Media Mergers and Media Bias with Rational Consumers

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ABSTRACT

We present an economic model of media bias and media mergers. Media owners have political motives as well as profit motives, and can influence public opinion by withholding information that is pejorative to their political agenda – provided that their agenda is not too far from the political mainstream. This is true even with rational consumers who understand the media owners' biases, because the public do not know how much information the news organizations have and so do not know when news is being withheld. In line with conventional wisdom, this problem can be undone by competition; but competition can be defeated in equilibrium by media mergers that enhance profits at the expense of the public interest. We thus derive a motive for media merger policy that is completely distinct from the motives behind conventional antitrust. While media bias may reduce the profit incentives to merge, media markets nonetheless err to being insufficiently competitive, and the consequences of merger are more severe than in other markets.

KEY WORDS: Information withholding, market for news, media bias, media mergers, pricing information, entry for buy-out

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1 Introduction

The hand that rules the press, the radio, the screen and the far-spread magazine, rules the country. - Judge Learned Hand, Memorial service for Justice Brandeis, December 21, 1942.

Media consolidation in the United States in recent decades has been dramatic,[3] and particularly so for local media.[4] Recent abortive attempts by the Federal Communications Commission (FCC) to relax merger restrictions have ignited fears by many that consolidation would accelerate, leading to diminished diversity of political expression and weakened public discourse. Some vehement opponents of relaxed merger scrutiny have argued that because of the threat of faster media consolidation 'democracy is in crisis' (Blethen (2004)).[5]

The controversy is both political and economic: even if a media merger increases profit, it affects how well informed is the public and hence political outcomes. This means that traditional IO merger analysis is inadequate for media mergers, and until recently policy debates have been dominated by non-economists. This paper presents an *economic* model of media bias and media mergers that incorporates informational and political issues from the outset. We show that if media corporations are motivated by political motives as well as profits, then (provided that their motives are not too extreme) they can distort information in order to manipulate political outcomes to the detriment of social welfare, even if consumers are rational. Monopoly is most useful to the publisher when its tastes are most similar to the

[3] Bagdikian (2000) charts the concentration of the media into the hands of six large firms. AOL/Time Warner is a vast media conglomerate. Clear Channel Communications now owns 1,200 radio stations, reaching 180 million listeners (Hopkins, 2004). The Gannett newspaper chain owns 101 daily newspapers (Gallagher, 2005).

[4] George and Waldfogel (2000) report that 25% of Metropolitan Standard Areas (MSA's) in the US are served by only one newspaper, while the median MSA is served by only two, with the median HHI equal to 75% (see their Table 1; HHI is the inverse of the 'Paper Equivalents' statistic). For local radio, measuring market shares by ownership rather than by radio stations *per se* and averaging across city markets, Waldfogel and Wulf (2006) report average 2-firm concentration ratios rising from 0.51 in 1995 to 0.63 in 1998, and 4-firm ratios rising from 0.75 to 0.86 (Table 1).

[5] The rise of the internet has not blunted public concerns about media consolidation. The internet, rather than providing *new* sources of news to compete with old ones, mostly provides alternative circulation routes for *existing* news (such as newspapers' online editions), as well as public fora for discussion of news.

population as a whole. If they are very dissimilar, no manipulation is possible. If, though, they are moderately different, a news monopoly will be politically disadvantageous.

As per conventional wisdom, the monopoly problem can be undone by competition. However, competition can be defeated in equilibrium by media mergers that enhance profits at the expense of the public interest. The market equilibrium can provide too little competition, but (if greed is a sufficiently strong motive) never too much; these problems persist even if media owners' political motives become vanishingly small compared with their profit motives. Concern about information withholding provides a rationale for merger restrictions in media industries that is absent in others.

In the remainder of this section, we provide some relevant background on the media industry and its regulatory environment, sketch our model, and discuss other relevant work.

1.1 Background

In the US, the FCC commissioners in 2003 voted 3-2 to relax FCC rules for merger approval.[6] Considerable public opposition flared up (from such disparate parties as the liberal moveon.org group and the National Rifle Association), and the new rules were overturned in a Federal court in 2004. The rules were sent back to the FCC for review, and have not been reissued since.[7]

Concern about media mergers arises because: (i) some media corporations have political motives; (ii) it is possible to bias news coverage significantly within conventional journalistic methods. Consequently, media corporations can tilt the news towards their political interests. We discuss these characteristics in turn.

[6] Previously the FCC had ruled that no single media entity could reach more than 35% of US households via TV, while the new rules raised the cap to 45% (Copps (2003) argues that *de facto* the cap would actually be 90% because of the treatment of UHF channels). The previous rules had barred owning a TV station and a newspaper in the same market, but the new rules allowed three TV stations to be owned by the newspaper publisher in large markets.

[7] See Labaton (2004) for an account of this story.

(i) Media organizations with agendas. Bernard Goldberg (2001) famously argued that the major news media in the US are biased with a liberal political agenda. Alterman (2003) rebutted that the media's real bias is in protecting its owners' corporate interests. Bagdikian (2000) argues that the proliferation of newspapers in the nineteenth century fostered pro-labor reforms, while current corporate control leads to a bias toward corporate-friendly political outcomes. Beyond professional media analysts, American news *consumers* increasingly perceive the presence of political agendas shaping the news they watch and read.[8]

The presence of news organizations with an agenda beyond profit is underlined by major news organs that do not make any profit. The *New York Post*, owned by Rupert Murdoch's News Corporation, has been estimated to lose between $15 and $20 million annually: "Murdoch appears willing to underwrite Post losses, perhaps for the political bully pulpit it affords him" (Fine (1999)). *The Washington Times* is owned by Sun Myung Moon of the Unification Church and promotes a conservative point of view to balance perceived liberal bias elsewhere in the media. It has been estimated as having lost $1.7 billion (see Ahrens (2002)).

The idea that a news provider can have an agenda and affect political outcomes is not new. Allen (1984) shows how a German town was converted to Nazism before the Second World War with the aid of the local newspaper. The Big Three newspapers in South Korea, with a combined market share of about 65%, are often accused of actively promoting a conservative political agenda (see Yang (2002)).

Perhaps the most striking example is Silvio Berlusconi, the Italian Prime Minister who was narrowly defeated in April 2006. Berlusconi is a television magnate who, while in

[8] One recent survey (Annenberg (2005, p.3)) reports that 79% of the public believe that news providers will self-censorship to avoid antagonizing advertisers. Another (PEW (2005, pp.7-8)) reports that "Six-in-ten see news organizations as politically biased, up from 53% two years ago. ... 72% say news organizations tend to favor one side, rather than treat all sides fairly; ...by... 73%-21%, the public feels that news organizations are often influenced by powerful people and organizations, rather than pretty independent."

power, controlled close to 90% of Italian television.[9] He was not reluctant to use this power to control content, with a history of bullying both publicly- and privately-owned stations under his control, firing critics and satirists (Stille, 2006), and using his privately-owned stations as a 'fan club' (Economist, 2002).

Finally, Rupert Murdoch has been known to harbor a political agenda, at one point promising to prohibit his British newspapers from publishing anything favorable to the prospect of the UK joining the Euro zone (Harding (2002)) and recently admitting that he had attempted to sway public opinion on the Iraq War (Szalai, 2007).

In short, news organizations with a political agenda and a willingness to use the news to promote it are by no means a mere theoretical possibility.[10]

(ii) Feasibility of bias within accepted journalistic standards.

Press bias is often manifested in sins of omission (or hiding an inconvenient fact at the end of a long article, or deep inside the newspaper), and they are the focus of our formal model below. A reporter may also pass on thinly-sourced information, subjecting contrary information to a higher standard, or may tilt a given set of facts through emphasis or subtle choices of words (see Gentzkow and Shapiro, 2007). As Posner (2005) puts it:

> Not that the media lie about the news they report; in fact, they have strong incentives not to lie. Instead, there is selection, slanting, decisions as to how much or how little prominence to give a particular news item.

Proponents of the US-led war in Iraq complain that the US press systematically omits good news from Iraq, such as successful relations between soldiers and local communities (see

[9] Companies controlled by the Berlusconi family have a 45% share of the Italian commercial TV audience, and 60% of advertising sales (www.ketupa.net/berlusconi.htm). Putting his own 3 stations together with the public RAI stations put the Berlusconi share at approximately 90% of the television audience (though RAI 3 appears to have taken a more independent or even anti-Berlusconi stance) (Stille (2006)).

[10] A political agenda by media owners would be irrelevant if the owners had no way to influence the journalists in their employ. However, owners choose editors who choose stories to run and where to assign journalists. Overt interference aside, there is considerable evidence that journalists censor themselves to avoid antagonizing the organization that employs them (Alterman (2003, p.24)).

Robbins (2004)). Some opponents of the war argue that the press was too eager to curry favor with the current administration. Goldberg (2001) argues that media reports suppress information of drug addiction and criminality among the homeless in order to elicit sympathy for them. Sinclair Broadcasting Group refused to air an episode of *Nightline* that listed the names of soldiers killed in the Iraq war (de Moraes (2004)). The editor of the *Washington Times* is open about using 'story selection' to give a conservative tilt to the publication (Ahrens (2002)). Puglisi and Snyder (2008) document the tendency of Democratic papers to report more coverage of scandals involving Republican politicians than Democrats, while Republican papers are more inclined to cover Democrats' scandals.

In March and April 2006, one Berlusconi station, RETE4, was fined 450,000 Euros by the Italian broadcasting watchdog for biassing its coverage blatantly in favor of Berlusconi's coalition (Barber (2006)). The imbalance was quite transparent: in one 15-day period in January, Berlusconi's airtime amounted to three hours and 16 minutes, while his challenger Romano Prodi had eight minutes (Hunt (2006)).

Enikolopov, Petrova and Zhuravskaya (2007) show the (exogenous) presence of an independent TV news channel significantly increased votes for the opposition party. They also suggest these results are larger than those found in established democracies. The Big Three Korean newspapers are said to "stifle stories critical of their interests"(Yang, 2002).

Thus, news organizations in many cases do have both the motive and the means to skew news coverage in the direction of a political agenda, through means that can be subtle and quiet but nonetheless potentially effective.

1.2 A sketch of our approach.

We present an economic theory of media bias and media mergers to examine when the political agendas of news organizations offer a rationale for government intervention. This requires a model with several elements. First, there must be some variable, x, whose true

value is not known to the public and that is relevant to political outcomes. This could be a politician's integrity, the state of the economy or of social security, or the situation in Iraq.

Second, it must be possible that documented information uncovered by a news organization can indicate the true value of x.[11] For simplicity, we assume that either the news organization uncovers information that proves the value of x, or else it uncovers nothing.

Third, there must be a public-sector decision that is affected by the public's beliefs about the value of x. Assume that this public sector decision is determined by majority voting (which adds no complication because all voters will be assumed identical).

Fourth, to explain the existence of private-sector news organizations, there must be a market demand for news. This is tricky, because news naturally has a public-good quality: unless a citizen expects to be a pivotal voter, which is effectively a zero probability event, becoming a more informed voter yields a negligible payoff in the form of improved electoral outcomes. Thus, we need a device to explain why consumers will pay for a newspaper (or spend valuable time watching the news on television). We assume that private decisions made by consumers can be better informed by knowing x.[12]

One must purchase a newspaper to learn what information its publisher is making public about x. (One might hear informally about a story in the paper from friends, but it is necessary to purchase the paper and read the story carefully in order to understand the information.) Perhaps x is the state of the social security program and the private decision concerns retirement planning. Alternatively, x is the state of terrorist threats and the private decision concerns travel plans, or x is the health of the public school system and the private choice is between public and private school. The desire to learn about x to make a better private decision generates a market demand for news, and this then through the voting

[11] The most closely related paper, Strömberg (2001), has a slightly different informational role for the press. In his model, the press can communicate the policy stands of politicians to the electorate, rather than states of nature.

[12] Another route is to assume some entertainment value to news, as in Strömberg (2001). We can readily allow papers to have some entertainment value too.

system affects the direction of the public decision. This does not though mean that there is only a single issue of concern to voters. Instead, the model can be interpreted (under some restrictive assumptions) as describing multiple issues: this point is elaborated in the section describing the model.

For concreteness, we assume that all news is propagated by newspapers alone, and that newspapers generate revenue only by the purchase price. Of course, neither assumption is realistic, and we discuss further below how advertising finance can be incorporated, and (hence) how the model can be construed as competition between television and newspaper.

A key feature of our model is that consumers are *rational*. We show that strategic information management can still affect public opinion even when consumers understand the bias of a news provider. Because consumers of news media do not know how much information a given news organization has, if the organization presents no news that is pejorative to the view of its owners, citizens do not know whether that is because of a genuine lack of information or because information is being withheld. Under monopoly, this prevents the familiar 'unraveling' observed in other models, such as the Milgrom (1981) 'persuasion game.' In that game, a sender with private information can send information to or withhold it from a receiver in order to induce the receiver to undertake some action. Because the receiver understands the sender's preferences, she understands that the sender will send only the information most favorable to his case; in this way, the receiver can deduce all of the sender's private information in equilibrium (a similar mechanism is at work in Lipman and Seppi (1995)). In our model, uncertainty about whether the sender (the news organization) has information will prevent complete deduction of its information, with the result that a news organization can sometimes manipulate political outcomes to its advantage.[13]

Under competition, the truth is revealed to consumers who buy both papers. As noted

[13]In this respect, the mechanism is similar to the one used in the lobbying model of Bennedsen and Feldmann (2006).

by Milgrom and Roberts (1986, p.19) "it has been argued that 'free and open discussion' or 'competition in the market for ideas' will result in the truth being known and appropriate decisions being made" and this feature arises naturally in our model.[14]

We should be up-front about the limitations of our approach. We offer a static analysis, and hence do not have reputational effects.[15] We do not allow for punditry or opinion-mongering, which is quite different from news although it is often bundled with it. We also do not allow a news organization to improve its news-gathering ability by spending more resources on it. We offer our model as the simplest oligopoly model of media mergers and media bias with rational consumers, to capture the political externalities from merger in the clearest way. We think of this exercise in the spirit of the original Cournot model, for example, which should be understood before a richer structure is contemplated.

1.3 Related Literature

A number of authors have attempted to measure media bias statistically, although no consensus has emerged regarding the existence or character of bias. D'Alessio and Allen (2000) review studies in the communications literature, finding little robust evidence of aggregate bias. Groseclose and Milyo (2005) measure bias by comparing media citations of think-tanks with Congressional citations of think-tanks, and find a left-wing bias. Gentzkow and Shapiro (2007) show how such a result can be interpreted as profit-maximizing behavior rather than bias per se. They distinguish between 'slant,' which indicates how coverage is skewed toward a particular political agenda, and 'bias,' which indicates how a given newspaper's slant differs from its profit-maximizing slant. They also propose a new measure of slant, comparing a newspaper's word choices to the word choices of Republican and Democratic members of

[14] They go on to show this can be true even with a single biased sender, on the lines of the Persuasion Game noted above, though we have closed down this unraveling with the mechanism of unsure information holding. They also show that the truth will out under competition even if the decision-maker is unsophisticated.

[15] Li and Mylovanov (2008) address this topic in the context of media bias and a repeated game: once reputation is lost though (through an adverse shock), it is lost forever in their model.

Congress. Significantly, Gentzkow and Shapiro find that although the *median* bias in US newspapers is close to zero, there is a large amount of *variance* in the bias as well, so that individual papers show significant bias in one direction or another.[16]

The theoretical literature on media bias, can be broadly split into two main camps: demand side, in which profit-maximizing news media supply consumers' preferred slant; and supply side, in which news media with a political agenda impose slant to manipulate political outcomes. One prominent demand-side model is Mullainathan and Shleifer (2005), which analyzes equilibrium slant for newspapers using a location model. In a similar vein, Gabszewicz, Laussel, and Sonnac (2001) analyze the newspapers' location game taking into account the effect of slant on newsstand prices and advertising revenues: if advertising demand is strong, the two newspapers choose identical slant, but if it is weak, they choose maximum differentiation. Bernhardt, Krasa, and Polborn (2008) also analyze the political process with a demand model that incorporates consumer demand for slant.

Balan, DeGraba, and Wickelgren (2004) proffer a supply-side analysis of bias with owners having preferences for tilting what is read. The consumer demand for newspapers depends on the amount of "persuasion" in each of two newspapers (although the price of the newspapers is exogenous). Newspaper owners' objectives depend on "effective persuasion" plus profit, where effective persuasion is own persuasion offset or abetted by the rival's persuasion. A variation on the supply-side theme is developed in Ellman and Germano (2008) and in Germano (2008): media self-censor to avoid annoying the advertisers that finance them. Several compelling examples are given in these papers.

Two papers model demand-driven slant with consumers who are not intrinsically interested in slanted or biased opinions. In Gentzkow and Shapiro (2006), slant arises through a

[16] Another relevant empirical literature shows that media effects can have measurable effects on political outcomes: DellaVigna and Kaplan (2007) on the Fox News effect in US elections; Snyder and Strömberg (2004) on US newspapers' effect on the performance of representatives in Congress, and Besley and Burgess (2001, 2002) on the effect of newspapers on government responsiveness to food shortages in India. See also Gentzkow and Shapiro (2008) for a fine survey.

reputation game whereby newspapers strive for quality reporting: this can sometimes best be delivered by following people's priors rather than the truth. Chan and Suen (2008) assume that the communication technology offered by newspapers is quite limited in that they can only say whether the true state of nature is above or below a critical threshold. This implies that readers will buy only one newspaper to help decide which party to vote for. Since the optimal choice is the paper closest to their own preferred threshold, the model generates the result that people buy papers offering opinions close to their own political beliefs, and they do so in order to be able to decide more finely between closely competing alternatives.

A type of demand-driven bias is derived in Strömberg (2001 and 2004). A single newspaper decides how much space to devote to issues. Demand for the newspaper is generated from individuals of two types: each gets a benefit when it reads news about its concern, and is more likely to read such news the more space the newspaper devotes to it. Thus, profit-maximizing news media cater more toward serving the informational needs of population segments who are more willing to pay for information.

Our approach overlaps with several of these papers. We share with Balan, DeGraba and Wickelgren (2004) a supply side model whereby owners aim to influence outcomes, and also a concern for the effects of mergers and merger policy. We share with Strömberg (2004) that the model generates internally a demand for the newspaper. We share with Chan and Suen (2008) and Gentzkow and Shapiro (2006) that consumers are Bayesian, updating their beliefs after reading reports in the newspaper. Ours is the first model showing how a politically motivated publisher can manipulate political outcomes with rational, Bayesian consumers who know the publisher's bias.

The next section sets out the model in detail. Section 3 determines the information that news organizations will reveal in equilibrium, and what readers infer. Section 4 compares equilibrium prices under different market structures. Section 5 considers when mergers arise, and the implications for information dissemination and merger policy. Section 6 summarizes.

2 The Model

Let $x \in [0,1]$ be the variable whose true value is not known to the public. The exogenous common prior for x has density $f(x) > 0$ with associated cumulative distribution function $F(x)$. Denote by $\rho \equiv \int_0^1 xf(x)dx$ the *ex ante* mean of x, and denote by $\sigma^2 \equiv \int_0^1 (x-\rho)^2 f(x)dx$ the *ex ante* variance. Let π be the probability that the news organization uncovers proof of the true value of x. We assume that $\pi > 0$ is the same for all news organizations, and that information discovery is perfectly correlated for all active news organizations.

The public sector decision, d^{pub}, can take the value -1 or 1. Denote the private decision $d^{priv} \in [0,1]$. The typical citizen's preferences are summarized by the utility function:

$$U^{cit} = -\alpha_1(x - d^{priv})^2 + \alpha_2(x - \beta)d^{pub} - \sum_i p_i n_i, \tag{1}$$

where $\alpha_i > 0$ and $\beta \in [0,1]$ are constants; p_i is the price of newspaper i; and n_i is a dummy variable indicating purchase of newspaper i (where the index i covers all newspapers available). Clearly, if the citizen knew x, she would want to set $d^{priv} = x$. If $x > \beta$, the citizen would prefer that the political process set $d^{pub} = 1$ while if $x < \beta$, the citizen would prefer that $d^{pub} = -1$. More generally, if the posterior Bayesian mean for x is greater (less) than β, voters prefer $d^{pub} = 1$ $(= -1)$. We normalize the population size to unity.[17]

Although we phrase our description and discussion in terms of a single event, it applies equally well to a series of issues that voters may care about (so that readers need to buy papers on a daily basis and not just when a single event happens). Suppose indeed that there are multiple issues and citizen utility is given by $U^{cit} = -\Sigma_j \alpha_{1j}(x_j - d_j^{priv})^2 + \Sigma_j \alpha_{2j}(x_j - \beta)d_j^{pub} - \sum_i p_i n_i$, where the subscript j denotes a particular issue (cf. (1)) with the same β and with the same priors for each event (i.i.d. across events). This generates the same

[17] The assumption that all citizens are the same does imply that they read both newspapers in equilibrium, as will be seen later. This unrealistic property derives from our aim of eliminating conventional deadweight loss concerns from the model in order to focus on the new form of distortions arising from political management of news. We can allow for heterogeneous voters by treating (1) as representing the preferences of the median voter. None of the analysis changes as long as all voters have the same value of α_1.

disclosure behavior on each issue as that described below, and thence the same demand for news (under the substitutions $\Sigma_j \alpha_{1j} \equiv \alpha_1$ and $\Sigma_j \alpha_{2j} \equiv \alpha_2$), although a single newspaper will now contain a mixture of true reports and obfuscation/omission. Think finally of political competition between parties with the sole objective of getting elected: this results in decision d_j^{pub} in dimension j. Then, if the true state were always revealed, the *fraction* of issues with $d_j^{pub} = -1$ tends to $F(\beta)$ (as the number of issues gets large); under the running assumption of a single issue, $F(\beta)$ is the *probability* that the public decision on the issue is $d^{pub} = -1$.

The usual economic objections to monopoly do not apply in this model. This is because all consumers of news are identical, and under a news monopoly each decides simply to buy or not buy the one available newspaper. Without a downward-sloping demand curve, there is no conventional monopoly deadweight loss. Thus, the usual economic analysis of antitrust is not relevant. However, we shall see that a new political-economic rationale for antitrust can arise, based on the political manipulation of information.

There are two possible publishers, A and B. The payoff to publisher i is:

$$U^i = \alpha_i(x - \beta_i)d^{pub} + p_i n_i - \delta_i K, \qquad i = A, B, \tag{2}$$

where $\alpha_i > 0$; $\beta_A = 0$; $\beta_B = 1$; δ_i is a dummy variable taking a value of 1 if publisher i operates a newspaper and 0 otherwise; and $K \geq 0$ is the cost of operating a newspaper. The first term represents the publisher's interest in the public-policy outcome, and the second represents its profits.[18]

Clearly, publisher A would like to see $d^{pub} = 1$, regardless of x, while B would like to see $d^{pub} = -1$. The α_i parameter measures the strength of this political motive relative to the profit motive. A publisher cannot commit to not interfere in the operation of the news organization. All of this is common knowledge. This is important, because it means that consumers of the news take into account the political motivations of the publishers of the

[18]For simplicity, we ignore the publisher's private decision, variable production costs, and distribution costs, as they have no role in what follows.

news in deciding which news sources to use.

The structure of the industry is either a monopoly by publisher A or B, competition between the two, or no newspaper. Denote the structure by S, which takes the values A, B, C, and $\emptyset$ representing these four structures respectively. The sequence of events is as follows. Each publisher in the market chooses its price p_i (simultaneously if they are both functioning), then the state x is either revealed to all publishers in the market (with probability π) or is not revealed (with probability $(1-\pi)$). If x has been revealed, each publisher then decides whether to print the information or to withhold it. Each consumer then, knowing the biases of the publishers and the prices they charge but not the content of the newspapers, decides whether or not to purchase a copy of each available newspaper. The Bayesian prior on x is updated with any information revealed in the papers, consumers vote on d^{pub}, and they make their decisions on d^{priv}. Payoffs are then realized.

In practice, newspapers are partly financed by advertising revenues, and for many this is the dominant income source. The simplest way to think of (pure) advertising finance is to write the publisher's payoff (2) as $U^i = \alpha_i(x-\beta_i)d^{pub} + a_i n_i - \delta_i K$, $i = A, B$, where the choice variable a_i is here the number of ads run by i, at an assumed \$1/ad/consumer reached (totally elastic ad demand, and hence no advertiser surplus to complicate the welfare analysis). Similarly, think of ads as annoying consumers, and write the consumer utility function (1) as $U^{cit} = -\alpha_1(x-d^{priv})^2 + \alpha_2(x-\beta)d^{pub} - \sum_i a_i n_i$ where the nuisance cost (which is more relevant to TV than newspapers) is assumed to be \$1/ad/consumer. Then the advertising finance model is formally equivalent to the subscription pricing one proposed here (see Anderson and Coate (2005) for more details on this model, and Anderson and Gabszewicz (2006) for a survey). The case of nuisance costs differing from advertiser demand price (per ad per consumer) corresponds to a production cost (or subsidy).

We phrase the analysis for concreteness in terms of newspapers. However, the analysis applies (under some restrictive assumptions just noted) to TV stations. Hence, there could

be two TV stations in the model, or indeed one TV station and one newspaper. The latter case is quite relevant given the debate in the US about whether to allow joint ownership of a TV station and a newspaper in a market, or indeed to Italy where Berlusconi effectively controls a large fraction of the TV market.

3 Equilibrium news content and inference

We first take market structure as exogenous, and study equilibrium information management and then equilibrium pricing. These can be dealt with separately because of the additive structure of preferences. Given homogeneous consumers and zero production costs for newspapers, prices will be set so that every consumer will purchase a copy of every newspaper available, and so all information printed in any newspaper will go to all consumers.

Each publisher has a very simple decision to make regarding news management: whether to publish any information received about x or to keep it quiet. Since it is not possible to falsify news, only (sometimes) to hide it; if a value of x is published, readers will know it is true.

For a given market structure S, let $g(x; S, \beta, \pi)$ denote the Bayesian posterior density for x, conditional on no news being published regarding x. Let $G(x; S, \beta, \pi)$ be the associated cumulative distribution. We use a tilde to denote the value of a variable conditional on no news. Thus, $\widetilde{\rho}(S, \beta, \pi)$ denotes the mean value of x, conditional on no news being published regarding x, while $\widetilde{\sigma}^2(S, \beta, \pi)$ denotes the conditional variance.

3.1 Competitive news production

Initially, suppose that both A and B operate (i.e., $S = C$). In this case, A (which would like to see $d^{pub} = 1$) will trumpet any information revealing that $x > \beta$, while B will bandy any information revealing that $x < \beta$. Since any news is available to both publishers, all of the information will be revealed. If there is no hard evidence published either way, the public

will know that such evidence is not available.[19] Thus, $\widetilde{\rho}(C,\beta,\pi) = \rho$, $\widetilde{\sigma}^2(C,\beta,\pi) = \sigma^2$, and $g(x;C,\beta,\pi) = f(x)$ for all x. This corresponds to the "conventional wisdom" discussed by Milgrom and Roberts (1986) that the truth will out under competition.

3.2 Monopoly news production

Now suppose that publisher B has been shut down, leaving A as the monopoly news source (i.e., $S = A$). Clearly, A would like to convince the electorate that $x > \beta$ if possible, to motivate voters to choose $d^{pub} = 1$. Therefore, if in truth $x > \beta$, and A finds proof, then it will publish x. This will result in the electorate being certain that $x > \beta$, and selection of $d^{\,pub} = 1$ by the political process.

On the other hand, if $x < \beta$, and A finds proof, it will withhold the information to leave the electorate doubtful. News consumers will see no hard information regarding x and thence derive their Bayesian *ex post* distribution for x. The consumer sees two reasons for no news. Either no news was discovered (with a probability of $(1-\pi)$), or else news was discovered but is being withheld. Given the known bias of publisher A to withhold information that $x < \beta$, the combined probability of these events is $\nu(A;\beta,\pi) \equiv 1 - \pi + \pi F(\beta)$.

This implies the Bayesian posterior density, conditional on no news reported, is:

$$\begin{aligned} g(x';A,\beta,\pi) &= \frac{f(x')}{\nu(A;\beta,\pi)} \qquad \text{if } x' \leq \beta; \\ &= \frac{(1-\pi)f(x')}{\nu(A;\beta,\pi)} \quad \text{if } x' > \beta. \end{aligned}$$

For a value $x' \leq \beta$, the probability that $x < x'$, conditional on no news reported, is equal to:

$$G(x';A,\beta,\pi) = \frac{F(x')}{\nu(A;\beta,\pi)},$$

[19] There are also other Nash equilibria to this game. For example, if A is expected to reveal the value of x no matter what it may be, then B will be unable to manipulate public opinion, and will be indifferent between all available strategy choices. Thus, it is a Nash equilibrium for both publishers to reveal all information. However, revelation of information about x that is prejudicial to one's own preferences regarding d^{pub} is a weakly dominated strategy, and we eliminate such strategies in the equilibrium discussed here.

and for a value $x' > \beta$, the corresponding probability is equal to:

$$G(x'; A, \beta, \pi) = \frac{\pi F(\beta) + (1-\pi)F(x')}{\nu(A; \beta, \pi)}.$$

It is straightforward to verify that $G(x; A, \beta, \pi) > F(x)$ for all $x \in (0,1)$, so that $\widetilde{\rho}(A, \beta, \pi) < \rho$ for all $\beta \in (0,1)$. This is the *suspicion effect*, which works against publisher A's interests. News consumers always know that A withholds news that cuts against its interests. When there is no news reported of a sort that decisively affects public policy debates, people rationally wonder if something is hidden from them, and they shade their posterior probabilities accordingly. At the same time, it is easy to see that $\widetilde{\rho}(A, \beta, \pi) \to \rho$ as $\beta \to 0$ and as $\beta \to 1$. The former case is when the public's preferences are similar to A's, so that only in rare events (when x is between zero and β) would the publisher withhold information. Consequently, when β is small, the suspicion effect is weak. The latter case is when the public's preferences are extremely different from those of the monopoly publisher. It is then rare that the publisher does *not* withhold information (that is, when x is between β and 1): the public expects the newspaper to be uninformative, so not much is deduced when they read it and see nothing there. Thus, in this case as well, paradoxically, the suspicion effect is weak.[20] The effect is at its strongest when the public and the publisher have an intermediate degree of divergence in their preferences. This is illustrated in Figure 1.

The publisher has considerable power to mold public opinion by withholding information, but because of the rationality of consumers, the monopoly position also comes with the liability of the suspicion effect. This effect can be strong enough that the monopoly power is *detrimental* to the publisher.

Proposition 1 *There is a unique value $\overline{\beta} \in (0, \rho)$ such that $\beta < \overline{\beta}$ implies that $\widetilde{\rho}(A, \beta, \pi) > \beta$ and $\beta > \overline{\beta}$ implies that $\widetilde{\rho}(A, \beta, \pi) < \beta$.*

[20] The suspicion itself is strong, but its effect is weak because there is little updating of priors.

Proof. The $\widetilde{\rho}(A,\beta,\pi)$ function is given by

$$\widetilde{\rho}(A,\beta,\pi)=\frac{1}{\nu(A;\beta,\pi)}\left(\int_0^{\beta}xf(x)dx+(1-\pi)\int_{\beta}^{1}xf(x)dx\right), \tag{3}$$

with $\nu(A;\beta,\pi)=1-\pi+\pi F(\beta)$ the probability of seeing no news. The derivative of (3) is

$$\frac{\partial}{\partial\beta}\widetilde{\rho}(A,\beta,\pi)=\frac{\pi f(\beta)}{\nu(A,\beta,\pi)}\left[\beta-\widetilde{\rho}(A,\beta,\pi)\right]. \tag{4}$$

We know that $\widetilde{\rho}(A,0,\pi)=\rho>0$ and $\widetilde{\rho}(A,1,\pi)=\rho<1$. Therefore, by continuity of $\widetilde{\rho}(A,\beta,\pi)$, there exists at least one β such that $\widetilde{\rho}(A,\beta,\pi)=\beta$. Furthermore, by (4), the function $\tilde{\rho}(.)$ is decreasing for $\tilde{\rho}>\beta$, and increasing for $\tilde{\rho}<\beta$, with a zero derivative where $\tilde{\rho}=\beta$. (Think by analogy of the behavior of average costs when marginal cost is rising, with here β playing the role of marginal cost and $\tilde{\rho}$ the role of average cost.) Hence $\tilde{\rho}$ falls initially until it reaches the 45-degree line (see Figure 1), which it crosses with zero slope, and then rises without further crossings (since to cross the 45-degree line from below would require $\frac{\partial\tilde{\rho}}{\partial\beta}\geqslant 1$, which cannot be satisfied at the crossing point because (4) implies $\frac{\partial\tilde{\rho}}{\partial\beta}=0$ at any crossing point). This means that the solution, $\overline{\beta}$ is unique. Moreover, since $\tilde{\rho}<\rho$ for all $\beta\in(0,1)$, then $\overline{\beta}<\rho$. ■

These properties imply that if publisher A's preferences are not too far from those of the general public (if $\beta\in[0,\overline{\beta})$), the political outcome when no news is published is $d^{pub}=1$, while if A is far from the mainstream ($\beta\in(\overline{\beta},1]$), the outcome that ensues following silence is $d^{pub}=-1$. The former regime is when the public can be successfully manipulated; in the latter regime it cannot. The latter regime has two sub-cases, so consider the three cases illustrated by Figure 1.

Case I: $0<\beta<\overline{\beta}$. If voters received no hard news, they would vote for $d^{\,pub}=1$ (since $\widetilde{\rho}>\beta$). Thus, $d^{\,pub}=1$ with probability 1. In this case, monopoly is of clear political benefit to publisher A, and it strictly prefers an A-monopoly to competition.

Case II: $\overline{\beta}<\beta<\rho$. Here, the suspicion effect is strong enough that when voters receive no hard news, they vote for $d^{\,pub}=-1$ (since $\widetilde{\rho}<\beta$). Thus, $d^{\,pub}=1$ if A uncovers

x is high, and $d^{pub} = -1$ if x is revealed to be low (A withholds the information but the outcome is still $d^{pub} = -1$, since $\widetilde{\rho} < \beta$). The outcome is the same as under competition if A learns hard information. But, if A does not find hard information about x, the suspicion effect leads to $d^{pub} = -1$, while the same event under competition leads to $d^{pub} = 1$ (since $\widetilde{\rho} < \beta < \rho$). Thus, as regards political outcomes, A is now worse off under monopoly than under competition.

Case III: $\rho < \beta < 1$. The outcome of the political process is exactly as under competition. Voters choose $d^{pub} = -1$ unless A finds hard evidence that $x > \beta$.

Clearly, in *Case I*, A receives a political advantage from possession of a news monopoly, and would be willing to pay to enjoy that situation. This is true despite the full rationality of the public, and its knowledge of the bias of the publisher. The point is that the power to truncate the information available to the public can change their decisions in the worst-case situations. While *Case I* benefits A, in *Case II* A would be better off politically by forfeiting the monopoly when the suspicions of the rational public undo the political intentions of the monopoly publisher. Note that this is the case in which the public's tastes are farther from A's. If the publisher's tastes are extremely different from popular tastes, as in *Case III*, the monopoly position will make no difference to the outcome.

A B-monopoly is analogous. B withholds information that $x > \beta$. The analogous posterior cumulative distribution conditional on no news being published is

$$\begin{aligned} G(x; B, \beta, \pi) &= \frac{(1-\pi)F(x)}{\nu(B,\beta,\pi)} \qquad \text{if } x < \beta; \\ &= \frac{F(x) - \pi F(\beta)}{\nu(B,\beta,\pi)} \qquad \text{if } x > \beta, \end{aligned}$$

where $\nu(B, \beta, \pi) = 1 - \pi F(\beta)$ is the probability that no news is published by B. The suspicion effect implies that $\widetilde{\rho}(B, \beta, \pi) > \rho$, and $\widetilde{\rho}(B, \beta, \pi)$ reaches its maximum at a value $\beta = \overline{\overline{\beta}} > \rho$.[21]

[21] The picture corresponding to Figure 1 then has $\widetilde{\rho}(B, \beta, \pi)$ rising from $\widetilde{\rho}(B, 0, \pi) = \rho$ till it reaches the 45 degree line at $\overline{\overline{\beta}} > \rho > \overline{\beta}$, then falling back down to reach $\widetilde{\rho}(B, 1, \pi) = \rho$.

4 Equilibrium Pricing

4.1 Monopoly pricing

Assume that publisher A has a monopoly on the news. A news monopolist will charge the highest price consumers are willing to pay, which is the expected payoff from improving the private decision, d^{priv}, after reading the information in the paper. From (1), the payoff from the private decision is:

$$E[-\alpha_1(x - d^{priv})^2|I],$$

where I denotes all the information available to the consumer at the time the decision is made. The first-order condition for this is simply $d^{priv} = E[x|I]$, so the maximized value of this component of utility becomes:

$$-\alpha_1\sigma^2(I),$$

where $\sigma^2(I)$ denotes the variance of x given information I. Thus, the information in the newspaper is useful only to the extent that it reduces the conditional variance of x.[22]

If the consumer purchases no newspaper, the decision on d^{priv} is made with no more information about x, resulting in payoff $-\alpha_1\sigma^2$. There are two possible outcomes if the consumer buys the newspaper. If it reports no relevant news, the private decision must be made with an *ex post* variance for x of $\widetilde{\sigma}^2(A, \beta, \pi)$, yielding a payoff $-\alpha_1\widetilde{\sigma}^2(A, \beta, \pi)$. This occurs with probability $\nu(A, \beta, \pi)$. If there is news about x in the paper, the value of x is known precisely. This results in payoff of zero. Consequently, the expected payoff from the private decision when the consumer buys the paper is $-\alpha_1\nu(A, \beta, \pi)\widetilde{\sigma}^2(A, \beta, \pi)$. Given that the publisher prices so as to extract all of the surplus, A's monopoly price is thus:

$$P_A(A, \beta, \pi) = \alpha_1[\sigma^2 - \nu(A, \beta, \pi)\widetilde{\sigma}^2(A, \beta, \pi)]. \tag{5}$$

[22] At the time a newspaper is purchased, the consumer does not know what information it will reveal, so at the time of purchase I is itself a random variable.

Similarly, the monopoly price of the B newspaper is given by:

$$P_B(B,\beta,\pi) = \alpha_1[\sigma^2 - \nu(B,\beta,\pi)\widetilde{\sigma}^2(B,\beta,\pi)]. \tag{6}$$

The following result is proved in the Appendix.

Proposition 2 *The monopoly prices are strictly positive for $\beta \in (0,1)$. The monopoly equilibrium price of the A newspaper is strictly decreasing in β, with*

$$P_A(A,0,\pi) = \alpha_1\pi\sigma^2 \text{ and } P_A(A,1,\pi) = 0. \tag{7}$$

The monopoly equilibrium price of the B newspaper is strictly increasing in β, with

$$P_B(B,0,\pi) = 0 \text{ and } P_B(B,1,\pi) = \alpha_1\pi\sigma^2. \tag{8}$$

For f symmetric ($f(x) = f(1-x)$), $P_A(A,\frac{1}{2},\pi) = P_B(B,\frac{1}{2},\pi)$, and $P_A(A,\beta,\pi) \gtrless P_B(B,\beta,\pi)$ as $\beta \lessgtr \frac{1}{2}$.

Thus, the price of a monopoly newspaper is always strictly positive as long as the voters are not at an extreme.[23] This is because the newspaper always imparts some useful information. As $\beta \to 0$, the range of x values for which A withholds news (that is, $x \in [0,\beta]$) becomes vanishingly small. Therefore, the probability ν that there is no news in the paper tends to $(1-\pi)$, the probability that there is no news to report. In addition, the difference between the densities f and g becomes vanishingly small, so $\widetilde{\sigma}^2(A,\beta,\pi)$ will converge to σ^2. Therefore, from (5), the price of the newspaper approaches the limit of $\alpha_1\pi\sigma^2$. This is the value to the consumer of a newspaper with full disclosure, so this is the maximum possible price a newspaper could possibly have.

Similarly, as $\beta \to 1$, $\nu(A,\beta,\pi) \to 1$ and $\widetilde{\sigma}(A,\beta,\pi) \to \sigma$ so, again from (5), the price of the newspaper will converge to zero. The case of the B-monopolist is parallel. Under

[23] Any entertainment value would be simply added to the equilibrium price expression.

symmetry, the more profitable newspaper is the one closer to the mainstream. This is the paper that reveals more information.

The point is that the more mainstream are the political views of the monopoly publisher, the less the public will expect that publisher to distort the news, and thus the more informative and valuable the paper will be. We now turn to competition.

4.2 Competitive pricing

Prices under competition are determined by Bertrand competition. This does not drive publishers' profits down to zero because the news sources are not perfect substitutes, owing to the different political biases of the publishers and hence different content of the papers. We assume that consumers simultaneously choose which paper(s) to buy.[24]

In any equilibrium, neither publisher will price itself out of the market. Hence, recalling production costs for newspapers are zero and consumers are homogeneous, all consumers will purchase both papers.[25] Each paper then has a price no greater than the additional payoff derived from reading that paper, given that the consumer is already reading the other paper. The price can be pushed all the way up to this additional payoff without losing any customers. Hence, the price charged for newspaper i is equal to the payoff from reading both papers (i.e., $-(1-\pi)\alpha_1\sigma^2$), minus the payoff derived from reading only paper $j \neq i$ (i.e., $-\alpha_1\nu(j,\beta,\pi)\widetilde{\sigma}^2(j,\beta,\pi)$). Differencing gives the price of each paper as its *incremental* contribution to utility, conditional on purchase of the other paper. It remains to check that with this pricing scheme the *sum* of the two prices is no greater than the *total* utility contributed by purchase of *both* papers, so that the consumer receives positive net surplus from buying both papers. This analysis is in the Appendix.

[24] In particular, they are not able to buy one and check what news it contains before deciding to buy the other. Think for example of taking out long-term subscriptions.

[25] This property results from the homogeneity of consumers. It is not really essential to our main point about how information that can be distorted by mergers. By design, the welfare effects in our model are *entirely* due to the special informational role of the media.

Proposition 3 *The price of a newspaper under duopoly is equal to its incremental information value for the private decision:*

$$P_i(C,\beta,\pi) = \alpha_1[\nu(j,\beta,\pi)\widetilde{\sigma}^2(j,\beta,\pi) - (1-\pi)\sigma^2], \qquad i \neq j, i, j = A, B. \tag{9}$$

Using the previous analysis of the monopoly prices indicates that as $\beta \to 0$, $P_A(C,\beta,\pi) \to \alpha_1\pi\sigma^2$ and $P_B(C,\beta,\pi) \to 0$, while as $\beta \to 1$, $P_A(C,\beta,\pi) \to 0$ and $P_B(C,\beta,\pi) \to \alpha_1\pi\sigma^2$.[26] The monopoly analysis also facilitates deriving further properties via the following adding up property, which follows directly from (5), (6) and (9).

Lemma 1 $P_A(C,\beta,\pi) + P_B(B,\beta,\pi) = P_B(C,\beta,\pi) + P_A(A,\beta,\pi) = \alpha_1\pi\sigma^2$.

Lemma 1 and Proposition 2 enable us now to characterize the duopoly price.

Proposition 4 *The duopoly equilibrium price of the A newspaper is strictly decreasing in β, with*

$$P_A(C,0,\pi) = \alpha_1\pi\sigma^2 \text{ and } P_A(C,1,\pi) = 0. \tag{10}$$

The duopoly equilibrium price of the B newspaper is strictly increasing in β, with

$$P_B(C,0,\pi) = 0 \text{ and } P_B(C,1,\pi) = \alpha_1\pi\sigma^2. \tag{11}$$

For f symmetric, $P_A(C,\frac{1}{2},\pi) = P_B(C,\frac{1}{2},\pi)$, and $P_A(C,\beta,\pi) \gtrless P_B(C,\beta,\pi)$ as $\beta \lessgtr \frac{1}{2}$.

The limit prices are the same as under monopoly because one of the papers is worthless (it never prints any hard information) while the other has full value. Thus, both under monopoly and competition, *a publisher known to be in the political mainstream is profitable, while a publisher far out of the mainstream has trouble generating revenues.* The symmetry property parallels the monopoly one: more profit goes to the paper printing more hard information.

[26] If paper i also had a net idiosyncratic entertainment value of E_i over and above that of the other paper, then E_i is then simply added to the equilibrium values of prices derived above.

Next, we compare welfare under the different market structures. To confirm that citizen utility is higher under competition, first denote the private portion of citizen utility by:

$$U^{priv}(S,\beta,\pi) \equiv -\alpha_1 E[(x-d^{priv})^2|S] - \sum_i P^i(S,\beta,\pi)n_i, \tag{12}$$

where $S \in \{A,B,C,\emptyset\}$ denotes the market structure. Since the monopolist prices so that each consumer is indifferent between buying the newspaper and not buying it, then $U^{priv}(A,\beta,\pi) = U^{priv}(B,\beta,\pi) = U^{priv}(\emptyset,\beta,\pi)$. Under duopoly each citizen has the option of purchasing no newspaper, so:

$$U^{priv}(C,\beta,\pi) \geq U^{priv}(A,\beta,\pi) = U^{priv}(B,\beta,\pi). \tag{13}$$

Denote the public part of a citizen's utility by $U^{pub}(S,\beta,\pi) = \alpha_2 E[(x-\beta)d^{pub}|S]$. Since voters have strictly more information under competition than monopoly, then $U^{pub}(C,\beta,\pi) > U^{pub}(i,\beta,\pi)$ for $i = A,B$, with the immediate consequence:

Proposition 5 *Citizen welfare is higher under competition than under monopoly.*

This can be used to deduce a simple fact about the effect of competition on prices:

Proposition 6 *Each newspaper's price is no higher under competition than under monopoly.*

Proof. Since each newspaper under competition is priced at its incremental information value, each consumer is indifferent between buying both papers and buying only the A paper:

$$\begin{aligned} U^{priv}(C,\beta,\pi) &= -\alpha_1 E[(x-d^{priv})^2|C] - \sum_i P_i(C,\beta,\pi) \\ &= -\alpha_1 E[(x-d^{priv})^2|A] - P_A(C,\beta,\pi). \end{aligned}$$

$$\begin{aligned} \text{Since} \qquad U^{priv}(C,\beta,\pi) &\geq U^{priv}(A,\beta,\pi) \\ &= -\alpha_1 E[(x-d^{priv})^2|A] - P_A(A,\beta,\pi), \end{aligned}$$

this implies that we must have $P_A(A, \beta, \pi) \geq P_A(C, \beta, \pi)$. ■

Despite lower prices, duopoly may generate higher gross profits than monopoly. Define

$$\Delta(\beta, \pi) \equiv \max\{P_A(A, \beta, \pi), P_B(B, \beta, \pi)\} - (P_A(C, \beta, \pi) + P_B(C, \beta, \pi)) \tag{14}$$

as the profit advantage of monopoly over duopoly. It may initially be surprising that Δ can take negative values. In a conventional oligopoly model, a monopoly is ensured higher profits than a duopoly, because at worst it can always duplicate the behavior of the duopolists. For newspapers with political agendas, that logic does not apply. It is not possible for a monopolist to publish both an A-type newspaper and a B-type newspaper because it has no way to credibly commit to publish information that is *ex post* injurious to its political interests. Thus, if a newspaper is a monopoly with the editorial bias of its publisher intact, it earns less than if it could commit to being as informative as a duopoly. This loss-of-variety effect pushes monopoly profits down relative to duopoly profits. Of course, the familiar effect of competitive pricing in a duopoly works in the other direction, so whether duopoly or monopoly profits are higher will be determined by which effect is stronger.

This trade-off can be illustrated with a simple example. Suppose that x has a two-point distribution, taking a value of $\frac{1}{4}$ or $\frac{3}{4}$ with equal probability. Then, if β is between $\frac{1}{4}$ and $\frac{3}{4}$, an A-monopolist will report the value of x if it is equal to $\frac{3}{4}$ but suppress it if $x = \frac{1}{4}$. If the probability of finding news, π, is sufficiently high, news readers would interpret the lack of news as strong evidence that x is indeed equal to $\frac{1}{4}$. With this information, the value to those readers of a B-newspaper in addition to the A-newspaper would be negligible. Likewise, the value of an A-newspaper given access to the B-newspaper is also be negligible. Therefore, the duopoly price for either newspaper would be close to zero, and a monopoly would clearly be more profitable than duopoly.

What kills duopoly profits in this example is that news readers learn almost everything they need to know even in the absence of news. Thus, the best chance for a duopoly to be

relatively profitable is for a lack of news to be relatively uninformative, in other words, for $\widetilde{\rho}$ to be relatively close to ρ. Recalling Figure 1, the situations favoring that outcome are a value of β close to 0 or 1 and a low value of π. The next two propositions confirm that these conditions do indeed favor duopoly profitability.

Proposition 7 *Duopoly is more profitable than monopoly (that is, $\Delta(\pi, \beta) < 0$) if β is sufficiently close to 0 or 1, or if π is sufficiently close to 0.*

Thus, duopoly dominates (in the absence of fixed costs) when one of the publishers is an extremist, or when there is not much news to be had. Second, under a weak sufficient condition, monopoly is more profitable when the publishers are balanced and news is plentiful:

Proposition 8 *If f is symmetric, then in a neighborhood of the point $(\beta, \pi) = \left(\frac{1}{2}, 1\right)$, monopoly is more profitable than duopoly (i.e., $\Delta(\frac{1}{2}, 1) > 0$) if and only if $\frac{2}{3}\sigma^2 > \widetilde{\sigma}^2(A, \frac{1}{2}, 1)$.*

In other words, the relevant condition is that the variance of x conditional on $x < \frac{1}{2}$ is no greater than 2/3 of the unconditional variance. Figure 2 shows the shape of $\Delta(\beta, \pi)$ for the Beta distribution (in this example, which we will pursue below, we use $f(x) = Ax^4(1-x)^4$, where A is chosen so that the density has a unit integral). This shows that the function turns sharply positive (indicating gains from merger) where π is near 1 and β is near $\frac{1}{2}$.

We now turn to comparing industry profits under the alternative market structures.

5 Equilibrium Market Structure

Here we endogenize market structure and analyze the effects of a rule prohibiting media mergers. It is easiest to do this by first considering market structure if mergers are disallowed, then market structure if mergers are permitted. After doing this, we analyze the welfare effects of a no-merger rule by studying the differences between these two regimes.

5.1 Mergers Disallowed

If mergers are not possible, the equilibrium market structure is simply the Nash equilibrium of an entry game. Define the payoff of publisher i under market structure S by:

$$W_i(S, \beta, \pi, K) = \alpha_i E[x(d^{pub} - \beta_i)|S, \beta, \pi] + (P_i(S, \beta, \pi) - K)\,\delta_i(S), \tag{15}$$

where $K \geq 0$ is the cost of setting up a newspaper and $\delta_i(S)$ is a dummy variable indicating whether or not publisher i operates a newspaper under structure i (so that $\delta_A(A) = \delta_A(C) = \delta_B(B) = \delta_B(C) = 1$ and $\delta_A(B) = \delta_B(A) = \delta_i(\emptyset) = 0$), and the value of d^{pub} is determined by the political process given S and the realization of x. Equilibrium entry is determined by the payoffs $W_i(S, \beta, \pi, K)$. Thus, for example, an A monopoly is an equilibrium outcome if:

$$W_A(A, \beta, \pi, K) \geqslant W_A(\emptyset, \beta, \pi, K) \text{ and } W_B(A, \beta, \pi, K) \geqslant W_B(C, \beta, \pi, K). \tag{16}$$

In the limiting case of a dominant profit motive (i.e., when α_A and α_B are both small), a publisher enters if and only if it earns positive profits. Then, an i monopoly is an equilibrium if:

$$P_i(i, \beta, \pi) \geq K \text{ and } P_j(C, \beta, \pi) \leq K, \tag{17}$$

where $i \neq j$; competition is an equilibrium if $P_i(C, \beta, \pi) \geq K$ for $i = A, B$; and no entry occurs if $P_i(i, \beta, \pi) \leq K$ for $i = A, B$. These conditions determine a unique equilibrium unless (17) is satisfied for both $i = A$ and $i = B$, in which case both an A-monopoly and a B-monopoly are equilibria. (This can occur under symmetry if β is not too far from 1/2, so that the profitabilities of the two are fairly balanced: see Figure 3 below.)

Clearly, if $K = 0$ and the profit motive is dominant, the only equilibrium is competition. For positive entry costs, Figure 3 shows the equilibria for a range of parameter values with $K = 0.001$ and the Beta distribution used in Figure 2 and illustrates some key properties which are summarized and generalized as follows.

Proposition 9 *Assume that f is symmetric, and consider a dominant profit motive. Define $\tilde{\beta} = \gamma\beta + (1-\gamma)(1-\beta)$ for any given $\gamma \in [0,1]$ and let $\tilde{\pi} \leq \pi$. Then:*

i) If (β, π) generates no entry as an equilibrium market structure, then so does $\left(\tilde{\beta}, \tilde{\pi}\right)$;

ii) If (β, π) generates competition as an equilibrium market structure, then so does $\left(\tilde{\beta}, \pi\right)$;

iii) If $K > 0$, competition cannot be an equilibrium for β close enough to 0 or 1.

Part (i) means that the no-entry region is at the bottom with an upward sloping boundary for $\beta < 1/2$. This follows because under symmetry the A monopoly price is decreasing in β (Proposition 2), and both monopoly prices are increasing in π. Parts (ii) and (iii) mean that the competitive region is in the middle: (ii) follows because the profit of the weaker duopolist always increases as β moves closer to 1/2; (iii) follows from Proposition 4 that $P^A(C, \beta, \pi) \to 0$ as $\beta \to 1$ and $P^B(C, \beta, \pi) \to 0$ as $\beta \to 0$. In other words, if hardly any real news can be generated (π low), neither news source will be profitable; and duopoly is a more likely outcome if neither publisher is a fringe extremist.

A last point about equilibrium structure can be deduced quickly. Recalling that each publisher's revenue equals the incremental value of its information for the private decision (Proposition 3), it is clear that a publisher will enter if and only if that incremental value exceeds K. This, together with the fact that entry improves the quality of public decision making (effectively a positive externality from entry), implies that if competition is an equilibrium, then it is the market structure that maximizes social welfare.[27] In summary:

Proposition 10 *Consider a dominant profit motive with free entry and mergers barred. The equilibrium can provide too little competition, but not too much.*

This result contrasts to standard IO findings of over-entry in equilibrium (see e.g. Mankiw and Whinston (1986) for the classic Cournot case, and Anderson, de Palma, and Nesterov (1995) for Bertrand differentiated products.)

[27] Adding together the payoffs of publishers with the utility of consumers, the price terms disappear, so that the utility from private and public decisions together with the sunk costs K are all that matter.

5.2 Mergers Allowed

Now we consider what happens if mergers are permitted. Assume that the game is played in two stages. First, the publishers choose independently whether to enter. If both have entered, they engage in Nash bargaining to decide whether to merge, and on what terms.

Denote the joint welfare of the two publishers, $W_A(S,\beta,\pi,K) + W_B(S,\beta,\pi,K)$, by $W_{AB}(S,\beta,\pi,K)$. Then if both publishers have entered, bargaining attains the structure S that maximizes $W_{AB}(S,\beta,\pi,0)$ (since the entry cost K is by that point sunk and irrelevant.) The bargaining surplus is split between them, so the bargaining payoff to publisher i will be $W_i^{BARG}(\beta,\pi) \equiv W_i(C,\beta,\pi,0) + \max_S \left[W_{AB}(S,\beta,\pi,0) - W_{AB}(C,\beta,\pi,0)\right]/2$.

Anticipating this, entry is determined as a (non-cooperative) Nash equilibrium. Payoffs are $W_i^{BARG}(\beta,\pi) - K$ if both enter ($S = C$), and $W_i(S,\beta,\pi,K)$ otherwise ($S \neq C$) which is the same payoff as in the model without mergers. The equilibrium is the same as without mergers, unless (i) $W_{AB}(i,\beta,\pi,0) > W_{AB}(C,\beta,\pi,0)$ for $i = A$ or B, and (ii) $W_i^{BARG}(\beta,\pi) > K$ for $i = A,B$. Condition (i) ensures that a merger will occur if both enter, and (ii) ensures that both will enter. We say that a *no-merger rule has bite* if and only if these two conditions are satisfied, because imposing a prohibition on mergers will change the outcome.

If a no-merger rule has bite and $W_i(C,\beta,\pi,K) > W_i(j,\beta,\pi,K)$ for $i,j = A,B$, $i \neq j$, then the outcome with mergers allowed is merger to monopoly, whereas competition prevails if mergers are barred. In this case, a no-merger rule *preserves competition.* On the other hand, if a no-merger rule has bite but $W_i(C,\beta,\pi,K) < W_i(j,\beta,\pi,K)$ for $i,j = A$ or B, $i \neq j$, then the outcome without merger is entry of only one publisher, while the outcome with mergers allowed is entry by both publishers followed by a merger to monopoly. In this case, a no-merger rule *prevents entry for buyout*; it does not change the final market structure, but it does prevent entry with a pure rent-seeking motive.

In the limiting case with a dominant profit motive, noting that (14) defines $\Delta(\beta,\pi)$ as

the joint bargaining surplus in the merger stage, the criterion for a no-merger rule to have bite is that (i) $\Delta(\beta, \pi) > 0$ and (ii) $P_i(C, \beta, \pi) + \Delta(\beta, \pi)/2 > K$ for $i = A, B$. Clearly, entry for buyout occurs if these two conditions hold and $P_i(C, \beta, \pi) < K$ for $i = A$ or B; i buys out j if $P_i(i, \beta, \pi) > P_j(j, \beta, \pi)$. Figure 4 shows the equilibrium market structure for the Beta distribution used in Figure 2. In accordance with Propositions 7 and 8, the no-merger rule has bite only near the top-central portion of the box, where the bargaining surplus Δ is at its highest because prices under duopoly are especially low.

There are two separate regions in which the no-merger rule has bite. The first is a subset of what had been the duopoly region in the Figure 3, where duopolists merge if they are allowed to do so. A no-merger rule preserves competition in this region. Above that lies a second region, which is a subset of the monopoly region from Figure 3. In this region, if mergers are allowed, one publisher enters for the sole purpose of receiving and accepting a merger offer from the other. Here, the no-merger rule prevents entry for buyout.

Putting all of this together, we can summarize the effects of the no-merger rule as follows: *With a dominant profit motive, the no-merger rule is most likely to have bite if news is plentiful (π is high) and neither publisher is a fringe extremist (β is not too close to* 0 *or* 1*).*

Another striking feature of the equilibrium with mergers allowed is that there is so little merger activity: competition remains as an equilibrium across a large swathe of the parameter space despite no impediment to merging. This points to the distinctive features of the media industry - in a standard differentiated products duopoly we would expect to see merger throughout the parameter range. Here, at least for intermediate values of π, the bias of the magnates and the profit motive together police the market and ensure "diversity of voices" (which is one of the major stated objectives of the FCC) even though the political motive for setting up a newspaper is arbitrarily small.

5.3 Welfare effects of no-merger rule

The welfare effects are clear in the case of entry for buyout: the resulting market structure is the same with or without the no-merger rule. With the no-merger rule, only one publisher enters, so the sunk cost K is paid only once, but it is paid twice under entry for buy-out. Entry by the publisher who intends to be bought out is pure rent-seeking.

Proposition 11 *If a no-merger rule prevents entry for buyout, it improves welfare.*

If the no-merger rule preserves competition, the welfare effects are more complicated, but in an important special case they are again straightforward. If the publishers have a dominant profit motive, then the no-merger rule can be shown to raise welfare. Ignore the sunk costs K, since they are the same with and without the no-merger rule, and add the joint welfare of publishers $W_{AB}(S, \beta, \pi, 0)$ to that of the citizens to compute total social welfare. The prices cancel out, and all that is left is the payoff of the publishers from the public decision and the utility of the citizens from the public and private decisions:

$$E\left[\sum_{i=A,B}\left(\alpha_i(x-\beta_i)d^{pub}\right)-\alpha_1(x-d^{priv})^2+\alpha_2(x-\beta)d^{pub}\right]. \tag{18}$$

The former disappears for a dominant profit motive (as α_A and α_B vanish) so welfare is determined entirely by the utility the citizens receive from the public and private decisions. Switching from a monopoly to competition, as the no-merger rule does in this case, improves this utility by providing more information to the public. Therefore, welfare rises. This, together with Proposition 11, provides the following result.

Proposition 12 *In the case of a dominant profit motive, the no-merger rule unambiguously improves welfare, and strictly so when the rule has bite.*

This holds even though the usual grounds for merger regulation are absent. In conventional IO merger models, the social cost to merger is that greater monopoly power increases

the wedge between price and marginal cost and prices out some consumers whose benefit exceeds marginal production cost. Here, by contrast, with or without a merger, all consumers purchase all newspapers available on the market (due to the artificial assumption that all consumers are identical). Therefore, *the welfare loss from merger results from the distortion of information due to the political motivation of the publishers. This distortion is facilitated by monopolization.* We thus derive a motive for merger review that is completely separate from the motive that drives merger review in non-media oligopolies.

5.4 Strong political motives

Most of the discussion above has focussed on a dominant profit motive. Here we comment briefly on how things change when the *political* motive of the publishers is also strong (so that α_A and α_B are not vanishingly small).[28] An example is illustrated in Figure 5, which shows equilibrium outcomes for the case in which $\alpha_A = \alpha_B = 1$ and merger is barred. Otherwise, the parameters are the same as in Figure 2.

A strong political motive changes equilibrium behavior in several ways. First, and most simply, it expands the range of entry. The boundaries of the "shield-shaped" region in Figure 3 indicating duopoly have spread out in Figure 5. At the edges of the region where the less mainstream publisher was just unwilling to enter because it was unable to break even, it now enters to achieve some political influence.[29] Thus, the out-of-mainstream publisher can derive a political benefit from entry that compensates for its financial loss. The *Washington Times* and the *New York Post* come to mind.

Second, for the same reason, the area in which no publisher enters diminishes. Comparing

[28] An extensive analysis of the case of strong political motives is contained in our Discussion Paper, available on our web-pages, or by request.

[29] For example, at the left-hand edge of the duopoly region in Figure 3, B is just indifferent between entering and not. At the same location in Figure 5, B enters because if it leaves the market to A, the political outcome will be $d^{pub} = 1$ with probability 1, but if B enters it can change the outcome to $d^{pub} = -1$ when it discovers a low value of x.

Figure 5 with Figure 3, there is a section in the bottom-center where no entry occurs if profits are dominant, but the less mainstream publisher enters under a strong political motive (this is publisher B if $\beta < \rho$ and A if $\beta > \rho$). Once again, the reason is that the less mainstream publisher can change the political outcome in its favor by entering. This implies, though, that *the market is served by the publisher who both makes the larger loss and provides less information germane to voting and private decision-making.*

Third, with a strong political motive there is now a region in which only mixed-strategy equilibria exist. In the middle of the "Competition" section of Figure 5, for example, just to the left of $\beta = \frac{1}{2}$, in the case of a dominant political motive the outcome would be competition, but with the strong political motive the outcome is random. The reason is that the suspicion effect is active in a way that is prejudicial to publisher A and beneficial to B. If A is expected to enter, then it is politically *advantageous* for B *not* to enter. That way, when A does not have any hard information to report, the suspicion effect will cause the public to choose $d^{pub} = -1$, an outcome that B would have been unable to achieve without the suspicion effect. Thus, competition is no longer an equilibrium.[30]

6 Conclusions

We have presented a model of a media oligopoly in which the owners of the media have both political and profit motives. In some circumstances they can manipulate political outcomes by distorting the information that consumers of news receive. They can do this, *even though news consumers are perfectly rational and know the bias of the publishers*, because the consumers do not know how much information the news organization has. However, there are

[30] Neither is any other pure strategy outcome. (i) An A-monopoly is not, because on political grounds, due to the suspicion effect, A prefers to stay out rather than enter and have the political outcome reverse when A reports no news. (ii) No entry is not an equilibrium, because on political grounds (as well as for profits) B prefers to be a monopolist rather than stay out. With no entry, the public decision will be $d^{pub} = 1$ with probability 1, but B can change the outcome to $d^{pub} = -1$ with positive probability. (iii) A B monopoly is not an equilibrium because A would enter to make it a duopoly. Then the political outcome is unchanged, but A also makes some profit.

also conditions under which a media monopoly is politically disadvantageous, because of the suspicion that rational consumers attach to the behavior of a politically-motivated news monopoly. We have characterized equilibrium market structure, identifying conditions under which mergers occur, and have shown that in our model a ban on mergers improves welfare, even though the usual sources of deadweight loss have been removed.

The results show that media markets are different from other markets in a number of important ways. (i) *Welfare analysis:* As noted above, the media oligopoly provides a possibility of welfare loss that is separate from the deadweight losses found in familiar oligopoly models, because the news organizations distort the information available to citizens, compromising the quality of both public and private decision-making. (ii) *Equilibrium market structure:* Even when mergers are allowed, the two media organizations may not merge to monopoly, for two reasons. First, if the political motive of the media owners is strong, it may be that neither one wishes to relinquish the megaphone that comes from owning a news organization, even if there is a substantial financial cost to keeping it. Second, even if the publishers merely want to maximize profit, they may not merge because joint duopoly profits may exceed monopoly profits. This is not possible in a conventional oligopoly model, because a merged entity always has the option of duplicating the prices and outputs of the duopolists, but in the case of media organizations with a political agenda the news products produced under owners with different agendas are differentiated products, which cannot in general be replicated by a merged entity because the owner cannot credibly commit to produce a news product that is incompatible with his or her own political agenda.

Thus, the problem with media markets can, over part of the parameter space, be self-correcting: the very source of the inefficiency, the political agenda of the media owners, can also provide the equilibrium level of competition that may be enough to rectify the problem. All of these effects, of course, are absent in a conventional oligopoly.

Finally, we have identified a role for merger review in a media oligopoly that is distinct

from the role it has in conventional oligopoly. We formalize the idea that the market may not provide sufficient diversity of political viewpoints, and that this conclusion does not rest on any assumption of irrationality on the part of news consumers. In our model, a policy banning media mergers either has no effect or improves welfare. Whether or not this precise result is robust to extensions of the model, the point remains that we have derived a rationale for merger review that is distinct from the traditional rationale in non-merger markets, based not on standard deadweight loss but rather on the need to preserve variety of political viewpoints in the public arena.

7 Appendix

Proof of Proposition 2. The limit values follow from (5) and (6). To prove that $P_A(A,\beta,\pi)$ is strictly decreasing in $\beta \in (0,1)$, recall from (5) that $\frac{P_A(A,\beta,\pi)}{\alpha_1} = \sigma^2 - \nu(A,\beta,\pi)\,\tilde{\sigma}_A^2(A,\beta,\pi)$, where $\nu(A,\beta,\pi) = 1-\pi+\pi F(\beta)$. We can write $\sigma^2 = \int_0^1 x^2 f(x)\,dx - \rho^2$, while

$$\tilde{\sigma}_A^2(A,\beta,\pi) = \int_0^\beta x^2 \frac{f(x)}{\nu(A,\beta,\pi)}dx + (1-\pi)\int_\beta^1 x^2 \frac{f(x)}{\nu(A,\beta,\pi)}dx - \tilde{\rho}^2(A,\beta,\pi).$$

Hence $\frac{P_A(A,\beta,\pi)}{\alpha_1} = -\rho^2 + \tilde{\rho}^2(A,\beta,\pi)\nu(A,\beta,\pi) + \pi\int_\beta^1 x^2 f(x)\,dx$, and so

$$\frac{\partial P_A(A,\beta,\pi)/\alpha_1}{\partial\beta} = 2\tilde{\rho}(A,\beta,\pi)\frac{\partial\widetilde{\rho}(A,\beta,\pi)}{\partial\beta}\nu(A,\beta,\pi) + \tilde{\rho}^2(A,\beta,\pi)\pi f(\beta) - \pi\beta^2 f(\beta).$$

From (4), $\frac{\partial\widetilde{\rho}(A,\beta,\pi)}{\partial\beta} = \frac{\pi f(\beta)}{\nu(A,\beta,\pi)}\left[\beta - \widetilde{\rho}(A,\beta,\pi)\right]$, so the derivative simplifies to

$$\frac{\partial P_A(A,\beta,\pi)/\alpha_1}{\partial\beta} = -\pi f(\beta)\left[\beta - \widetilde{\rho}(A,\beta,\pi)\right]^2, \tag{19}$$

which is clearly negative, as desired. The fact that $P_A(A,1,\pi) = 0$ together with the monotonicity result proves that $P_A(A,\beta,\pi)$ is positive for all $\beta \in (0,1)$. The argument for the B monopoly price is parallel. The symmetry result is a simple corollary. **Q.E.D.**

Proof of Proposition 3. Since the total utility contribution is $\alpha_1\pi\sigma^2$, the condition to check is that $\sum_i P_i(C,\beta,\pi) \le \alpha_1\pi\sigma^2$. Using the relevant definitions, this is equivalent to $Q(\pi) \le R(\pi)$, where $Q(\pi) = \sum_i \nu(i,\beta,\pi)\int_0^1 (x-\widetilde{\rho}(i,\beta,\pi))^2 g(x;i,\beta,\pi)dx$ and $R(\pi) = (2-\pi)\sigma^2$. Further, $Q'(\pi) = -\int_0^\beta (x-\widetilde{\rho}(B,\beta,\pi))^2 f(x)dx - \int_\beta^1 (x-\widetilde{\rho}(A,\beta,\pi))^2 f(x)dx$. Since $\frac{\partial}{\partial y}\int_\beta^1 (x-y)^2 f(x)dx = 2(y-\rho^+)(1-F(\beta)) < 0$ if $y < \rho^+ \equiv E[x|x>\beta]$, and since $\widetilde{\rho}(A;\beta,\pi) < \rho < \rho^+$, clearly $\int_\beta^1 (x-\widetilde{\rho}(A,\beta,\pi))^2 f(x)dx > \int_\beta^1 (x-\rho)^2 f(x)dx$. By parallel logic, $\int_0^\beta (x-\widetilde{\rho}(B,\beta,\pi))^2 f(x)dx > \int_0^\beta (x-\rho)^2 f(x)dx$. Therefore, $Q'(\pi) < -\sigma^2$. But $R'(\pi) = -\sigma^2$ for all π. Since, $Q(0) = R(0)$ and $Q'(\pi) < R'(\pi)$ for all π, then $Q(\pi) \le R(\pi)$, with strict inequality for $\pi > 0$. **Q.E.D.**

Proof of Proposition 7.

(i) The case with β close to 0 or 1. Recall the derivatives of duopoly prices:

$$\frac{\partial P_A(C,\beta)}{\partial \beta} = -\alpha_1 \pi f(\beta)(\beta - \widetilde{\rho}(B,\beta))^2 < 0, \quad \text{and}$$

$$\frac{\partial P_B(C,\beta)}{\partial \beta} = \alpha_1 \pi f(\beta)(\beta - \widetilde{\rho}(A,\beta))^2 > 0.$$

Further, the derivatives of monopoly prices are (the first is (19) above):

$$\frac{\partial P_A(A,\beta,\pi)/\alpha_1}{\partial \beta} = -\pi f(\beta)\left[\beta - \widetilde{\rho}(A,\beta,\pi)\right]^2, \quad \text{and}$$

$$\frac{\partial P_B(B,\beta,\pi)/\alpha_1}{\partial \beta} = \pi f(\beta)\left[\beta - \widetilde{\rho}(B,\beta,\pi)\right]^2. \tag{20}$$

Given (14): $\Delta(\beta,\pi) \equiv \max\{P_A(A,\beta,\pi), P_B(B,\beta,\pi)\} - (P_A(C,\beta,\pi) + P_B(C,\beta,\pi))$, then

$$\begin{aligned}
\frac{\partial \Delta}{\partial \beta} &= \alpha_1 \pi f(\beta)\left[(\beta - \widetilde{\rho}(B,\beta))^2 - 2(\beta - \widetilde{\rho}(A,\beta))^2\right] \text{ if } P_A(A,\beta) > P_B(B,\beta) \\
&= \alpha_1 \pi f(\beta)\left[2(\beta - \widetilde{\rho}(B,\beta))^2 - (\beta - \widetilde{\rho}(A,\beta))^2\right] \text{ if } P_A(A,\beta) < P_B(B,\beta).
\end{aligned}$$

If β is close to zero, then $P_A(A,\beta) > P_B(B,\beta)$, so $\frac{\partial \Delta}{\partial \beta} < 0$ for small β iff $2(\beta - \widetilde{\rho}(A,\beta))^2 > (\beta - \widetilde{\rho}(B,\beta))^2$. This condition holds because $\lim_{\beta \to 0} \widetilde{\rho}(j,\beta) = \rho$ for $j = A, B$. Since $\Delta(0,\pi) = 0$, this implies that $\Delta < 0$ for β close to 0. By parallel logic, $\Delta < 0$ for β close to 1.

(ii) The case with π close to 0.

Consider the case with $P_A(A,\beta,\pi) > P_B(B,\beta,\pi)$. Using the expressions for the monopoly and duopoly prices, we can write the bargaining surplus as:

$$\Delta(\beta,\pi) = (3 - 2\pi)\sigma^2 - 2\nu(A,\beta,\pi)\widetilde{\sigma}^2(A,\beta,\pi) - \nu(B,\beta,\pi)\widetilde{\sigma}^2(B,\beta,\pi,) > 0. \tag{21}$$

If $\pi = 0$, then $\nu_A = \nu_B = 1$ and $\widetilde{\sigma}^2(A,\beta,\pi) = \widetilde{\sigma}^2(B,\beta,\pi) = \sigma^2$, and so $\Delta(\beta,0) = 0$ (duopoly papers and monopoly papers are all worthless, and so the difference in their values is also zero). We are now interested in the derivative of $\Delta(\beta,\pi)$ at $\pi = 0$.

The second term in $\Delta(\beta,\pi)$ in (21) is:

$$-2\int_0^\beta (x - \widetilde{\rho}(A,\beta,\pi))^2 f(x)dx - 2(1-\pi)\int_\beta^1 (x - \widetilde{\rho}(A,\beta,\pi))^2 f(x)dx.$$

The derivative of this with respect to π is:

$$4\frac{\partial\widetilde{\rho}}{\partial\pi}\int_0^\beta (x-\widetilde{\rho})f(x)dx + 4(1-\pi)\frac{\partial\widetilde{\rho}}{\partial\pi}\int_\beta^1 (x-\widetilde{\rho})f(x)dx + 2\int_\beta^1 (x-\widetilde{\rho})^2 f(x)dx,$$

where $\partial\widetilde{\rho}/\partial\pi$ is finite. When $\pi = 0$, $\widetilde{\rho}(A,\beta,0) = \rho$, so the first two terms sum to zero, leaving

$$2\int_\beta^1 (x-\rho)^2 f(x)dx > 0.$$

Applying this logic to the first term of $\Delta(\beta,\pi)$ in (21) as well, we find:

$$\begin{aligned}\frac{\partial\Delta(\beta,0)}{\partial\pi} &= -2\sigma^2 + 2\int_\beta^1 (x-\rho)^2 f(x)dx + \int_0^\beta (x-\rho)^2 f(x)dx \\ &= -\int_0^\beta (x-\rho)^2 f(x)dx < 0.\end{aligned}$$

Therefore, for small positive values of π, $\Delta(\beta,\pi) < 0$, and so joint duopoly profits dominate an A-monopoly. Parallel logic applies when $P_A(A,\beta,\pi) < P_B(B,\beta,\pi)$. **Q.E.D.**

Proof of Proposition 8. Duopoly profits at the point $\beta = \frac{1}{2}, \pi = 1$ can be written:

$$\begin{aligned}& 2\pi\sigma^2 - P_A(A,\frac{1}{2},1) - P_B(B,\frac{1}{2},1) \\ = \;& 2\pi\sigma^2 - 2P_A(A,\frac{1}{2},1).\end{aligned}$$

The A monopoly is more profitable if and only if:

$$\begin{aligned}P_A(A,\frac{1}{2},1) &> 2\pi\sigma^2 - 2P_A(A,\frac{1}{2},1), \text{ or} \\ 3P_A(A,\frac{1}{2},1) &> 2\pi\sigma^2.\end{aligned}$$

Recall that $P_A(A,\beta,\pi) = \sigma^2 - \nu(A,\beta,\pi)\widetilde{\sigma}^2(A,\beta,\pi)$.

Thus, monopoly is more profitable than duopoly if and only if:

$$\begin{aligned}3\sigma^2 - 3\nu(A,\frac{1}{2},1)\widetilde{\sigma}^2(A,\frac{1}{2},1) &> 2\pi\sigma^2, \text{ or} \\ (3-2\pi)\sigma^2 &> 3\nu(A,\frac{1}{2},1)\widetilde{\sigma}^2(A,\frac{1}{2},1).\end{aligned}$$

As $\pi \to 1$, $\nu(A,\beta,\pi) \to \frac{1}{2}$, so in the limit monopoly is more profitable than duopoly if and only if $\frac{2}{3}\sigma^2 > \widetilde{\sigma}^2(A,\frac{1}{2},1)$. **Q.E.D.**.

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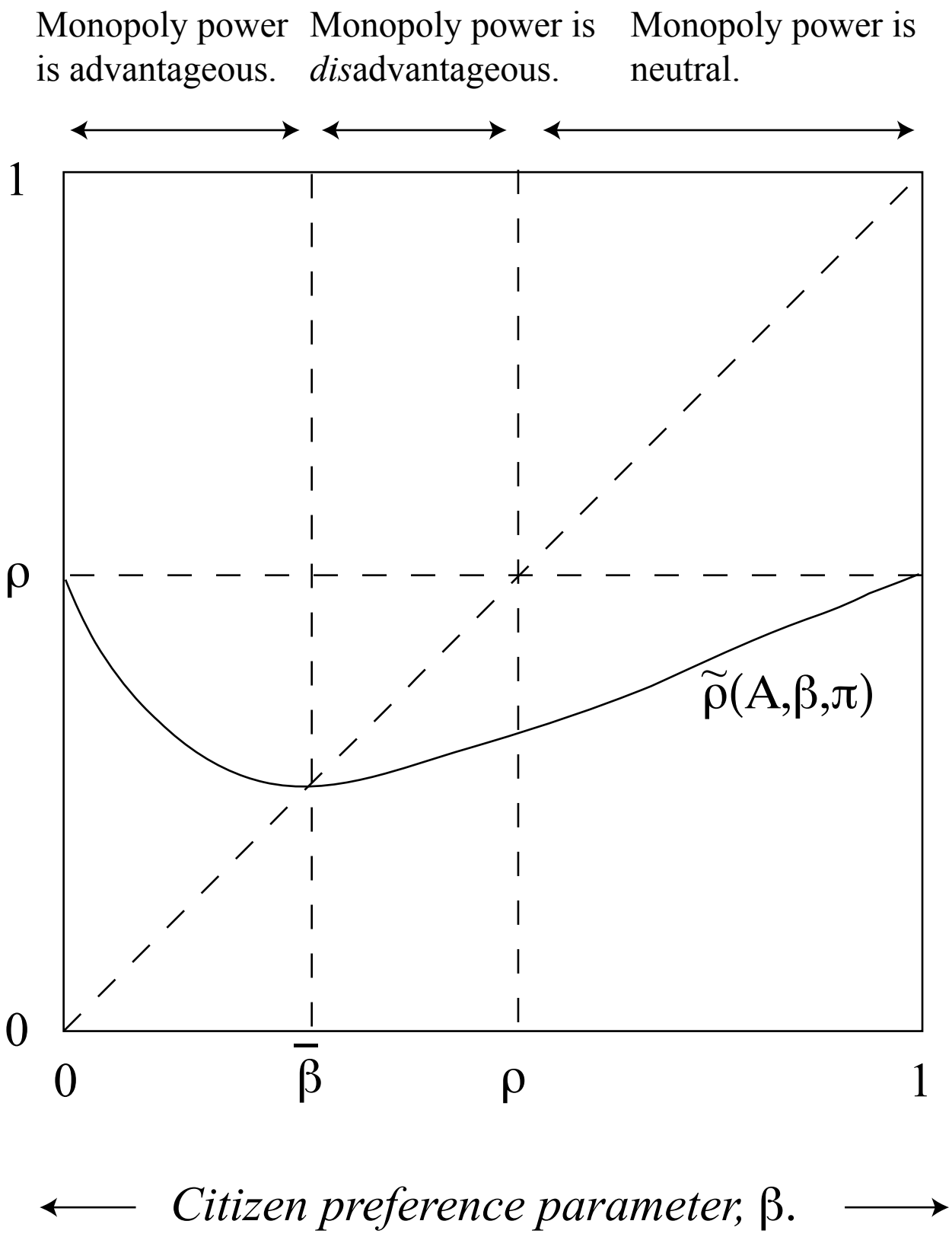

Figure 1: The Suspicion Effect: When is Monopoly Advantageous Relative to Competition?

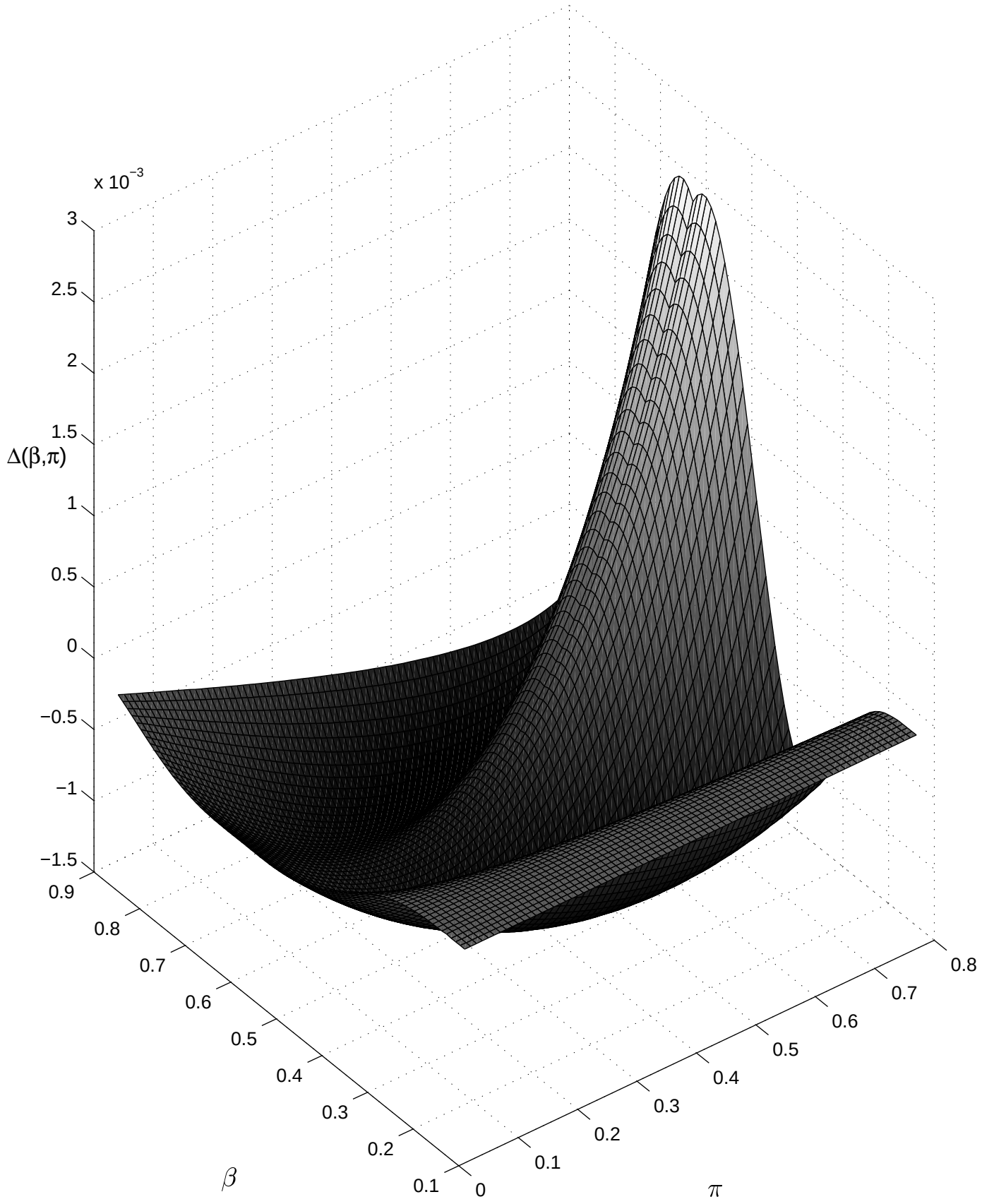

Figure 2: The Publisher's Bargainning Surplus

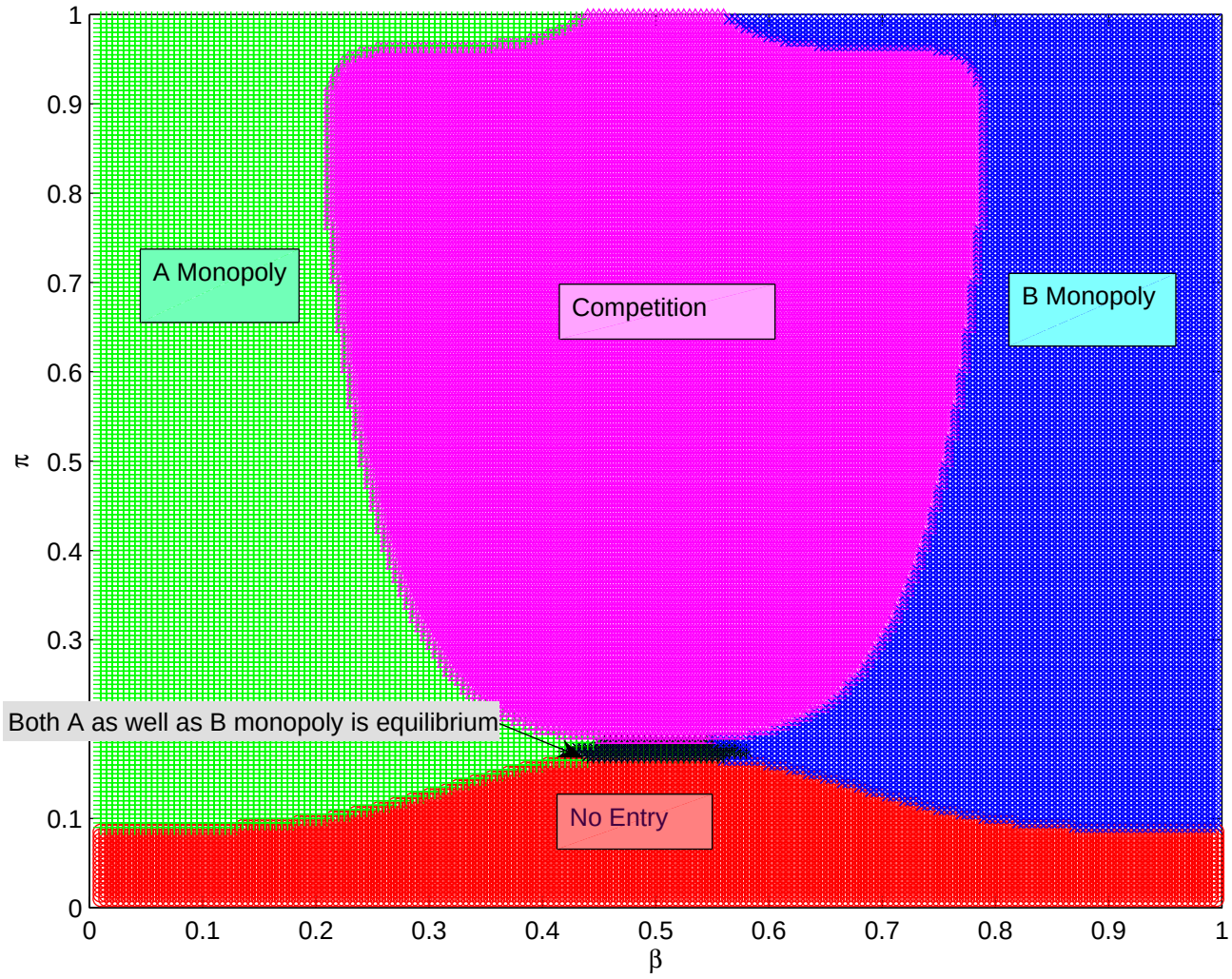

Figure 3: Equilibrium Market Structure Without Mergers−Dominant Profit Motive

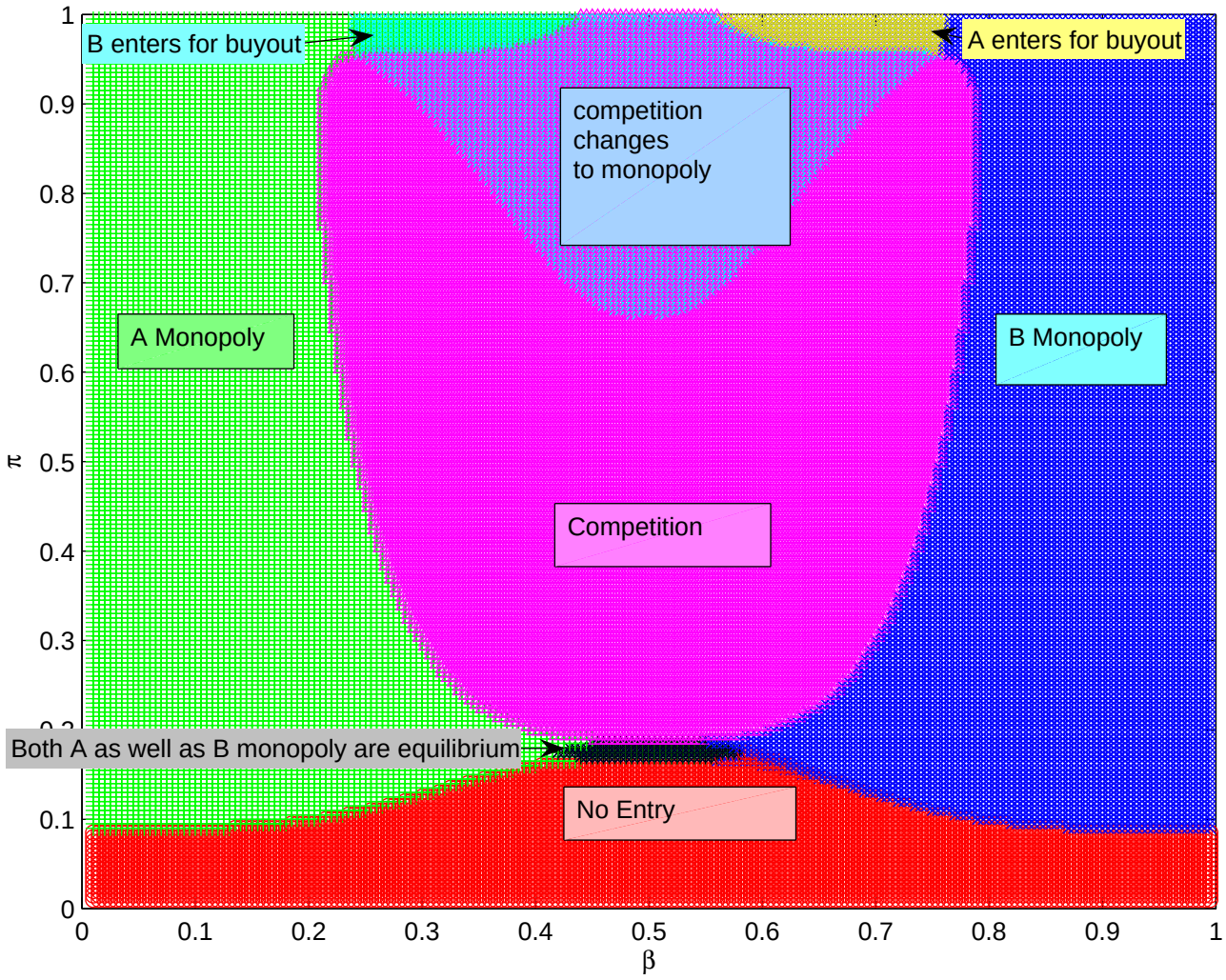

Figure 4: Equilibrium Market Structure Allowing Mergers− Dominant Profit Motive

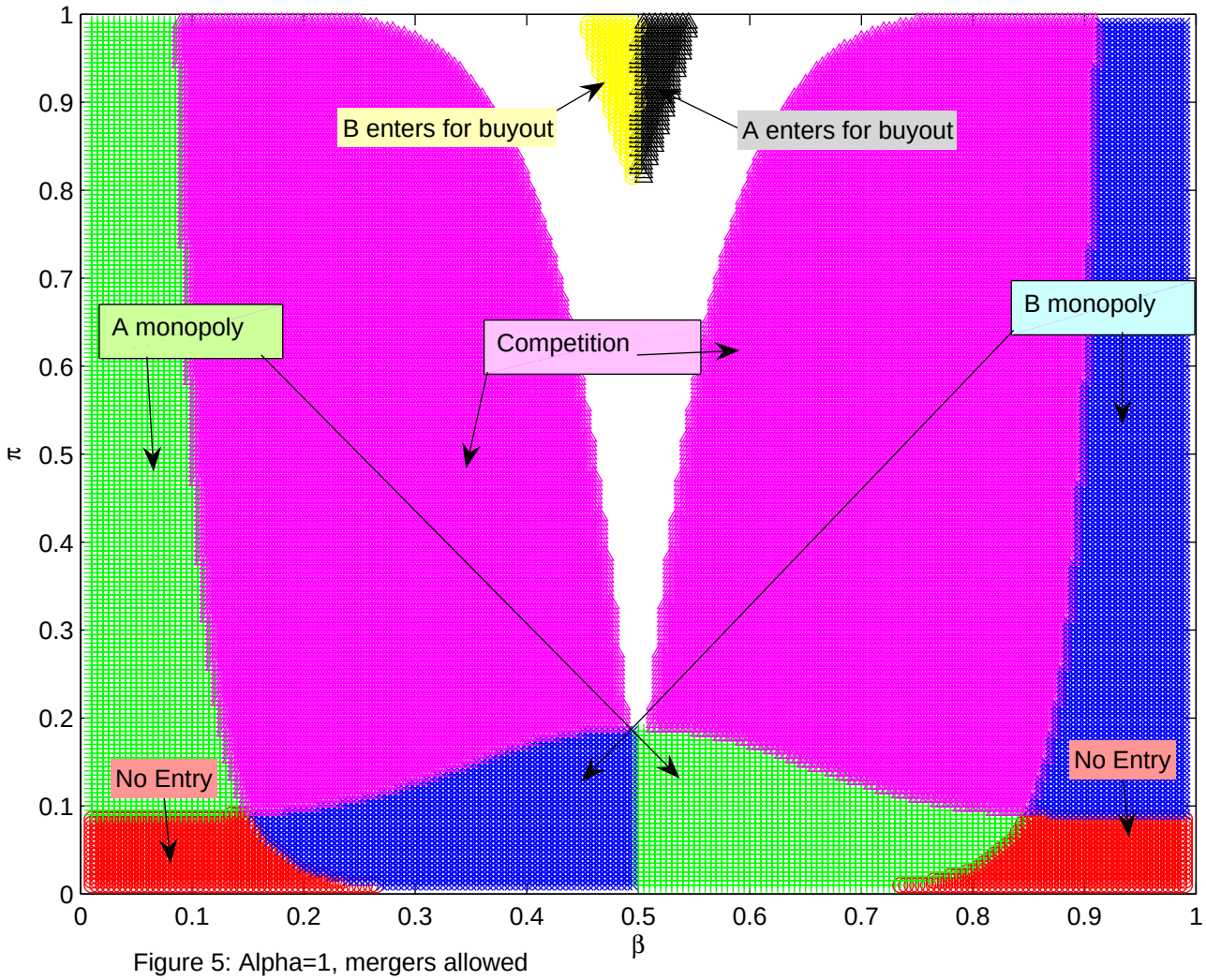

Figure 5: Alpha=1, mergers allowed