Diversity in Advertising in Times of Racial Unrest

Jochen Hartmann
Technical University of Munich, TUM School of Management, jochen.hartmann@tum.de (corresponding author)

Oded Netzer
Columbia University, Columbia Business School, Arthur J. Samberg Professor of Business

Rachel Zalta
Mastercard, Marketing Services

Version: June 1, 2023

Firms increasingly aim to present diversity across age, gender, and/or race in their promotional material. Recent social movements such as BlackLivesMatter (BLM) or MeToo have further raised awareness towards social inequality. This paper examines racial diversity in U.S. digital advertising, analyzing both the diversity of ads distributed to consumers (supply) and consumer reactions to diverse ads (demand). We also investigate the change in advertising diversity (supply and demand) surrounding George Floyd's murder and the subsequent BLM protests. Using a longitudinal dataset of tens of thousands of display ads, generating over 250 billion impressions, we employ robust, advanced deep learning methods to automatically detect demographic diversity in these ads. From January 2019 to July 2021, we observe an overall increase in minority models in digital ads, particularly Black models, along with higher click-through rates for ads featuring Black models. The murder of George Floyd led to a temporary surge in Black model inclusion and more positive consumer reactions. However, both effects subsided within a few months. Overall, our findings indicate that diverse advertising can create a win-win opportunity, promoting minority representation in public media while benefiting advertisers financially, and that social movements like BLM can influence the supply and demand of advertising.

Key words: diversity; online advertising; social inequality; racism; machine learning

---

Diversity, Equity, and Inclusion (DEI) is becoming an increasingly prominent aspect of marketing (Sudhir et al. 2023). More than ever, consumers expect firms to adhere to social equality and reflect diversity in their marketing strategies.

Yet, little field evidence exists on the effectiveness of diversity in marketing material. Most studies that investigated consumers' reactions to diversity in advertising conduct lab studies at a single point in time on a single or a few advertising stimuli. What's more, the current body of literature is inconclusive on its effectiveness (Lenk et al. 2023). While some studies argue that Black consumers prefer Black models (e.g., Aaker et al. 2000)

Electronic copy available at: https://ssrn.com/abstract=4466378

and White consumers prefer White models (e.g., Qualls and Moore 1990), other studies indicate a preference of White consumers for Black models (e.g., Brumbaugh 2002) and vice versa (e.g., Brunel et al. 2004).

Complicating firms' decisions to include minority models in their marketing content, even less is known about the effectiveness of diversity in advertising at times of *racial unrest* and heightened public attention to racial inequality. The murder of George Floyd, a 46-year-old African American man, in Minneapolis on May 25, 2020 has caused unprecedented global protests and amplified public discussions on racial inequality around the globe (Dunivin et al. 2022). Especially in the U.S., the BLM movement has gained monumental momentum over summer 2020 turning into "one of the largest racial justice movements in U.S. history" (Sullivan et al. 2021).

Researchers have explored how the murder of George Floyd affected mental health (Eichstaedt et al. 2021), discussions around race in Black and White families (Sullivan et al. 2021), content in digital learning environments (Agarwal and Sen 2022), and presidential elections (Mutz 2022). However, little is known about its effect on the world of business in general and marketing in particular. For a notable exception see Wang et al. (2022), which suggests that firms' support of BLM had a negative impact on consumer responses. The persuasive power and frequent exposure of U.S. consumers to advertising messages, which can affect their judgement of products and people (Zebrowitz et al. 2008), highlight the need to understand the impact of George Floyd's murder and the subsequent BLM movement on advertising. Did firms jump on the bandwagon and include more Black and other, non-White models in their advertising materials? If so, how did consumers react? Given the prevalence of White models in ads, we define diversity in ads as the inclusion of non-White models in ads as opposed to a diversity of the models within an ad for ads with multiple models. Unlike Wang et al. (2022), our focus is not on firms' explicit endorsement of BLM. Instead, we examine how advertisers change the demographics of the models in their visual media content and how consumers react to these ads, using large-scale field data. Moreover, we assess how the racial unrest surrounding the murder of George Floyd affected the supply and demand of digital ads including Black models.

One possibility is that – despite the increased interest and awareness around racial inequality – advertisers do not adapt. Today's advertising firms are still largely dominated by White executives (85.4% White vs. 6.6% Black; Statista (2022)). One could expect

Electronic copy available at: https://ssrn.com/abstract=4466378

that this racial imbalance may translate into the racial misrepresentation of Black models in advertising due to false-consensus bias (Ross et al. 1977). Relatedly, despite vows of more diversity, there is some evidence that TV ads have recently become "whiter" (Council 2023). Alternatively, firms may seek to exploit the increased public attention to racial inequality brought about by the BLM movement, anticipating a positive response from consumers. Consequently, they might increase the share of minority models in their digital advertising. In terms of consumer reactions, on the one hand, the attention to racial inequality may entice consumers to be drawn to diverse representations in digital ads and react favorably to Black models featured in ads. On the other hand, consumers' backlash may also lead to negative reactions, as suggested by Wang et al. (2022).

To test these possibilities empirically, we draw on a large-scale sample of tens of thousands of display ads that collectively generated more than 259.4 billion impressions and 308.3 million clicks over a time span of 31 months (from January 2019 to July 2021). This provides us with a rare window into the diversity in racial representation in digital ads over time. In addition to exploring the potential shock to supply and demand by the murder of George Floyd, our longitudinal dataset allows us to test the overall time trend of the inclusion of non-White models in advertising as well as consumer response.

To assess the effectiveness of diversity in advertising, we pursue a multi-pronged approach. First, we employ a robust and scalable deep learning-based approach to detect diversity in advertising across tens of thousands of ads. Second, we run two lab experiments to investigate the effects of diversity in a controlled setting, exploring not only diversity in ads but also in the race of consumers exposed to the ad. Overall, we find that ads including Black models outperform all-White ads. Moreover, we identify a positive trend in terms of the supply of Black ads, wherein advertisers continuously increase the share of Black models over time. Consistently, we find a positive trend in consumer reactions to ads featuring Black models over time. In addition, we observe a substantial time-bound shock around the murder of George Floyd. Specifically, advertisers launched more campaigns featuring Black models and consumers were more likely to click on ads featuring Black models, although these effects leveled off after a few months.

Our paper makes three important contributions. First, we quantify the racial composition of digital ads using deep learning, enabling us to provide large-scale field evidence on the presence and effectiveness of diversity in a real-world context. While advertising is still

Electronic copy available at: https://ssrn.com/abstract=4466378

predominantly "white", our findings suggest that advertisers are well advised to diversify their ads. Second, based on our longitudinal dataset we document - both in terms of supply and demand - a positive time trend in terms of the inclusion of Black models in advertising, suggesting advertisers are (slowly) adapting to a changing social and demographic landscape and consumer expectations. Last, we further enrich this dynamic perspective, by demonstrating how societal events, the murder of George Floyd in this paper, can spill over to the advertising industry and, at least temporarily, affect consumers' responses.

1. The Display Advertising Dataset and the Extraction of Demographic Features

1.1. Display Advertising Dataset

We obtained a large-scale, longitudinal dataset of digital marketing ad campaigns from a leading content discovery platform that covers 31 months, from January 2019 to July 2021 (17 months pre-George Floyd's murder and 14 months post). All ads were run in the United States by a total of 3,484 unique advertisers. Each ad consists of an image and a title (see Figure 1). In total, the ads generated 259.4 billion impressions and 308.3 million clicks,[1] emphasizing the massive reach that online mass-media marketing communication can generate. Each ad received a median of 125,715 impressions and 135 clicks, with a median CTR of .11%. Because our focus is on the diversity of models in the ads, we select only ads with one or two human faces, where each face's height and width are at least 15% and 30% of the respective image dimensions, and the ad has obtained at least 1,000 impressions (Richardson et al. 2007), leading to 38,658 unique display ad images and 77,474 unique image-title combinations (i.e., ads). Our unit of analysis is an ad-year-month, resulting in a total of 156,917 observations and 167,445 faces (1.1 faces per ad on average). See Table 2 for summary statistics of the dataset.

Automatic Demographic Feature Extraction

Due to the scale of the data, we rely on automatic methods to extract the demographic features from the ads (see Zhang et al. (2021) for a similar approach). Specifically, to identify the race of the model depicted in the ad, we leverage Clarifai, a state-of-the-art machine-learning tool for demographic image analysis.[2] In addition to race, we extract

[1] Unfortunately, we do not observe the demographics (and specifically the race) of the consumers clicking on the ads.

[2] See https://www.clarifai.com/blog/socially-responsible-pixels-a-look-inside-clarifais-new-demographics-recognition-model for details. Consistent with Zhang et al. (2021), we operationalize race as: White (baseline), Black, and Other, referring to all other non-Black, non-White racial groups.

Electronic copy available at: https://ssrn.com/abstract=4466378

Figure 1 A Sample Display Ad Featuring a Black Model

the models' gender and age. For ads with multiple faces, we compute mean values for continuous variables, e.g., age. We validated the accuracy of the Clarifai predictions using a subset of 130 human-coded images and observed a high level of accuracy (accuracy for race, gender, and age 85%, 96%, and 79%, respectively). For robustness analyses, we also detect the brightness of the skin tone of the models as a proxy for race. For details on our image analysis pipeline and skin tone analysis, see Web Appendix A1.

In addition to the image features, we also extract control variables from the title of the ad, e.g., if the title contains promotion words such as "sale" or "discount", and control for differences in the ad quality score as measured by the advertising platform (see Table 1 for an overview).Table 2 reports the summary statistics of the demographics and other variables.

2. The Presence of Black Models in Display Ads (Supply): Pre/Post-George Floyd's Murder

2.1. Model-free Evidence

Between January 2019 to July 2021, on average 7.5% of the ads in our dataset include at least one Black model and 25.6% include at least one model of another non-White, non-Black race (see Table 2). 67.3% are all-White ads. These figures emphasize the under-representation of Black models in advertising relative to a Black U.S. population share of 12.4% in the 2020 U.S. Census. But is this under-representation of Black models stable or do we see improvement in the diversity of models in ads over time and after the murder of George Floyd? To assess a potential reaction by advertisers to the worldwide BLM protests

Electronic copy available at: https://ssrn.com/abstract=4466378

Variable	Description
Race	Predicted race of the model on an ad
Age	Predicted age of the model on an ad
Gender	Predicted gender of the model on an ad
Face size	Bounding box area of model's face divided by image resolution
Face count	Number of faces per image (either 1 or 2)
Promotion	Measure if campaign title contains promotive text (e.g., "sale")
Quality level	Measure for campaign quality by advertising platform
Impressions	Number of times consumers viewed an ad
Clicks	Number of times consumers clicked on an ad

Note: We compute the mean for age and face size if more than 1 face are visible in an ad image.

Table 1 Variable Descriptions

in summer 2020, we compare the prevalence of Black models pre vs. post George Floyd's murder. Specifically, while only 6.7% of ads featured at least one Black model before George Floyd's murder, in the 6 months after his murder this share spiked considerably to 9.7% ($\chi^2(1, N = 100,036) = 297.24, p < .001$), representing an increase by 44.8%. Still, an under-representation compared to Black people in the U.S. population, but a positive change. We observe a similar result when we limit our analysis to only advertisers in our sample that were active before and after May 2020 (pre: 7.1% vs. post: 10.1%; $\chi^2(1, N = 72,288) = 195.23, p < .001$).

The model-free evidence suggests a shift in advertisers' behavior after George Floyd's murder. However, dealing with an event study, we need to control for a possible time trend in behavior that may be unrelated to the event. Additionally, it is possible that the increase in the presence of Black models is due to particular advertisers advertising more frequently over time. Accordingly, we next turn to a model that controls for time and advertiser-fixed effects, as well as a host of ad-specific controls.

2.2. Empirical Model

We estimate a logistic regression with a binary dependent variable, indicating if an ad included a Black model, year-month fixed effects to assess changes in the likelihood of a Black model being featured over time and specifically post-May 2020, and advertiser fixed effects to capture any difference in the advertisers' mix over time and advertiser time-invariant differences in their advertising strategy. See equation (1),

$$\text{logit}(P(Y_{it} = 1)) = \alpha_0 + \alpha_1 \text{Advertiser}_i + \alpha_2 \text{Year-Month}_t + \alpha_3 \mathbf{X_i}, \tag{1}$$

Electronic copy available at: https://ssrn.com/abstract=4466378

Variable	**%**	**M**	**SD**
Race (ad level)			
Black	7.5		
Other	25.6		
White	67.3		
Race (face level)[1]			
Black	7.2		
Other	24.7		
White	68.1		
Age		32.9	15.2
Gender[1]			
Female	60.8		
Male	39.2		
Face size (in %)		22.9	18.4
Face count			
1	93.3		
2	6.7		
Promotion			
Yes	5.5		
No	94.5		
Quality			
High	4.8		
Medium	79.5		
Low	15.7		
Impressions (in 10^6)		1.7	11.9
Clicks (in 10^3)		2.0	15.3
		Count	
Faces		167,445	
Ad-Year-Month		156,917	
Ads (Image-Title Pairs)		77,474	
Images		38,658	
Titles		34,108	
Advertisers		3,484	

Note: [1] computed based on total face count.

Table 2 Summary Statistics

where $P(Y_{it} = 1)$ denotes the probability of a Black model appearing in an ad i at time t. Advertiser$_i$ and Year-Month$_t$ are advertiser and year-month fixed effects. We also include a set of ad-specific controls $\mathbf{X_i}$, e.g., face count, promotion, and ad quality, to capture any

Electronic copy available at: https://ssrn.com/abstract=4466378

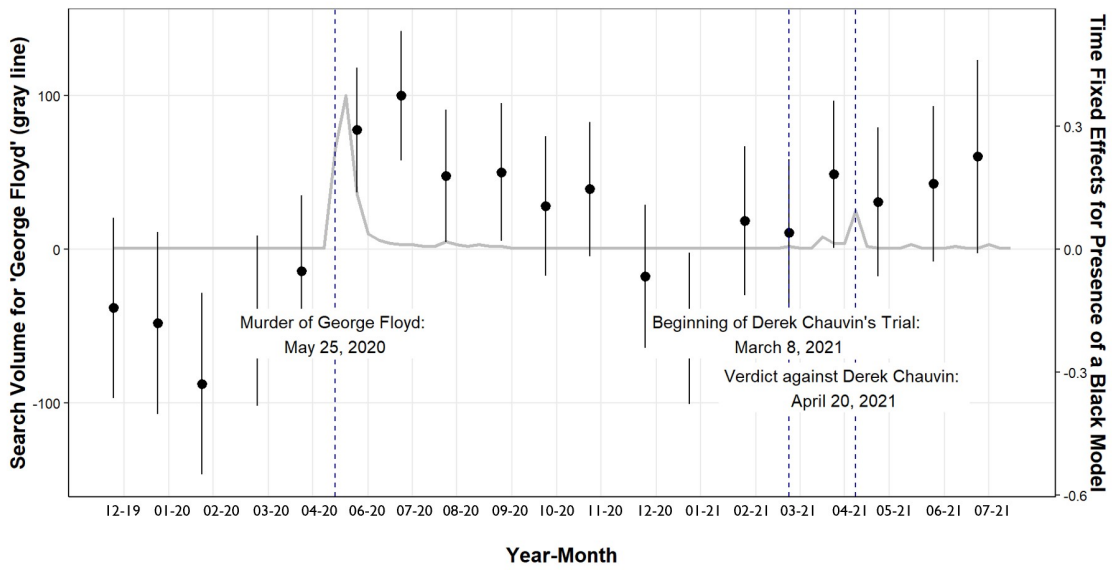

Figure 2 **Prevalence of Black Models on Ads vs. Google Search Volume for George Floyd**

possible correlation between the inclusion of a Black model and ad characteristics. See Table 1 for all control variables.

The year-month coefficients capture the dynamics in the presence of Black models in ads over time and specifically before and after May 2020. To obtain a benchmark to compare these fixed effects against, in Figure 2 we present the year-month fixed-effect coefficients relative to the Google Search volume for "George Floyd", as an approximation of public attention (e.g. Gravino et al. 2022). Noteworthy are the spikes in search volume around May 25, 2020, shortly after George Floyd was murdered as well as the smaller increase in search volume in April 2021, when the court delivered the verdict against Derek Chauvin, the police officer who was convicted of murdering George Floyd.[3] Superimposing the year-month coefficients on the Google Search volume indicates that advertisers were significantly more likely to feature a Black model on an ad in the 4 months that followed May 2020 before it leveled off, and slightly spiked again after the verdict against Derek Chauvin in April 2021.

$$\text{logit}(P(Y_{it}=1)) = \beta_0 + \beta_1 \text{Advertiser}_i + \beta_2 \text{Trend}_t + \beta_3 \text{After}_t + \beta_4 \mathbf{X_i} \tag{2}$$

[3] See Web Appendix Figure A2 for the Google Search volume for "COVID-19".

Electronic copy available at: https://ssrn.com/abstract=4466378

Next, we disentangle the effect of a potential overall time trend and a temporary increase in the post-George Floyd periods. For this purpose, we replace the Year-Month$_t$ fixed-effects in equation (1) with the variable Trend$_t$, a continuous variable, which is 0 for the first month of our dataset (January 2019) and 30 for the last month we observe (July 2021). In addition, we sequentially include in equation 2 different post-George Floyd periods ($After_t$) with varying lengths into our regression models.

Table 3 presents the results of the regression analyses. First, we observe a positive time trend regarding the inclusion of Black models during the nearly 3 years that our data cover ($\beta_{Trend} = .012, p < .001$, **Model 1**), indicative of an overall improving trend in racial equality in U.S. online advertising. In addition, we find a time-bound increase in Black models post-George Floyd's murder. Specifically, consistent with our model-free evidence, the likelihood of an ad featuring a Black model increased significantly 1 month ($\beta_{1month} = .225, p < .001$, **Model 2**), 2 months ($\beta_{2months} = .313, p < .001$, **Model 3**), and 6 months after the murder of George Floyd ($\beta_{6months} = .239, p < .001$, **Model 4**). The odds ratio of 1.252 (= exp(.225)) suggests that in the period after George Floyd's murder, the odds of observing an ad featuring a Black model increased by more than 25%.

DV:	Has Black model				Has Other model			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Variables	Trend only	Post-GF 1 month	Post-GF 2 months	Post-GF 6 months	Trend only	Post-GF 1 month	Post-GF 2 months	Post-GF 6 months
Trend	.012***	.013***	.013***	.011***	.002	.002	.002	.002
	(.003)	(.003)	(.003)	(.003)	(.001)	(.001)	(.001)	(.001)
Post-George Floyd$_1$		.225***				.019		
		(.057)				(.037)		
Post-George Floyd$_2$			.313***				.009	
			(.045)				(.029)	
Post-George Floyd$_6$				.239***				.030
				(.033)				(.021)
Advertiser Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ad Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	156,917	156,917	156,917	156,917	156,917	156,917	156,917	156,917
Log Likelihood	−22,860	−22,853	−22,837	−22,834	−66,064	−66,064	−66,064	−66,062

Note: $^{***}p < .001, ^{**}p < .01, ^{*}p < .05$

Constant omitted from table. Trend is mean-centered. Standard errors in parentheses.

Table 3 Likelihood of an Ad Featuring a Black (Other) Model Before and After the Murder of George Floyd

Electronic copy available at: https://ssrn.com/abstract=4466378

Following the same econometric framework as **Models 1-4**, we assess the dynamics in the presence of other non-White, non-Black models in ads over time and post-May 2020. We find an overall positive time trend, although the magnitude is lower compared to Black models and insignificant ($\beta_{Black} = .012$ vs. $\beta_{Other} = .002, p > .05$). In contrast to Black models, we also do not observe a significant increase in the likelihood of a model of another race being featured on an ad in the post-George Floyd periods. Taken together, these findings suggest that while overall digital ads have become more diverse (i.e., less White) over the 31-months time span that we observe, the time-bound increase of non-White models in the post-George Floyd period appears to be primarily tied to Black models.

2.3. Discussion

Consistent with evidence from different media contexts (Mastro 2017), Black models are indeed under-represented in our dataset, appearing in only 7.5% of the display ads. However, both the converging model-free evidence and multivariate analysis of our data suggest that (i) advertisers became more prone to include diverse models in their ads over time both in terms of Black and other non-White models and (ii) there was a substantial, time-bound increase in the appearance of Black models in ads in the period after the murder of George Floyd. While it is likely that advertisers anticipated a positive consumer response to more diverse ads in times of heightened public attention to social inequality, our data does not allow us to examine why advertisers made their marketing materials more inclusive. But does the market appreciate more inclusive advertising materials? We explore the demand-side effects next.

3. Consumers' Reaction to Black Models in Display Ads (Demand): Pre/Post-George Floyd's Murder

The objective of the demand-side analysis is to examine the differential response of consumers exposed to ads including Black models over time. As our primary dependent variable, we focus on click-through rate (CTR), i.e., clicks divided by impressions. Given the scarcity of studies providing field evidence on the effectiveness of diversity in advertising, we first explore the main effect. Does diversity in display ads, i.e., including non-White models, pay off? Consistent with our supply-side analysis, we disentangle the overall dynamics in a continuous time trend and a potential temporary shock in the period after the murder of George Floyd.

Electronic copy available at: https://ssrn.com/abstract=4466378

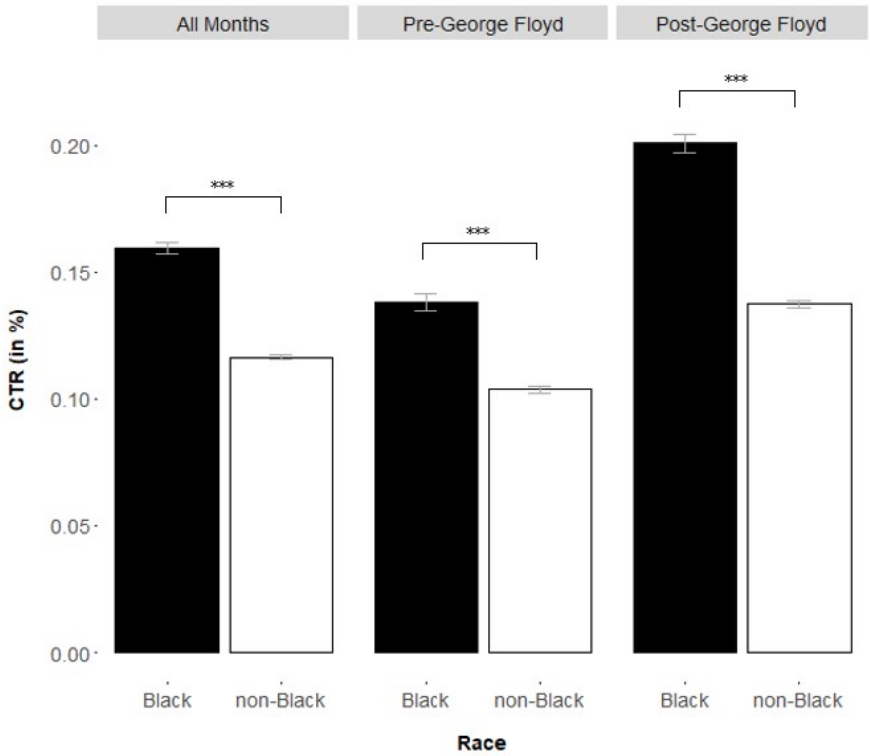

Figure 3 Model-free Evidence for CTR on Ads with vs. without Black Models

Note: $^{***}p < .001$. Error bars indicate standard errors. Post-George Floyd includes 6 months after May 2020.

3.1. Model-free Evidence

Looking first at model-free evidence for CTRs for ads with diverse models, we find that overall, ads featuring Black models obtain higher CTRs than ads without Black models (.159% vs. .116%, $p < .001$, respectively; Figure 3, panel "All Months"). The results are robust when comparing ads with Black models to only all-White ads as the baseline (.159% vs. .118%, $p < .001$, respectively). More importantly, the difference between the CTRs of ads with vs. without Black models became larger in the 6 months post-George Floyd, providing preliminary evidence that ads with Black models performed better after the murder of George Floyd. Specifically, pre-George Floyd, ads with Black models outperformed non-Black ads by 32.7% (.138% vs. .104%, $p < .001$, respectively; Figure 3, panel "Pre-George Floyd"). In the 6 months post-George Floyd, this performance difference increased to 46.7% (.201% vs. .137%, $p < .001$, respectively; Figure 3, panel "Post-George Floyd").

Electronic copy available at: https://ssrn.com/abstract=4466378

3.2. Empirical Model

To assess the effectiveness of Black models in digital ads and consumers' differential response over time, we estimate a binomial regression (Lambrecht and Tucker 2019), where CTR is the dependent variable. We model ad effectiveness as follows:

$$k_{it} \sim \text{Binomial}(n_{it}, \pi_{it}) \tag{3}$$

where k_{it} is the number of clicks, n_{it} is the number of impressions, and $0 \leq \pi_{it} \leq 1$ denotes the probability of a consumer clicking on ad i at time t. The regression is given by,

$$\begin{aligned} \text{logit}(\pi_{it}) = \gamma_0 &+ \gamma_1 \text{Advertiser}_i + \gamma_2 \text{Year-Month}_t \\ &+ \gamma_3 \text{Black}_i + \gamma_4 \text{Black}_i \times \text{Trend}_t + \gamma_5 \text{Black}_i \times \text{After}_t \\ &+ \gamma_6 \text{Other}_i + \gamma_7 \text{Other}_i \times \text{Trend}_t + \gamma_8 \text{Other}_i \times \text{After}_t \\ &+ \gamma_9 \mathbf{X}_i, \end{aligned} \tag{4}$$

where Black_i is an indicator that is equal to one if ad i included a Black model and zero for ads featuring only non-Black models. After_t is an indicator equal to one for the time periods after the murder of George Floyd and zero otherwise. $\mathbf{X_i}$ denotes the same set of control variables as in equation (1).[4] The key coefficients, γ_4 and γ_5, reflect the differential effect of ads including Black models (i) over time and (ii) in the period after May 2020. Consistent with Black_i, we include a variable indicating if the ad included a model of another race (non-White, non-Black) as well as its two-way interactions with Trend_t and After_t.

3.3. Results

First, we assess the main effect of including a Black model in an ad. The results replicate our model-free evidence on the effectiveness of ads featuring Black (vs. all-White) models ($\gamma_{Black} = .073, p < .001$, see **Model 1** in Table 4). Additionally, the inclusion of Other (non-White, non-Black) models appears effective, although the effect size is lower compared to Black models ($\gamma_{Other} = .022, p < .001$).

Next, we investigate the dynamic effects of diverse, i.e., non-White, ads, both as a time trend as well as in the time periods after George Floyd's murder. Consistent with the

[4] Note due to the year-month fixed effects we cannot include the main effects of Trend_t and After_t in equation (4), however these are captured by the Year-Month_t fixed effects.

Electronic copy available at: https://ssrn.com/abstract=4466378

increase in the supply of diverse ads, there is also a positive time trend in terms of the CTRs of ads featuring a Black model ($\gamma_{Black \times Trend} = .001, p < .001$, **Model 1**). In addition, ads featuring Black models experience an increase in CTR 1, 2, and 6 months post-George Floyd's murder, as indicated by the positive interaction effects in **Models 2-4**. Intuitively, the effect levels off the longer the time span of the post-George Floyd period, from .048 ($p < .001$, post 1 month), to .037 ($p < .001$, post 2 months), and .002 ($p < .001$, post 6 months). The interaction effect of the post 1 month for ads with Black models represents an increase of the odds of clicking by approximately 5%. In contrast, diverse ads including other races performed worse in the post-George Floyd periods, presumably as consumer attention might have moved to Black models.

3.4. Discussion

Consistent with the increase in the presence of Black models in advertising over time and particularly post-May 2020, consumers have also reacted more positively (higher CTR) to advertising that featured Black models over time and particularly after the murder of George Floyd. However, the temporary increase in CTR was somewhat short-lived. The return to pre-George Floyd levels is consistent with a panel that suggests support for BLM has spiked in June 2020, but returned to pre-George Floyd levels in September 2020 (Horowitz 2021).

While our results are primarily correlational in nature, we conduct several robustness analyses and lab experiments to further assess the relationship between diversity in ads and consumers' reactions. See Web Appendix C for three robustness analyses 1) extracting race from images via skin tone; 2) exploiting the quasi-experimental nature of our data with sibling ads that share the same advertiser, title, month, and similar impressions, but differ only in the diversity of models in the image, and 3) analyzing within-ad diversity on ads with two faces).

4. Lab Experiments: Exploring the Effect of Consumers' Race

While the observational field data provides the richness of tens of thousands of ad campaigns, a longitudinal view, and external validity, it also comes with several limitations. Even though we had some sibling ads, which create a quasi-experimental setting, we cannot fully control for targeting of different ads by advertisers or the platform. Specifically, we cannot observe who clicked on the ad. Hence, it is unclear if the effects are more likely driven by White or Black consumers clicking on the ad.

Electronic copy available at: https://ssrn.com/abstract=4466378

DV:	Clicks / Impressions			
	Model 1	**Model 2**	**Model 3**	**Model 4**
	Trend	Post-GF	Post-GF	Post-GF
Variables	only	1 month	2 months	6 months
Black	.073***	.068***	.064***	.071***
	(.0003)	(.0003)	(.0003)	(.0004)
Other (non-White, non-Black)	.022***	.027***	.033***	.036***
	(.0002)	(.0002)	(.0002)	(.0002)
Black × Trend	.001***	.001***	.001***	.001***
	(.00004)	(.00004)	(.00004)	(.00004)
Other × Trend	−.001***	−.001***	−.001***	−.001***
	(.00002)	(.00002)	(.00002)	(.00002)
Black × Post-George Floyd$_1$		.048***		
		(.001)		
Black × Post-George Floyd$_2$			.037***	
			(.001)	
Black × Post-George Floyd$_6$				.002***
				(.001)
Other × Post-George Floyd$_1$		−.092***		
		(.001)		
Other × Post-George Floyd$_2$			−.102***	
			(.001)	
Other × Post-George Floyd$_6$				−.046***
				(.0004)
Advertiser Fixed Effects	Yes	Yes	Yes	Yes
Year-Month Fixed Effects	Yes	Yes	Yes	Yes
Ad Controls	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes
N	156,917	156,917	156,917	156,917
Log Likelihood	−32,550,144	−32,537,989	−32,526,636	−32,542,263

Note: $^{***}p < .001, ^{**}p < .01, ^{*}p < .05$

Constant omitted from table. Trend is mean-centered. Standard errors in parentheses.

Table 4 CTRs for Ads with Black Models Over Time and Post-George Floyd's Murder

4.1. Design

To understand the role of the consumer's race, we ran two controlled lab studies, covering three different product categories (perfume, wine, and face masks) in which we hold everything constant between ads and only vary the race of the model in the ad. See Figure 4 for example stimuli. For details on the study designs, see Web Appendix D. The experiments targeted consumers of different races (Experiment 1: N = 450 participants (150 Black, White, and Asian respondents each), M_{Age} = 30.9, 47.9% female; Experiment 2: N = 150

Electronic copy available at: https://ssrn.com/abstract=4466378

Figure 4 **Six Sample Display-Ads Stimuli from our Lab Experiments**

(White only), $M_{Age} = 34.4$, 44.3% female). The experiments were run between September 2020 and February 2021, both of which post George Floyd's murder.

4.2. Results

Figure 5 summarizes the findings from both studies. First, consistent with the CTR results from our field data, we find that display ads featuring Black (vs. White) models generate an overall higher likelihood to click among the respondents (5-point Likert scale). Interestingly, the effect is primarily driven by White rather than Black or Asian respondents (see Figure 5, Experiment 1). The results are robust to adding controls for the perceived attractiveness of the models on the ads (see Web Appendix Table A4).

To further rule out concerns regarding differences in perceived attractiveness and facial expressions, we replicate the findings from the perfume and wine categories (Experiment 1) using stimuli from the face mask category (Experiment 2) only for White consumers. Again, and consistent with the field data and the first lab study, display ads featuring Black models outperform the display ads featuring White models in terms of likelihood to click (see Figure 5, Experiment 2), which also remains robust to additional attractiveness controls (see Web Appendix Table A4, **Model 5**).

Electronic copy available at: https://ssrn.com/abstract=4466378

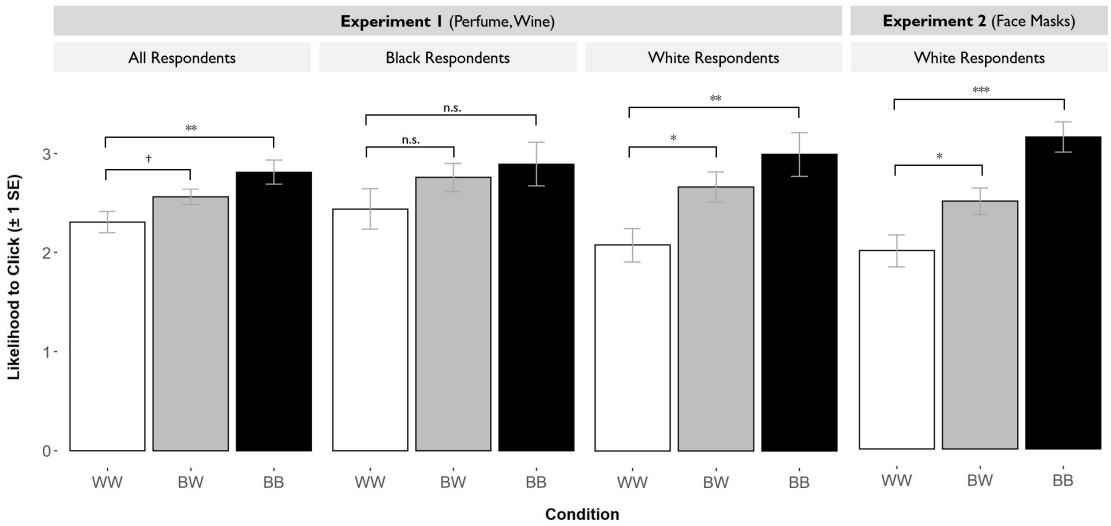

Figure 5 Likelihood of Clicking on Ads in Two Experiments by Models' and Respondents' Race

Note: $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$, $^{\dagger}p < .1$. Error bars indicate standard errors. See Web Appendix D for results by Asian respondents, which are omitted for ease of interpretation. WW = two White models, BW = one Black and one White model, BB = two Black models.

4.3. Discussion

Overall, the two controlled lab studies replicate the findings from the observational field data that ads with Black models can outperform all-White ads. Both studies suggest that these findings are not only driven by ingroup preference, i.e., Black consumers preferring Black models, but that also White consumers express a preference for Black (vs. White) models. These findings are in line with recent findings, suggesting that White people became less pro-White during previous BLM protests, while the attitudes of Black people did not change (Sawyer and Gampa 2018).

5. General Discussion

DEI has become a core theme of modern-day marketing. But how do consumers react to non-White models in digital advertising? And how did advertisers and consumers react to diverse advertising in the context of the murder of George Floyd and the subsequent racial unrest?

Drawing on a large-scale, longitudinal dataset of display ads and leveraging computer vision for automated image analysis, we provide converging field and lab evidence that consumers react favorably to Black models in display advertising. Two controlled lab experiments indicate that this effect is unlikely to be driven only by ingroup favoritism, i.e.,

Electronic copy available at: https://ssrn.com/abstract=4466378

Black consumers clicking on ads with Black models. Instead, we find that White consumers are also more likely to click on ads with Black models.

The BLM movement gained unprecedented momentum as a result of the murder of George Floyd, drawing global attention to racial inequality and the issue of police violence directed towards Black individuals. On the advertising supply side, our research indicates that this societal shock had an impact on marketing practices, as advertisers noticeably elevated the representation of Black models in their digital media content following the murder of George Floyd. Moreover, there was an overall positive trend of greater inclusion of Black models in digital ads, closing the gap on the under-representation of Black models in the industry. On the demand side, we also observe an overall positive trend of consumers clicking on ads featuring Black models and a time-bound increase post-George Floyd's murder.

Our paper adds to the growing body of research studying the effects of diversity in marketing (Arsel et al. 2022). While the vast majority of extant studies use lab studies at a single point in time, we explore the effects of diversity in the field and demonstrate dynamic effects related to the increased public awareness to racial inequality, incited in summer 2020. Our findings contribute to advancing the theoretical knowledge about interracial preferences in advertising in times of racial unrest. We challenge the widely accepted notion of ingroup favoritism that is commonly cited in the context of diversity (e.g., Qualls and Moore 1990).

Importantly, for managers, our findings imply that increasing the share of non-White models in digital advertising can offer a win-win opportunity. First, given the omnipresence of advertising and its persuasive power, advertising can change people's attitudes towards people of other races and, in turn, contribute to lowering discrimination and racial prejudice (Zebrowitz et al. 2008). Second, the historical White dominance in advertising (Mastro 2017) highlights the need to diversify advertising content. Third, our findings suggest that diversity pays off. Consumers favorably react to minority models in advertising, especially in times of high attention to racial inequality. The overall positive trend both in terms of supply and demand of non-White models in advertising appears as an encouraging harbinger of future developments in terms of diverse, equitable, and inclusive advertising.

Clearly, our research is not without limitations. Our large-scale field data does not allow us to infer user-level characteristics. Also, we cannot control the platforms' targeting

Electronic copy available at: https://ssrn.com/abstract=4466378

algorithm or the advertisers' targeting decisions, which may affect the distribution and presentation of ads (Matz et al. 2017). While the online marketing platform, whose data we analyzed, does not target based on consumer demographics such as race and gender, we acknowledge that targeting may confound the effects of our field data. For example, ads featuring Black models could possibly be easier to target for Black audiences, which might explain the main effect we observe. Our lab studies indicate, however, that this main effect might also be driven by White audiences, which is in line with the continuous increase of White consumers' preference for Black models in advertising over time (Lenk et al. 2023). The dynamic effect of ads with Black models performing better after the murder of George Floyd is even less likely to be an artifact of the targeting algorithm. Future studies can rule out this concern by running field experiments on platforms that eliminate any targeting. Additionally, the display advertising company we collaborated with and our data focuses on CTRs. Future research could explore the effect of diversity in advertising on both upper-funnel metrics like brand awareness and lower-funnel measures like purchases. Lastly, while we do include other non-White races, our research focuses primarily on Black models and the interaction with the murder of George Floyd. Future research can explore the impact of events of societal scale on other races, e.g., the #stopasianhate movement or COVID-19 pandemic (e.g., Huang et al. 2023).

To conclude, diversity has become an integral component of modern-day marketing. The constantly increasing share of non-White models indicates the ongoing paradigm shift in the marketing landscape. Embracing diversity in marketing appears not just the right thing to do, but it can also pay off for firms. Our results provide evidence not only for the effectiveness of diversity in advertising but also for the important interrelations between marketing endeavors and societal trends. We hope our study inspires future scholars to investigate the multifaceted topic of DEI in marketing and encourages firms to diversify their marketing content.

Funding and Competing Interests

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript. The authors have no funding to report.

Electronic copy available at: https://ssrn.com/abstract=4466378

References

Aaker JL, Brumbaugh AM, Grier SA (2000) Nontarget Markets and Viewer Distinctiveness: The Impact of Target Marketing on Advertising Attitudes. *Journal of Consumer Psychology* 9(3):127–140.

Agarwal S, Sen A (2022) Antiracist Curriculum and Digital Platforms: Evidence from Black Lives Matter. *Management Science* 68(4):2932–2948.

Arsel Z, Crockett D, Scott ML (2022) Diversity, Equity, and Inclusion (DEI) in the Journal of Consumer Research: A Curation and Research Agenda. *Journal of Consumer Research* 48(5):920–933.

Banerjee A, Urminsky O (2022) The Language That Drives Engagement: A Systematic Large-scale Analysis of Headline Experiments. *Available at SSRN 3770366* .

Brumbaugh AM (2002) Source and Nonsource Cues in Advertising and Their Effects on the Activation of Cultural and Subcultural Knowledge on the Route to Persuasion. *Journal of Consumer Research* 29(2):258–269.

Brunel FF, Tietje BC, Greenwald AG (2004) Is the Implicit Association Test a Valid and Valuable Measure of Implicit Consumer Social Cognition? *Journal of Consumer Psychology* 14(4):385–404.

Council J (2023) After Vows Of More Diversity, TV Commercials And Digital Ads Are Getting Whiter, Survey Says. URL `https://www.forbes.com/sites/jaredcouncil/2023/01/26/after-vows-of-more-diversity-tv-commercials-and-digital-ads-are-getting-whiter-survey-says/`.

Dunivin ZO, Yan HY, Ince J, Rojas F (2022) Black Lives Matter Protests Shift Public Discourse. *Proceedings of the National Academy of Sciences* 119(10):e2117320119.

Eichstaedt JC, Sherman GT, Giorgi S, Roberts SO, Reynolds ME, Ungar LH, Guntuku SC (2021) The Emotional and Mental Health Impact of the Murder of George Floyd on the US Population. *Proceedings of the National Academy of Sciences* 118(39):e2109139118.

Gravino P, Prevedello G, Galletti M, Loreto V (2022) The Supply and Demand of News During COVID-19 and Assessment of Questionable Sources Production. *Nature Human Behaviour* 6(8):1069–1078.

Horowitz JM (2021) Support for Black Lives Matter Declined After George Floyd Protests, but has Remained Unchanged Since. URL `https://www.pewresearch.org/short-reads/2021/09/27/support-for-black-lives-matter-declined-after-george-floyd-protests-but-has-remained-/unchanged-since/`.

Huang JT, Krupenkin M, Rothschild D, Lee Cunningham J (2023) The Cost of Anti-Asian Racism During the COVID-19 Pandemic. *Nature Human Behaviour* 1–14.

Lambrecht A, Tucker C (2019) Algorithmic Bias? An Empirical Study of Apparent Gender-Based Discrimination in the Display of STEM Career Ads. *Management Science* 65(7):2966–2981.

Lenk J, Hartmann J, Sattler H (2023) White Americans' Preference for Black People in Advertising has Increased in the Past 66 Years: A Meta-Analysis. *Working Paper* .

Electronic copy available at: https://ssrn.com/abstract=4466378

Mastro D (2017) Race and Ethnicity in US Media Content and Effects. *Oxford Research Encyclopedia of Communication*.

Matz SC, Kosinski M, Nave G, Stillwell DJ (2017) Psychological Targeting as an Effective Approach to Digital Mass Persuasion. *Proceedings of the National Academy of Sciences* 114(48):12714–12719.

Mutz DC (2022) Effects of Changes in Perceived Discrimination During BLM on the 2020 Presidential Election. *Science Advances* 8(9):eabj9140.

Qualls WJ, Moore DJ (1990) Stereotyping Effects on Consumers' Evaluation of Advertising: Impact of Racial Differences Between Actors and Viewers. *Psychology & Marketing* 7(2):135–151.

Richardson M, Dominowska E, Ragno R (2007) Predicting Clicks: Estimating the Click-Through Rate for New Ads. *Proceedings of the 16th International Conference on World Wide Web*, 521–530.

Ross L, Greene D, House P (1977) The "False Consensus Effect": An Egocentric Bias in Social Perception and Attribution Processes. *Journal of Experimental Social Psychology* 13(3):279–301.

Sawyer J, Gampa A (2018) Implicit and Explicit Racial Attitudes Changed During Black Lives Matter. *Personality and Social Psychology Bulletin* 44(7):1039–1059.

Statista (2022) U.S.: Ad & Promotions Managers' Ethnicity 2022. URL `https://www.statista.com/statistics/1179684/advertising-industry-employees-share-by-ethnicity-united-states/`.

Sudhir K, Toubia O, Tucker C (2023) Special Section of Marketing Science on Diversity, Equity and Inclusion. *Marketing Science* URL `https://pubsonline.informs.org/page/mksc/calls-for-papers`.

Sullivan JN, Eberhardt JL, Roberts SO (2021) Conversations about Race in Black and White US Families: Before and After George Floyd's Death. *Proceedings of the National Academy of Sciences* 118(38):e2106366118.

Wang Y, Qin MS, Luo X, Kou Y (2022) Frontiers: How Support for Black Lives Matter Impacts Consumer Responses on Social Media. *Marketing Science* 41(6):1029–1044.

Zebrowitz LA, White B, Wieneke K (2008) Mere Exposure and Racial Prejudice: Exposure to Other-Race Faces Increases Liking for Strangers of That Race. *Social Cognition* 26(3):259–275.

Zhang S, Mehta N, Singh PV, Srinivasan K (2021) Frontiers: Can an Artificial Intelligence Algorithm Mitigate Racial Economic Inequality? An Analysis in the Context of Airbnb. *Marketing Science* 40(5):813–820.

Electronic copy available at: https://ssrn.com/abstract=4466378