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Media Coverage and Car Manufacturers' Sales

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Abstract

A wide range of media-provided information on many products is based on reviews or expert opinions. The effects of such information on product sales is analyzed in a small but growing literature in economics and marketing science. However, there is much more general coverage on companies and products in the media than product reviews and expert opinions. Based on a unique dataset, we test whether coverage of car manufacturers in leading media outlets has significant impact on new car registrations in Germany. We find that positive media coverage has a statistically significant effect on the number of new cars sold by several leading manufacturers on the German car market.

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1. Introduction

Consumers' purchasing decisions largely depend on information. Such information can be product related as in (online) reviews of books and movies, reviews in car magazines or expert opinions on wines and restaurants (see, e.g., Dewenter and Heimeshoff, 2015, Reuter, 2009, or Zhu and Zhang, 2010). However, not every report in the media related to certain companies is also concerned with their products' characteristics like qualities or prices. Especially in the news media general coverage on companies, which is not focused on single products, but on broader topics like companies' general strategies, management or financial issues often dominates. A recent example is the much debated scandal of German car manufacturer Volkswagen manipulating emissions of its Diesel engines on test runs. Some of the reporting related to this scandal deals with particular products, engines as well as cars, produced by Volkswagen.

The literature provides some evidence that product related coverage, for example expert opinions or reviews in magazines, may or may not impact consumers' buying decisions (see e.g. Eliashberg and Shugan, 1997; Reinstein and Snyder, 2005; Sorensen and Rasmussen, 2004; and Clement et al., 2008). A different strand of the literature analyzes the effects of reviews on wine demand (see Friberg and Grönqvist, 2012; Hilger et al., 2011; Ashenfelter and Jones, 2013). Another strand of the literature deals with financial products. In magazines and newspapers dealing with financial topics, recommendations and evaluations of certain financial instruments have a long tradition. As a result, the literature on recommendations of financial products is significantly larger than on media products and food (see Sirri and Tuffano, 1996; Jaun and Wu, 2000; Cronquist, 2004; and Reuter and Zitzewitz, 2006).

Currently there is much coverage devoted to the general performance of the Volkswagen group and its strategy in the future. The research question of this paper is to investigate if and to which extent this kind of general coverage influences consumers' purchasing decisions. Testing the effects of general media reporting on firms and prices is relatively rare. One exception is the long tradition in financial economics of testing the effects of news on prices in financial markets. These tests are regularly implemented as event studies (see MacKinlay, 1997) dealing for instance with the effects of merger announcements on asset prices. But in political science the effects of media coverage, for example on elections, are also studied extensively (see, e.g., Lawson and McCann, 2005).

Our paper intends to fill this research gap by analyzing the impact of media coverage in leading newspapers and television channels in Germany on new car registrations using panel data techniques by regressing manufacturers' numbers of new registrations on measures of media coverage, which is classified as positive, negative, and neutral, as well as on some controls. The following section describes our dataset. Section 3 reports the results from our statistical analysis and section 4 concludes.

2. Data

Unbalanced Panel data on media coverage on 37 car manufacturers[1] is extracted from the Media Tenor database. Swiss-based company Media Tenor International analyzes a broad range of international opinion-leading media, including TV news programs, newspaper, magazines, business media, radio as well as social media with regard to all possible protagonists, such as persons (for example politicians or managers) and institutions (political parties, companies etc.). Each of these news items is analyzed for instance with regard to the topic mentioned (foreign policy, HR, unemployment, business strategy, etc.) as well as with regard to the tone of the information (negative, positive or neutral).

Data is available on a monthly basis from March 2001 to October 2011 and is and indexed by brands. It covers information from 7 TV newscasts, 9 newspapers, and 5 magazines (see the appendix for a full list).[2] Media Tenor counts the number of reports on a respective manufacturer (see Table 1 for descriptive statistics). Furthermore, each report is coded as "positive", "neutral" or "negative" with respect to the tonality. Put differently, the coding reflects if a manufacturer is mentioned in a positive, neutral or negative way. *Positive*, *neutral* and *negative* is simply the number of positive, neutral or negative reports on a brand per month. *Reports* is the sum of all reports on a brand per month.

To approximate monthly car sales, we used data on new car *registrations* provided by the *German Federal Office of Motor Vehicles* (Kraftfahrzeugbundesamt). Additionally, to account for variations in new car registrations due to general business cycle fluctuations, we include the *ifo* business cycle indicator, which is published on a monthly basis by one of Germany's leading economic research institutes. We also used gas and diesel prices for 1000 liters as a control variable.

Table 1: Descriptive Statistics

	Obs	Mean	Std. Dev.	Min	Max
registrations	4,666	7413.92	26812.29	0	857112
cpicars	4,666	96.28	3.02	92.2	102.2
ifo	4,666	101.36	8.04	84.50	115
gasoline price	4,716	1322.44	251.09	970.97	2172.6
diesel price	4,716	1131.77	218.72	796.35	1652.6
reports	4,668	23.67	122.94	0	6887
positive	4,668	5.13	19.18	0	916
neutral	4,668	13.60	70.20	0	3883
negative	4,668	4.94	36.86	0	2088

[1] That is, Alfa Romeo, Audi, BMW, Chevrolet, Chrysler, Citroen, Daihatsu, Ferrari, Fiat, Ford, Honda, Hyundai, Jaguar, Jeep, Kia, Lancia, Land Rover, Lexus, Maserati, Mazda, Mercedes Benz, Mitsubishi, Nissan, Opel, Peugeot, Porsche, Renault, Rover, Saab, Seat, Skoda, Smart, Subaru, Suzuki, Toyota, Volvo, VW.

[2] Media Tenor is a Swiss company providing media analyses based on a unique data set on international media coverage. Reports from a huge set of media products is encoded with respect to tonality.

3. Results

To analyze the impact of media coverage on new car registrations we run simple fixed effects panel regressions

$$registrations_{it} = \beta_0 + \beta_1\, coverage_{it} + x_{it}'\beta + u_i + \varepsilon_{it}, \quad (1)$$

where registrations is the number of new registrations of brand *i* in time *t*, coverage is either the number of overall reports or the number of positive and neutral reports on brand *i* in time *t*. The u_i are brand specific fixed effects. The vector x_{it} consists of controls such as gas prices and time dummies. We also run a dynamic fixed effects models (see Wooldridge, 2010)

$$registrations_{it} = \beta_0 + \beta_1\, coverage_{it} + \beta_2\, registrations_{it-1} + x_{it}'\beta + u_i + \varepsilon_{it}, \quad (2)$$

where $registrations_{it-1}$ is the first lag of new car registrations. Dynamic models provide the advantage that the strong persistence in new car registrations is captured adequately and furthermore, in addition to fixed effects, biases due to omitted variables are less likely to affect our results. As the time dimension of our panel is relatively large, we do not expect a significant Nickell bias when using fixed effects regression with a lagged dependent variable (see Pesaran, 2015).

As can be seen from Table 2, dynamic models (FE II and VI) provide some evidence for a significant impact of general coverage on sales. Using all reports (positive, neutral and negative) as an explanatory variable, a positive and statistically significant impact on registrations can be found. Each report increases the number of new registrations by about 1.2 cars, which is quite a high number from our point of view. Using positive and neutral reports on car manufacturers instead of all reports combined leads to very similar results (FE IV). An additional report increases the number of registrations by about 1.6. This result seems comprehensible since good news on manufacturers is more likely to attract consumers to buy their products than bad news. In both dynamic regressions the model fits the data quite well.[3]

Following the literature on the demand for new cars operating costs is a most important factor of automobile demand (see Tishler, 1982; Kayser, 2000). Operating costs are determined to a large part by gasoline consumption of the car and gasoline prices. Increasing gasoline prices could cause shifts in consumers' demand from large cars to smaller, more fuel efficient cars (see Bresnahan and Ramey, 1993). We therefore also used gasoline as well as diesel prices as explanatory variables. Fuel prices are most commonly used in the literature and it is the only aggregated variable which is available to us on a brand level. We also included a consumer price index for cars (cpicars) which is part of the general CPI provided by the official statistics. FE V and VI provide further evidence for a positive impact of coverage.

Our results are in line with recent reports on sales slumps caused by the Volkswagen scandal. After manipulations of emissions tests became public, Volkswagen sales in the U.K. dropped by 20 % in November 2015.[4] This anecdotal evidence shows that consumers react to general, i.e. non-product specific, media coverage on companies. Many cars produced by Volkswagen, for example those equipped with petrol engines, are not affected by the manipulation of Diesel engines. However, customers' buying decisions are nevertheless affected by this news, no matter whether indirectly relevant or even relevant.[5]

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[3] We also used the number of negative effects as a regressor, however, results were not statistically significant.

[4] http://www.theguardian.com/business/2015/dec/04/vw-sales-drop-uk-new-car-registrations.

[5] The effects of irrelevant information on decision making is studied extensively in economics and psychology. See, e.g., Kahneman and Tversky (1974).

Table 2: Fixed Effects Regressions

	FE I	**FE II**	**FE III**	**FE IV**	**FE V**	**FE VI**
$registrations_{t-1}$	-	.9460*** (0.00)	-	.9460*** (0.00)	.9429*** (0.01)	.9429*** (0.00)
$reports_t$	4.88 (0. 51)	1.22*** (0.00)	-	-	2.69*** (0.01)	-
$postive+neutral_t$	-	-	6.59 (0.19)	1.57*** (0.00)	-	3.89*** (0.00)
ifo_t	-136.63 (0.34)	-20.14 (0.28)	-136.33 (0.34)	-20.08 (0.28)	-42.75 (0.36)	-42.87 (0.36)
gasoline price	-	-	-	-	1.95 (0.43)	1.95 (0.42)
diesel price	-	-	-	-	.4455** (0.05)	.4375 (0.57)
cpicars	-	-	-	-	157.19 (0.37)	159.41 (0.37)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	20434.53 (0.16)	1706.59 (0.30)	20395.03 (0.16)	1698.94 (0.30)	-13843.87 (0.44)	-15278.58 (0.16)
R2 (within)	0.01	0.68	0.01	0.44	0.68	0.69
F-Test	3.96 (0.00)	1299 (0.00)	3.88 (0.00)	1670 (0.00)	1210.88 (0.00)	1271.87 (0.00)
# of Obs	4,666	4,629	4,666	4,629	4629	4629
# of Groups	37	37	37	37	37	37

Note: Heteroscedasticity-consistent clustered standard errors are used to calculate p-values given in parentheses. ***, **, * representing 1, 5, and 10% levels of confidence.

4. Conclusions

Consumers typically base their decisions on information about prices and other product characteristics. Media outlets, either in terms of advertising or editorial content, usually provide such information. However, not every report in the media also contains information on products. Especially in the news media there is rather a general coverage of companies, focusing on their general strategies, management or finances. In order to analyze the impact of general news on consumer behavior, we run dynamic fixed effects regressions to determine the impact of media coverage on new car registrations. Overall, we find a positive and significant number of sales influenced by the news. An additional report per month leads to about 1.2 more registrations. In case that reports have a positive (or at least neutral) tonality, the effect is even higher. Not only product specific information, but also general news, therefore seem to affect consumer behavior.

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Appendix

Table A: Media Outlets

TV	Newspaper	Weeklies	Business media
ARD Tagesschau	Bild-Zeitung	Focus	ManagerMagazin
ARD Tagesthemen	Frankfurter Allgemeine Zeitung	Frankfurter Allgemeine	Wirtschaftswoche
Pro 7 Nachrichten	(FAZ)	Sonntagszeitung (FAS)	
RTL AKTUELL	Frankfurter Rundschau	Spiegel	
SAT.1 18:30	Rheinischer Merkur	Stern	
ZDF heute	Süddeutsche Zeitung	Welt am Sonntag	
ZDF heute journal	Welt Taz		