0 < \theta < 1$. Of course, a higher degree of product differentiation is inversely proportional to θ. Maximization of the utility function with respect to q_i and q_j leads to following demand for newspapers:

$$q_i = \frac{(1-\theta) - (p_i - \theta p_j) + \gamma(s_i - \theta s_j)}{1-\theta^2}, \tag{2}$$

for i, $j = 1$, 2 and $i \neq j$.

Now we specify the advertising side of the market. Analogue to the reader side and again following Singh and Vives (1984), we specify the following per-reader utility function of a representative advertiser:[7]

$$U_a = \mu(s_i + s_j) - \frac{1}{2}(s_i^2 + s_j^2 + 2\beta s_i s_j) - r_i s_i - r_j s_j. \tag{3}$$

The advertising rate per reader is denoted by r_i, while s_i is the quantity of advertising printed. The advertising rate per reader can be interpreted as the "access price" that advertisers have to pay to obtain access to a reader. The total advertising rate is then $R_i = r_i q_i$. We also suppose that advertising space is differentiated over the newspapers from an advertiser's point of view, with $0 < \beta < 1$ measuring the degree of product differentiation in the advertising market.[8] The parameter μ (with $\mu > 0$) measures the relative size and, therefore, importance of the advertising market. To put it differently, both parameters γ and μ can be seen as network parameters measuring the strength of the indirect network effects from both markets. Then, advertisers have the

[7] As equation (3) specifies the per-reader utility, total utility of a representative advertiser is attained by multiplication with the number of readers.

[8] The reason for newspapers' differentiation on the advertising side is that the two newspapers attract different customer segments. Put differently, differentiation on the advertiser side mirrors differentiation on the reader side.

following per-reader willingness to pay for advertisement messages:[9]

$$r_i = \mu - s_i - \beta s_j. \tag{4}$$

Newspaper i's total profit from both the reader and the advertising market is then given by

$$\Pi_i = q_i p_i + q_i r_i s_i, \tag{5}$$

ignoring any fixed cost that there may be. Also, we assume that there are fixed marginal cost of producing a newspaper copy which, for simplicity, are set to zero.

To ensure interior equilibria we make the following assumption on parameter values:

$$\mu > \gamma \frac{(2-\theta^2)(1+\beta)}{2-\theta^2-\theta\beta}. \tag{6}$$

In the following, we consider a two-stage game where the two newspapers simultaneously set advertising quantities s_1, s_2 in the first stage and then copy prices p_1, p_2 (also simultaneously) in the second stage of the game. The assumption of Cournot competition in the advertising market has also been applied by, e.g., Crampes et al. (2009) or Peitz and Valletti (2008).

2.1 Competition in both markets

Let us solve the game backwards and first derive the optimal prices for given advertising levels s_i, s_j. Maximizing firm i's profit Π_i with respect to p_i yields

[9] A similar functional form for the advertising demand function is assumed in Reisinger et al. (2009). In addition, they provide a microfoundation for such a demand function. The assumption that advertisers' willingness to pay is specified per reader is a standard assumption in the literature (e.g., Anderson and Coate (2005)). This reflects that industry practice quotes advertising rates as per thousand viewers/readers.

the following first-order condition

$$p_i = \frac{1}{2}((1-\theta) + \theta p_j + \gamma(s_i - \theta s_j) - s_i(\mu - s_i - \beta s_j)). \tag{7}$$

As can be seen from the best response function (7) the firms' copy prices are strategic complements to their rival's copy price, which is a standard result for price competition with substitutes. The relationship between firm i's price and firm j's advertising level is ambiguous, as the sign of $\partial p_i/\partial s_j$ is equal to the sign of $(-\gamma\theta + s_i\beta)$, which can be either positive or negative. The intuition is here as follows: If readers like advertising ($\gamma > 0$), an increase in the rival's advertising space makes the competing newspaper more attractive so that, neglecting the feedback effect from the advertising market, the best response would be to lower one's copy price by a factor of $-\gamma\theta$. At the same time, however, an increase in the rival's advertising space is associated with a decrease in the advertising rate r_i by β. Hence, the marginal revenue from advertising declines, which in turn makes it less worthwhile for the firm to stimulate advertising demand through low copy prices so that, neglecting the first effect, the best response to an increase in s_j would be to increase p_i. Depending on the relative size of these two countervailing effects, the total effect may either be negative or positive.

Similarly, the relationship between a newspaper's advertising space and its copy price is ambiguous, depending on the magnitude of three different effects. First, an increase in one's advertising s_i directly increases readers' willingness to pay by γ. Secondly, an increase in one's advertising space is associated with a decrease in the advertising rate r_i. Again the marginal revenue from advertising declines, which in turn makes it less worthwhile for the firm to stimulate advertising demand through low copy prices. Thirdly, an increase in one's advertising space is associated with an increase in one's advertising revenues per newspaper sold which makes it more worthwhile for the firm to

stimulate advertising demand through low copy prices. Hence, the total effect for $\partial p_i/\partial s_i$ depends on the sign of $(\gamma + s_i - (\mu - s_i - \beta s_j))$.

Also note that the best response function (7) can be rewritten as $p_i = \frac{1}{2}(1 - \theta + \theta p_j + \gamma(s_i - \theta s_j) - r_i(s_i, s_j)s_i)$. This implies that the "access price" that advertisers pay to access a reader is partially handed back to the reader, i.e. the price per copy p_i is exactly lowered by $\frac{1}{2}r_i s_i$. Put differently, readers are "subsidized" to read the paper and the higher the advertising rate per reader the lower the copy price that readers have to pay. Note that from the newspapers's perspective an increase in the advertising rate per reader has the same effect on the optimal copy price as a downward shift in the readers' demand curve due to the partial pass-through of the advertising rate per reader.

Given firm i's optimal copy price p_i, we can rewrite firm i's profit as $\Pi_i(s_i, s_j)$. Maximizing with respect to s_i and solving the first-order condition yields the equilibrium advertising level, which is given by

$$s^C = \frac{(\gamma + \mu)(2 - \theta^2)}{4 + 2\beta - \theta\beta - 2\theta^2 - \theta^2\beta}.$$

Now it is straightforward to calculate the symmetric equilibrium values for p, q and r, which are given by:

$$p^C = \frac{1}{2 - \theta}\left[(1 - \theta)(1 + \gamma s^C) - s^C r^C\right], \tag{8}$$

$$q^C = \frac{1 + \gamma s^C - p^C}{1 + \theta},$$

and

$$r^C = \frac{\mu(2 - \theta^2 - \theta\beta) - \gamma(2 - \theta^2)(1 + \beta)}{4 + 2\beta - \theta\beta - 2\theta^2 - \theta^2\beta}.$$

Also note that $\Pi^C = (1 - \theta^2)(q^C)^2$.

Note that the copy price is the standard price that results under price com-

petition with differentiated products ($(1-\theta)/(2-\theta)$) corrected by (a) the advertising benefit that readers receive (γs^C) and (b) the advertising revenue per reader ($s^C r^C$). The advertising revenue per reader is passed through to consumers by a factor of $1/(2-\theta)$, so that with a reader market monopoly ($\theta = 0$) half of the advertising revenue per reader is "handed back" to readers. In general, the more of the advertising revenue per reader is passed through to readers via lower copy prices the more intense the competition in the reader market. With $\theta = 1$ (homogeneous products) the entire advertising revenue per reader is used to "subsidize" the copy price so that it becomes negative. Consequently, the firms' profits are reduced to zero as the entire advertising revenue is used to compete for (or to "buy") readers.

2.2 Semi-collusion over advertising

Now suppose that newspapers were allowed to collude over advertising. Since the firm's optimal pricing strategy as given by (7) does not change, we can immediately derive the optimal advertising levels. If firms can cooperate over advertising, they will jointly maximize the sum of $\Pi_i(s_i, s_j) + \Pi_j(s_i, s_j)$ before competing in the reader market. Maximizing with respect to s_i and s_j and solving the first-order conditions results in the following symmetric equilibrium advertising level

$$s^S = \frac{\gamma + \mu}{2(1+\beta)}.$$

The equilibrium copy price, quantity and advertising rate per reader are now given by

$$p^S = \frac{1}{2-\theta}\left((1-\theta)(1+\gamma s^S) - s^S r^S\right), \tag{9}$$

$$q^S = \frac{1}{(1+\theta)(2-\theta)}\left[1 + \frac{(\gamma+\mu)^2}{4(1+\beta)}\right],$$

and

$$r^S = \frac{\mu - \gamma}{2}.$$

Note that again the profits can be represented as a function of quantities as $\Pi^S = (1 - \theta^2)(q^S)^2$.

2.3 Full collusion

Finally, let us suppose that the two newspapers can collude over both copy prices in the reader market and advertising levels in the advertising market. In this case the price $p(s)$ which maximizes the firms' joint profit is given by

$$p = \frac{1}{2}(1 + \gamma s - s(\mu - s(1 + \beta)) = \frac{1}{2}\left(1 + \gamma s - sr(s)\right).$$

Given the cartel's optimal copy price $p(s)$, we can again rewrite the two firms' profits as $\pi(s)$. Maximizing with respect to s and solving the first-order condition yields the same equilibrium advertising level as in the case with semi-collusion:[10]

$$s^F = \frac{\gamma + \mu}{2(1 + \beta)}.$$

The equilibrium copy price, quantity and advertising rate per reader are now given by

$$p^F = \frac{1}{2}\left((1 + \gamma s^F) - s^F r^F\right),$$

$$q^F = \frac{1}{2\left(1 + \theta\right)}\left(1 + \frac{\left(\gamma + \mu\right)^2}{4\left(1 + \beta\right)}\right),$$

and

$$r^F = \frac{\mu - \gamma}{2}.$$

[10]The reason for this result lies in the fact that advertisers' willingness to pay is specified on a per-reader basis. Despite the fact that newspaper sales change in the two regimes, the joint profit-maximizing advertising level per reader does not change.

Firms' profits are $\pi^F = (1+\theta)(q^F)^2$.

3 Comparing the results

In order to analyze the effects that collusion can have, let us compare the results under the three different modes of competition. For that purpose, let us first compare semi-collusion with competition, before we compare semi-collusion and full collusion and finally, full collusion and competition.

3.1 Semi-collusion vs. competition

Given that firms collude in the advertising market under semi-collusion, it is not surprising that firms restrict advertising quantities when compared to a competitive advertising market, i.e. $s^S < s^C$. The reason is that, just as in traditional Cournot competition, firms set advertising levels above the joint profits maximizing level. Thus, advertising revenues per reader are higher in the case of semi-collusion. How does this affect the reader market?

Comparing copy prices and quantities we find that $p^S < p^C$ and $q^S > q^C$. That means, in our model, copy prices decrease and quantities increase when newspapers are allowed to collude over advertising. The intuition behind this finding is that firms compete more fiercely for readers once they have colluded in the advertising market. A higher profit from advertising is used to "cross-subsidize" readers, as can easily be seen from both the 'reaction function' as given by (7) and the optimal price $p_i^*(s_i^*)$, as given by (8) and by (9). Put differently, by lowering the copy price more newspaper copies are sold, which increases the demand for advertising. Since semi-collusion increases the profit made from advertising, which is used to "cross-subsidize" readers, copy prices are lower under semi-collusion so that income from readers decrease. This is a standard result in two-sided markets. Factors that lead to an increase of market

power on one side of the market tend to reduce the price on the other side of the market (e.g., Weyl (2009)). Profits are higher under semi-collusion which can be easily seen given that $\Pi^S = (1-\theta^2)(q^S)^2$ and $\Pi^C = (1-\theta^2)(q^C)^2$ and $q^C < q^S$. This is in contrast to Evans and Schmalensee (2007) who claim that profits of collusion on one side of the market are competed away on the other side of the market so that firms may not benefit from semi-collusion. In contrast, we show that supra-competitive profits are only partially competed away so that semi-collusion can lead to higher profits. Note, however, that as differentiation on the reader side vanishes ($\theta \to 1$), profits under semi-collusion and competition coincide. Only in this case the claim made by Evans and Schmalensee (2007) is indeed true and all profits realized on the advertising side are competed away on the reader side.

3.2 Semi-collusion vs. full collusion

Comparing the results under semi-collusion and full collusion we find that

- $s^F = s^S$ and $r^F = r^S$,
- $p^F > p^S$,
- $q^F < q^S$.

The amount of advertising is at the same level as in the semi-collusion case, $s^F = s^S$. It immediately follows that the contact price for advertisers (i.e., the advertising rate per reader) does not change and remains at the same level as under semi-collusion.

Not surprisingly, the quantity of newspapers sold decreases while their price increases if firms do not only collude over advertising, but also over copy prices.

While advertisers pay lower absolute advertising fees under full collusion ($r^F q^F < r^S q^S$) the reach of their advertisements, as given by newspaper circu-

lation, decreases proportionally. Thus in the case of full collusion, newspapers earn a lower fraction of their profits from advertisers but a higher fraction from readers.

Hence, our comparisons reveal that for readers who are indifferent about advertising ($\gamma = 0$) the unambiguously best situation is semi-collusion, as the copy price is lowest with $p^S < \min\{p^F, p^C\}$. This, in turn, raises the question of whether we can establish a clear ordering of prices or, put differently, whether there is an unambiguous relationship between p^F and p^C. Therefore, let us compare market outcomes under full collusion and competition more closely.

3.3 Full collusion vs. competition

Comparing market outcomes under full collusion and competition we can first of all observe that $s^F = s^S < s^C$ and $r^F = r^S > r^C$. This means that advertising levels are lower while contact prices are higher under full collusion than under competition, which is hardly surprising. To establish a relationship between p^F and p^C as well as between q^F and q^C is less straight forward, however. Comparing prices and quantities under competition and under full collusion, we find that copy prices may even be lower (and quantities higher) under full collusion than under competition. There are two effects at work here. On the one hand, collusion has the general tendency to weaken price competition among newspapers which tends towards higher prices. On the other hand, collusion on advertising raises the access price for readers and hence the cross-subsidy from advertising to copy prices. This tends to decrease copy prices. The overall effect is ambiguous and depends on the strength of these two effects.

To demonstrate the possibility that copy prices may be lower under full collusion than under competition we turn to an example where readers are indifferent about the level of advertising ($\gamma = 0$). This has the advantage that in

this case copy prices and newspaper circulation are inversely related. The direct collusive effect on prices is weak if newspaper are considerably differentiated (low value of θ). On the other hand, the subsidy effect is strong if competition in the advertising market is tough (large β) and the newspaper market is large (large μ). Figure 1 displays the difference between the collusive and the competitive copy price depending on the size of the advertising market (μ) for given values of θ and β. In the figure, we set $\beta = 0.8$ and two values of θ ($\theta_1 = 1/10$, $\theta_2 = 1/13$). The figure shows that for a smaller size of the advertising market, the collusive price is higher than the competitive price. In contrast, for larger values of μ, the collusive price may be lower than the competitive price making the cross-subsidy effect the dominant one.

4 Welfare analysis

Next a welfare analysis is provided considering the effects of collusive behavior in both markets. For this purpose, we compare reader and advertiser surplus as well as total surpluses which result under competition, full collusion and semi-collusion. We define total welfare as the sum of reader surplus, advertiser surplus and newspaper profits.

4.1 Reader surplus

Here we analyze the impact of collusion on reader surplus. In a symmetric equilibrium consumer surplus can be expressed as

$$W_r = \frac{(1 + \gamma s - p)^2}{1 + \theta}. \tag{10}$$

Collusion has an impact on both the copy price and the amount of advertising. As long as readers like advertising ($\gamma > 0$), the reduction of advertising due

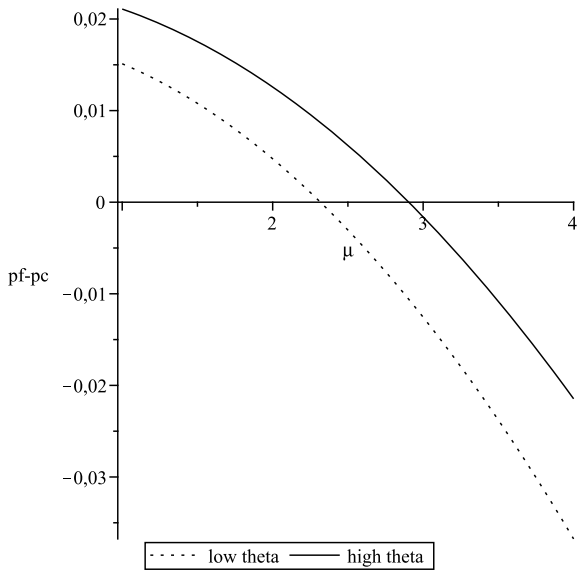

Figure 1: Collusive price may be lower than competitive price

to both collusion and semi-collusion impacts readers negatively.[11] On the other hand, consumer surplus rises with lower copy prices. In the case of semi-collusion copy prices are lower than under competition. Thus, comparing consumer surplus under competition and semi-collusion there are two opposing effects (lower copy prices vs. less advertising). In our model setup, the positive effect of lower copy prices dominates and consumer surplus is higher under semi-collusion than under competition. Comparing competition and full collusion it turns out that results are ambiguous. To see this easily, consider that readers do not care about

[11] For $\gamma < 0$, that is, readers dislike advertising, reduced advertising is positive for reader surplus.

advertising ($\gamma = 0$). We have shown before that both full collusion may lead to higher or to lower copy prices than under competition. Thus, even full-collusion may make readers better off. Note that consumer surplus is strictly higher with semi-collusion than with full collusion. This follows immediately as advertising is the same ($s^F = s^S$), but copy prices are lower with semi-collusion ($p^S < p^F$).

4.2 Advertiser surplus

Using equations (4) and (3) advertiser surplus can be expressed as follows:

$$W_a = q\frac{(\mu - r)^2}{1 + \beta}. \tag{11}$$

Advertisers benefit from low advertising rates per reader (low r) and high newspaper circulation (high q). As advertising rates are the same under semi-collusion and full collusion, but newspaper circulation is lower under full collusion it follows immediately that advertisers are better off under semi-collusion. Comparing competition and semi-collusion we see that the two effects oppose each other, advertising rates increase but so does circulation. The overall impact of semi-collusion depends on the strength of these two effects and both outcomes are possible. This is a quite surprising finding: Advertisers may actually benefit from collusion intended to raise advertising prices.

4.3 Profits

Profits in the three modes of competition can be ranked unambiguously. The higher the degree of collusive behavior the higher are the profits: $\Pi^F > \Pi^S > \Pi^C$.

4.4 Total welfare

Total welfare is defined as the sum of reader surplus, advertiser surplus and profits. Adding up these components total welfare can be expressed as:

$$W = 2q(1 + \gamma s) - q^2(1 + \theta) + q[2\mu s - s^2(1 + \beta)]. \tag{12}$$

We can determine the welfare optimal level of advertising and newspaper circulation:

$$s^W = \frac{\gamma + \mu}{(1 + \beta)}, \tag{13}$$

and

$$q^W = \frac{1}{1 + \theta}\left(1 + \frac{(\gamma + \mu)^2}{2(1 + \beta)}\right). \tag{14}$$

Advertising in any of the modes of competition we considered falls short of the welfare optimal level. More precisely, $s^W > s^C > s^S = s^F$. Even under competition advertising is too low, but collusion worsens the outcome on this dimension.

Comparing newspaper circulation we find that in all three modes of competition circulation is lower than optimal, that is, $q^W > q^S$. Note, as shown above, the relationship between q^C and q^F was unambiguous. Thus, depending on the specific parameter values, either $q^W > q^S > q^F > q^C$ or $q^W > q^S > q^C > q^F$. However, in this dimension, collusion can be beneficial as it may increase newspaper circulation closer to the optimal level.

Let us start considering the impact of semi-collusion compared with competition in more detail. The comparisons above reveal that there is a trade-off. On the one hand, semi-collusion leads to lower advertising which is bad. On the other hand, semi-collusion leads to higher newspaper circulation which is beneficial. The total effect thus depends on which effect is the stronger one.

It turns out that both are possible. Thus, semi-collusion can actually improve total welfare. For some circumstances, semi-collusion can even be a Pareto improvement in the sense that all players gain. We have seen that readers and newspapers gain unambiguously while advertisers may gain under certain circumstance. When this is the case, semi-collusion is a Pareto improvement.

Comparing full collusion and competition the same principal trade-off exists if full collusion leads to a higher circulation. Then, full collusion might actually improve total welfare. Otherwise, if $q^C > q^F$, full-collusion reduces welfare.

Comparing semi-collusion and full collusion we see immediately that semi-collusion leads to superior welfare outcomes. Advertising levels are the same, while newspaper circulation is lower due to higher copy prices.

Summarizing, collusion may actually improve welfare. The reason is that collusion induces a price structure that is more favorable to higher newspaper circulation, but lower advertising.

5 Conclusions

In this paper we have analyzed the impact of collusive behavior in media markets on advertising levels, circulation, copy prices, and advertising rates, using a simple duopoly model where firms first determine advertising levels and then compete in newspaper copy prices.

As we have found, policy proposals to allow for collusion in newspaper advertising markets may actually benefit readers. In contrast, concerns that such an exception from general competition law would not only lead to higher advertising rates but also to an increase in copy prices are not warranted on the basis of our model. This is because an increase in the profit generated from advertising may lead to larger cross-subsidies towards newspaper copy prices. In fact, readers may even be better off under full collusion than under compe-

tition. In addition, our welfare analysis has shown that collusion may have a positive impact on total welfare. However, semi-collusion is always preferable to full collusion.

Our results have been derived under the assumption that advertising is enjoyed by readers. One may wonder how our results would be affected if readers dislike advertising (that is, $\gamma < 0$). We have checked for the robustness if reader are not too ad-averse ($0 > \gamma > -\mu$). In all scenarios, equilibrium advertising decreases with the degree of ad-aversion, and for $\gamma < -\mu$ advertising would be reduced to zero. It turns out that our main results still hold under the assumption that readers dislike advertising. Semi-collusion leads to lower advertising levels, higher ad prices and larger newspaper circulation. In addition, the welfare results are confirmed as reader surplus and newspaper profits are higher. The effect on advertiser surplus as well as on total welfare are still ambiguous.

The paper demonstrates that the impact of collusion can be quite different in two-sided markets compared to one-sided markets. Though we have framed our analysis in terms of the newspaper market we believe that our results are more general and similar effects may exist in other two-sided markets. Finally, a word of caution in terms of policy conclusions is in order here. Even though we have demonstrated that collusion may have efficiency-improving effects we do not claim that collusion cannot be used in an anti-competitive way. We still like to point out though that in a two-sided market environment there can be an additional efficiency-enhancing aspect that is not present in a classic one-sided market.

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