Does Conflict of Interest Lead to Biased Coverage? Evidence from Movie Reviews*

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Abstract

Media outlets are increasingly owned by conglomerates, inducing a conflict of interest: a media outlet can bias its coverage to benefit companies in the same group. We test for bias by examining movie reviews in media outlets owned by News Corp, such as the Wall Street Journal, and Time Warner, such as Time. We find higher ratings for 20th Century Fox movies in News Corp. outlets compared to movies by other studios. To disentangle bias from correlation of taste, we introduce and validate a novel matching procedure using individual movie ratings from online platforms. Using this procedure, we find no evidence of bias in News Corp. nor Time Warner outlets. We reject even small effects, such as bias of one extra star (out of four) every 13 movies. We test for differential bias when the return to bias is plausibly higher, examine bias by media outlet and by journalist, as well as editorial bias. We also consider bias by omission—whether media outlets are more likely to review highly-rated movies by affiliated studios—and conflict of interest within a movie aggregator. In none of these dimensions do we find evidence of bias. We relate to previous work and discuss three explanations for the lack of bias in our setting: high values of media reputation, organizational features in a conglomerate, and low returns to bias.

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1 Introduction

On Dec. 13, 2007, News Corp. officially acquired Dow Jones & Company, and hence the *Wall Street Journal*, from the Bancroft family. Unlike the prior owner whose holdings were limited to Dow Jones & Company, Murdoch's business holdings through News Corp. included the movie distribution studio 20th Century Fox, cable channels such as Fox Sports and Fox News, and satellite televisions in the Sky group, among others. The new ownership structure created a potential conflict of interest: the *Wall Street Journal* coverage of affiliated businesses may be biased to benefit the parent company, News Corp.

In the highly competitive media industry, the *Wall Street Journal* case is hardly unique. Media outlets are increasingly controlled by large corporations, such as Comcast, which owns NBC and Telemundo, the Hearst Corporation, which owns a network of newspapers and ESPN, and Time Warner, which owns HBO, CNN, and other media holdings.

Should one be concerned about bias in coverage induced by conflict of interest within a conglomerate? Anecdotal evidence in this regard includes Disney-owned ABC News rejecting reports by its correspondents about labor and safety conditions at Disney World (McChesney, 2015). Whether the bias extends beyond a few examples, however, is debated among researchers. Some like McChesney (2015) take the affirmative view while, as Williams (2002) discusses, others argue that company ties within conglomerates are too weak to generate bias.

In this paper, we aim to provide systematic evidence on this debate. We study two conglomerates—News Corp. and Time-Warner—and measure how media outlets in these groups review movies distributed by an affiliate, such as 20th Century Fox and Warner Bros. The advantage of focusing on movie reviews is that they are frequent, quantifiable, and are believed to influence ticket sales (Reinstein and Snyder, 2005), with monetary benefits to the studio distributing the movie. As such, movie reviews are a potential target of distortion.

In fact, ties between studios and media outlets are used as a prime example by journalists and media critics to warn about conflict of interest due to conglomeration. Disney and Time Warner reportedly used own outlets to promote movies distributed by their studios (Sterngold, 1998). Further, *Time Magazine* has been criticized for aiding the Warner Bros. movie *Twister* when a cover story on tornadoes coincided with the movie release (Williams, 2002).[1] Moviegoers are concerned about bias as well, according to an online survey we conducted.

To investigate bias, we use half a million professional reviews of movies released from 1985 until 2010. The data sources are the online aggregators Metacritic and Rotten Tomatoes. We compare the reviews by 324 outlets with no conflict of interest (known to us) to the reviews by 12 media outlets with cross-holdings. Eight media outlets are owned by News Corp. during at least part of the sample: the U.S. newspapers *Chicago Sun-Times* (owned until 1986), *New*

[1] There is further anecdotal evidence that press coverage has directly been manipulated by movie distributors. In 2001, a Newsweek reporter detected that Sony had fabricated highly favorable reviews by a fictitious critic to promote movies distributed by its studio Columbia Pictures (Horn, 2001).

York Post (owned until 1988 and after 1993), and *Wall Street Journal* (owned from 2008), the U.K. newspapers *News of the World, Times* and *Sunday Times*, the weekly *TV Guide* (owned from 1988 until 1999) and the website *Beliefnet* (owned from 2007 to 2010). Four media outlets are owned by Time Warner: the weeklies *Entertainment Weekly* and *Time* as well as *CNN* and the online service *Cinematical* (owned from 2004 until 2009).

We adopt a difference-in-difference strategy and compare the review of movies distributed by 20th Century Fox by, say, the *Wall Street Journal* to the reviews by outlets not owned by News Corp. Since the *Wall Street Journal* may have a different rating scale, we use as a further control the reviews of movies distributed by non-affiliated studios, such as Paramount. If the *Wall Street Journal* provides systematically more positive reviews for 20th Century Fox movies, but not for Paramount movies, we infer that conflict of interest induces bias.

Our estimates indicate statistically significant bias for the News Corp. outlets. However, these results are also consistent with correlation of taste: the *Wall Street Journal* may provide positive reviews to, say, action movies of the type distributed by 20th Century Fox because this reflects the tastes of its audience (or its journalists), not because of conflict of interest.

To disentangle bias from correlation of taste, one would like to compare a given 20th Century Fox movie only to movies of the same style by other studios. We propose a novel matching approach to do so using reported preferences. We say that movies A and B are comparable if viewers that like movie A also like movie B, and vice versa viewers who dislike movie A also dislike movie B. This approach does not require any information on movie features, since preferences already distill the relevant features. It does, however, require a rich individual-level data set of movie ratings by audience members.

We take advantage of three such data sets by *Netflix*, *Flixster*, and *MovieLens*. For each 20th Century Fox and Warner Bros. movie, we find the ten movies distributed by other studios which are most comparable by the above reported preference criterion. We validate this procedure in two steps, comparing matching movies to movies by 20th Century Fox and Warner Bros. First, matching movies are likely to share observable movie characteristics, such as genre and MPAA rating. Second, matching movies are much closer in professional review scores, our outcome of interest, than randomly selected movies.

Before presenting the results, we discuss two qualifications. First, an important question is whether one could achieve the same objective—controlling for tastes—by matching on observable movie features, instead of reported preferences. We show that matching on observables does not do anywhere near as well in terms of the validation with professional review scores. Second, we should be clear that our procedure does not test for *all* forms of bias. A News Corp. outlet, perhaps worried about detection, may aim to boost sales of 20th Century Fox movies by inflating the rating for all similar movies. This form of bias would go undetected.

Using the outlined matching strategy, we find no evidence of bias. We estimate an average bias of -0.2 points out of 100 for News Corp. and of 0 points for Time Warner. The richness of the data ensures tight confidence intervals: we can reject at the 95% level a bias of 1.9 points

for News Corp. and 1.7 points for Time Warner, corresponding to a bias of 0.09 standard deviations or, alternatively, a one-star higher review score (on a 0–to–4 scale) for one out of 13 movies. To put this in perspective, respondents to our survey, when warned about the conflict of interest, expect a bias of 8 points for News Corp. and of 4.7 points for Time Warner.

This result is in contrast to the apparent finding of bias in the difference-in-difference estimates for News Corp. We show that the latter finding depends on the composition of the control group: Including movies that are not comparable to the movies with conflict of interest confounds the estimates. Further, we provide direct evidence on correlated tastes: News Corp. outlets provide more positive reviews to movies distributed by other studios when they are similar to the 20th Century Fox movies.[2]

We provide five additional pieces of evidence on the extent, type, and channel of bias. While the first test suggests no bias overall, bias may be present for movies where the return to bias is larger. Though we do not observe the return to bias, in our second test we consider dimensions which are likely to correlate with it. Movies with generally higher review scores are likely to have higher returns to bias, as an extra star is likely to matter more if it is the fourth star out of 4, as compared to the second star. Also, movies distributed by the mainstream studios, movies with larger budgets or larger box office sales are likely to have higher returns to bias. We find no systematic pattern of differential bias in this respect.

Third, the overall result of no bias may mask heterogeneity in bias by the individual outlets. We find no overall statistical evidence in the twelve outlets, with more precise null effects for the *New York Post* and *TV Guide* (News Corp.) as well as for *Entertainment Weekly* and *Time* (Time Warner). Given that each outlet employs a small number of reviewers, we go further and test for bias by journalist, and again do not find any systematic evidence of bias.

Fourth, we test for bias at the editorial level. Since journalists differ in the average generosity of their reviews, we examine if affiliated movies are assigned to more generous reviewers. In line with previous results, we find no evidence of bias in editorial assignment.

The evidence so far examines bias by commission: writing more positive reviews for movies by affiliated studios. In our fifth piece of evidence, we tackle *bias by omission*. A reviewer that intends to benefit an affiliated studio may selectively review only above-average movies by this studio, while not granting the same benefit to movies by other studios. This type of bias would not appear in the previous analysis, which examines bias *conditional* on review. Bias by omission is generally hard to test for, since one needs to know the universe of potential news items. Movie reviews is a rare setting which allows us to test for this form of bias which plays a role in models of media bias (e.g., Anderson and McLaren, 2012).

We examine the probability of review as a function of a movie's average review score. The reviewing patterns do not differ for movies with conflict of interest and matching movies, thus providing no evidence of omission bias. We show how apparent omission bias for *Time* magazine

[2]We do not find, instead, similar evidence of correlated tastes for the Time Warner conglomerate. Correlated taste is a concern to guard against, not a necessary feature in the data.

reflects a spurious pattern, which was also present before acquisition by Time Warner.

The sixth and final piece of evidence examines conflict of interest for the aggregator itself. Rotten Tomatoes was independent when launched in 1998, was acquired by News Corp. in September 2005 and divested in January 2010. This ownership structure could induce Rotten Tomatoes to assign positive reviews (its 'freshness' indicator) to 20th Century Fox movies during the period of News Corp. ownership. This test is particularly powerful: bias is identified *within* an outlet and by comparison of the Rotten Tomatoes review versus the Metacritic score for the *same* review. Once again, we find no evidence of bias, even for unscored reviews which are evaluated by the Rotten Tomatoes staff, and for which bias would be hardest to detect.

Overall, we find no evidence of bias: no bias by commission or omission, nor bias in the aggregator. We discuss three explanations and relate to previous work.

According to the first explanation, the media conglomerates optimally choose no bias given high reputational costs. We outline a simple model in which a conglomerate maximizes expected profits by balancing the additional revenue from a biased review and the expected reputational cost. We model the latter as function of the probability of detection, that is, the probability that journalists or researchers can reject the null hypothesis of no bias. Using this simple model, we can calibrate an implied value of media reputation at our estimate of zero bias. Under the assumption that an extra star (out of 4) persuades 1 percent of readers to watch a movie, the implied value of reputation is \$16 million for News Corp. and \$45 millions for Time Warner. Intuitively, these values must be high for a conglomerate to choose zero bias.

A second explanation for the absence of bias relies not on high reputation values, but on an organizational feature: a conglomerate may not internalize benefits and costs of bias since the parties benefitting from bias, the movie studios, are sufficiently removed from those bearing the costs, the outlets. This organizational feature mitigates distortions from conflict of interest even if in a Coasian sense the benefits could be internalized. This interpretation reconciles our results with the findings of media outlets biasing their coverage to earn advertising revenue (Reuter and Zitzewitz, 2006 and Di Tella and Franceschelli, 2011). In these and other cases where bias due to conflict of interest is documented, as for analyst forecasts (e.g., Michaely and Womack, 1999), benefits and costs of bias directly accrue within one company.

A third explanation is that the return to bias may be lower than the one assumed in our calibrations. Our assumption of a persuasion rate of 1 percent is in the lower range of estimates (DellaVigna and Gentzkow, 2010) and smaller than the impact of movie reviews estimated by Reinstein and Snyder (2005), though admittedly we have no direct evidence. In the paper we provide a qualitative comparison regarding the return to bias to other settings, in particular mutual funds recommendations as in Reuter and Zitzewitz (2006), where bias due to conflict of interest has been documented.

A small number of papers considers media bias due to cross-ownership, as we do. Gilens and Hertzman (2000) provide some evidence that the coverage of the debate on TV deregulation is biased by conflict of interest. Chipty (2001) examines the extent to which vertical integra-

tion in the entertainment industry affect network programming and cable offering. Dobrescu, Luca, and Motta (2013) estimate the bias in 1,400 book reviews due to affiliation with the outlet reviewing the book; consistent with our findings, their evidence of apparent bias is most consistent with correlated tastes, not conflict of interest. Rossman (2011) and Ravid, Wald, and Basuroy (2006) examine the extent of bias in movie reviews, including due to conflict of interest. Both papers use a small sample of reviews—about 1,000 reviews for Rossman (2011) and about 5,000 reviews for Ravid et al. (2006). Relative to these papers, the granularity of information embedded in half a million reviews and the matching procedure allow us to obtain more precise measures and study the bias in a number of novel directions, such as editorial bias and bias by omission. A recent study by Camara and Dupuis (2015) estimates a cheap talk game using movie reviews, including in the estimates a parameter for conflict of interest.[3]

This paper also relates to the economics of the media (Strömberg 2004; George and Waldfogel, 2006; DellaVigna and Kaplan, 2007; Mullainathan, Schwartzstein, and Shleifer, 2008; Knight and Chiang 2011; Enikolopov, Petrova, and Zhuravskaya 2011; Dougal et al., 2012), and in particular to media bias (Hamilton, 2003; Groseclose and Milyo, 2005; Ellman and Germano, 2009; Gentzkow and Shapiro, 2010; Larcinese, Puglisi and Snyder, 2011; Durante and Knight 2012). We address questions with sparse existing evidence—such as whether bias occurs by omission or commission and the role of journalists versus that of editors.

The paper also relates to the literature on disclosure, reviewed in Dranove and Jin (2010). In our setting, we find that media outlets do not withhold reviews for low-quality affiliated movies, consistent with the Milgrom and Roberts (1986) unraveling result.

We proceed as follows. In Section 2 we introduce the data, the matching procedure, and the survey. In Section 3 we present the results followed by a discussion in Section 4 and conclusions in Section 5.

2 Data and Survey

2.1 Movie Reviews

Media Review Aggregators. The data used in this paper comes from two aggregators, *metacritic.com* and *rottentomatoes.com*. Both sites collect reviews from a variety of media and publish snippets of those reviews, but they differ in their scoring rules. Metacritic assigns a score from 0 to 100 to each review, and then averages such scores across all reviews of a movie to generate an overall score. For reviews with a numeric evaluation, such as for the *New York Post* (0-4 stars), the score is a straightforward normalization on a 0-100 scale. For reviews without a numerical score, such as primarily for *Time* magazine, Metacritic staffers evaluate

[3]The estimate of the effect of conflict of interest in Camara and Dupuis (2015) is of sizeable magnitude but is not statistically significant at conventional level. The estimate is obtained within a structural estimation of a cheap talk model of the critic behavior, which is the focus of the study.

the review and assign a score on the same 0-100 scale (typically in increments of 10).

Rotten Tomatoes does not use a 0-100 score, though it reports the underlying rating for reviews with a score. It instead classifies each movie as 'fresh' or 'rotten', and then computes a score for each movie – the *tomatometer* – as the percent of reviews which are 'fresh'. For quantitative reviews, the 'freshness' indicator is a straightforward function of the rating: for example, movies with 2 stars or fewer (out of 4) are 'rotten', movies with 3 or more stars are 'fresh', and movies with 2.5 stars are split based on a subjective judgment. For reviews with no quantitative score, the movie is rated as 'fresh' or 'rotten' by the staff.

The two data sets have different advantages. Metacritic contains more information per review, since a review is coded on a 0-100 scale, rather than with a 0 or 1 score. Rotten Tomatoes, however, contains about five times as many reviews as Metacritic, due to coverage of more media (over 500 compared to less than 100) and a longer time span. We take advantage of both data sets and combine all reviews for movies released since 1985 and reviewed up until 2010 on the Metacritic and Rotten Tomatoes website. We eliminate earlier reviews because of limited coverage in earlier years, and because before 1985 there is no conflict of interest: Newscorp. acquired 20th Century Fox in 1985 and the Time Warner conglomerate was created in 1989. We do not include reviews appearing later than 2010, since this is the most recent year covered by the user rating data which we employ in our matching procedure.

We merge the reviews in the two data sets in two steps. First, we match the movies by title, year and studio with an approximate string matching procedure, checking manually the imperfect matches. Then, we match reviews of a given movie by media and name of the reviewer.[4] We then exclude movies with fewer than 5 reviews and media with fewer than 400 reviews, for a final sample of 540,799 movie reviews.

To make the two data sets compatible, we apply the Metacritic conversion into a 0-100 scale to the Rotten Tomatoes reviews which report an underlying quantitative score. We use the reviews present in both data sets and assign to each Rotten Tomatoes score the corresponding median 0-100 score in the Metacritic data, provided that there are at least 10 reviews present in both samples with that score. For a small number of reviews using review scales which are present in Rotten Tomatoes but not in Metacritic, we assign the score ourselves following the procedure of the Metacritic scoring rules (e.g., a score of 25 to a movie rated '2/8'). The final 0-100 score variable exhibits a mean of 61.5 and a standard deviation of 21.7.

Media Outlets. The data set includes eight media outlets within News Corp.: the American newspapers *Chicago Sun-Times* (owned by News Corp. only up until 1986), *New York Post* (owned until 1988 and after 1992), and *Wall Street Journal* (owned from 2008), the British newspapers *News of the World*, *Times* and *Sunday Times* (owned throughout the period), the magazine *TV Guide* (owned from 1988 until 1999) and the website *Beliefnet* (owned from 2007 to 2010). The number of reviews and the data source differ across these outlets. The British

[4]We allow for the year of the movies in the two data sets to differ by one year.

newspapers are represented only in Rotten Tomatoes and have less than 1,000 reviews each. The *New York Post* is in both data sets and has the most reviews (5,657). *TV Guide* and *Wall Street Journal* have a relatively high number of reviews, but only a minority while owned by News Corp. All but one of these eight media (the *Wall Street Journal*) have quantitative scores in the reviews. These media employ as reviewers a small number of journalists who stay on for several years, and often for the whole time period. Therefore, within each media the two or three most common reviewers write the large majority of reviews, with two media using essentially only one reviewer: *Chicago Sun-Times* and the *Wall Street Journal*.

The second media conglomerate, Time Warner, includes four media: the weekly magazines *Time* and *Entertainment Weekly* (both owned by Time Warner from 1990 on), *CNN* (owned from 1996) and the web service *Cinematical* (owned between 2007 and 2010). The reviews in these media might be affected by conflict of interest with Warner Bros. movies, since the studio was acquired in 1989 by Time, Inc. Two of the four outlets – *CNN* and *Time* – use only qualitative reviews; since the reviews from *CNN* are only in the Rotten Tomatoes data set, there is almost no 0-100 score for these reviews, but only a freshness rating. Most of the observations are from *Entertainment Weekly*, with more than 4,000 reviews. These outlets, like the News Corp. outlets, employ only one or two major reviewers.

Studios. Dozens of studios distribute the 11,832 movies reviewed in our data set, including the 6 majors *20th Century Fox, Columbia, Disney, Paramount, Universal, and Warner Bros.* Among the distributors owned by News Corp., 20th Century Fox is the largest (426 movies), followed by Fox Searchlight which distributes 'indie' movies. Among the studios owned by Time Warner, the largest distributor is Warner Bros., followed by distributors of 'indie' movies: Fine Line, New Line, Picturehouse, and Warner Independent. In most of the following analysis, we group all the studios into those owned by News Corp., which we call for brevity 20th Century Fox, and those owned by Time Warner, which we call Warner Bros.

Additional Movie Information. We also merge this data set to additional information on movies from *the-numbers.com*, including the genre and the MPAA rating.

2.2 Matching Procedure

User Ratings. We employ user-generated movie ratings from *Netflix*, *Flixster*, and *MovieLens* to find the movies most similar to a 20th Century Fox or Warner Bros. movie.

Netflix is an online movie streaming service. Users rate movies on a scale from 1 to 5 with 1-point increments, typically right after watching a movie. *Netflix* made public a large data set of (anonymized) reviews as part of its Netflix prize competition. This dataset contains roughly 100 million ratings by 480,000 users of 17,700 movies released up to 2005.

Flixster is a social network for users interested in the film industry. Besides other services, *Flixster* offers movie recommendations based on user ratings. We use a subset of this data which is available at *http://www.cs.ubc.ca/~jamalim/datasets/*. The rating scale ranges from

.5 to 5 in .5 steps. The dataset contains about 8 million ratings by 150,000 users on 48,000 movies released up to 2010.

MovieLens is an online movie recommendation service launched by GroupLens Research at the University of Minnesota. The service provides users with recommendations based on individual movie ratings (using the same .5 to 5 scale as *Flixster*). The dataset, available at *http://www.grouplens.org/datasets/movielens/*, was designed for research purposes. It provides 7 million ratings by roughly 70,000 users on more than 5,000 movies released up to 2004.

Online Appendix Table 1 summarizes key features. *Netflix* has the most comprehensive data set but, like *MovieLens*, it does not cover more recent movies. *Flixster* covers the most recent years but it is a smaller data set and has a small number of ratings per user. We use all three data sets, and perform the matches separately before aggregating the results.[5]

To determine the movie matches for a particular 20th Century Fox or Time Warner movie based on the user-generated reviews, we use the following procedure. Given movie i by 20th Century Fox, we narrow down the set of potential matching movies J_i according to four criteria: (i) the distributing studio of a movie $j \in J_i$ is not part of the same conglomerate as i in order to provide a conflict-of-interest-free comparison; (ii) at least 40 users reviewed both movie i and movie j so as to guarantee enough precision in the similarity measure; (iii) movie j is represented in either the Metacritic or Rotten Tomatoes data set; (iv) movies i and j are close on two variables: the difference in release years does not exceed 3 years, and the absolute log-difference of the number of individual user ratings is not larger than .5.

Among the remaining potential matches $j \in J_i$ for movie i, we compute the mean absolute difference in individual ratings between movie i and a movie j as $D_{ij} = \frac{1}{k}\sum_k |r_{ik} - r_{jk}|$, where we aggregate over all users k who reviewed both movies (hence the requirement $k \geq 40$). We then keep the 10 movies with the lowest distance measure D_{ij}.

To determine the overall best ten matches for movie i, we pool the matching movies across the three data sets. If movie i is present in only one data set, say because it was released after 2006 and thus is only in *Flixster*, we take the ten matches from that data set. If movie i is present in multiple data sets, we take the top match in each data set, then move to the second best match in each data set, and so on until reaching ten unique matches.[6] We denote as a *movie group* the set of 11 movies consisting of movie i and its ten closest matches. Later, we examine the robustness of the results to alternative matching procedures.

Main Sample. We illustrate the sample construction with an example in Table 1. For the 20th Century Fox movie *Black Knight*, the movie group includes movies of similar genre

[5]Within each of the three data sets, we match the movies to the movies in the Metacritic/Rotten Tomatoes data set using a parallel procedure to the one used when merging the Metacritic and Rotten Tomatoes data. This allows us also to import the information on the year of release of the movie, used below.

[6]We take matches from *Netflix* first, then *MovieLens*, then *Flixster*. Notice that to identify the top 10 matches overall, one may need to go down to, say, the top 5 matches or lower even with three data sets, given that the different data sets may yield the same matching movie j.

like *Down To Earth* and *Snow Dogs*. We combine the movie-group information with the review information from Metacritic and Rotten Tomatoes. We thus form *movie-media groups* consisting of reviews in a given media outlet of any of the 11 movies in the movie group. The first movie-media group in Table 1 consists of reviews by the *New York Post* of *Black Knight* and its 10 matches. The difference within this group between the review of *Black Knight* and the review of the matching movies contributes to identify the effect of conflict of interest. The next movie-media group consists of reviews by *Entertainment Weekly* magazine of the same 11 movies. These reviews by a 'control' media outlet contribute to identify the average differential quality of a 20th Century Fox movie. In the specifications we include movie-media group fixed effects, thus making comparisons within a movie group for a particular media outlet.

Note two features of the procedure. First, each media typically reviews only a subsample of the 11 movies and thus a movie-media group can consist of fewer than 11 observations. Second, a movie can be a match to several 20th Century Fox or Warner Bros. movies. In this case the particular movie and its reviews will appear in the data set multiple times. In Table 1, for example, *102 Dalmatians* is a match for both *Black Knight* and *Scooby-Doo*. In the empirical specifications, we address this repetition by clustering the standard errors at the movie level.

The initial sample for the test of conflict of interest in the News Corp. conglomerate includes all movie-media groups covering movies distributed by 20th Century Fox and all media outlets in the sample. We then drop matching movies which were not reviewed by at least one News Corp. media outlet. A movie group has to fulfill two conditions to remain in the final sample: (i) there has to be at least one review with conflict of interest (e.g., one review of the 20th Century Fox movie by an outlet owned by News Corp.) and (ii) the movie group has to contain at least one movie match (which was reviewed by a News Corp. outlet).

Appendix Table 1, Panel A reports summary statistics on the sample for the News Corp. conglomerate (top panel) and for the Time Warner conglomerate (bottom panel). The data set covers reviews from 335 different media outlets. Appendix Table 1, Panel B presents information on the studios belonging to News Corp. and to Time Warner.

Validation of Matching Procedure. Does the matching procedure work? If the matching procedure is successful, the movies with conflict of interest and the ten matching movies should resemble each other. We do the comparison in two steps. First, we compare the two groups in features relevant to a movie's style, like genre and MPAA rating. Second, we compare the two groups with respect to the professional 0-100 review scores. This second validation is particularly important as the review score is our outcome of interest and we would like, barring bias, the matching movies to resemble the movies with conflict of interest along this key variable. This validation also allows us to compare our matching procedure to alternative matching procedures based on observable movie features.

Turning to the first validation, 20th Century Fox movies are most likely to be action, comedy, and drama, and unlikely to be documentaries (Figure 1a). The matching movies have similar genres, while the movies that are never a match to a 20th Century Fox movie are more

likely to be documentaries. Figure 1b displays parallel findings for the Warner Bros. movies. The 20th Century Fox and Warner Bros. movies and their respective matches are also similar with respect to the MPAA rating (Figures 1c-d), while the non-matching movies are more likely to be rated R and less likely to be rated PG-13. Parallel patterns hold for the number of theaters on the opening weekend, sorted in quintiles in 5-year bins (Figures 1e-f).[7]

Thus, matching movies resemble the movies at conflict of interest on a range of observables. Are they also similar in the eyes of the movie critics, whose judgment we study? The leftmost bar in Figure 2a shows, as the benchmark, the average absolute distance in the mean review score between 20th Century Fox movies and ten randomly selected movies, 16.8 points on the 0 - 100 scale.[8] The next 5 bars show the distance using 10 movie matches selected on observables: MPAA rating, genre, budget, and number of theaters.[9] Using all the observables to select movie matches brings down the distance from 16.8 points to 13.5 points. The rightmost bar shows the distance for movie matches selected using reported preferences. This strategy, which we adopt in this study, brings down the distance to 9.7 points, outperforming matching on observables by a factor of two. Figure 2b shows parallel patterns for Warner Bros. movies.[10]

In summary, movie matches identified from reported audience preferences resemble 20th Century Fox and Warner Bros. movies on a broad set of movie features. Further, relative to matching on observables, movie matches selected on reported preferences come closer to 20th Century Fox and Warner Bros. movies in the review score assigned by professional reviewers. Hence, we use the matching procedure on reported preferences in what follows.

[7]The same pattern holds for a micro level comparison: matching movies are disproportionately likely to share the genre, rating, and theaters at opening of the movie they are matched to, compared to the general population of movies (Online Appendix Figure 1a-f).

[8]When calculating the mean review score of 20th Century Fox movies and the ten randomly selected movies, we exclude reviews by outlets with conflict of interest.

[9]To select movie matches on observables or using random selection, we first restrict the set of potential matches to movies released within 3 years of the 20th Century Fox movie, as we do for matching on reported preferences. Further, for matching on observables we adopt the following strategy: for categorical variables–MPAA rating and genre–, we randomly select 10 movies with the same characteristic. For continuous characteristics–budget and number of theaters–, we select the 10 movies with the smallest absolute distance in the logarithmic transformation of the respective variable. For matching on all observables, we first restrict the set of potential matches to movies with the same genre and MPAA rating, and then select the movies with the smallest sum of ranks for the distance in (log) budget and (log) number of theaters.

[10]The sample of 20th Century Fox and Warner Bros. movies changes when applying matching on observables, since information on some features is not available for all movies. In Online Appendix Figures 2a-b, we show that the patterns are similar when using only 20th Century Fox and Warner Bros. movies for which all observables are available. In Online Appendix Figures 3a-b we further document that the quality of the matching procedure does not depend on the year of distribution of the 20th Century Fox and Warner Bros. movies. Additionally, in Online Appendix Figure 4a-b we provide similar evidence for the probability of review as outcome variable instead of the 0-100 review score.

2.3 Survey

Before we turn to the test of bias, we present the results of a survey, run on the Amazon MTurk platform, involving 611 participants who are readers of movie reviews. We designed the survey to provide evidence on the perception of conflict of interest in movie reviews.

We ask participants first to assess qualitatively the likelihood of bias in different settings of conflict of interest. For the setting at hand, we ask: "*Consider a media group which owns newspapers as well as movie distribution studios. How likely do you think is it that a newspaper in this media group biases movie reviews towards movies distributed by studios in the same media group?*" Among 62 respondents, 79% say bias is *likely* or *very likely*. This response is comparable for the scenarios on advertising in financial magazines (84%), as studied by Reuter and Zitzewitz (2006), and advertising in wine magazines (82%), as studied by Reuter (2009).

Next, we attempt to elicit the expected size of this bias.[11] We briefly describe a well-known 20th Century Fox or Warner Bros. movie (like *The Day After Tomorrow*) and then ask for guesses of reviews by major media outlets, including two with conflict of interest (like the *New York Post*).[12] A control group just sees this information, while a conflict-of-interest group also sees the disclosure: "*Note that the movie distribution company 20th Century Fox and the newspaper New York Post were held by the same media conglomerate, Rupert Murdoch's News Corporation. Therefore, a more positive review in the New York Post could be used to generate a higher audience for this particular movie.*" Among 549 participants, the disclosure raises the guessed rating by the *New York Post* and by the *Wall Street Journal* by 0.32 stars, or 8 points on the 0-100 scale (t=4.76), shown in Appendix Figure 1. There is a similar, if somewhat smaller, increase for *Time Magazine* and *Entertainment Weekly*: a 0.19 star increase, or 4.75 points (t=2.70). We later compare these guesses to the estimated bias.[13]

We also measure the awareness of the conflict of interest. Namely, when we ask which of ten media companies are, or were, owned by one of the conglomerates, less than 20 percent of respondents identify the conflict of interest. This is perhaps not surprising given that the reviews of movies by affiliated studios do not disclose the conflict of interest.

[11] This is an example of the elicitation of forecasts of research results (see DellaVigna and Pope, 2016).

[12] For example, a movie description is "*The disaster film The Day After Tomorrow (2004) distributed by 20th Century Fox tells a story about a fictional ice age due to climate change. The movie received a Tomatometer score of 45% as well as an Audience Score of 50%.*". We ask for guesses: "*Assume that all of the following newspapers use the described 4-star rating scale. Without collecting information online how many stars do you think The Day After Tomorrow got in reviews by: New York Times, New York Post, Entertainment Weekly*".

[13] An additional piece of evidence supports a similar conclusion. We present participants with favorable reviews of movies distributed by 20th Century Fox, Warner Bros., and control studios. The reviews had appeared in News Corp. or Time Warner media outlets. We then ask for the interest in watching the particular movie on a scale from 0 to 10. We compare individuals in the control group and in the group with disclosure of conflict of interest. Among 549 participants, interest for the movie is lower when conflict of interest information is revealed (-.55, t=-2.82 for News Corp. and -.27, t=-1.33 for Time Warner). Thus, when informed of the conflict of interest, participants take into account potential bias to discount the quality of the reviews.

3 Bias in Movie Reviews

3.1 Overall Bias – Difference-in-Difference

We first take a difference-in-difference approach comparing, on the whole sample of 469,252 reviews, reviews of movies by 20th Century Fox and other studios across News Corp. and control outlets. For the 20th Century Fox movies, we estimate the OLS regression

$$r_{m,o} = \alpha + \beta^{FM} d_m^{FoxMovie} + \beta^{FO} d_o^{FoxOutlet} + \gamma^F d_m^{FoxMovie} d_o^{FoxOutlet} + \varepsilon_{m,o.} \quad (1)$$

Each observation is a review for movie m by outlet o. The dependent variable $r_{m,o}$ is a 0 to 100 score, or an indicator for 'freshness'. The coefficient β^{FM} captures the average difference in reviews between 20th Century Fox movies and movies by other studios. The coefficient β^{FO} captures the average difference in reviews between outlets owned by News Corp. (at the time of the movie release) and other outlets. The key coefficient, γ^F, indicates the impact of conflict of interest, that is, the average rating difference for a 20th Century Fox movie when reviewed by a News Corp. outlet, compared to the counterfactual. The standard errors are clustered at the movie level to allow for correlation of errors across multiple reviews of a movie. We run a parallel specification for the Time Warner group.

Table 2 presents the results for the 0-100 score variable, with the unconditional difference-in-difference estimate in Column (1), and with movie and media outlet fixed effects in Column (2). The movie fixed effects account for heterogeneity of quality in the set of movies reviewed by each outlet, and the media outlet fixed effects control for differences in outlet generosity in reviews. The fixed effects also increase the precision of the estimate. While bias for Time Warner seems to be absent, we find apparent evidence of bias favoring 20th Century Fox movies in News Corp. outlets: the ratings for affiliated movies are 2 points higher ($\hat{\gamma}^F = 2.05$), a statistically significant difference, once one controls for movie and media outlet fixed effects.

In Online Appendix Table 2 we provide results for an alternative specification. Instead of including the reviews by unaffiliated outlets as part of the difference-in-difference specification, we only include reviews by the affiliated media, but add as a control variable the average review score for that movie by unaffiliated outlets. The results, not surprisingly, are very similar, with no evidence of bias for Time Warner and an estimated bias for the News Corp. outlets of 2.38 points.

The estimated bias for News Corp. in Table 2, while not large—it represents an increase of one star for every 12 reviews—, still suggests distortions due to conflict of interest. But does this reflect conflict of interest or correlation of taste? We tackle this issue next.

3.2 Overall Bias – Matching

To separate bias from correlation of taste, we compare 20th Century Fox and Time Warner movies only to comparable movies by other studios, using the outlined matching procedure.

Graphical Evidence. The bars on the right of Figure 3a indicate the average review score for media not owned by News Corp. (the 'placebo' group). In this group, the average review score for the 20th Century Fox movies (dark blue bar) and for the matching movies distributed by other studios (light blue bar) is indistinguishable. The matching movies appear to provide a good counterfactual: in the absence of conflict of interest, their average score is essentially identical to the one of the 20th Century Fox movies.

The left bars in Figure 3a present the average score for reviews in News Corp. media outlets, like the *Wall Street Journal*. The score for the matching movies (light blue bar) is somewhat lower than in the non-News Corp. media, indicating that the News Corp. media outlets are on average somewhat harsher in their reviews. The key question is whether this pattern is the same for the movies distributed by 20th Century Fox, or whether those movies receive a more generous treatment. The leftmost bar provides no evidence of bias: the average score for the 20th Century Fox movies is essentially identical to the one for the matching movies by other studios, with tight confidence intervals. A difference-in-difference estimator indicates a difference of -0.12 points (out of 100, with p-value of .908 of the test of equality to zero).

Figure 3b presents the evidence for Time Warner. Once again, the reviews in non-Time Warner media outlets are scored in about the same way for Warner Bros. movies and for matching movies (right panel). Turning to the reviews in the Time Warner outlets (left panel), the score is also essentially the same for the Warner Bros. movies and for the matching movies. In this second conglomerate we also find no evidence of bias due to conflict of interest.

Regressions. To present a formal test, we re-estimate specification (1) only for 20th Century Fox and the associated matching movies. Column (1) in Table 3 presents the results. The estimated coefficient on 20th Century Fox movies, $\hat{\beta}^{FM} = -0.40$, is close to zero indicating, consistent with Figure 3a, that the 20th Century Fox movies and the matching movies are comparable in quality. The estimated coefficient on News Corp. outlets, $\hat{\beta}^{FO} = -4.34$, is negative, again consistent with Figure 3a. The key coefficient, $\hat{\gamma}^{F} = -0.12$, suggests a null effect of the conflict of interest for News Corp. outlets: 20th Century Fox movies receive slightly *less* positive reviews by News Corp. outlets.

Note that outlets may not necessarily review both the 20th Century Fox movie and one of the matching movies. Thus, the estimate of bias may be confounded by selective reviewing in the presence of heterogeneity in reviewer generosity across outlets. In Column (2) we include movie-media group fixed effects $\zeta_{M(m),o}$, where $M(m)$ denotes the 11 movies in the group for movie m. These fixed effects ensure that estimates are only identified from within-outlet variation between reviews of the movie with conflict of interest and its matching movies.[14]

This specification confirms the results in Column 1: the coefficient on bias, $\hat{\gamma}^{F} = -0.19$, indicates no bias in the News Corp. outlets. The small standard errors imply that we can reject at the 95% confidence level a bias of 1.92 points out of 100, equivalent to an increase

[14] In this specification, the coefficient for News Corp. outlets is identified off of media outlets that change ownership within our sample.

of one star (on a zero-to-four scale) for one out of 13 movies reviewed, or alternatively, 0.09 standard deviations. As a point of comparison, the inferred bias from our survey of readers of movie reviews is 8 points, which we clearly reject.[15]

In Columns 3 and 4 we estimate the impact of conflict of interest on the Warner Bros. movies. The results are parallel to the ones for News Corp., as we find no evidence of an impact of conflict of interest: $\hat{\gamma}^T = -0.02$. Given the larger sample of Warner Bros. movies, we can reject even smaller effects, corresponding to 1.72 points out of 100, equivalent to an increase of one star (out of 4) for one out of 14.5 reviews or 0.08 standard deviations. This effect is once again smaller than the prior of readers of movie reviews, at 4.75 points.

In Panel B of Table 3 we present parallel specifications with the 'freshness' indicator as dependent variable. The results for the 'freshness' variable are parallel to the results for the score variable: we find no evidence of bias for either of the two conglomerates. For the rest of the paper we focus on the 0-100 score variable given the higher statistical power given by a continuous variable. The results are parallel with the freshness indicator.

Robustness. In Table 4 we present alternative specifications of the benchmark results (Columns 2 and 4 of Table 3), reporting only the conflict-of-interest coefficient. We examine alternatives for: (i) standard errors, (ii) additional controls, (iii) the underlying data source, (iv) the matching procedure. Clustering the standard errors by studio and by media outlet lead to lower standard errors (Columns 2 and 3, compared to the benchmark clustering reproduced in Column 1). Adding movie fixed effects has a small impact on the estimates (Column 4). Estimating the effect separately for the Metacritic database (Column 5) and in the Rotten Tomatoes database (Column 6) yields similar results. (Movie reviews which are in both data sets are present in both samples).

We also investigate the robustness of the matching procedure. Restricting the match to only the best 3 movie matches (rather than 10) does not change the estimate appreciably but, predictably, lowers the precision somewhat (Column 7). Changing the closeness measure to maximizing the correlation in reviews yields similar results (Column 8). Not using any observable variable (year of release and number of reviews) in the match procedure also has little impact (Column 9). In Online Appendix Table 3 we show that the results are robust to computing matches using only one of the user reviews data sets, and using as a criterion for closeness a likelihood ratio measure of the probability of rating a movie. Further, in Online Appendix Table 4 we split the data into three different time periods according to the year of the movie release, finding no evidence of bias in either time period.

Finally, in Online Appendix Figure 5 we present an event study of change in ownership when an outlet is acquired by either News Corp. or Time Warner. Unfortunately, since such changes are rare, the estimates are very imprecise.

Comparison to Cross-Sectional Estimates. How can we reconcile the difference-in-

[15]For the alternative specification in Online Appendix Table 2 we document similar results for the matching sample (Columns 4 to 6).

difference estimates with the matching estimates? Reviewers in the News Corp. outlets may have a liking for movies in the style of the 20th Century Fox movies. Indeed, we show that movies that are distributed by other studios but are matches to 20th Century Fox movies are reviewed more positively by the News Corp. outlets (Online Appendix Table 5). We find similar evidence for correlated tastes when considering movies similar in genre to the 20th Century Fox movies, though not for similarity of MPAA rating and budget. In the matching analysis we control for such features, since we compare the 20th Century Fox movies only to other movies with similar style. In the difference-in-difference estimates, instead, 20th Century Fox movies are compared to all kinds of other movies.

Taking this into account, in Table 2 we revisit the difference-in-difference estimates but allowing for an interaction between the indicator for News Corp. and Time Warner outlet with controls for movie characteristics: genre, MPAA rating, budget, and number of theaters. Introducing such controls slightly reduces the estimate of media bias for News Corp. but leaves it statistically significant (Columns 3 and 4).[16] Hence, observable features capture some, but not all of the relevant movie characteristics (consistent with the evidence in Figures 2a-b).

Next, we examine whether we can reconcile the estimates by excluding movies from the control group which are not comparable to the movies with conflict of interest. The difference-in-difference estimates do not change when excluding movies that are not reviewed by outlets with conflict of interest (Column 5) or when we account for the fact that some of the 20th Century Fox and Warner Bros. movies are not present in the Flixster/Netflix/MovieLens data set (Column 6), and thus dropped from our matching analysis. Instead, the main difference is the inclusion of control movies that are not matches to a 20th Century Fox or Warner Bros. movie. When we drop these movies (Column 7) from the difference-in-difference specification, the resulting estimate is very similar to the matching estimate.[17]

3.3 Bias by Movie Quality and Type

So far, we presented evidence on bias for the average movie. Yet, bias should be larger for movies with a higher return to bias, holding constant the reputational cost. While we do not have direct measures of return to bias, we consider two dimensions which are likely to correlate with it. We expect that movies with generally higher review scores are likely to have higher return to bias, as an extra star is likely to matter more if it is the 4th star out of 4, as compared to the first star. We also assume that high-profile movies are likely to have higher returns given the larger potential audience (holding constant the persuasive impact of a review).

[16] For the alternative specification in Online Appendix Table 2 we find a similar impact of including movie characteristics (Columns 2 and 3).

[17] This last specification differs from the matching one because (i) the set of fixed effect differs and (ii) in the benchmark specification reviews for a matching movie appear multiple times if the movie is a match to multiple, say, 20th Century Fox movies; instead, in the cross-sectional specification each movie review appears only once. Column (7) shows that this difference is immaterial to the results.

Bias by Movie Quality. In Figure 4a we present evidence on potential bias as function of movie quality for the 20th Century Fox movies. We assign to each movie the average review score computed excluding the reviews in media at potential conflict of interest. We then display a polynomial plot of the review score in the News Corp.-owned media outlets for the movies distributed by 20th Century Fox (dark blue line) and for the matching movies distributed by other studios (light blue line).[18] The plot for the matching movies indicates that the News Corp. outlets largely follow the other outlets in their review. The plot for the movies with conflict of interest hovers around the one for the matching movies, with no evidence of deviation for movies of higher, or lower, quality. For Time Warner as well (Figure 4b), the average score for affiliated movies tracks closely the score for the non-affiliated movies, with no systematic deviation for higher-quality movies. There is no evidence of differential bias.

Bias by Movie Profile. In addition to the mainstream studios 20th Century Fox and Warner Bros., the News Corp. and Time Warner conglomerates include indie studios like Fox Searchlight, Fine Line, and New Line (see Appendix Table 1B). Figures 5a and 5b plot, for each studio, the average review score in media outlets with conflict of interest (y axis) and in other outlets (x axis). To make the comparison clear, we plot the same measure for the other 9 major studios.[19] The trend line is based on all studios whose movies received more than 100 reviews. There is no evidence of differential bias, which consists of points lying above the trend line, for the mainstream studio compared to the indie studios. There is also no evidence of downward bias in reviews of the competing major studios.

In Online Appendix Table 6, we present additional evidence. We re-estimate specification (1) allowing for a differential effect of conflict of interest for four proxies of return to bias: (i) distribution by a mainstream studio, (ii) production budget, (iii) number of theaters at opening and (iv) domestic box office.[20] We find no statistically significant evidence of differential bias by the four proxies, even though directionally the sign of the effects is as expected for the 20th Century Fox movies. Overall, there is no clear evidence of differential bias for movies with plausibly higher return to bias.

3.4 Bias by Media and Journalist

The previous evidence indicates the apparent lack of bias due to conflict of interest, even when considering separately movies with plausibly higher incentives for bias. These results reject the scenario of widespread bias across all outlets within a conglomerate. Still, it is possible that some media outlets, or some journalists, bias their reviews, but this is balanced by the

[18] We use an Epanechnikov kernel and a 1st degree polynomial, with a kernel of 5 rating points. We truncate movies with average movie score below 30 or above 80, since such movies are rare.

[19] Dot Sizes are proportional to the square root of the number of reviews by News Corp. or Time Warner outlets. We do not use the matching procedure in order to ensure a larger sample of movies by other studios.

[20] For the last three proxies, we use deciles, formed within 5-year periods, of the variable to adjust for changes over time and skewness.

lack of bias in other outlets in the same conglomerate, or perhaps even by negative bias (to avoid criticism). We thus examine the occurrence of bias by media and by journalist.

Bias By Media. The scatter plot in Figure 6a reports for each media outlet the average review for the 20th Century Fox movies and the average review for the matching movies by other studios. To provide a counterfactual, we also plot these measures for the control outlets not owned by News Corp.[21] No News Corp. media outlet deviates substantially on the positive side of the trend line, the indication for bias.[22] We separately estimate a specification like (1) for each outlet at conflict of interest, comparing only to outlets of the same media type ("newspaper", "periodical", or "website"), and we find no significant evidence of bias for any of the outlets (Online Appendix Table 7).

Figure 6b provides parallel evidence for the Time Warner conglomerate, with *Entertainment Weekly, Time magazine* and *Cinematical* right on the regression line indicating no bias, a finding that is replicated in regression format (Online Appendix Table 7). Thus, the pattern for the individual outlets is similar to the overall pattern of no bias.

Bias By Journalist. We further take advantage of the fact that most media have only a small number of movie reviewers, and these journalists typically stay on for years, if not decades. This long tenure allows us to estimate journalist-specific patterns which, as far as we know, is a rare feature within the media economics literature (Dougal et al., 2012). In Appendix Figures 2a-b we provide parallel plots to Figures 6a-b, but by journalist. In addition to the journalists working in the two conglomerates, we include the 500 other journalists with the most reviews. Only one journalist stands out, Maitland McDonagh (at *TV Guide*), with a statistically significant estimate of bias (Online Appendix Table 8). Yet, given that the pattern appears for only one out of 12 journalists, it is plausible that this pattern is due to chance.

3.5 Editorial Bias

In the previous section we tested for bias in the presence of conflict of interest, focusing on the role of journalists. Conversely, we now examine the role of editors. An editor who intends to bias the review process can do so in at least two ways: by putting pressure on the journalists, or by assigning the affiliated movies to journalists who on average assign higher review scores.[23] We examine the latter mechanism, which is well-suited to test for biased coverage as a managerial policy of the conglomerate. While journalists could resist managerial pressure to bias the content of their reviews, this form of bias only requires the assignment of movies to different reviewers.

We provide graphical evidence on this test for the reviewers in News Corp. media outlets

[21] We only include outlets with at least 15 reviews of 20th Century Fox movies while owned by News Corp.

[22] The *Sunday Times* and *Wall Street Journal* are outliers below the line, but the estimate of bias is imprecise for these outlets given the small number of reviews with conflict of interest.

[23] A third form of editorial influence is the hiring of more favorable journalists and firing of less favorable ones. We observe no evidence of elevated turn-over for the outlets after a change in ownership.

in Figure 7a. We plot for each reviewer the average generosity in review score (relative to the media outlet average) (x axis) and the share of their reviews of 20th Century Fox movies (y axis).[24] As the scatter shows, movie reviewers differ sizably in generosity within a given outlet. Yet, there is no evidence that the more generous reviewers are more likely to review 20th Century Fox movies. Indeed, the regression line points to a slight negative relationship between generosity and review probability.

In Figure 7b we report the parallel evidence for the Time Warner outlets. As for the News Corp. outlets, we find no evidence of a systematic pattern of assignment of movies to reviewers in order to benefit the affiliated studio.

3.6 Bias by Omission

The previous evidence rules out sizable bias in the movie quality assessed in reviews, whether due to editorial or journalistic decisions. But this evidence does not cast light on a potentially more insidious form of bias: bias by *omission*. The media can selectively display items of information, as in Anderson and McLaren (2012). In our setting, an outlet may decide to not review a below-average movie by an affiliated studio, but make sure to review an above-average movie by the same studio. A media outlet following this strategy would not display any bias *conditional* on review; hence, bias by omission would not be detected by the previous analysis.

In Figure 8a we present evidence on omission bias for the News Corp. media. We test whether News Corp. outlets are more likely to review 20th Century Fox movies with high predicted review (as proxied by high average rating by other reviewers), compared to their reviewing patterns for non-20th Century Fox movies. We display a polynomial smoother of the review probability as a function of the average review score of a movie (in the range between 30 and 80).[25] The average probability of review by News Corp. media outlets of 20th Century Fox movies is barely increasing in the review score (darker continuous line). By comparison, the probability of review of the matching movies by other studios (lighter continuous line) is more clearly increasing in the movie review, suggesting if anything a negative bias by omission.

[24] To compute the average generosity, we only take into account score reviews (on a 0-100 scale) and generate for each review an idiosyncratic review score defined as the score minus the average review score of the corresponding movie. We then compute the average of this variable for all journalists and their affiliated outlets. The measure of the average generosity of a journalist (relative to the affiliated outlet) is calculated as the difference between the two means. Here, we do not use the matching procedure in order to preserve a larger sample of movies.

[25] The sample for the omission bias test in this section is determined as follows. For each of the 8 News Corp. outlets, like the *New York Post*, we determine all 20th Century Fox movies and their movie matches which were released during News Corp. ownership of the respective outlet. For each movie in this subsample and outlet-either the News Corp. or one of the control outlets (see below)-we generate a dummy of whether it was reviewed (0-100 score or 'freshness' indicator). Thus, there is only one observation per movie and media outlet. We use this data set when testing for omission bias for that particular outlet. To obtain the sample for the overall test pooling across all 8 outlets, we repeat this procedure for all 8 News Corp. outlets and append the data sets. We follow a parallel procedure for the Time Warner test.

To strengthen the inference, we also compare these patterns to the probability of review by *other* media outlets not owned by News Corp. In doing so, we need to take into account that media outlets differ in their reviewing propensity. Thus, for each media outlet owned by News Corp. we choose the ten media outlets which display the closest pattern in the review probability of non-20th Century Fox movies.[26] The dotted lines in Figure 8a display the probability of review by these matched media of 20th Century Fox movies (dotted darker line) and of the matching movies (dotted lighter line). The dotted lines track remarkably well the continuous lines for the matching movies, suggesting that the matching media provide a good counterfactual to the News Corp. media. Overall, Figure 8a suggests no evidence of omission bias. Online Appendix Figures 6a-d show that the same pattern holds when considering the News Corp. media outlets individually.

The corresponding figure for the Time Warner outlets (Figure 8b) instead provides some evidence consistent with omission bias. The probability of review of Warner Bros. movies in Time Warner outlets is increasing in the measured quality of the movie, more so than in the matched media. Yet, this increasing pattern is similar for matching movies in the Time Warner media (lighter continuous line), suggesting that the pattern may be due to a reviewing strategy in the Time Warner media outlets, rather than to bias.

To provide more evidence, in Online Appendix Figures 7a-d we disaggregate the effect by the four Time Warner media outlets. The evidence suggestive of omission bias is almost entirely due to *Time* magazine. To ascertain whether the pattern in the data is due to intended omission bias or an idiosyncratic reviewing strategy by *Time*, we exploit two placebos. First, we take advantage of the fact that in years 1985-89 *Time* magazine was not yet part of the Time Warner conglomerate. Second, we exploit the fact that 20th Century Fox movies share some characteristics with Warner Bros. movies (see Figures 1a-f), but there is no conflict of interest in place with those movies at *Time* magazine. As Online Appendix Figures 8b and 8c show, these two placebos show a similar reviewing pattern to the one in the main sample. This suggests that the pattern at *Time* magazine should not be interpreted as bias by omission.

To further put these findings in context, we compare the extent of selective reviewing in the media with conflict of interest with the same phenomena for the largest 200 other outlets. Figures 9a-b display for each media outlet the estimated sensitivity of the review probability to the average score for the movies at conflict of interest (y axis) versus the same movies in the matching outlet (x axis). The two sensitivity coefficients are just the slope coefficient of separate linear regressions of the review probability on the average review score. Bias by omission would manifest itself as an outlier above the regression line: an outlet is more sensitive to quality when reviewing a movie at conflict of interest. The patterns confirm the findings

[26]The matching outlets are the ten outlets with the smallest distance in the probability of review for the matching movies. We form bins with a width of 5 points of the average review score and determine the average distance between two media outlets in the review probabilities within each bin. The overall distance is computed averaging the distance across the bins, weighting by the number of movies in a bin.

above. None of the News Corp. outlets stand out for omission bias, while among the Time Warner outlets, only *Time* magazine stands out, a case we discussed above.

To provide a statistical test of omission bias, we estimate a linear probability model in Table 5, which we illustrate for the case of media owned by News Corp.:

$$\begin{aligned} d_{m,o} &= \alpha + \gamma^F d_m^{FoxMovie} d_o^{FoxOutlet} + \Gamma^F d_m^{FoxMovie} d_o^{FoxOutlet} \bar{r}_m + \beta^{FM} d_m^{FoxMovie} + \\ & B^{FM} d_m^{FoxMovie} \bar{r}_m + \beta^{FO} d_o^{FoxOutlet} + B^{FO} d_o^{FoxOutlet} \bar{r}_m + \phi \bar{r}_m + \zeta_{M(m),o} + \varepsilon_{m,o}. \end{aligned} \quad (2)$$

An observation is a possible review of a 20th Century Fox movie or of a matching movie by one of the News Corp. or matching outlets with similar probability of review. The dependent variable is the indicator $d_{m,o}$ which equals 1 if media outlet o reviews movie m. The key coefficient is Γ^F on the interaction of the conflict of interest variable with the mean rating score $\bar{r}_m$. This coefficient indicates how the probability of a review varies with the average review score, in the presence versus absence of a conflict of interest. The regression includes movie-media group fixed effects. A key assumption made in equation (2) is that the probability of movie review is linearly increasing in the average movie score; we adopt this assumption given the evidence of approximate linearity in Figures 8a-b.

Table 5 provides no evidence of selective review consistent with omission bias for the News Corp. or for the Warner Bros. media. For News Corp. outlets, we can reject that a one-standard deviation increase in movie quality (14 points in overall score) for a 20th Century Fox movie increases the probability of review (differentially) by more than 1.7 percentage points. Similarly, for Time Warner we can reject for a similar increase in movie quality an increase in review probability of more than 2.2 percentage points.

We can also test for a level effect: to the extent that all news is good news, past literature has discussed the possibility that even *negative* coverage can benefit a firm by directing consumer attention to a product (Berger et al., 2010). When estimating equation (2) without including the average movie score and its interactions, we do not find that News Corp. or Time Warner outlets exhibit a systematically higher propensity to review movies by affiliated studios. The conflict of interest coefficient is -0.28 percentage points ($s.e. = 1.02$) for News Corp. and 1.15 percentage points ($s.e. = 1.02$) for Time Warner in the specification without fixed effects.

In Online Appendix Table 9 we present the results parallel to Table 5 separately for each media outlet. The relevant coefficient δ^F on the interaction between conflict of interest and average review score is significantly positive only for *Time* Magazine, a special case we discussed above. Overall, we conclude that it is unlikely that any of the outlets is explicitly adopting a strategy of bias by omission.[27]

[27]We also examined a form of partial omission: whether media with conflict of interest are more likely to display delayed reviews and shorter reviews for low-quality affiliated movies. Using a smaller data set (since the information on date of review and length of review is not in Metacritic or Rotten Tomatoes) we do not find evidence of such bias.

3.7 Bias in Movie Aggregator

So far we have focused on the conflict of interest induced by the consolidation of studios like 20th Century Fox and Warner Bros. into media conglomerates which employ movie reviewers. But consolidation affects the review aggregators themselves. Rotten Tomatoes, independent when launched in 1998, was acquired by IGN Entertainment in June 2004, and IGN itself was purchased by News Corp. in September 2005. IGN, and hence Rotten Tomatoes, was then sold in January of 2010 by News Corp. and acquired in April 2011 by Time Warner.

This ownership structure generates an incentive for Rotten Tomatoes to post more positive reviews of 20th Century Fox movies during the period of News Corp. ownership (2006-2009). Since the reviews are posted quickly on the Rotten Tomatoes site and then rarely updated[28], we use the year of release of the movie to test the hypothesis of conflict of interest. We estimate

$$f_{m,o} = \alpha + \gamma^{CI} d_m^{FoxMovie} d_t^{2006-09} + \beta^F d_m^{FoxMovie} + \eta_t + \beta r_{m,o} + \varepsilon_{m,o}, \tag{3}$$

where $f_{m,o}$ is the 'freshness' indicator on Rotten Tomatoes for movie m in media outlet o. The coefficient of interest, γ^{CI}, captures how movies distributed by the 20th Century Fox studio ($d_m^{FoxMovie} = 1$) are characterized in years 2006-2009, compared with the years before and after. We allow for a baseline difference in reviews for 20th Century Fox movies (captured by β_F) and fixed effects for year t and for the movie-media group. Most importantly, we control for the Metacritic scoring $r_{m,o}$ for the *same* movie review[29]. Column 1 in Table 6 shows that the effect of conflict of interest is a precisely estimated zero ($\hat{\gamma}^{CI} = 0.0031$), a result that replicates when using all reviews, rather than just the matched sample (Column 2). We can reject as an upper bound that conflict of interest increases the probability of a fresh score by 0.6 percentage points (Column 2), a small effect. In Figure 10a, using the matched sample, we present graphical evidence using a local polynomial estimator of the Rotten Tomatoes 'freshness' indicator on the 0-100 quantitative score. We run the non-parametric regressions separately for the 20th Century Fox movies (the continuous lines) and the matching movies by other studios (dotted lines), split by the period of News Corp. ownership (dark blue line) and the remaining time period (light blue line). The two continuous as well as the two dotted lines are very close on the graph, again indicating no bias.

While we detect no bias on average, bias may have been present in some years, for example when News Corp. just acquired Rotten Tomatoes and awareness of the conflict of interest was presumably lower. We estimate an event study specification:

$$f_{m,o} = \alpha + \gamma_t^F d_m^{FoxMovie} \eta_t + \gamma_t^{NF} (1 - d_m^{FoxMovie}) \eta_t + \beta r_{m,o} + \varepsilon_{m,o}.$$

[28] Consistent with this, two separate scrapes of the site at 3 month distance yielded no change in the reviews for older movies.

[29] The quantitative scoring is as reported by Rotten Tomatoes, translated into the 0-100 score. If the Rotten Tomatoes score is missing, for example for qualitative reviews, we use the score in Metacritic if available. We confirm that Rotten Tomatoes does not bias this quantitative score by regressing it on the corresponding score for the same review in Metacritic, when both are available.

The specification is parallel to (3) except that, instead of separating the years into a period of ownership (2006-09) and all else, we interact the year fixed effects η_t with an indicator for 20th Century Fox movie and an indicator for the complement. Figure 10b shows that the residual freshness score for the 20th Century Fox movies, γ_t^F, tracks the series for other movies, γ_t^{NF}, also during the years of ownership, providing no evidence of bias. Since bias may still be present in a subset of the data, we analyze separately reviews with a quantitative score (i.e. stars) and qualitative reviews for which the freshness score is determined by a staff reading. For the quantitative reviews, we focus on reviews with scores between 50 and 70, for which Rotten Tomatoes appears to use qualitative information to assign the 'freshness' rating. Even in this sample (Column 3), we detect no bias.

However, bias should be most likely for reviews *without* a quantitative score since the probability of detection is particularly low. Yet, we find no evidence of bias in this sample either (Column 4). We replicate this result on the smaller sample of qualitative reviews stored in both aggregators, so as to include as a control the score attributed by the Metacritic staff (Column 5), again finding no effect of the conflict of interest on bias, with more precise estimates.

Despite the conflict of interest, there is no semblance of bias in the movie aggregator Rotten Tomatoes, even for the types of reviews for which detection of bias would be hardest.

4 Interpretation

We offer three distinct explanations for the absence of bias, relating to the previous literature.

High Reputation Cost. First, the reputational cost may be too high for a conglomerate to engage in bias. In the Appendix we model a conglomerate which internalizes the benefit and cost of bias and optimally trades off the revenue from a biased review with the expected reputational damage. On the revenue side, the bias allows the conglomerate to stimulate ticket sales as a function of the persuasion rate of movie reviews and the number of readers. On the cost side, the conglomerate is concerned about a reputational damage if the bias is exposed by researchers or in the media. The reputational damage is a function of the probability of detection, that is, the probability that journalists or researchers can reject the null of no bias. This probability corresponds to the power of a one-tailed test with the null of no bias.

We use this model to calibrate the implied value of media reputation for News Corp. and Time Warner given our estimate of zero bias. We observe the number of readers, as well as the average return per additional ticket sold, \$8.[30] Furthermore, we know the number of reviews of affiliated movies and the standard deviation of reviews, necessary to compute the probability of detection. The key parameter is the persuasion rate, for which we do not have direct evidence. We assume that an extra star (out of 4) persuades 1 percent of readers to watch a movie, an

[30] The studios receive about half of the box office sales (at an average price of \$8 per ticket), and about another half from higher DVD and TV royalties. Personal communication with Bruce Nash, founder of *the-numbers.com.*

effect in the lower range of estimates of persuasion rates (DellaVigna and Gentzkow, 2010).[31] Under these assumptions, at our estimated bias of zero, the implied value of reputation equals $16 million for News Corp. and $45 million for Time Warner. These values are high because the conglomerates must be very concerned about reputation to choose zero bias.

Organizational Failure. A second explanation for the absence of bias relies not on high reputation values, but on an organizational failure: a conglomerate may not internalize benefits and costs of bias since the parties benefitting from the bias, the movie studios, are sufficiently removed from those bearing the costs, the outlets. This organizational feature mitigates distortions from conflict of interest even if in a Coasian sense the benefits could be internalized. This interpretation reconciles our results with the findings of media outlets biasing their coverage to earn advertising revenue (Reuter and Zitzewitz, 2006 and Di Tella and Franceschelli, 2011). In these and other cases where bias due to conflict of interest is documented, as for analyst forecasts (e.g., Michaely and Womack, 1999), benefits and costs of bias directly accrue within one company. This organizational mechanism is reinforced by the higher risk of whistle-blowers since the implementation of bias in a conglomerate would require the cooperation of multiple subsidiaries and hence a larger number of confidantes.

Low Return to Bias. A third explanation relates to the persuasion rate. In practice, studios seem to believe in the persuasive power of movie reviews: besides anecdotal evidence, Brown, Camerer, and Lovallo (2012) find that studios engage in strategic cold openings to avoid unfavorable coverage of low-quality movies. However, there is uncertainty about the exact level of the persuasion rate. In our calibration we assumed a persuasion rate of 1 percent, which is smaller than the estimate by Reinstein and Snyder (2005), but in reality it may be lower.[32]

Are differences in the persuasion rate likely to reconcile our results with those for advertising of mutual funds? Conceptually, we expect a higher persuasion rate if consumers have limited information about the quality of a product before purchase and if the (biased) recommendation is credible. With regards to the first condition, actors and movie budget can in principle serve as signals for movie quality (Basuroy, Chatterjee and Ravid, 2003), but the high demand for movie reviews itself indicates that a movie's quality can be hard to evaluate ex ante. Concerning the

[31] The average 20th Century Fox and Warner Bros. movie has a total domestic box office audience of around 7 million viewers, that is, about 3 percent of the relevant US population. Newspapers and magazine readers are likely to have higher rates of movie attendance, say, 5 percent. The 1 percent persuasion rate thus implies that, say, a very positive review (4 stars out of 4) compared to a positive review (3 stars) increases the share of readers who decide to watch the movie from, 5 to 6 percent, a magnitude we find plausible. Of course, the potential effect of reviews on attendance is larger for high-profile movies, and smaller for more indie-type movies, a difference that we consider in the paper.

[32] Prior literature has found mixed evidence on the persuasive effects of movie reviews. Reinstein and Snyder (2005) estimate a large impact of movie reviews using a natural experiment on the timing of reviews by a famous critic. Eliashberg and Shugan (1997) find that movie reviews correlate with box office revenue in the long-run but do not in the short-run. Interpreting this evidence, they argue that movie reviews are predictors instead of influencers of box office revenue. In contrast, Basuroy, Chatterjee and Ravid (2003) find in a similar analysis that movie reviews play a dual role as both influencers and predictors.

second condition, a media outlet's credibility depends on the validity of past recommendations. The performance of a mutual fund can be assessed with objective measures—its returns—, which are easy to compare to past recommendations by an outlet. In contrast, the quality of a movie is subjective, with much interpersonal heterogeneity.[33] This heterogeneity in tastes offers the media some wiggle room to bias coverage without risking its credibility, as it allows an outlet to mask bias as idiosyncratic taste. Hence, it is not obvious that the persuasion rate of a biased review is higher for mutual funds than for movies.

In any case, movies are a particular good, thus one should be careful about the generalizability of our results to other cases of conflict of interest within conglomerates.

5 Conclusion

Consolidation in the media industry is considered by many a condition for survival in an industry hit hard by the loss of advertising. Yet, consolidation does not come without potential costs. In addition to the potential loss of diversity (George and Waldfogel, 2003), consolidation increases the incidence of conflict of interest due to cross-holdings, and possible ensuing bias (McChesney, 2015). We focus on conflict of interest for movie reviews, such as when the *Wall Street Journal* reviews a 20th Century Fox movie. The holding company, News Corp., can benefit financially from a more positive review, creating a conflict of interest.

Using a data set of over half a million movie reviews from 1985 to 2010, we find no statistical evidence of media bias due to conflict of interest in either the News Corp. conglomerate or the Time Warner conglomerate. The null finding is not due to imprecision. We can reject small estimates of bias, such as one extra star (out of 4) in one out of every 13 movies with conflict of interest. We examine bias at a high level of detail, including bias by media outlet and journalist, comparative statics in the return to bias, bias in editorial assignment, bias by omission, and bias in the aggregator. In none of these dimensions do we find evidence of bias.

The above results rely on a novel methodological tool: matching based on reported preferences. We use individual user ratings from online platforms to find for each movie A with conflict of interest a movie B by other studios that is close in individual ratings: if a person likes movie A, she also likes movie B, and conversely. This strategy allows us to separate bias from correlated tastes. Indeed, we document evidence of correlated tastes, which confounds the estimates from a plain difference-in-difference design. This confound is a potential issue also for other studies examining the presence and determinants of media bias: whenever evaluations are based on idiosyncratic tastes, a researcher must be careful to disentangle bias due to conflict of interest from correlated tastes.

Matching based on reported preferences could also be used in other settings where un-

[33] To put this in perspective, in the Netflix data the standard deviation of user ratings for a given movie is 1.01 on a 1-5 scale. In comparison, the standard deviation of the mean user rating *across* movies is 0.53. Thus, there is substantial heterogeneity in views about a movie across users.

observed features of products can bias the results. For example, consider studies of online platforms such as eBay or Amazon that examine the impact of variation in, say, shipping costs or starting price. These studies compare products that supposedly differ in only one dimension. Matching based on user ratings could be used to validate the comparability assumption.

We outline three interpretations of the results. Under the assumption that a conglomerate internalizes the costs and benefits of bias, the findings imply a high value of reputation. A second interpretation hinges not on a high reputational value, but on an organizational feature: the conglomerate may not internalize the benefits and costs of bias since they accrue to two different parties. This explanation reconciles our results with the finding of bias in the case of conflict of interest for advertising or analysts. Third, we discuss the possibility that benefits from bias in the case of movie reviews may be too low for bias to emerge.

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6 Appendix

6.1 Simple Model of Profit-Maximizing Media Bias

This section presents a simple model of profit maximizing bias to calibrate an implied value of media reputation. We consider a conglomerate which trades off the benefits from a biased review against the expected reputational cost. A key assumption of the model is that benefits and costs of bias can be internalized by the conglomerate.

On the revenue side, the conglomerate sets bias b to stimulate ticket sales. Each unit of bias b persuades a share f of the readers to watch a movie. Each additional ticket sold yields revenue R. For simplicity, we take a static approach and assume that the conglomerate sets the same bias across all movie reviews reaching a total number of readers N. Thus, the aggregate revenue from bias b absent any concerns about detection equals $fNR \cdot b$.

On the cost side, the conglomerate is concerned about a reputational damage C if the bias is exposed by researchers or in the media. The conglomerate maximizes expected profits and values the expected cost at $p_D(b)C$, where $p_D(b)$ is the probability of detection as a function of bias b. We model $p_D(b)$ as the power of a one-tailed statistical test with the null hypothesis of no bias. The journalists act as econometricians in the model and publish an article alleging bias if they reject the null of no bias at the statistical significance level α, say, .05. The probability that this occurs is exactly the statistical power, $p_D(b) = P\left(H_0 \text{ is rejected}|\text{bias } b\right)$. For a one-tailed test with null hypothesis of no bias, the statistical power is equal to $1-\Phi\left(\sqrt{N}\frac{-b}{\sigma}+z_\alpha\right)$, where Φ is the cdf of a standardized normal distribution and z_α the $1-\alpha$ quantile. We assume that movie reviews, and hence bias, are distributed normally and exhibit i.i.d. draws.

Returning to the revenue side, we assume that a biased review is no longer persuasive if bias is exposed. Thus, the effective persuasion rate equals $f \cdot (1 - p_D(b))$.

The conglomerate maximizes $f\left(1-p_D\left(b\right)\right)NRb - p_D\left(b\right)C$, yielding the first order condition

$$f\left(1-p_D\left(b\right)\right)NR - p'_D\left(b\right)fNRb - p'_D\left(b\right)C = 0. \tag{4}$$

The first two terms in (4) capture the marginal benefit of bias: increasing b raises revenue by $f\left(1-p_D\left(b\right)\right)NR$ (though it also lowers the persuasion rate given the increased detection probability). The marginal cost of bias is represented by $p'_D\left(b\right)C$, the increase in the probability of detection times the reputational cost. Online Appendix Figure 9a illustrates the equilibrium for the case of the *New York Post*: increasing the reputational cost C leads to a decrease in bias.

Using the model, we back out a calibrated value for media reputation C for the two conglomerates. The number of reviews of affiliated movies and the number of readers yields N. We assume an average return R per additional ticket sold of \$8 and that an extra star (out of 4) persuades 1 percent of readers to watch a movie. In addition, we observe the variables necessary to compute the power $p_D(b)$, namely the standard deviation of movie reviews and the number of reviews of affiliated movies. We base our calculations on the significance level of .025 for one-tailed rejection.

Under these assumptions, at our estimated bias of zero, the implied value of reputation equals \$16 million for News Corp. and \$45 million for Time Warner. As Online Appendix Figure 9b shows, the implied value of reputation is sharply decreasing in the bias (expressed in number of points out of 100). A bias of .5 points out of 100 (which is within the confidence interval of our estimates) corresponds to a reputational value of \$4.6 million for News Corp. and \$9.9 million for Time Warner.

The reputational value scales proportionally with the assumed persuasion rates. For instance, a persuasion rate that is five times smaller translates into reputational cost that is also five times smaller. Related, if journalists and researches need a higher degree of statistical certainty, the implied costs would increase.

Figures 1a-1f. Documenting the Quality of Movie Matches I: Movie Features

Figure 1a-b. Similarity to Match: Movie Genre

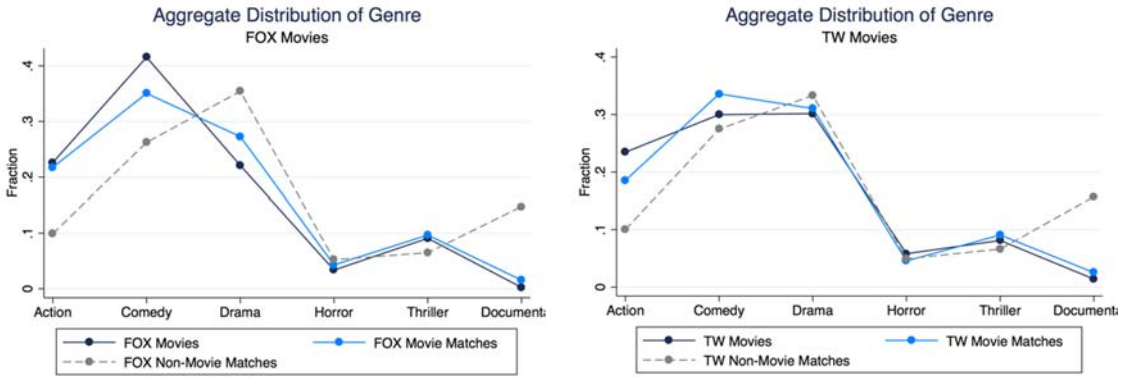


Figure 1c-d. Similarity to Match: MPAA Rating

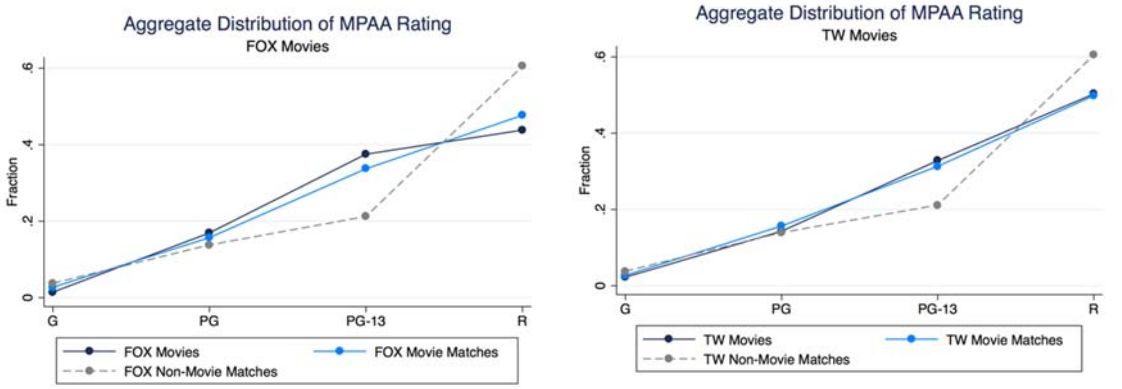
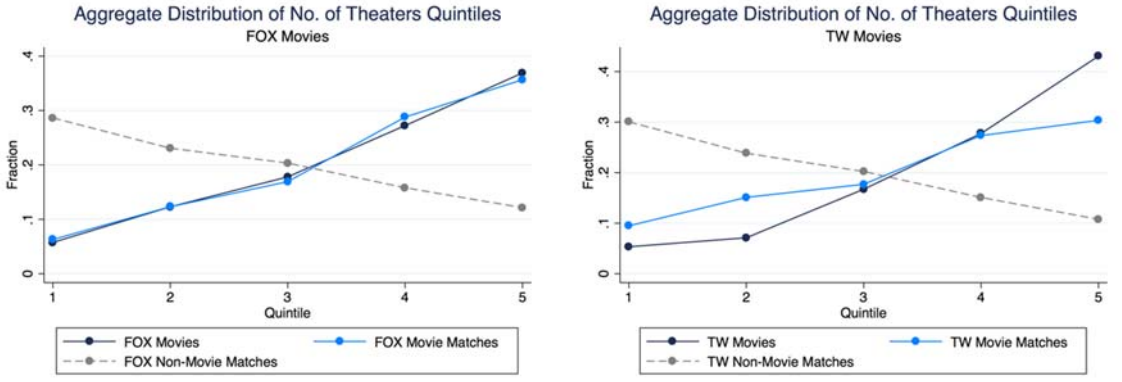


Figure 1e-f. Similarity to Match: Number of Theaters in Opening Weekend



Notes: Figures 1a-b display the distribution of movie genre for the movies by 20th Century Fox and Warner Bros., the movie matches, and movies which are not matches. Figures 1c-d and 1e-f display parallel evidence for the distribution of MPAA ratings and the number of theaters at opening. For the purpose of assigning movies to a particular quintile in Figures 1e-f, 5-year bins are formed and the quintile of a particular movie is determined within each bin.

Figure 2a-b. Documenting the Quality of Matches II: Distance in Critical Review
Figure 2a. News Corp. Movies

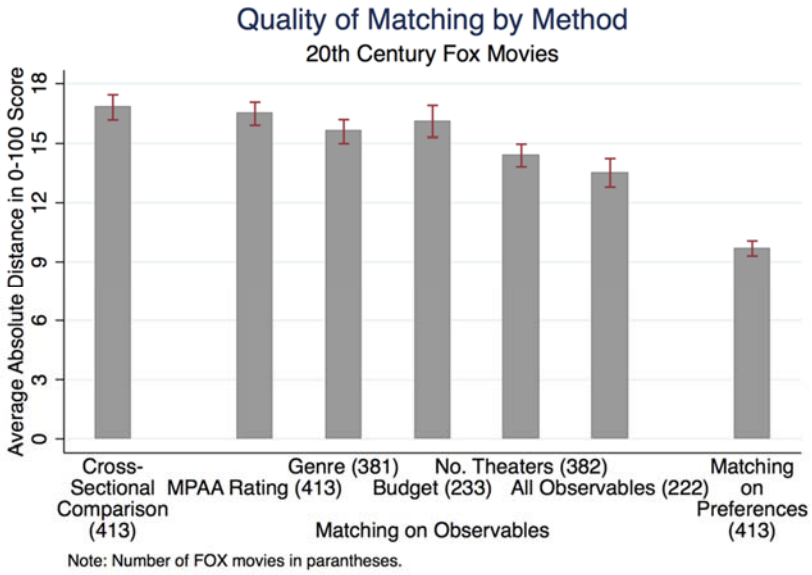
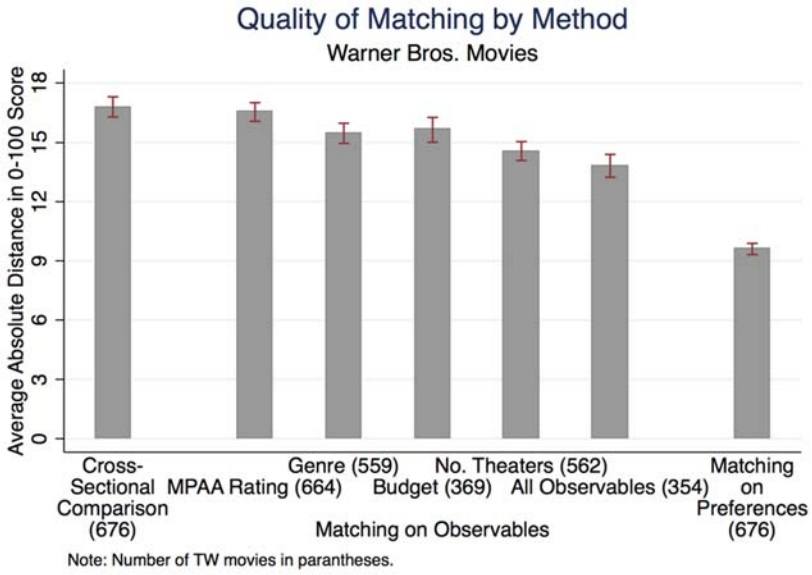
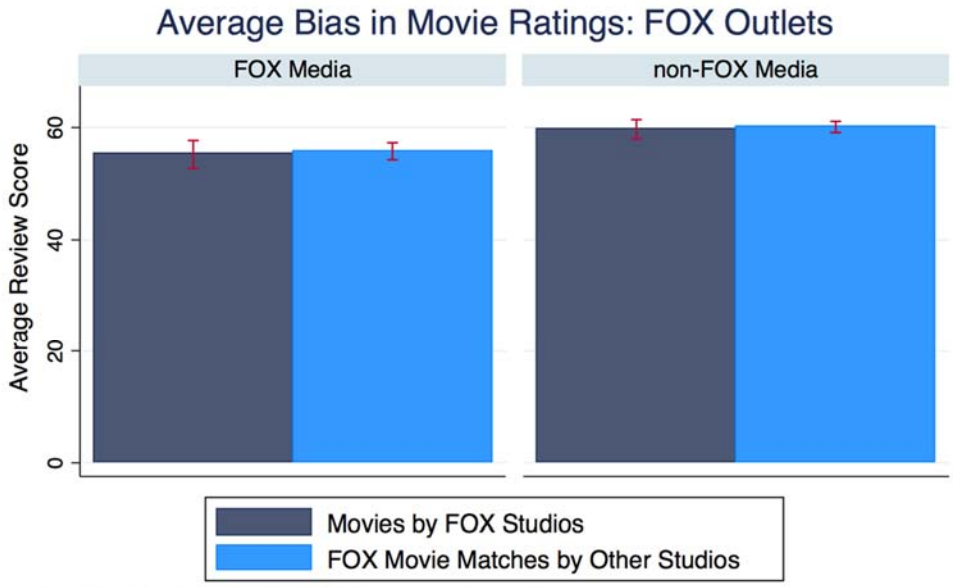


Figure 2a. Time Warner Movies



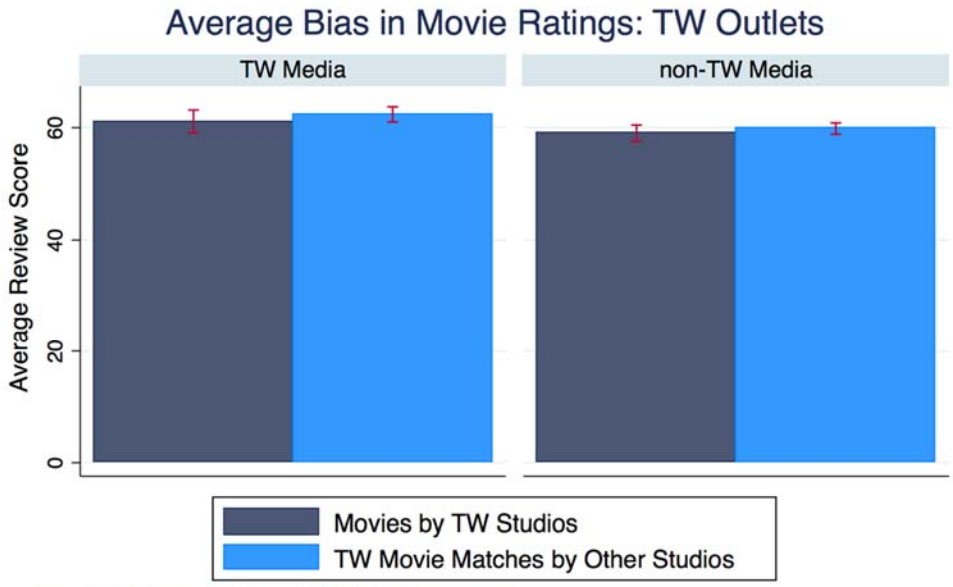
Notes: Figure 2a shows the average absolute distance in the mean 0-100 score by non-News Corp. affiliated outlets between 20th Century Fox movies and 10 matching movies selected by different matching strategies. Matching movies are selected from the subset of movies by unaffiliated studios which were distributed within 3 years of the 20th Century Fox distribution. The leftmost bar shows the average absolute distance in the 0-100 score between 20th Century Fox movies and 10 randomly selected movies by unaffiliated studios. The following 5 bars use matching movies identified by matching on observables. For categorical variables—MPAA rating and genre—we randomly select 10 movies which share the same characteristic. For continuous characteristics—budget and number of theaters—we select the 10 movies which exhibit the smallest absolute distance in the logarithmic transformation of the respective variable. For matching on all observables we first restrict the set of potential matches to movies which share the same genre and MPAA rating. Next, we assign ranks to all potential matching movies based on the absolute distance in the logarithmic transformation of budget and number of theaters to the particular 20th Century Fox movie. The 10 matching movies are then determined as the ones with the smallest sum of ranks for the distance in (log) budget and (log) number of theaters. The rightmost bar uses matching movies selected by matching on reported preferences in the *Netflix*, *Flixster*, and *MovieLens* datasets. The numbers in parentheses indicates the number of 20th Century Fox movies for which matching movies can be determined. Figure 2b shows parallel evidence for Warner Bros. movies. In Online Appendix Figures 2a-b, we provide parallel evidence for the subsample of 20th Century Fox and Warner Bros. movies for which all observables are available.

Figure 3a. Average bias in movie ratings: News Corp.-affiliated outlets



No. of FOX Movies: 308. No. of FOX Movie Matches: 2533
No. of FOX Reviews of FOX Movies: 421. No. of FOX Reviews of Movies of Others: 3637.
No. of Others Reviews of FOX Movies: 28679. No. of Others Reviews of Movies of Others: 258387.
DD-Estimator: -.12 (p-Value: .908)

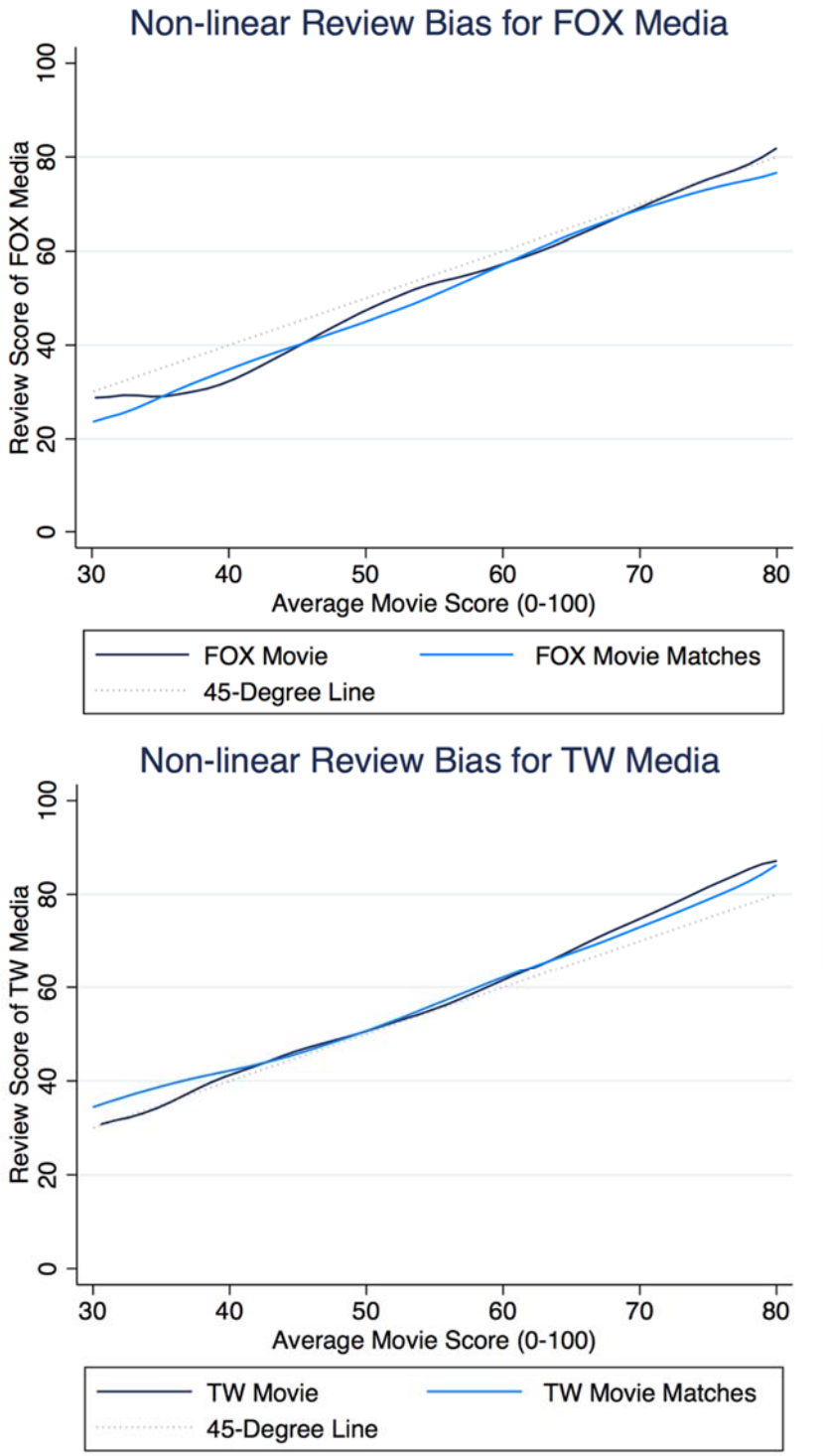
Figure 3b. Average bias in movie ratings: Time Warner-affiliated outlets



No. of TW Movies: 459. No. of TW Movie Matches: 3808
No. of TW Reviews of TW Movies: 685. No. of TW Reviews of Movies of Others: 5483.
No. of Others Reviews of TW Movies: 46594. No. of Others Reviews of Movies of Others: 397937.
DD-Estimator: -.43 (p-Value: .644)

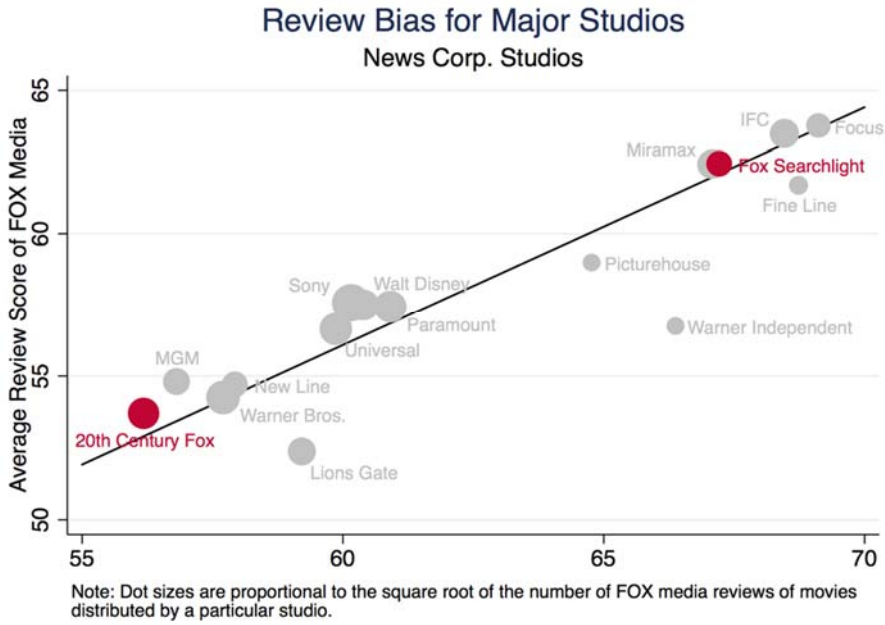
Notes: Figures 3a and 3b report the average review score on a 0 to 100 scale. Figure 3a is split by whether the movies are reviewed by News Corp. or other outlets. Each subpanel shows two differently colored bars indicating either movies distributed by 20th Century Fox (dark blue bar) or movie matches (light blue bar). Figure 3b displays parallel evidence for Time Warner outlets and Warner Bros. movies.

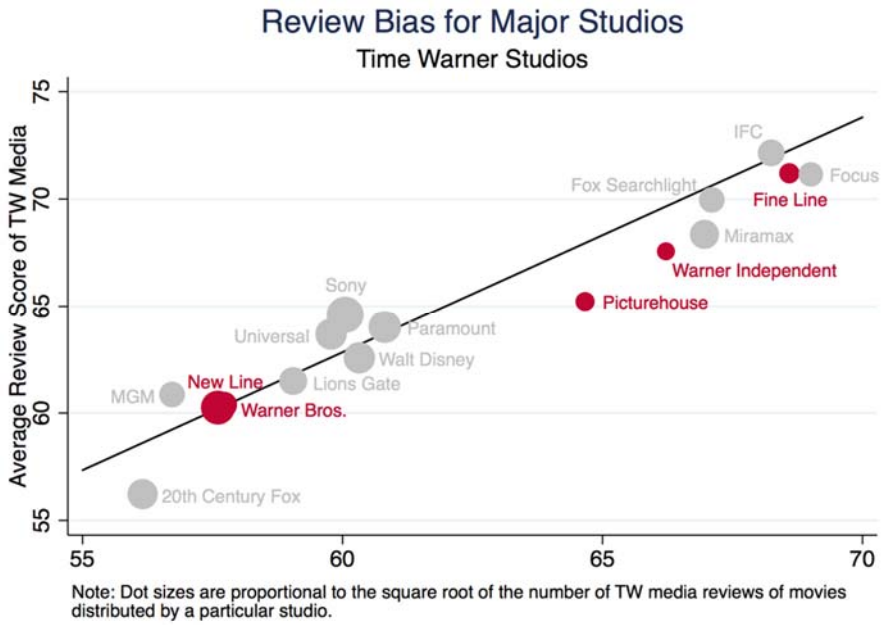
Figure 4a-b. Bias by Quality: News Corp.-owned outlets (4a) and Time Warner-owned outlets (4b)



Notes: Figures 4a reports local polynomial regressions with Epanechnikov kernel with bandwidth of 5 and 1st degree polynomial of the average review score (on a 0 to 100 scale) by News Corp. outlets on the average movie review score by all other outlets. We do separate regressions for 20th Century Fox movies (dark blue line) and the matching movies distributed by other studios (light blue line). Figure 4b reports the same polynomial regressions for Time Warner outlets and Warner Bros. movies. The sample only contains movies with an average review score in the range of 30 to 80.

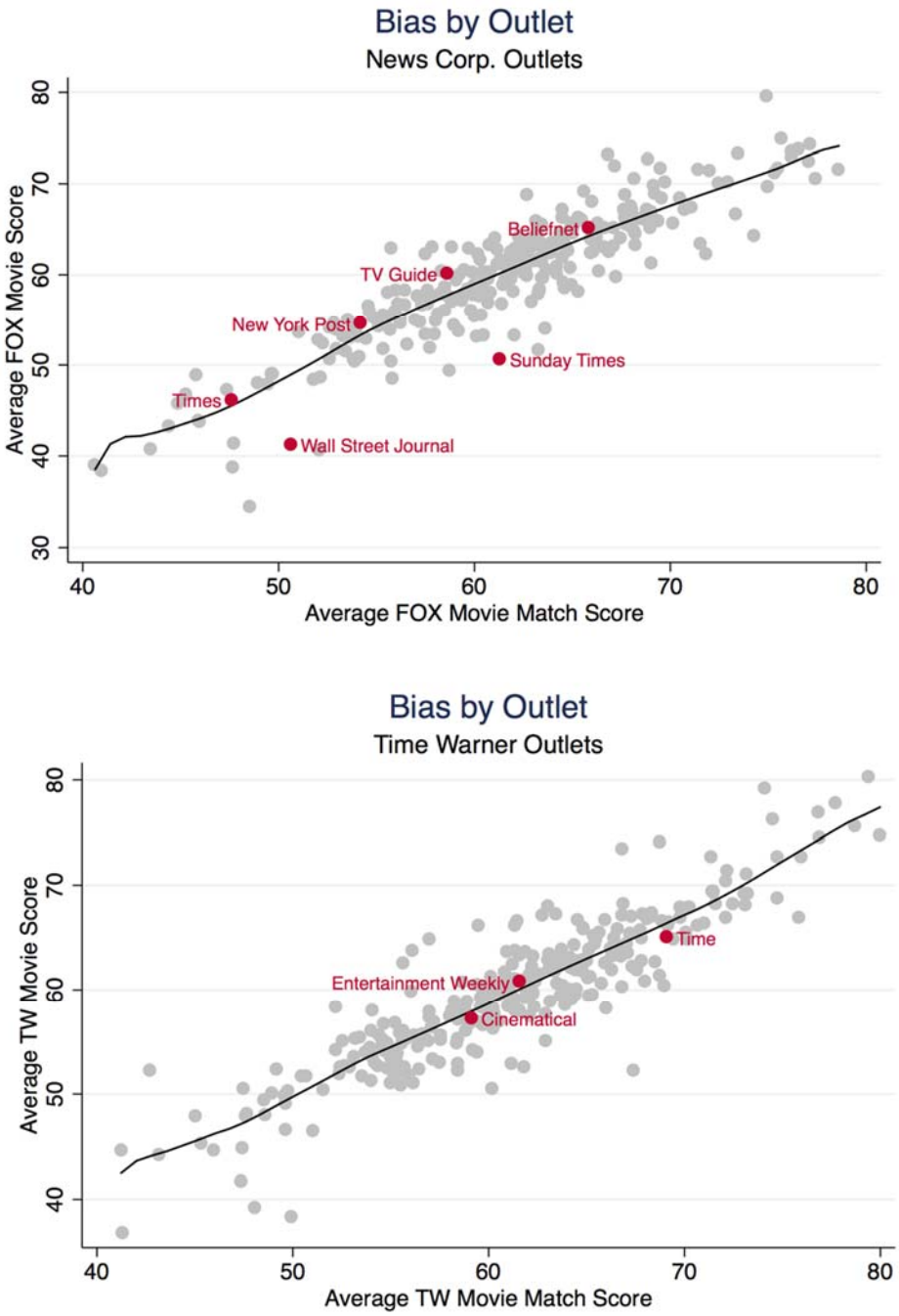
Figure 5a-b. Bias by Studio: News Corp.-owned outlets (5a) and Time Warner-owned outlets (5b)





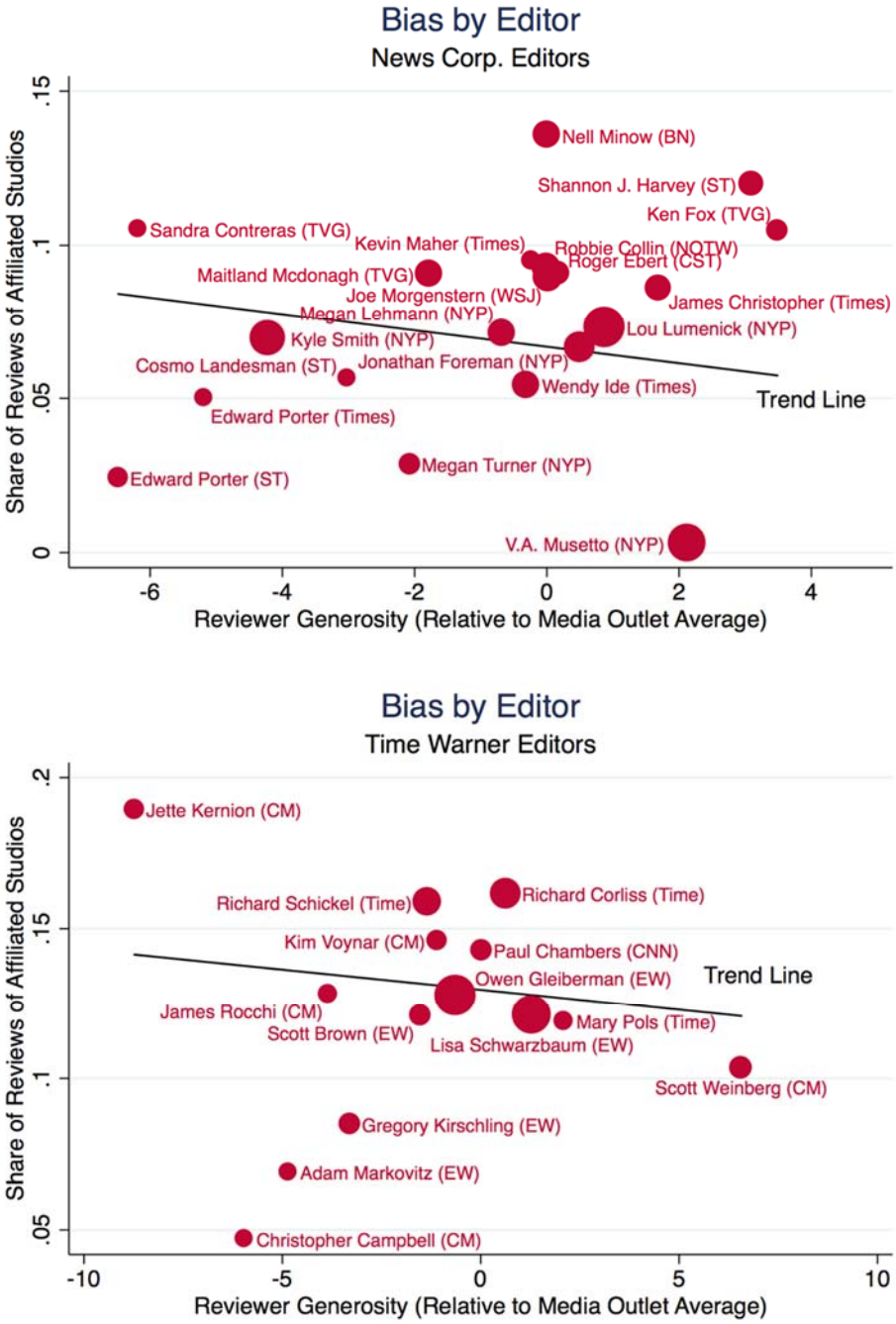
Notes: Figure 5a displays the average review score (on a 0 to 100 scale) by News Corp. outlets against the average review score by other outlets conditional on the distributing studio of the movies reviewed. Colors indicate whether a particular studio is owned by News Corp. (red dots) or is one of the other nine biggest studios (excluding Time Warner studios) (gray dots). Dot sizes are proportional to the square root of the number of reviews by News Corp. outlets. Studios with a number of reviews by News Corp. outlets less than 20 are excluded. The trend line is based on all studios whose movies received more than 100 reviews and weighted by the number of reviews by News Corp. outlets. Figure 5b shows parallel evidence for Time Warner outlets and Warner Bros. movies. Both figures use the Metacritic/Rotten Tomatoes dataset without matches.

Figure 6a-b. Bias by Media Outlet: News Corp.-owned outlets (6a) and Time Warner-owned outlets (6b)



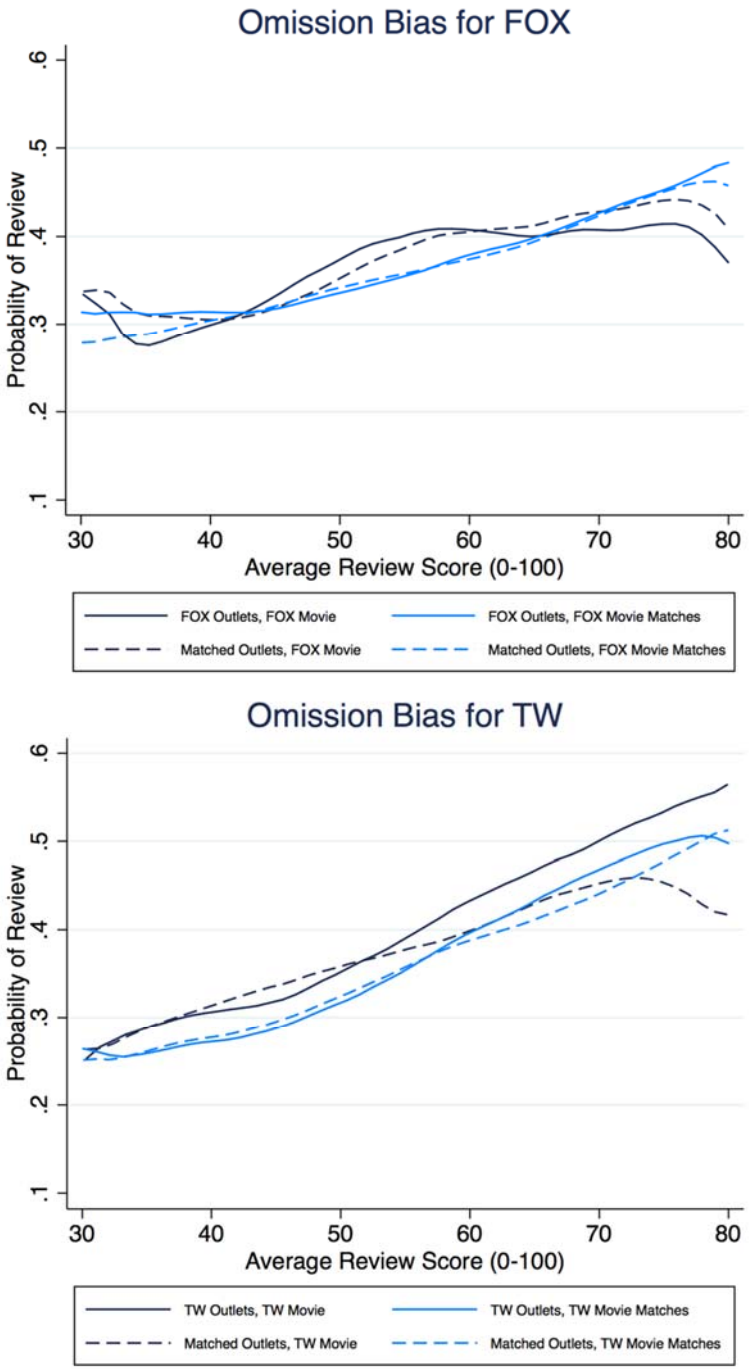
Notes: Figure 6a displays the average review score (on a 0 to 100 scale) of 20th Century Fox movies against the average review score of the associated movie matches for News Corp. outlets and outlets not owned by News Corp. Colors indicate whether a particular outlet is owned by News Corp. (red dots) or is one of the control outlets (gray dots). Outlets with a number of reviews of 20th Century Fox movies less than 15 are excluded. Figure 6b displays parallel evidence for Warner Bros. movies and Time Warner outlets.

Figure 7a-b. Editorial Bias in Assignment of Reviews



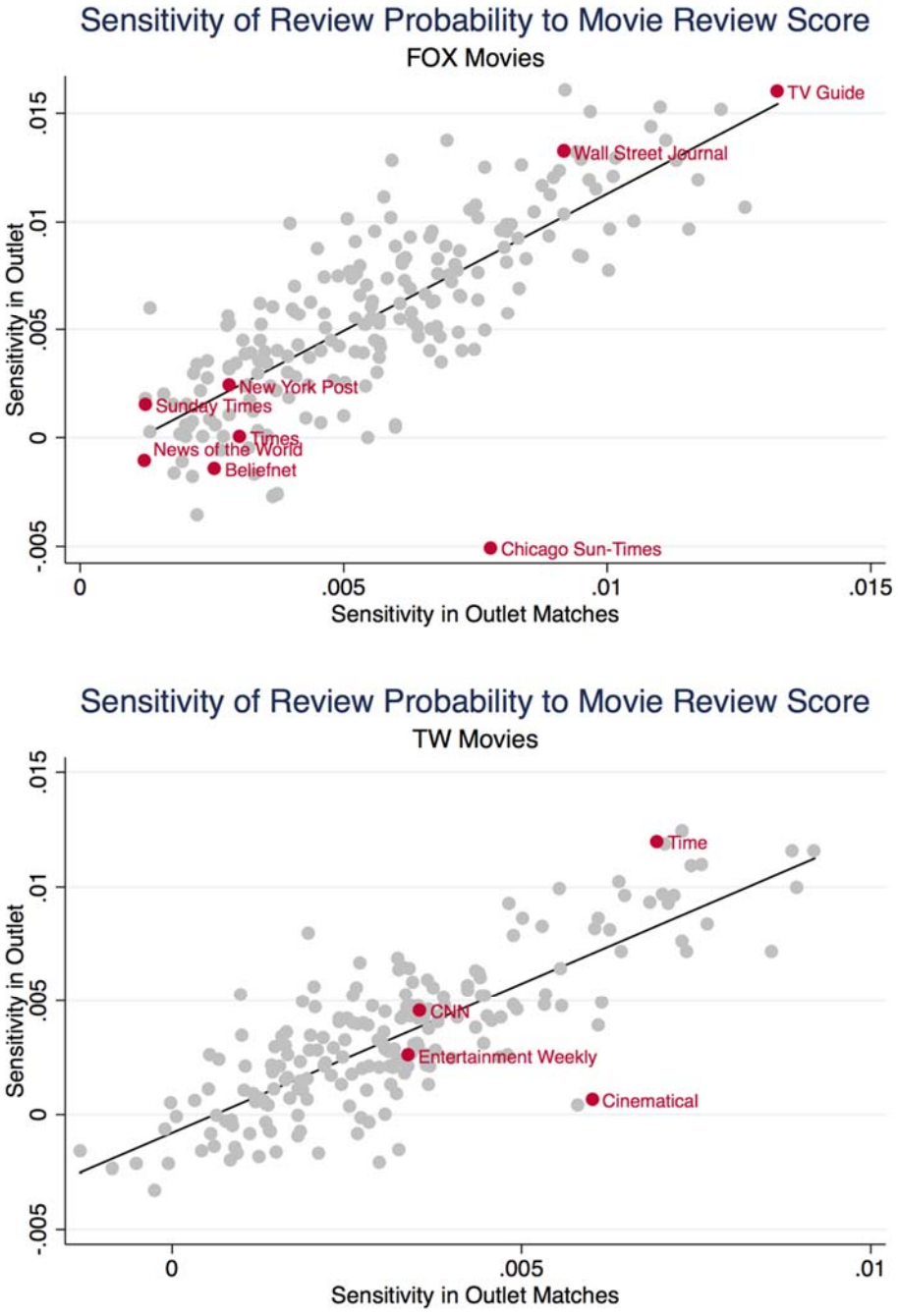
Notes: Figure 7a displays the share of score reviews (on a 0 to 100 scale) of 20th Century Fox movies for a given journalist employed at a News Corp. outlet versus a measure for the journalist generosity. For each review an idiosyncratic score is calculated as the review score minus the average review score for the corresponding movie. The mean of this variable is computed for each journalist and outlet to calculate a measure of absolute generosity. The journalist generosity (relative to the media outlet average) is then defined as the difference between the absolute generosity of a journalist minus the absolute generosity of the affiliated outlet. Dot sizes are proportional to the square root of the number of reviews by a particular journalist. Journalists with a number of reviews less than 50 are excluded. Figure 7b displays the same relationship for journalists employed at a Time Warner outlet. For each journalist the associated outlet is indicated in parentheses: BN: *Beliefnet*; CST: *Chicago Sun-Times*; CM: *Cinematical*; CNN: *CNN*; NOTW: *News of the World*; EW: *Entertainment Weekly*; NYP: *New York Post*; ST: *Sunday Times*; Time: *Time*; Times: *Times*; TVG: *TV Guide*; WSJ: *Wall Street Journal*.

Figure 8a-b. Selective coverage -- Probability of review by movie quality (rating)



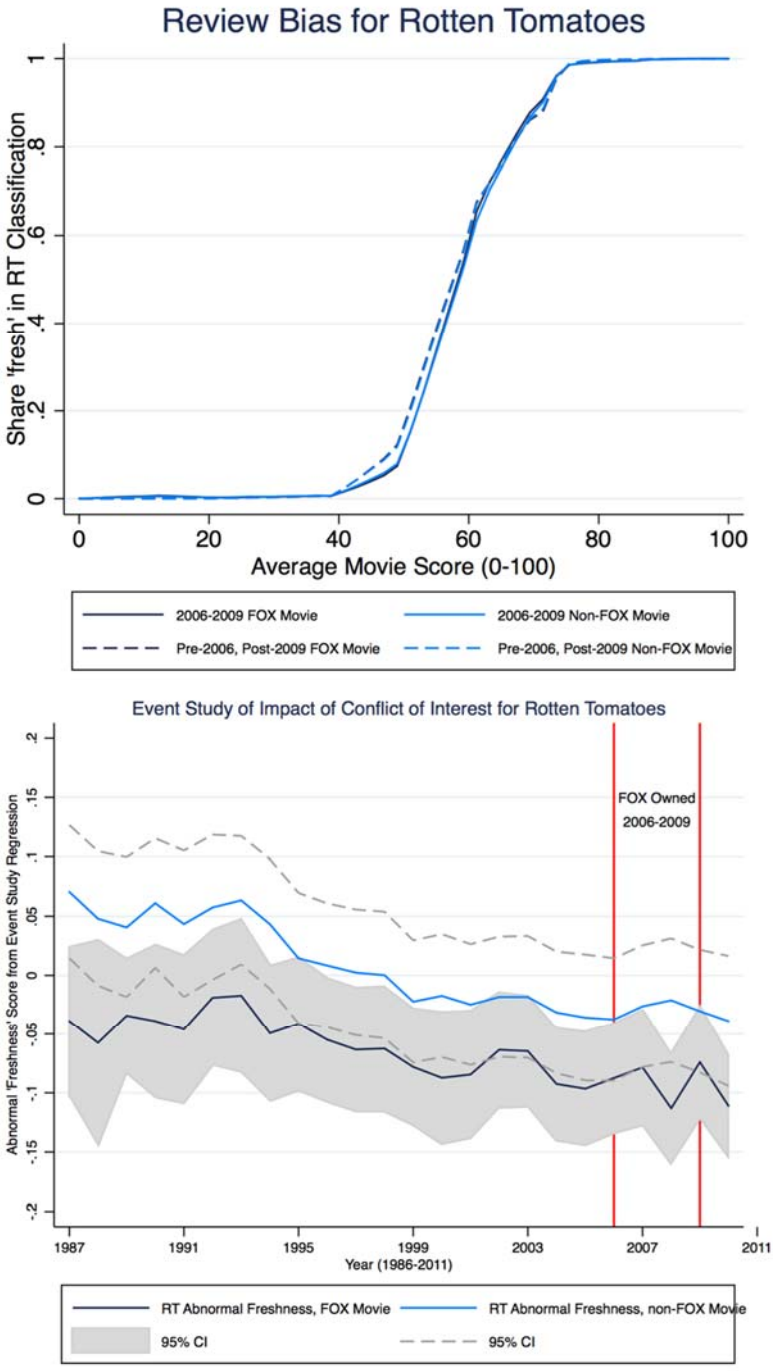
Notes: Figure 8a reports local polynomial regressions with Epanechnikov kernel with a bandwidth of 5 and 1st degree polynomial of an indicator for whether the movie was reviewed (score on a 0 to 100 scale or 'freshness' indicator) on the average movie review score. Colors distinguish separate polynomials for either 20th Century Fox movies or associated movie matches. Solid lines characterize regressions for outlets owned by News Corp., dashed lines those for the ten best matching media. For each News Corp. outlet those are determined by minimizing the distance to the particular News Corp. outlet in the review probability only for the matching movies. For this purpose, bins with a width of 5 score points are formed and the distance in the review probability for each bin is weighted by the number of matching movies in the particular bin. We only keep movies released in the time period of News Corp. ownership of a particular outlet. Figure 8b displays parallel evidence for Warner Bros. movies and Time Warner outlets. The sample only contains movies with an average review score in the range of 30 to 80. For additional information on how the data is generated see text.

Figure 9a-b. Selective coverage -- Probability of review by movie quality, Comparison to other media



Notes: Figure 9a depicts the sensitivity of the review probability of 20th Century Fox movies to the average review score for all outlets owned by News Corp. as well as for 200 control outlets (selected as those with the highest number of reviews). Sensitivity is measured as the slope coefficient of a linear regression of the review probability on the average review score of a movie. The y-axis shows the sensitivity in a particular outlet while the x-axis measures the sensitivity in the 10 outlet matches determined as for Figure 8. A positive (negative) sensitivity measure indicates that the review probability is increasing (decreasing) in the average movie review score. Additionally, the graph contains a linear fit. Dots above the line indicate that the likelihood of a particular outlet reviewing a 20th Century Fox movie increases more strongly in the average review score relative to its outlet matches. Figure 9b shows parallel evidence for Warner Bros. movies and Time Warner outlets.

Figures 10a-10b. Conflict of Interest in Rotten Tomatoes (Newscorp 2006-09)



Notes: Figure 10a reports a local polynomial regression with Epanechnikov kernel with a bandwidth of 5 and a 1st degree polynomial of an indicator for 'freshness' rating of a movie in Rotten Tomatoes on the corresponding movie review score. The sample includes the period in which Rotten Tomatoes is owned by News Corp. (2006-09, continuous lines) and the remaining period (dotted lines), and plots separate regressions for 20th Century Fox movies (dark blue lines) and movie matches (light blue lines). Figure 10b reports the estimated coefficients from an event study regression of the freshness score in Rotten Tomatoes on the quantitative score, outlet fixed effects, and year fixed effects interacted with an indicator for a 20th Century Fox movie (dark blue lines) and year fixed effects interacted with an indicator for movie matches (light blue lines).

Table 1. Data set Formation, Example

Movie Group A	Matched Movies
	Black Knight (FOX)
	Down To Earth
	Snow Dogs
	The Tuxedo
	102 Dalmatians
	Clockstoppers
	Nutty Professor 2
	Half Past Dead
	Darkness Falls
	Blue Streak
	The Medallion
Movie Group B	Matched Movies
	Scooby-Doo (TW)
	The Haunted Mansion
	Josie And The Pussycats
	102 Dalmatians
	Agent Cody Banks
	Bulletproof Monk
	Big Fat Liar
	Doctor Dolittle 2
	Crocodile Dundee in Los Angeles
	Stuart Little
	Stuart Little 2
...	...

× Rotten Tomatoes/ Metacritic Dataset

Final Sample →

Movie Group A	Movie-Media Group A(1)	Black Knight	New York Post
		Down To Earth	New York Post
		Snow Dogs	New York Post
		The Tuxedo	New York Post
		102 Dalmatians	New York Post
		...	...
	Movie-Media Group A(2)	Black Knight	Entertainment Weekly
		Down To Earth	Entertainment Weekly
		Snow Dogs	Entertainment Weekly
		The Tuxedo	Entertainment Weekly
		102 Dalmatians	Entertainment Weekly
		...	...
	Movie-Media Group A(3)	Black Knight	Washington Post
		Down To Earth	Washington Post
		Snow Dogs	Washington Post
		The Tuxedo	Washington Post
		102 Dalmatians	Washington Post
		...	...
	...	...	...
Movie Group B	Movie-Media Group B(1)	Scooby-Doo	New York Post
		The Haunted Mansion	New York Post
		Josie And The Pussycats	New York Post
		102 Dalmatians	New York Post
		Agent Cody Banks	New York Post
		...	...
	Movie-Media Group B(2)	Scooby-Doo	Entertainment Weekly
		The Haunted Mansion	Entertainment Weekly
		Josie And The Pussycats	Entertainment Weekly
		102 Dalmatians	Entertainment Weekly
		Agent Cody Banks	Entertainment Weekly
		...	...
	Movie-Media Group B(3)	Scooby-Doo	Washington Post
		The Haunted Mansion	Washington Post
		Josie And The Pussycats	Washington Post
		102 Dalmatians	Washington Post
		Agent Cody Banks	Washington Post
		...	...
	...	...	...
...	...	...	...

Notes: Table 1 shows the construction of the main sample. For every movie distributed by a News Corp. studio (for simplicity called 20th Century Fox) or Time Warner studio (for simplicity called Warner Bros.) which is covered by at least one of the three datasets *Netflix*, *Flixster*, or *MovieLens* the ten best movie matches are determined as those with the minimum distance in individual user ratings. This data provides movie groups consisting of a particular 20th Century Fox or Warner Bros. movie and its 10 best matches. The information is combined with the movie reviews provided by MetaCritic and Rotten Tomatoes. The resulting movie-media groups contain all reviews of movies in a certain movie group by a particular outlet. The upper part of Table 1 illustrates this formation for the example of the comedy movie "Black Knight" by 20th Century Fox. Gray color indicates that an outlet, in this case *New York Post*, belongs to the same conglomerate. Darker gray color indicates that a certain review is at conflict of interest. The lower part of Table 1 shows the equivalent for the comedy movie "Scooby-Doo" by Warner Bros. Note that a certain movie can be a match to several movies, and thus its reviews can be appear more than once in the main sample, as is the case for the comedy movie "102 Dalmatians" by Walt Disney.

TABLE 2

THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: CROSS-SECTIONAL ESTIMATES

Specification:	OLS Regressions						
Dependent Variable:	Movie Review on a 0-100 Scale for Movie *m* in Media Outlet *o*						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. News Corp.							
Indicator for Fox Movie on News Corp.-Owned Outlet	1.2906	2.0460***	1.8504**	1.7669**	2.0720***	1.8516**	0.618
(Measure of Conflict of Interest for News Corp.)	[0.9450]	[0.7409]	[0.7527]	[0.7489]	[0.7382]	[0.8740]	[0.9372]
Indicator for 20th Century Fox Movie	-2.4572***						
	[0.7556]						
Indicator for Media Outlet Owned by News Corp.	-4.4576***	-1.7134***	-1.7307*	-2.0365	-1.5201***	-1.5688***	-1.2759*
	[0.2357]	[0.4544]	[0.9061]	[3.7158]	[0.4567]	[0.4602]	[0.7293]
R^2	0	0.45	0.45	0.45	0.45	0.45	0.46
Number of Reviews with Conflict of Interest	620	620	620	620	620	421	421
N	469252	469252	469252	469252	408695	401595	154572
Panel B. Time Warner							
Indicator for Warner Bros. Movie on TW-Owned Outlet	-0.9727	-0.4512	-0.253	-0.3313	-0.4515	-0.8342	0.0866
(Measure of Conflict of Interest Time Warner)	[0.7597]	[0.6606]	[0.6652]	[0.6709]	[0.6563]	[0.7209]	[0.7864]
Indicator for Warner Brothers Movie	-2.9171***						
	[0.6546]						
Indicator for Media Outlet Owned by Time Warner	3.5985***	1.6477	0.6702	-3.7778	0.2341	0.217	-11.3558***
	[0.2688]	[1.4247]	[1.6557]	[4.6853]	[1.7685]	[1.8088]	[1.1743]
R^2	0	0.45	0.45	0.45	0.45	0.45	0.46
Number of Reviews with Conflict of Interest	842	842	842	842	842	685	685
N	469252	469252	469252	469252	369490	361575	185262
Control Variables:							
Movie Fixed Effects		X	X	X	X	X	X
Media Outlet Fixed Effects		X	X	X	X	X	X
Interaction of News Corp. (Time Warner) Outlet Indicator with Genre and MPAA Rating			X	X			
Interaction of News Corp. (Time Warner) Outlet Indicator with Budget and No. of Theaters				X			
Sample Restrictions:							
Include only movies with at least one review by an outlet at potential conflict of interest					X	X	X
Exclude Fox/TW movies not in Filixter/Netflix/MovieLens data						X	X
Exclude movies that are never matches to a Fox/TW movie							X

Notes: An observation is a movie review by a media outlet from 1985 to July 2011. The dependent variable is a movie review converted on the 0-100 scale devised by *metacritic.com* . In specifications where genre, MPAA rating, budget, and number of theaters is used, a dummy is included indicating when information on a particular characteristic is missing. The standard errors are clustered by movie.

* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 3
THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: AVERAGE BIAS

Specification:	OLS Regressions			
Panel A. Dep. Var.: 0-100 Score for Movie	(1)	(2)	(3)	(4)
Indicator for Fox Movie on News Corp.-Owned Outlet (Measure of Conflict of Interest for News Corp.)	-0.1288 [1.1166]	-0.1898 [1.0596]		
Indicator for 20th Century Fox Movie	-0.4033 [1.0131]	-0.7560 [0.5297]		
Indicator for Media Outlet Owned by News Corp.	-4.3446*** [0.6234]	0.3348 [1.2639]		
Indicator for Warner Bros. Movie on TW-Owned Outlet (Measure of Conflict of Interest for Time Warner)			-0.4368 [0.9468]	-0.0188 [0.8762]
Indicator for Warner Brothers Movie			-0.8251 [0.9017]	-0.6220 [0.4413]
Indicator for Media Outlet Owned by Time Warner			2.5421*** [0.5382]	-26.2505*** [5.6107]
Movie-Media Group Fixed Effects		X		X
R^2	0	0.45	0	0.47
Number of Reviews with Conflict of Interest	421	421	685	685
N (number of reviews)	291124	291124	450699	450699
Panel B. Dep. Var.: Freshness Score				
Indicator for Fox Movie on News Corp.-Owned Outlet (Measure of Conflict of Interest for News Corp.)	0.0330 [0.0277]	0.0156 [0.0286]		
Indicator for 20th Century Fox Movie	-0.0005 [0.0215]	-0.0138 [0.0115]		
Indicator for Media Outlet Owned by News Corp.	-0.0790*** [0.0149]	0.0304 [0.0520]		
Indicator for Warner Bros. Movie on TW-Owned Outlet (Measure of Conflict of Interest for Time Warner)			-0.0068 [0.0216]	-0.0113 [0.0227]
Indicator for Warner Brothers Movie			-0.0227 [0.0179]	-0.0188** [0.0093]
Indicator for Media Outlet Owned by Time Warner			0.0103 [0.0133]	-0.5340*** [0.1026]
Movie-Media Group Fixed Effects		X		X
R^2	0	0.37	0	0.38
Number of Reviews with Conflict of Interest	360	360	642	642
N (number of reviews)	280797	280797	435242	435242

Notes: An observation is a movie review by a media outlet from 1985 to 2010. The dependent variable is a movie review converted on the 0-100 scale devised by *metacritic.com* . The standard errors are clustered by movie.
* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 4
THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: ROBUSTNESS

Specification:	OLS Regressions								
Dep. Var.:	Movie Review on a 0-100 Scale for Movie *m* in Media Outlet *o*								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Newscorp. Media									
Indicator for Fox Movie on News Corp. Outlet	-0.1898	-0.1898	-0.1898	0.713	0.3875	-0.3810	0.1913	0.2261	-0.5384
(Measure of Conflict of Interest for News Corp.)	[1.0596]	[0.8868]	[1.0230]	[1.0134]	[1.1291]	[1.2089]	[1.3622]	[1.1532]	[1.2192]
R^2	0.45	0.45	0.45	0.6	0.39	0.46	0.64	0.45	0.55
Number of Reviews with Conflict of Interest	421	421	421	421	300	350	411	420	460
N (number of reviews)	291124	291124	291124	291124	72610	239994	106941	278433	163993
Panel B. Time Warner Media									
Indicator for Warner Bros. Movie on TW Outlet	-0.0188	-0.0188	-0.0188	-0.0558	0.4248	-0.0184	0.6316	0.8640	0.6458
(Measure of Conflict of Interest Time Warner)	[0.8762]	[0.5170]	[0.4886]	[0.8233]	[0.8739]	[1.0742]	[1.0787]	[0.9181]	[1.0126]
R^2	0.47	0.47	0.47	0.6	0.42	0.48	0.64	0.46	0.56
Number of Reviews with Conflict of Interest	685	685	685	685	594	485	657	685	711
N (number of reviews)	450699	450699	450699	450699	115940	359201	163937	413953	237182
Control Variables:									
Movie-Media Group Fixed Effects	X	X	X	X	X	X	X	X	X
Movie Fixed Effects				X					
Robustness Check:		Standard Errors		Extra Controls	Sample		Matching Procedure		
Specification:	Benchmark	Cluster by Studio	Cluster by Media	Extra Controls	MetaCritic Sample Only	Rotten Tomatoes Sample Only	Match Uses 3 (not 10) Best Matches	Match Uses Correlation in Reviews	Match Does Not Use Year and Ratings No.

Notes: An observation is a movie review by a media outlet from 1985 to 2010. The dependent variable is a movie review converted on the 0-100 scale devised by *metacritic.com*. The standard errors are clustered by movie unless stated otherwise. In Columns (2)-(3) robustness to alternative ways of clustering is tested. In Column (4) movie fixed effects are added to the regression as additional controls. In column (5)-(6) only reviews either of the Metacritic or the Rotten Tomatoes dataset are included. Column (7) uses three compared to the 10 best movie matches as control movies. In Column (8) movie matches are determined based on the correlation of the individual user ratings compared to the minimum distance measure in the benchmark specification. Restrictions on potential matches explained in Section 2.2. are applied in determining the movie matches. In column (9) we do not restrict the set of potential movie matches based on the closeness in the release year and number of user ratings as explained in section 2.2.

* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 5
CONFLICT OF INTEREST AND OMISSION BIAS: PROBABILITY OF REVIEW

Specification:	OLS Regressions			
Dependent Variable:	Indicator variable for review of a movie *m* by outlet *o*			
	News Corp. Conflict of Interest		*Time Warner* Conflict of Interest	
	(1)	(2)	(3)	(4)
Indicator for Conflict of Interest *	-0.00026	-0.00008	0.00011	0.00034
Average Movie Rating	[0.00069]	[0.00067]	[0.00068]	[0.00060]
Distributed by Conglomerate*	-0.00033	-0.00065	-0.00073	-0.00080*
Average Movie Rating	[0.00074]	[0.00058]	[0.00069]	[0.00043]
Media Owned by Conglomerate*	-0.00009	-0.00003	0.00108***	0.00041
Average Movie Rating	[0.00033]	[0.00039]	[0.00037]	[0.00043]
Indicator for Conflict of Interest	0.01137	0.00598	0.00583	-0.00294
	[0.03947]	[0.03960]	[0.03774]	[0.03330]
Distributed by Conglomerate	0.02843	0.05148	0.06177	0.07236***
	[0.04327]	[0.03256]	[0.03833]	[0.02410]
Media Owned by Conglomerate	0.0064		-0.05288**	
	[0.01911]		[0.02122]	
Average Movie Review Score	0.00412***	0.00310***	0.00565***	0.00413***
	[0.00037]	[0.00033]	[0.00037]	[0.00033]
Control Variables:				
Movie-Media Group Fixed Effects		X		X
Sample:	Potential review in featured media and in each of 10 matched media, with match based on minimum distance in probability of review.			
R^2	0.01	0.55	0.03	0.48
Number of Potential Reviews with Conflict of Interest	1142	1142	2020	2020
N	120692	120692	234388	234388

Notes: Each column is a separate regression including as observations potential movie reviews by the featured media outlets, or by any of 10 matched media, with match based on minimum distance in the probability of review as described in Figure 8. The sample only includes years in which the media featured in the relevant column are owned by News Corp. or Time Warner. The average score is computed as the average 0-100 score for a movie from all media outlets. All specifications include fixed effects for the movie-media group. The standard errors are clustered by movie.
* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 6

BIAS IN REVIEW AGGREGATORS: EFFECT OF NEWSCORP. OWNERSHIP OF ROTTEN TOMATOES

Specification:	OLS Regressions				
Depedent Variable:	RottenTomatoes 0-1 "Freshness" indicator				
	(1)	(2)	(3)	(4)	(5)
Indicator for 20th Century Fox Movie *	0.00315	-0.00816	0.000352	-0.0572	-0.00338
(RottenTomatoes owned by Newscorp.: 2006-09)	[0.00832]	[0.00685]	[0.00822]	[0.0352]	[0.0183]
Indicator for 20th Century Fox Movie	-0.00204	-0.00638*	-0.00579	-0.0474**	-0.0271**
	[0.00436]	[0.00372]	[0.00477]	[0.0184]	[0.0106]
0-100 Review Score	0.0188***	0.0183***	0.0409***		
	[0.000140]	[0.0000535]	[0.000131]		
0-100 MetaCritic Review Score					0.0173***
					[0.0000928]
Control Variables:					
Year Fixed Effects	X	X	X	X	X
Media Outlet Fixed Effects		X	X	X	X
Movia-Media Group Fixed Effects	X				
Sample:	All Reviews, Matching Group Sample	All Reviews Scored in RT	Only Reviews with 50<=Score<=7	Only Reviews Unscored in RT	
R^2	0.74	0.65	0.59	0.05	0.56
N	295400	397420	153229	97940	28225

Notes: An observation is a movie review from 1985 to July 2011. Column (1) uses the FOX sample of the matching dataset while column (2)-(5) use the full Metacritic/ Rotten Tomatoes data set. The dependent variable is an indicator variable for 'freshness' of a movie according to review in Rotten Tomatoes. The key indepedendent variables are indicators for movies distributed by 20th Century Fox and an interaction of this indicator with the years in which Rotten Tomatoes is owned by News Corp. (2006-09). The standard errors are clustered by movie.

* significant at 10%; ** significant at 5%; *** significant at 1%

APPENDIX TABLE 1, PANEL A
SUMMARY STATISTICS: MEDIA SOURCES OF MOVIE REVIEWS

Sample	Media Outlet	Media Type	Years	Owner	Usual Rating System	Data Source (MC Score (0-100)/ MC Fresh Ind. - RT Score (0-100)/ RT Fresh Ind. - Both Score (0-100)/ Both Fresh Ind.)	Score Variable		Fresh Indicator		Most Common Reviewers (Reviews Score (0-100)/ Reviews Fresh Ind.)
							No. Reviews While Owned (with Conflict of Interest)	No. Reviews While Not Owned	No. Reviews While Owned (with Conflict of Interest)	No. Reviews While Not Owned	
News Corp.	**All Reviews**	335 media	1985-2010	Varies	Varies	75326/49208 - 270147/280797 - 54349/49208	4058 (421)	287066	3410 (360)	277387	
News Corp.	**Beliefnet**	Website	1994-2010	News Corp. from '08 to '10	A to F (+/- allowed)	0/0 - 302/289 - 0/0	241 (21)	61	230 (21)	59	Nell Minow (302/289)
News Corp.	**Chicago Sun-Times**	Newsp.	1985-2010	News Corp. until 1986	0 to 4 stars (1/2 allowed)	2176/1622 - 2436/1930 - 2103/1622	67 (13)	2442	54 (13)	1876	Roger Ebert (2281/1706)
News Corp.	**New York Post**	Newsp.	1989-2010	News Corp. from 1993	0 to 4 stars (1/2 allowed)	2168/1990 - 2159/2088 - 2085/1990	2241 (218)	1	2088 (211)	-	Lou Lumenick (1087/1029), Kyle Smith (485/477)
News Corp.	**News Of The World**	Newsp. (UK)	1985-2010	News Corp.	1 to 5 stars	0/0 - 87/84 - 0/0	87 (8)	-	84 (8)	-	Robbie Collin (87/84)
News Corp.	**Sunday Times**	Newsp. (UK)	1985-2009	News Corp.	0 to 5 stars (1/2 allowed)	0/0 - 206/162 - 0/0	206 (27)	-	162 (27)	-	Shannon J. Harvey (156/117)
News Corp.	**TV Guide**	Weekly	1985-2009	New Corp. 1988-99	0 to 4 stars (1/2 allowed)	2632/1855 - 2015/1897 - 1969/1855	588 (78)	2090	129 (21)	1768	Maitland McDonagh (1388/1104), Ken Fox (473/405)
News Corp.	**Times**	Newsp. (UK)	1985-2010	News Corp.	0 to 5 stars	0/0 - 437/495 - 0/0	437 (40)	-	495 (45)	-	Wendy Ide (132/159), James Christopher (185/222)
News Corp.	**Wall Street Journal**	Newsp.	1985-2010	News Corp. from 2008	Qualitative	1197/328 - 345/336 - 345/328	191 (16)	1006	168 (14)	168	Joe Morgenstern (1045/282)
News Corp.	**Other Reviews**	327 media	1985-2010	-	Varies	67153/43413 - 262160/273516 - 47847/43413	-	281466	-	273516	
Time Warner	**All Reviews**	335 media	1985-2010	Varies	Varies	118538/76549 - 417346/435242 - 85185/76549	6168 (685)	444531	5461 (642)	429781	
Time Warner	**Cinematical**	Website	2004-2010	Time Warner until 2009	0 to 5 stars (1/2 allowed)	0/0 - 584/689 - 0/0	575 (61)	9	676 (76)	13	James Rocchi (127/159), Scott Weinberg (123/122)
Time Warner	**CNN.com**	Website/Radio	1996-2007	Time Warner	Qualitative	0/0 - 42/929 - 0/0	42 (5)	-	929 (120)	-	Paul Clinton (0/596)
Time Warner	**Entertainment Weekly**	Weekly	1990-2010	Time Warner from 1990	A to F (+/- allowed)	4171/3140 - 3445/3240 - 3314/3140	4302 (463)	-	3240 (349)	-	Owen Gleiberman (2038/1483), Lisa Schwarzbaum (1626/1318)
Time Warner	**Time**	Weekly	1990-2010	Time Warner from 1990	Qualitative	1249/474 - 507/616 - 507/474	1249 (156)	-	616 (97)	-	Richard Corliss (654/328), Richard Schickel (568/269)
Time Warner	**Other Reviews**	331 media	1985-2010	-	Varies	113118/72935 - 412768/429768 - 81364/72935	-	444522	-	429768	

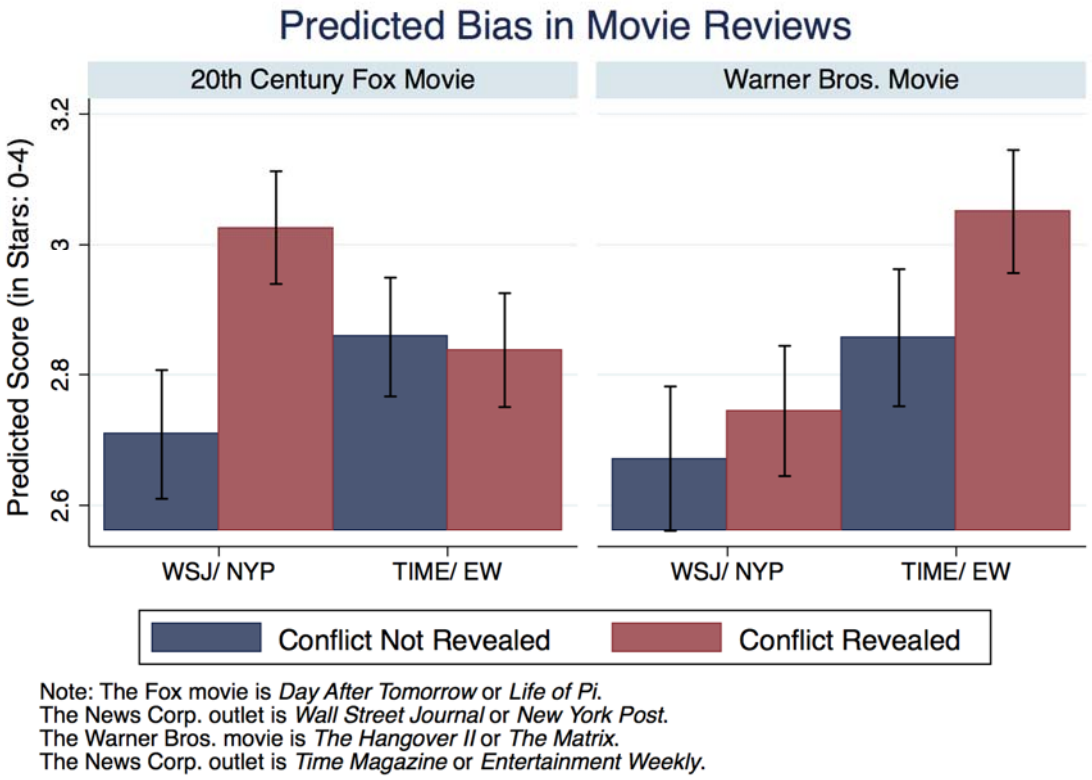
Notes: The sources of the movie review data are *www.metacritic.com* (abbreviated MC) and *www.rottentomatoes.com* (abbreviated RT). The data covers reviews available from 1985 until 2010. See text for additional information.

APPENDIX TABLE 1, PANEL B
SUMMARY STATISTICS: STUDIOS

Sample	Distributor of Movie (Studio)	Studio Type	Years	Owner	No. of Reviews (Score 0-100/ Fresh Ind.)	No. of Movies (Score 0-100/ Fresh Ind.)
News Corp.	**All Studios**	Varies	1985-2010	Varies	291124/280797	1593/1278
News Corp.	**20th Century Fox**	Major	1985-2010	News Corp.	21080/20500	236/189
News Corp.	**Fox Searchlight**	Independent	1995-2010	News Corp.	8020/8221	72/61
News Corp.	**Other Studios**	Varies	1985-2010	-	262024/252076	1285/1028
Time Warner	**All Studios**	Varies		Varies	450699/435242	1847/1532
Time Warner	**Warner Bros.**	Major	1990-2010	Time Warner from 1989	30195/30808	288/243
Time Warner	**Fine Line**	Independent	1991-2005	Time Warner from 1989	2474/1968	33/20
Time Warner	**HBO**	Other	1997-2003	Time Warner from 1989	76/30	3/1
Time Warner	**New Line**	Independent	1992-2008	Time Warner from 1996	12135/12431	114/98
Time Warner	**Picturehouse**	Independent	2005-2008	Time Warner from 1989	892/998	8/8
Time Warner	**Warner Independent**	Independent	2004-2006	Time Warner	1444/1591	11/11
Time Warner	**Warner Home Video**	Other	1994-1999	Time Warner from 1989	63/149	2/4
Time Warner	**Other Studios**	Varies	1985-2010	-	403420/387267	1388/1147

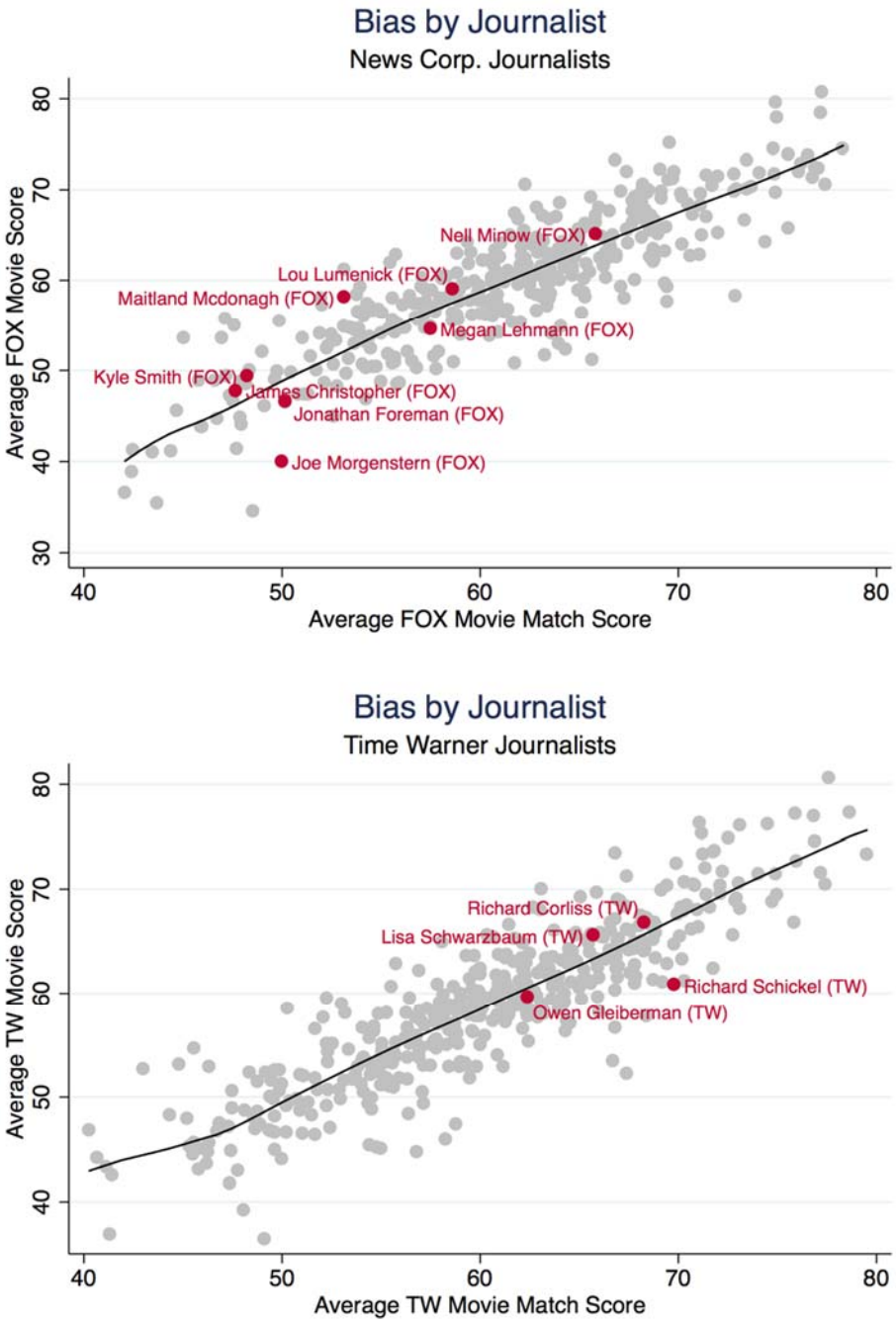
Notes: The sources of the movie review data are *www.metacritic.com* (abbreviated MC) and *www.rottentomatoes.com* (abbreviated RT). The data covers reviews available from 1985 until 2010. See text for additional information.

Appendix Figure 1. Predicted Bias Due To Conflict of Interest, Survey Response



Notes: The sample relevant for Appendix Figure 1 is 549 respondents to an Amazon Mechanical Turk survey advertised for readers of movie reviews. We briefly describe a well-known 20th Century Fox or Warner Bros. movie (like The Day After Tomorrow) and then ask for guesses of reviews by major media outlets, including two at conflict of interest (like the New York Post). A control group just sees this information, while a conflict-of-interest group also sees a conflict-of-interest disclosure. The Figure displays the average guesses of movie ratings in stars (out of 4) in News Corp. outlets (*Wall Street Journal* and *New York Post*) and Time Warner outlets (*Time* and *Entertainment Weekly*). The left panel refers to 20th Century Fox movies, the right panel to Warner Bros. movies. The red bars refer to the predicted ratings when respondents are informed about the cross-ownership structure, while the blue bars represent the predicted ratings when respondents are missing this information. We interpret the difference in the ratings for affiliated reviews between the control and disclosure group as a forecast for the size of bias. The point estimate of bias is .32 stars (8 points on the 0-100 score) for News Corp. and .19 stars (4.7 points on the 0-100 score) for Time Warner. Error bars show 95% confidence intervals with standard errors clustered on the individual level.

Appendix Figure 2a-b. Bias by Journalist: News Corp.-owned outlets (1a) and Time Warner-owned outlets (1b)



Notes: Appendix Figure 2a displays the average review score (on a 0 to 100 scale) of 20th Century Fox movies against the average review score of the associated movie matches for News Corp. journalists and journalists not employed at a News Corp. outlet. Colors indicate whether a particular journalist is employed at a News Corp. outlet or is one of the other 500 journalists with the most reviews in the sample. News Corp. journalists with a number of reviews of 20th Century Fox movies less than 15 are excluded. Appendix Figure 2b displays the parallel evidence for journalists employed at a Time Warner outlet and Warner Bros. movies.

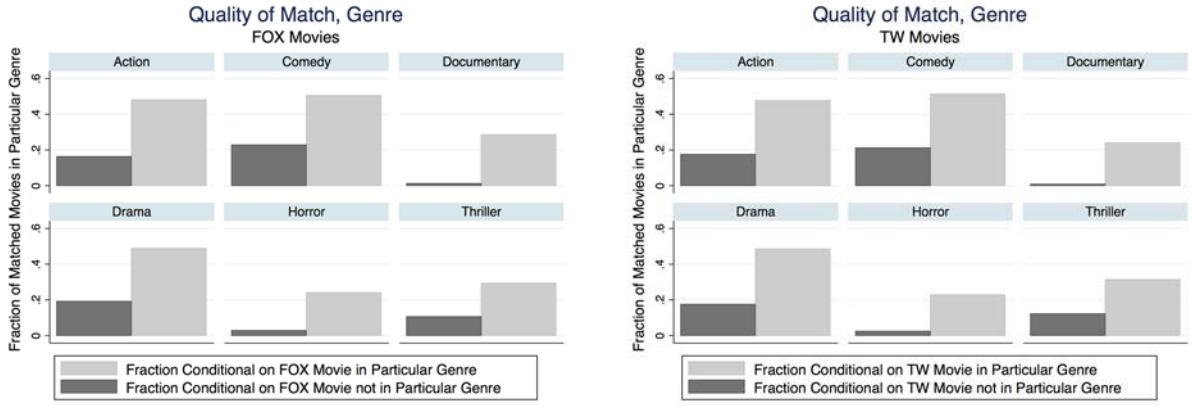
For Online Publication

"Does Conflict of Interest Lead to Biased Coverage? Evidence from Movie Reviews"

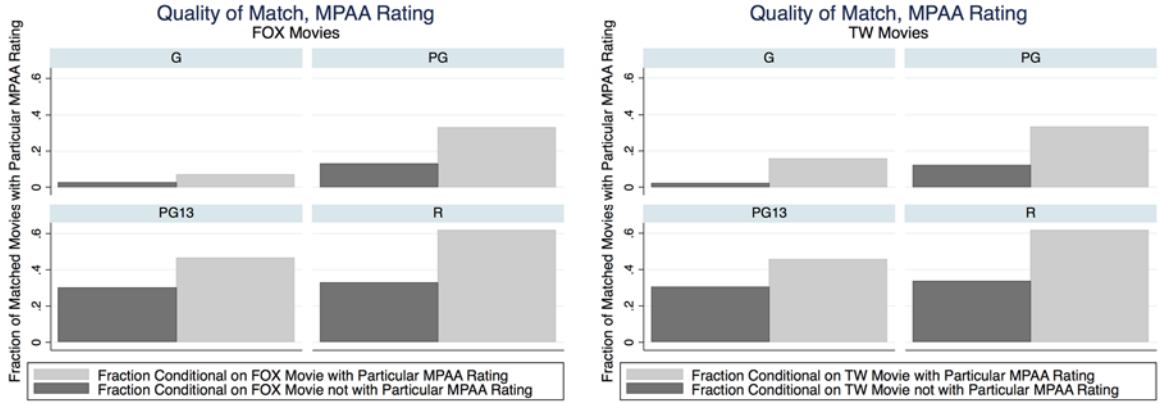
Stefano DellaVigna and Johannes Hermle

Online App. Fig. 1a-1f. Documenting the Quality of Matches: Micro-level Comparison

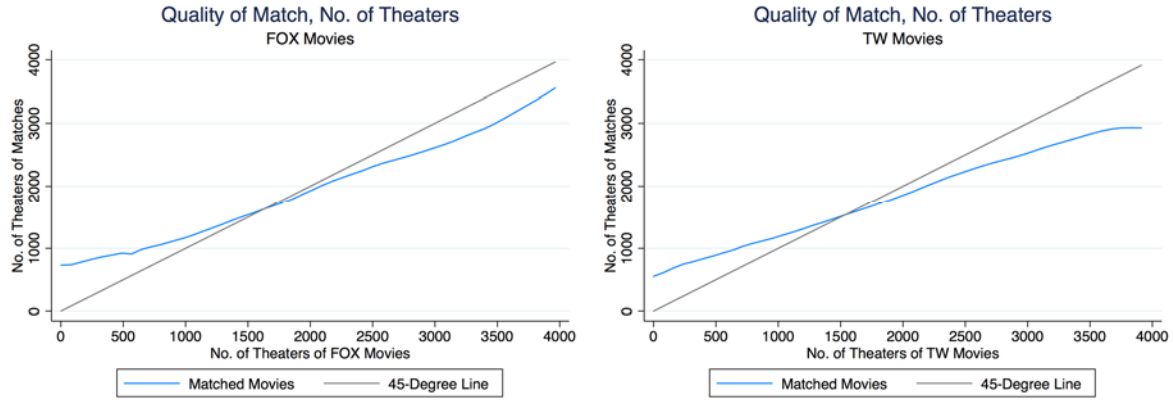
Online Appendix Figure 1a-b. Similarity to Match: Movie Genre



Online Appendix Figure 1c-d. Similarity to Match: MPAA Rating

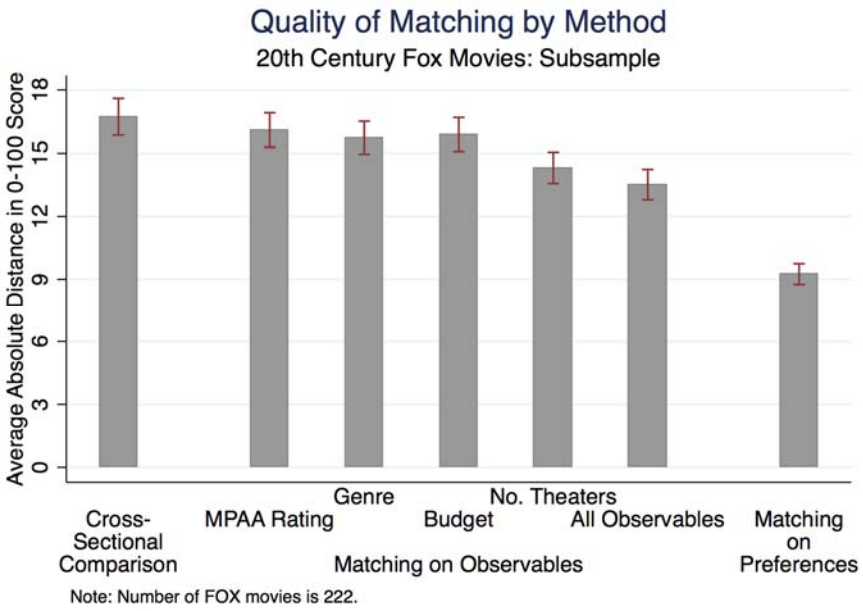


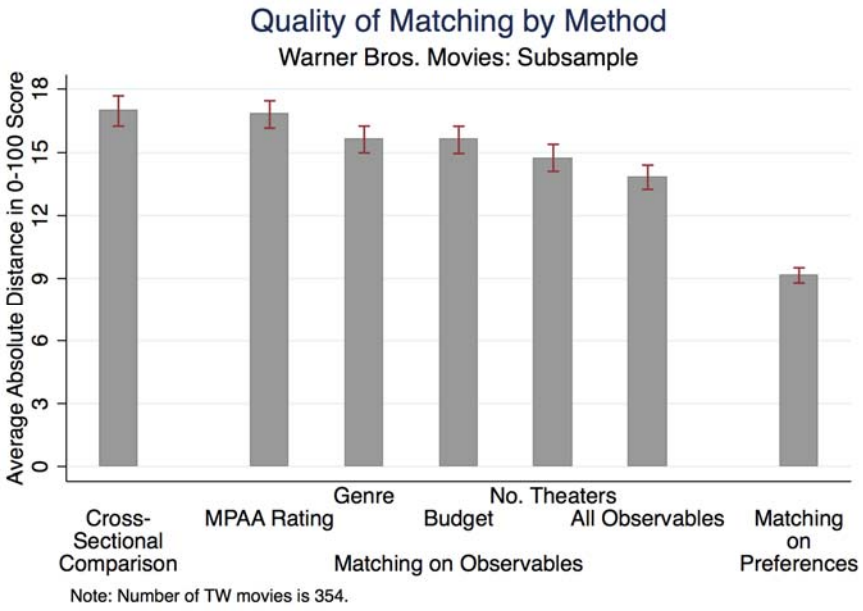
Online Appendix Figure 1e-f. Similarity to Match: Theaters at Openings



Notes: Online Appendix Figures 1a-b display the fraction of movie matches in a particular genre conditional on the genre of the associated movie distributed by 20th Century Fox or Warner Bros. Online Appendix Figures 1c-d display the fraction of movie matches with a particular MPAA rating conditional on the MPAA rating of the associated movie distributed by 20th Century Fox or Time Warner. Online Appendix Figures 1e-f report local polynomial regressions with Epanechnikov kernel with bandwidth of 250 and 1st degree polynomial of the number of theaters at opening of movie matches on the number of theaters at opening of associated movies distributed by 20th Century Fox or Warner Bros.

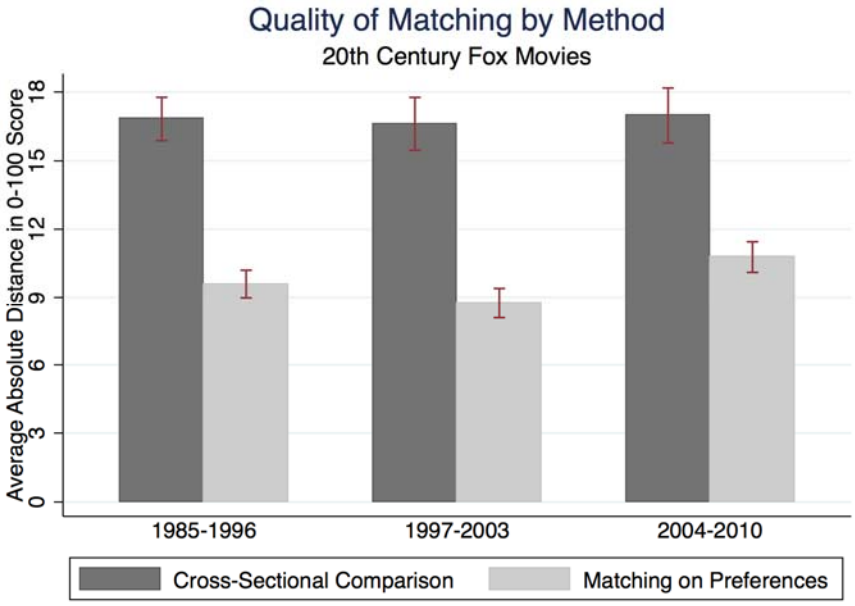
.Online Appendix Figure 2a-b. Documenting the Quality of Matches: Distance in Critical Reviews, Constant Movie Sample

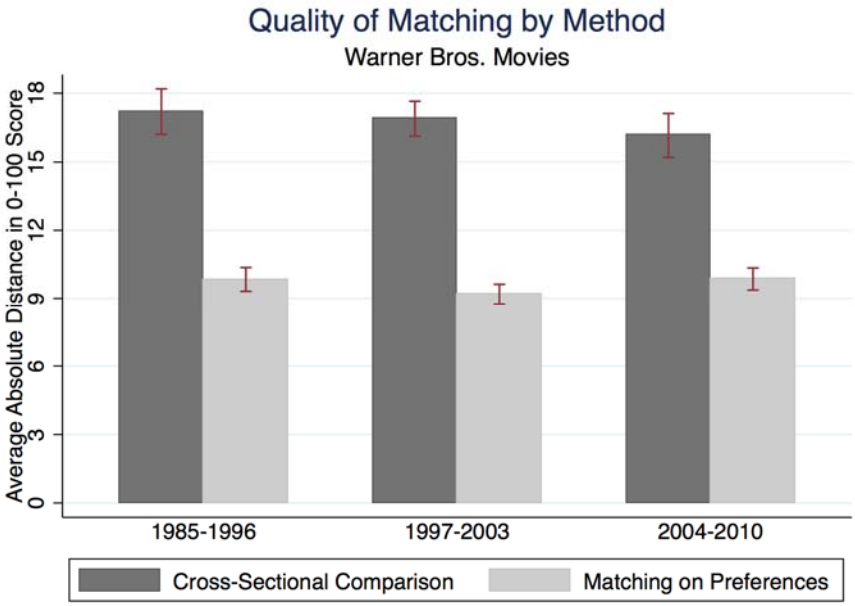




Notes: Online Appendix Figures 2a-b present evidence parallel to Figure 2 for the subset of 20th Century Fox and Warner Bros. movies for which information on MPAA rating, genre, budget, and number of theaters is available.

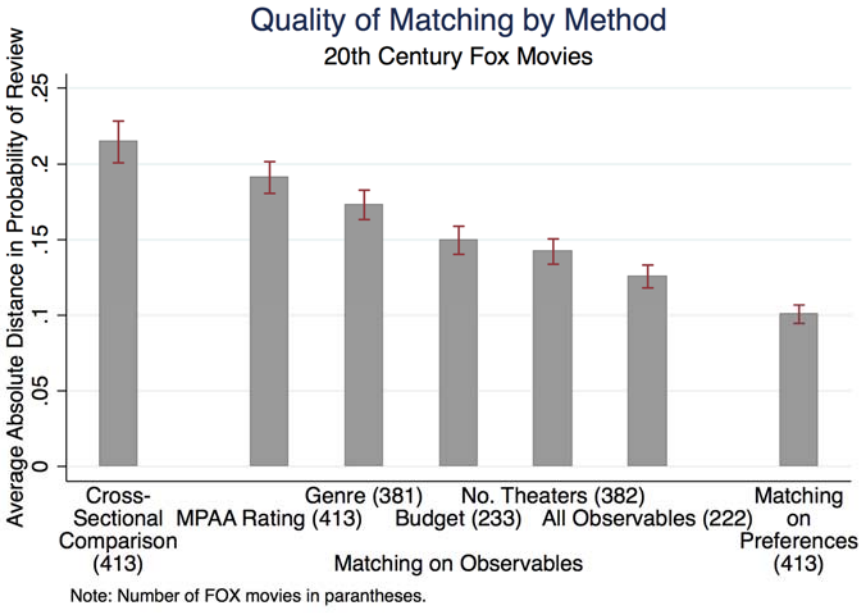
Online Appendix Figures 3a-b. Documenting the Quality of Matches: Absolute Distance in 0-100 Score between Movies with Conflict of Interest and Matching Movies by Time Period

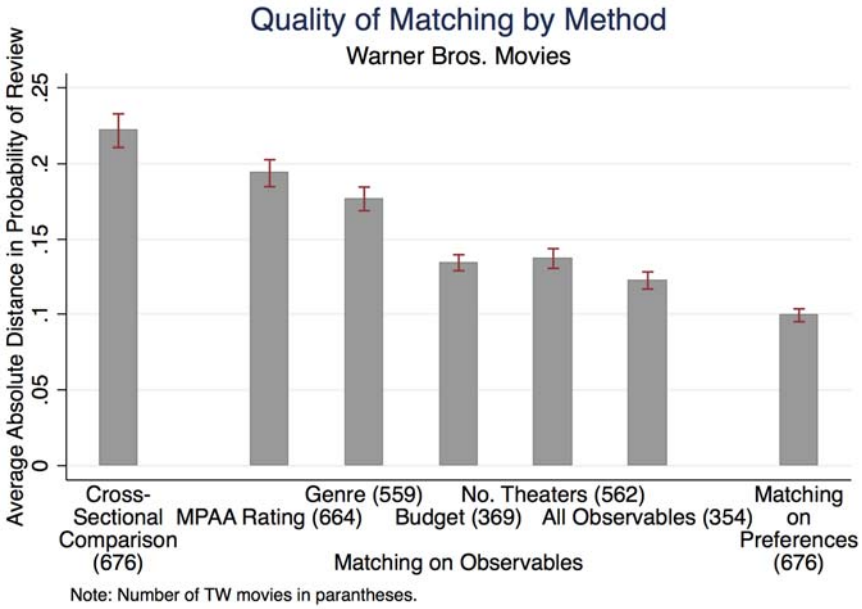




Notes: Online Appendix Figure 3a presents the average absolute distance in the 0 – 100 score between 20th Century Fox movies and 10 randomly selected movies as well as matching movies selected by matching on reported preferences (see notes of Figure 2) for different time periods. Online Appendix Figure 3b presents parallel evidence for Warner Bros. movies.

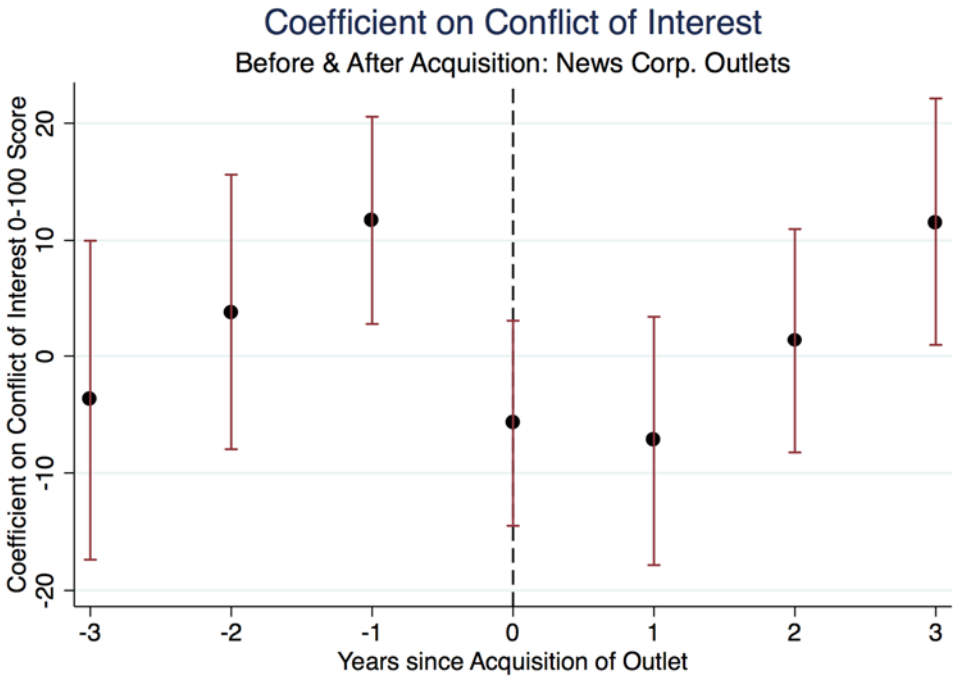
Online Appendix Figure 4a-b. Documenting the Quality of Matches: Absolute Distance Probability of Review between Movies with Conflict of Interest and Matching Movies

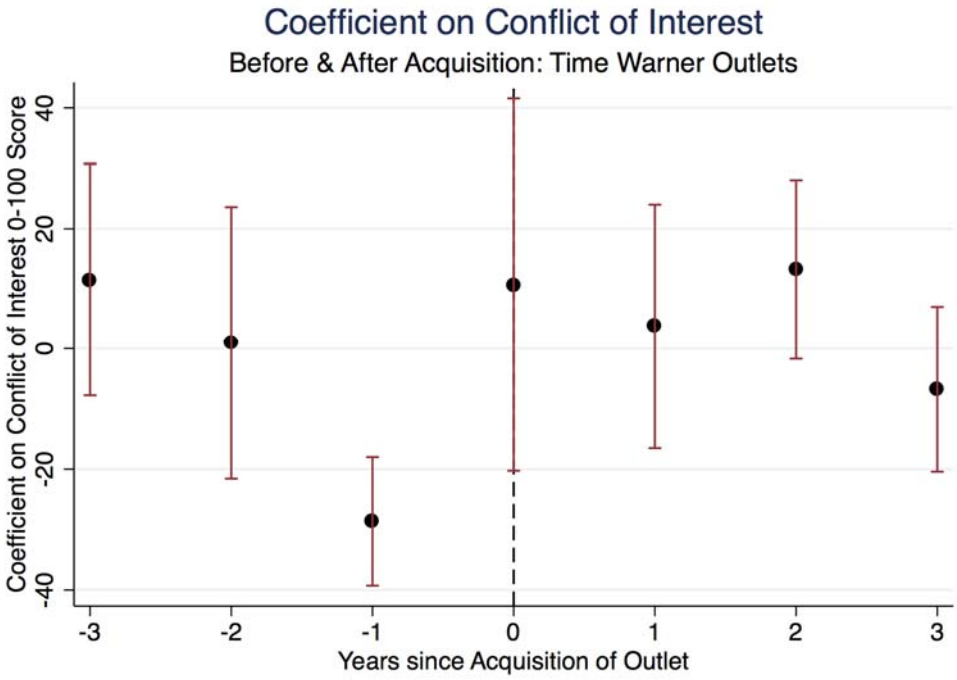




Notes: Online Appendix Figure 4a shows the average absolute distance in the mean review probability by non-News Corp. affiliated outlets between 20th Century Fox movies and 10 matching movies selected by different matching strategies. Matching movies are selected as for Figure 2a. Online Appendix Figure 4b shows parallel evidence of Warner Bros. movies.

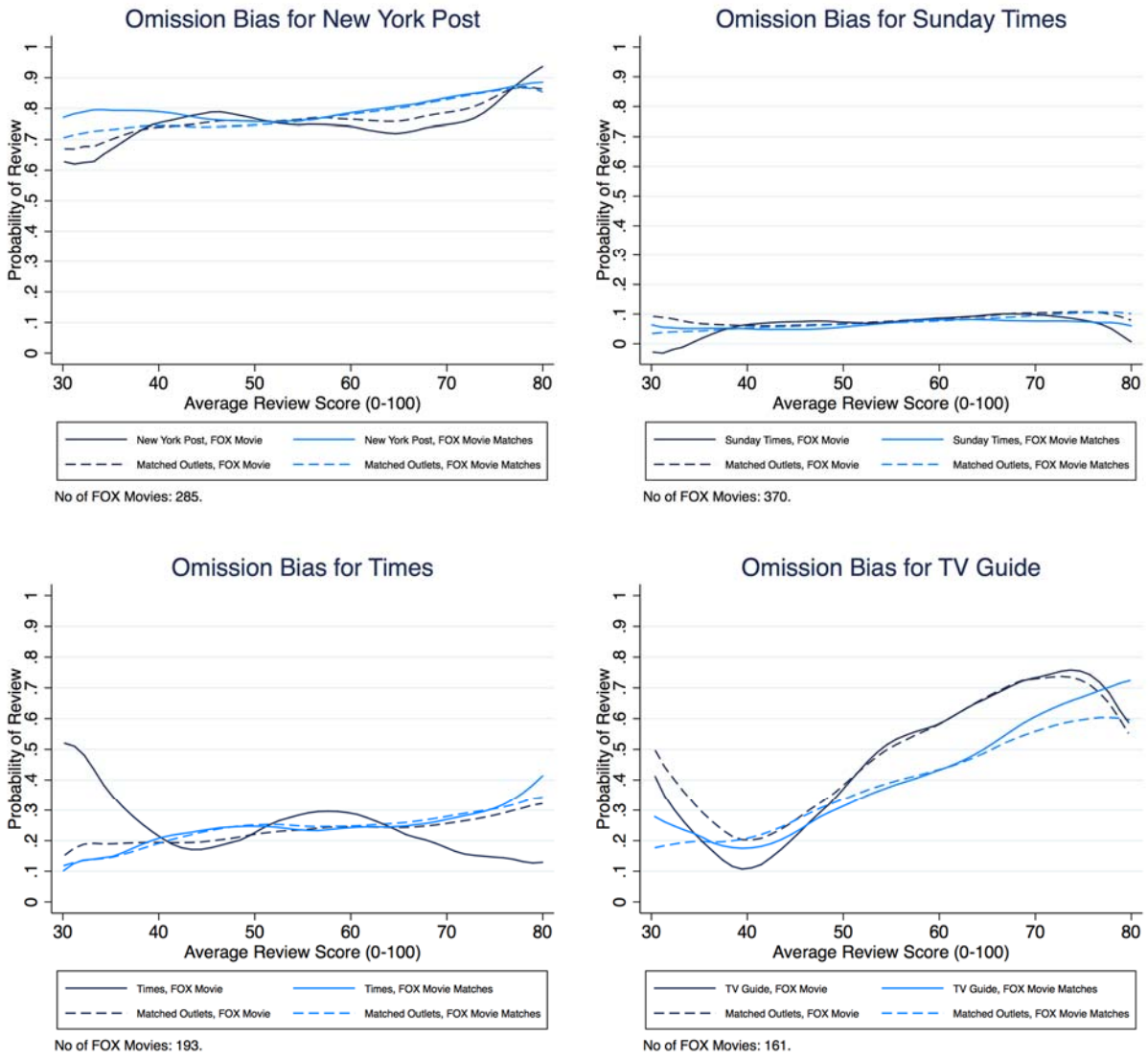
Online Appendix Figures 5a-b. Event Study of Change in Ownership





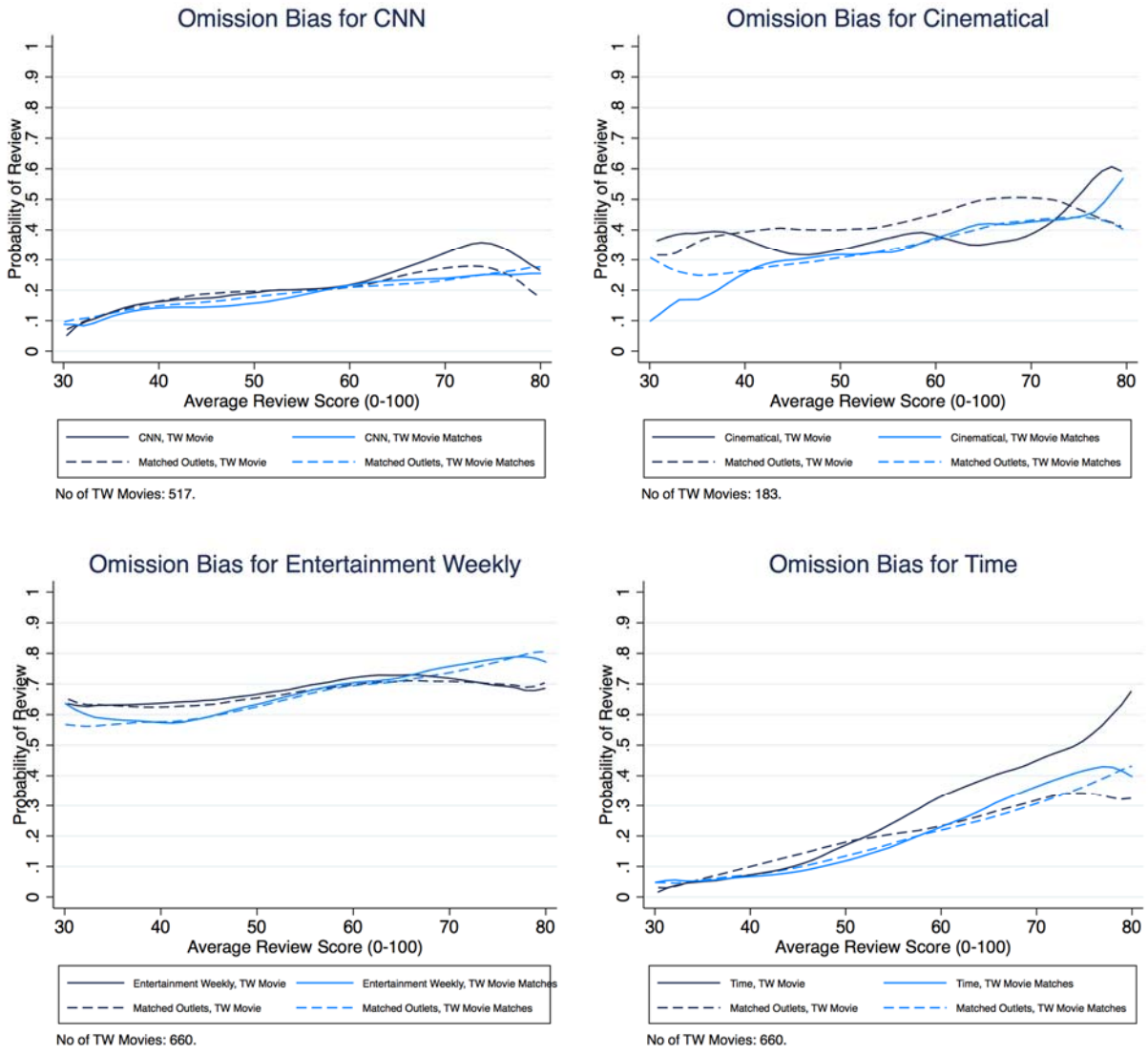
Notes: Online Appendix Figure 5a presents an event study of change in ownership when an outlet is acquired by News Corp (*TV Guide* in 1988, *New York Post* in 1993, *Beliefnet* in 2008, and *Wall Street Journal* in 2008). The figure is constructed by taking the sample of movie reviews by the aforementioned outlets and regressing the 0-100 score variable on time indicators, their interactions with a dummy for distribution by 20th Century Fox, and outlet fixed effects. The figure plots the coefficients on the interactions of time indicators and the dummy for distribution by 20th Century Fox. Online Appendix Figure 5b plots parallel evidence for acquisition by Time Warner (*Entertainment Weekly* in 1990, *Time* in 1990).

Online Appendix Figure 6a-d. Selective coverage -- Probability of review by movie quality: News Corp. outlets



Notes: Online Appendix Figures 6a-d segregates the evidence of Figure 8a for News Corp. outlets. Outlets with less than 50 potential movies to review are not included.

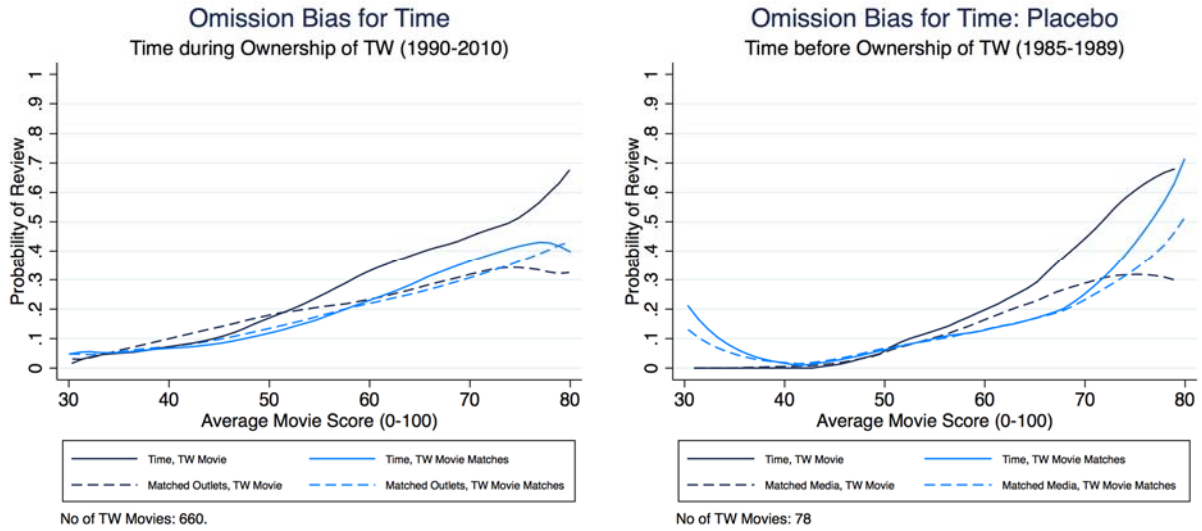
Online Appendix Figure 7a-d. Selective coverage -- Probability of review by movie quality: Time Warner outlets



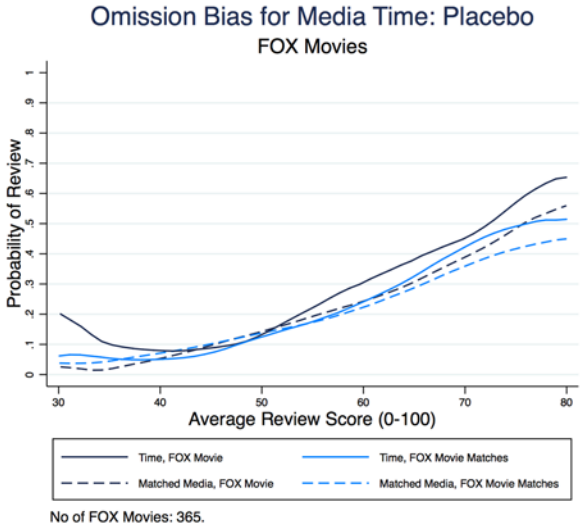
Notes: Online Appendix Figures 7a-d segregates the evidence of Figure 8b for Time Warner outlets.

Online Appendix Figure 8a-c. Selective coverage for Time magazine, Placeboes

Online Appendix Figure 8a-b. Period of Time Warner Ownership (8a) and pre-period (8b)

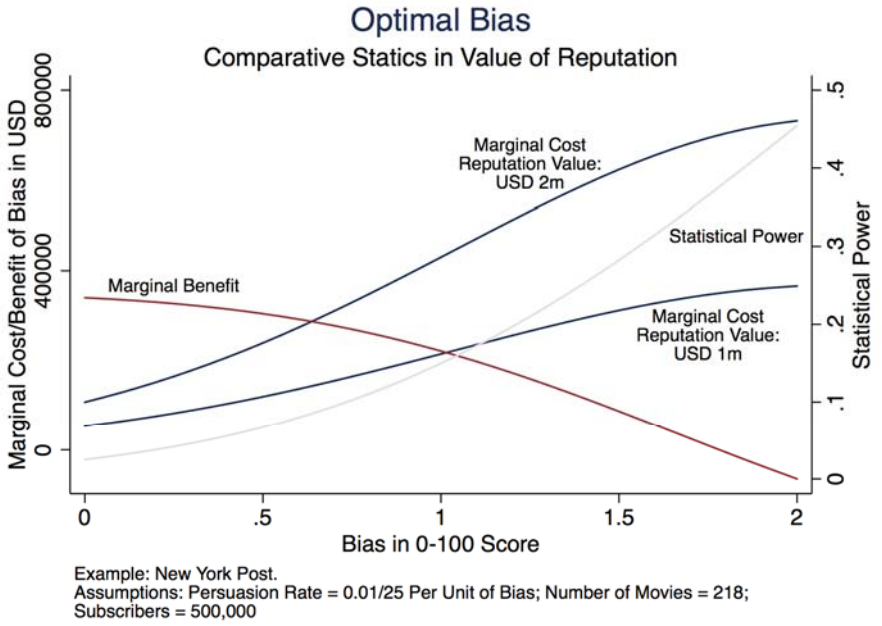


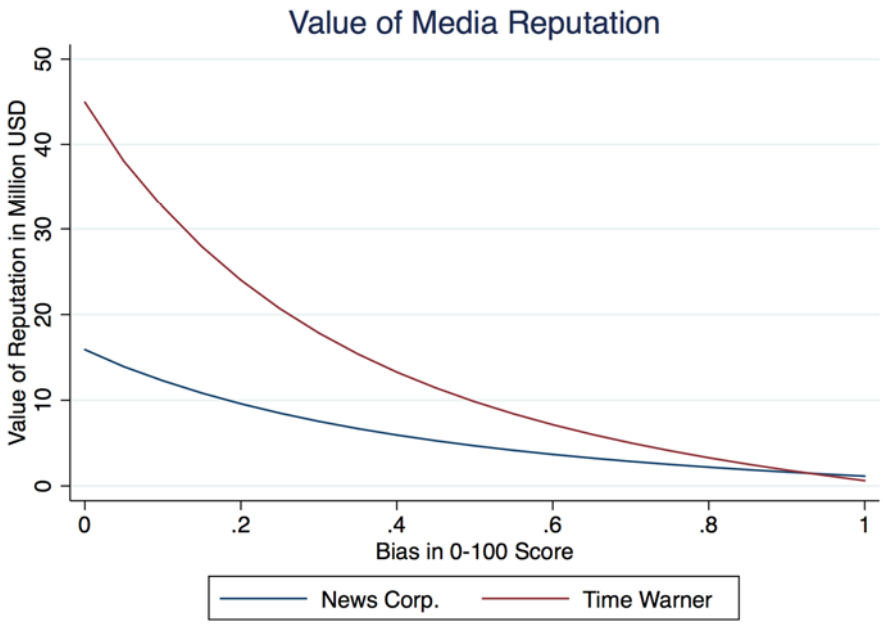
Online Appendix Figure 8c. Probability of Review of 20th Century Fox movies



Notes: Online Appendix Figure 8 presents a placebo test for potential omission bias in the Time Warner outlet *Time.* Online Appendix Figure 8a reproduces the evidence in Online Appendix Figure 7d. Online Appendix Figure 8b shows a placebo test for the period before 1990 in which the Time Warner conglomerate has not been established. For this purpose, movie matches are determined for movies distributed by studios which merged or were acquired by the Time Warner conglomerate at the time of establishment. For simplicity these movies are labeled as TW. Online Appendix Figure 8c shows a placebo test of omission bias by *Time* of 20th Century Fox movies during ownership.

Online Appendix Figures 9a-b. Optimal Bias and Value of Media Reputation





Notes: Online Appendix Figure 9a illustrates the determination of optimal bias for the case of the *New York Post* with two scenarios for the value of media reputation. The gray line indicates the probability of detection as a function of bias, measured by the power of a one-tailed statistical test with the null hypothesis of no bias. The blue lines represent marginal costs of bias which capture the increase in expected loss of reputation. The red line represents marginal benefits of bias which reflect additional revenues from increased tickets sales. The intersection of the two lines characterizes the profit-maximizing level of bias as captured by equation (4). Increasing the assumed value of reputation decreases optimal bias. Online Appendix Figure 9b displays the calibrated implied value of media reputation for the News Corp. and Time Warner conglomerates as a function of bias (expressed in 0-100 score units). The values are calculated from equation (4). We assume revenues of $8 per additional ticket sold and an average audience of 927,500 (computed from circulation data averaged across the media outlets) for the 400 reviews of News Corp. affiliated movies and an average audience of 2,102,400 for the 619 affiliated reviews for Time Warner. We also assume a significance level of .025% for the power calculation and a persuasion rate of 1% per extra star out of 4 (i.e. the persuasion rate is 1/25% for each unit of bias in the score variable). For the value of zero bias, our benchmark estimate, the value of reputation equals $16 million for News Corp. and $45 million for Time Warner.

Online Appendix Table 1. Documenting the Netflix, Flixster data

Dataset	**Flixster**		**MovieLens**		**Netflix**	
	All Movies	Movies: # Reviews $\geq$ 50	All Movies	Movies: # Reviews $\geq$ 50	All Movies	Movies: # Reviews $\geq$ 50
# Users	147612	146586	69865	69865	480189	480189
# Movies	48794	7504	5047	4015	17770	17713
# Reviews	8196077	7880692	7315231	7291554	100480507	100478440
# Reviews/User						
· Average	55.52	53.76	104.70	104.37	209.25	209.25
· p25	2	2	29	29	39	39
· p50	4	4	55	55	96	96
· p75	19	19	117	117	259	259
Rating						
· Average	3.61	3.62	3.44	3.44	3.60	3.60
· p25	3	3	3	3	3	3
· p50	3.5	3.5	3.5	3.5	4	4
· p75	4.5	4.5	4	4	4	4
Rating Scale	0.5 (0.5) 5		0.5 (0.5) 5		1 (1) 5	
Time Span Covered	up to 2010		up to 2004		up to 2005	

Notes: Online Appendix Table 1 reports summary statistics for the three user rating datasets *Flixster*, *MovieLens*, and *Netflix*. Only movies are kept which can be identified with a movie title. Furthermore, for the *MovieLens* and *Netflix* datasets for which information on the release year of the movie is available, we only keep movies for which this information is provided.

ONLINE APPENDIX TABLE 2
CONFLICT OF INTEREST AND MOVIE REVIEWS: ALTERNATIVE CROSS-SECTIONAL ESTIMATES

Specification:	OLS Regressions					
Dependent Variable:	Movie Review on a 0-100 Scale for Movie m in Media Outlet with Conflict of Interest o					
	Cross-sectional Sample			Matching Sample		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. News Corp.						
Indicator for Fox Movie	2.3762***	2.1168***	1.9963***	0.9976	0.8762	0.9644
Corp.)	[0.7495]	[0.7604]	[0.7632]	[0.9881]	[0.9892]	[1.0011]
Average 0-100 review score in control outlets	1.0282***	1.0383***	1.0452***	1.1268***	1.1068***	1.1058***
	[0.0137]	[0.0144]	[0.0149]	[0.0301]	[0.0317]	[0.0341]
Control Variables:						
Genre and MPAA Rating		X	X		X	X
Budget and No. of Theaters			X			X
R^2	0.39	0.39	0.39	0.44	0.45	0.45
Number of Reviews with Conflict of Interest	620	620	620	423	423	423
N	9294	9294	9294	4530	4530	4530
Panel B. Time Warner						
Indicator for Warner Bros. Movie (Measure of Conflict of Interest Time Warner)	-0.7908	-0.4981	-0.5266	-0.1736	0.0049	-0.0343
	[0.6501]	[0.6562]	[0.6612]	[0.8103]	[0.8019]	[0.8051]
Average 0-100 score in control outlets	1.0777***	1.0619***	1.0641***	1.0650***	1.0645***	1.0776***
	[0.0155]	[0.0170]	[0.0180]	[0.0299]	[0.0308]	[0.0336]
Control Variables:						
Genre and PG Rating		X	X		X	X
Budget and No. of Theaters			X			X
R^2	0.44	0.44	0.44	0.43	0.44	0.44
Number of Reviews with Conflict of Interest	842	842	842	691	691	691
N	6413	6413	6413	6983	6983	6983

Notes: An observation is a review of a movie by an outlet owned by News Corp. (Panel A) or Time Warner (Panel B). Each column is a regression of the 0-100 review score on an indicator for whether the particular movie was distributed by an affiliated studio as well as the average score assigned by non-affiliated outlets for the movie. In columns (2) - (4) and (6) - (8) different sets of movie characteristics are included. In these specifications a dummy is included indicating when information on a particular characteristic is missing. Columns (1) - (4) use the full sample of movie reviews, column (5) - (8) the matching sample. The standard errors in parentheses are clustered by movie.

* significant at 10%; ** significant at 5%; *** significant at 1%

ONLINE APPENDIX TABLE 3
THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: ADDITIONAL ROBUSTNESS

Specification:	OLS Regressions				
Dependent Variable:	Movie Review on a 0-100 Scale for Movie *m* in Media Outlet *o*				
	(1)	(2)	(3)	(4)	(5)
Panel A. Newscorp. Media					
Indicator for Fox Movie on News Corp. Outlet	-0.1898	0.4393	0.4966	0.8704	-0.0394
(Measure of Conflict of Interest for News Corp.)	[1.0596]	[1.2296]	[1.1706]	[1.4028]	[1.0478]
R^2	0.45	0.49	0.42	0.55	0.39
Number of Reviews with Conflict of Interest	421	233	358	189	514
N (number of reviews)	291124	169575	253726	129111	322808
Panel B. Time Warner Media					
Indicator for Warner Bros. Movie on TW Outlet	-0.0188	-0.8084	0.8813	-1.3899	0.6058
(Measure of Conflict of Interest Time Warner)	[0.8762]	[1.1111]	[1.0275]	[1.1943]	[0.8355]
R^2	0.47	0.51	0.41	0.54	0.4
Number of Reviews with Conflict of Interest	685	433	567	349	772
N (number of reviews)	450699	289958	376283	225849	490668
Control Variables:					
Movie-Media Group Fixed Effects	X	X	X	X	X
Robustness Check:	Benchmark	Match Uses Only Netflix Data	Match Uses Only Flixter Data	Match Uses Only MovieLens Data	Match Uses Likelihood Ratio Method

Notes: An observation is a movie review by a media outlet from 1985 to 2010. The dependent variable is a movie review converted on the 0-100 scale devised by *metacritic.com* . The standard errors are clustered by movie. Columns (2)-(4) only use one of the three user rating datasets to determine the ten best movie matches of 20th Century Fox or Warner Bros. movies. In column (5) movie matches are determined for each of the three user rating datasets based on a probability measure: For each potential movie match *M* and 20th Century Fox or Warner Bros. movie *F,* we calculate the probability of rating M condititional on rating *F* as *P(M|F),* as well as the unconditional rating probability *P(M)* . For each *F* we select the ten movies with the highest value of *P(M|F)/P(M)* as movie matches. We apply the constraints on the matching procedure explained in Section 2.2, but do not restrict the sample of potential movie matches on those with at least 40 common user ratings. Compared to the baseline scenario this mathing procedure does not take into account the closeness of ratings but the probability of rating.

* significant at 10%; ** significant at 5%; *** significant at 1%

ONLINE APPENDIX TABLE 4

THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: AVERAGE BIAS BY TIME PERIOD

Specification:						
Dependent Variable:	Movie Review on a 0-100 Scale for Movie m in Media Outlet with Conflict of Interest o					
Time Period:	*1985 - 1996*		*1997 - 2003*		*2004 - 2010*	
	(2)	(4)	(2)	(4)	(2)	(4)
Indicator for Fox Movie on News Corp.-Owned (Measure of Conflict of Interest for News Corp.)	-0.5101		0.6653		-0.939	
	[3.5770]		[1.4512]		[1.5706]	
Indicator for 20th Century Fox Movie	1.6872		-0.4008		-1.2607	
	[1.3042]		[0.6176]		[0.8280]	
Indicator for Media Outlet Owned by News Corp.	-2.6109		1.4001		-0.334	
	[3.7356]		[1.3043]		[2.7005]	
Indicator for Warner Bros. Movie on TW-Owned (Measure of Conflict of Interest for Time Warner)		-1.4164		-1.2641		1.4945
		[2.7411]		[1.2165]		[1.3300]
Indicator for Warner Brothers Movie		-0.6569		-0.4979		-0.7817
		[1.1950]		[0.5471]		[0.6756]
Indicator for Media Outlet Owned by Time Warner						-26.4621***
						[5.5540]
Movie-Media Group Fixed Effects	X	X	X	X	X	X
R^2	0.52	0.5	0.48	0.52	0.42	0.42
Number of Reviews with Conflict of Interest	58	90	151	295	212	298
N (number of reviews)	13434	17738	116239	202386	161451	229623

Notes: An observation is a movie review by a media outlet from 1985 to 2010. The dependent variable is a movie review converted on the 0-100 scale devised by *metacritic.com* . The standard errors are clustered by movie.

* significant at 10%; ** significant at 5%; *** significant at 1%

ONLINE APPENDIX TABLE 5
CONFLICT OF INTEREST IN MOVIE REVIEWS: EVIDENCE ON CORRELATED TASTES

Specification:	OLS Regressions				
Dependent Variable:	Movie Review on a 0-100 Scale for Movie *m* in Media Outlet *o*				
	(1)	(2)	(3)	(4)	(5)
Panel A. News Corp.					
Indicator for News Corp.-Owned Outlet	-2.1225***	-2.0614***	-1.6554***	-2.0787***	-1.8792***
	[0.4972]	[0.5158]	[0.4968]	[0.6664]	[0.5135]
Indicator for News Corp.-Owned Outlet * Movie Match to a 20th Century Fox Movie	1.5952***				
	[0.4680]				
Indicator for News Corp.-Owned Outlet * Predicted Prob. Of Being a 20th Century Fox Movie Based on Characteristic (Standardized)		0.4868**	-0.1505	-0.1873	0.2459
		[0.2251]	[0.2178]	[0.3137]	[0.2169]
R^2	0.45	0.45	0.45	0.46	0.45
First Stage Chi^2		147.31	60.53	17.51	151.05
N (number of reviews)	429994	351293	378975	224816	358940
Panel B. Time Warner					
Indicator for Time Warner-Owned Outlet	2.2712	1.0276	1.7354	0.2018	0.4371
	[1.4649]	[1.5769]	[1.5121]	[2.0935]	[1.5784]
Indicator for Time Warner-Owned Outlet * Movie Match to a Warner Bros. Movie	-1.4856***				
	[0.4882]				
Indicator for Time Warner-Owned Outlet * Predicted Prob. Of Being a Warner Bros. Movie Based on Characteristic (Standardized)		-0.5626**	-0.5647**	-0.0197	0.1692
		[0.2264]	[0.2271]	[0.3297]	[0.2409]
R^2	0.45	0.45	0.45	0.46	0.45
First Stage Chi^2		104.74	29.31	100.64	338.48
N (number of reviews)	409096	332649	358257	210258	340145
Sample:	Excludes Movies with Conflict of Interest (20th Century Fox movies in Panel A and Warner Bros. movies in Panel B)				
Proxy Used and Controls:					
Characteristic of Movie Used to Predict Probability of Being a 20th Century Fox (Warner Bros.) Movie		Genre	MPAA Rating	Decile of Budget of Production	Decile of No. of Theaters at Opening
Movie and Media Fixed Effects	X	X	X	X	X

Notes: An observation is a movie review by a media outlet from 1985 to 2010. In column (1) a 0-1 indicator for whether a movie is a match to a 20th Century Fox or Warner Bros. movie is interacted with the dummy indicating News Corp. or Time Warner ownership. In columns (2)-(5) the ownership variable is interacted with a probability measure of being a 20th Century Fox or Warner Bros. movie. This measure is obtained after predicting from a probit regression and standardized by subtracting the mean and dividing by the standard deviation. In columns (4)-(5) the probability is estimated from a probit regression of an indicator for a 20th Century Fox or Warner Bros. movie on the decile of the budget of production and the number of theaters at opening as a categorical variable. Deciles are determined within 5-year intervals. In columns (2)-(3) the probability is estimated using the categories for genre and MPAA Rating respectively. Standard errors are clustered at the movie level.

* significant at 10%; ** significant at 5%; *** significant at 1%

ONLINE APPENDIX TABLE 6

CONFLICT OF INTEREST IN MOVIE REVIEWS: COMPARATIVE STATICS ON RETURN TO BIAS

Specification:	OLS Regressions			
Dependent Variable:	Movie Review on a 0-100 Scale for Movie *m* in Media Outlet *o*			
	(1)	(2)	(3)	(4)
Panel A. News Corp.				
Indicator for Fox Movie on News Corp.-Owned Outlet	-1.1754	-0.4953	-2.4027	-3.1797
(Measure of Conflict of Interest for News Corp.)	[2.0402]	[2.2611]	[2.0722]	[2.2124]
Indicator for Fox Movie on News Corp.-Owned Outlet *	1.4372	0.2996	0.3916	0.5539
Proxy for Higher Return to Biased Review	[2.3503]	[0.3845]	[0.3529]	[0.3730]
R^2	0.45	0.45	0.45	0.45
Number of Reviews with Conflict of Interest	421	308	410	416
N (number of reviews)	291124	231731	282908	285171
Panel B. Time Warner				
Indicator for Warner Bros. Movie on TW Outlet	-0.6096	-2.6253	-0.4526	-0.7714
(Measure of Conflict of Interest Time Warner)	[1.2862]	[1.9628]	[1.6518]	[1.8568]
Indicator for Warner Bros. Movie on TW Outlet*	0.9219	0.3941	0.1042	0.1568
Proxy for Higher Return to Biased Review	[1.6193]	[0.3088]	[0.2626]	[0.2824]
Proxy Used and Controls:				
Proxy for Higher Return to Biased Review	Indicator for Major Studio	Decile of Budget of Production	Decile of No. of Theaters at Opening	Decile of Domestic Box Office
Movie-Media Group Fixed Effects	X	X	X	X
Interaction of Proxy with Fox Movie Indicator and with Newscorp Outlet Dummy	X	X	X	X
R^2	0.47	0.47	0.47	0.47
Number of Reviews with Conflict of Interest	685	508	651	664
N (number of reviews)	450699	362124	437617	438888

Notes: An observation is a movie review by a media outlet from 1985 to 2010. In column (1) in each movie group an indicator for whether the 20th Century Fox or Warner Bros. movie is distributed by a major studio is interacted with the independent variables. In column (2)-(4) for each movie group the decile of the 20th Century Fox or Warner Bros. movie (on a 1-10 scale) is interacted with the independent variables. Deciles are determined by grouping the 20th Century Fox or Time Warner movies in 5-year bins and calculating the deciles within each bin. Note that the indicator or decile is unique in each movie group, and thus drops out given the movie-media group fixed effects. The standard errors are clustered by movie.

* significant at 10%; ** significant at 5%; *** significant at 1%

ONLINE APPENDIX TABLE 7
THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: BY MEDIA

Specification:	OLS Regressions							
Dependent Variable:	Movie Review on a 0-100 Scale for Movie *m* in Media Outlet *o*							
Panel A.	*News Corp.* Conflict of Interest							
	Chicago Sun-Times *(Newspaper)*	*New York Post* *(Newspaper)*	*News of the World* *(Periodical)*	*TV Guide* *(Periodical)*	*Times (UK)* *(Newspaper)*	*Wall Street Journal* *(Newspaper)*	*Beliefnet* *(Website)*	*Sunday Times* *(Periodical)*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Indicator for Conflict of Interest	2.5127	0.2199	-5.0183	2.511	0.1757	-5.6647	6.5099*	-10.6627
	[13.3612]	[1.3749]	[5.2413]	[2.0285]	[3.5440]	[6.1939]	[3.4456]	[8.9528]
Control Variables:								
Movie-Media Group Fixed Effects	X	X	X	X	X	X	X	X
R^2	0.74	0.43	0.51	0.46	0.48	0.55	0.43	0.68
Number of Reviews with Conflict of Interest	13	218	7	73	39	16	21	16
N	175	80893	385	4291	7864	3449	5164	425

Panel B.	*Time Warner* Conflict of Interest			
	CNN.com *(Website)*	*Entertain-ment Weekly* *(Periodical)*	*Time* *(Periodical)*	*Cinematical* *(Website)*
	(1)	(2)	(3)	(4)
Indicator for Conflict of Interest	2.9934	0.2867	-1.3163	-0.8736
	[9.1685]	[1.0133]	[1.8524]	[3.1975]
Control Variables:				
Movie-Media Group Fixed Effects	X	X	X	X
R^2	0.47	0.44	0.5	0.53
Number of Reviews with Conflict of Interest	2	463	146	60
N	283	66879	11640	14299

Notes: An observation is a movie review by a media outlet from 1985 to 2010. Each column is a separate regression including as observations only movies with at least one review by the featured outlet, and as independent variables indicator variables for the outlet and for production by the conflicted distributing company (20th Century Fox and Warner Bros.). Control outlets are restricted to those of the same media type as the outlet with conflict of interest, which is either "newspaper", "periodical", or "website". All specifications include fixed effects for the movie-media group.The standard errors in parentheses are clustered by movie.
* significant at 10%; ** significant at 5%; *** significant at 1%

ONLINE APPENDIX TABLE 8
THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: BY REVIEWER

Specification:	OLS Regressions							
Dependent Variable:	Movie Review on a 0-100 Scale for Movie *m* in Media Outlet *o*							
Panel A.	*News Corp.* Conflict of Interest							
	New York Post				*TV Guide*	*Beliefnet*	*Times (UK)*	*Wall Street Journal*
	Lou Loumenick	Kyle Smith	Jonathan Foreman	Megan Lehmann	Maitland McDonagh	Nell Minow	James Christopher	Joe Morgenstern
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Indicator for Conflict of Interest	1.8109	0.339	-3.8099	-0.368	6.3402**	6.2866*	0.7005	-4.5947
	[1.9946]	[4.2489]	[4.3026]	[4.1527]	[2.9709]	[3.3805]	[6.6586]	[6.4825]
Control Variables:								
Movie-Media Group Fixed Effects	X	X	X	X	X	X	X	X
R^2	0.5	0.51	0.68	0.68	0.54	0.43	0.64	0.61
Number of Reviews with Conflict of Interest	103	46	28	20	29	21	18	15
N	73641	24666	10115	8249	7818	11184	6814	7794

Panel B.	Time Warner Conflict of Interest			
	Entertainment Weekly		*Time*	
	Owen Gleiberman	Lisa Schwarzbaum	Richard Corliss	Richard Schickel
	(1)	(2)	(3)	(4)
Indicator for Conflict of Interest	0.7818	0.7173	1.423	-5.9921*
	[1.5304]	[1.5697]	[2.6838]	[3.4257]
Control Variables:				
Movie-Media Group Fixed Effects	X	X	X	X
R^2	0.55	0.56	0.56	0.67
Number of Reviews with Conflict of Interest	225	174	74	50
N	117097	100662	33894	15064

Notes: An observation is a movie review by a journalist from 1985 to 2010. Each column is a separate regression including as observations only movies with at least one review by the featured journalist and as independent variables indicator variables for the outlet and for production by the conflicted distributing company (20th Century Fox and Warner Bros.). Reviews by other journalist from the same conglomerate are taken out. All specifications include fixed effects for the movie-media group.The standard errors in parentheses are clustered by movie.

* significant at 10%; ** significant at 5%; *** significant at 1%

ONLINE APPENDIX TABLE 9
CONFLICT OF INTEREST AND OMISSION BIAS: BY MEDIA OUTLET

Specification:	OLS Regressions							
Dependent Variable:	Indicator variable for review of movie *m* by media outlet *o*							
Panel A.	*News Corp.* Conflict of Interest							
	Chicago SunTimes	*New York Post*	*News of the World*	*TV Guide*	*Times (UK)*	*Wall Street Journal*	*Beliefnet*	*Sunday Times*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Conflict of Interest *	-0.02578***	0.00186	-0.00164	-0.00041	-0.00232	-0.0013	-0.00315	0.00048
Average Rating	[0.00857]	[0.00124]	[0.00375]	[0.00150]	[0.00207]	[0.00448]	[0.00542]	[0.00107]
Conflict of Interest	1.67750***	-0.10598	0.12088	0.00573	0.13175	-0.01133	0.17137	-0.01561
	[0.49981]	[0.07619]	[0.21264]	[0.08316]	[0.11634]	[0.23296]	[0.29734]	[0.05892]
Control Variables:								
Movie-Media Group F.E.	X	X	X	X	X	X	X	X
Sample:	Potential review in featured media and in 10 matched media (match based on minimum distance in review probability)							
R^2	0.37	0.37	0.24	0.34	0.26	0.27	0.2	0.28
Number of Fox movies in sample	19	285	44	161	193	35	35	370
N	1045	32285	3036	16940	20537	2695	2684	41470

Panel B.	*Time Warner* Conflict of Interest			
	CNN.com	*Entertainment Weekly*	*Time*	*Cinematical*
	(1)	(2)	(3)	(4)
Conflict of Interest *	0.00088	-0.00097	0.00239**	-0.00426
Average Rating	[0.00129]	[0.00072]	[0.00109]	[0.00288]
Conflict of Interest	-0.03184	0.06471	-0.09498*	0.1907
	[0.07376]	[0.04185]	[0.05696]	[0.16413]
Control Variables:				
Movie-Media Group F.E.	X	X	X	X
Sample:	Potential review in featured media and in 10 matched media (match based on minimum distance in review probability)			
R^2	0.28	0.44	0.34	0.26
Number of Warner Bros. movies in samp	517	660	660	183
N	58916	78529	78529	18414

Notes: Each column is a separate regression including as observations potential movie reviews by the featured media outlet, or by any of 10 matched media, with match based on minimum distance in probability of reviews as described in Figure 8. The sample only includes years in which the media featured in the relevant column is owned by News Corp. or Time Warner. The average score is computed as the average 0-100 score for a movie from all media outlets. The standard errors in parentheses are clustered by movie.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix A, Survey

We conducted an online survey on the Amazon MTurk platform involving 611 participants to measure the perception of conflict of interest in movie reviews. The survey's advertisement read:

Answer a survey, which will take no more than 10 minutes, about movie reviews and media companies. In order to participate, you should have read movie reviews in the past.

We elicited the perception of bias in three different ways: (i) qualitatively, (ii) quantitatively, (iii) through revealed preferences. Furthermore, we assessed the knowledge of conflict of interest.

Qualitative Assessment of Bias:

In the following questions, you are presented different situations in which you are asked to indicate how likely you think it is that media bias will arise.

Consider a finance magazine (e.g., Money) which has received high advertising revenue from a particular mutual fund in the past. How likely do you think is it that the finance magazine biases its investment recommendations toward the mutual fund?

Consider a media group (e.g., News Corp) which owns newspapers (such as The Wall Street Journal) as well as movie production studios (such as 21st Century Fox). How likely do you think is it that a newspaper in this media group biases movie reviews toward movies distributed by studios in the same media group?

Consider a wine magazine (e.g., Wine Spectator) which gives awards to high-quality wines and has received a high advertisement revenue from a particular winery in the past. How likely do you think is it that the wine magazine biases its award decision toward a wine of the particular winery?

Quantitative Assessment of Bias:

Participants were presented with short background information about a movie distributed by 20th Century Fox (*The Day After Tomorrow*, *Life of Pi*) or Time Warner (*The Hangover II*, *The Matrix*). Respondents were then asked to predict the 0-4 star rating in News Corp. (*Wall Street Journal*, *New York Post*), Time Warner (*Time Magazine*, *Entertainment Weekly*), and control outlets. Participants in the conflict of interest treatment were given information about the cross-ownership structure of the two conglomerates. Participants in the control treatment were not given any such information. Exemplarily, the item on the movie The Day After Tomorrow read:

The disaster film The Day After Tomorrow (2004) distributed by 20th Century Fox tells a story about a fictional ice age due to climate change. The movie received a Tomatometer score of 45% as well as an Audience Score of 50%.

[Displayed in conflict of interest treatment:] *Note that the movie distribution company 20th Century Fox and the newspaper New York Post were held by the same media conglomerate, Rupert Murdoch's News Corporation. Therefore, a more positive review in the New York Post could be used to generate a higher audience for this particular movie.*

Assume that all of the following newspapers use the described 4-star rating scale. Without collecting information online how many stars do you think The Day After Tomorrow got in reviews by:

Wall Street Journal – New York Post – Time Magazine – Entertainment Weekly – Control Outlet

0.0 – 0.5 – 1.0 – 1.5 – 2.0 – 2.5 – 3.0 – 3.5 – 4.0

Assessment of Bias through Revealed Preferences:

Participants were presented with favorable reviews of movies distributed by 20th Century Fox (*Black Swan*, *Unstoppable*, *Walk the Line*), Warner Bros. (*The Sweet Hereafter*, *Dark City*, *Superman Returns*), and a control movie (13 Assassins). Participants in the conflict of interest treatment were given information about the cross-ownership structure of the two conglomerates. Participants in the control treatment were not given any such information. Exemplarily, the item on the movie Black Swan read:

An excerpt of the New York Post review for the movie Black Swan (2010), distributed by Fox Searchlight Pictures, is provided below.

[Displayed in conflict of interest treatment:] *Please note that Fox Searchlight Pictures and the New York Post were held by the same media conglomerate, News Corp. Therefore, a more positive review in the New York Post could be used to generate a higher audience for this particular movie.*

[Movie Review]

After reading this review, please rate — on a scale of 0 to 10 — your level of interest in viewing this film:
0 (Not at all) – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 (Very much so)

Knowledge of Conflict of Interest:

Without doing any online searches, which of the following media holdings do you think are or were owned by News Corp.? (Select all that apply.)
New York Times – CNN – Wall Street Journal – 20th Century Fox – Warner Bros. – Entertainment Weekly – Time Magazine – Washington Post – New York Post – MGM

Without doing any online searches, which of the following media do you think are or were owned by Time Warner? (Select all that apply.)
New York Times – CNN – Wall Street Journal – 20th Century Fox – Warner Bros. – Entertainment Weekly – Time Magazine – Washington Post – New York Post – MGM