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The Twitter Effect: Social Media Usage as a Contributor to Movie Success

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Abstract

This paper examines whether an online social media presence affects box office revenues in both domestic and foreign markets using a star's Twitter account as a measure of star power. The results suggest that there is a negative social media effect on box office performance in foreign markets, as a Twitter presence decreased revenues by an average of approximately $30 million. Moviegoers seem disinclined to see movies in theaters featuring female stars that are active in social media, suggesting that special care should be exercised when selecting female leads. Studios should take into account not just an actress's professional accomplishments, but also their overall presence and popularity as a public figure on social media.

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The Twitter Effect: Social Media Usage as a Contributor to Movie Success

Since a consumer is forced to estimate the quality of the movie prior to the opening credits, moviegoers search for information that will provide quality signals to guide their movie choice. While conventional signals, such as advertisements and critic reviews, are still used frequently by consumers, online social networks have become an increasingly popular source of information (Chen et al. 2011; Duan et al. 2008; Godes and Mayzlin 2004; Godes et al. 2005; Jansen et al. 2009; Holbrook and Addis 2007). Social networking platforms such as *Twitter* are increasingly recognized as a significant factor in consumption decisions and strong emotional connections can be formed by fans to an actor based on information revealed on social media.

Previous research has found that audiences do not connect to male and female stars in the same manner. Treme and Craig (2013) reported a negative relationship between female celebrity exposure and box office performance. Additionally, research has found a link between mass media depictions of thin subjects and negative body image in women (Grabe et al. 2008). Since many leading actresses are both thin and attractive, it is hypothesized that their Twitter accounts may reinforce this negative body image in women and therefore may negatively affect movie consumption decisions since is well known that emotions can influence consumer attitudes (Burke and Edell 1989).

As foreign box office revenues have become increasingly important to a movie's financial success, more movies are being released overseas to attract a wider audience. While American films earned up to two-thirds of their revenues in North America in the 1980s, today it averages only about one third. Asia and Central and Eastern Europe have been the fastest-growing regions in recent years and while Twitter is not accessible in China, there has been significant growth in active Twitter users in countries such as Brazil, Japan, Indonesia, India and Mexico (Ong 2012). Nelson and Glotfelty (2012) hypothesized that foreign consumers may rely more on star power as a signal of a movie's quality than U.S. consumers since they have less overall information about the movie than their U.S. counterparts. Given the growing importance of movie revenues from foreign markets, results from this research can be used to assess whether an actor's social media account significantly affects box office performance and whether this effect is constant across countries and the gender of the actor.

Previous research has investigated the role of celebrities and social media as they relate to both entertainment and sport. Kian and Clavio (2011) found that following the social media accounts for celebrities has become a popular leisure activity. Jung and Kim's (2010) research examined star power in the Korean movie industry. Treme (2010) used the number of celebrity appearances in *People* magazine before and during their movie's promotional period to quantify star popularity and found that celebrity popularity positively impacted box office success. Research that investigates male or female bias of star power suggests audiences are positively predisposed towards actors rather than actresses. Treme and Craig (2013) examined stars in American *People* magazine and found that male celebrities had a positive impact on box office success while female actresses negatively impacted a movie's performance. Perez (2013) investigated the relationship between the success of professional soccer teams and the number of new Twitter users following teams.

While previous studies have focused on examining either the Twitter accounts for movies or tweets related to a particular movie, we expand upon the current literature by using Twitter as a measure of a star's popularity and restrict the analysis to a star's personal Twitter account. Therefore we are not measuring the impact of movie specific Twitter behavior, rather we are focused on measuring the impact of a star's social media account on box office success and testing whether this effect is constant across gender. Second, we also test for cultural social media effects by using both domestic and foreign box office data. Lastly, it is valuable to have analyses using Twitter statistics collected in different phases of its development. Choosing a selection of movies stretching back to 2009 allows our model to be a basis of comparison for future Twitter and star power research and allows us to isolate the impact of early Twitter adoption by movie stars on box office performance.

1. Data and Empirical Results

Data on both the domestic and foreign box office performances is used to estimate the impact of a star's Twitter account on a movie's revenues. A sample of releases from movies shown in over 1,000 theaters from 2009 to 2011 generated a data set with approximately 375 observations. Data was collected primarily from three websites: Box Office Mojo (boxofficemojo.com), a comprehensive database of film releases, Rotten Tomatoes (rottentomatoes.com), the popular critics rating website, and Twitter (twitter.com). Gross revenues, budget, theaters, studio, genre, MPAA (Motion Picture Association of America) rating, and season were collected from Box Office Mojo. MPAA ratings include G, PG, PG-13, and R and are recorded as dummy variables. Names of top stars and critical rating were collected from Rotten Tomatoes. A movie receiving an 'A' from Rotten Tomatoes is denoted as 'RT A' and other grades are assigned accordingly. Each of these is a dummy variable. Season of the movie's release were also included. Holiday is defined as a movie released between the first Friday in November through New Year's week or weekend. Fall is defined as a movie released between the day after Labor Day Weekend through the Thursday before the first Friday in November. Spring was defined as a movie released between the first Friday in March through the Thursday before the first Friday in May. Winter was defined as a movie released between the first day after the New Year's week or weekend through the Thursday before the first Friday in March. The dates are consistent with major box office data seasonal definitions. Summary statistics can be found in Table 1.

Twitter data was collected from the site itself. The first two actors listed on Rotten Tomatoes were used to identify the lead actors in a movie. The star was only reported to have a Twitter if their account is "verified", meaning that the celebrity has established the account's authenticity with Twitter staff. Twitter was launched in 2006, though it did not enjoy immediate popularity. According to Twitter, it took three years, two months, and one day for users to send a cumulative total of one billion tweets. By March 2011, users sent a billion tweets per *week* and 140 million tweets per day. As of October 2013, users were sending *500 million* tweets per day. Twitter only had 75 million users in 2009 compared to the 500 million users it has in 2013. As a measure of comparison, Facebook had 350 million users in 2009 and 1.15 billion users in 2013. Since our sample captures an early Twitter adoption phase, only 39 percent of this sample had a

leading star with a Twitter account. Since such a small percentage of actors had an official Twitter account, a dummy variable was created to indicate whether or not one of the lead actors had a Twitter account three months prior to the movie's release date. Data was collected in advance of the movie's release to ensure that the star's Twitter account was not created and used for promotional tweets he or she posted to generate buzz about the movie in particular. Two Twitter dummy variables were created based on the gender of the lead actor or actress. Twitter Male takes on a value of 1 if a lead actor is a male and had a Twitter account and Twitter Female takes on the value of 1 if a lead actress is a female and had a Twitter account. In addition, the age of the actor's Twitter account was used as a count variable. Twitter Age Male measures the number of days an actor had a Twitter account prior to a movie's opening and Twitter Age Female measures the number of days an actress had a Twitter account prior to a movie's opening. All Twitter accounts in the analysis were verified accounts.

2SLS models were used since the number of theaters in which a movie is seen and box office revenue are endogenous variables. To the extent that higher-quality (more popular) movies are released on more screens, estimates of this coefficient will be upwardly biased and it cannot be interpreted in the typical reduced form fashion, and OLS would be expected to yield biased and inefficient coefficients (Treme 2010). Following Elliott and Simmons (2008), Gross Revenue and Opening Revenue will be instrumented by a set of studio dummy variables, since some studios may have closer relationships with exhibitors than smaller, independent studios. A studio dummy variable, Major, was created and production companies were grouped as a dummy variable: Buena Vista, Fox, New Line, Paramount, Universal, Warner Brothers, and Sony movies received a 1 and the remaining movies received a zero. Studio dummies provide a potentially important source of variation in both box office revenues and the allocation of opening screens, as studios may have different relationships with exhibitors. Studios may also release a movie based on the available leisure time of the public.

Table 3 uses domestic box office gross revenues as the dependent variable and reports the second stage regression results. The results suggest that whether or not a leading male actor has a Twitter account does not significantly impact box office success, but a female lead with a Twitter account negatively and significantly affects a movie's performance. A female lead in a movie with a Twitter account decreases box office revenues by approximately 20 percent. In this sample, that translates to roughly $9 million. Table 5 uses foreign gross box office revenues as the dependent variable and finds a significant and negative Twitter effect. A male lead with a Twitter account costs a movie approximately $49 million while a female lead with a Twitter account decreases box office revenues by nearly $58 million. Table 7 reports regression results using the age of the Twitter account for domestic box office revenues and the pattern of the results are similar to what was found using only the Twitter dummy variable: the age of the male Twitter account does not affect box office revenues but a female Twitter account of an average age decreases domestic box office revenues by approximately 12 percent, or approximately $5.2 million.[1] Table 9 uses the age of the Twitter account for foreign box office revenues and the results suggest that both male and female Twitter accounts have a negative impact on box office performance. Specifically, a male movie lead with a Twitter age equal to 100 days decreases

[1] Only movies in which the lead actors had a Twitter account were used in regressions using Twitter age.

box office revenues by approximately $25 million while a female movie lead with a Twitter account the same age decreases revenues by approximately $48 million.

2. Discussion

Twitter accounts of a movie's stars matter to moviegoers, not only in terms of popularity, but also in terms of box office success. Since the foreign movie market reflects audiences with different tastes and preferences than North American markets, it is important to recognize that a movie that performs well domestically is not guaranteed to perform well abroad. Nelson and Glotfelty (2012) tested star popularity in both domestic and foreign markets and found that the popularity of the top star did not significantly affect box office success in seven of the eight foreign markets they examined, but when star power was calculated using the top three stars in a movie, the popularity of the star ensemble significantly and positively impacted box office performance in the U.S. market and each of the foreign markets they examined. The results from this study reinforce the notion that a star power variable should reflect more than just the popularity of the top star in the movie (this study includes Twitter information for the two leading actors in a movie), while also uncovering a negative social media effect on box office performance. This negative relationship between a social media presence and box office success could reflect the fact that most stars in this sample were American and the online presence and popularity of an American star is not easily transferable to other cultures. It also might point to a bias against American actors. "We can no longer risk making an expensive film with a star who isn't popular in Asia," says Hollywood producer Jerry Bruckheimer (Beier 2013). The results from this study can be expanded in the future by devising a more comprehensive measure of star popularity in foreign markets. Cultural preferences should be explored in greater detail in future studies that use marketing techniques of lead actor and actresses to enhance the consumer's movie experience.

The results also reveal that female leads with a Twitter account harm both domestic and foreign film success and is similar to the result found in Treme and Craig (2013) in which female celebrity exposure was inversely related to domestic box office performance. Given the relatively recent series of results highlighting a gender difference in terms of the effects of popularity on revenues, this offers a number of opportunities for future research centered on the gender makeup of audiences. Moviegoers seem to have strong (and negative) emotional connections to female stars that are active in social media and this may be affecting their movie choices. One explanation for this result pertains to how female fans relate to a female actress. King and King (1997) found that heavier women reported more negative self-evaluations when exposed to ideal images than thinner women. Cattarin et al. (2000) found that female respondents displayed greater distress when viewing media images of thin and attractive females than more neutral images. Tiggemann and McGill (2004) found that exposure to magazine advertisements with body images led to increased negative mood and body dissatisfaction among women. A seminal study on beauty (Silverstein et al. 1986) found that actresses are increasingly slimmer than in the past and the standard for attractiveness for actresses is slimmer than for men. This could explain why male social media presence does not affect box office success while female social media presence negatively impacts domestic markets and since the body size and shape of the average young woman in North America has become increasingly different from that of a celebrity actress, it is possible that the effect has been magnified in recent years (Spitzer et al. 1999).

In order for movies to build a relationship with potential audiences, special care should be exercised when selecting the female leads in a movie. Studios should take into account not just an actress's professional accomplishments, but also their overall presence and popularity as a public figure on social media. Future research can examine the impact of current Twitter activity on box office success and compare the results to this early Twitter adoption study. The preliminary evidence suggests it would be worthwhile to explore this gender and cultural Twitter effect in more detail so movie stars and studios can effectively use social media to create positive and lasting emotional connections with fans.

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Table 1 Summary Statistics

Variable	N	Mean	Std Dev
Domestic Gross	377	43,237,752	72,355,918
Foreign Gross	377	65,059,966	168,772,107
Budget	377	36,929,489	46,403,035
Theaters	377	1,677	1,471
Age of Male Twitter Account	143	315	330
Age of Female Twitter Account	143	146	300
Twitter Male Dummy Variable	377	0.3222	0.4678
Twitter Female Dummy Variable	377	0.1527	0.3601

Table 2 Domestic Gross: 2SLS with Twitter Variables

2SLS: First Stage Results			
Variable	**Coefficient**	**SE**	**P**
Supply Equation, with Log (Theaters) as Dependent Variable			
Log (Budget)	0.718	0.056	0.000
RT A	-0.563	0.259	0.030
RT B	-0.454	0.218	0.038
RT C	-0.227	0.225	0.315
RT D	-0.059	0.246	0.811
Fall	0.644	0.217	0.003
Holiday	0.620	0.215	0.004
Winter	0.392	0.236	0.098
Spring	0.533	0.204	0.009
Major	1.776	0.167	0.000
Comedy	0.158	0.178	0.377
Drama	-0.209	0.183	0.254

Adj. $R^2 = 0.564$

N = 377

Table 3 Domestic Gross: 2SLS with Twitter Variables

2SLS: Second Stage Results			
Variable	**Coefficient**	**SE**	**P**
Demand Equation, with Log (Domestic Gross) as Dependent Variable			
Twitter Male	0.009	0.094	0.921
Twitter Female	-0.218	0.114	0.058
Log (Theaters)	1.272	0.043	0.000
RT A	1.072	0.140	0.000
RT B	0.779	0.118	0.000
RT C	0.486	0.119	0.000
RT D	0.545	0.129	0.000
Comedy	-0.017	0.096	0.859
Drama	0.146	0.098	0.137
PG	-0.012	0.046	0.788
R	-0.088	0.080	0.271
Fall	-0.372	0.114	0.001
Holiday	-0.031	0.116	0.790
Winter	-0.098	0.124	0.431
Spring	-0.134	0.108	0.216
Major	-0.114	0.139	0.410

Adj. $R^2 = 0.875$

N = 377

Table 4 Worldwide Gross: 2SLS with Twitter Variables

2SLS: First Stage Results			
Variable	**Coefficient**	**SE**	**P**
Supply Equation, with Log (Theaters) as Dependent Variable			
Log (Budget)	0.718	0.056	0.000
RT A	-0.563	0.259	0.030
RT B	-0.454	0.218	0.038
RT C	-0.227	0.225	0.315
RT D	-0.059	0.246	0.811
Fall	0.644	0.217	0.003
Holiday	0.620	0.215	0.004
Winter	0.392	0.236	0.098
Spring	0.533	0.204	0.009
Major	1.776	0.167	0.000
Comedy	0.158	0.178	0.377
Drama	-0.209	0.183	0.254

Adj. $R^2 = 0.564$

N = 377

Table 5 Worldwide Gross: 2SLS with Twitter Variables

2SLS: Second Stage Results			
Variable	**Coefficient**	**SE**	**P**
Demand Equation, with Log (Worldwide Gross) as Dependent Variable			
Twitter Male	-1.433	0.601	0.018
Twitter Female	-2.298	0.731	0.002
Log (Theaters)	2.899	0.277	0.000
RT A	4.168	0.899	0.000
RT B	3.226	0.756	0.000
RT C	1.268	0.764	0.098
RT D	0.746	0.826	0.367
Comedy	-2.126	0.614	0.001
Drama	-1.213	0.626	0.053
PG	-0.013	0.292	0.965
R	0.735	0.512	0.152
Fall	0.047	0.731	0.949
Holiday	0.434	0.745	0.561
Winter	0.202	0.796	0.800
Spring	-0.810	0.689	0.241
Major	-1.594	0.887	0.033

Adj. $R^2 = 0.403$

N = 377

Table 6 Domestic Gross: 2SLS with Twitter Variables

2SLS: First Stage Results			
Variable	**Coefficient**	**SE**	**P**
Supply Equation, with Log (Theaters) as Dependent Variable			
Log (Budget)	0.64638	0.114185	<.0001
RT A	-0.54427	0.492467	0.2711
RT B	-0.69087	0.456197	0.1323
RT C	-0.11915	0.416107	0.7751
RT D	-0.20599	0.396377	0.6042
Fall	-0.05381	0.366876	0.8836
Holiday	0.269113	0.366586	0.4642
Winter	-0.40475	0.418903	0.3357
Spring	0.661968	0.350616	0.0612
Major	1.547798	0.293766	<.0001
Comedy	-0.10721	0.280543	0.703
Drama	-0.43382	0.356054	0.2253

Adj. R^2 = 0.509

N = 143

Table 7 Domestic Gross: 2SLS with Twitter Variables

2SLS: Second Stage Results			
Variable	**Coefficient**	**SE**	**P**
Demand Equation, with Log (Worldwide Gross) as Dependent Variable			
Twitter Age Male	-0.00024	0.000302	0.4312
Twitter Age Female	-0.00081	0.000428	0.0592
lntheaters	1.443786	0.109449	<.0001
RTA	1.163746	0.318097	0.0004
RTB	0.688236	0.301416	0.0241
RTC	0.325732	0.269414	0.2289
RTD	0.692985	0.259797	0.0086
Comedy	0.203528	0.184495	0.272
Drama	0.472986	0.239119	0.0501
PG	0.012373	0.067891	0.8557
R	0.28174	0.18701	0.1344
Fall	-0.60432	0.237511	0.0121
Holiday	0.129388	0.237938	0.5875
Winter	0.028544	0.277139	0.9181
Spring	-0.4167	0.228623	0.0707
Major	-0.42124	0.299573	0.1621
Adj. R^2 = 0.822			
N = 143			

Table 8 Worldwide Gross: 2SLS with Twitter Variables

2SLS: First Stage Results			
Variable	**Coefficient**	**SE**	**P**
Supply Equation, with Log (Theaters) as Dependent Variable			
Log (Budget)	0.64638	0.114185	<.0001
RT A	-0.54427	0.492467	0.2711
RT B	-0.69087	0.456197	0.1323
RT C	-0.11915	0.416107	0.7751
RT D	-0.20599	0.396377	0.6042
Fall	-0.05381	0.366876	0.8836
Holiday	0.269113	0.366586	0.4642
Winter	-0.40475	0.418903	0.3357
Spring	0.661968	0.350616	0.0612
Major	1.547798	0.293766	<.0001
Comedy	-0.10721	0.280543	0.703
Drama	-0.43382	0.356054	0.2253

Adj. R^2 = 0.509
N = 143

Table 9 Worldwide Gross: 2SLS with Twitter Variables

2SLS: Second Stage Results			
Variable	**Coefficient**	**SE**	**P**
Demand Equation, with Log (Worldwide Gross) as Dependent Variable			
Twitter Age Male	-0.00318	0.001858	0.08
Twitter Age Female	-0.00744	0.002634	0.0055
lntheaters	3.993645	0.674154	<.0001
RTA	3.190461	1.959331	0.1059
RTB	2.123044	1.856589	0.255
RTC	0.943998	1.659468	0.5705
RTD	-0.31418	1.600234	0.8447
Comedy	-1.94522	1.136409	0.0894
Drama	0.50928	1.472864	0.7301
PG	0.478357	0.418176	0.2548
R	2.780731	1.151896	0.0172
Fall	-0.32042	1.46296	0.827
Holiday	-0.44998	1.465592	0.7593
Winter	1.736358	1.707052	0.311
Spring	-2.62253	1.408215	0.0649
Major	-3.10044	1.845237	0.0954

Adj. R^2 = 0.3959

N = 143