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ABSTRACT

Do news media bias content in favor of advertisers? We examine the relationship between advertising by auto manufacturers in U.S. newspapers and news coverage of car safety recalls. This context allows us to separate the influence of advertisers, who prefer less coverage, from that of readers, who demand more. Consistent with theoretical predictions, we find that newspapers provide less coverage of recalls by their advertisers, especially the more severe ones. Competition for readers from other newspapers mitigates bias, while competition for advertising by online platforms exacerbates it. Finally, we present suggestive evidence that lower coverage increases auto fatalities.

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1. INTRODUCTION

An independent press is essential to inform citizens about relevant policy issues and to expose government and corporate misconduct (Strömberg and Snyder, 2010; Dyck et al., 2008). Because media are important for the formation of public opinion, powerful private and political interests may have an incentive to "capture" outlets in order to promote friendly coverage and deter hostile reporting (Besley and Prat, 2006).

The debate over the risks of media capture has primarily focused on the potential impact of government control and private ownership on media freedom (Corneo, 2006; Petrova, 2008; Durante and Knight, 2012). One question that has been less explored is the extent to which media editorial decisions are vulnerable to the pressures of advertisers, as commercial media outlets rely heavily on advertising revenues and have an interest in maintaining a good relationship with their advertisers. When negative news about an advertiser emerges, an outlet may consider under-reporting to keep a good relationship with advertisers. While newspapers do attempt to separate the editorial and marketing sides of their business, real-world examples suggest that advertisers can sometime influence editorial decisions.[1] For example, the Daily Telegraph, a British newspaper, was accused of providing limited coverage of tax scandals involving Swiss bank HSBC, one of its largest advertisers (Plunkett and Ben, 2015).[2] This type of bias can be particularly insidious because it may be difficult for readers to recognize the conflict of interest and discount the bias accordingly (Chiang and Knight, 2011).

From an empirical point of view, the two-sided nature of media markets makes it difficult to identify the causal impact of ad spending on media bias. On the one hand, consumers have preferences over content (Gentzkow and Shapiro, 2010). On the other hand, advertisers have preferences over consumers as they aim to reach individuals with specific characteristics that make them more sympathetic and receptive to their message (Chen et al., 2009; Joshi et al., 2011). Profit-maximizing media outlets can slant content either to cater to

[1] For example, the first point on The New York Times' standards and ethics guidelines states that: "the goal of The New York Times is to cover the news as impartially as possible - "without fear or favor"....Thus The Times and members of its news department and editorial page staff share an interest in avoiding conflicts of interest or an appearance of a conflict". For more detail see http://www.nytco.com/who-we-are/culture/standards-and-ethics/ for details.

[2] According to Peter Oborne, former Telegraph chief political commentator, the paper had discouraged stories critical of HSBC since the bank suspended its advertising following a Telegraph's investigation. He also reported that a former Telegraph's executive defined HSBC as "the advertiser you literally cannot afford to offend".

the preferences of consumers (demand-driven bias) or to the demands of advertisers (supply-driven bias). Because the two are inextricably linked, and typically push content in the same direction, disentangling one effect from the other can be challenging. As a consequence, correlations between ad spending and content cannot necessarily be interpreted as evidence of a causal effect of advertisers' influence on content. This issue affects existing studies that have examined the influence of advertisers on newspapers, and casts a doubt as to what the influence of advertisers on media might actually be.

To overcome this challenge, our analysis focuses on a situation in which preferences of readers and advertisers should affect content in opposite directions. Specifically, we investigate the relationship between advertising by car manufacturers in U.S. newspapers and news coverage of car safety recalls. It is natural to assume that advertisers prefer less coverage of recalls, as this type of coverage may damage their reputation and reduce future demand (Freedman et al., 2012).[3] On the other hand, readers, particularly car owners, naturally demand more information about the associated safety risks and the competence of the manufacturer in dealing with recalls.

Three additional aspects make this case an ideal testing ground. First, since car manufacturers account for a substantial share of total advertising spending, media outlets are unlikely to ignore their demands. Second, because car defects can sometimes result in serious accidents, this case illustrates the importance of media scrutiny and the potential social costs of the lack of corporate accountability due to media capture. Third, there is significant variation in newspaper market structure, allowing us to examine factors, such as competition between newspapers, that might either mitigate or exacerbate any advertising bias.

We begin by proposing a simple theoretical model in which newspapers decide whether to report about car safety recalls by balancing the demands of advertisers, for more coverage, and of readers, for less. The model predicts that, in equilibrium, newspapers favor advertisers by limiting news coverage of their recalls. We then test this prediction empirically using data from four sources. First, we collect information on the car safety recalls issued in the U.S. between 2000 and 2014, focusing on all recalls involving the nine largest

[3] For an analysis based on a few recent case studies see http://www.autonews.com/Assets/pdf/NADA%20UCG_WhitePaper_Impact%20of%20Vehicle%20Recalls.pdf .

car manufacturers of the U.S. car market.[4] Second, we gather detailed data on the number of recall-related articles published in 115 U.S. daily newspapers, both national and local, for the entire sample period, for a total of over 13,600 articles. Third, we incorporate information on monthly advertising spending in these newspapers by automobile manufacturers. Finally, to measure demand-side preferences, we use survey data on the distribution of car ownership by manufacturer at the media market level.

Our identification strategy exploits the timing of recalls by each manufacturer relative to the timing of ad spending by that manufacturer in different newspapers. In particular, the availability of manufacturer-specific data allows us to estimate the impact of ad spending on news coverage controlling for advertiser-newspaper fixed effects and manufacturer-specific local demand and thus to separate supply-driven bias from demand-driven bias.

We find that newspapers in which a given manufacturer advertises more are less likely to write about recalls involving vehicles produced by that manufacturer. In particular, advertising by a manufacturer over the previous two years is associated with both a lower probability that the newspaper will publish any article on the recall and a reduction in the number of articles published. This effect is strongest for recalls that involve more vehicles and more severe defects, potentially reflecting the importance of these recalls for the reputation of manufacturers.

Crucially, our findings also support the hypothesis that reader preferences affects content in the opposite direction than advertiser preferences. Indeed, we find that newspapers serving areas where more people own vehicles by recalled brands provide significantly more coverage of recalls.

We are also able to study the dynamics of this relationship between advertisers and newspapers. We find that a medium-term advertising relationship between firms and newspapers is most conducive to friendly coverage, as advertising six months to two years prior to coverage has the largest effect on coverage. In contrast, ad spending both in the few months prior to a recall and more than two years prior to it have no effect on coverage.

We then explore how market structure affects newspapers propensity to bias content in favor of advertisers. First, we find that pro-advertiser bias is more pronounced in markets with fewer newspapers, suggesting that competition for readers, and the related reputation

[4] We compile this list based on the car manufacturers involved in the top 100 recalls in terms of the number vehicles affected which gave us the nine largest in the United States. As of 2015, these nine largest manufacturers accounted for about 87% of the U.S. car market.

concerns, has a disciplining effect on editorial choices. Second, we find that newspapers facing competition for ad revenues from online platforms are more vulnerable to the pressures of advertisers, suggesting that financial hardship makes media capture by advertisers more likely. Interestingly, we also find that, while content on larger newspapers responds to ad spending by national manufacturers, smaller papers are especially sensitive to spending by local dealers, a result that highlights the potential importance of personal relationships.

Finally, we show that reduced public awareness of recalls has potentially important consequences. In particular, we document that more advertising prior to a recall is associated with a higher number of fatal accidents involving vehicles by that manufacturer in the month after the recall. This finding provides suggestive evidence of the informative value of recall-related news and of the potential costs for consumers of a captured press.

Our research relates to and improves upon the few previous studies on the influence of advertisers on media editorial decisions. Looking at three personal finance publications and two national newspapers Reuter and Zitzewitz (2005) find that advertising spending by a mutual fund family is systematically associated with more favorable recommendations for that family's funds though only in personal finance publications. Focusing on four Argentinian newspapers, Di Tella and Franceschelli (2011) document that newspapers in which the government advertises more are less likely to report on corruption scandals involving government officials. Using data on advertising spending by 13 Italian companies on 6 newspapers, Gambaro and Puglisi (2015) find that newspapers on which a given company purchases more ads are more likely to publish articles about that company, especially following that company's press releases. Looking at 52 U.S. newspapers, Beattie (2017) finds that advertising from firms in carbon emitting industries decreases the quantity of coverage of climate change and shifts the tone of coverage towards climate skepticism. Finally, looking at U.S. local newspapers, Gurun and Butler (2012) find that the news coverage of local companies is significantly more positive than that of non-local ones and provide evidence that this may be due to higher advertising spending on local newspapers by local firms. As mentioned above, identification in this strand of literature often faces the threat that consumer demand is an omitted variable, which generally pushes content in the same direction as advertisers' preferences. Our strategy allows us to address this issue by: i) focusing on a situation in which the interests of advertisers and consumers work in opposite directions, and ii) by explicitly accounting for a measure of consumer demand. Our analysis also improves

upon previous work in that it looks at much larger number of newspapers over a longer time period. This wealth of data and longer time frame allow us to further qualify our findings by testing whether news bias is driven by shorter or longer term relationship between advertisers and media outlets, an aspect which previous work has disregarded.

More generally, by documenting that advertisers' pressure can deter media from adequately covering issues on which readers' interests conflict with advertisers' reputational concerns, our results complement previous evidence that media cater to the preferences of readers (Gentzkow and Shapiro, 2010; Sen and Yildirim, 2015). Also, our results that competition in the newspaper market reduces supply-side media bias dovetail nicely with previous studies of 19th century U.S. newspapers (Gentzkow et al., 2015; Galvis et al., 2016) and suggest an additional rationale for regulation aimed at limiting concentration in media ownership. Also, our findings complement the evidence presented in Seamans and Zhu (2013) that newspapers' advertising revenues from classified ads decreased due to the entry of online competitors by suggesting that financial weakness may have lead to less editorial independence. This result is especially informative about the risks of media capture by corporate interests at a time when numerous media outlets experience financial distress and become increasingly vulnerable to outside pressures. Finally, our result on ownership patterns not influencing media bias is in line with Gentzkow and Shapiro (2010) who find that political preferences of newspaper owners do not influence media slant and DellaVigna and Hermle (2016) who find no bias in movie reviews in favor of companies which have a financial stake in the movie and are part of the same media conglomerate.

The remainder of the paper is organized as follows. Section 2 provides an overview of both newspaper advertising by car manufacturers and vehicle recalls. Section 3 provides the basic theoretical model along with several extensions. Section 4 describes the data, while Section 5 lays out the empirical framework. Section 6 details our benchmark results, Section 7 investigates timing, Section 8 describes how market structure interacts with media bias, and Section 9 analyzes some of the heterogeneity of the baseline estimates. Section 10 investigates the implications for fatalities, and Section 11 concludes.

2. BACKGROUND

2.1. NEWSPAPER ADVERTISING BY AUTOMOTIVE FIRMS

Advertising accounts for a large share of newspapers' total revenues around the world and up to 80% in the United States (FTC, 2010). Car manufacturers are among newspapers' largest advertisers; as of 2006, total ad spending by the automotive sector amounted to over 20 billion dollars, 40% of which benefited the printed press (Ellman and Germano, 2009).[5] Reliance on advertising by newspapers raises the concern that editorial decisions may be vulnerable to the influence of advertisers, especially the largest advertisers.

2.2. RECALLS AND CAR MANUFACTURERS

Car safety recalls are managed by the National Highway Traffic Safety Administration (NHTSA). When a manufacturer becomes aware of a potentially faulty part, they are obliged to report it to the NHTSA, which publicizes information about the recall, including details about the defective part and the number of affected vehicles. By law, the manufacturer is required to provide a free remedy to the problem and notify owners of affected vehicles. Notices include information on the nature of the problem, the associated risks, how an owner can access the free remedy, how long the repair will take, and a description of what owners can do if they are not able to have the affected vehicle repaired.

Despite the fact that owners are directly notified by manufacturers via recall notices, media coverage of recalls may play an important role. There is evidence that many recall letters never reach owners of recalled vehicles.[6] In addition, even for owners who do receive the recall notice, the media may provide additional information. For example, the media may report on the number of vehicles affected and other recent recalls by manufacturers, information that is not generally included in recall letters. Finally, in addition to current owners, potential buyers in both used and new car markets may benefit from media coverage

[5] According to a report by Advertising Age, a marketing research, three of the top ten national advertisers in 2015 were car manufacturers, namely GM (#3), Ford (#6) and Fiat Chrysler Automobiles (#8).

[6] There are at least two reasons for recall letters not reaching owners. First, notices will only be delivered to owners of used vehicles if the manufacturer uses updated information from state DMV systems, and, by law, manufacturers are not required to do so. Second, owners who move without forwarding their mail will also not receive the notice. See https://www.edmunds.com/car-safety/recalled-but-unrepaired-cars-are-a-safety-risk-to-consumers.html for additional details.

of recalls.[7] For all of these reasons, the media may provide additional valuable information to newspaper readers about product recalls.

3. MODEL

We propose a simple model in which newspapers value both readers and advertisers and must decide how to cover recalls, when they occur. While readers demand more information about recalls, advertisers prefer less coverage since this can potentially hurt their reputation. While our baseline model allows for only one newspaper and one advertiser, we then extend the analysis in various ways, including consideration of competition between newspapers for readers and for advertisers.

3.1. SETUP

Let p be the probability that a a product is recalled. In case of a recall, the newspaper can either report the information or suppress it. A unit mass of readers get value v from news about the recall. Let b_i, the idiosyncratic benefits from reading a newspaper (regardless of the recall), be distributed across readers uniformly over the interval $[\mu - \frac{1}{2\xi}, \mu + \frac{1}{2\xi}]$. Also, let ρ be the price readers have to pay to subscribe to the paper. Hence, the expected payoff for consumer i from reading the paper is $b_i + pv - \rho$, if the recall is covered, and $b_i - \rho$, if coverage is suppressed. Readers subscribe to the paper if the expected payoff from doing so is positive. Finally, let σ_c be the paper's market share if it covers the recall, and σ_n if it does not.

The paper sells each copy at (exogenous) price ρ, and face marginal costs m and fixed costs F. As further discussed below, the papers also has the option to suppress coverage of the recall in exchange for ad spending by the manufacturer (a). Hence, the newspaper's profit equals $(\rho - m)\sigma_c - F$, if it covers the recall, and $(\rho - m)\sigma_n - F + a$, if it does not.

Turning to the manufacturer, it gets a payoff π in the absence of recall. If a recall is issued and is covered, the manufacturer's payoff is $\pi - \sigma_c d$, where d is the damage to the manufacturer's reputation associated with publicity of the recall. Finally, if a recall is issued but the paper decides not to cover it, the manufacturer's payoff is $\pi + \sigma_n e - a$, where e is the

[7] Sellers in used car markets are not required to disclose recalls. In new car markets, potential buyers may want to learn about the quality and reliability of the vehicles and of the capacity of the manufacturer to deal with problematic situations.

per-reader economic benefit from advertising, independent of the coverage of the recall.

The timing of the game is as follows. In the first stage, the manufacturer makes the paper a credible offer of ad spending in exchange for suppressing information about the recall. In the second the newspaper accepts or rejects the offer. In the third, and conditional on the newspaper's coverage decision, readers decide whether or not to subscribe. Finally, nature chooses whether or not a recall occurs and payoffs are realized.

3.2. EQUILIBRIUM

Working backwards, the newspaper's market share with and without coverage of the recall is, respectively:

$$\sigma_c = 0.5 + \xi(\mu + pv - \rho)$$

$$\sigma_n = 0.5 + \xi(\mu\text{-}\rho)$$

Thus, the boost in readership from coverage is equal to $\sigma_c - \sigma_n = \xi pv$; this is increasing in the density of marginal readers, in the likelihood of a recall, and in the benefits to readers from learning about the recall.

The newspaper is willing to accept offers that involve a higher profit than what it can get by covering the recall. That is, the newspaper decides to suppress information about the recall if $(\rho - m)\sigma_n - F + a > (\rho - m)\sigma_c - F$. Using the results above, the minimum required ad spending is thus:

$$a = (\rho - m)\xi pv$$

This represents the drop in subscription revenue, net of production costs, associated with the loss in reputation for not covering the recall. Hence, the manufacturer is willing to strike a deal with the paper if its profit without coverage is higher than that with coverage (i.e., if $\pi + \sigma_n e - a > \pi - p\sigma_c d$). Substituting in market shares and minimum advertising levels, this can be written as:

$$d > \frac{(\rho - m)\xi pv - e[0.5 + \xi(\mu - \rho)]}{p[0.5 + \xi(\mu + pv - \rho)]}$$

Thus, media capture is more likely when the damage to the manufacturer (d) and the economic benefit of advertising (e) are larger, and when marginal costs (m) are higher, since this reduces the newspaper's profit margins. Hence, the key prediction of the model is that news coverage of the recall is lower for recalls issued by advertisers.

3.3. EXTENSIONS

We next consider six separate extensions of the model, which deliver additional predictions that we test in our empirical analysis. We briefly describe each extension below, and provide a lengthier discussion and model details in the Online Appendix.

1) Intensive margin: while our baseline model considers the decision by the newspaper over whether or not to cover a recall, we also consider the impact of ad spending on the number of recall-related articles. In this case we assume that readers have a preferred number of recalled-related articles and that their utility decreases as the number of articles declines from that ideal point. Along the same lines, we assume that the damage to the reputation of the manufacturer is increasing in the number of recall-related articles. In this case, the manufacturer offers the newspaper a certain amount of ad spending in exchange for a certain number of articles. The key prediction here is that the number of recall-related articles decreases for every dollar of ad spending.

2) Recall severity: we consider two types of recalls, moderate and severe. News coverage of severe recalls is more valuable to readers but more damaging to the manufacturer's reputation. A newspaper can decide whether to cover all recalls, no recalls, or only severe recalls. Similarly, a manufacturer can attempt to suppress coverage of all recalls or only of severe ones. In this case, the key prediction of the model is that a manufacturer will attempt to only suppress coverage of severe recalls, under certain conditions (if the reputational damage for severe recalls is sufficiently high and the reputational damage for moderate recalls is sufficiently low).

3) Competition for readers: while in the baseline model we only consider one newspaper, in an extension we allow for multiple newspapers competing for readers. For simplicity, we assume that papers are perfect substitutes; that is, if all papers suppress coverage of the recall, they split the market share under no coverage (σ_n) in an equal way. However, if only one newspaper rejects the manufacturer's offers and covers the recall, it captures the entire market share under coverage (σ_c). This implies that suppressing coverage of the recall becomes more costly for the manufacturer as it needs to compensate each paper for the foregone monopoly profit. Hence, the key prediction is that capture should be less likely in markets with a larger number of newspapers.

4) Competition in the advertising market: if a newspaper declines the manufacturer's offer for suppressing information about the recall, it can sell the associated advertising slot

at some price, which can be interpreted as the market price for classified advertising. As this price falls, the newspaper has less leverage with the manufacturer and a greater incentive to accept lower offers to suppress information. Hence, the model predicts that advertisers are more likely to capture media outlets in markets with falling advertising prices due to, for example, increased competition from online platforms for classified ads.

5) Transactions costs: transfers from a manufacturer to a newspaper aimed at suppressing information about the recall may incur a transaction cost. This cost reflects the difficulty of enforcing the non-contractual *quid pro quo* relationship between the paper and the manufacturer due to, for example, a lack of trust between the two agents. The model predicts that the lower the transaction cost, the less costly for the manufacturer to capture the paper, and the more likely that information will be suppressed, in equilibrium. Empirically, we proxy for transactions costs using personal relationships between advertisers and newspapers which, we hypothesize, are more likely between local car dealers and small papers, relative to national manufacturers and larger papers.

6) Manufacturer private information: if the manufacturer knows whether or not a recall is forthcoming, it will only advertise when there is potential coverage to suppress. Expecting to receive no advertising if a recall is not forthcoming, the newspaper will demand higher ad spending for suppressing information. Hence, the model predicts that, in the presence of private information, capture and information suppression are less likely to occur.

4. DATA

For our empirical analysis we use data on car safety recalls, news coverage of recalls, advertising spending by car manufacturers, and vehicle ownership by manufacturer and media market.

4.1. CAR SAFETY RECALL DATA

Comprehensive data on all car safety recalls issued in the U.S. between 2000 and 2014 are available from the National Highway Traffic Safety Administration (NHTSA). For each recall, the NHTSA reports information on the make, model(s), and part(s) affected by the recall, and on the number of vehicles potentially affected. We focus on manufacturers involved in the top 100 recalls during our 15-year sample period in terms of the number of

potentially affected vehicles.[8] Since major recalls often concern multiple models, we aggregate and analyze the data at the manufacturer level.[9] Overall, we consider more than 1800 recalls involving nine car manufacturers, accounting for over 87 percent of the market share as of 2015.[10]

4.2. News Coverage Data

Data on news coverage of recalls in U.S. newspapers for the period 2000-14 are obtained from the Newslibrary.com database. To identify recall-related articles, we performed an automated search of specific keywords over full text articles, attempting to minimize the probability of both false positives and false negatives. Specifically, an article is deemed to concern a recall if it contains the word "safety" and the word "recall" and the name of a manufacturer.[11] Recall-related articles are then assigned to a manufacturer, or multiple manufacturers, based on whether the name of the manufacturer is mentioned in the article.[12] Finally, based on the date the article was published, we assign the article to a specific month. Data on news coverage of recalls are hence organized by manufacturer-newspaper-month. Overall, we collected data on coverage for 115 daily U.S. newspapers for a total of 13,600 recall-related articles.

As shown in Table A1, there is a 7.1 percent probability that a newspaper writes a recall-related article about a particular manufacturer in a given month, with the mean number of articles equal to 0.118. To provide some evidence on the tone of coverage, Figure 1 pro-

[8] Each of the top 100 recalls concerned affected atleast 680,000 vehicles with the mean number of potentially affected vehicles being about 1.4 million vehicles.

[9] The mean number of models affected by each recall is 8.5.

[10] These include Chrysler, Ford, General Motors, Honda, Hyundai, Kia, Nissan, Toyota and Volkswagen. See https://www.statista.com/statistics/249375/us-market-share-of-selected-automobile-manufacturers/ for more details.

[11] Including the word "safety" reduces the probability that "recall" is used as a synonym for "remember". The NHTSA employs the expression "safety recall" ; hence, although some articles which mention recalls do not use the word "safety", almost all articles including a lengthy discussion of a recall use it.

[12] The same recall-related article can be included more than once in the dataset if it contains the names of multiple manufacturers. This type of articles is not uncommon since some times articles discussing a recall may compare it to other recent recalls, or discuss general NHTSA's recall procedures.

vides a visual representation of the language in articles of five newspapers.[13] As shown, there is significant representation of words with negative tone, such as as "problem", "switch", "deaths", and there is little evidence of words indicating a positive tone.

4.3. Advertising Expenditures

Data on advertising spending by both car manufacturers and local car dealers were purchased from the Ad$pender database produced by Kantar Media. The dataset includes monthly advertising spending by newspaper for each product.[14] For our analysis, we assign spending for a given product to a manufacturer if the name of the product contains either the name of the manufacturer or the name of one of the brands the manufacturer produces.[15] As shown in Table A1, the average monthly advertising expenditure per newspaper by a manufacturer is $102,300.

4.4. Vehicle Ownership Information

As a measure of demand for news coverage, information on the distribution of owned vehicles by manufacturer at the local level are available from the National Household Travel Survey (NHTS). The data contain information on a sample of vehicles at the Census Block Group level. To merge them with the newspaper data, we aggregate the NHTS data at the Metropolitan Statistical Areas (MSAs) level; specifically, we assign each newspaper the shares of vehicles by manufacturer in the MSA where the newspaper's headquarters is located. Since the NHTS survey was only conducted in 2001 and 2009, data for the other years are imputed via interpolation. As shown in Table A1, the mean market share for a car manufacturer is 8 percent, with a maximum of about 27 percent.

[13] These include USA Today, Tampa Bay Times (formerly St. Petersburg Times), St. Louis Post-Dispatch, Pittsburgh Post-Gazette, and Atlanta Journal Constitution. In addition, we read a subsample of articles from these newspapers. Almost all articles mentioned some information that is not generally available in recall notices provided by manufacturers to owners of affected vehicles. The most common additional information provided was the number of affected vehicles, which can arguably be considered negative news for the manufacturer especially since it is the larger recalls which eventually get covered. Other common pieces of information include the number of accidents, injuries, or deaths caused by the defective part, comparisons with other recent recalls, and quotes and analysis by industry experts.

[14] To estimate actual spending, Kantar Media measures the advertising space dedicated to each product, and then attaches to it a value based on the rates listed by each newspaper.

[15] For example, spending for a product whose name includes the words “Toyota” or “Lexus” is assigned to Toyota Inc.

4.5. Road Fatalities Data

To assess the impact of recall-related news coverage on a relevant outcome, we look at fatalities associated with vehicle crashes. These data are provided by NHTSA's Fatality Analysis Reporting System (FARS). This is a nationwide census of vehicle related fatalities with information on the date of the accident, the make of the vehicle involved as well as the location of where the vehicle is registered. We aggregate these data to the state-manufacturer-month level during our sample period 2000-2014.

5. The Empirical Framework

Our baseline specification links coverage to advertising spending as follows:

$$coverage_{mnt} = \alpha + \theta_1 log(\sum_{i=1}^{\tau} advertising_{mn(t-i)}) + \theta_2 demand_{mny} + \theta_3 severity_{mt} + \phi_{mn} + \psi_t + \varepsilon_{mnt}$$

The key outcome $coverage_{mnt}$ is measured in two ways. First, we consider the extensive margin – whether or not the a newspaper contains any articles about recalls by a manufacturer in a given month. Second, we consider the intensive margin (the natural log of the number of recall related articles). $advertising_{mn(t-i)}$ represents the amount of advertising spending by manufacturer m on newspaper n at time $t-i$; for example, if i is 12 the summation term captures total ad spending by manufacturer m on newspaper n in the previous year. A key decision involves the time period over which advertising should be measured. In our baseline analysis, we focus on two-year advertising histories and then later investigate the dynamics of the relationship in more detail. $demand_{mny}$ represents the number of vehicles made by manufacturer m as a share of total vehicles in the MSA where newspaper n operates in year y. We expect that this time-varying measure of manufacturer demand will be positively related to recall-related coverage since it would be interest of owners of vehicles to seek out information on recall involving the manufacturer of their vehicles. $severity_{mt}$ represents the number of total vehicles potentially affected by the recall(s) of manufacturer m at time t. Due to reader demand, we expect coverage to increase in this measure of recall severity. Finally, we also control for newspaper size by including a measure of the total number of articles published by the newspaper in a year.

Our specification also includes a set of fixed effects. ψ_t represents aggregate time effects, which include any other time-specific factors that might affect coverage and/or ad-

vertising spending (e.g., seasonality). ϕ_{mn} represents manufacturer-newspaper fixed effects, which capture time invariant characteristics of the manufacturer-newspaper relationship, including time invariant demand for the manufacturer's brand in that particular geographical market. In order to account for the error term being serially correlated between newspaper-manufacturer pairs, even after accounting for newspaper by manufacturer fixed effects, we cluster standard errors at the newspaper-manufacturer level. This ensures that we do not overestimate the precision of our results.[16]

6. Benchmark Results

We begin our analysis by estimating our baseline specifications examining the link between advertising expenditures and coverage of recalls. In columns (1)-(5) of Table 1, we use an indicator for any recall-related articles as our dependent variable. In column (1), we simply regress the total amount of advertising dollars over the past two years on this coverage indicator without including any fixed effects or controls. As shown, the relationship is positive and significant, highlighting that there can be a spurious relationship between coverage and advertising in the absence of controls for demand-side preferences. Inclusion of newspaper-manufacturer fixed effects in column (2) flips the sign on the log of advertising dollars, leading to a negative and statistically significant (at the 1% level) impact on the probability of writing a recall-related article.[17] In column (3) we include the following additional controls: a time varying measure of the demand for the manufacturer's vehicles, the number of affected vehicles, and newspaper size. As shown, this increases the coefficient of interest, while still being statistically significant at the 1% level. This is in line with intuition since these variables are positively correlated with recall coverage, depressing the coefficient on advertising expenditures if omitted from the regression. Our results are also robust to the

[16] The specification we estimate is structurally equivalent to looking at the logarithm of the recall related articles written in a month as a share of the total number of articles written in a year. Looking at the annual number provides a more stable measure of the newspaper size or output. We demonstrate how the results are robust to using the logarithm of the total number of monthly articles as a measure of size, in Table A3.

[17] To provide further evidence on the role of demand-side bias, we examine the decision of manufacturers over where to advertise. We define a geographical market for each newspaper based on the MSA it is has its headquarters in. We then regress the monthly advertising expenditure by a manufacturer in a newspaper on the share of vehicles owned of that manufacturer by consumers living in that region. The results show that monthly advertising expenditure is positively correlated with contemporaneous and lagged demand for that manufacturer's vehicles in that geographical market. Using newspaper locations as proxies for regional markets, this indicates that manufacturers target geographies where there is already an underlying taste for their vehicles. Results available upon request.

inclusion of month fixed effects (column 4). In terms of magnitudes, doubling advertising spending reduces the probability of coverage by 0.2 to 0.7 percentage points (or 3 to 10 percent of the baseline coverage of 7 percent). Finally, in column (5), we report results from a specification in which we control for newspaper and manufacturer fixed effects separately as opposed to controlling for newspaper-manufacturer fixed effects as in columns (2)-(4). The coefficient is negative and statistically significant at the 5% level but the magnitude is smaller than in column (4). This demonstrates, again, that newspaper-manufacturer fixed effects do capture something substantive about the relationship between the newspaper-manufacturer relationship and the underlying demand characteristics of that media market.

While the baseline results consider the extensive margin, our first theoretical extension involves the intensive margin. In particular, we conduct the same analysis with the dependent variable being the total number of recall articles written by a newspaper. As shown in Table 2, advertising spending has a negative and statistically significant impact on the number of articles written by a newspaper across a variety of specifications. The effect is robust to the inclusion of newspaper by manufacturer fixed effects (columns (2)-(4)), controls for manufacturer demand (columns (3) and (4)), the size or the importance of the recall (columns (3) and (4)), and month fixed effects (column (4)). In column (5), when controlling for newspaper and manufacturer fixed effects separately instead of newspaper-manufacturer fixed effects we find results similar to the extensive margin, with a coefficient that is negative and significant but smaller in magnitude relative to the estimate in column (4).

Motivated by our severity extension in the theoretical model, we also test whether bias is more pronounced for more severe recalls. To do so, we create two measures of recall severity. First, based on the vehicle component affected, we create an indicator for recalls due to defects, defined as a problem in the engine, accelerator, brakes, airbags, steering, electrical system, fuel system or powertrain.[18] Second, we create an measure indicating that the number of vehicles affected in a recall is above the median. As shown in Table 3, the interaction between advertising spending and the indicator for defect is negative and statistically significant, and this is the case for both the extensive (column (1)) and intensive

[18] These are components which can lead to serious consequences if a defect occurs. Some examples of components which form the baseline category and hence, are not classified as severe are: Latches/Locks/Doors, Equipment (other), Adaptive Equipment, Defroster/Defogger system, Seats, Behicle Manual, Sunroof. It is clear that defects in these vehicle parts would create less of a hazard than those in the severe category. For more on how to classify the seriousness of a recall see http://www.truckinginfo.com/blog/auto-focus/story/2015/09/should-auto-recalls-be-delineated-by-severity.aspx.

(column (2)) margins. Likewise, the interaction effect is negative and statistically significant for a recall involving a large number of vehicles, in terms of both the extensive and intensive margins, (columns (3) and (4), respectively). These results highlight that recalls receiving less coverage are those that are more relevant for consumer safety, suggesting important implications for the social cost of media capture.

As a first robustness check, we also develop recall-specific measures of news coverage for recalls with more than 1 million affected vehicles.[19] For each recall, we added to our baseline search terms (i.e. recall and manufacturer) words relevant to the recall, such as "air bag" or "fire" and focus on coverage within 6 months of the recall. Our first finding is that the timing of articles is strongly correlated with recall events. In particular, Figure 2, documents that coverage spikes during and immediately after a recall and lasts up to 4 months. We then test whether coverage of these recalls is different if advertising in the previous year was higher than the average amount a newspaper receives from the manufacturer of the recalled vehicle. As shown in Figure 3, newspapers are less likely to cover recalls when they have recently received more advertising than usual from a manufacturer.[20] These effects are strongest during the month immediately after the month the recall takes place, with coverage returning to normal shortly after.[21] Taken together, the results of this analysis demonstrate that the relationships documented in the main specifications apply to coverage of specific recalls.

Finally, we consider a large number of additional robustness checks, with details and results provided in the Online Appendix. In particular, the robustness checks include the following specifications: 1) consideration of the manufacturers in the top 50, rather than the top 100, recalls, 2) the inclusion of controls for advertising campaigns, 3) the inclusion of controls for television coverage of recalls, 4) non-linear specifications (negative binomial and logit models), 5) alternative time windows for the measure of newspaper size, 6) allowing newspaper by manufacturer fixed effects to vary over four-year intervals, 7) measuring advertising as the proportion of total advertising in that newspaper by all car manufacturers, 8) using measures of word counts, rather than the number of articles, for the intensive margin measure, and 9) controls for and consideration of advertising by competing manufacturers.

[19] There are 54 of these recalls in our sample.

[20] In the Online Appendix we present corresponding results for the intensive margin.

[21] During this month, a newspaper may not feel obliged to provide public service information about the recall as they would in the month of the recall, but the recall is still recent enough to be discussed, particularly for these very large recalls.

While we refer the reader the Appendix for details, our results are robust to all of these alternative specifications.

7. Market Structure, Advertising Revenue and Bias

Having established our baseline results, we next analyze the role of market structure and how it interacts with media bias. First, we ask how the presence of competition between newspapers affects media bias. We then study competition in the advertising market via an analysis of the entry of Craigslist, an alternative advertising platform. We then consider differences between advertising from local dealers and from national manufacturers and the interaction with newspaper size. Finally, we assess whether the ownership structure of newspapers feeds into coverage decisions.

7.1. Newspaper Competition and Media Bias

We first consider the role of competition between newspapers. As formalized in a theoretical extension, we hypothesize that competition between newspapers may reduce media bias due to increased reader choice, reducing the leverage of advertisers with each individual newspaper. To define whether a newspaper faces competition, we first count the total number of newspapers with headquarters in each MSA. A newspaper is then defined as facing competition if the total number of newspapers in the MSA exceeds two, the median number. As shown in Table 4, competition has a disciplining effect on media bias. For the extensive margin (columns (1) and (2)) the interaction term between advertising and competition is positive and statistically significant, implying that competition reduces the direct impact of advertising spending on bias in news coverage. We find similar results (in columns (3) and (4)) when we analyze the intensive margin, with the interaction term again positive and statistically significant.[22]

These results are in line with existing findings about newspaper competition. In a historical study, Gentzkow et al. (2015) find that competitive forces in the newspaper market mitigated any impact of the party in power had to exert political influence.[23] Similarly, Galvis et al. (2016) find that partisan bias in the coverage of corruption scandals was limited

[22] We find similar results if we look at the county in which the newspaper has its headquarters in instead of the MSA.

[23] The exceptions were the Southern states, where media and political competition was limited.

by the presence of other newspapers in the market.

7.2. Craigslist and Media Bias

We next consider competition in the advertising market. As formalized in a theoretical extension, we hypothesize that increased competition in the advertising market, modeled via a reduction in the market price for classified advertising, makes newspapers more reliant on traditional advertisers, such as automobile manufacturers. This reduces the leverage of newspapers and may increase bias towards these traditional advertisers.

Empirically, we examine competition in the advertising market via the disruption of the advertising market by the introduction of the internet during our sample period (2000-2014). Websites such as Craigslist, which was termed the 'newspaper killer', provided a platform for free classified advertising, reducing demand for classified advertising space in a newspapers.[24] Indeed, Seamans and Zhu (2013) find that the introduction of Craiglist lead to a decline in advertising revenues for local newspapers of about $5 billion between 2000 and 2007. Given this, we examine whether the entry of Craiglist and the associated negative shock to advertising revenues led newspapers to cater more to traditional advertisers and to increase their bias in the coverage of recalls.

We use a difference-in-differences setup, as in Seamans and Zhu (2014), exploiting the quasi-random geographic and temporal variation in the entry of Craiglist into various counties in the U.S. Our coefficient of interest is the interaction between advertising in the past two years and whether Craigslist was available in the county where the newspaper was headquartered in that year. Additionally, we collect information on whether a newspaper had a classifieds manager or not in the year 2000 to evaluate any heterogeneity in the impact of Craigslist across newspapers.[25] As in Seamans and Zhu (2013), one would expect newspapers with classifieds ad managers to be more 'exposed' to a negative shock to ad revenue through Craigslist entry. We restrict the sample period to 2000-2007 since Craigslist entry had taken place in most regions by 2005.[26]

The results in Table 5 indicate that the entry of Craigslist did exacerbate the problem of media bias. In particular, the coefficient on the interaction between advertising and

[24] See http://sfist.com/2004/12/29/craigslist_newspaper_killer.php for more.
[25] This information is collected from the Editor and Publisher's International Yearbook (2000).
[26] Our results are robust to alternative cutoff years. Available upon request.

Craigslist entry is negative and statistically significant for both the extensive (column (1)) and intensive (column (2)) margins. We then split the sample into newspapers with and without a classifieds manager. In line with our hypotheses, the Craigslist impact is driven by newspapers with a classifieds manager (columns (3) and (4)), while there is no effect on newspapers without a manager (columns (5) and (6)). This implies that the presence of Craigslist made those newspapers bias their coverage even more when they were more vulnerable to a negative shock, as proxied by the presence of a classifieds ad manager.

To sum up, we do find indirect, spillover effects on media bias from the introduction of Craigslist in addition to its direct effect on ad prices as documented by Seamans and Zhu (2013). More generally, this exercise captures how the availability of the internet indirectly impacted news content by providing traditional newspaper advertisers an alternative channel to reach their desired audience.

7.3. Dealer Dollars and Small Newspapers

An additional dimension of market structure involves how advertising spending differentially affects coverage depending on whether advertising is made by a local dealer or directly by a manufacturer. As motivated by our theoretical extension involving transactions costs, we hypothesize that the relationship should be strongest when small newspapers receive advertising from local dealers since the relationship should be strongest in this case and monitoring costs should be low.

Using information on the distinction between advertising by local dealers and advertising by national manufacturers, we focus on the interaction between advertising dollars coming from dealers and an indicator for small newspapers, defined as those with below the median level of daily circulation in our sample. As shown in Table 6, we find a statistically significant difference in coverage when the dealers advertise in small newspapers. In columns (1)-(2), which report results for the extensive margin, the interaction term on dealer dollars and small newspapers is negative and significant across different specifications. The direct effect of dealer dollars is positive and insignificant in column (1) though it turns marginally significant at the 10% level in column (2).[27] The results are similar in columns (3)-(4) when analyzing the intensive margin. Taken together, these results are in

[27] The overall effect of dealer dollars is still negative on the amount of coverage when looking at the combination of the direct effect and the interaction term.

line with our theoretical hypothesis that smaller newspapers provide more favorable coverage when advertising comes from local dealers.

7.4. Ownership Structure and Media Bias

While we have so far focused on the impact of advertising and reader preferences on newspaper coverage, it is also possible that newspaper ownership matters for media bias. In particular, we examine whether manufacturers influence coverage via advertising in other newspapers with the same owner to analyze whether there are any spillovers in media bias across newspapers because of joint ownership.

First, we analyze whether advertising by manufacturers in a newspaper leads to any spillovers in coverage by another newspaper owned by the same company and headquartered in the same MSA. In particular, in addition to the ad spending over the previous two years, we also look at advertising expenditure over the past two years by the manufacturer in any other newspaper owned by the same company in the same MSA. Columns (1) and (2) in Table 7 show that there is no evidence of such spillovers. The coefficient on the log of ad spending in other newspapers in the MSA owned by the company is statistically insignificant for both the extensive (column (1)) and intensive (column (2)) margin. In columns (3) and (4), we also include a measure of advertising in newspapers in other MSAs owned by the same company. Again, we find the coefficient on both variables to be statistically insignificant, indicating an absence of spillovers in bias across newspapers owned by the same company.

These results on cross-ownership are consistent with existing work. Gentzkow and Shapiro (2010) find that the political preferences of newspaper owners do not influence the political slant of news coverage. Likewise, DellaVigna and Hermle (2016) analyze movie reviews and find no evidence of media outlets biasing their reviews in favor of companies in the same conglomerate.

8. Timing

While our baseline results use advertising over the past two years, we investigate advertising over different time periods to clarify the timing of the relationship between advertising and coverage. In Figure 4, we plot the coefficients of a regression of the number of recall related articles by a newspaper on quarterly ad spending by a manufacturer in that newspaper, conditional on newspaper-manufacturer and calendar month fixed effects. There are two

main takeaways from this analysis. First, very short term ad spending (previous 6 months) and extremely long term ad spending (24 months and beyond) have no impact on coverage decisions by the newspaper. Second, it indicates that a medium-term (beyond 6 months and less than 24 months) advertising relationship seems to be driving coverage decisions of the newspaper.

In a regression format, we re-estimate our baseline specifications with a variety of timing specifications in Table 8. As shown, advertising expenditure over the past 6 months (column (1)) has no statistically significant impact on the likelihood of an article, with the point estimates being small as well. Moreover, very long lags, such as advertising expenditure between two and three years ago (column (4)), also have no statistically significant impact. Advertising expenditure between the past six months and a year (columns (2)) and between the previous year and two years (columns (3)) are statistically significant, indicating that the variation is coming from a medium-term relationship. In columns (5), these results survive even when we include all lags in one specification. These results are similar when considering the intensive margin (column (6)). More generally, this exercise highlights that it is the medium or long term relationships which drives this media bias and not short term advertising expenditure effects.

From a theoretical perspective, the lack of short-run effects can potentially be explained by our private information extension in Section 3. In particular, we show that the returns to advertising are lower when manufacturers have private information about recalls, and this seems more plausible in the short-term than in the medium-term or long-term. This type of adverse selection is often solved in insurance markets by waiting periods, and, while our model is purely static in nature, one could imagine newspapers adopting similar strategies by not rewarding recent advertising with favorable coverage.

Since the literature (Di Tella and Franceschelli (2011), Puglisi and Gambaro (2015) and Reuter and Ziztewitz (2006)) has focused mainly on short term lags, we next zoom into ad spending in months (t-1), (t-2) and (t-3) to ensure we are not missing any short term effects. As shown in Table 9, introducing the short term lags sequentially (columns (1)-(3)) or all at once (column (4)) has no statistically or economically significant relationship with recall related coverage. Introducing longer lags ((months (t-18)-(t-6)) in addition to the short term ones does not affect their significance (columns (5) and (6)) while the longer lags are still significant and of a similar magnitude as in the baseline.

These results indicate that a medium or long term relationship between the advertiser and the newspaper seem to drive media bias. In addition to the quantity of ad spending over the past two years, another dimension of such relationships could be reflected in how consistently the manufacturer advertised in the newspaper. We test whether a more stable stream of spending leads to an advertiser 'buy' better coverage for itself. We create a dummy variable which equals one if the manufacturer's monthly ad spend had been above the median for each of the 24 months over the past two years. As shown in columns (1) and (2) of Table 10, consistently high ad spending leads to a negative and statistically significant impact on recall-related coverage in terms of both the extensive and intensive margins. Additionally, when we control for the total amount of spending, we find that the negative effect of the stability of spending persists both on the extensive (column (3)) and intensive (column (4)) margin. This result implies that consistent advertising expenditure, indicative of a more stable relationship between the newspaper and manufacturer, over and above the total amount spent leads to more media bias in favor of the manufacturer.

Finally, in the Online Appendix, we also analyze the exact timing in the relationship between the manufacturer and the newspaper. In particular, we assess whether the manufacturer punishes (rewards) the newspaper ex-post in the case of more negative (less negative) coverage associated with their recalls over and above their existing advertising relationship. We find that no evidence that manufacturers respond to coverage, suggesting that advertisers move first in setting advertising spending.

9. Heterogeneity of Baseline Estimates

We next analyze the heterogeneity of our baseline results across several different dimensions: the size of newspapers and manufacturers, domestic versus foreign manufacturers, and dealer versus manufacturer advertising.

We begin by analyzing how our results vary with the size of the newspapers. It is important to analyze the extent of media bias on newspapers with the highest circulation since they are ones which are most likely to shape public opinion. To do so, we create indicators for large newspapers, as defined above, and interact this measure with ad spending. As shown in Table 11, the coefficient on the interaction term is negative across specifications and statistically significant for both the extensive (column (1)) and intensive margins (column (2)). This result indicates that, if anything, larger newspapers are more responsive to

advertising expenditure from car manufacturers.

We now turn our attention to the car manufacturers that are the largest advertisers to see if a similar result holds. We create an indicator variable which is equal to one if the car manufacturer's advertising expenditure is above the median and zero otherwise.[28] As shown in Table 11, the coefficient on the interaction between advertising and the indicator is negative and statistically significant for both the extensive margin (column (3)) and the intensive margin (column (4)). In terms of the magnitude, a one standard deviation increase in ad spending from a large advertiser in the prior two years reduces recall-related coverage at the intensive margin by 24% for the average newspaper as seen in column (4). Overall, this implies that newspapers bias their coverage the most in favor of the largest advertisers.

Next, we analyze whether there is any difference in the way advertising expenditures are treated by newspapers depending on the country of origin of the car manufacturers. In particular, we investigate whether domestic manufacturers (Ford, General Motors and Chrysler) are favored more conditional on the amount of advertising expenditure.[29] As shown in Table 11, the results clearly indicate a systematic difference in news coverage between domestic and foreign car manufacturers for both the extensive and intensive margins (columns (5) and (6)). This implies that an advertising dollar buys a domestic car manufacturer more favorable coverage than a foreign one.

10. Informative Effects of Recall-Related Coverage

Distortion of media coverage or media capture due to advertising revenue would be of particular concern, from a policy perspective, if it influenced the information and subsequent actions of readers. If readers get safety related information from newspaper coverage of recalls, then biased coverage could lead to lower levels of information and sub-optimal actions. Hence, if readers are unable to discount the bias, this would in turn lead to an underestimation of safety risks, potentially increasing the number of accidents and fatalities. In this section, we provide some evidence suggesting that lower number of recall related news articles is indeed associated with greater fatalities.

[28] One can use the demand for the manufacturers' cars as an alternative definition for size to find similar results.

[29] Friebel and Heinz (2014) find that, for similar firm downsizing events, German newspapers bias their coverage against foreign firms much more than for domestic firms, providing evidence in favor of xenophobia in media behavior.

To do so, we use the FARS data described earlier, and estimate the following specification:

$$fatalities_{mlt} = \alpha + \theta_1 coverage_{mlt} + \theta_2 recall_{m(t-1)} + \theta_3 recall_{m(t-1)} \times coverage_{mlt} + \beta_s + \phi_m + \psi_t + \varepsilon_{mlt}$$

In particular, we regress the number of fatalities in a particular state l, associated with manufacturer m in month t on the number of articles written about that manufacturer's recalls in that month accounting for whether there was a recall related to that manufacturer in the previous month. The coefficient of interest is on the interaction term between (recall-related) coverage and whether a recall related to that manufacturer was announced in the previous month. The intuition is that when a defect is identified and a recall is issued, then news coverage will provide that information to vehicle owners who can take relevant steps to prevent accidents.[30]

The results in Table 12 highlight the social value of recall-related information in news articles. We find that the interaction term between the number of articles and whether there was a recall in the previous month is negative and statistically significant across different specifications (columns (1)-(4)). This indicates that if there is greater news coverage of a manufacturer's recall after the recall is formally announced, then it leads to lower vehicle related fatalities. This effect is robust to controlling for state fixed effects (columns (2)-(4)), manufacturer and month fixed effects (columns (3)-(4)) as well as explicitly controlling for the mean level of advertising spending in the state (column (4)).

These results suggest that news articles contain information which is utilized by car owners and higher recall related coverage can reduce road accidents and fatalities. Taken together, our findings indicate that sustained advertising spending by car manufacturers can impact vehicle related deaths by distorting media coverage of car safety recalls.

11. Conclusion

There is significant existing evidence that media coverage has an impact on variety of outcomes, ranging from voting (e.g., DellaVigna and Kaplan, 2007) and financial decisions (e.g., Fang and Peress, 2009) to war-related deaths (e.g., Durante and Zhuravskaya, 2016).

[30] This is also in line with the evidence in the recall specific event study which shows that most recall related coverage and the bias associated with it takes place in the month after the recall is initiated.

Hence, it is vital that the media provides unbiased and accurate news to its consumers so that they make better informed decisions.

Despite the perceived importance of this issue, existing studies are unable to separate advertiser bias from demand-side bias. We overcome these challenges by analyzing media bias in the context of car safety recalls, where advertisers and readers arguably have opposing preferences over coverage. We find that higher advertising spending over the previous two years leads to more favorable coverage of recalls, and the relationship is particularly strong for more severe recalls. In contrast to the existing literature, which finds evidence of a high frequency advertising-media bias relationship, we find that it is a medium-long term relationship between the advertiser and newspaper that drives the favorable coverage decisions.

We also analyze the impact of the media market structure and how it interacts with media bias. Competition between newspapers has a disciplining effect by reducing the amount of favorable coverage given to a manufacturer, when compared to newspapers operating as local monopolies. Additionally, we find that the entry of Craigslist, which arguably makes newspapers more reliant on traditional advertisers, increases bias in coverage. Moreover, in line with the literature, we do not find any effect of the ownership structure of newspapers on media bias. Highlighting the importance of relationships, we find that bias is strongest when small newspapers receive advertising from local dealers. Finally, we provide evidence that news coverage of recalls can lead to lower fatalities, suggesting an important social cost from the distortion of media coverage.

Taken together, our findings demonstrate the existence of a supply-side bias due to advertising revenue in a robust manner. The vulnerability of newspapers to influence by advertisers and the role of market structure has implications for policy makers. In particular, regulators should seek to formulate rules which limit such conflicts of interest and collusion through policies such as limiting concentration of media ownership and encouraging competition between media outlets.

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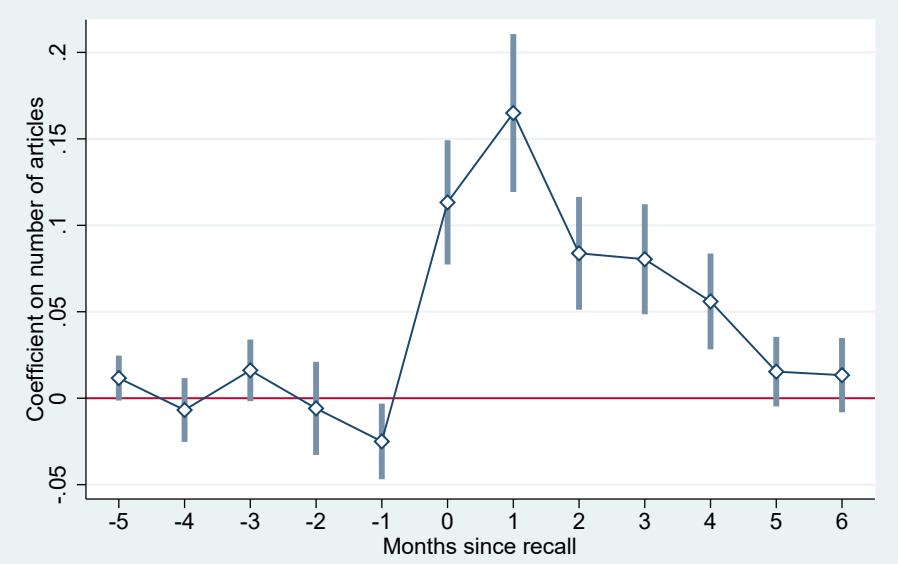
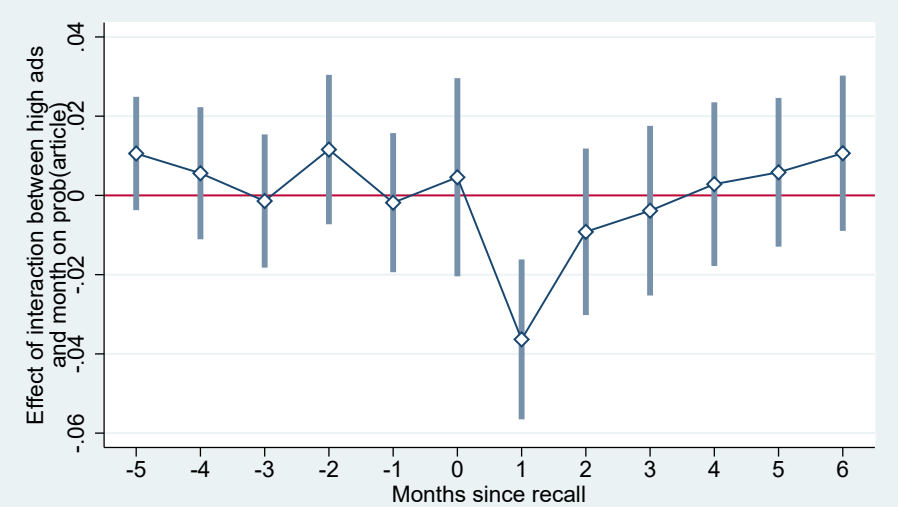
FIGURE 1: LANGUAGE USE IN FULL TEXT ARTICLES

FIGURE 2: TIMING OF ARTICLES AROUND A RECALL



Note: Coefficients shown are from a regression including month and newspaper-by-manufacturer fixed effects. Omitted term is the month 6 months prior to the recall. Error bars show 95% percent confidence interval based on standard errors clustered by newspaper-manufacturer.

FIGURE 3: COEFFICIENTS ON HIGH ADS × MONTH SINCE RECALL ON PROBABILITY OF ARTICLE



Note: Coefficients shown are for the interaction term between a dummy representing higher ad spending than the sample average by a manuacturer in a newspaper during the previous 2 year and month relative to recall dummies. These coefficents are taken from a regression including vehicle ownership, total articles, as well as month, newspaper-by-manufacturer and recall fixed effects. Omitted term is 6 months prior to the recall. Error bars show 95% percent confidence intervals based on standard errors clustered by newspaper-manufacturer.

FIGURE 4: COEFFICIENTS ON LAGGED QUARTERLY ADVERTISING SPENDING

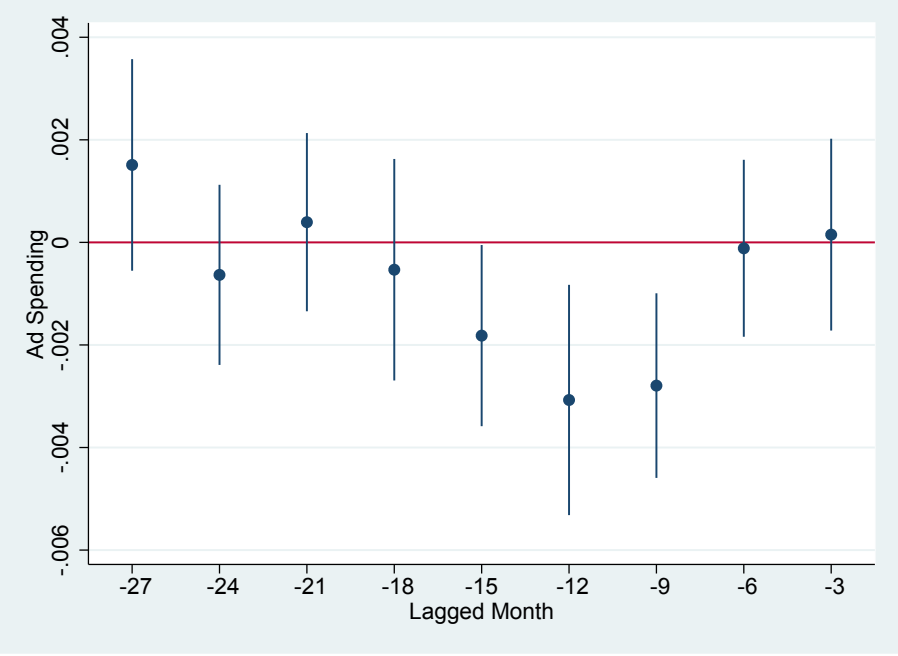


TABLE 1: ADVERTISING SPENDING AND RECALL-RELATED COVERAGE: EXTENSIVE MARGIN

	(1) P(articles)	(2) P(articles)	(3) P(articles)	(4) P(articles)	(5) P(articles)
Log Ad Spending (previous 2 years)	0.918***	-0.519***	-0.651***	-0.271**	-0.217**
	(0.127)	(0.117)	(0.113)	(0.106)	(0.093)
Log Affected Vehicles			0.296***	0.261***	0.261***
			(0.019)	(0.018)	(0.019)
Firm's Share Local Cars			0.331***	0.316***	0.301***
			(0.120)	(0.117)	(0.068)
Total Articles			0.027***	0.050***	0.049***
			(0.005)	(0.005)	(0.005)
Month FE	No	No	No	Yes	Yes
Newspaper x Firm FE	No	Yes	Yes	Yes	No
Newspaper FE	No	No	No	No	Yes
Firm FE	No	No	No	No	Yes
Observations	131,332	131,332	131,332	131,332	131,332
R-squared	0.007	0.124	0.129	0.168	0.14

Robust standard errors in parentheses clustered by newspaper x firm. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given manufacturer. To improve legibility, the coefficient of "Log Ad Spending (previous 2 years)", and "Log Affected Vehicles", are scaled up by a factor 10^2. Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually.

TABLE 2: ADVERTISING SPENDING AND RECALL-RELATED COVERAGE: INTENSIVE MARGIN

	(1) Log(articles)	(2) Log(articles)	(3) Log(articles)	(4) Log(articles)	(5) Log(articles)
Log Ad Spending (previous 2 years)	0.705*** (0.124)	-0.561*** (0.121)	-0.670*** (0.119)	-0.277*** (0.106)	-0.221*** (0.098)
Log Affected Vehicles			0.286*** (0.021)	0.259*** (0.206)	0.259*** (0.210)
Firm's Share Local Cars			0.335*** (0.126)	0.311** (0.120)	0.315*** (0.084)
Total Articles			0.023*** (0.005)	0.047*** (0.006)	0.047*** (0.006)
Month FE	No	No	No	Yes	Yes
Newspaper x Firm FE	No	Yes	Yes	Yes	No
Newspaper FE	No	No	No	No	Yes
Firm FE	No	No	No	No	Yes
Observations	131,332	131,332	131,332	131,332	131,332
R-squared	0.005	0.140	0.145	0.201	0.161

Robust standard errors in parentheses clustered by newspaper *x* firm. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given manufacturer. To improve legibility, the coefficient of "Log Ad Spending (previous 2 years)", and "Log Affected Vehicles", are scaled up by a factor 10^2. Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually.

TABLE 3: ADVERTISING SPENDING AND SEVERITY OF RECALLS

	(1) P(articles)	(2) Log(articles)	(3) P(articles)	(4) Log(articles)
Log Ad Spending (previous 2 years)	-0.179*	-0.162*	-0.239**	-0.221**
	(0.102)	(0.0963)	(0.101)	(0.0930)
Log Ad Spending × Defect (previous 2 years)	-0.252***	-0.302***		
	(0.0801)	(0.0968)		
Log Ad Spending × No. Vehicles (previous 2 years)			-0.590**	-0.920**
			(0.260)	(0.385)
Controls	Yes	Yes	Yes	Yes
Controls× Severity Measure	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
News x Manufac FE	Yes	Yes	Yes	Yes
Observations	131,332	131,332	131,332	131,332
R-squared	0.169	0.203	0.171	0.205

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given firm (columns (1) & (3)), and the log (+1) of the number of such articles (columns (2) & (4)). To improve legibility, the coefficients on all lags of Log Ad Spending are scaled up by a factor 10^2. Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually. Controls x Severity Measure includes interactions of control variables with dummies if there was a recall involving an important component such as the engine, accelerator, brakes etc. (Defect) in columns (1) and (2), and if the recall was severe in terms of the number of vehicles affected (No. Vehicles) in columns (3) and (4).

TABLE 4: MEDIA BIAS AND NEWSPAPER COMPETITION

	(1) P(articles)	(2) P(articles)	(3) Log(articles)	(4) Log(articles)
Log Ad Spending (previous 2 years)	-0.415*** (0.141)	-0.462*** (0.143)	-0.430*** (0.140)	-0.465*** (0.145)
Log Ad Spending x Newspaper Competition (previous 2 years)	0.501** (0.194)	0.569*** (0.193)	0.536*** (0.201)	0.579*** (0.204)
Controls	Yes	Yes	Yes	Yes
Controls x Newspaper Competition	No	Yes	No	Yes
Month FE	Yes	Yes	Yes	Yes
News x Manufac FE	Yes	Yes	Yes	Yes
Observations	131,332	131,332	131,332	131,332
R-squared	0.168	0.168	0.201	0.202

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given manufacturer (columns 1 and 2), and the log (+1) of the number of such articles (columns 3 and 4). To improve legibility, the coefficient of Log(2 Year Ad Spending) is scaled up by a factor 10^2 (equivalent to scaling down Log(2 Year Ad Spending) by 10^2). Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually.

TABLE 5: AD SPENDING, BIAS AND CRAIGSLIST

	Full Sample (1) P(articles)	Full Sample (2) Log(articles)	Cl. Ads Manager (3) P(articles)	Cl. Ads Manager (4) Log(articles)	No Cl. Ads Manager (5) P(articles)	No Cl. Ads Manager (6) Log(articles)
Log Ad Spending (Previous two years)	-0.093 (0.196)	-0.047 (0.169)	0.179 (0.220)	0.226 (0.177)	-0.458 (0.390)	-0.524 (0.345)
Log Ad Spending x Craigslist (Previous two years)	-0.345** (0.157)	-0.314** (0.135)	-0.550*** (0.178)	-0.508*** (0.150)	-0.079 (0.350)	0.045 (0.310)
Craigslist	0.012 (0.009)	0.0121 (0.008)	0.012 (0.011)	0.018** (0.009)	0.012 (0.022)	0.254 (0.019)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
News x Manufac FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	55,363	55,363	39,511	39,511	15,508	15,508
R-squared	0.174	0.193	0.170	0.192	0.195	0.206

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given manufacturer (columns 1,3 and 5), and the log (+1) of the number of such articles (columns 2, 4 and 6). To improve legibility, the coefficient of Log(2 Year Ad Spending) is scaled up by a factor 10^2 (equivalent to scaling down Log(2 Year Ad Spending) by 10^2). Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually.

TABLE 6: DEALER DOLLARS AND SMALL NEWSPAPERS

	(1) P(articles)	(2) P(articles)	(3) Log(articles)	(4) Log(articles)
Dealer Ad Spending (previous 2 years)	0.469	0.767*	0.384	0.747*
	(0.447)	(0.437)	(0.435)	(0.432)
Dealer Ad Spending × Small Paper (previous 2 years)	-0.973**	-1.04**	-0.915**	-1.02**
	(0.457)	(0.448)	(0.448)	(0.445)
Manuf. Ad Spending (previous 2 years)	-0.284	-0.175	-0.371**	-0.249
	(0.189)	(0.174)	(0.188)	(0.173)
Manuf. Ad Spending × Small Paper (previous 2 years)	0.388*	0.404**	0.461**	0.495**
	(0.211)	(0.201)	(0.209)	(0.203)
Controls	No	Yes	No	Yes
Month FE	No	Yes	No	Yes
News x Manufac FE	Yes	Yes	Yes	Yes
Observations	129,950	129,950	129,950	129,950
R-squared	0.124	0.167	0.138	0.20

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable in columns (1)-(2) is the probability of an article written by a newspaper about the recall of a firm's vehicle in a particular month while it is the log (1+) of the number of articles written in columns (3)-(4). To improve legibility, the coefficients of Log(2 Year Ad Spending) are scaled up by a factor 10^2 (equivalent to scaling down Log(2 Year Ad Spending) by 10^2) .Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually. All columns include controls for ad spending by manufacturers as well as its interaction with the size of the newspaper.

TABLE 7: OWNERSHIP STRUCTURE AND MEDIA BIAS

	(1) P(articles)	(2) Log(articles)	(3) P(articles)	(4) Log(articles)
Log Ad Spending (previous 2 years)	-0.274** (0.108)	-0.279*** (0.107)	-0.268** (0.108)	-0.266** (0.107)
Log Other Ad Spending in MSA (previous 2 years)	0.038 (0.102)	0.031 (0.102)	0.039 (0.102)	0.034 (0.102)
Log Other Ad Spending outside MSA (previous 2 years)			-0.134 (0.176)	-0.303 (0.210)
Controls	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
News x Manufac FE	Yes	Yes	Yes	Yes
Observations	131,332	131,332	131,332	131,332
R-squared	0.168	0.201	0.168	0.201

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given manufacturer (columns 1 and 3), and the log (+1) of the number of such articles (columns 2 and 4). To improve legibility, the coefficient of Log(2 Year Ad Spending) is scaled up by a factor 10^2 (equivalent to scaling down Log(2 Year Ad Spending) by 10^2). Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually.

TABLE 8: PROBABILITY OF RECALL-RELATED ARTICLES AND DIFFERENT LAGS OF ADVERTISING SPENDING

	(1) P(articles)	(2) P(articles)	(3) P(articles)	(4) P(articles)	(5) P(articles)	(6) Log(articles)
Log Ad Spending (previous 6 months)	-0.0582				0.140	0.0938
	(0.105)				(0.101)	(0.116)
Log Ad Spending (6 to 12 months before)		-0.179*			-0.201*	-0.352**
		(0.107)			(0.107)	(0.140)
Log Ad Spending (1 to 2 years before)			-0.239***		-0.289***	-0.176
			(0.089)		(0.098)	(0.113)
Log Ad Spending (2 to 3 years before)				-0.072	0.146	0.176
				(0.082)	(0.099)	(0.124)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Newspaper x Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	156,095	143,458	131,332	120,456	118,771	118,771
R-squared	0.176	0.171	0.168	0.170	0.170	0.206

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given firm (columns 1-5), and the log (+1) of the number of such articles (column 6). To improve legibility, the coefficients on all lags of Log Ad Spending are scaled up by a factor 10^2. Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually.

TABLE 9: SHORTER LAGS OF AD SPENDING AND COVERAGE OF RECALL-RELATED ARTICLES

	(1) P(articles)	(2) P(articles)	(3) P(articles)	(4) P(articles)	(5) P(articles)	(6) Log(articles)
Log Ad Spending in Month t-1	0.011			-0.037	-0.032	-0.011
	(0.101)			(0.0871)	(0.0899)	(0.0809)
Log Ad Spending in Month t-2		0.033		0.090	0.105	0.0766
		(0.102)		(0.0856)	(0.0904)	(0.0770)
Log Ad Spending in Month t-3			-0.005	-0.052	0.0371	-0.0288
			(0.103)	(0.0882)	(0.088)	(0.0827)
Log Ad Spending					-0.293***	-0.288***
(6 to 18 months before)					(0.0984)	(0.105)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
News x Manufac FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	157,191	156,248	155,524	153,264	136,257	136,257
R-squared	0.175	0.175	0.176	0.176	0.168	0.20

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given firm (columns 1-5), and the log (+1) of the number of such articles (column 6). To improve legibility, the coefficient of Log(Ad Spending) is scaled up by a factor 10^2 (equivalent to scaling down Log(Ad Spending) by 10^2). Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually.

TABLE 10: STABLE ADVERTISING SPENDING AND COVERAGE

	(1) P(articles)	(2) Log(articles)	(3) P(articles)	(4) Log(articles)
Consistent Spending (previous 2 years)	-0.199*** (0.0661)	-0.134** (0.0640)	-0.191*** (0.0667)	-0.126* (0.0646)
Log Ad Spending (previous 2 years)			-0.278** (0.111)	-0.289*** (0.112)
Controls	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
News x Manufac FE	Yes	Yes	Yes	Yes
Observations	128,803	128,803	128,803	128,803
R-squared	0.165	0.198	0.165	0.198

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given firm (columns (1) & (3)), and the log (+1) of the number of such articles (columns (2) & (4)). To improve legibility, the coefficients on all lags of Log Ad Spending are scaled up by a factor 10^2. Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually.

TABLE 11: HETEROGENEITY OF BASELINE RESULTS

	(1) P(articles)	(2) Log(articles)	(3) P(articles)	(4) Log(articles)	(5) P(articles)	(6) Log(articles)
Log Ad Spending (previous two years)	-0.019 (0.0968)	0.035 (0.093)	0.020 (0.102)	0.039 (0.0917)	-0.059 (0.117)	-0.066 (0.110)
Ad Spending × Large Paper (previous two years)	-0.578*** (0.229)	-0.702*** (0.362)				
Ad Spending × Large Manuf. (previous two years)			-0.706*** (0.218)	-0.750*** (0.226)		
Ad Spending × Domestic (previous two years)					-0.616*** (0.242)	-0.583** (0.258)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
News x Manufac FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	130,884	130,884	131,332	131,332	131,332	131,332
R-squared	0.168	0.202	0.170	0.204	0.169	0.202

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given manufacturer (columns 1, 3 and 5), and the log (+1) of the number of such articles (columns 2,4 and 6). To improve legibility, the coefficient of Log(2 Year Ad Spending) is scaled up by a factor 10^2 (equivalent to scaling down Log(2 Year Ad Spending) by 10^2). Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand. Controls x demand include interactions of control variables with dummies for large newspapers in columns (1) and (2), large manufacturers in columns (3) and (4) and domestic manufacturers in columns (5) and (6).

TABLE 12: RECALL-RELATED COVERAGE AND ROAD FATALITIES

VARIABLES	(1) Fatalities	(2) Fatalities	(3) Fatalities	(4) Fatalities
Total Articles	0.182***	0.194***	0.203***	0.0859**
	(0.0537)	(0.0553)	(0.0576)	(0.0349)
Recall (in month t-1)	0.110***	0.107***	0.122***	-0.00143
	(0.0206)	(0.0196)	(0.0230)	(0.00637)
Total Articles × Recall in month (t-1)	-0.120***	-0.128***	-0.130***	-0.0520**
	(0.0345)	(0.0373)	(0.0380)	(0.0220)
Log(Ad Spending) (previous 2 years)				0.0186***
				(0.00631)
Manufacturer FE	No	No	Yes	Yes
Month FE	No	No	Yes	Yes
State FE	No	Yes	Yes	Yes
Observations	108,844	108,844	108,844	92,362
R-squared	0.010	0.089	0.095	0.194

Robust standard errors in parentheses clustered at the State level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the number of road fatalities associated with a manufacturer in an MSA in that month.

APPENDIX A: THEORETICAL EXTENSIONS (NOT FOR PUBLICATION)

INTENSIVE MARGIN EXTENSION

Given a recall, newspapers provide a certain amount of coverage q of the recall, and readers value that coverage at $v_0 - v_1(q-q^*)^2$, where q^* represents optimal reader coverage and v_1 represents the responsiveness of reader preferences to coverage. Then, overall payoffs for consumer i equal:

$$b_i + p[v_0 - v_1(q-q^*)^2] - \rho$$

Given this, market shares equal $\sigma(q)$. For newspapers, payoffs are similar to before and equal:

$$\sigma(q)(\rho - m) + a - F$$

For manufacturers, there is a per-article damage equal to d and payoffs are given by:

$$\pi - \sigma(q)pdq + e\sigma(q) - a$$

Working backwards, reader market shares equal:

$$\sigma(q) = 0.5 + \xi\left\{\mu + p[v_0 - v_1(q-q^*)^2] - \rho\right\} = \sigma(q^*) - \xi p v_1 (q-q^*)^2$$

This equals $\sigma(q^*)$ at reader-preferred levels and is declining as the number of articles is reduced from that point. In the absence of an agreement, newspapers maximize readership and thus set coverage equal to q^*. Thus, they will accept the offer from the manufacturer if the following condition holds:

$$a \geq (\rho - m)[\sigma(q^*) - \sigma(q)] = (\rho - m)\xi p v_1 (q-q^*)^2$$

The right-hand side is again the drop in subscription revenue associated with censoring. Setting this to equality, we can call $a(q)$ the required advertising equals. This equals zero in the absence of censoring ($q = q^*$) and is increasing as coverage is reduced from that point. Thus, newspapers are willing to be compensated with additional advertising for marginal suppression of information.

Taking $a(q)$ and $\sigma(q)$ as represented above, manufacturers then choose coverage levels in order to maximize:

$$\pi - \sigma(q)pdq + e\sigma(q) - a(q)$$

Assuming an interior solution in coverage, this yields the following first-order condition for advertisers:

$$\sigma(q)pd + \sigma'(q)[pdq - e] = -a'(q)$$

The first term on the left-hand side is the marginal cost of an increase in coverage in the form of a reduction in coverage of recalls, and this is valued by the manufacturer on the margin according to $\sigma(q)pd$. The second term on the left-hand side represents the effect of an increase in market share associated with the increase in coverage. This has both costs, in the form of greater damage to the manufacturer but also benefits due to advertising reaching more readers. The right hand side represents the marginal benefit of an increase in coverage, as manufacturers can lower their advertising spending.

SEVERITY EXTENSION

Assume next that there are two types of recalls, severe and moderate. These occur with probabilities p_s and p_m, respectively. Coverage of severe recalls provide more value to readers in the sense that $v_s > v_m$. Likewise, coverage of severe recalls is associated with more damage to the reputation of the manufacturer. That is, $d_s > d_m$. We assume that newspapers now decide whether to provide coverage of all recalls, no recalls, or only moderate recalls. In this case, manufacturers choose to make one of two types of offers, a_n and a_m, where n denotes no coverage of any recalls and m denotes coverage of only moderate recalls.

Readership under the three scenarios (coverage, moderate coverage, and no coverage) equal:

$$\sigma_c = 0.5 + \xi(\mu + p_s v_s + p_m v_m - \rho)$$

$$\sigma_m = 0.5 + \xi(\mu + p_m v_m - \rho)$$

$$\sigma_n = 0.5 + \xi(\mu\text{-}\rho)$$

Then, required advertising levels are given by:

$$a_n = (\rho - m)(\sigma_c - \sigma_n) = (\rho - m)\xi(p_s v_s + p_m v_m)$$

$$a_m = (\rho - m)(\sigma_c - \sigma_m) = (\rho - m)\xi(p_s v_s)$$

In this case, manufacturer payoffs equal $\pi + e\sigma_n - a_n$ under no coverage, $\pi + e\sigma_m - a_m - p_m\sigma_m d_m$ under coverage of only moderate recalls, and $\pi - \sigma_c(p_s d_s + p_m d_m)$ in the absence of an agreement. Then, manufacturers prefer agreements to provide only moderate coverage occur under the following conditions:

$$\pi + e\sigma_m - a_m - p_m\sigma_m d_m > \pi + e\sigma_n - a_n$$

$$\pi + e\sigma_m - a_m - p_m\sigma_m d_m > \pi - \sigma_c(p_s d_s + p_m d_m)$$

One can show that this occurs when the damage from severe recalls is sufficiently high and the damage from moderate recalls is sufficiently low:

$$d_s > \frac{-e\sigma_m + a_m + p_m\sigma_m d_m - \sigma_c p_m d_m}{\sigma_c p_s}$$

$$d_m < \frac{e\sigma_m - a_m - e\sigma_n + a_n}{\sigma_m p_m}$$

COMPETITION FOR READERS EXTENSION

There are now n newspapers and, for simplicity, assume that they are perfect substitutes. That is, readers choose between the outside option (as above) and the paper with the most coverage of recalls. If all reject the offer , then each newspaper gets a market share equal to σ_c/n. If all accept, then each newspaper gets a market share equal to σ_n/n. If one rejects and the others accept, then the rejecting newspaper receives the entire market share equal to σ_c. In a symmetric equilibrium, in which newspapers are given and accept identical offers, we have that each newspaper accepts under the following condition:

$$a \geq (\rho - m)[\sigma_c - (1/n)\sigma_n]$$

Thus, required advertising levels equal:

$$a = (\rho - m)[\xi pv + \left(\frac{n-1}{n}\right)(0.5 + \xi\mu - \xi\rho)]$$

As shown, required advertising levels for each newspaper are higher under competition ($n > 1$), relative to monopoly ($n = 1$), and are increasing in the number of newspapers (n). Thus, the returns to advertising for each paper are lower under competition.

ADVERTISING MARKET COMPETITION EXTENSION

Suppose now that the newspaper can sell advertising slots at some price θ should an agreement not be reached with the manufacturer. This can be interpreted in our context as the market price for classified advertising. Then, required advertising equals:

$$a = \theta + (\rho - m)\xi pv$$

This is decreasing as θ declines, meaning that the returns to advertising are higher when newspaper financial leverage is reduced.

TRANSACTIONS COSTS EXTENSION

Suppose now that an agreement between the newspaper and the advertiser entails a transaction cost equal to $\tau > 1$, such that manufacturers pay a but that newspapers only receive a/τ. Then, required advertising levels are equal to:

$$a = \tau(\rho - m)\xi pv$$

Thus, required advertising is higher, and the returns to advertising are thus lower when transactions costs are high. Given this, manufacturers are willing to enter an agreement when profits are higher under no coverage (i.e., $\pi + \sigma_n e - a > \pi - p\sigma_c d$)). Substituting in, this can be written as:

$$d > \frac{\tau(\rho - m)\xi pv - e[0.5 + \xi(\mu - \rho)]}{p[0.5 + \xi(\mu + pv - \rho)]}$$

Thus, the right hand side is higher in the presence of transactions costs and agreements are thus less likely.

PRIVATE INFORMATION EXTENSION

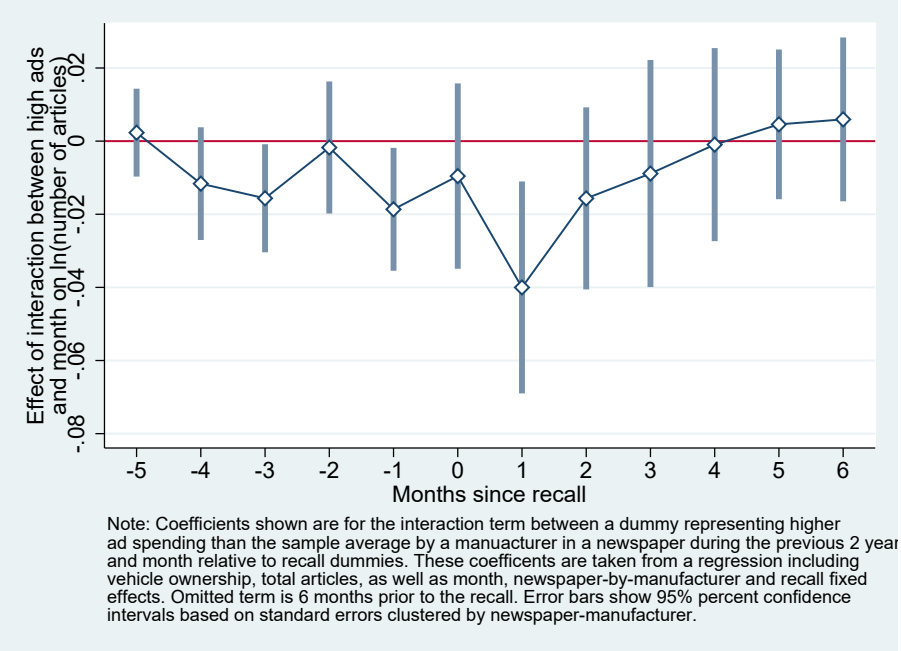
Suppose now that the manufacturer observes whether or not a recall occurs before placing their advertisements and can withdraw their advertising in the absence of a recall. In this case, advertising is only received in the recall state of the world, and newspapers will only enter an agreement when $(\rho - m)\sigma_n - F + pa > (\rho - m)\sigma_c - F$. Given this, the required advertising equals $a = (\rho - m)\xi v$. Advertising is higher in equilibrium agreements so long as $p < 1$, and the price of censorship is thus higher, meaning that the returns to advertising are lower.

APPENDIX B: SUMMARY STATISTICS AND EVENT STUDY (NOT FOR PUBLICATION)

TABLE A1: SUMMARY STATISTICS

	Obs.	Mean	Std. Dev.	Min.	Max.
Number of Articles	160,261	0.118	0.753	0	64
Probability of an Article	160,261	0.071	0.251	0	1
Monthly Advertising ($,000)	160,261	102.3	209.7	0	7395.6
Advertising ($,000)-Past Two Years	131,332	2576.7	4749.5	0	64931.9
Number of Affected Vehicles	160,261	77866.72	415894.2	0	587771
Firm's Share Local Cars	160,261	0.081	0.072	0	0.269
Newspaper Size	160,261	283249	171793.9	99	1542951

FIGURE A1: COEFFICIENTS OF HIGH ADS × MONTH SINCE RECALL ON NUMBER OF ARTICLES



We present summary statistics of key variables in Table A1 related to some of the key variables of interest used in the main analysis. Additionally, in Figure A1 we present event study results when the dependent variable is the number of recall-related articles (the intensive margin).

12. Appendix C: Robustness Checks (Not for Publication)

12.1. Top 50 Recalls, Advertising Campaigns, TV News Coverage of Recalls and Media Bias

We next carry out a series of tests to analyze the robustness of our baseline estimates. First, to ensure that our results are not driven by focusing on the top 100 recalls, we analyze whether our results are robust to analyzing the manufacturers involved in the top 50 recalls.[31] As shown in Table A2, the results from this smaller set of recalls is in line with our baseline estimates for both the extensive (column (1)) and the intensive margin (column (2)). The coefficients on advertising expenditure over the past two years is negative and statistically significant, with the coefficients being larger by 30% compared to the baseline. This is in line with intuition since we would expect advertising relationships to pay dividends for manufacturers involved in relatively larger recalls.

Next, we check whether our results are robust to explicitly controlling for potential advertising campaigns.[32] We define an advertising campaign month as one in which the advertising spending allocated to a newspaper by a manufacturer is above the 90th percentile. In columns (3) and (4) of Table A2, we explicitly control for whether there was an advertising campaign in the previous three, six and nine months. As shown, the estimates are very similar to our baseline estimates. Moreover, in columns (5) and (6), we additionally control for whether a campaign took place three, six and nine months previous to a recall being initiated and again find very similar results.[33]

Finally, we separately control for television coverage of recalls using data on recall-related coverage on evening news broadcasts by the top three networks (ABC, CBS and NBC) from the Vanderbilt Television News Archive.[34] We aggregate these TV news stories during our sample period to the level of the manufacturer-month. As shown, controlling for whether there is any recall related news story on TV in a particular month, we find that the coefficient on ad spending over the past two years is very similar to our baseline results (columns (7) and (8)). Moreover, the coefficient on the TV news indicator is positive and statistically significant, reflecting a positive correlation in coverage across different news platforms.[35]

[31] This includes Toyota, Honda, General Motors, Chrysler and Ford. We exclude Hyundai from the list because it was involved in only one top 50 recall while the others had multiple. Our results are robust to different thresholds and are available upon request.

[32] Note that advertising campaigns and the launch of new vehicle models are seasonal, mainly concentrated in autumn and early winter and hence will be largely captured by the month fixed effects. See Beattie (2015) for more.

[33] These results are robust to a wide variety of definitions of an advertising campaigns. This also serves as a robustness check for manufacturers, potentially anticipating a recall, changing their advertising strategy which could possibly make the short term advertising lags insignificant. Controlling for these advertising campaigns, leave those results unchanged as well. Further results available upon request.

[34] See Eisensee and Stromberg (2007) for more details on this dataset.

[35] We find similar results when controlling explicitly for the number of news stories instead of a TV news dummy. These results are available upon request from the authors.

12.2. Non Linear Models and Alternative Specifications

In Table A3, we present results using non-linear models. Results from a negative binomial (columns 1) and a logit model for probability of writing any article (column 2) are qualitatively similar to our linear baseline setting.[36] Next, we evaluate whether our results hold if we change the time window for the measure of the size of the newspaper in terms of the number of articles. Instead of using the total annual number of articles written by the newspaper, we use the total monthly articles written in columns (3) and (4) of Table A3. Results are qualitatively and quantitatively in line with our baseline estimates for both the probability of writing an article (column (3)) as well as number of articles (column (4)). In columns (5) and (6), we allow for even more flexible fixed effects by allowing newspaper by manufacturer fixed effects to vary over time (four-year intervals). Even with these flexible fixed effects, we find that the results are in line with those in Tables 1, highlighting the robustness of our estimates. Finally, in columns (7) and (8), we measure advertising over the past two years by a manufacturer as the proportion of total advertising in that newspaper by all car manufacturers. In line with our baseline results, we find that the higher the proportion of ad expenditure by a manufacturer, the lower is the coverage of recalls. This holds for both the extensive (column (7)) and the intensive margin (column (8)).

As a final robustness check to our baseline results, we consider an alternative reporting strategy by newspapers related to how verbose the recall related articles are. We analyze (the logarithm of) the total number of words written in a month by a newspaper in recall related articles associated with a particular manufacturer as the dependent variable of interest. The results in Table A4 are in line with our baseline estimates. If we do not include any fixed effects or time varying demand side controls then we get a spurious positive association between advertising expenditure and the word count of recall related articles (column (1)). As soon as we introduce newspaper-manufacturer fixed effects (column (2)) and time varying controls (column (3)), we see that there is a negative and significant impact of advertising revenue on the number of words written about the manufacturer's recall. This effect persists even with the introduction of month fixed effects (column (4)) or newspaper and manufacturer fixed effects separately (column (5)).

[36] We are unable to estimate the specifications with the full set of fixed effects due to convergence issues. Hence, we follow Goldfarb and Tucker (2011) and Latham (2015), who faced the same similar convergence problems, by saturating the model with as many interactions of controls and fixed effects as possible.

TABLE A2: ROBUSTNESS CHECKS I

	(1) Top 50 recalls P(articles)	(2) Top 50 recalls Log(articles)	(3) Ad Campaign P(articles)	(4) Ad Campaign Log(articles)	(5) Ad Campaign P(articles)	(6) Ad Campaign Log(articles)	(7) TV news P(articles)	(8) TV news Log(articles)
Log Ad Spending (previous 2 years)	-0.405**	-0.382**	-0.301***	-0.285***	-0.299***	-0.284***	-0.287***	-0.300***
	(0.171)	(0.172)	(0.0993)	(0.0951)	(0.0992)	(0.0952)	(0.1064)	(0.1052)
TV news							0.113***	0.161***
							(0.0092)	(0.0134)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
News x Manufac FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ad Campaign	No	No	Yes	Yes	Yes	Yes	No	No
Ad Campaign x recall month	No	No	No	No	Yes	Yes	No	No
Observations	70,096	70,096	130,909	130,909	130,909	130,909	131,332	131,332
R-squared	0.182	0.228	0.167	0.20	0.169	0.201	0.170	0.208

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the number of articles written by a newspaper about the recall of a firm's vehicle in a particular month in columns (2), (4) and (6) while it is the probability of writing an article in columns (1), (3) and (5). Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually. In columns (3) and (4), we control for ad campaigns taking place 3,6 and 9 months prior to month t. In columns (5) and (6), we further control for ad campaigns within 3, 6 and 9 months of the recall first being initiated. In columns (7) and (8), we control for coverage of the recalls on TV news.

TABLE A3: ROBUSTNESS CHECKS II

	(1) Logit Dummy	(2) Neg. Bin. #articles	(3) OLS P(articles)	(4) OLS Log(articles)	(5) OLS P(articles)	(6) OLS Log(articles)	(7) OLS P(articles)	(8) OLS Log(articles)
Log Ad Spending (previous 2 years)	-0.084***	-0.078***	-0.258**	-0.264**	-0.467***	-0.340***		
	(0.0114)	(0.0114)	(0.107)	(0.108)	(0.146)	(0.128)		
Proportion of Ad Spending (previous 2 years)							-0.059**	-0.067**
							(0.028)	(0.032)
Month FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
News x Manufac FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Calendar Month FE	Yes	Yes	No	No	No	No	No	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls Interacted	Yes	Yes	No	No	No	No	No	No
Newspaper FE	Yes	Yes	No	No	No	No	No	No
Manufacturer FE	Yes	Yes	No	No	No	No	No	No
Observations	131,162	131,332	131,332	131,332	131,332	131,332	131,332	131,332
R-squared	-	-	0.167	0.202	0.21	0.257	0.168	0.201

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the number of articles written by a newspaper about the recall of a firm's vehicle in a particular month in columns (2), (4), (6) and (8) while it is the probability of writing an article in columns (1), (3), (5) and (7). In columns (1) and (2), there are controls interacted which means that there are interactions between all pairs of control variables: logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually. In columns (3)- (4), we use the logarithm of the total number of monthly articles published by the newspaper instead of the logarithm of the total annual articles. In (5)-(6), we allow newspaper x firm FE to vary over time. In columns (7) and (8), the independent variable of interest is the ad spending by a manufacturer as a proportion of ad spending by all manufacturers in that newspaper.

TABLE A4: ROBUSTNESS CHECKS III: WORD COUNT AS DEPENDENT VARIABLE

	(1) Log(word count)	(2) Log(word count)	(3) Log(word count)	(4) Log(word count)	(5) Log(word count)
Log Ad Spending (previous 2 years)	0.0615*** (0.008)	-0.0353*** (0.008)	-0.0441*** (0.007)	-0.0185** (0.007)	-0.0147** (0.006)
Log Affected Vehicles			0.0194*** (0.001)	0.0172*** (0.001)	0.0172*** (0.001)
Firm's Share Local Cars			2.248*** (0.820)	2.103*** (0.795)	2.135*** (0.486)
Total Articles			0.182*** (0.034)	0.331*** (0.037)	0.330*** (0.037)
Month FE	No	No	No	Yes	Yes
Newspaper x Firm FE	No	Yes	Yes	Yes	No
Newspaper FE	No	No	No	No	Yes
Firm FE	No	No	No	No	Yes
Observations	131,332	131,332	131,332	131,332	131,332
R-squared	0.007	0.128	0.133	0.175	0.146

Robust standard errors in parentheses clustered by newspaper x firm. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given manufacturer. Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually.

APPENDIX D: COMPETING ADVERTISERS (NOT FOR PUBLICATION)

Finally, we examine whether our results are robust to including controls for advertising by other manufacturers. In this analysis, we can also examine whether a newspaper provides less favorable coverage of recalls because of higher advertising by competitors of the manufacturer involved in the recall. To do so, we follow the literature and include a control for past advertising expenditure by other manufacturers in that newspaper.[37]

The results in Table A5 document that the baseline results are robust to controls for advertising by competitors. Moreover, we find that relationships are independent across manufacturers, with no evidence of spillovers from other advertisers. In particular, the coefficient on spending by other advertisers is statistically insignificant across all specifications (columns (1)-(4)).

[37] That is, as in Shapiro (2016) and Sinkinson and Starc (2016), we additionally include a variable which is the sum of advertising expenditure by all other manufacturers in that newspaper over the past two years.

TABLE A5: AD SPENDING AND COMPETITION FROM OTHER ADVERTISERS

	(1) P(articles)	(2) Log(articles)	(3) P(articles)	(4) Log(articles)
Log Ad Spending (previous 2 years)	-0.529*** (0.133)	-0.646*** (0.163)	-0.237* (0.125)	-0.330** (0.149)
Log Competitors' Ad Spending (previous 2 years)	-0.021 (0.143)	0.134 (0.165)	-0.073 (0.142)	0.074 (0.164)
Controls	Yes	Yes	Yes	Yes
Month FE	No	No	Yes	Yes
News x Manufac FE	Yes	Yes	Yes	Yes
Observations	131,332	131,332	131,332	131,332
R-squared	0.131	0.148	0.168	0.202

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given manufacturer (columns 1 and 3), and the log (+1) of the number of such articles (columns 2 and 4). To improve legibility, the coefficient of Log(2 Year Ad Spending) is scaled up by a factor 10^2 (equivalent to scaling down Log(2 Year Ad Spending) by 10^2). Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually. Additionally, we also control for the number of potentially affected vehicles across other manufacturers as well as the mean firm share of local car demand across all manufacturers in the media market.

APPENDIX E: TIMING ADDITIONAL RESULTS (NOT FOR PUBLICATION)

In Figure A2, we plot the coefficients from the regression of the number of recall related articles on short term advertising leads (months $t+1$, $t+2$, ... , $t+6$) , controlling for ad spending over the past two years as well as newspaper-manufacturer and calender month fixed effects. One can clearly see that all advertising leads are statistically insignificant indicating no ex-post payment. We then estimate specifications with the full set of controls, which are presented in Table A6. The results show clearly that all the short term leads (months $t+1$,$t+2$,..., $t+6$) are statistically insignificant on the extensive (columns (1)-(3)) and intensive (columns (4)-(6)) margin. This result displays no significant ex-post reaction by the manufacturer to the newspaper's coverage.

FIGURE A2: COEFFICIENTS ON MONTHLY LEADS OF ADVERTISING SPENDING

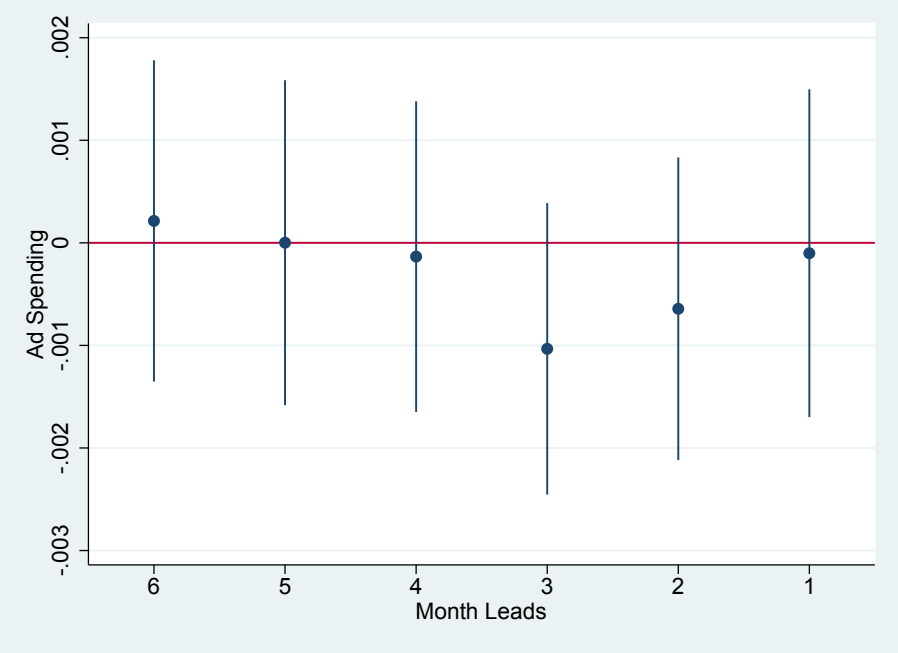


TABLE A6: LEADS OF AD SPENDING AND COVERAGE OF RECALL-RELATED ARTICLES

	(1) P(articles)	(2) P(articles)	(3) P(articles)	(4) Log(articles)	(5) Log(articles)	(6) Log(articles)
Log Ad Spending (previous 2 years)	-0.246** (0.100)	-0.232** (0.099)	-0.203** (0.096)	-0.216** (0.0919)	-0.182** (0.088)	-0.143* (0.0816)
Log Ad Spending in Month t+1	-0.0009 (0.0958)	0.0788 (0.0879)	0.0482 (0.0867)	-0.0712 (0.102)	0.0271 (0.0799)	0.0078 (0.0077)
Log Ad Spending in Month t+2		-0.0069 (0.0891)	-0.0313 (0.0888)		-0.055 (0.0761)	-0.0539 (0.0748)
Log Ad Spending in Month t+3		-0.113 (0.0870)	-0.130 (0.0903)		-0.099 (0.0779)	-0.0813 (0.00724)
Log Ad Spending in Month t+4			0.0132 (0.0935)			-0.0104 (0.0075)
Log Ad Spending in Month t+5			0.0868 (0.09291)			0.0010 (0.0787)
Log Ad Spending in Month t+6			-0.0401 (0.0895)			-0.0189 (0.00763)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
News x Manufac FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	130,189	128,018	124,827	130,189	128,018	124,827
R-squared	0.165	0.164	0.164	0.198	0.196	0.196

Robust standard errors in parentheses clustered at the Newspaper-Firm level. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the probability that a newspaper writes one or more articles about the recalls of the vehicles produced by a given firm (columns 1-3), and the log (+1) of the number of such articles (columns 4-6). To improve legibility, the coefficient of Log(Ad Spending) is scaled up by a factor 10^2 (equivalent to scaling down Log(Ad Spending) by 10^2). Controls include the logarithm of the number of potentially affected vehicles, firm share of local car demand and the logarithm of total articles written by the newspaper annually.