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### Share of Voice: Findings from the US Automotive Industry

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#### Abstract

This paper examines the impact of advertising spending on financial performances. It is often difficult to justify the ROI of advertising because the gain is often intangible. We utilize signaling theory to predict that competitive advertising spending should positively influence brand perceptions and nudge consumers to choose the brand over competitors that spend less on advertising. We implemented the system GMM on panel data to examine how competitive ad spending contributes to market share while controlling for persistence. The findings indicate that not the advertising spending but the competitive advertising spending share in the market significantly predict market dominance.

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Share of Voice: Findings from the US Automotive Industry

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This paper examines the impact of advertising spending on financial performances. It is often difficult to justify the ROI of advertising because the gain is often intangible. We utilize signaling theory to predict that competitive advertising spending should positively influence brand perceptions and nudge consumers to choose the brand over competitors that spend less on advertising. We implemented the system GMM on panel data to examine how competitive ad spending contributes to market share while controlling for persistence. The findings indicate that not the advertising spending but the competitive advertising spending share in the market significantly predict market dominance.

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## 1. Introduction

The ROI of marketing spending is questionable (Gallo, 2017). Marketing gains are often intangible, and advertising budgets are most susceptible to budget cuts when the finances worsen (Joshi and Hanssens, 2010). The automobile industry has been a good example. *Ford* announced a 5 billion spending cut in advertising over the next five years (Thibodeau, 2018). *Toyota* is on a similar move and plans to gradually reallocate marketing budgets to increase R&D investments (Shirozu, 2018). Jones initially proposed the Share of Voice (SOV) theory, where he argued that the share of advertising spending in the industry should substantially influence the market share (Jones, 1990). However, empirical insights into the theory have been limited (Danenberg et al., 2016).

## 2. Background

Advertisements can contribute to brand awareness and brand equity (Chandrasenkaran et al., 2018). Furthermore, previous research suggests that even increasing advertising spending can signal the brand's commitment to quality and subsequently improve consumer perceptions of product quality (Kirmani, 1990; Dewatripont and Bolton, 2005). Advertising spending had positive correlations with product evaluation scores on *Consumer Reports* (Moorthy and Zhao, 2000). Predictably, the previous research found that increasing advertising budgets improved cash flows and firm value (Conchar et al., 2005; Graham and Frankenberger, 2011; Sridhar et al., 2014). However, the effect of advertising spending on firm performances might be complex. Investors also pay attention to spending efficiency. Stock value growths from sales are negatively moderated by advertising budget, suggesting that investors prefer sales growth with minimal ad spending (Tuli et al., 2013). The ROI of advertising spending in terms of its effect on sales growth has been decreasing in the last 30 years (Cheong et al., 2014).

Firm performance cannot be effectively measured as if it existed in a vacuum since firm performances are often always contingent on the performances of other competing firms in the market (Keiningham et al., 2011). The effect of ad spending on firm performance should be best measured in the context of market competition and consumer choice. The previous research suggests that advertising spending has positive correlations with the brand image (Kirmani, 1990; Moorthy and Zhao, 2000). Improving the brand image might not always lead to sales growth if the brand efforts were not sufficient to attract consumer choice over other competing options. Imagine that two competing brands launch successful advertisements. Both brands might have effectively improved their brand images, however, consumers are likely to choose only the *more* appealing brand. Thus, assessing the marketing effect on brand performance, especially in the context of advertising budgets, should be better measured when it accounts for the market competition.

## 3. Data and Empirical Approach

We collected panel data of the trends in advertising spending for the top five brands in the US automobile market between 2007 and 2017. The brands include *Chevrolet*, *Ford*, *Chrysler*, *Toyota*, and *Honda*. We collected market share data of the brands in the US market between 2007 and 2018. The trends in advertising spending, competitive spending, and market share for the Big

Three firms show that the automobile brands increased advertising spending sharply since 2009, and market share often does not follow the budget increase for advertisements. *Chevrolet* has allocated approximately 60% more budgets into advertising since 2009, however, the market share has decreased by 25%. The utility of the advertising budget is questionable.

We implemented the Generalized Method of Moments (GMM) estimation method to address heterogeneity and endogeneity concerns (Arellano and Bond, 1991). The Generalized Method of Moments (GMM) estimation converges error-free moments where  $E(\mu_{it}) = 0$  then estimates the effect by utilizing the unbiased observations as instruments (Wooldridge, 2010). Hence the estimation results are expected to be relatively free from the unobserved heterogeneities, such as recall, merger, or recession in the context of this study (Arellano and Bond, 1991; Semykina and Wooldridge 2010). Since GMM estimates the effect, not from all observations but the error-free 'moments', it methodologically limits collinearity-related standard errors (Arellano and Bond, 1991; Wooldridge, 2005).

$$E(Z) = E(Y_t - X_t' \beta) = 0 \text{ for } t \in 1, \dots, T \quad (1)$$

$$\hat{\beta}^{GMM} = (X'PX)^{-1}(X'PY) \quad (2.1)$$

$$P = Z(Z'Z)^{-1}Z \quad (2.2)$$

We examined panel regression models estimated by the system GMM (Arellano and Bond, 1991). Since the system GMM panel model estimation utilizes error-free moments as instruments and control for persistence, there is a low concern for unobserved endogeneity when compared to GLM and fixed-effect models (Ullah et al., 2018). We generated the share of voice  $\omega_{it}$  by the percentage of firm  $i$  advertising spending  $v_i$  in year  $t$ . Market share  $\gamma_t$  is likely to be persistent because the firm reputation tends to be established over an extended period, and past advertising spending might have lasting impacts on revenues (Sriram et al., 2006; Mizik, 2014).  $\lambda$  is the set of control variables including the lagged advertising spending  $v_{it-1}$  and lagged market shares  $\gamma_{it-1}$  (Arellano and Bond, 1991; Semykina and Wooldridge, 2010; Heid et al., 2012).

$$\omega(i, t) = v(i, t) / \sum_{i=1}^n v(i, t) \quad (3)$$

$$\gamma_{it} = \alpha_{it} + \beta v_{it} + \beta \omega_{it} + \lambda + \mu_{it} \quad (4.1)$$

$$E(\gamma_{it-p} \Delta u_{it}) = 0 \text{ for } t = 2, \dots, T \text{ and } 1 \leq p \leq T - 1 \quad (4.2)$$

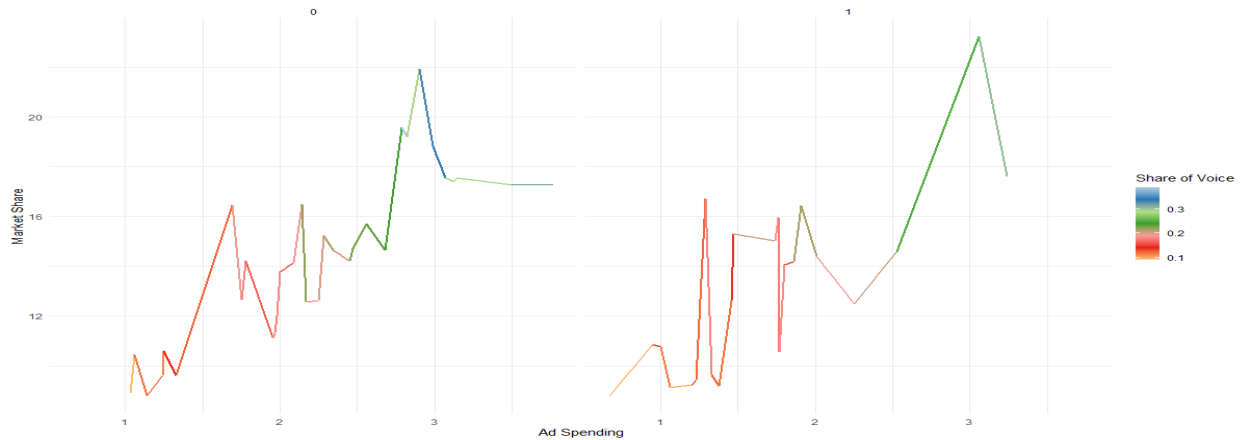
*Endogeneity.* One challenge can be that it is uncertain if advertising expenditure influences market share, or reversely, businesses might increase advertising spending when the market shares increase. To address the concern, we conducted difference in differences (DID) analysis (Variyah, 2016). We set a treatment condition to be higher than average changes in advertising expenditure (5.1). Assume  $\gamma^{\text{TREATMENT}} / \gamma^{\text{TREATMENT}}_{t-1} = \gamma^{\text{CONTROL}} / \gamma^{\text{CONTROL}}_{t-1}$  if there is no causal effect of the treatment condition, DID analysis compares the changes in market share when the changes in ad

expenditure were substantial to small, and examines if there is a causal effect of ad expenditure on market share (Stock and Watson, 2007; Variah, 2016). We estimated market shares  $\bar{y}$  for each year based on covariance between the market share and ad spending per condition. Ad spending had significant prediction power for market share per each treatment ( $R^2=.58$ ) and controlled condition ( $R^2=.69$ ). Then we estimated the difference in differences (DID) as described in (5). There were substantial differences between conditions – indicating that ad spending has substantial impacts on market share. (Fig.2)

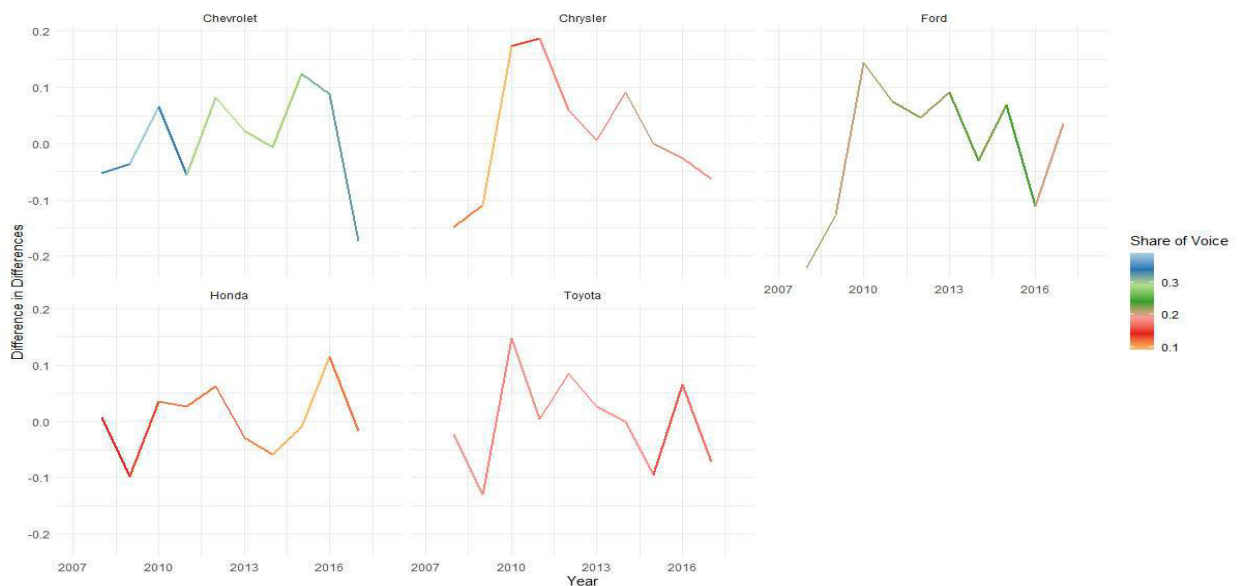
$$(\bar{y}^{\text{TREATMENT}}_t - \bar{y}^{\text{TREATMENT}}_{t-1}) - (\bar{y}^{\text{CONTROL}}_t - \bar{y}^{\text{CONTROL}}_{t-1}) \text{ for } t = 2, \dots, T \quad (5)$$

$$\text{Treatment Condition: } |\ln(i, t) / \ln(i, t - 1)| > |\ln(\sum_{i=1}^n v(i, t) / v(i, t - 1)) / N| \text{ for } t = 2, \dots, T \quad (5.1)$$

**Fig.1** The Effect of Ad Spending on Market Share by Percentage Changes in Ad Spending



**Fig.1** Difference in Differences (DID) by Firm



## 4. Results and Discussion

**Table 1:** GMM Model Estimation Results (N=55)

	(1)	(2)	(3)	(4)	(5)
Ad spending ( $v_{it}$ )	.08 (.35)	-.33(.43)	.	.18(.48)	-.44(.61)
Share of Voice ( $\omega_{it}$ )	.	11.88(7.19)**	10.17 (6.14)*	.	13.25(7.31)*
Lagged spending ( $v_{it-1}$ )	.	.	-.12 (.32)	-.12(.43)	.11(.45)
Lagged market share ( $\gamma_{it-1}$ )	.54(.11)***	.43(.12)***	.47 (.10)***	.54(.11)***	.41(.13)***
Intercept ( $\alpha_{it}$ )	5.99 (1.87)***	6.02 (1.82)***	5.32 (1.67)***	5.99 (1.89)***	6.02 (1.85)***
Wald's $\chi^2$	30.85**	34.62**	33.39**	29.91**	33.97**

Significance levels: \*\*\* $p < .01$  \*\* $p < .05$  \*  $p < .1$

Interestingly, advertising spending had insignificant impacts on market share, ( $\alpha_{(1)}=.08(.35)$ ) however, the competitive advertising spending share compared to competitors substantially predicted the market share. ( $v_{(2)}=11.88(7.19)**$ ) The findings were consistent after controlling for the past advertising spending and persistence of market share. Past advertising spending tended not to have lasting effects on future marketing dominance, and subsequently, changes in competitive advertising shares in the market competitions were likely led to substantial changes in the market shares. Small sample sizes tend to lower the significance level – which is referred to as Type II error (Stone-Romero et al., 1994). The high significance of the effects despite the small sample size shows a strong prediction power of the model.

The results provide insights into how advertising spending influences market dominance. The positive effects of advertising spending tend to benefit sales for only the firm which spends more compared to competitors. Ford once drastically increased advertising spending between 2009 and 2013, from 1.52 billion USD to 2.56 billion USD. However, the growth in the market share was relatively limited, which increased from 15.3 to 15.7%. In this case, the CEO might question the benefits of advertising spending and devalue its importance (Gallo, 2017). However, there is a neglected perspective. During the same period, the increase in competitive advertising spending of *Ford* was relatively small at 0.32 billion USD, because the other competing brands also significantly expanded the advertising budgets. The increase in advertising spending is not likely to expand market share if the increase in competitive advertising spending is insignificant.

Defining the competition is challenging, and the data unavailability to specify advertising spending per product segments can a limitation of this study. The automobile brands included in this study compete with each other in all product segments and their market shares per segment tend to be consistent (Tulumba, 2019). The effect is consistent over multiple random samples. It is not likely that unobserved heterogeneities might alter the results. The other limitation lies in generalizing the findings into other industries since this study examines only the automobile industry. Future research might explore industry characteristics and consumer factors that moderate the effect of advertising spending on market dominance.

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