

Does Media Concentration Lead to Biased Coverage? Evidence from Movie Reviews*

Stefano DellaVigna
UC Berkeley and NBER
sdellavi@berkeley.edu

Alec Kennedy
San Francisco Federal Reserve Bank
aleck188@gmail.com

October 20, 2011

Abstract

Fueled by the need to cut costs in a competitive industry, media companies have become increasingly concentrated. But is this consolidation without costs for the quality of information? Concentrated media companies generate a conflict of interest: a media outlet can bias its coverage to benefit companies in the same group. We test empirically for bias by examining movie reviews by media outlets owned by News Corp.—such as the *Wall Street Journal*—and by Time Warner—such as *Time*. We find a statistically significant, if small, bias in the review score for 20th Century Fox movies in the News Corp. outlets. We detect no bias for Warner Bros. movies in the reviews of the Time Warner outlets, but find instead some evidence of bias by omission: the media in this group are more likely to review highly-rated movies by affiliated studios. Using the wealth of detail in the data, we present evidence regarding bias by individual reviewer, and also biases in the editorial assignment of review tasks. We conclude that reputation limits the extent of bias due to conflict of interest, but that nonetheless powerful biasing forces are at work due to consolidation in the media industry.

*Preliminary, do not cite without permission. Ivan Balbuzanov, Tristan Gagnon-Bartsch, and Xiaoyu Xia provided excellent research assistance. We thank Marianne Bertrand, Saurabh Bhargava, Lucas Davis, Matthew Gentzkow, Austan Goolsbee, Jesse Shapiro, Noam Yuchtman, and audiences at Brown University, Boston University, Chicago Booth, and UC Berkeley for very helpful comments. We also thank Bruce Nash for access to data from *the-numbers*, as well as helpful clarifications about the industry.

1 Introduction

On Dec. 13, 2007, News Corp. officially acquired Dow Jones & Company, and hence the *Wall Street Journal*, from the Bancroft family. The acquisition was controversial in part because of concerns about a conflict of interest. Unlike the Bancroft family whose holdings were limited to Dow Jones & Company, Murdoch's business holdings through News Corp. include a movie production studio (20th Century Fox), cable channels such as Fox Sports and Fox News, and satellite televisions in the Sky group, among others. The coverage in the *Wall Street Journal* of businesses in these sectors may be biased to benefit the owner of the Journal, Newscorp.

The *Wall Street Journal* case is hardly unique. Media outlets are increasingly owned by large corporations, such as Comcast, which owns NBC and Telemundo, the Hearst Corporation, which owns a network of magazines and newspapers as well as ESPN, and Time Warner, which owns AOL, Time, and other newspapers and magazines. Indeed, in the highly competitive media industry, consolidation with the ensuing economies of scale is widely seen as a necessary condition for survival. But is this consolidation without cost for the quality of coverage given the ensuing conflicts of interest?

Addressing this question is important, since the potential biases in coverage can translate into a serious policy concern in the presence of sizeable persuasion effect from the media (e.g., DellaVigna and Kaplan, 2007; Gerber, Karlan, and Bergan, 2009; Enikolopov, Petrova, and Zhuravskaya, forthcoming). Based on these and other studies, DellaVigna and Gentzkow (2010) suggest as a benchmark estimate that on average 5 to 10 percent of the audience is persuaded by messages of the media. In the presence of such sizeable persuasion, distortions in media coverage can lead to significant welfare losses.

Yet should we expect coverage to be biased due to consolidation? Economic theory provides no obvious response. If consumers can detect the bias in coverage due to cross-holdings and if media reputation is paramount, no bias should necessarily occur. If consumers instead do not detect the bias perhaps because they are unaware of the cross-holding, as in a simple model we present, coverage in the conglomerate will be biased.

Despite the importance of this question, we know of no systematic evidence on distortions in coverage induced by cross-holdings. In this paper, we provide such evidence. We focus on two groups—News Corp. and Time-Warner—and measure how media outlets in these groups review movies distributed by an affiliate in the group—20th Century Fox and Warner Bros. Pictures, respectively. The advantage of focusing on movie reviews is that they are frequent, easily quantifiable, and are believed to influence ticket sales (Reinstein and Snyder, 2005), with clear monetary benefits to the studio distributing the movie. As such, they are a target of potential distortion by the media company.

The identification of bias is transparent. We compare the review of, say, *Avatar* (distributed by 20th Century Fox) by the *Wall Street Journal* to the reviews by outlets not owned by News

Corp. Since the *Wall Street Journal* may have a different evaluation scale from other reviewers, we use as a further control group the reviews of movies distributed by a different studio, such as Paramount. If the *Wall Street Journal* provides systematically more positive reviews for 20th Century Fox movies, but not for Paramount movies, we conclude that conflict of interest induces a bias. In short, the empirical strategy is a difference-in-difference comparison.

We use a data set of over half a million reviews for movies released from 1985 (year in which Newscorp. acquired 20th Century Fox) until 2011. The data sources for the reviews are two online aggregators, Metacritic and RottenTomatoes. We compare the movie reviews by 327 outlets with no conflict of interest (known to us) to the movie reviews issued by nine media outlets with cross-holdings. Six 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 York Post* (owned from 1993), and *Wall Street Journal* (owned from 2008), the U.K. newspapers *News of the World* and *Times*, and the weekly *TV Guide* (from 1988 until 1999). Three media outlets are owned by Time-Warner—the weekly magazines *Entertainment Weekly* and *Time* and the website *CNN.com*. For these outlets we compare the reviews for movies distributed by an affiliated studio (including also distributors of independent movies, such as Fox Searchlight and New Line) to reviews of movies by other studios.

We find differing results for the two media groups on the impact of conflict of interest. For the media outlets owned by News Corp., in the more comprehensive empirical specification we find that these media outlets give a more positive review to the 20th Century Fox movies by 2.6 points out of 100. The effect is relatively small, the equivalent of raising the review score by one star (on a zero-to-four scale) for one out of ten movies. Still, it is a statistically and economically significant difference, and the effect is larger in the specification with controls than in the specification without, suggesting that unobservables may bias the estimates, if anything, downward (Altonji, Elder, Taber, 2006). The effect is statistically significant, and economically larger, on the ‘freshness’ indicator employed by Rottentomatoes to classify reviews.

For the media outlets owned by Time Warner, we find no evidence of bias due to cross-holdings. The finding of no bias is not due to lack of power, since we can reject any bias in the reviews larger than 0.7 out of 100 points. In fact, we reject the hypothesis that the bias due to conflict of interest is the same for the two conglomerates. We also find no evidence of bias using the ‘freshness’ indicator.

The unusually detailed information embedded in movie reviews allows us to provide some evidence on the most likely channels through which bias may occur: (i) an explicit editorial policy conveyed to the journalists; (ii) bias by a journalist ultimately due to the conflict of interest, but lacking editorial pressure; (iii) correlation in taste between the media reviewer (or the media audience) and the affiliated studio. To test for the different explanations, we present evidence on clustering of bias within a conglomerate, on editorial policies, on selective bias by type of movie, and on omission of reviews.

First, in the presence of an editorial policy or correlated tastes, but less so if bias represents idiosyncratic behavior, the bias should be similar in most media outlets within a conglomerate. Given that each outlet employs only a small number of reviewers, we go further and test for bias *by journalist* for the media with sufficient reviews in the data.

Within the Newscorp. media, the bias is statistically significant only for the *New York Post*, but is similar in size (though less precisely estimated) for *Chicago Sun-Times*, *News of the World*, and *TV Guide*. There is marginally significant evidence of bias on the ‘freshness’ score for the *Wall Street Journal*, though not on the 0-100 score. In addition, we detect statistical evidence of bias for 3 out of the 4 main *New York Post* reviewers, and for 1 of the 2 main *TV Guide* reviewers. Within the Time Warner media, we find no evidence of bias when considering separately *Entertainment Weekly*, *Time* and *CNN.com*, nor for any of the major reviewers in these outlets. The commonality of bias in the Newscorp. outlets, but not in the Time Warner outlets, suggests the possibility of a common factor within one conglomerate but not the other, such as editorial policies. The results could also be due to correlated tastes, although it is not obvious why this would not apply to the Time Warner outlets.

Second, we test directly for editorial policies to implement bias, both with regard to the dismissal of reviewers who turn out to be too independent, and assignment of movies to different reviewers. There is no evidence that in media which changed ownership, reviewers are dismissed or new reviewers are hired. We also find no evidence that affiliated movies are more likely to be assigned to reviewers who are on average less critical, despite significant differences across reviewers. Similarly, there is no evidence of selective assignment to reviewers who display more (estimated) bias. These results suggest that the observed bias is unlikely to represent an institutionalized editorial policy, of which we find no evidence. The results so far thus support either the possibility of a (correlated) journalistic decision, or correlated tastes.

Third, we provide evidence to separate these two explanations. As we illustrate in a simple model, if bias is due to a journalistic decision, bias should be larger for movies for which the marginal benefit of bias is larger, holding constant the (reputational) marginal cost. If bias reflects correlated tastes, it would presumably instead be similar across different affiliated movies. While we do not have direct evidence on the marginal return to a higher score, the return is likely to be lowest for movies that are rated negatively by other reviewers, since the bias would have to be very significant to induce movie attendance. Indeed, in the *New York Post*, the bias is concentrated among the movies which reviewers in other media rate positively, with qualitative evidence of such pattern also for the *Wall Street Journal*. This suggests that the bias in these outlets is more likely due to intentional bias, rather than correlated tastes. We do not find this same pattern in the other Newscorp. media outlets (though the samples are small) or in the Time Warner outlets.

Fourth, we present further evidence on these two explanations by examining *bias by omission*. A reviewer that intends to benefit an affiliated studio may selectively review only above-

average movies by this studio; this pattern is unlikely instead to be generated by correlated tastes. Interestingly, we find no consistent evidence of bias by omission for the News Corp. outlets, but we find evidence for two of the Time Warner outlets: *CNN.com* and *Time magazine*. We also examine, using a smaller data set, a related form of omission bias, whether media outlets write longer reviews and are less likely to delay a review for high-quality affiliated movies. We find that Time Warner outlets write longer earlier reviews for the Warner Bros. movies; however, this pattern does not depend on the movie quality, unlike for the omission of review. This evidence suggests that some journalistic bias due to conflict of interest also takes place within the Time Warner outlets, and that bias by omission and bias by commission are substitutes, rather than complements.

We conclude the empirical analysis by providing one last piece of evidence on conflict of interest due to cross-holdings. While the results so far focus on conflict of interest for movie reviewers, the conflict of interest induced by consolidation hardly stops there. Indeed, one of the review aggregators which we use in this study—Rottentomatoes—is itself at risk of conflict of interest: independent when launched in 1998, it was acquired by News Corp. in September 2005 and then divested in January of 2010. This ownership structure generates an incentive for RottenTomatoes to assign more positive reviews (its ‘freshness’ indicator) of 20th Century Fox movies during the period of Newscorp. ownership. Interestingly, we find no evidence of such distortion. The test of distortion has high power because we can compare the Rottentomatoes rating to the Metacritic score for the *same* movie review. Most tellingly, we find no bias even when bias would be hardest to detect (and hence presumably most likely), for unscored reviews which are evaluated qualitatively by the Rottentomatoes staff.

Overall, these results have two main implications. On the one hand, reputation-based incentives are quite effective at limiting the occurrence of bias: we find no evidence of explicit editorial bias, such as in the assignment of movies to reviewers, no evidence of bias among the aggregators, and quantitatively small (if statistically significant) evidence of reviewer bias. On the other hand, bias does occur on situation, and that biasing strategies can be sophisticated, such as in the case of seemingly strategic bias for the *New York Post*, or the omission bias for *Time* magazine and *CNN.com*. This suggests that the potential for bias is always lurking, were reputational concerns not strong enough. As we discussed, while several of the results are consistent with the observed bias being due simply to correlated tastes, the findings of selective bias and omission bias are best explained by conflict of interest.

We use the estimated impact of media bias on movie reviews to compute a back-of-the-envelope bound for the value of a reputation. We assume that an extra star (our of 4) persuades 1 percent of readers to watch a movie. This persuasion rate is in the lower range of the estimated persuasion rates (DellaVigna and Gentzkow, 2010) and is significantly smaller than the estimated impact of media reviews of Reinstein and Snyder (2005), though admittedly we have no direct evidence. Under this assumption, an extra star in a single movie review for a

20th Century Fox in a newspaper like the *New York Post* with a circulation of about 500,000 readers would add approximately \$40,000 in profits for Newscorp. If the *New York Post* had biased by one star all reviews for the 481 20th Century Fox movies released since 1993, the increased profit could have been nearly \$20m. The fact that such systematic bias did not take place indicates that the value of the *New York Post* reputation is larger. We do, however, find a bias of one star every ten reviews, for an overall estimated benefit to Newscorp. of \$2m.

This paper relates to the literature on conflict of interest. Analysts employed by investment banks which recently undertook an IPO or SEO for the company covered display significantly biased recommendations (Hong and Kubik, 2003; Richardson et al., 2004; Malmendier and Shanthikumar, 2007). Compared to these papers, we find more nuanced evidence of bias. Interestingly, this occurs despite the fact that the conflict of interest is typically not disclosed¹ (Cain, Loewenstein, and Moore, 2005). Turning to conflict of interest in the media, Reuter and Zitzewitz (2006) find evidence that media outlets bias their coverage to earn advertising revenue. While the conflict of interest with advertisers is unavoidable for media outlets, we investigate the additional conflict of interest due to cross-holdings.

A small number of papers considers bias in the media due to consolidation, as we do. Gilens and Hertzman (2008) provide some evidence that the coverage of the debate on deregulation of TV is biased by conflict of interest. Goolsbee (2007) and Chipty (2001) examine the extent to which vertical integration in the entertainment industry affect the network programming and cable offering. Rossman (2003) and Ravid, Wald, and Basuroy (2006) examine the extent of bias in movie reviews, including due to conflict of interest. Both papers use only a small sample of hand-coded reviews—about 1,000 reviews for the years 1996-97 for Russman (2006) and about 5,000 reviews for the years 1991-93 for Ravid et al. (2006). Relative to these papers, the granularity of information embedded in half a million movie reviews allows us to more precisely measure and decompose the extent of the impact of consolidation.

This paper also relates to the economics of the media (Strömberg 2004; George and Waldfogel, 2006; Gentzkow 2006; DellaVigna and Kaplan 2007; Gerber, Karlan, and Bergan 2009; Snyder and Strömberg 2010; Knight and Chiang forthcoming; Enikolopov, Petrova, and Zhuravskaya forthcoming), and in particular to papers measuring the extent of media bias (Grose-close and Milyo, 2005; Gentzkow and Shapiro, 2010; Larcinese, Puglisi and Snyder, 2010; Durante and Knight forthcoming). Within the context of movie reviews we address questions that have arisen in this literature—such as whether bias occurs by omission or commission and the role of journalists versus that of editors—about which prior evidence was very limited.

The remainder of the paper is as follows. In Section 2 we introduce a simple model of the biasing decision. In Section 3 we introduce the data and the institutional context. In Section 4 we present the results of the test of whether media outlets bias movie reviews as a result of a conflict of interest. In Section 5 we conclude.

¹The results are from an analysis of a random sample of over 100 reviews for affiliated studios.

2 Framework

We consider the decision by a media to assign a review score to a movie. The true quality of a movie is given by q , which is unknown, but it is common knowledge that q has a normal distribution with mean q_0 and precision γ : $q \sim N(q_0, \gamma^{-1})$. Each media source receives a noisy signal of quality given by $z = q + v$, where v is i.i.d. with a known distribution, also normal: $v \sim N(0, \rho^{-1})$.

For simplicity, we consider the case of a single media source. The standard normal learning model implies that, upon observing signal z , the media updates the expected quality to

$$E[q|z] = \frac{\gamma q_0 + \rho z}{\gamma + \rho}.$$

After observing signal z , the media chooses a rating r to announce to its readers. We consider first the case of an unbiased media news source with no conflict of interest, then the case of a media source which is biased by the conflict of interest, and finally the case of a media source which receives a biased signal.

Unbiased media source. We assume that the media source minimizes the expected squared deviation of the review from the true movie quality:

$$r_U = \arg \max_r -\frac{c}{2} E[r - q]^2. \quad (1)$$

This cost function can be interpreted as the expected reputational cost $c > 0$ of detection of bias, which occurs with a probability which is increasing in the square of the bias (for small enough bias). It can also be interpreted as the desire to comply with reader preferences. The solution to problem (1) is

$$r_U^* = E[q|z] = \frac{\gamma q_0 + \rho z}{\gamma + \rho}. \quad (2)$$

The media will release as its review r_U^* the updated expected quality of the movie, given the signal z .

The potential movie-goers are of two types, N readers of the media review and M non-readers. We do not endogenize the decision to read the review, which could be due for example to the decision to subscribe to the media because of its sport section.² Neither type observes the signal z , but the N readers use the review r to update the prior on the quality of the movie, while the non-reader have to rely on the prior.

Using the review, the readers decide whether movie attendance is preferable to an alternative option yielding utility \bar{u} . The utility of watching the movies equals the expected quality of the movie plus a random utility term ε , with c.d.f. F and an absolutely continuous p.d.f. f . We impose two mild conditions on $f(\cdot)$: (i) that $f(x)$ is bounded, that is, $f(x) \leq K$ for all

²Endogenizing the decision to read the newspaper would not affect the solution as long as we assume (as we do below) that readers do not realize the presence of conflict of interest.

x for some finite K , and (ii) that $f(\cdot)$ is single-humped with mode at 0, that is $f'(x) < 0$ for $x < 0$ and $f'(x) > 0$ for $x > 0$. Readers watch the movie if

$$r + \varepsilon \geq \bar{u}$$

which occurs with probability $1 - F(\bar{u} - r)$, which is increasing in r . The M movie-goers who do not observe the movie review r rely on their priors and watch a movie with probability $1 - F(\bar{u} - q_0)$. The expected total movie attendance hence equals $N[1 - F(\bar{u} - r)] + M[1 - F(\bar{u} - q_0)]$.

Conflict of interest. A media source with conflict of interest, while still wanting to appear unbiased, also aims to increase the sales of movies produced by affiliated studios. For each ticket sold for an affiliated movie, the media outlet owner earns $p > 0$ dollars. The optimal review for movies distributed by other studios is still represented by expression (2), but for affiliated movies the media maximizes

$$r_B = \arg \max_r -\frac{c}{2}E[r - q]^2 + pN[1 - F(\bar{u} - r)] + pM[1 - F(\bar{u} - q_0)] \quad (3)$$

The key assumption used for (3) is that the N readers of the movie reviews are naive about the conflict of interest, and hence take the review r as the best measure of expected quality, neglecting the fact that the conflict of interest induces a bias in the reviews. We make this assumption for simplicity, but we also think that most readers are likely unaware of the conflict of interest, especially given that the conflict is not revealed in the reviews.

The maximization problem (3) leads to the first-order condition

$$-c(r_B^* - r_U^*) + pNf(\bar{u} - r_B^*) = 0 \quad (4)$$

and the second order condition

$$-c - pNf'(\bar{u} - r_B^*) < 0. \quad (5)$$

The first-order condition makes clear that the bias will always be positive ($r_B^* > r_U^*$) since for $r_B^* \leq r_U^*$ the expected utility of the media is strictly increasing in r_B^* . The existence of a solution for r_B^* is guaranteed by the assumption that $f(x)$ is bounded, and hence for a large enough r_B^* the left-hand side of (4) turns negative; hence, any optimum is given by a solution to (4). The second-order condition indicates that at the optimum f' cannot be too negative; notice that uniqueness of r_B^* is not guaranteed in general.

Biased Draws. A third case which we consider is that a media source does not have a conflict of interest (or is not affected by it), but receives biased draws $z + b$, where z is drawn as above and b is a scalar indicating the bias; we set $b > 0$ to fix ideas. While biased draws from the signal distribution can occur for many reasons, an important case for our analysis is one in which journalists employed in a conglomerate share the tastes of the affiliated studio

distributing movies. For example, reviewers at the *New York Post* may (genuinely) like more the movies produced by 20th Century Fox studios, apart from any effect of conflict of interest.

To simplify, we assume that the media itself is not aware of this bias term, nor are readers.³ Hence, the media still maximizes problem (1), but the solution now for the review r_D^* under biased draws is

$$r_D^* = \frac{\gamma q_o + \rho(z + b)}{\gamma + \rho}, \quad (6)$$

which leads to a bias $r_D^* - r_U^* = \rho b / (\gamma + \rho)$ in the review.

We summarize these results in the following proposition.

Proposition 1. *With no conflict of interest, the optimal media review r_U^* will be perfectly informative of the expected quality of the movie given the information available: $r_U^* = E[q|z]$. With conflict of interest or with biased draws, the optimal review will be biased upward: $r_B^* > r_U^*$ and $r_D^* > r_U^*$*

Next, we consider comparative statics properties, summarized in the next proposition.

Proposition 2. *With conflict of interest, (i) the bias in the review $r_B^* - r_U^*$ is (locally) increasing in the number of readers N , in the revenue per ticket p , and is decreasing in the reputation cost c ; (ii) the bias in the review $r_B^* - r_U^*$ is increasing in the unbiased review r_U^* for a low-enough quality movie: $d(r_B^* - r_U^*) / dr_U^* > 0$ for $r_U^* < KNp/c$. With biased draws, the bias $r_B^* - r_U^*$ is insensitive to the above parameters.*

Proof. Using the implicit function theorem, the optimal review r_B^* is increasing locally in the number of readers N :

$$\frac{dr_B^*}{dN} = -\frac{pf(\bar{u} - r_B^*)}{-c - pNf'(\bar{u} - r_B^*)} > 0,$$

while r_U^* does not vary with N , and hence $r_B^* - r_U^*$ is increasing in N . Similarly, one shows $dr_B^*/dp > 0$ and $dr_B^*/dc < 0$. Turning to $d(r_B^* - r_U^*)/dr_U^*$, the implicit function theorem implies

$$\frac{d(r_B^* - r_U^*)}{dr_U^*} = \frac{-c}{-c - pNf'(\bar{u} - r_B^*)} - 1 = \frac{1}{1 + (p/c)Nf'(\bar{u} - r_B^*)} - 1,$$

which is positive for $f'(\bar{u} - r_B^*) < 0$. Using the property that $f(\cdot)$ is bounded by K , notice that the first-order condition (4) implies that $r_B^* - r_U^*$ is bounded above by $\bar{K} \equiv KNp/c$. Hence, if we consider $r_U^* < \bar{u} - \bar{K}$, it follows that $\bar{u} - r_B^* \geq \bar{u} - r_U^* - K > 0$. Given the assumptions about F , $\bar{u} - r_B^* > 0$ implies $f'(\bar{u} - r_B^*) < 0$ and hence the desired condition. **Q.E.D.**

The first set of comparative statics is intuitive: the distortion due to conflict of interest is increasing in the marginal return of distortion, determined by the revenue per ticket p and the number of readers N , and is decreasing in the marginal cost of distortion, the reputation cost c . The second property explores the impact on distortion of the distribution of the

³We could alternatively assume that this bias is common knowledge, and that it is shared by the readers. To keep the framework simple, we do not model the horizontal differentiation implied in this version.

random utility term ε . The first-order condition in (4) indicates that the bias is increasing in the density $f(\bar{u} - r_B^*)$, which implies a higher persuasion rate since more types are at the margin. Proposition 2(ii) states that for movies of low enough quality, given the hump-shape of the distribution of ε , the bias is increasing in the quality of the movie, since the density of persuadable types $f(\bar{u} - r_B^*)$ is increasing in the movie quality. In comparison, instead, the bias in review due to biased draws is constant with respect to any of these parameters.

To illustrate the general shape of bias with respect to the movie quality, in Figure 1 we plot the optimal reviews for the three cases— r_U^* , r_B^* , and r_D^* —as a function of the signal z . We assume a normal distribution for $\varepsilon \sim N(0, 2/3)$, we set $\gamma = \rho$ equal to 1, the bias b equal to 1, pN/c equal to 1, and \bar{u} equal to 10. As Figure 1 illustrates, the review for the conflict of interest case r_B^* and for the biased draws case r_D^* are both above the unbiased review r_U^* . However, while the bias in review is constant for case of biased draws, it is hump-shaped for the case of conflict of interest: it first increases monotonically, as predicted by Proposition 2.(ii), and then decreases monotonically.

3 Data

Metacritic and Rottentomatoes. The data used in this paper comes from the publicly-available information collected from two review aggregator websites, *www.metacritic.com* and *www.rottentomatoes.com*. Both websites collect movie reviews from a variety of media and publish snippets of those reviews.

The two websites differ in how they summarize reviews. Metacritic assigns a score for each movie review on a scale from 0 to 100, 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* (out of 4 stars), the score is a straightforward renormalization on a 0-100 scale. For reviews without a numerical score, such as for *Time* magazine, Metacritic staffers read the review, evaluate its general tone and assign a score on the same 0-100 scale (typically in increments of 10).

In contrast, Rottentomatoes does not use a 0-100 score, though it does report the underlying summary assessment for reviews with a quantitative score. For each review, Rottentomatoes instead classifies a movie as ‘fresh’ or ‘rotten’ based on the review, and then computes an aggregate score for each movie – the *tomatometer* – as the share of reviews which are ‘fresh’. For reviews that are quantitative, the binary indicator for ‘freshness’ is built relatively straightforwardly as a function of the underlying score: for example, movies with 2 stars or fewer are classified as ‘rotten’, while movies with 3 or more stars are classified as ‘fresh’, with movies with 2.5 stars split based on a subjective judgment. For the reviews with no quantitative score, the movie is rated as ‘fresh’ or ‘rotten’ using a subjective evaluation by the staff, like in the Metacritic case (though the final evaluation is a 0/1 indicator, not a 0-100 score).

The two data sets have different advantages for our purposes. Metacritic contains more information on each review, since a review is coded on a 0-100 scale, rather than just using a binary indicator. Rottentomatoes, however, is a much more comprehensive data set, containing about five times as many reviews as Metacritic, due both to coverage of many more media (over 500 compared to less than 100) and to a longer time span. To take advantage of the strength of both data sets, we combine all reviews in the two data sets for movies produced since 1985 and reviewed up until July 2011 in the Metacritic website and until March 2011 on the Rottentomatoes website. We eliminate earlier reviews because the review data for earlier years is quite sparse, and before 1985 there is no conflict of interest: Newscorp. acquired 20th Century Fox in 1985 and the conglomerate Time Warner was created in 1989. We also eliminate a small number of duplicate reviews by the same reviewer in a given media.

We merge the reviews in the two data sets (134,129 reviews in MetaCritic and 583,783 reviews in RottenTomatoes) by title, year of production of the movie (since some movie titles are repeated in the data), media of review, and name of the reviewer. Out of the resulting sample of 640,042 reviews, we excluded all movies with fewer than 5 reviews, and all media with fewer than 400 reviews, for a final sample of 548,764 movie reviews.⁴

To make the two data sets compatible, we then apply the Metacritic conversion into a 0-100 scale also to all the reviews in the Rottentomatoes data which report an underlying quantitative score. To do so, we use the reviews present in both Metacritic and Rottentomatoes and assign to each Rottentomatoes 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 other scores which are common in Rottentomatoes but not in Metacritic we assign the score ourselves following the spirit of the Metacritic scoring rules (e.g., a score of 25 to a movie rated ‘2/8’).

Media Sources. Table 1, Panel A reports summary statistics on the combined data set of 548,764 reviews covering a total of 12,999 movies reviewed in 336 different media outlets. The data set includes reviews from six media with a conflict of interest within the News Corp. group with 20th Century Fox movies: the American newspapers *Chicago Sun-Times* (owned by News Corp. only up until 1986), *New York Post* (owned by News Corp. from 1993), and *Wall Street Journal* (owned by News Corp. since December 2007), the British newspapers *News of the World* and *Times* (both owned throughout the period) and the magazine *TV Guide* (owned by News Corp. from 1988 until 1999). The number of reviews, and the data source, differs across these seven media. The British newspapers are represented only in Rottentomatoes and have less than 1,000 reviews each in the data. The *New York Post* is represented in both data sets and has the most reviews (6,278, all while owned by Newscorp.). *TV Guide* and *Wall*

⁴While we edited to the extent possible the title of movies and the name of the reviewer to match the names in the two data sets, some reviews in the merged data are duplicates because they were not exact matches. To increase the match rate, we allow for the year of the movies in the two data sets to differ by one year.

Street Journal have a relatively high number of reviews, but only a minority while owned by Newscorp.. All but one of these seven media (the *Wall Street Journal*) have a quantitative scoring rule for the reviews. The average quantitative score ranges between 56 and 70 (out of 100), with an standard deviation of about 20, while the share of ‘fresh’ reviews varies between 48 percent and 62 percent. Finally, 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 most common reviewers (three for the *New York Post*) cover the large majority of the reviews, with two media using essentially only one reviewer: *Chicago Sun-Times* (Roger Ebert) and the *Wall Street Journal* (Joe Morgenstern).

The lower part of Table 1, Panel A reports the information on the three media owned by Time Warner: the website *CNN.com*, and the weekly magazines *Time* and *Entertainment Weekly* (both owned by Time Warner from 1990 on). The reviews in these three publications are at conflict of interest with Warner Bros. movies, since the studio was acquired in 1989 by Time, Inc. Two of the three outlets – *CNN.com* and *Time* – use only qualitative reviews; since the reviews from *CNN.com* are only in the RottenTomatoes data set, there is no 0-100 score for these reviews, but only a freshness rating. Most of the observations are from *Entertainment Weekly*, with nearly 5,000 reviews. These outlets, like the Newscorp. outlets, employ only one or two reviewers.

Studios. Table 1, Panel B presents information on the studios distributing the 12,999 movies reviewed in our data set. Among the distributors owned by News Corp., 20th Century Fox movies are the largest group (449 movies), followed by Fox Searchlight which distributes movies in the ‘indie’ category. Among the studios owned by Time Warner, the largest distributor is Warner Bros., followed by a number of 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 that are owned by Newscorp., which we call for brevity 20th Century Fox, and those that are owned by Times Warner, which we call Warner Bros.

4 Bias in Movie Reviews

4.1 Bias by Conglomerate

Graphical Evidence. As a first step in the analysis, we examine whether the conflict of interest induces a bias on average in the reviews, that is, whether, say, the *Wall Street Journal* provides a more positive review to 20th Century Fox movies when owned by Rupert Murdoch. Appendix Figure 1 provides preliminary evidence in this regard for movies reviewed by the *Wall Street Journal* on a quantitative review score between 0 and 100.

The top panel presents the information for reviews for the period in which Newscorp. owns the Journal (2008 on), while the bottom panel presents the earlier data. The first quadrant

focuses on the 20th Century Fox movies produced from 2008 which were reviewed by the *Wall Street Journal*, and compares the reviews by the Journal to reviews by other media for the same movies.⁵ The Journal reviews are more negative than other reviews. The second quadrant does a similar comparison for movies produced by other studios and finds a similar, if somewhat smaller, difference. The bottom panel shows similar statistics for movies produced before News Corp. owned the *Wall Street Journal*, that is, pre-2008. Overall, this comparison produces no obvious evidence of bias due to cross-holdings, or possibly a negative bias.

However, the evidence in Appendix Figure 1 is based on a small number of movies, as the *Wall Street Journal* reviewed only 45 movies produced by 20th Century Fox since 2008. Hence, in Figure 2a we expand the analysis to consider all media owned by Newscorp. The left panel in Figure 2a focuses on the 406 movies produced by 20th Century Fox over the period 1985-2011: the average review score by the News Corp. owned media is just slightly lower than the score attributed for the same movies by other media outlets. This comparison, however, does not control for possible differences in the average generosity of reviews for the media owned by News Corp. versus the other media. Indeed, the second panel of Figure 2a shows that for the 6,976 movies not distributed by 20th Century Fox, the average rating by News Corp. media is about 3 points lower than the average rating by other media outlets. Once one takes into account this baseline difference in a difference-in-difference comparison, News Corp.-owned media give a more positive review to movies distributed by 20th Century Fox. Below, we test whether this difference is statistically significant and robust to the addition of control variables.

Figure 2b provides the same evidence for movies distributed by Warner Brothers and their reviews, compared to movies distributed by other companies. The media owned by Time Warner provide on average slightly more positive reviews than other media, and this difference is nearly identical for movies produced by Warner Brothers and for other movies. Hence, unlike for the case of News Corp. we find no *prima facie* evidence of conflict of interest in the movie reviews for media owned by Time Warner.

Regressions on Average Bias. We implement a regression-based test for the effect of conflict of interest which builds on the graphical evidence above, but allows for the addition of control variables, which is important since movies produced by different studios differ in important ways. We estimate a difference-in-difference OLS regression:

$$r_{m,o} = \alpha + \beta^{FM} d_m^{FoxMovie} + \beta^{FO} d_o^{FoxOutlet} + \gamma^F d_m^{FoxMovie} d_o^{FoxOutlet} + \beta^{TM} d_m^{TWMovie} + \beta^{TO} d_o^{TWOutlet} + \gamma^T d_m^{TWMovie} d_o^{TWOutlet} + BX_{m,o} + \varepsilon_{m,o} \quad (7)$$

Each observation is a review for movie m on media outlet o . The dependent variable $r_{m,o}$ is a 0 to 100 score for the review, or an indicator for ‘freshness’ in the Rottentomatoes sample.

⁵To compute the average review by other media outlets, we first compute for each movie the average review by all other outlets, and then we average these averages across movies.

The coefficient β^{FM} captures the average difference in reviews for movies that are produced by 20th Century Fox, for which the indicator variable $d_m^{FoxMovie}$ equals 1. The coefficient β^{FO} captures the average difference in reviews for media outlets that are owned by News Corp. at the time of movie release, in which case the indicator variable $d_o^{FoxOutlet}$ equals 1. The key coefficient is γ^F , which indicates the estimated impact of the conflict of interest, that is, the average rating for a movie released by 20th Century Fox when reviewed by a media owned by News Corp., compared to the counterfactual. The coefficients β^{TM} , β^{TO} , and γ^T present the parallel cases for the Time Warner group. The control variables X vary across different specifications. The standard errors are clustered at the movie level to allow for correlation of errors across multiple reviews of a movie.⁶

Table 2 reports the results for the combined sample of 474,496 reviews on the 0-100 review score. (Notice that the sample is smaller than the overall sample of 548,764 reviews because it does not include qualitative reviews in the Rottentomatoes data, which are not scored) In Columns 1 to 4 we present the results after including an increasing number of control variables, to show the effect of controlling for observables. A specification without any controls (Column 1) indicates no significant effect of conflict of interest for either the News Corp. outlets (γ^F) or the Time Warner outlets (γ^T), and introducing fixed effects for the year of release of the movie reviewed (Column 2) does not affect the estimates appreciably. These estimates, however, do not control for the fact that the type of movies reviewed by the Newscorp. and Time Warner media may differ from other media in a way that could bias the estimates. It could be, for example, that Time magazine reviews only good movies produced by smaller studios, but reviews both good and bad movies produced by large studios such as Warner Bros. In this case, the coefficient γ^T on the conflict of interest interaction could be downward biased because we are not controlling for movie quality.

In Column 3 we control for movie quality by introducing fixed effects for each movie. Not surprisingly, these controls raise the R^2 significantly from 0.01 to 0.41. Once we control for movie quality, we now detect a statistically significant, if moderate sized, effect of conflict of interest for the News Corp. outlets: $\hat{\gamma}^F = 2.0749$: movies at risk of conflict of interest receive a more positive review by 2.1 points out of 100. There is instead no significant estimated impact of conflict of interest for the Time Warner outlets: in fact, the estimated effect of conflict of interest is to lower the score by 1 point out of 100, if insignificantly so. Given the opposite sides of the coefficients, an F-test rejects the equality of the conflict of interest coefficients for the two media groups with a p-value of 0.0035 (bottom row in Table 2).

To further control for the selection of movies reviewed into different media, in Column 4 we introduce fixed effects for each of the 336 media in the sample. The introduction of these fixed effects, which raises the R^2 further to 0.46, increases the estimated effect of the bias due

⁶In Appendix Table 1 we consider alternative forms of clustering and show that clustering by movie appears to be the most aggressive one.

to conflict of interest for the News Corp. media to $\hat{\gamma}^F = 2.5651$, significantly different from 0 at the 1 percent level. The estimated effect of conflict of interest for the Time Warner group, instead, remains negative, small, and not significantly different from zero.

Finally, in Columns (5) and (6) we estimate separately the effect for movie reviews in, respectively, the Metacritic database and in the Rottentomatoes database. (Movie reviews which are in both data sets are present in both samples) The results are similar in the two samples, with larger estimates of conflict of interest for News Corp. in the MetaCritic data.

The results using the 0-100 score hence provide evidence of a statistically significant bias for the News Corp. outlet of 2.6 points out of 100 in the most controlled specification, corresponding to a 4 percent increase relative to the average score of 61.5 points. The effect is relatively small, the equivalent of raising the review by one star (on a zero-to-four scale) for one out of 10 movies reviewed. The fact that the addition of a rich set of control variables increases the estimated effect suggests that the estimate may be if anything biased downward, to the extent that the unobservables resemble the observables (Altonji, Elder, and Taber, 2006) The conclusions of the Altonji, Elder, and Taber test are strengthened by the fact that the covariates control a significant share of the residual variance, with an R^2 of 0.46 in Column 4.

For the Time Warner outlets, given the precision of the estimates, in the benchmark specification we can reject a positive bias larger than 0.9 points out of 100, corresponding to 1.5 percent of the mean score. Hence, the finding of no bias for Time Warner is not due to lack of power.

In Table 3 we estimate the OLS regression (7) with the ‘freshness’ indicator as dependent variable $r_{m,o}$. While the 0-100 score used in Table 2 conveys more information than a 0-1 variable, the freshness indicator is defined for the qualitative reviews in the Rottentomatoes data, which the 0-100 score is not. The results in Table 3 are remarkably parallel to the results in Table 2. There is no significant evidence of conflict of interest in the specification with no controls (Column 1). However, once the controls for movie fixed effect (Column 3) and media fixed effect (Column 4) are added, the results indicate a statistically significant positive bias for the News Corp. outlets. In the most controlled specification, the bias amounts to a 6.59 percentage point higher probability of a ‘fresh’ review for movies with conflict of interest, an 11 percent increase relative to an average freshness score of 59 percentage points. The estimate is even larger in the sub-sample of RottenTomatoes data which is also part of the Metacritic data (Column 5). We return below to a comparison of the magnitude of bias in Table 3 versus in Table 2. In contrast, we find no evidence of positive bias and some evidence of a (statistically insignificant) negative bias for the Time Warner outlets.

Robustness. In Appendix Table 1 we present the result of a series of robustness checks for the benchmark specification with full controls (Column 4 in Tables 2 and 3); we report only the relevant conflict-of-interest coefficients. Alternative ways to cluster standard errors by studio

and by media lead to higher standard errors than in the benchmark specification (Columns 2 and 3, compared to the benchmark clustering reproduced in Column 1). We then explore the impact of restricting the sample of movies in the control group to ones that are arguably more similar to the ones at conflict of interest: movies distributed by the Big-6 major studios—Columbia Pictures, Paramount Pictures, Universal Pictures, Walt Disney/Touchstone Pictures, in addition to 20th Century Fox and Warner Bros.—and by the major indie studios. The results are very similar (Column 4). Finally, we analyze separately the quantitative reviews (Column 5) and the qualitative reviews (Column 6). The evidence of bias for Newscorp. is for the quantitative reviews, which are the large majority; the sample of purely qualitative reviews is much smaller, and hence the estimates quite noisy.

4.2 Bias by Media and Journalist

So far, we discussed the extent of possible bias in review for the two media conglomerates, finding evidence of bias in the Newscorp. group, but not among the Time Warner media. This evidence, however, does not speak to the possible channels through which bias may occur: (i) an explicit editorial policy conveyed to the journalists; (ii) bias by a reviewer ultimately due to the conflict of interest, but lacking editorial pressure; (iii) correlation in taste between the media reviewer (or the media audience) and the affiliated studio.

We can exploit the richness of the movie review data to open up the black-box of media coverage, and help assess the different possibilities. We postpone the discussion of the correlated-taste explanation (iii) until section 4.4, and focus this section and the next section on distinguishing editorial bias (i) from journalistic bias (ii).

To the extent that bias reflects an editorial policy, we expect to find similar bias in most media outlets belonging to the same conglomerate, and for most journalists within a given media. This clustering of bias is less likely if bias represents idiosyncratic behavior by a journalist. We present now evidence on the extent of such clustering.

Bias By Media. For each media j , we estimate the specification

$$r_{m,o} = \alpha^j + \beta^j d_m^{G(j)Movie} + \beta^j d_o^{G(j)outlet} + \gamma^j d_m^{G(j)Movie} d_o^{G(j)Outlet} + B^j X_{m,o} + \varepsilon_{m,o}, \quad (8)$$

where $G(j)$ is the relevant industrial group (e.g., *FOX* if the media considered is TV Guide). We include in the sample for media j all reviews for movies that are reviewed by media j , and include only years in which media j is owned by the industrial group $G(j)$ (e.g., for the TV Guide regressions, we only include the years 1988-99). The controls X are the full set of movie and reviewer fixed effects. We present the estimates for the 0-100 score in Panel A of Table 4 and for the freshness score in Panel B of Table 4.

For all six media owned by News Corp., the coefficient for bias is positive, whether one considers the score results or the freshness results. Given the larger standard errors involved

in a media-by-media analysis, the bias is however significant for only one media, the daily *New York Post*, for which the bias is significant both in terms of 0-100 score (3.13 points) and ‘freshness’ (7.18 percentage points). There is also marginally significant evidence of a bias in the ‘freshness’ variable, though not in the 0-100 score, for the *Wall Street Journal*; however, the estimates for the Journal are quite imprecise as the conflict of interest starts in 2008. The largest point estimate of bias in the 0-100 score (though with large standard errors) is for *News of the World*, the UK daily which recently closed down because of the scandal regarding journalistic behavior in hacking.

For the three media owned by Time Warner, instead, the estimated coefficients of bias are all negative, although insignificant. For both *Entertainment Weekly* and *Time* magazine, the estimates are quite precise and given the confidence intervals we are able to reject any sizeable bias, such as bias larger than 1.2 points (out of 100) for *Entertainment Weekly* and larger than 1.8 points (out of 100) for *Time* magazine.

Bias By Journalist. The evidence documented so far suggests a significant amount of clustering in the point estimate of the bias within a given conglomerate, suggesting the potential for a coordinated editorial policy. A stricter test, however, involves testing for bias journalist-by-journalist within a given media, which we do now.

We take advantage of the fact that most media have only a small number of movie reviewers, and these reviewers 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 unique feature within the literature. Table 5 lists all the significant reviewers for the media in the two conglomerates. Some media outlets, such as *Chicago Sun-Times*, *News of the World*, and *Wall Street Journal*, have only one reviewer, respectively Roger Ebert, Robbie Collin, and Joe Morgenstern. Most other media outlets have two main reviewers, including *TV Guide*, *The Times*, *Entertainment Weekly*, and *Time Magazine*. Finally, the *New York Post* has five main reviewer, three of which are more frequent than the others.

In Table 6 we estimate, reviewer-by-reviewer, the equivalent of specification (8), except that we include in the sample only reviews done by a particular reviewer, and all other reviews by other media of those same movies. The first four columns of Table 6 present the analysis separately for four of the main reviewers of the *New York Post*. (We do not include V.A. Musetto because, as discussed below, he reviewed only four 20th Century Fox movies, and hence we cannot estimate whether he is biased). Interestingly, the estimates indicate statistically significant evidence of bias (at least at 10% level) for three out of four of the *New York Post* reviewers. The conclusion holds whether we use the 0-100 score measure or the ‘freshness’ indicator. The estimated bias for the *New York Post*, hence, is not due to an outlying individual. We also estimate significant bias for the main reviewer of the *TV Guide* (Maitland McDonagh), but not for the second *TV Guide* reviewer. For the other Newscorp. outlet with multiple reviewers—the *Times*—the point estimates do not indicate bias, but the sample is

small enough that the estimates are quite imprecise (results not reported).

Turning to the Time Warner outlets, we detect no evidence of bias for any of the two reviewers of *Entertainment Weekly* and *Time*. (In fact, there is statistically significant evidence of negative bias for one Time reviewer, but the result does not hold with the ‘freshness’ score.) Hence, the null finding of bias in the Time Warner outlets does not appear to be due to multiple reviewers having opposite biases, but rather a uniform finding.

The evidence by media and by journalists suggests a quite homogeneous pattern—the estimated bias is frequent among the NewsCorp. journalists, but not among the Time Warner journalists. This evidence is certainly consistent with common incentives (or common selection) within a conglomerate, though it does not provide any direct evidence of editorial bias, to which we turn next.

4.3 Editorial Bias

An editor who intends to bias the review process can do so in at least two ways, by putting pressure on the reviewers, or by assigning the affiliated movies to reviewers who are more positive. While the former editorial choice is indistinguishable in the data from independent journalistic bias, the latter evidence of editorial discretion can be detected in the data. Additionally, this latter form of bias may be more palatable to an editor, as it does not involve any direct pressure on individual journalists.

The most obvious form of editorial selection of journalists is the hiring of more favorable journalists and firing of less favorable ones. Editorial pressure therefore can manifest itself in turn-over of reviewers at the time of change in ownership. We observe no evidence of elevated turn-over for the outlets which we observe before and after the change in ownership (Table 5): Roger Ebert stayed on at the *Chicago Sun-Times* when NewsCorp. divested the newspaper, and Joe Morgenstern stayed on at the *Wall Street Journal* when NewsCorp. took it over. Similarly, in *Time magazine* there was no change in reviewers in 1990 when Time, Inc. acquired Warner Bros.

Table 5 provides also evidence on a related personnel-based reviewer selection: reviewers who are not prone to bias may be more likely to lose their job. We test for this form of selection using the estimates of bias by reviewer in Table 6. There is no systematic such evidence for *New York Post* (one of the reviewers with most positive bias, Megan Lehmann, stays on only very shortly) and *TV Guide*.⁷

The lack of such evidence may not, however, be surprising, since dismissals are a costly biasing policy. Editorial bias, however, can take advantage less costly forms. A simple strategy is to assign movies to the reviewers who are on average more generous in their evaluation. A

⁷We do not apply the test to the Time Warner outlets since we find no evidence of bias in Table 6 for these media.

second, related, strategy is to pick reviewers who are more prone to bias. Both forms of selection are quite unlikely to occur if individual journalists happen to be biased with no editorial involvement.

We first test for the first bias, that is, whether affiliated movies are more likely to be assigned to reviewers who on average are more generous, that is, assign higher scores. To estimate whether there indeed are significant differences in average reviewer score, we estimate the OLS regression

$$r_{m,o} = \alpha + \lambda_j + \eta_m + \varepsilon_{m,o},$$

where $r_{m,o}$ is the 0-100 score for movie m on media outlet o , η_m is a movie fixed effect, and λ_j is a reviewer fixed effect (with A.O. Scott of the *New York Times* as omitted category). We exclude movies distributed by studios owned by Newscorp. or Time Warner. Table 5 reports the estimated reviewer fixed effects $\hat{\lambda}_j$, together with the standard errors. Movie reviewers indeed differ quite sizably within a given outlet. Within the *New York Post*, reviewers differ by up to 7 points, by 5 points in *TV Guide*, and 3 points in the *Times*. The differences are instead smaller in the Time Warner outlets, with a 2-point difference in *Entertainment Weekly*, and a 1-point difference in *Time Magazine*.

Given that journalists in the News Corp. media differ in terms of the average generosity of their reviews, we can estimate whether movies at conflict of interest are more likely to be assigned to reviewers who are on average more generous, an assignment which would be more likely to be due to explicit editorial bias. The last column of Table 5 provides evidence on the share of each journalist’s reviews which are about movies from affiliated studios. There is no detectable pattern in the data: the share of 20th Century Fox movies reviewed is 7-8% for almost all reviewers, despite the large difference in average score generosity. The one exception is that a reviewer at the *New York Post*, V.A. Musetto, reviewed nearly none of the 20th Century Fox movies, differently from the other 4 reviewers. The pattern is, however, explained by the fact that this reviewer covers nearly exclusively indie movies; and in any case this reviewer has a high fixed effect, and hence would have been expected, in case of intention editorial assignment, to handle *more* 20th Century Fox movies.

To formalize the test, we run for each media with a regressions like (8), except that the dependent variable is the estimated reviewer fixed effect $\hat{\lambda}_j$. The evidence, in Appendix Table 2, provides no indication of editorial bias. In fact, for the *New York Post* we obtain evidence of negative selection which is due, as discussed before, to one specialized indie movie reviewer who happens to be relatively generous. We can therefore reject any systematic pattern of assignment of movies to reviewers in order to benefit the affiliated studio.

In addition, the approximately random assignment of movies documented in Table 5 implies that we can reject also a second editorial biasing processes, assigning movies from affiliated studios to reviewers which are more likely to display bias in the case of conflict of interest.

The evidence in this section provides no evidence of editorial bias, whether by dismissal

and hiring of different reviewers, or by differential assignment of movies to different reviewers. Hence, the evidence points more toward a correlated journalistic bias (or correlated tastes) rather than to editorial policies causing bias.

4.4 Selective Bias

The findings so far focused on the extent of average bias by conglomerate, by media and by journalist, and in editorial assignments. The bias due to conflict of interest, however, could be predictably different for different types of movies, in which case the focus on bias *on average* does not maximize the chance of detection of bias. To the extent that a journalist, or an editor, biases movie reviews, we expect the bias to be higher for movies for which the marginal return to bias is higher, assuming a constant marginal cost.

In this Section, we provide qualitative tests of this prediction. First, we attempt to test the prediction that the distortion due to bias should be higher for movies for which the audience is closer to indifference, and hence the density of persuadable types is higher. While we do not have direct evidence on which movies have the most marginal readers, we suggest that movie quality is one useful proxy. We assume that movies with low quality (captured by negative reviews by other outlets) would yield the least impact from a review biased on the margin, while the impact would be highest for movies with intermediate or higher quality. To illustrate, a review that attributes to a movie a review of 2 stars (out of 4) instead of the deserved 1 star is unlikely to persuade many readers. Instead, a reviews which attributes 4 stars to a 3-star movie could have a significant impact. As a proxy for the movie quality, we use the average review score by the other media.

We present graphical evidence in Figures 3a-b. In Figure 3a we plot the score assigned by the Newscorp.-owned media as a function of the average reviews score for the same movie by all media, separately for movies distributed by affiliated studios (continuous line) and movies distributed by other studios (dotted line). More precisely, we plot an estimated local polynomial regression (with an Epanechnikov kernel and a 1st degree polynomial) of the average review score across the Newscorp. media (excluding the media which did not review the movie) on the average movie review score. We truncate movies with average movie score below 25 and above 90 (respectively, the 1st and 99th percentile in the distribution). Figure 3a shows that for the movies with no conflict of interest (dotted line) the Newscorp. outlets on average follow very closely the reviews of other outlets, with an intercept which is about 2 points lower. Compared to this line, the reviews of 20th Century Fox (continuous darker line) are very close for movies with average review score in the range 35-60, but are higher by about 5 points in the range above 60. Interestingly, 60 is about the crossing point for a ‘fresh’ review in Rottentomatoes. This graph, therefore, indicates a pattern of bias which is consistent with optimizing bias as in the framework above. The pattern is most accentuated for the *New York*

Post (Appendix Figure 2a) though there is qualitative evidence also for the *Wall Street Journal* (Appendix Figure 2b)

In Figure 3b we present parallel evidence for the Time Warner-owned outlets. For these outlets, instead we find no evidence of selective bias: the average score for affiliated movies follows very closely the score for the non-affiliated movies, a pattern which we find both in *Time magazine* (Appendix Figure 2c) and in *Entertainment Weekly* (Appendix Figure 2d).

We also provide a regression based test in the next OLS specification in Table 7, which we illustrate here for the Newscorp. case:

$$r_{m,o} = \alpha + \gamma^F d_m^{FoxMovie} d_o^{FoxOutlet} + \delta_{55-70}^F d_m^{FoxMovie} d_o^{FoxOutlet} * d_{55 < \bar{r}_m \leq 70} + \delta_{70+}^F d_m^{FoxMovie} d_o^{FoxOutlet} * d_{\bar{r}_m > 70} + BX_{m,o} + \varepsilon_{m,o}. \quad (9)$$

The dependent variable $r_{m,o}$ is the review 0-100 score by a particular media, \bar{r}_m is the average review for movie m , and $d_{55 < \bar{r}_m \leq 70}$ and $d_{\bar{r}_m > 70}$ are indicators for, respectively, whether the average review falls in the range $55 < \bar{r}_m \leq 70$ or in the range $\bar{r}_m > 70$. As such, the coefficients δ_{55-70}^F and δ_{70+}^F are the key coefficients which indicate how the effect of conflict of interest changes for different types of movies. The regressions include not only movie fixed effects and media outlet fixed effects, but also interactions between the media outlet fixed effect and the indicators $d_{55 < \bar{r}_m \leq 70}$ and $d_{\bar{r}_m > 70}$.

The evidence in Table 7 provides statistically significant evidence for the *New York Post* of a larger bias for movies with more positive reviews, as in Appendix Figure 2a, and qualitative evidence for the *Wall Street Journal*. The evidence for these outlets is most consistent with an optimizing bias. The fact that the bias appears only for certain movies is less consistent with correlation in tastes between the reviewers and the 20th Century Fox movies, since then we would expect to see such correlation for all movies.

We find no evidence of differential bias for the other media in the Newscorp. group, or in the Time Warner group.

4.5 Bias by Omission

So far, we have focused on testing whether on average media outlets bias the reviews of movies for films where the parent company would benefit from extra attendances. However, bias can occur by omission, rather than by commission. A movie outlet may decide not to review a below-average movie by an affiliated studio, and make sure to review an above-average movie by the same studio. In this case, the movie may not display any bias conditional on review, but the bias is in the review decision itself. We hence analyze the extent to which the News Corp. outlets fail to review 20th Century Fox movies that other reviewers rate negatively, while reviewing the movies with positive reviews, and similarly for Time Warner outlets.

Investigating this channel is particularly important because bias by omission in the me-

dia may well be more important than bias by commission (Mullainathan, Schwartzstein, and Shleifer, 2008), and such bias is generally difficult to detect. The study of movie reviews offers an opportunity to do such a study because we know the universe of movies which receive at least some review in the media, and hence can measure the absence of coverage, which is instead hard to do for most other studies of media coverage.

Full Omission. We estimate the extent to which different outlets do, or do not, review movies, as a function of the average review that *other* reviewers assign, in the presence or absence of conflict of interest. We condition on the average review by other media for the same movie, since it is a good predictor of the likely review that a media would issue. Hence, this allows us to test whether, in case of conflict of interest, a media outlet is more likely to review movies with high predicted review, compared to its usual pattern.

In doing this, we take into account that media outlets differ widely in their average probability to review a movie: the *New York Post*, *TV Guide* and *Entertainment Weekly* review a good share of movies, while *Time Magazine* reviews only a fraction. Hence, for each media in the News Corp. or Time Warner Group, we define as matching media the ten other media in the sample with the most similar average probability of reviewing movies.

Figures 4a-d present the graphical evidence for the four main media in the sample, the *New York Post* and *Wall Street Journal* under Newscorp. ownership, and *Time magazine* and *Entertainment Weekly* under Time Warner ownership. For each of these media, we plot an estimated local polynomial regression (with an Epanechnikov kernel and a 1st degree polynomial) of an indicator for whether the movie was reviewed on the average movie review score, computed excluding the eleven media considered in the Figure. We truncate movies with average movie score below 25 and above 90 (respectively, the 1st and 99th percentile in the distribution). We do the regression separately for movies distributed by the affiliated studio (continuous line) and movies distributed by other studios (dotted line). For the ten matching media, we first compute for each movie the average probability of review in these media, and then run a local polynomial regression of this average probability on the average movie score separately by the two types of distributing studios, as above.

Figure 4a presents the evidence for the *New York Post* (darker blue line) and the average of ten matched media (lighter blue line). For the movies not distributed by the 20th Century Fox studios (dotted line), the probability of review increases fairly monotonically from about 40% to about 65% as a function of the average review score; importantly, the pattern is quite similar for the *New York Post* and for the matching media, suggesting a successful match. The question then is whether this pattern differs for movies distributed by 20th Century Fox (continuous line). The Figure makes clear why it is important to include the matching media as a comparison group: even in the matched media (continuous light blue line) the probability of review is higher for 20th Century Fox movies compared to other movies, likely because 20th Century Fox produces movies with a higher budget and hence on average higher audiences

relative to some smaller studios. Compared to this line, the probability of review by the *New York Post* for 20th Century Fox movies (continuous dark blue line) is quite close, although with some evidence of lower review probability for movies with average score below 40 and higher review probability for movies with average score above 80; there is thus some qualitative evidence of omission bias.

Figure 4b presents parallel evidence for the *Wall Street Journal*. The evidence is significantly noisier because it only includes the years in which the Journal was under Newscorp., that is, from 2008 on. Still, Figure 4b displays a systematic pattern consistent with omission bias: the probability of review for 20th Century Fox movies increases more steeply in the average movie score for the *Wall Street Journal* than it does for the matching media. However, a similar, though more attenuated pattern, also appears for the non-20th Century Fox media, suggesting that the match based on average probability in this case is not as successful

Turning to the media owned by Time Warner, Figure 4c presents the corresponding evidence for *Time* magazine. The figure provides quite striking evidence of omission bias. The probability of review of Warner Bros. movies is strongly increasing in the measured quality of the movie, and this relationship is significantly more accentuated than in the matched media. Still, a cautionary note is that the match is imperfect in that even for non-Warner Bros. movies the probability of review by *Time* magazine is somewhat more responsive to the score than it is in the sample of matching media.

Figure 4d presents the evidence for *Entertainment Weekly*. The average probability of review of Warner Bros. movies in this weekly as a function of movie quality closely parallels the corresponding average probability of review in the ten matched media (with a higher level). As such, there is no evidence of omission bias.

To complement the graphical evidence, we estimate the following linear probability model in Table 8, which we illustrate for the case of media owned by News Corp.:

$$d_{m,o} = \alpha + \gamma^F d_m^{FoxMovie} d_o^{FoxOutlet} + \delta^F d_m^{FoxMovie} d_o^{FoxOutlet} * \bar{r}_m + BX_{m,o} + \varepsilon_{m,o}. \quad (10)$$

An observation is a possible review for a movie by one of eleven media: the media outlet featured in the respective column and the ten media outlets in the sample with the closest matching probability of review to the featured media. In each specification, the time period spans the period in which the featured media exists and is owned by the conflicted conglomerate. The dependent variable is the indicator $d_{m,o}$ which equals 1 if media outlet o reviews movie m . The key coefficient is δ^F on the interaction of the conflict of interest variable with the mean rating score \bar{r}_m (computed excluding the eleven media). 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 a rich set of fixed effect, movie fixed effects, media outlet fixed effects, and media outlet fixed effects interacted with the mean rating \bar{r}_m . The inclusion of these fixed effects implies that we are controlling for other double interaction

terms such as $d_m^{FoxMovie} * \bar{r}_m$ (absorbed by the movie fixed effects) and $d_o^{FoxOutlet} * \bar{r}_m$ (absorbed by the media outlet fixed effects interacted with the mean rating). A key assumption made in equation (10) 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 4a-d.

The evidence in Table 8 provides no consistent evidence of selective review consistent with omission bias for the Newscorp. media. Indeed, the relevant coefficient δ^{FF} on the interaction between conflict of interest and average review score is significantly negative for one media (*The Times*) and marginally significantly positive for two other media (*TV Guide* and *Wall Street Journal*). For the Time Warner outlets, instead, we find evidence consistent with strategic omission bias for two outlets – *CNN.com* and *Time Magazine*. This evidence, consistent with the graphical evidence, therefore suggests that bias by omission is a substitute, not a complement, of bias by commission, as we find evidence of it in the media group – Time Warner – for which we found no evidence of bias condition on a review.

Partial Omission. To provide further evidence on the possibility of bias by omission, we consider a more subtle biasing strategies of partial omission of information: delivering a review later, once readers are likely to have received the information from other media and hence a review is likely less influential, and providing shorter reviews, which likely convey less information.

Since the information on both date of review and on the content of the review are not available on either the Metacritic or Rottentomatoes site, we scraped the content of all the reviews available on the websites of the four media with the most reviews in our data: *Entertainment Weekly* (3,624 reviews starting from 1990), *New York Post* (1,257 reviews starting from 2006), *Time magazine* (662 reviews starting from 1985), and *Wall Street Journal* (1,364 reviews starting from 2002). In addition, we observe two control media which were relatively easy to scrape, the *Boston Globe* (896 reviews starting from 2002), and the *Village Voice* (3,975 reviews starting from 1998). For the subset of reviews in these media with information on date of review, we create an indicator variable for movies reviewed 5 or more days after the release date, as well as a continuous variable for the difference between the date of review and the date of movie release⁸. We also use as an indicator of length the log of number of words in a review (we set to missing reviews shorter than 100 words).

In Table 9, for each of the three outcome variables, we estimate specification (7) to test whether there is an impact of conflict of interest, independent of the quality of movie. We include both media and movie fixed effects. We find evidence of biased coverage in the Time Warner outlets: the reviews for movies produced by Warner Bros. are less likely to be delayed by about 7 percentage points (Column 1), are released on average 0.7 day early (Column 3), and are one average 16 percent longer (Column 5). There is no consistent evidence instead

⁸For both variables, we exclude reviews published either more than 10 days before the release date, or more than 20 days after the release date, since for these observations the date is likely to be miscoded.

for the Newscorp. outlets, with if anything evidence of more delay for the 20th Century Fox movies.

We then consider how these patterns vary by the average review score of the movie (computed excluding the five media), as in specification (10). We include fixed effects for movie, media, and media interacted with the average review score. In these specifications (Columns 2, 4, and 6), we find no evidence that the intensity of coverage differs as a function of the quality of the movie, either in the Time Warner outlets or in the Newscorp. outlets.

Altogether, there is evidence of more intensive coverage for movies at conflict of interest in the Time Warner outlets; however, unlike for the evidence on omission of reviews, this pattern is not responsive to the movie quality.

4.6 Bias in Movie Aggregator

So far we have focused on the most obvious conflict of interest in the movie industry induced by the consolidation of studios like 20th Century Fox and Warner Bros. into media conglomerates which employ movie reviewers. But the conflict of interest induced by consolidation hardly stops there.

Both of the review aggregators which we use in this study—Metacritic and Rottentomatoes—are themselves at risk of conflict of interest. Metacritic.com, an independent entity when launched in 2001, was acquired by CNET in August 2005, and CNET itself was acquired in 2008 by CBS. Rottentomatoes.com, also 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 RottenTomatoes, was then sold in January of 2010 by Newscorp. Interestingly, in April 2011 IGN was then acquired by Time Warner, the other conglomerate in our study.

The ownership structure of RottenTomatoes generates an incentive to post more positive reviews of 20th Century Fox movies during the period of Newscorp. ownership (2006-2009). Since the movie reviews are posted quickly on the Rottentomatoes site and then rarely updated⁹, we use the year of release of the movie to test the hypothesis of conflict of interest. We estimate

$$r_{m,o} = \alpha + \gamma^{CI} d_m^{FoxMovie} d_t^{2006-09} + \beta^F d_m^{FoxMovie} + BX_{m,o} + \varepsilon_{m,o}, \quad (11)$$

where $r_{m,o}$ is a measure of a movie review on Rotten Tomatoes for movie m in media outlet o , and the coefficient of interest is γ^{CI} which captures how movies distributed by the 20th Century Fox studio (indicated with $d_m^{FoxMovie} = 1$) are characterized in reviews in years 2006-2009, compared with the years before and after. Since 20th Century Fox movies may have a different average quality than movies produced by other studios, we control for the time-invariant quality with coefficient δ^F . Also, in most specifications we include in the control

⁹Consistent with this, two separate scrapes of the site at 3 month distance yielded no change in the reviews for older movies.

variables X year fixed effects (to control for differences in movie quality or review generosity by year) and media fixed effects (to control for time-invariant media averages). Most importantly, we can include among the controls the MetaCritic scoring for the *same* movie review.

In Table 10 we report the estimate of (11) where in Columns 1 to 7 we use as dependent variable $r_{m,o}$ the 0-1 freshness indicator which is the hallmark of the Rottentomatoes site. Using the sample of all reviews in the Rottentomatoes sample and with no controls (Column 1), the estimates suggest that over the period of Newscorp. ownership, Rottentomatoes provides more *negative* reviews of 20th Century Fox movies ($\hat{\gamma}^{CI} = -0.0684$), a conclusion which does not change after inclusion of year and media fixed effects (Column 2).

This finding, however, may be spurious and due to objectively lower quality movies produced by the Fox studio in those four years. To control for this confound, we add as control the quantitative score of the review, as reported by Rottentomatoes, and translated into a 0-100 scale as described in Section 3.¹⁰ Hence, we examine whether Rottentomatoes is more generous in attributing ‘fresh’ reviews to Fox movies, *given the underlying coded score* (say, 3 out of 5 stars). In this specification (Column 3), the effect of conflict of interest is precisely estimated to be close to zero ($\hat{\gamma}^{CI} = -0.0073$). The standard errors in this specifications are tight, allowing us to reject as an upper bound that conflict of interest increases the probability of a fresh score by 0.7 percentage points, a small effect.

In Figure 5a, we present parallel graphical evidence using a local polynomial estimator of the Rotten Tomatoes freshness score on the 0-100 quantitative score. We run the non-parametric regressions separately for the 20th Century Fox movies (the continuous lines) and the other movies (dotted lines), split by the period of Newscorp. ownership (dark blue line) and the remaining time period (light blue line). The four lines are so close it is nearly impossible to tell them apart on the graph, again indicating no bias.

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

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

The dependent variable is the freshness indicator and the 0-100 score is a control variable, as in Column 3 of Table 10, but 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 Fox movie and an indicator for the complement. In Figure 5b, we plot the coefficients γ_t^F and γ_t^{NF} . As the graph shows, there is no evidence that the residual freshness score for the Fox movies (γ_t^F) diverges upwards from the series for other movies (γ_t^{NF}) in any of the years of ownership.

Since bias may still be present in a subset of the data, we analyze separately reviews with a

¹⁰If the Rotten Tomatoes score is missing, for example for qualitative reviews, we use the score in MetaCritic if available.

quantitative score (i.e. stars) and qualitative reviews for which the freshness score is attributed by a staff reading. We find no bias in the sample of scored reviews (Column 4), but this could be due to the fact that, as Figure 5a shows, nearly all movie reviews scored below 50 receive a ‘rotten’ rating and nearly all movie reviews scored above 70 receive a ‘fresh’ rating. Hence, in Column 5 we focus on the intermediate range of reviews with scores between 50 and 70, for which Rottentomatoes does not apply a strict cut-off rule and seems to use qualitative information such as a detailed reading of the review. Even in the sample, we detect no bias (Column 5).

Arguably, however, bias is most likely for reviews without a quantitative score since the probability of detection is particularly low without a quantitative benchmark. Yet, we find no evidence of bias in this sample (Column 6). To tighten the power of the test, we reduce the sample to qualitative reviews which are stored in both aggregators, and include as a control the score attributed by the staff of Metacritic. Since Metacritic does not suffer from the same conflict of interest, its score should be unbiased in this respect. In this sample (Column 7), we again estimate no effect of the conflict of interest on bias, with more precise estimates.

We also consider the possibility that Rottentomatoes may not bias its freshness indicator, but rather the quantitative score which we used as control variable in Columns 3-5. In Column 8 we regress the RottenTomatoes quantitative score (hence excluding unscored reviews) on the corresponding score for the same review in MetaCritic. The estimates indicate again no bias, and we can reject even a very small bias of 0.15 points out of 100.

Hence, the results from this part of the analysis indicate that, despite the presence of a conflict of interest, there is no semblance of bias in Rottentomatoes, even for the types of reviews for which detection of bias would be hard and hence bias more likely.

5 Conclusion

Consolidation in the media industry is considered by many as a condition for survival for an industry which has been hard hit by the loss of advertising. Yet, consolidation does not come without potential costs. In addition to the concern about the potential loss of diversity, we consider the increased incidence of conflict of interest, and possible ensuing bias. We focus on conflict of interest for movie reviews, such as when the *Wall Street Journal* reviews a movie by 20th Century Fox. The holding company, Newscorp., would benefit financially from a more positive review, and hence higher movie attendance, creating a conflict of interest.

Using a data set of over half a million movie reviews from 1985 to 2011, we show that while media bias due to conflict of interest in conglomerates occurs, its extent is limited, presumably by the value of the reputation of the media outlets and the reviewers themselves. We find that Newscorp. media outlets provide a more positive review to 20th Century Fox movies by 2.6 points out of 100, the equivalent of one extra star every ten reviews. We find no evidence of

such bias among the Time Warner outlets, although among these outlets we find evidence of bias by omission—weaker Warner Bros. movies are less likely to be reviewed. We examine the incidence of bias by type of movie, by individual reviewer, and considered editorial choices. Although some reviewers display higher bias than other reviewers, we find no evidence that affiliated movies are more likely to be assigned to more generous reviewers, an editorial choice which would have indicated more conscious bias. We also find no evidence of bias in the Rotten Tomatoes aggregator, which was owned by Newscorp. between 2006 and 2009.

We can use the estimates of the impact of media bias on movie reviews and the model in Section 2 to compute a back-of-the-envelope bound for the value of a reputation. To do so, we need an assumption about the persuasiveness of positive movie reviews, $f(\bar{u} - r^*)$ in the model. We take to be that an extra star (out of 4) convinces 1 percent of readers to watch a movie. This persuasion rate is in the lower range of the estimated persuasion rates (DellaVigna and Gentzkow, 2010) and is significantly smaller than the estimated impact of media reviews of Reinstein and Snyder (2005), though admittedly we have no evidence. Under this assumption, an extra star in a single movie review for a 20th Century Fox in a newspaper like the *New York Post* with a circulation of about 500,000 readers would add approximately \$40,000 in profits for Newscorp., since the studio receives 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.¹¹

If the *New York Post* had biased by one star all reviews for the 481 20th Century Fox movies released since 1993, the increased profit could have been nearly \$20m. The fact that such systematic bias did not take place indicates that the value of the *New York Post* reputation is larger. We do, however, find a bias of one star every ten reviews, for an overall estimated benefit to Newscorp. of \$2m. This observed bias indicates that such extra revenue is worth the reputational risk that this small bias be discovered.

Within the context of movie reviews we addressed questions that have arisen in the economics of the media – such as whether bias occurs by omission or commission – about which we previously had limited empirical knowledge. We view this contribution as a step forward in better understanding the functioning of media outlets, which play a key role in the formation of public opinion.

The findings in this paper relate to the general debate about the impact of conflicts of interest. Conflicts of interest are believed to have played a major role in the recent economic crisis, as in the case of rating agencies that had incentives to provide AAA ratings even when the underlying security was hard to price. This particular project focuses on one form of conflict of interest in the context of the media, the one induced by cross-holdings, which has not previously been investigated. We believe that it is important to better understand how media outlets navigate the trade-off between professional journalism and revenue maximization for the owners.

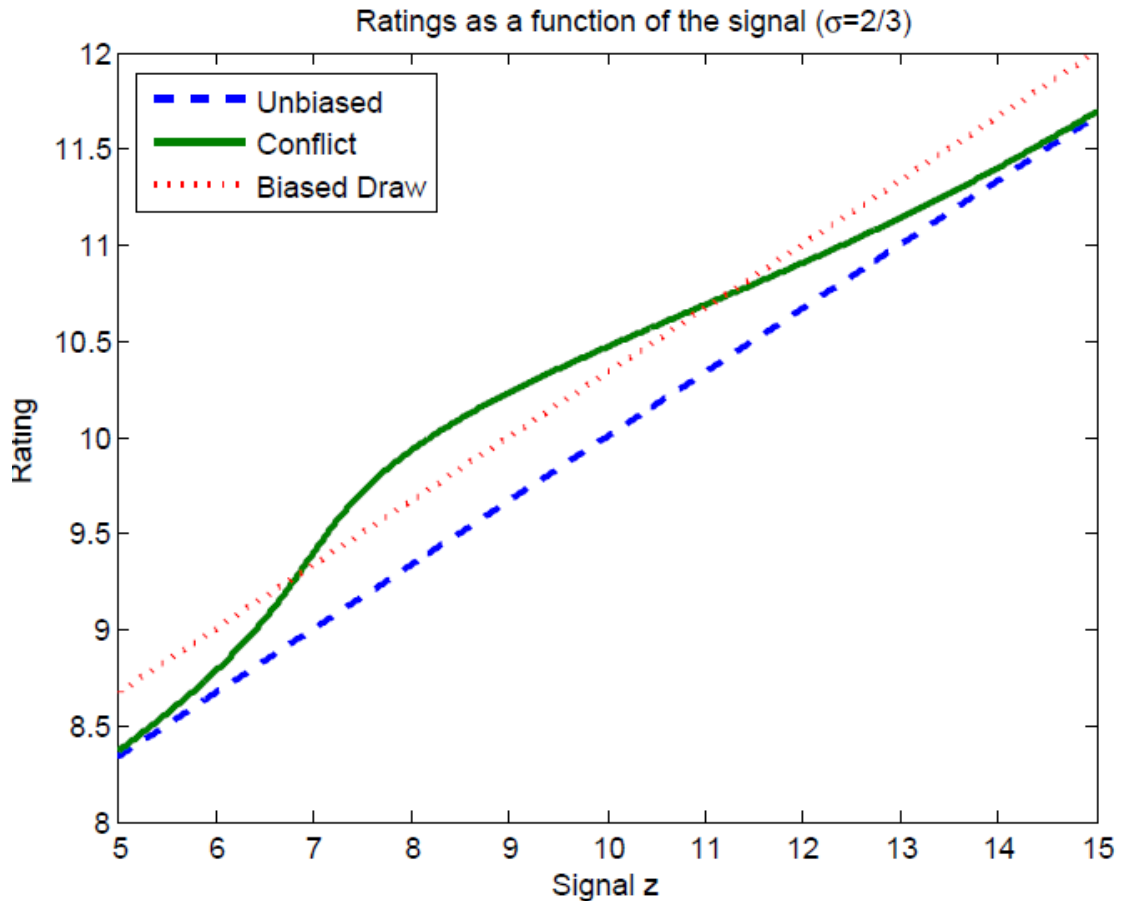
¹¹Personal communication with Bruce Nash, founder of www.the-numbers.com.

References

- [1] Altonji J., T. Elder T, and C. Taber (2005) Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools. *Journal of Political Economy*, 113(1), 151-184.
- [2] Cain, D.M., Loewenstein, G. & Moore, D.A. (2005). The dirt on coming clean: Perverse effects of disclosing conflicts of interest. *Journal of Legal Studies*, 34(1), 1-25.
- [3] Chipty, Tasneem. 2001. Vertical integration, market foreclosure, and consumer welfare in the cable television industry, *The American Economic Review*, 91 (3), 428-453.
- [4] DellaVigna S, Gentzkow G. 2010. Persuasion: Empirical Evidence. *Annual Review of Economics*, 2, 643-669.
- [5] DellaVigna S, Kaplan E, 2007. The Fox News effect: Media bias and voting. *Quarterly Journal of Economics*, 122(3):1187–234
- [6] DeMarzo P, Vayanos D, Zwiebel J. 2003. Persuasion bias, social influence, and uni-dimensional opinions. *Quarterly Journal of Economics*, 118:909–68
- [7] Durante Ruben, Knight Brian. Forthcoming. Partisan control, media bias, and viewer responses: evidence from Berlusconi’s Italy. *Journal of the European Economic Association*.
- [8] Enikolopov R, Petrova M, Zhuravskaya EV, forthcoming. Media and political persuasion: Evidence from Russia. *American Economic Review*.
- [9] Eyster E, Rabin M. 2009. Rational and native herding. Work. Pap., Univ. Calif., Berkeley
- [10] Gentzkow MA, Shapiro JM. 2006. Media bias and reputation. *J. Polit. Econ.* 114(2):280–316.
- [11] Gentzkow M, Shapiro J. 2010. What drives media slant? Evidence from U.S. daily newspapers. *Econometrica*.
- [12] George, Lisa and Joel Waldfogel. 2006. “The New York Times and the Market for Local Newspapers” *American Economic Review*, Vol. 96, pp. 435-447.
- [13] Gerber A, Karlan D, Bergan, D, 2009. Does the media matter? a field experiment measuring the effect of newspapers on voting behavior and political opinions. *American Economic Journal: Applied Economics*, 1(2):35–52
- [14] Gilens M, Hertzman C. 2008. Corporate ownership and news bias: newspaper coverage of the 1996 Telecommunications Act. *J. Polit.* 62(02):369–86

- [15] Gooslbee, Austan. 2007. Vertical Integration and the Market for Broadcast and Cable Television Programming. Working paper.
- [16] Groseclose, Tim and Jeffrey Milyo. 2005. "A Measure of media bias". *Quarterly Journal of Economics*, 120, 1191-1237.
- [17] Knight B., Chiang C. (forthcoming) Media bias and influence: Evidence from newspaper endorsements. *Review of Economic Studies*.
- [18] Larcinese V, Puglisi R, Snyder JM. 2007. Partisan bias in economic news: evidence on the agenda-setting behavior of us newspapers. NBER Work. Pap. 13378
- [19] Malmendier U, Shanthikumar DM. 2007. Are small investors naive about incentives? *J. Financ. Econ.* 85(2):457-89
- [20] Mullainathan S, Schwartzstein J, Shleifer A, 2008. Coarse thinking and persuasion. *Quarterly Journal of Economics*, 123(2):577-619
- [21] Reinstein D, Snyder C, 2005 "The Influence of Expert Reviews on Consumer Demand for Experience Goods: A Case Study of Movie Critics" *Journal of Industrial Economics*, 53(1):27-51.
- [22] Ravid, S. Abraham, John Wald, and Suman Basuroy. 2006. "Distributors and film critics: does it take two to Tango?" *Journal of Cultural Economics*, 30, pp. 201-218.
- [23] Reuter J, Zitzewitz E, 2006. Do ads influence editors? Advertising and bias in the financial media. *The Quarterly Journal of Economics*, 121(1):197-227
- [24] Gabriel Rossman. 2003. The Influence of Ownership on the Valence of Media Content: The Case of Movie Reviews. Working Paper #27, Summer 2003
- [25] Strömberg, D. (2004) Radio's impact on public spending. *Quarterly Journal of Economics* 119(1), 189-221.

Figure 1. Bias due to conflict of interest as a function of movie quality



Notes: Figure 1 plots the optimal bias in the model as a function of the expected updated quality of the movie. We assume a normal distribution for $\varepsilon \sim N(0, 2/3)$, we set $\gamma = \rho = 1$, $q_0 = 10$, pN/c equal to 1 and u equal to 10.

Figure 2a. Average bias in movie ratings: News Corp.-affiliated outlets

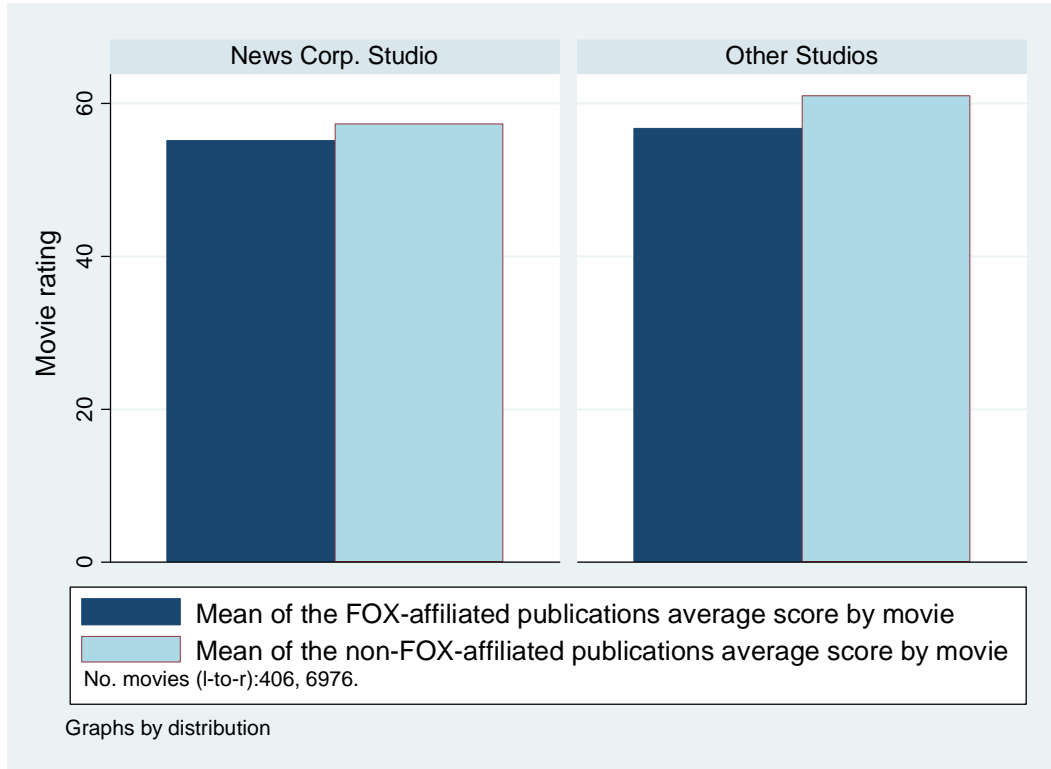
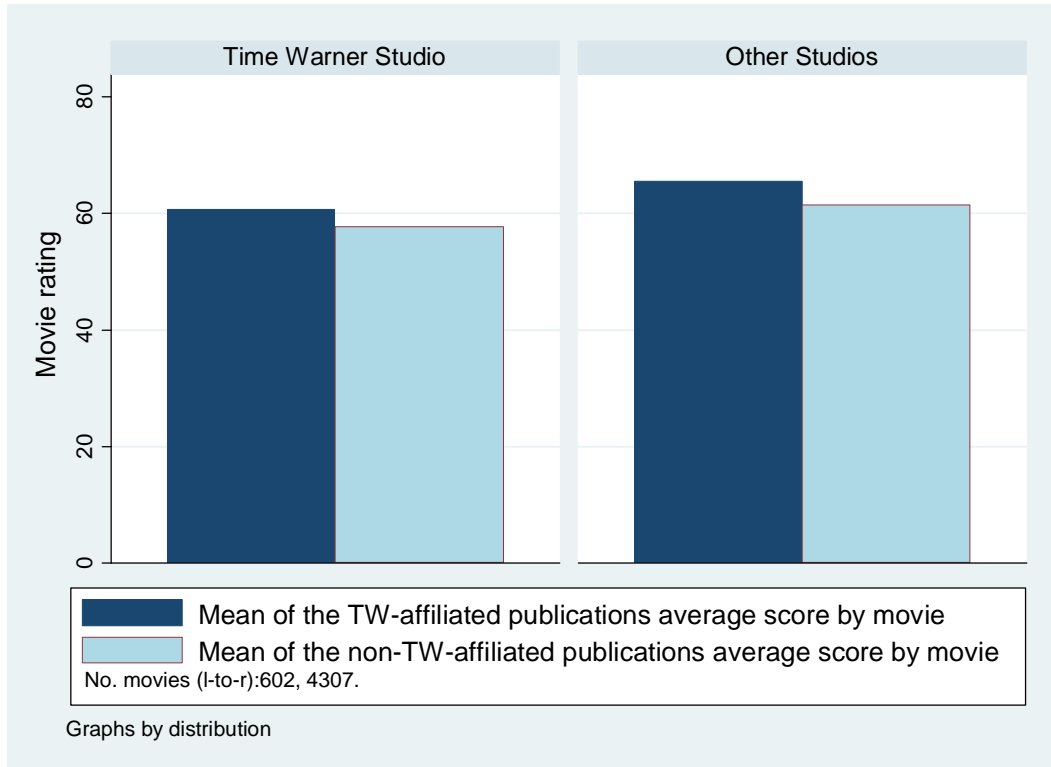
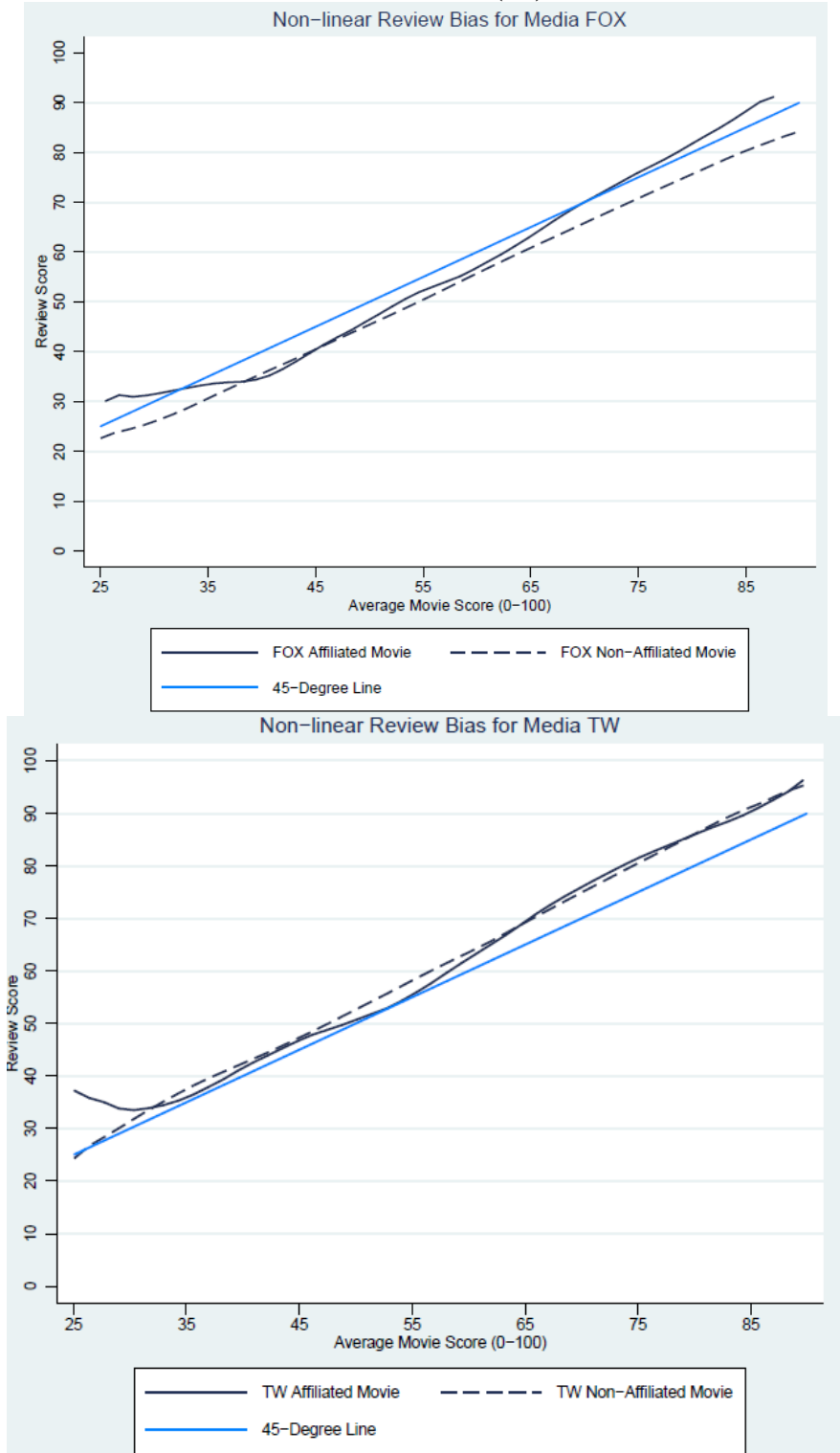


Figure 2b. Average bias in movie ratings: Time Warner-affiliated outlets



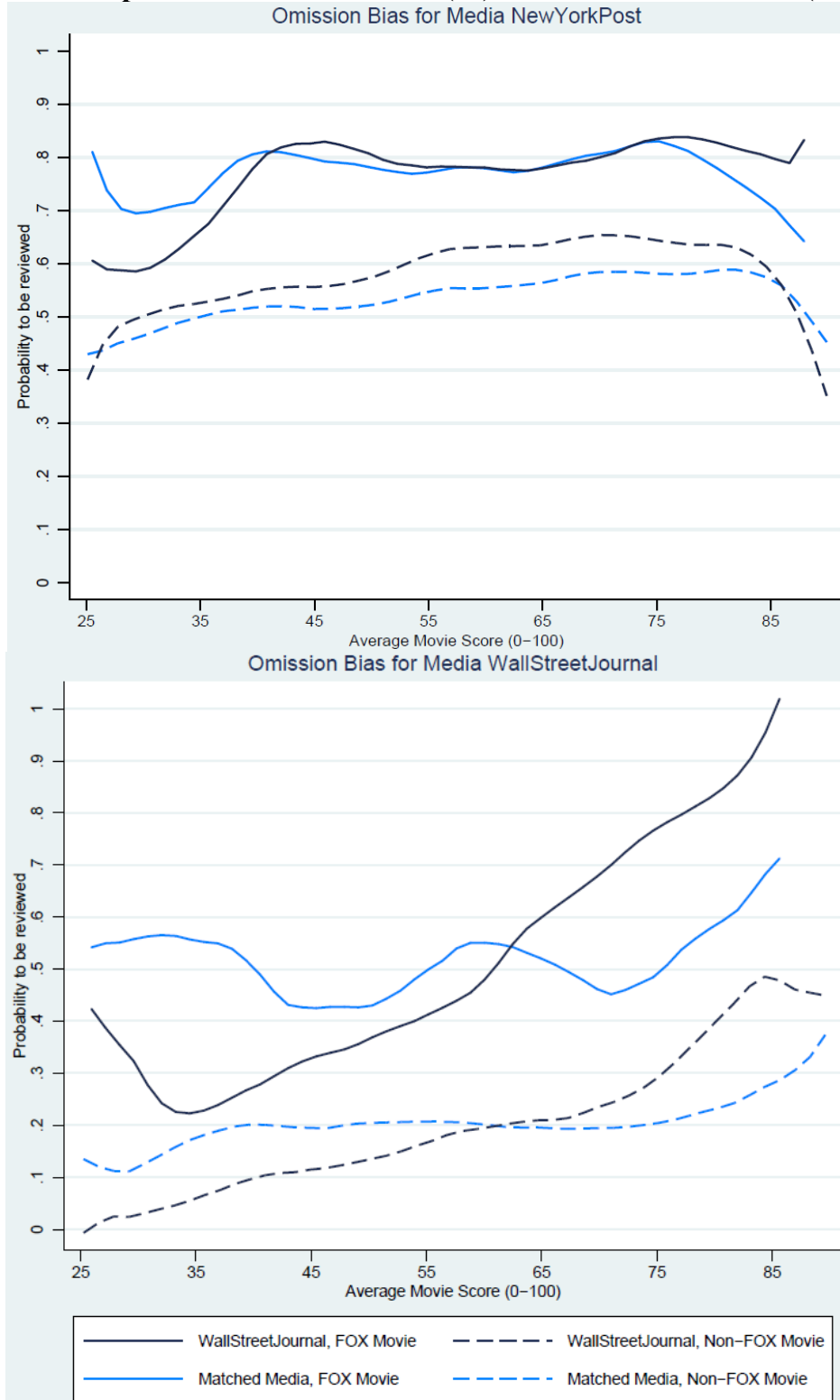
Notes: Figures 2a and 2b report the average movie review score on a 0 to 100 scale. In Figure 2a the movies are split by whether the movies are distributed by 20th Century Fox and whether the media reviewing is owned by Newscorp. In Figure 2b the split is by whether the movies are distributed by Warner Bros. and the media reviewing is owned by Time Warner.

Figure 3a-b. Selective bias –News Corp.-owned outlets (2a) and Time Warner-owned outlets (2b)



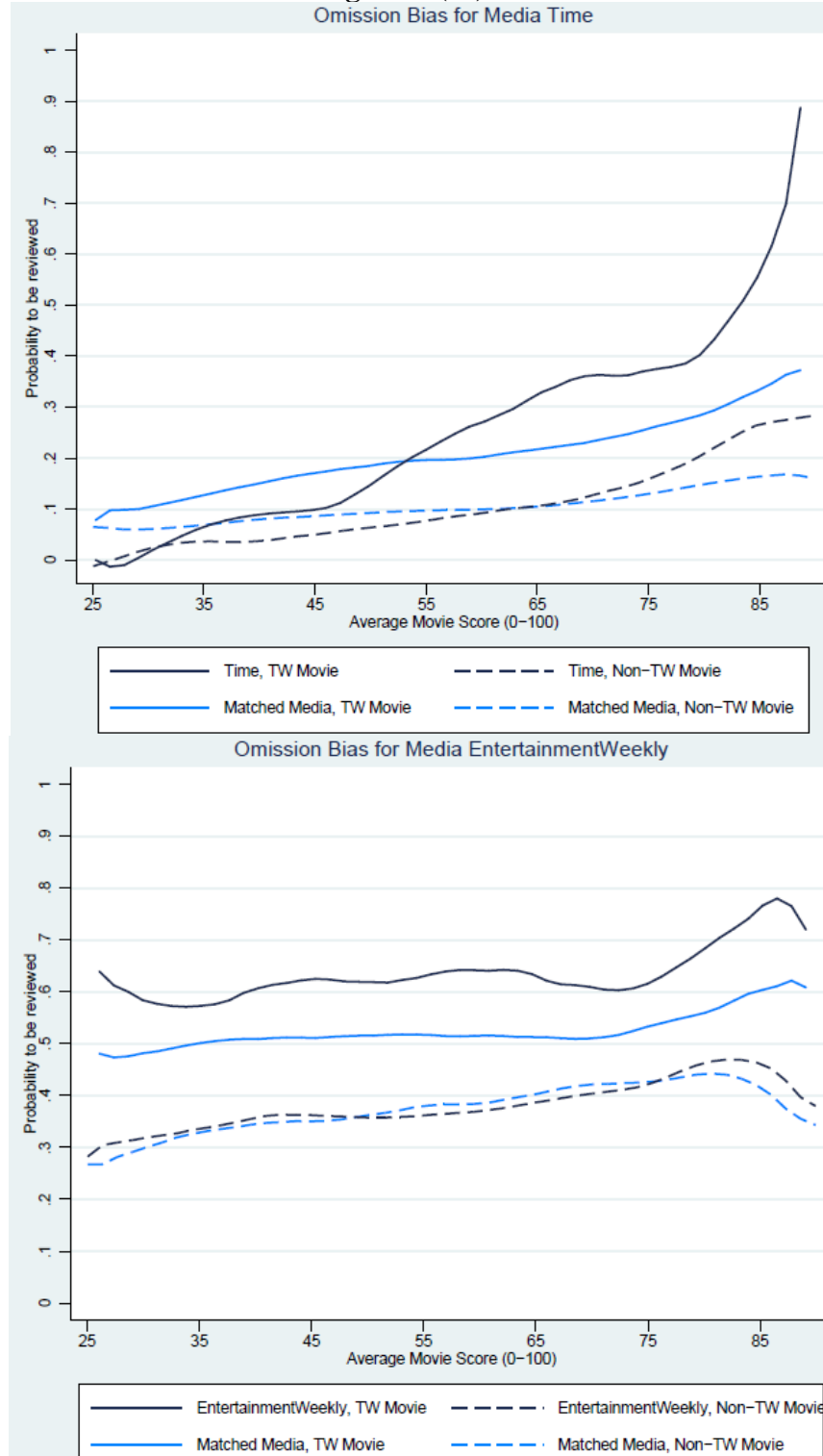
Notes: Figures 3a-3b report a local polynomial regression with Epanechnikov kernel and 1st degree polynomial of the review score for a particular group of media on the average movie review score by all media. We do separate regressions for the movies distributed by the affiliated studio and movies distributed by all other studios. Figure 3a focuses on all the Newscorp.-owned media, Figure 3b focuses on all the Time Warner-owned media.

**Figure 4a-b. Selective coverage -- Probability of review by movie quality (rating):
News Corp. outlets: New York Post (4a) and Wall Street Journal (4b)**



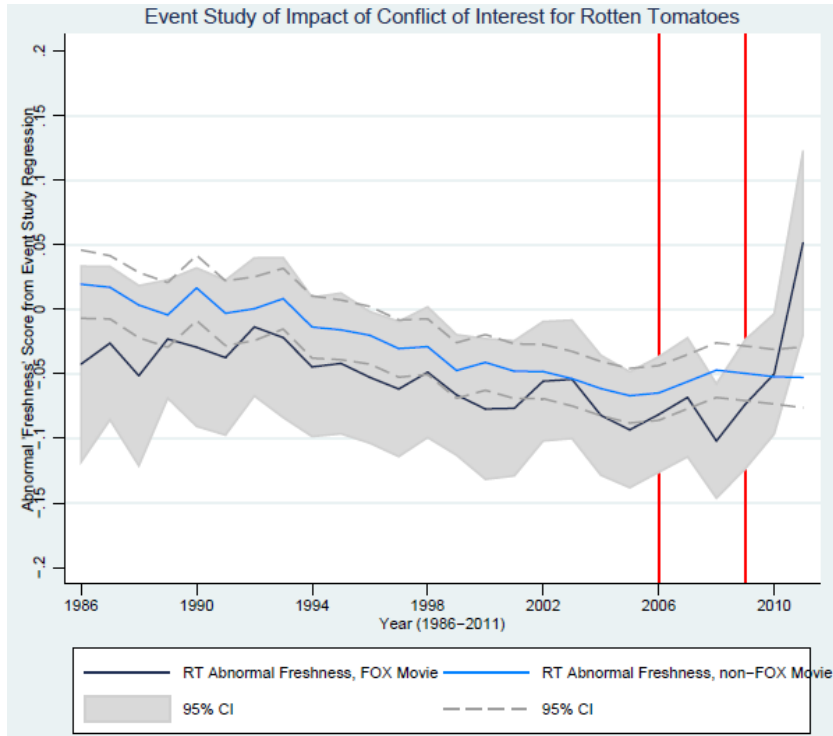
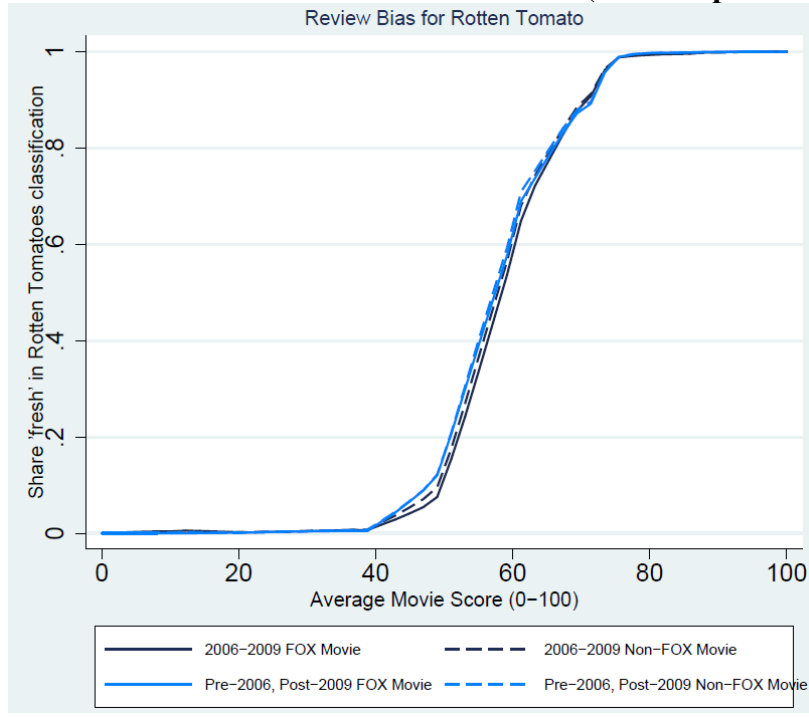
Notes: Figures 4a and 4b report a local polynomial regression with Epanechnikov kernel and 1st degree polynomial of an indicator for whether the movie was reviewed on the average movie review score. Figure 4a focuses on the probability of review (and hence possible omission bias) for New York Post, Figure 4b for the Wall Street Journal. In both cases, the sample includes the media itself (the dark blue line) and the average of 10 matching media with the closest average review probability (the light blue line).

**Figure 4c-d. Selective coverage -- Probability of review by movie quality (rating):
Time Warner outlets: Time Magazine (4c) and Entertainment Weekly (4d)**



Notes: Figures 4c and 4d report a local polynomial regression with Epanechnikov kernel and 1st degree polynomial of an indicator for whether the movie was reviewed on the average movie review score. Figure 4c focuses on the probability of review (and hence possible omission bias) for *Time Magazine*, Figure 4d for *Entertainment Weekly*. In both cases, the sample includes the media itself (the dark blue line) and the average of 10 matching media with the closest average review probability (the light blue line).

Figures 5a-5b. Conflict of Interest in Rotten Tomatoes (Newscorp 2006-09)



Notes: Figure 5a reports a local polynomial regression with Epanechnikov kernel with bandwidth 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 Newscorp. (2006-09, dark blue) and the remaining period (light blue), and plots separate regressions for 20th Century Fox movies (continuous line) and other movies (dotted line). Figure 5b reports the estimated coefficients from an event study regression of the freshness score in Rotten Tomatoes on the quantitative score and year fixed effects interacted with an indicator for a 20th Century Fox movie (coefficient plotted in continuous line) and year fixed effects interacted with an indicator for all other movies (coefficient plotted in dotted line).

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

Media Outlet	Media Type	Years	Owner	No. of Reviews While Owned	No. of Reviews While Not Owned	Usual Rating System	Data Source (Rotten Tomato - RT, MetaCritic - MC, or Both)	Score in MC - Mean (s.d.)	Score in RT - Mean (s.d.)	Share 'fresh' in RT	Most common reviewers
All Reviews	336 media	1985-2011		17039	531725	Varies	MC (54354), RT (416862), Both	61.13 (21.52)	61.65 (21.57)	0.59	
Chicago Sun-Times	Newsp.	1985-2011	News Corp. until 1986	186	5833	0 to 4 stars (1/2 allowed)	MC (653), RT (2531), Both (2835)	71.20 (20.41)	68.75 (21.14)	0.62	Roger Ebert (5638)
New York Post	Newsp.	1998-2011	News Corp. from 1993	6278	-	0 to 4 stars (1/2 allowed)	MC (1472), RT (1200), Both (3606)	56.35 (22.48)	56.09 (22.74)	0.48	Lou Lumenick (2236), V.A. Musetto (1618), Kyle Smith (1154)
News Of The World	Newsp. (UK)	2008-2011	News Corp.	407	-	0 to 5 stars	RT	-	58.08 (24.41)	0.57	Robbie Collin (407)
TV Guide	Weekly	1985-2009	New Corp. 1988-99	980	4876	0 to 4 stars (1/2 allowed)	MC (1928), RT (900), Both (3028)	59.48 (17.20)	60.24 (17.18)	0.59	Maitland McDonagh (2588), Ken Fox (2072)
Times	Newsp. (UK)	2003-2011	News Corp.	960	-	0 to 5 stars	RT	-	53.60 (20.64)	0.55	Wendy Ide (377), James Christopher (286)
Wall Street Journal	Newsp.	1985-2011	News Corp. from 2008	555	1218	Qualitative	MC (1124), RT (81), Both (568)	58.56 (26.28)	-	0.56	Joe Morgenstern (1510)
CNN.com	Website	1997-2007	Time Warner	528	-	Qualitative	RT	-	-	0.55	Paul Clinton (325)
Entertainment Weekly	Weekly	1990-2011	Time Warner from 1990	4889	-	A to F (+/- allowed)	MC (1340), RT (615), Both (2934)	65.15 (23.04)	65.16 (22.99)	0.59	Owen Gleiberman (2307), Lisa Schwarzbaum (1946)
Time	Weekly	1985-2010	Time Warner from 1990	1375	97	Qualitative	MC (773), RT (240), Both (459)	66.57 (22.83)	-	0.71	Richard Corliss (775), Richard Schickel (542)
Other Reviews	326 media	1985-2011		-	519701	Varies	MC (47064), RT (408519), Both	60.93 (21.40)	61.63 (21.55)	0.59	

Notes: The sources of the movie review data are www.metacritic.com (abbreviated MC) and www.rottentomatoes.com (abbreviated RT). The data covers all reviews available from 1985 until July 2011. See text for additional information.

TABLE 1, PANEL B
SUMMARY STATISTICS: STUDIOS

Distributor of Movie (Studio)	Studio Type	Years	Owner	No. of Reviews	No. of Movies	Data Source (Rotten Tomato - RT, MetaCritic - MC, or Both)	Score in MC - Mean (s.d.)	Score in RT - Mean (s.d.)	Share 'fresh' in RT
All Studios		1985-2011		548764	12999	MC (54354), RT (416862), Both (77548)	61.13 (21.52)	61.65 (21.57)	0.59
20th Century Fox	Major	1985-2011	News Corp.	32159	449	MC (2580), RT (25455), Both (4124)	54.40 (21.57)	56.33 (21.79)	0.48
Fox Searchlight	Independent	1995-2011	News Corp.	12547	126	MC (990), RT (9433), Both (2124)	66.91 (19.41)	67.40 (20.07)	0.68
Fox (Other)	Other	1987-2010	News Corp.	390	13	MC (70), RT (307), Both (13)	54.55 (28.55)	66.40 (20.18)	0.71
Warner Bros.	Major	1989-2011	Time Warner from 1989	44162	575	MC (3428), RT (34511), Both (6223)	55.84 (22.27)	58.04 (22.05)	0.50
Fine Line	Independent	1990-2005	Time Warner from 1989	3764	80	MC (526), RT (2751), Both (487)	68.96 (21.37)	68.80 (22.00)	0.71
HBO	Other	1989-2010	Time Warner from 1989	605	64	MC (23), RT (532), Both (50)	74.60 (18.29)	66.65 (20.83)	0.78
New Line	Independent	1989-2008	Time Warner from 1996	16667	233	MC (1310), RT (2014), Both (2198)	55.49 (23.12)	57.94 (22.55)	0.50
Picturehouse	Independent	2005-2009	Time Warner from 1989	2590	34	MC (195), RT (2014), Both (381)	65.10 (19.02)	66.54 (20.14)	0.66
Warner Independent	Independent	2004-2008	Time Warner	2733	26	MC (177), RT (2105), Both (451)	65.95 (18.90)	66.53 (19.21)	0.63
Warner Home Video	Other	1989-2009	Time Warner from 1989	783	59	MC (30), RT (739), Both (14)	52.61 (22.60)	58.93 (24.02)	0.57
Other Studios		1985-2011		432364	11423	MC (45025), RT (325856), Both (61483)	61.92 (21.27)	62.29 (21.38)	0.60

Notes: The sources of the movie review data are www.metacritic.com (abbreviated MC) and www.rottentomatoes.com (abbreviated RT). The data covers all reviews available from 1985 until July 2011. See text for additional information.

TABLE 2
THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: AVERAGE BIAS (0-100 SCORE)

Specification:	OLS Regressions					
Dep. Var.:	Movie Review on a 0-100 Scale for Movie <i>m</i> in Media Outlet <i>o</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
Indicator for Fox Movie on News Corp.-Owned Outlet (Measure of Conflict of Interest for News Corp.)	1.0285 [0.9381]	1.0886 [0.9371]	2.0749** [0.8133]	2.5651*** [0.7966]	2.7175*** [0.9045]	2.3197** [0.9246]
Indicator for Warner Bros. Movie on TW-Owned Outlet (Measure of Conflict of Interest Time Warner)	-1.2510 [0.7937]	-1.2101 [0.7925]	-1.0430 [0.6832]	-0.4998 [0.6829]	-0.1152 [0.7224]	-0.0585 [0.8076]
Indicator for 20th Century Fox Movie	-2.9916*** [0.7443]	-3.0534*** [0.7418]				
Indicator for Warner Brothers Movie	-3.2318*** [0.6252]	-3.2496*** [0.6246]				
Indicator for Media Outlet Owned by News Corp.	-4.9151*** [0.2299]	-4.8264*** [0.2186]	-4.4181*** [0.1939]	-1.7450*** [0.4612]	-2.1882*** [0.5112]	-1.7968** [0.7140]
Indicator for Media Outlet Owned by Time Warner	4.2613*** [0.2763]	4.4035*** [0.2724]	3.7427*** [0.2428]	4.4895* [2.6362]	3.7029 [2.5121]	3.5507 [4.6752]
Control Variables:						
Year Fixed Effects		X	X	X	X	X
Movie Fixed Effects			X	X	X	X
Media Outlet Fixed Effects				X	X	X
Sample:	Metacritic Sample + RottenTomatoes Sample				MetaCritic Only	RottenTomatoes Only
Mean of Dependent Variable	61.52	61.52	61.52	61.52	61.13	61.52
p-value of test of equality of effect of conflict of interest for News Corp. and for Time Warner:	p = 0.0658*	p = 0.0633*	p = 0.0035***	p = 0.0037***	p = 0.0153**	p = 0.0541*
R ²	0	0.01	0.41	0.46	0.52	0.45
N	N=474,496	N=474,496	N=474,496	N=474,496	N=132,731	N=419,402

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*. The standard errors in parentheses 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 (0-1 FRESH INDICATOR)

Specification:	OLS Regressions				
Dep. Var.:	Indicator for "Fresh" movie for Movie m in Media Outlet o				
	(1)	(2)	(3)	(4)	(5)
Indicator for Fox Movie on News Corp.-Owned Outlet (Measure of Conflict of Interest for News Corp.)	0.0305 [0.0228]	0.0294 [0.0228]	0.0618*** [0.0207]	0.0659*** [0.0206]	0.0835*** [0.0261]
Indicator for Warner Bros. Movie on TW-Owned Outlet (Measure of Conflict of Interest Time Warner)	-0.0041 [0.0184]	-0.0046 [0.0184]	-0.0197 [0.0177]	-0.0127 [0.0176]	0.0013 [0.0223]
Indicator for 20th Century Fox Movie	-0.0674*** [0.0148]	-0.0683*** [0.0147]			
Indicator for Warner Brothers Movie	-0.0792*** [0.0120]	-0.0794*** [0.0120]			
Indicator for Media Outlet Owned by News Corp.	-0.0948*** [0.0059]	-0.0924*** [0.0058]	-0.0921*** [0.0054]	-0.0369** [0.0175]	-0.0056 [0.0232]
Indicator for Media Outlet Owned by Time Warner	0.0114 [0.0069]	0.0155** [0.0069]	0.0116* [0.0065]	0.1234* [0.0676]	0.0552 [0.1034]
Control Variables:					
Year Fixed Effects		X	X	X	X
Movie Fixed Effects			X	X	X
Media Outlet Fixed Effects				X	X
Sample:		RottenTomatoes Sample			Subsample of RT also in MC
Mean of Dependent Variable	0.590	0.590	0.590	0.590	0.555
p-value of test of equality of effect of conflict of interest for News Corp. and for Time Warner:	p = 0.2397	p = 0.2460	p = 0.0027***	p = 0.0038***	p = 0.0198**
R ²	0	0.01	0.28	0.32	0.36
N	N=494,460	N=494,460	N=494,460	N=494,460	N=77,637

Notes: An observation is a movie review by a media outlet from 1985 to July 2011 in the *rottentomatoes.com* aggregator. The dependent variable is an indicator for movie "freshness" devised by *rottentomatoes.com*. The standard errors in parentheses are clustered by movie.
* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 4
THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: BY MEDIA

Specification:	OLS Regressions								
	<i>News Corp. Conflict of Interest</i>						<i>Time Warner Conflict of Interest</i>		
	<i>Chicago SunTimes</i>	<i>New York Post</i>	<i>News of the World</i>	<i>TV Guide</i>	<i>Times (UK)</i>	<i>Wall Street Journal</i>	<i>CNN.com</i>	<i>Entertainme nt Weekly</i>	<i>Time</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A.									
<u>Dep Var.: Score (0-100)</u>									
Indicator for Conflict of Interest	2.3530 [4.8051]	3.1382*** [0.9877]	3.8096 [3.2221]	2.4169 [1.6519]	0.0286 [2.2918]	0.5175 [3.1342]	.	-0.3039 [0.7363]	-0.9717 [1.3957]
R ²	0.49	0.45	0.48	0.43	0.46	0.46	.	0.46	0.41
N	N=3,314	N=362,309	N=36,787	N=46,740	N=73,318	N=47,888	.	N=362,266	N=127,688
Panel B.									
<u>Dep Var.: Indicator for Fresh in Rottentomatoes</u>									
Indicator for Conflict of Interest	-0.0166 [0.1261]	0.0718*** [0.0258]	0.0130 [0.0769]	0.0672 [0.0913]	0.0598 [0.0593]	0.1120* [0.0615]	-0.0541 [0.0436]	-0.0027 [0.0208]	-0.0079 [0.0457]
R ²	0.38	0.30	0.31	0.32	0.30	0.29	0.29	0.31	0.27
N	N=3,435	N=381,533	N=40,551	N=42,286	N=82,516	N=50,265	N=73,883	N=379,758	N=133,835
Control Variables:									
Movie Fixed Effects	X	X	X	X	X	X	X	X	X
Media Outlet Fixed Effects	X	X	X	X	X	X	X	X	X

Notes: An observation is a movie review by a media outlet from 1985 to July 2011. 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.). The dependent variable in Panel A is a 0-100 score for the review, while the dependent variable in Panel B is an indicator variable for "freshness" from the rottentomatoes data. All specifications include fixed effects for the movie and for the media reviewing. The standard errors in parentheses are clustered by movie.

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

TABLE 5
 REVIEWERS FOR MEDIA AT RISK OF CONFLICT OF INTEREST

Media Outlet	Media Type	Years In Data	Years In Data and Owned	Reviewer Name and Years	No. of Reviews while Owned	Fixed Effect for Average Score (s.e.)	Share reviews of affiliated studio
<u>Panel A. News Corp. Outlets</u>							
Chicago Sun-Times	Newsp.	1985-2011	1985-1986	Roger Ebert ('85-'11)	184	10.23 (.46)	8.70%
New York Post	Newsp.	1998-2011	1998-2011	Lou Lumenick ('98-'11)	2236	-2.19 (.56)	6.98%
New York Post	Newsp.	1998-2011	1998-2011	V.A. Musetto ('98-'11)	1618	-1.34 (.57)	0.25%
New York Post	Newsp.	1998-2011	1998-2011	Kyle Smith ('05-'11)	1154	-7.38 (.78)	6.67%
New York Post	Newsp.	1998-2011	1998-2011	Jonathan Foreman ('98-'04)	622	-0.74(.80)	6.91%
New York Post	Newsp.	1998-2011	1998-2011	Megan Lehmann ('02-'04)	366	-3.81 (.98)	7.10%
News of the World	Newsp. (UK)	2008-2011	2008-2011	Robbie Collin ('08-'11)	407	-0.62 (1.17)	9.09%
TV Guide	Weekly	1985-2011	1988-1999	Maitland McDonagh ('97-'08)	370	-0.60 (.48)	9.19%
TV Guide	Weekly	1985-2011	1988-1999	Ken Fox ('97-'08)	134	4.29 (.50)	9.70%
Times	Newsp. (UK)	2003-2011	2003-2011	Wendy Ide ('03-'10)	377	-7.82 (.96)	5.31%
Times	Newsp. (UK)	2003-2011	2003-2011	James Christopher ('03-'10)	286	-4.59 (1.28)	9.09%
Wall Street Journal	Newsp.	1985-2011	2008-2011	Joe Morgenstern ('01-'11)	496	-3.64 (.66)	8.67%
<u>Panel B. Time Warner Outlets</u>							
CNN.com	Website	1997-2007	1997-2007	Paul Clinton ('98-'05)	325	.	22.46%
Entertainment Weekly	Weekly	1990-2011	1990-2011	Owen Gleiberman ('90-'11)	2307	6.49 (.58)	12.83%
Entertainment Weekly	Weekly	1990-2011	1990-2011	Lisa Schwarzbaum ('94-'11)	1946	8.41 (.53)	11.97%
Time	Weekly	1985-2010	1990-2010	Richard Corliss ('85-'11)	724	3.53 (.88)	16.71%
Time	Weekly	1985-2010	1990-2010	Richard Schickel ('85-'08)	502	2.50 (1.11)	16.73%

Notes: The sources of the movie review data are *www.metacritic.com* (abbreviated MC) and *www.rottentomatoes.com* (abbreviated RT). The data covers all reviews available from 1985 until July 2011. See text for additional information.

TABLE 6
THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: BY REVIEWER

Specification:	OLS Regressions									
	<i>News Corp.</i> Conflict of Interest					<i>Time Warner</i> Conflict of Interest				
	<i>New York Post</i>				<i>TV Guide</i>		<i>Entertainment Weekly</i>		<i>Time</i>	
	Lou Loumenick	Kyle Smith	Jonathan Foreman	Megan Lehmann	Maitland McDonagh	Ken Fox	Owen Gleiberman	Lisa Schwarzbau	Richard Corliss	Richard Schickel
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A.										
<u>Dep Var.: Score (0-100)</u>										
Indicator for Conflict of Interest	3.0068** [1.3149]	6.0914*** [2.3501]	-0.2606 [2.8959]	5.4902* [3.1414]	6.0412*** [2.1031]	-4.2065 [5.0740]	-0.3830 [1.1448]	-0.4791 [1.0141]	0.9784 [1.8489]	-4.6170** [2.3329]
R ²	0.46	0.45	0.46	0.44	0.43	0.47	0.44	0.45	0.42	0.38
N	N=165,133	N=82,384	N=42,165	N=25,553	N=20,826	N=5,708	N=172,627	N=152,808	N=71,569	N=43,975
Panel B.										
<u>Dep Var.: Indicator for Fresh in Rottentomatoes</u>										
Indicator for Conflict of Interest	0.0614* [0.0348]	0.1537*** [0.0558]	0.0368 [0.0769]	0.1479* [0.0837]	0.2377** [0.0918]	0.0105 [0.1812]	-0.0097 [0.0309]	0.0059 [0.0298]	0.0511 [0.0639]	-0.0182 [0.0719]
R ²	0.30	0.31	0.31	0.31	0.32	0.35	0.30	0.30	0.28	0.26
N	N=175,793	N=87,197	N=45,559	N=25,634	N=20,214	N=5,326	N=180,977	N=162,379	N=75,084	N=46,505
Control Variables:										
Movie Fixed Effects	X	X	X	X	X	X	X	X	X	X
Media Outlet Fixed Effects	X	X	X	X	X	X	X	X	X	X

Notes: An observation is a movie review by a media outlet from 1985 to July 2011. Each column is a separate regression including as observations only movies with at least one review by the featured reviewer, and as independent variables indicator variables for the outlet and for production by the conflicted distributing company (20th Century Fox and Warner Bros.). The dependent variable in Panel A is a 0-100 score for the review, while the dependent variable in Panel B is an indicator variable for "freshness" from the rottentomatoes data. All specifications include fixed effects for the movie and for the media reviewing. The standard errors in parentheses are clustered by movie.

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

TABLE 7
THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: SELECTIVE BIAS

Specification:	OLS Regressions								
Dependent Variable:	Movie review score (0-100)								
	<i>News Corp.</i> Conflict of Interest						<i>Time Warner</i> Conflict of Interest		
	<i>Chicago SunTimes</i>	<i>New York Post</i>	<i>News of the World</i>	<i>TV Guide</i>	<i>Times (UK)</i>	<i>Wall Street Journal</i>	<i>Entertainment Weekly</i>		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Indicator for Conflict of Interest	-1.8511 [8.1669]	1.6053 [1.5719]	9.3846** [4.5067]	2.7745 [3.1145]	3.0971 [3.1936]	-0.4418 [4.6435]	.	0.0172 [1.2686]	-1.3100 [3.4622]
Indicator for Conflict of Interest * (55<Average Movie Rating<=70)	6.6737 [8.9600]	1.2414 [2.2644]	-15.0553** [6.9450]	-3.4936 [3.9723]	-5.8530 [5.8224]	6.0759 [6.6080]	.	-0.1049 [1.7136]	0.9607 [4.0386]
Indicator for Conflict of Interest * (Average Movie Rating>70)	-5.5183 [8.7293]	5.6198*** [2.1265]	5.5208 [6.1254]	-0.1861 [3.9991]	-6.4469 [5.0638]	2.1793 [6.2369]	.	1.2430 [1.7644]	1.6107 [3.9919]
R ²	0.58	0.48	0.51	0.47	0.49	0.48	.	0.48	0.43
N	N=3,314	N=362,272	N=36,772	N=46,740	N=73,308	N=47,880	.	N=362,230	N=127,682
Control Variables:									
Movie Fixed Effects	X	X	X	X	X	X	X	X	X
Media Outlet Fixed Effects	X	X	X	X	X	X	X	X	X
Media Outlet f.e. *(55<Average Movie Rating<=70)	X	X	X	X	X	X	X	X	X
Media Outlet f.e. *(Average Movie Rating>70)	X	X	X	X	X	X	X	X	X

Notes: An observation is a movie review by a media outlet from 1985 to July 2011. Each column is a separate regression including as observations only movies with at least one review by the featured outlet during the period in which the outlet is owned by NewsCorp. or Time Warner. The average score is computed as the average 0-100 score for a movie from all media outlets. The dependent variable is a 0-100 score for the review. The standard errors in parentheses are clustered by movie.

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

TABLE 8
CONFLICT OF INTEREST AND OMISSION BIAS: PROBABILITY OF REVIEW

Specification:	OLS Regressions								
Dependent Variable:	Indicator variable for review of a movie by media m								
	<i>News Corp. Conflict of Interest</i>						<i>Time Warner Conflict of Interest</i>		
	<i>Chicago SunTimes</i>	<i>New York Post</i>	<i>News of the World</i>	<i>TV Guide</i>	<i>Times (UK)</i>	<i>Wall Street Journal</i>	<i>Entertainme nt Weekly</i>		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Indicator for Conflict of Interest * Average Movie Rating	-0.0189* [0.0103]	0.0011 [0.0012]	-0.0008 [0.0027]	0.0039* [0.0022]	-0.0035** [0.0016]	0.0051* [0.0027]	0.0024** [0.0010]	0.0004 [0.0007]	0.0034*** [0.0009]
Indicator for Conflict of Interest	1.0969* [0.5838]	-0.1214 [0.0750]	-0.0142 [0.1546]	-0.1896 [0.1212]	0.1329 [0.0936]	-0.3019** [0.1439]	-0.0903 [0.0605]	0.0939** [0.0388]	-0.1493*** [0.0483]
R ²	0.31	0.52	0.44	0.44	0.32	0.48	0.23	0.48	0.34
N	N=3,278	N=109,747	N=28,974	N=37,048	N=76,978	N=28,974	N=85,316	N=133,331	N=133,342
Control Variables:									
Movie Fixed Effects	X	X	X	X	X	X	X	X	X
Media Outlet Fixed Effects	X	X	X	X	X	X	X	X	X
Media Outlet Fixed Effects*Average Movie Rating	X	X	X	X	X	X	X	X	X
Sample:	Potential review in featured media and in each of 10 matched media, with match based on similar average probability of review								

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 similar average probability of review. The sample only includes years in which the media featured in the relevant column is owned by Newscorp. or Time Warner. The average score is computed as the average 0-100 score for a movie from all media outlets excluding the featured media and the 10 matched media. All specifications include fixed effects for the movie, for the media reviewing, and an interaction of the average score and the reviewer fixed effect. The standard errors in parentheses are clustered by movie.

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

TABLE 9
PARTIAL OMISSION BIAS: DELAYED REVIEWS AND REVIEW LENGTH

Specification:	OLS Regressions					
Dep. Var.:	Indicator for delayed review		Difference between date of review and of release		Log (Word length in review)	
	(1)	(2)	(3)	(4)	(5)	(6)
Conflict of Interest for News Corp.	0.0722** [0.0303]	-0.1190 [0.1808]	0.9039*** [0.3377]	-1.3530 [1.7651]	0.0063 [0.0634]	0.2134 [0.3145]
Conflict of Interest for News Corp. * Average Movie Rating		0.0029 [0.0027]		0.0340 [0.0270]		-0.0030 [0.0047]
Conflict of Interest for Time Warner	-0.0722*** [0.0246]	-0.0098 [0.1485]	-0.7497** [0.3773]	-0.5489 [2.4431]	0.1589*** [0.0503]	0.0115 [0.2576]
Conflict of Interest for Time Warner * Average Movie Rating		-0.0010 [0.0024]		-0.0025 [0.0418]		0.0020 [0.0039]
Control Variables:						
Movie Fixed Effects	X	X	X	X	X	X
Media Outlet Fixed Effects	X	X	X	X	X	X
Media Outlet Fixed Effects *						
Average Movie Rating		X		X		X
Sample:	<i>Boston Globe, Entertainment Weekly, New York Post, Time, Village Voice, and Wall Street Journal</i>					
Mean of Dependent Variable	0.185	0.185	0.185	0.185	5.976	5.976
R ²	0.63	0.65	0.73	0.74	0.7	0.71
N	N=10,875	N=10,875	N=10,875	N=10,875	N=11,219	N=11,219

Notes: An observation is a movie review by the *Boston Globe*, *Entertainment Weekly*, *New York Post*, *Time* magazine, *Village Voice*, and *Wall Street Journal*. The dependent variable in Columns 1 and 2 is an indicator variable for a review taking place at least 5 days after the movie release date. The dependent variable in Columns 3 and 4 is the difference between the date of the review and the date of the release of a movie. The dependent variable in Columns 5 and 6 is the log of the word count. The average review score for a movie is computed excluding the media in the sample. The standard errors in parentheses are clustered by movie.

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

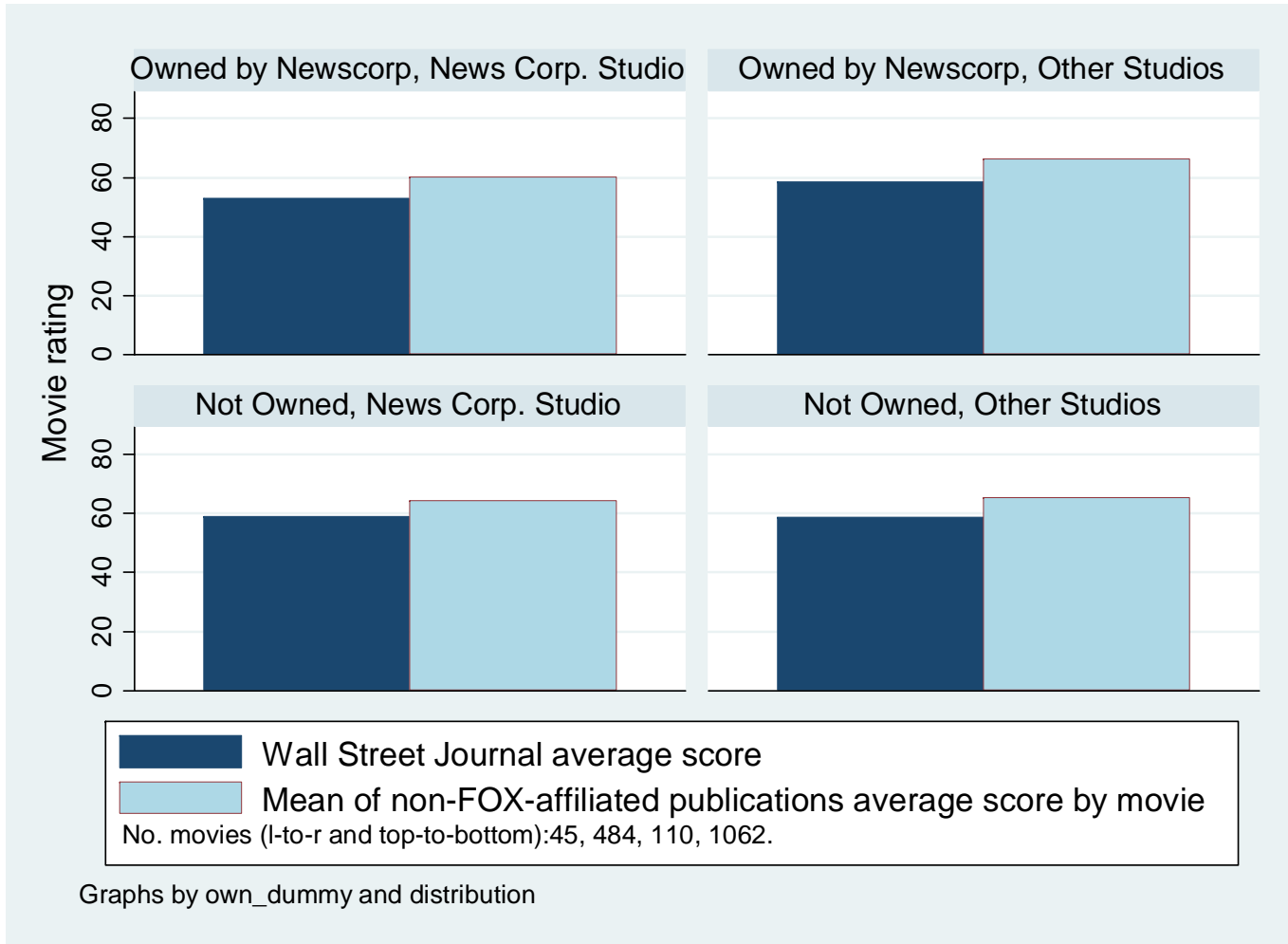
TABLE 10
BIAS IN ROTTEN TOMATO: EFFECT OF NEWSCORP. OWNERSHIP

Specification:	OLS Regressions							RottenTomatoes
Dep. Var.:	RottenTomatoes 0-1 "Freshness" indicator							0-100 Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Indicator for 20th Century Fox Movie * (RottenTomatoes owned by Newscorp.: 2006-09)	-0.0684** [0.0328]	-0.0637* [0.0330]	-0.0073 [0.0069]	-0.0075 [0.0069]	0.0002 [0.0084]	-0.0557 [0.0349]	-0.0049 [0.0188]	-0.1609 [0.1471]
Indicator for 20th Century Fox Movie	-0.0329** [0.0164]	-0.0366** [0.0161]	-0.0082** [0.0037]	-0.0070* [0.0038]	-0.0060 [0.0049]	-0.0470** [0.0185]	-0.0255** [0.0111]	-0.1698* [0.0948]
0-100 Review Score			0.0182*** [0.0001]	0.0183*** [0.0001]	0.0394*** [0.0002]			
0-100 MetaCritic Review Score							0.0174*** [0.0001]	0.9597*** [0.0012]
Control Variables:								
Year Fixed Effects		X	X	X	X	X	X	X
Media Outlet Fixed Effects		X	X	X	X	X	X	X
Sample:		All Reviews		Only Reviews Scored in RT	Only Reviews with 50<=Score<=70	Only Reviews Unscored in RT		Reviews Scored in RT and MC
R ²	0	0.04	0.64	0.65	0.57	0.05	0.56	0.94
N	N=494,410	N=419,375	N=419,375	N=394,908	N=152,343	N=97,375	N=24,467	N=53,108

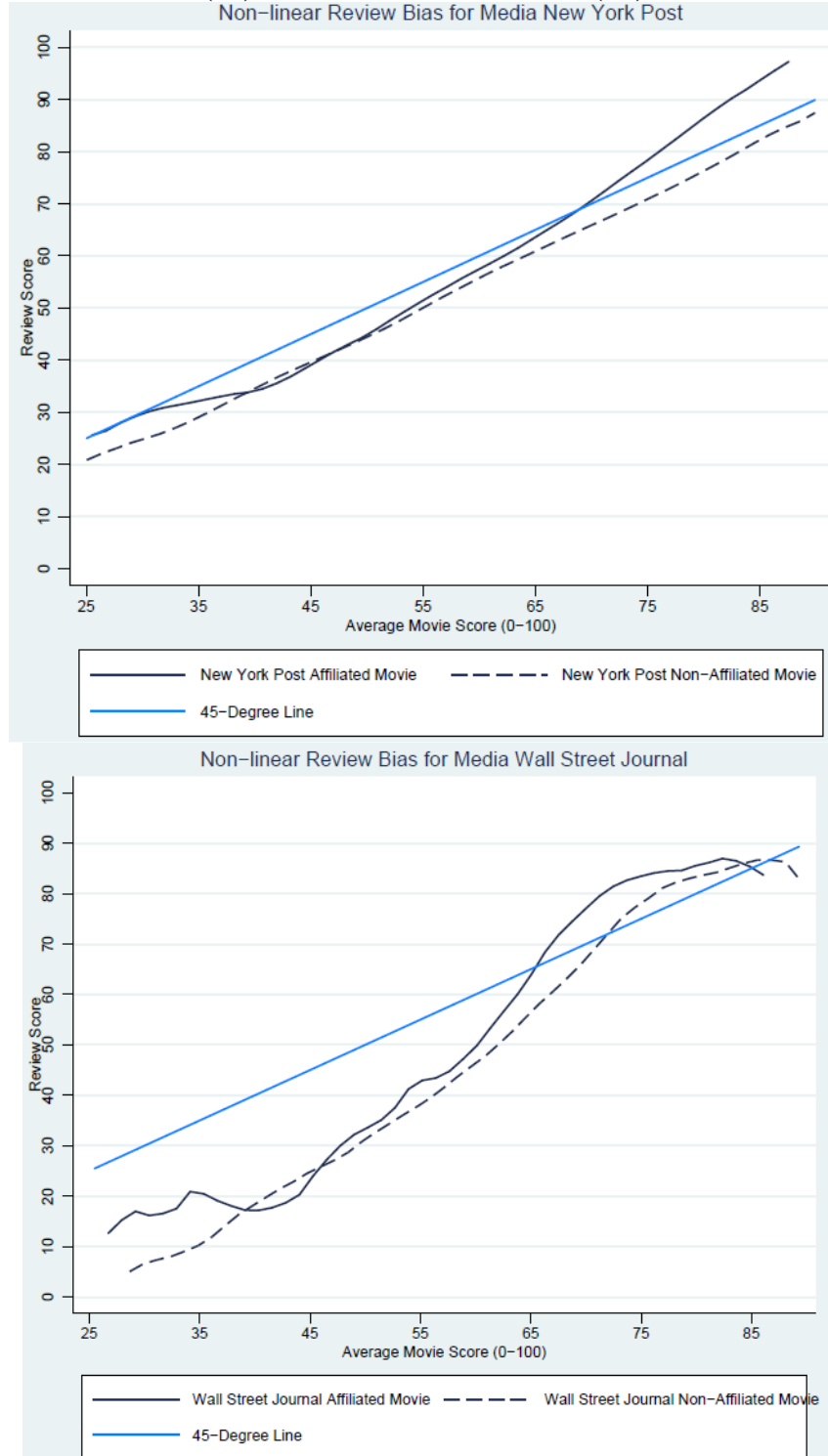
Notes: An observation is a movie review. The dependent variable in Columns 1 to 7 is an indicator variable for 'freshness' of a movie according to review in RottenTomatoes, while the dependent variable in Column 8 is the underlying quantitative rating of a review in RottenTomatoes converted into a 0-100 score according to the MetaCritic procedure. The key independent variables are indicators for movies distributed by 20th Century Fox and an interaction of this indicator with the years in which Rottentomatoes is owned by Newscorp. (2006-09). The standard errors in parentheses are clustered by movie.

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

Appendix Figure 1. Average bias in movie ratings: Wall Street Journal pre- and post-2008 (year of acquisition by News Corp.)

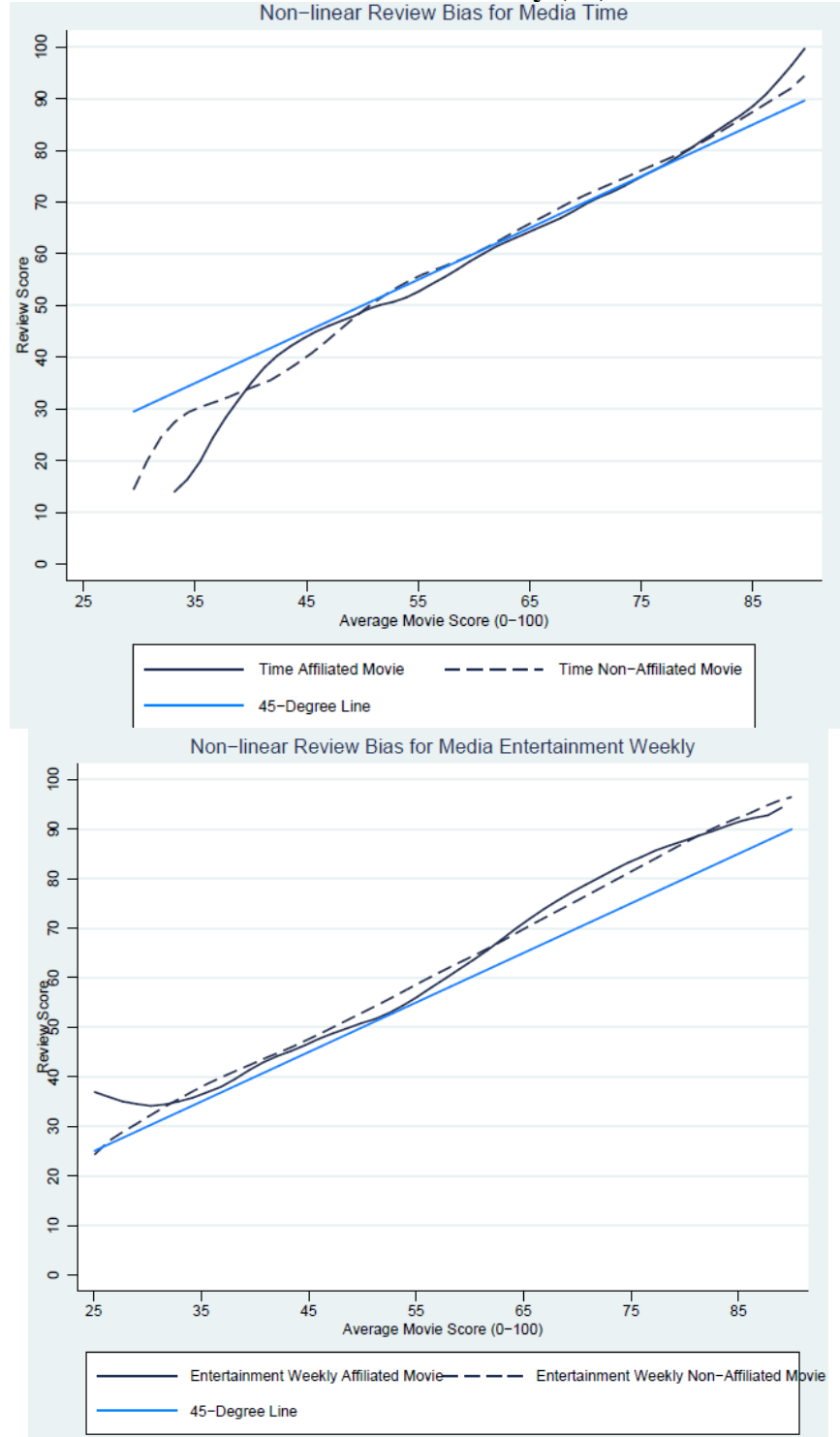


Appendix Figure 2a-b. Selective bias –News Corp.-owned outlets: New York Post (2a) and Wall Street Journal (2b)



Notes: Appendix Figures 2a-2b report a local polynomial regression with Epanechnikov kernel and 1st degree polynomial of the review score for a particular group of media on the average movie review score by all media. We do separate regressions for the movies distributed by the affiliated studio and movies distributed by all other studios. Figure 2a focuses on the *New York Post*, Figure 2b on the *Wall Street Journal*.

Appendix Figure 2c-2d. Selective bias –Time Warner -owned outlets: Time (2c) and Entertainment Weekly (2d)



Notes: Appendix Figures 2c-2d report a local polynomial regression with Epanechnikov kernel and 1st degree polynomial of the review score for a particular group of media on the average movie review score by all media. We do separate regressions for the movies distributed by the affiliated studio and movies distributed by all other studios. Figure 2c focuses on on *Time*, Figure 2d on *Entertainment Weekly*.

APPENDIX TABLE 1
THE EFFECT OF CONFLICT OF INTEREST ON MOVIE REVIEWS: ROBUSTNESS

Specification:	OLS Regressions					
Dep. Var.:	Movie Review on a 0-100 Scale for Movie <i>m</i> in Media Outlet <i>o</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Dep Var.: Score (0-100)						
Indicator for Fox Movie on News Corp.-Owned Outlet (Measure of Conflict of Interest for News Corp.)	2.5651*** [0.7966]	2.5651*** [0.2535]	2.5651*** [0.4780]	1.8353** [0.8178]	2.8436*** [0.9586]	-1.2320 [3.1867]
Indicator for Warner Bros. Movie on TW-Owned Outlet (Measure of Conflict of Interest Time Warner)	-0.4998 [0.6829]	-0.4998 [0.3680]	-0.4998** [0.2052]	-0.4379 [0.7122]	-0.4857 [0.8812]	4.6602* [2.7006]
R ²	0.46	0.46	0.46	0.46	0.45	0.6
N	N=474,496	N=474,496	N=474,496	N=297,607	N=394,930	N=24,472
Panel B. Dep Var.: Freshness Indicator (0-1)						
Indicator for Fox Movie on News Corp.-Owned Outlet (Measure of Conflict of Interest for News Corp.)	0.0659*** [0.0206]	0.0659*** [0.0087]	0.0659*** [0.0079]	0.0517** [0.0212]	0.0632*** [0.0230]	0.0598 [0.0522]
Indicator for Warner Bros. Movie on TW-Owned Outlet (Measure of Conflict of Interest Time Warner)	-0.0127 [0.0176]	-0.0127 [0.0120]	-0.0127 [0.0094]	-0.0196 [0.0184]	-0.0074 [0.0207]	-0.0290 [0.0337]
R ²	0.32	0.32	0.32	0.31	0.33	0.35
N	N=494460	N=494460	N=494460	N=314,071	N=397,057	N=97,403
Control Variables:						
Indicators for ownership of media by FOX and TW	X	X	X	X	X	X
Movie Fixed Effects	X	X	X	X	X	X
Media Outlet Fixed Effects	X	X	X	X	X	X
Robustness Check:	Benchmark	Cluster by Studio	Cluster by Media	Only major-6 studios and major indie studios	Numeric reviews only	Qualitative reviews only

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*. The standard errors in parentheses are clustered by movie.

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

APPENDIX TABLE 2
TEST OF EDITORIAL ASSIGNMENT TO REVIEWER WITH HIGHEST SCORE

Specification:					
Dependent Variable:					
	<i>Newscorp. Conflict</i>			<i>Time Warner Conflict</i>	
	<i>New York</i>			<i>Entertainme</i>	
	<i>Post</i>	<i>TV Guide</i>	<i>Times (UK)</i>	<i>nt Weekly</i>	<i>Time</i>
	(1)	(2)	(3)	(4)	(5)
Indicator for Conflict of Interest	-0.5914***	0.3535	0.4271	-0.3039	-0.9717
	[0.1381]	[0.3915]	[0.3288]	[0.7363]	[1.3957]
R ²	0.75	0.69	0.82	0.46	0.41
N	N=388,382	N=47,593	N=77,481	N=386,348	N=136,823
Control Variables:					
Movie Fixed Effects	X	X	X	X	X
Media Outlet Fixed Effects	X	X	X	X	X

Notes: An observation is a movie review by a media outlet from 1985 to July 2011. 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.). The dependent variable is the estimated fixed effect for the chosen reviewer. As such, the specification tests whether for movies with conflict of interest, reviewers who tend to give on average more positive scores are more likely to be chosen. All specifications include fixed effects for the movie and for the media reviewing. The standard errors in parentheses are clustered by movie.

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