# Advertising Spending and Media Bias: Evidence from News Coverage of Car Safety Recalls*

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February 2017

ABSTRACT

Do media outlets bias news content in favor of advertisers? We study this question by examining the relationship between advertising spending by car manufacturers in U.S. newspapers and news coverage of major safety recalls issued between 2000 and 2014. Examining car safety recalls allows us to separate the effect of advertisers' influence from that of readers' tastes which, in this case, should lead to *more* coverage as owners of recalled vehicles demand more information about the safety risks associated with the recall. Consistent with the predictions of our theoretical model, we find that recalls involving a given manufacturer receive significantly less coverage on newspapers in which that manufacturer advertised more over the previous two years. We find that pro-advertiser bias is more pronounced in markets with a single newspaper, which indicates that competition - and the related reputational concerns - mitigates capture by advertisers. Finally, increased competition for advertising revenues from online platforms makes newspapers more vulnerable to the pressure of advertisers.

*Keywords: media bias, advertising, newspapers, car manufacturers, safety recalls*

*We thank Sinan Aral, Ruben Enikolopov, Matthew Gentzkow, Fabrizio Germano, Xiang Hui, Maria Petrova, Arnaud Philippe, Paul Seabright, Francesco Sobbrio, David Stromberg, Michael Ward, Erina Ytsma and participants in the 2016 Media Economics Workshop, the 10th Toulouse Internet Conference, the 2nd Conference on Media Bias, and seminars at MIT and UPF for helpful discussion. Milena Djourelova provided excellent research assistance.

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## 1. INTRODUCTION

An independent press is essential to inform citizens about relevant policy issues and to expose government as well as 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 can have an incentive to "capture" them 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. Indeed, commercial outlets rely heavily on advertising revenues and have an interest in keeping a good relationship with their advertisers. When negative news about an advertiser emerges, an outlet may consider under-reporting due to a 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 can 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 that they like to see confirmed (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 receptive to their message (Chen et al., 2009; Joshi et al., 2011). Profit-maximizing media outlets can slant content either to cater to the preferences of consumers (demand-driven bias) or to the demands of advertisers

[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".

(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, any correlation between ad spending and content can not 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 ad spending by car manufacturers in U.S. newspapers and news coverage of car safety recalls. While advertisers prefer less coverage, which might damage their reputation, readers who own vehicles of the same brand naturally demand more information about the safety risks and the competence of the manufacturer in dealing with recalls. Two 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.

We first develop a simple model predicting that, in equilibrium, an increase in advertising should be associated with a reduction in coverage of recalls. In order to test this prediction, our empirical analysis is based upon four data sources. First, we measure recalls by focusing on the top 100 recalls in terms of the number of potentially affected vehicles issues between 2000 and 2014.[3] Second, we collect detailed data on the number of recall-related articles published in about 115 US daily newspapers (both national and local) for the whole sample period, for a total of over 13,600 articles. Third, we incorporate information on advertising spending in these newspapers by manufacturers. Finally, to measure demand-side preferences, we employ survey data on the distribution of car ownership by manufacturer at the media market level. 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. Furthermore, the availability of data over a long time period allows us to test whether pro-advertiser bias is driven by contemporaneous ad spending or whether

[3] The top 100 recalls concern nine large manufacturers which, as of 2015, accounted for about 87% of the U.S. car market as of 2015.

any bias results from a long-run relationship between adverstisers and newspapers, allowing advertisers to be more influential when it matters.

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, ad spending 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. The effect is robust and quite sizeable: a 10% increase in ad spending in the prior two years reduces the likelihood of recall-related coverage by 35%, and the number of recall-related articles by 20%. This result indicates that a medium-to-long term advertising relationship between firms and newspapers is conducive to friendly coverage, while ad spending in the few months prior to a recall has no significant effect on coverage. We find no evidence that advertisers withdraw spending in response to more extensive coverage of recalls; this result further supports the view that the relationship we identify is due to prior spending influencing later editorial decisions. Our findings also support the hypothesis that reader demand and advertiser preferences affects content in opposite directions. Indeed, we find that recalls concerning a manufacturer receive significantly *more* coverage on newspapers serving areas where more people own vehicles by that manufacturer. Taken together, these results provide novel evidence that media editorial policy responds to both demand-side and supply-side factors and that consumers' demand for publicity can at times conflict with firm reputation concerns.

After documenting the existence and magnitude of pro-advertiser bias, we explore whether competitive pressure mitigatse or exacerbates any such bias. First we distinguish between markets in which multiple newspapers compete with each other and markets in which a newspaper enjoys a local monopoly (as in Galvis et al., 2016; Gentzkow et al., 2015). We find that pro-advertiser bias is more pronounced in single-newspaper markets, suggesting that competition and the related reputation concerns have a disciplining effect on editorial choices. We then examine whether newspapers experiencing financial distress due to increased competition from online platforms became more vulnerable to the pressures

of advertisers.[4] To do so, following Seamans and Zhu (2013), we exploit the staggered introduction of Craigslist - the world's largest online platform for classified ads - across U.S. media markets. We find that, after the entry of Craigslist and the associated financial distress, newspapers became more reluctant to write about the recalls of their advertisers. As one would expect, the effect is stronger for newspapers that relied more heavily on classified ads, for which the entry of CL represented a bigger shock.

Our research contributes to the growing literature on the role of mass media in consolidated democracies. In particular, it 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 US 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 US 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 an situation in which the interests of advertisers and consumers work in opposite directions, and

[4] This conjecture is consistent with previous findings showing that media companies that are financially solid and able to raise independent revenues are more likely to resist capture. (Petrova, 2011) provides evidence that the growth of advertising revenues was one of the drivers of the development of an independent press in late nineteenth century U.S.. Using an instrumental variable approach, she finds that in places with higher ad revenues, newspapers were more likely to enter the market as independents. Consistent results are found by Qin et al. (2014) who, looking at contemporary China, find that newspapers that depend more on commercial revenues are less directly controlled by the Communist Party and less likely to report low-level corruption.

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, our results, by documenting that advertisers' pressure can deter media from adequately covering issues on which readers' interests conflict with advertisers' reputational concerns, 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 results on 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. Finally, 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.

The remainder of the paper is organized as follows. Section 2 provides an overview of the advertising by car manufacturers in newspapers as well as the procedure through which recalls are handled. Section 3 describes the data, while Section 4 lays out the empirical framework. Section 5 details our benchmark results with, Section 6 describes how market structure interacts with media bias. Sections 7 analyzes some of the heterogeneity of the baseline estimates while Section 8 details a variety of robustness checks we carry out. Section 9 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 biggest ones.

### 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 makes information about the recall, including details about the defective part and the number of affected vehicles, public. By law, the manufacturer is required to provide a free remedy to the problem and notify all registered owners of potentially affected vehicles to provide them with the following information: the nature of the problem; the risks associated with the problem; how an owner can access the free remedy and 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.

Because owners are eventually directly notified by manufacturers, one might argue that media coverage of recalls does not matter. On the other hand, it does arguably serve two purposes for both owners and potential owners. First, it provides a negative signal about quality and reliability to consumers considering buying a vehicle produced by a manufacturer. For owners of vehicles subject to a recall, media coverage provides more detailed background information about the recall, which can help consumers form beliefs about whether the manufacturer is to blame. For example, media coverage often provides information about the number of vehicles affected and other recent recalls by a manufacturer. This information is not required and is not generally included in recall letters, but it may affect the perceptions held by both owners and non-owners of recalled vehicles.

In most cases, media coverage of recalls is detrimental to manufacturer of the recalled vehicles as it is likely to hurt the brand reputation.[6] On the other hand, consumers may arguably prefer to receive more information about a recall involving their vehicle, especially when this is associated with serious safety risks. Similarly, consumers who do not own a recalled vehicle, but are considering buying one from a given manufacturer, are likely

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

to be interested to learn about the quality of its vehicles, and of its capacity to deal with problematic situations. That is, coverage of the recall may help both existing and potential owners in terms of making more informed decisions.

## 3. MODEL

In this section, we present a simple model of newspaper coverage of recalls following Ellman and Germano (2009). In the model, coverage of recalls interests consumers but lowers revenues for vehicle manufacturers. These manufacturers can induce newspapers to withhold some coverage of the recall and to compensate newspapers for the lost consumer revenue. To simplify the analysis, we present a model with just one newspaper and one manufacturer.

### 3.1. CONSUMERS

Consumers receive utility from receiving information about recalls, which occurs with probability $p$. The sum of the utility that consumers receive from a newspaper with $c$ articles is $u_c = d(l,s)f(c)$, where $f(c)$ is an increasing concave function of the number of articles $c$, and $d(l,s)$ is a recall specific demand parameter, which is increasing in local interest $l$, and the severity of the recall $s$.

Consumers receive a constant utility $\alpha$ from a non-recall related article. Consumer utility is maximized when the marginal utility from a recall related article is equal to the marginal utility of a non-recall related article:

$$d(l,s)f'(c) = \alpha$$

The level of coverage which solves this equation is denoted $c^*(l,s)$.

### 3.2. NEWSPAPER

The newspaper gains revenue from consumer interest in its coverage. If consumers are more interested, they are more likely to pay for a newsstand edition or a subscription, and more likely to share the newspaper with others, increasing both reputation and consumption. As a simplifying assumption, let the payoff the newspaper receives from consumers be the sum of consumer interest, so the payoff from consumers is maximized at $c^*(l,s)$ and decreases in the distance between actual coverage and optimal. Denote the payoff that a newspaper

receives from providing consumers with coverage $c$ as $\pi(c)$. The newspaper also receives a payoff equal to the amount of advertising they receive from the manufacturer.

### 3.3. MANUFACTURER

Coverage of recalls damages the reputation of the manufacturer and therefore profits. If there are $c$ articles about a recall, the total loss in profits to the manufacturer is denoted $g(c)$. In addition, the manufacturer's payoff decreases according to each dollar of advertising they buy.

### 3.4. TIMING OF THE GAME

In Stage 1, the manufacturer makes a credible offer of advertising to the newspaper. The offer consists of a level of advertising $\bar{a}$, and a function $\bar{c}(l,s)$. This function determines the amount of recall coverage $c$ as a function of local interest $l$, and the severity of the recall $s$.

Between Stage 1 and Stage 2, a recall occurs with probability $p$. If a recall occurs, the severity is drawn from a known distribution and the game proceeds to Stage 2. If a recall does not occur, the advertiser buys advertising at level $\bar{a}$ and the game ends.

In Stage 2, the newspaper chooses coverage $c(l,s)$. Since the advertiser offer in Stage 1 is credible, this fixes the level of advertising. The newspaper receives $\bar{a}$ as long as $c \leq \bar{c}(l,s)$, otherwise they receive 0.

In Stage 3, consumers make their consumption decision.

Note that the set of offers available to the manufacturer is restricted. For example, the amount of offered advertising $\bar{a}$ is not allowed to be a function of either whether a recall occurs or the severity of a recall. Clearly, if this type of offer were permitted, the manufacturer would never advertise unless a recall occurs. To understand the intuition behind this assumption, note that the offer must be credible. While not modeled explicitly, advertising in other periods when there is no recall can be seen as a reputation building mechanism where the manufacturer can signal its willingness to pay $\bar{a}$, and thus establish the credibility of the offer.

### 3.5. SUBGAME PERFECT EQUILIBRIUM

The following proposition describes a property that holds for the set of subgame perfect equilibria.

**Proposition 1.** *Among the set of subgame perfect equilibria, equilibria with more advertising involve less coverage of a recall. A more serious recall or one with more local interest will be covered more.*

*Proof.* In Stage 2, if a recall of severity $s$ happens, a newspaper will provide the level of coverage $\bar{c}(l,s)$ if and only if $\pi(c^*(l,s)) \geq \pi(\bar{c}(l,s)) + \bar{a}$.

In Stage 1, the manufacturer chooses a value $\bar{a}$ and a set of values $\bar{c}(l,s)$ to maximize

$$p\Big(E\left(g(\bar{c}(l,s)) - g(c^*(l,s))\right)\Big) - \bar{a}$$
$$\text{s.t. } \pi(c^*(l,s)) \geq \pi(\bar{c}(l,s)) + \bar{a} \; \forall \; s$$

Its payoffs are strictly decreasing in $\bar{a}$ and $\bar{c}(l,s)$, so it will choose values such that $\pi(\bar{c}(l,s)) = \pi(c^*(l,s)) - \bar{a} \; \forall \; s$. Given that we assumed $c^*(l,s)$ is strictly increasing in $l$ and $s$, the result follows. □

The intuition for this equilibrium is straightforward. If there is more demand for coverage of a recall, because $l$ or $s$ are higher, the newspaper will cover it more. The manufacturer is harmed by coverage of a recall so it may choose to bribe a newspaper to cover it less. This bribe must compensate the newspaper for the lost revenue from consumers and any loss in reputation. Thus for a given recall, if there is more advertising, the newspaper is more willing to distort coverage away from the optimal level, and there will be less coverage.

The model makes several predictions that we test in our empirical analysis. In particular, observed coverage ($\bar{c}(l,s)$) is strictly increasing in the local interest ($l$) and severity of the recall ($s$), and strictly decreasing in advertising $\bar{a}$. The model also highlights the importance of capturing demand-side preferences, as captured by local interest.

## 4. DATA

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

### 4.1. Car Safety Recall Data

Comprehensive data on all car safety recalls issued in the US 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 vehicle's part(s) concerned by the recall, and on the number of vehicles potentially affected. For our analysis, to arrive at a list of car manufacturers, we focus on those manufacturers which were involved in the top one hundred recalls, in terms of the number of vehicles potentially affected, issued over our 15-year sample period.[7] Since major recalls often concern multiple models, we aggregate and analyze the data at the manufacturer level.[8] In our analysis, overall, we consider more than 1800 recalls involving a total of nine car manufacturers, including Chrysler, Ford, General Motors, Honda, Hyundai, Kia, Nissan, Toyota and Volkswagen. These car manufacturers are the nine largest in the U.S. accounting for over 87% of the market share as of 2015.[9]

### 4.2. News Coverage Data

Data on news coverage of recalls on US newspapers for the period 2000-14 are obtained from the Newslibrary.com database which contains most US newspapers, both large and small. To identify recall-related articles we performed an automated search of specific keywords over the full text of all the articles of the newspapers in our sample 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".[10] Recall-related articles are then assigned to one or more manufacturers if they also include the manufacturer's name (e.g., "General Motors") or that of one or more of its brands (e.g., "Chevrolet" for General Motors).[11] 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-

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

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

[9] See https://www.statista.com/statistics/249375/us-market-share-of-selected-automobile-manufacturers/ for more details.

[10] 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.

[11] 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.

newspaper-month. Overall we collected data on coverage for 115 daily US newspapers for a total of 13,600 recall-related articles. As shown in Table 1, the probability that a newspaper writes a recall-related article about a particular manufacturer in a month is 0.071, with 0.118 being the mean number of articles.

To provide readers with information on the content, we read a subsample of articles from 5 large newspapers.[12] 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. Figure 1 provides a visual representation of the language use in the articles in these five newspapers. As shown, the tone of coverage ranged from neutral to critical, and we did not find any recall related articles which used a positive tone towards the manufacturer of recalled vehicles.

### 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 manufacturer/dealer divided by product and by newspaper. 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. For our analysis we construct a measure of ad spending by each manufacturer/dealer on each newspaper in each month, summing up spending for different products. Specifically, 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.[13] As shown in Table 1, the average monthly advertising expenditure by a manufacturer in a newspaper is $102,300.

[12] Note that, while we can search over all 115 newspapers, we do not have access to the full text of the articles in many cases. Given this, we read articles from five large newspapers for which we have access to the full text. These include USA Today, Tampa Bay Times (formerly St. Petersburg Times), St. Louis Post-Dispatch, Pittsburgh Post-Gazette, and Atlanta Journal Constitution.

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

### 4.4. VEHICLE OWNERSHIP INFORMATION

Finally, 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; in particular, we assign to each newspaper the shares of vehicles by manufacturer in the MSA where the newspaper's headquarter is located (e.g., the Boston MSA for the *Boston Globe*). Since the NHTS survey was only conducted in 2001 and 2009, data for the other years are imputed via interpolation. As shown in Table 1, the mean market share for a car manufacturer is 8.1% with a maximum of about 27%.

## 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 an article was written). 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 $t-i$; hence, for example, if $i$ equals 12 the summation term captures total ad spending by manufacturer $m$ on newspaper $n$ in the previous year. We hypothesize that advertising should reduce coverage ($\theta_1 < 0$). $demand_{mny}$ represents the number of vehicles owned made by manufacturer $m$ as a share of total vehicles owned in the area where newspaper $n$ operates at time $t$. 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. $severity_{mt}$ indicates the number of total vehicles potentially affected by the recall(s) of manufacturer $m$ at time $t$. We expect that the higher the number of potentially affected vehicles in a particular recall, the more newsworthy or 'important' the story becomes. This may lead to greater news coverage. Finally, we also control for newspaper size by including a variable for the total number of articles published by the newspaper in a year.

Our specification also includes a set of fixed effects. $\psi_t$ captures the aggregate time effects which include any other time-specific factor susceptible to affect coverage and/or advertising spending (e.g., seasonality). $\phi_{mn}$ are manufacturer x 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 x manufacturer level. This ensures that we do not overestimate the precision of our results.[14]

A key decision involves the time period over which advertising should be measured. In the context of the theoretical model, we observe many recalls in many newspapers over a long period of time, and these can be interpreted as many iterations of the game. One empirical challenge is determining how to measure advertising in this repeated panel scenario. Recall that the game assumed that advertisers made a credible offer, suggesting that historical advertising data is a good indicator of what the offer might be. There is considerable seasonality in vehicle advertising, which argues that advertising should be looked at as an annual, as opposed to monthly figure. On the other hand, measures such as severity may vary over time and thus time periods far in the past may not be a good indicator of credible advertising offers. Given all of this, we focus on one-year or two-year advertising histories, which might be the best indicator of the manufacturer's offer.

## 6. Benchmark Results

We begin our analysis by estimating our baseline specifications examining the link between advertising expenditures and coverage of recalls. We then examine in more detail the role of advertising over different time periods. Finally, we consider the link between advertising expenditures and demand for vehicles across different geographic markets.

[14] 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 14.

### 6.1. BASELINE RESULTS

In Table 2, in columns (1)-(5), we use the probability of 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 without including any fixed effects or controls. 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 x 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. [15] In column (3) we include a time varying measure of the demand for the manufacturer's vehicles, as well as a metric for the 'importance' of the story captured by the number of vehicles potentially affected and a control for newspaper size, increasing the coefficient of interest by approximately 25 percentage points, while still being statistically significant at the 1% level. This is in line with intuition since these variables are positively correlated with recall coverage, depress the coefficient on advertising expenditures if omitted from the regression. Our results are robust to the inclusion of month fixed effects (column 4). In terms of the magnitudes, a 10% increase in two year advertising expenditure leads to a decrease in the probability of at least one recall related article by 0.027. With a mean probability of 0.071, this corresponds to a 35% decline in the probability of an article appearing.[16] 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 20 percentage points lower 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.

[15] 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. Table A1 shows that monthly advertising expenditure is positively correlated with contemporaneous (columns (1) and (2)) and lagged demand (columns (3) and (4)) 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.

[16] A 10% increase in advertising expenditure over the past two years is economically significant since it amounts to approximately $300,000 which is one standard deviation from the mean monthly advertising expenditure by a manufacturer in a newspaper.

Turning to the intensive margin, we carry out the same analysis with the dependent variable being the total number of recall articles written by a newspaper. As shown in Table 3, 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)). Quantitatively, the estimates imply that a 10% increase in two year advertising expenditure leads to a 20% decrease in the number of recall related articles since the mean number of recall-related articles is 0.127. Again, these magnitudes are economically significant. In column (5), when controlling for newspaper and manufacturer fixed effects separately instead of newspaper-manufacturer fixed effects we find results similar to what we found when looking at the extensive margin, with a coefficient that is negative and significant but smaller in magnitude relative to the estimate in column (4).

### 6.2. TIMING

While our baseline results use advertising over the past two years, we next investigate advertising over different time periods. In Figure 2, 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 picture. 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 short and longer term lags in Tables 4 (extensive margin) and 5 (intensive margin). As shown, advertising expenditure over the past 6 months (column (1) in Tables 4 and 5) has no statistically significant impact on coverage decisions by the newspaper, with the point estimates being small as well. Moreover, very long lags, such as advertising expenditure between two and three years ago (column (5)), also have no statistically significant impact on either the probability of writing an article (Table 4) or the number of articles being written

(Table 5). The point estimates are also small as in the case of the past 6 months of advertising expenditure. Advertising expenditure between the past six months and a year (columns (4)) and between the previous year and two years (columns (5)) are statistically significant, indicating that the variation is coming from a medium term relationship. In columns (6), these results survive even when we put all lags together since they would be significantly correlated. 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.

Moreover, 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 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 6, 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.

We also analyze the exact timing of 'payment' in the implicit contract 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. In Figure 2, 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 7. 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.

This finding is consistent with manufacturers and newspapers playing equilibrium strategies in the model presented in Section 3. Manufacturers make credible offers of advertising, which can be observed by looking at the levels of advertising during the periods prior to the recall. This offer dictates how much coverage of the recall will be withheld, and

advertising will be withdrawn if there is too much coverage. However, in equilibrium, the newspaper provides the coverage that the manufacturer has bought, and is not punished with lower advertising. Therefore, conditional on previous advertising, advertising after a recall is not affected by coverage of the recall.

## 7. Market Structure, Advertising Revenue and Bias

Having established our baseline results, we next analyze whether competition attenuates or exacerbates the impact of advertising revenue on media bias. First, we ask how the presence of multiple competing newspapers, as opposed to a local monopoly, affects media bias. We then analyze whether the advent of Craigslist, and the internet more generally, affects media bias since it provides an alternative advertising platform. Finally, we ask whether a newspaper biases its coverage less in favor of an advertiser if it receives a large amount of advertising revenue from other, potentially competing, advertisers.

### 7.1. Newspaper Competition and Media Bias

Does media bias due to advertising revenue differ between newspapers that are local monopolies as opposed to those which face competition from at least one more newspaper? Theoretically, the impact of competition on the relationship between advertising revenue and bias is ambiguous. Higher competition could lead to an increase in media bias with the newspapers alert to the threat of advertisers shifting their spending to other newspapers in the same geographic region if they are not provided favorable coverage. On the other hand, competition could have a disciplining effect on newspapers and reduce bias if the reputation costs of biased and inaccurate coverage is high enough (Besley and Prat, 2006, Gentzkow and Shapiro, 2008).

We define newspapers as facing competition if there is at least one other newspaper with its headquarters in the same county. We interact advertising revenue received over the past two years with our measures of competition. As shown in Table 8, competition has a disciplining effect on media bias. In columns (1) and (2), the interaction term between advertising revenue and a competition dummy (indicating multiple newspapers in that county) is positive and statistically significant at the 5% level, 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 use a continuous measure by looking at the number of other

newspapers in the county (as opposed to a dummy), with the interaction term being positive and statistically significant.

These results are in line with existing findings of 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 from exerting political influence. The exception were the Southern states where media and political competition was limited. Similarly, Galvis et al. (2016) find that partisan bias in the coverage of corruption scandals was limited by the presence of other newspapers in the market.

### 7.2. Craigslist and Media Bias

Over the course of our 15 year sample period, 2000-2014, the news industry has been disrupted with the advent of the internet. Websites such as Craigslist provided a platform for people to post classified ads for free, reducing demand for space in a newspapers. It was even termed the 'newspaper killer' because of its probable adverse impact on advertising revenue available to newspapers.[17] Indeed, Seamans and Zhu (2014) find that the introduction of Craiglist lead to a decline in advertising revenues for local newspapers of about $5 billion between 2000 and 2007. We examine whether the entry of Craiglist led newspapers to increase their bias in the coverage of recalls as a response to their existing advertising relationships becoming more valuable.

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 ad spending 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 ad manager or not in the year 2000 to evaluate any heterogeneity in the impact of Craigslist across newspapers.[18] As in Seamans and Zhu (2014), 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 to 2007 since Craigslist entry had taken place in most regions by 2005.[19]

The results in Table 9 indicate that the entry of Craigslist did spillover to existing

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

advertising relationships and exacerbate the problem of media bias. The interaction term between previous ad spending and Craiglist entry is negative and statistically different from zero for both the extensive (column (1)) and intensive margin (column (2)). Quantitatively, the magnitudes of the coefficients are comparable (-0.34 when the dependent variable is the probability of writing an article in column (1)) to the baseline estimates in Table 2 (-0.277 in column (4)). Then, we split the sample into newspapers with and without a classifieds ad manager. In line with our hypotheses, the Craigslist impact is driven primarily by the newspapers which have a classifieds ads 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 Craiglist 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 (2014). 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. The Impact of Competing Advertisers

Finally, we examine whether a newspaper provides less favorable coverage to a manufacturer's recall because of higher advertising dollars coming from that manufacturer's competitors. To quantify the spillover effect, we explicitly introduce a variable for past advertising expenditure by other manufacturers in that newspaper in addition to that by manufacturer $m$. This is the model that the Industrial Organization literature uses to capture spillover effects of advertising expenditure on product demand between different firms.[20]

The results in Table 10 indicate newspaper-manufacturer relationships are independent of each other 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)). Overall, we do not find any evidence of strategic concerns in a newspaper's coverage decisions because of different advertisers being competitors in the market.

[20] That is, we additionally include a variable which is the sum of advertising expenditure by all other manufacturers in that newspaper over the past two years. See Shapiro (2016) and Sinkinson and Starc (2016) for more details on how to account for competitive effects.

## 8. 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.

### 8.1. Large Newspapers and Manufacturers

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.

We create indicators for newspapers in the top quartile of our sample according to circulation and interact this measure with ad spending. As shown in Table 11, the coefficient on the interaction term, when the dependent variable is the probability of writing a recall related article (column (1)), is negative across specifications and statistically significant at conventional levels. This result indicates that, if anything, larger newspapers are more responsive to advertising expenditure from car manufacturers. This is reinforced when looking at the intensive margin (column (2)) where the interaction term is statistically significant in similar specifications.

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.[21] The coefficient on the interaction term between ad spending and the dummy is negative and significant across all specifications in Table 11 whether the dependent variable is the probability of an article (column (3)) or the number of articles (column (4)). Overall, this implies that newspapers bias their coverage the most in favor of the largest advertisers.

### 8.2. Domestic vs. Foreign Manufacturers

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)

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

are favored more conditional on the amount of advertising expenditure.[22] To do so, we create a dummy variable which takes the value one if the manufacturer is domestic and zero otherwise. The results in Table 11 clearly indicate that there is a systematic difference in news coverage across domestic and foreign car manufacturers. We find a significant negative interaction term on both the probability of coverage (column (5)) and the amount of coverage (column (6)). This implies that an advertising dollar buys a domestic car manufacturer more favorable coverage than a foreign one.

### 8.3. Dealer Dollars and Small Newspapers

One final dimension of heterogeneity involves how advertising spending differentially affects coverage depending on whether advertising is made by a local dealer or by the manufacturer directly. It is widely believed that the smaller newspapers rely much more on advertising expenditure by dealers since they operate at a more local level. We test this in our data since we have information on how much advertising came from dealers versus manufacturers within a month.

In Table 12, we focus on the interaction between advertising dollars coming from dealers and an indicator for whether a newspaper was 'small'.[23] As shown, controlling for total advertising expenditure over the past two years from manufacturers (and its interaction with newspaper size), we find a statistically significant difference in coverage, on average, if the dealers advertised more in smaller newspaper. 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). 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. The results are similar in columns (3)-(4) when analyzing the total number of articles written as the dependent variable. Taken together, these results are in line with intuition that smaller newspapers are more reliant on advertising revenue from dealers and hence provide more

[22] 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.

[23] Small is defined as those newspaper which are not large in terms of circulation as defined in the sub section above.

favorable coverage to them.

## 9. Robustness Checks

### 9.1. 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.[24] As shown in Table 13, 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.[25] 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 13, we explicitly control for whether there was an advertising campaign in the previous three, six and nine months relative to month $t$. 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.[26]

Finally, we assess whether our results are robust to controlling for news coverage of recalls on TV. To do so, we use data from the Vanderbilt Television News Archive for the 2000-2014 period. This allows us to measure if there was any recall related coverage on

[24] 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.

[25] 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.

[26] 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.

any particular day about a manufacturer in our sample on the evening news broadcasts on the top three U.S. networks (ABC, CBS and NBC).[27] We aggregate these TV news stories at the level of the manufacturer-month. Controlling for whether there is any recall related news story on TV in a particular month, in columns (7) and (8), we find that the coefficient on ad spending over the past two years is very similar to our baseline results. Moreover, the coefficient on the TV news indicator is positive and statistically significant, reflecting a positive correlation in coverage across different news platforms.[28]

### 9.2. Non Linear Models and Alternative Specifications

In Table 14, we present results using non-linear models. Results from a negative binomial (columns 1) and a logit model for probability of writing an article (column 2) are qualitatively similar to our linear baseline setting.[29] 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 14. 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. We divide the sample into four-year intervals and allow newspaper-manufacturer fixed effects to vary over those intervals. Even with such flexible fixed effects, we find that the results are in line with those in Tables 2, highlighting the robustness of our estimates. Finally, in columns (7) and (8), we measure ad expenditure over the past two years by a manufacturer as the proportion of total ad expenditure 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)).

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

[28] 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.

[29] 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.

## 10. CONCLUSION

There is significant existing evidence that the media coverage of events 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). Hence, it is vital that the media provides unbiased and accurate news to its consumers so that they take the correct, informed decision. The FCC has regulations that aim to limit a supply side media bias due to influence by corporate advertisers and political powers.

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, with advertising preferring less coverage and readers wanting more coverage. We find that higher advertising spending over the previous two years leads to more favorable coverage of the recall by the newspaper. 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.

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 possibly through 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: COEFFICIENTS ON LAGGED QUARTERLY ADVERTISING SPENDING

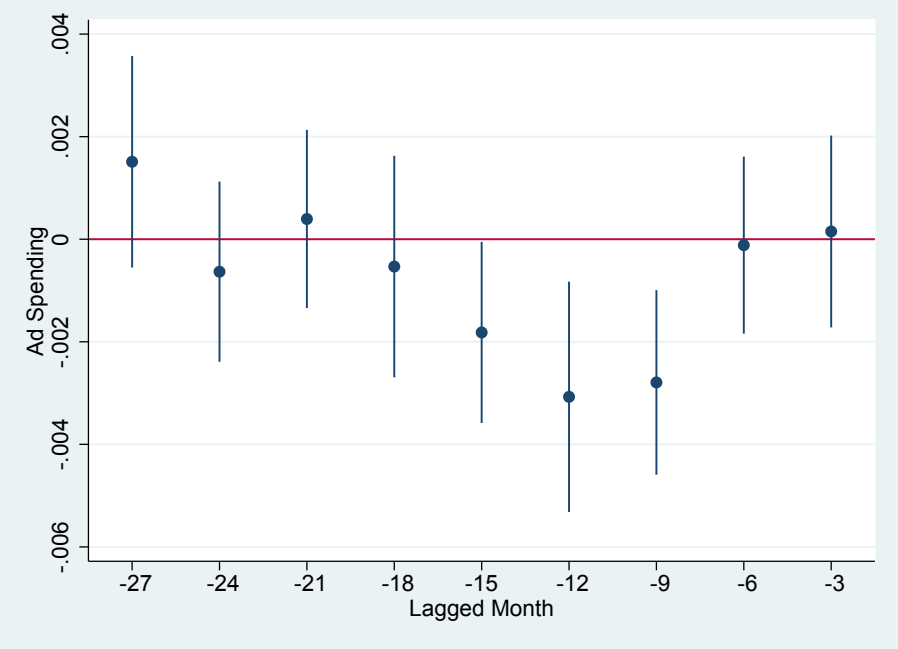

FIGURE 3: COEFFICIENTS ON MONTHLY LEADS OF ADVERTISING SPENDING

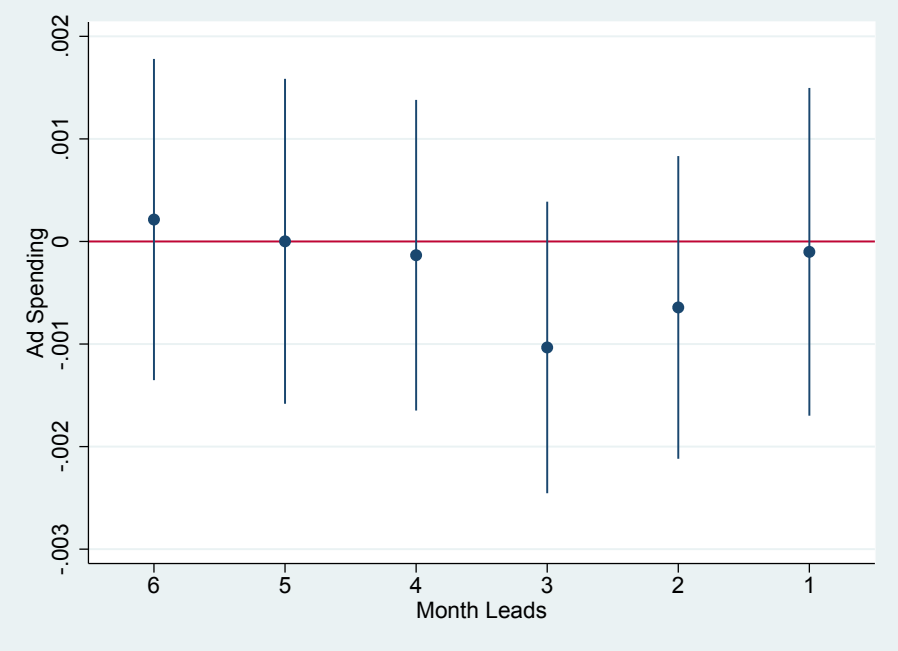

TABLE 1: SUMMARY STATISTICS

| | 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 |

TABLE 2: 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*** (0.127) | -0.519*** (0.117) | -0.651*** (0.113) | -0.271** (0.106) | -0.217** (0.093) |
| Log Affected Vehicles | | | 0.296*** (0.019) | 0.261*** (0.018) | 0.261*** (0.019) |
| Firm's Share Local Cars | | | 0.331*** (0.120) | 0.316*** (0.117) | 0.301*** (0.068) |
| Total Articles | | | 0.027*** (0.005) | 0.050*** (0.005) | 0.049*** (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 3: 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 4: 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) P(articles) |
|---|---|---|---|---|---|---|
| Log Ad Spending (previous 2 years) | -0.271** | | | | | |
| | (0.127) | | | | | |
| Log Ad Spending (previous 6 months) | | -0.0582 | | | | 0.140 |
| | | (0.105) | | | | (0.101) |
| Log Ad Spending (6 to 12 months before) | | | -0.179* | | | -0.201* |
| | | | (0.107) | | | (0.107) |
| Log Ad Spending (1 to 2 years before) | | | | -0.239*** | | -0.289*** |
| | | | | (0.089) | | (0.098) |
| Log Ad Spending (2 to 3 years before) | | | | | -0.072 | 0.146 |
| | | | | | (0.082) | (0.099) |
| 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 | 131,332 | 156,095 | 143,458 | 131,332 | 120,456 | 118,771 |
| R-squared | 0.168 | 0.176 | 0.171 | 0.168 | 0.170 | 0.170 |

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 of an article written by a newspaper about the recall of a manufacturer's vehicle in a particular month. 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 5: DIFFERENT LAGS OF AD SPENDING AND NUMBER OF RECALL-RELATED ARTICLES

| | (1) Log(articles) | (2) Log(articles) | (3) Log(articles) | (4) Log(articles) | (5) Log(articles) | (6) Log(articles) |
|---|---|---|---|---|---|---|
| Log Ad Spending (previous 2 years) | -0.277*** | | | | | |
| | (0.106) | | | | | |
| Log Ad Spending (previous 6 months) | | -0.122 | | | | 0.0938 |
| | | (0.135) | | | | (0.116) |
| Log Ad Spending (6 to 12 months before) | | | -0.254* | | | -0.352** |
| | | | (0.131) | | | (0.140) |
| Log Ad Spending (1 to 2 years before) | | | | -0.220** | | -0.176 |
| | | | | (0.088) | | (0.113) |
| Log Ad Spending (2 to 3 years before) | | | | | -0.049 | 0.176 |
| | | | | | (0.097) | (0.124) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Month FE | Yes | Yes | Yes | Yes | Yes | Yes |
| News x Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 131,332 | 156,095 | 143,458 | 131,332 | 120,456 | 118,771 |
| R-squared | 0.201 | 0.212 | 0.203 | 0.201 | 0.204 | 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 number of articles written by a newspaper about the recall of a manufacturer's vehicle in a particular month. 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 6: 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 7: 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.

TABLE 8: SINGLE AND MULTI-NEWSPAPER CITIES

| | (1) P(articles) | (2) Log(articles) | (3) P(articles) | (4) Log(articles) |
|---|---|---|---|---|
| Log Ad Spending (previous 2 years) | -0.401*** (0.137) | -0.407*** (0.139) | -0.658*** (0.232) | -0.628** (0.253) |
| Log Ad Spending x #newspapers dummy (previous 2 years) | 0.495** (0.211) | 0.499** (0.210) | | |
| Log Ad Spending x #newspapers (previous 2 years) | | | 0.274** (0.124) | 0.250* (0.146) |
| Controls | Yes | Yes | Yes | Yes |
| Controls x #newspapers | 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 9: 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 10: 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.

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) | -0.107 | -0.948 | 0.020 | 0.039 | -0.059 | -0.066 |
| | (0.0824) | (0.0847) | (0.102) | (0.0917) | (0.117) | (0.110) |
| Ad Spending × Large Paper (previous two years) | -0.643* | -0.714** | | | | |
| | (0.336) | (0.362) | | | | |
| Ad Spending × Large Manuf. (previous two years) | | | -0.706*** | -0.750*** | | |
| | | | (0.218) | (0.226) | | |
| Ad Spending × Domestic (previous two years) | | | | | -0.616*** | -0.583** |
| | | | | | (0.242) | (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 | 131,332 | 131,332 | 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: 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 (0.447) | 0.767* (0.437) | 0.384 (0.435) | 0.747* (0.432) |
| Dealer Ad Spending × Small Paper (previous 2 years) | -0.973** (0.457) | -1.04** (0.448) | -0.915** (0.448) | -1.02** (0.445) |
| Manuf. Ad Spending (previous 2 years) | -.0028 (0.001) | -0.001 (0.001) | -0.003 (0.001) | -0.002 (0.001) |
| Manuf. Ad Spending × Small Paper (previous 2 years) | .00388 * (0.002) | 0.004** (0.002) | 0.004** (0.002) | 0.004** (0.002) |
| 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 13: 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 14: 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 A1: CORRELATION BETWEEN ADS AND FIRM DEMAND IN THE REGION

| | (1) Log Ad Spending | (2) Log Ad Spending | (3) Log Ad Spending | (4) Log Ad Spending |
|---|---|---|---|---|
| Firm's Share Local Cars | 5.841*** | 5.926*** | | |
| | (1.275) | (1.268) | | |
| Firm's Share Local Cars (One Year Previous) | | | 6.158*** | 6.240*** |
| | | | (1.388) | (1.383) |
| Controls | No | Yes | No | Yes |
| Month FE | Yes | Yes | Yes | Yes |
| News x Manufac FE | Yes | Yes | Yes | Yes |
| Observations | 160,261 | 160,261 | 147,160 | 147,160 |
| R-squared | 0.645 | 0.646 | 0.645 | 0.646 |

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 logarithm of ad spending by a manufacturer in a newspaper in a month. Controls include the logarithm of the number of potentially affected vehicles and the logarithm of total articles written by the newspaper annually.

## APPENDIX A: SUPPLEMENTARY TABLES