

# MEASURING SOCIAL MEDIA SUCCESS: THE CASE OF FACEBOOK MARKETING IN THE MOTION PICTURE INDUSTRY

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## Abstract

*Social media marketing is playing a growing role in firms' marketing efforts. However, industry practice suggests that firms have difficulty in quantitatively measuring its impact and implementing effective content management strategy. This study attempts to assess the value of Facebook marketing for the financial success of a movie's theatrical release, and investigate what kind of high quality contents are most effective for movie studios. We construct a rich dataset that includes information about 200 movies' Facebook marketing activities, box office revenues, and various control variables such as traditional marketing expenditure, critical and customer reviews, and movie characteristics. We estimate that an official Facebook Page contributes to an average increase of more than 6 million US dollars in opening weekend box office revenue and more than 11 million US dollars in overall box office revenue. We also address the self-selection issues. Further on, we will dig more into both the intensity and content of those page posts by using text mining techniques. These findings will contribute to social media marketing literature, and provide practical implications for studios to improve their social media marketing implementation.*

*Keywords: social media marketing, Facebook marketing, motion pictures, box office revenues, measuring success*

# 1. INTRODUCTION

Firms have been increasingly adopting social media to promote products and engage with customers, and their marketing spending on social media outlets is also rising over the past few years (Sass 2013). Despite the high social media penetration, many firms still remain sceptical about the exact value of social media marketing and are unable to quantitatively gauge its effectiveness (Forbes 2014; Harvard Business Review Analytic Services 2010). Previous studies in this area focus on various activities happening on social media and their impacts on different business outcomes, such as social media consumer participation (Rishika et al. 2013), marketer promotion activities (Chen et al. 2014), content generation and sharing (Goh et al. 2013; Schulze et al. 2014). However, we still don't know whether this new media creates enough business value as a whole from a channel level. In this study, we attempt to shed light on these issues by (1) assessing the business value of Facebook marketing as a whole channel, (2) investigating how firms should perform effective content management for their social media marketing.

The motion picture industry provides a unique setting to measure the true value of social media because we can link the Facebook channel as a whole with the financial success of a movie's theatrical release and ask the question of whether a Facebook presence matters or not to movie studios. For decades, the motion picture industry heavily relies on advertising in traditional media channels such as TV, magazines, and newspapers to reach potential audience (Caves 2000). Lately, social media sites, especially Facebook, have become a popular alternative for the purpose of generating word of mouth (WOM), building awareness, and connecting with movie fans (Jonson 2013). We investigate the marketing presence of 200 movies released in the USA in 2012 on Facebook, and estimate the average benefit of an official Facebook Page as measured in its contribution to the movie's opening weekend and overall box office revenues. Our sample covers all films grossed more than \$1 million accounting for 91.9% of the total 10 billion box office revenue in 2012. Our analyses indicate that having an official Facebook Page is associated with an increase of more than \$6 million in opening weekend box office revenue and more than \$11 million in overall sales. We also find Facebook marketing efforts, measured by intensity of page posts, are positively associated with movie sales. Later on, we will dig more into the contents of those page posts by using text mining techniques.

# 2. LITERATURE REVIEW

As firms increasingly take advantage of social media platform to promote their brands and products, a growing stream of studies on social media marketing emerges. Extant studies dig into different aspects of firms' social media community. First, there are articles investigating different activities on social media from the perspective of both consumer and marketer. For example, Rishika et al. (2013) examine the customers' participation activities in a firm's Facebook fan page, and uncover such social media participation positively influence consumers' offline visit frequency and customer profitability. From marketer's standpoint, Chen et al. (2014) investigate companies' broadcasting activities. After controlling marketers' promotion on traditional media channels and user-generated content, they find the positive impact of personal broadcasting messages on music sales. Second, other studies investigate the content generated on social media communities. For instance, Goh et al. (2013) evaluate different qualitative characteristics of community content (both user-generated content and marketer-generated content), communication mode between marketer and users, and their effects on consumers' purchase behaviour. Schulze et al. (2014) study the effect of content sharing mechanism on viral marketing success, and the moderating effect of product characteristics, in the context of social media. By examining how consumer-generated WOM flows, Kumar et al. (2013) measure the return of investment on social media marketing from customer perspective. They measure the impact of individual consumers, captured by both the viral impact of consumers' WOM influence and the monetary value realized by that. Every study in this area touches upon some interesting issues of social media marketing. By learning it from within, we got much

detailed knowledge about SMM, but still cannot grasp the significance of social media marketing at the channel level. Whether social media marketing is just a management fad or we can justify the adoption practice? Our understanding of social media marketing could be enhanced if we can learn it as a whole channel.

### 3. DATA

Our dataset combines information from multiple sources, including main independent variables from Facebook, dependent variables of movie ticket sales from Box Office Mojo, and others like traditional marketing expenditure from Kantar Media, movie and cast characteristics from IMDb and The Numbers, customer reviews from Fandango, and critical reviews from Rotten Tomatoes. We select movies released in the United States in 2012 that received box office revenue of at least \$1 million as our sample (200 observations), whose total revenues account for 91.9% of the over 10 billion box office revenue in that year. Our sample covers both large budget/Hollywood blockbusters and small budget/independent films and eliminates those films of insignificant economics values. Table 1 shows the descriptive statistics of the variables.

*Table 1 Description of Variables*

Variable	Mean	Std. Dev.	Min	Max
OPENINGGROSS (in millions)	18.50	28.86	0.03	207.44
REVENUE (in millions)	60.90	84.80	0.22	623.28
FACEBOOK	0.90	0.29	0	1
PAGEPOSTS <sub>t</sub>	138	114	0	946
COMMENTS <sub>t</sub>	24.28	76.62	0	85.38
LIKES <sub>t</sub>	674.53	41.29	0	51,914.2
SHARES <sub>t</sub>	62.98	285.5	0	3,355.33
BUDGET (in millions)	45.42	52.77	0.13	250.00
TRAD <sub>t</sub> (in millions)	14.16	10.41	0	44.10
SEQUEL	0.11	0.32	0	1
THEATRES <sub>t</sub>	12,563	9,520	266	43,268
OFFICIAL_SITE	0.95	0.21	0	1
COMPETITON	3.52	1.67	0	8
STAR_POWER	0.40	0.50	0	1
WOM_VOL <sub>t</sub>	749	1,156	0	7,256
WOM_VAL <sub>t</sub>	0.70	0.24	0	1
CRITIC_VOL <sub>t</sub>	78	51	0	237
CRITIC_POS <sub>t</sub>	0.56	0.29	0	1

Note: (1) The time period over which the above statistics are computed is from inception to the end of the movie's final release week. (2) The number of observations equals 161.

#### 3.1 Box Office Revenue

Movie box office revenue is our dependent variable. *OPENINGGROSS*, *REVENUE*, and *WEEKLYGROSS<sub>it</sub>*, are the opening weekend, overall box office revenue, and gross receipts in each week respectively. Following prior studies (e.g., Chintagunta et al. 2010, Liu 2006), we also include theater count (*THEATRES<sub>it</sub>*: the number of theatres showing a movie) and competition variables (*COMPETITION*: the number of other movies released in the same week as the focal movie) as controls in our analyses.

#### 3.2 Facebook

We collect social media marketing data from Facebook, which is the most popular social media site in the United States (Stelzner 2014). In the motion picture industry specifically, it has become the dominant

social media avenue (Jonson 2013). We manually identify the official Facebook Page for each of the 200 movies in our sample by searching the movie titles. 180 movies are found to have a presence on Facebook, i.e., 90% of movies had adopted the Facebook channel for social media marketing in 2012<sup>1</sup>. We also search official account for each movie on Twitter, but only 24 out of 200 movies (i.e., 12%) have a presence on Twitter. This suggests that Facebook was the most popular social media outlet for movie studios in 2012.

We download all Facebook data, such as page profile information, posts submitted by the page, and users' comments/shares/likes, through Facebook API. Our first main explanatory variable, *FACEBOOK*, equals one if the film maintains an official Facebook page and zero otherwise. The marketing activities of movie studios are captured primarily by their posts on Facebook over time. They post on various topics such as film posters, trailers, and news on cast members, among others. The information we collect about each post includes the following items: post ID, page username, date of publication, and content. Our second main explanatory variable, *PAGEPOST<sub>it</sub>*, is the number of posts submitted by a page in the time period *t*. We collect the number of users' comments (*COMMENTS<sub>it</sub>*), number of shares (*SHARES<sub>it</sub>*), and number of likes (*LIKES<sub>it</sub>*) for each post.

### 3.3 Movie Characteristics, Advertising Expenditure on Traditional Channel, Consumer Reviews and Critical Reviews

Several movie characteristics are widely considered as impact factors of movie sales and controlled in previous movie studies. We therefore gathered information on movie and cast characteristics from two popular movie Web sites: IMDb ([www.imdb.com](http://www.imdb.com)) and The Numbers (<http://www.the-numbers.com/>). These data include production budget (*BUDGET*), genre (*GENRE*: Action, Adventure, Animation, Comedy, Drama, Thriller, and Documentary), MPAA ratings (*MPAA*: G, PG, PG-13, and R), whether the movie is a sequel of an earlier movie (*SEQUEL*), whether it owns an official websites (*OFFICIAL\_SITE*), and the star power of the movie (*STAR\_POWER*: a dummy variable equals one if at least one of the movie's cast members won the Oscar Award prior to this movie and zero otherwise (Basuroy et al. 2003)). We also control the influence of traditional media marketing channel. *TRAD<sub>it</sub>*, is the total spending for promoting a movie in traditional channels (e.g., TV, magazines, radio stations, etc.) in a given time period, which is acquired from Kantar Media. To control for the effect of user-generated content outside of Facebook, we collect customer reviews from Fandango ([www.fandango.com](http://www.fandango.com)). We collected user ID, review date, star rating, and review content, for each customer review. Volume and valence of WOM are measured by the number of customer reviews (*WOM\_VOL<sub>it</sub>*) and the average rating (*WOM\_VAL<sub>it</sub>*) following prior studies such as Liu (2006). We also collected critical reviews information from Rotten Tomatoes ([www.rottentomatoes.com/](http://www.rottentomatoes.com/)). The variable *CRITIC\_VOL* is the total number of critical reviews. Following Basuroy et al. (2003), we use the percentage of positive critic reviews, *CRITIC\_POS*, to measure valence.

## 4. PRELIMINARY RESULTS

### 4.1 Quantify the Business Value of Facebook Marketing

In this section, we report the analyses results of quantifying the business value of having a Facebook Page on movie ticket sales. We first perform a simple t-test to obtain the initial evidence of whether a Facebook presence matters. In this t-test, the 20 movies that do not have an official Facebook page are considered to fall within the control group, while the remaining 180 movies that have an official Facebook page fall within the treatment group. In other words, having a Facebook Page is regarded as the "treatment". We

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<sup>1</sup> We exclude community and fan pages, as they do not represent movie studios' marketing activities; we also limit our search to official pages for the US market and do not consider international pages.

examine how the treatment leads to differences in two outcome variables: opening weekend box office revenue and overall box office revenue.

Table 2 reports the result of the two-sample t-test with unequal variances. We find that movies with a Facebook Page on average gained \$16.5 million for opening weekend box office, while movies without a Facebook Page gained only \$3.4 million. The difference between two groups is \$13.1 million and the t-value is 5.32, which is significant at the 1% level. This initial result suggests that having an official Facebook Page or not matters to the opening success of a film. We also get a similar result with a significant difference in the overall box office revenue. The average overall box office revenue for the treatment and control group is \$54.0 million and \$19.0 million, respectively. The difference is 35.0 million US dollars, with a t-value of 3.76.

Table 2. T-test of Opening and Overall Box Office Revenues

With Facebook Page	Number of Movies	Opening Box Office	Overall Box Office
Yes	180	16.5 million	54.0 million
No	20	3.4 million	19.0 million
Difference		13.1 million	35.0 million
t-value		5.32	3.76

Next, we extend our analysis more formally within a regression framework, with dummy variable *FACEBOOK* as the main independent variable. Other explanatory variables studied by prior literature as we summarized before are all controlled. We consider critical reviews generated only before movie release to ensure their credibility. In Equations (1), *THEATRES* is the number of theatres playing the movie in opening weekend, *TRAD* is the cumulative advertising expenditures on traditional channels before opening week. In Equations (2), both *THEATRES* and *TRAD* are the cumulative value from the inception to the end of movie theatrical release. Only Equation (2) includes WOM outside Facebook (*WOM\_VAL* and *WOM\_VAL*), as customer reviews are posted on Fandango only after a movie release. We finally get 161 observations for regressions analysis, as the production budget information of some movies is not publicly available.

$$\begin{aligned} \text{Log}(\text{OPENINGGROSS}) = & \alpha_0 + \alpha_1 \text{FACEBOOK} + \alpha_2 \text{Log}(\text{CRITIC\_VOL}) + \alpha_3 \text{CRITIC\_POS} + \alpha_4 \\ & \text{Log}(\text{THEATRES}) + \alpha_5 \text{Log}(\text{TRAD}) + \alpha_6 \text{Log}(\text{BUDGET}) + \alpha_7 \text{STAR\_POWER} + \alpha_8 \\ & \text{COMPETITION} + \alpha_9 \text{SEQUEL} + \text{MPAA Dummies} + \text{GENRE Dummies} + \varepsilon \quad (1) \end{aligned}$$

$$\begin{aligned} \text{Log}(\text{REVENUE}) = & \beta_0 + \beta_1 \text{FACEBOOK} + \beta_2 \text{Log}(\text{WOM\_VOL}) + \beta_3 \text{WOM\_VAL} + \beta_4 \text{Log}(\text{CRITIC\_VOL}) + \\ & \beta_5 \text{CRITIC\_POS} + \beta_6 \text{Log}(\text{THEATRES}) + \beta_7 \text{Log}(\text{TRAD}) + \beta_8 \text{Log}(\text{BUDGET}) \\ & + \beta_9 \text{STAR\_POWER} + \beta_{10} \text{COMPETITION} + \alpha_{11} \text{SEQUEL} + \text{MPAA Dummies} + \text{GENRE} \\ & \text{Dummies} + \xi \quad (2) \end{aligned}$$

Table 3 Impact of Facebook Page on Opening and Overall Box Office Revenues

VARIABLE	(1) LOG(OPENINGGROSS)	(2) LOG(REVENUE)
FACEBOOK	0.344** (0.138)	0.258*** (0.094)
Log(WOM_VOL)		0.125** (0.050)
WOM_VAL		0.232 (0.173)
Log(CRITIC_VOL)	-0.017 (0.096)	0.056 (0.072)
CRITIC_POS	0.748*** (0.270)	0.313* (0.168)
Log(THEATRES)	0.651*** (0.061)	1.117*** (0.079)

Log(TRAD)	0.082 (0.070)	-0.113 (0.069)
Log(BUDGET)	0.255*** (0.063)	0.111*** (0.037)
STAR_POWER	0.019 (0.109)	0.099* (0.053)
SEQUEL	0.129 (0.151)	-0.054 (0.065)
COMPETITION	-0.106*** (0.033)	-0.015 (0.016)
MCAA	Yes	Yes
GENRE	Yes	Yes
Constant	9.546*** (0.422)	5.616*** (0.644)
Observations	161	161
Adj. R <sup>2</sup>	0.917	0.948

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The regression results reported in Table 3 indicate that Facebook Page is associated with higher box office revenue. This result is consistent with the t-test result reported earlier. Dependent variables in Column (1) and (2) are opening weekend and total box office receipts respectively. The coefficient estimate of *FACEBOOK* is 0.344 and statistically significant at the 5% level in Column (1), and equals to 0.258 and statistically significant at the 1% level in Column (2). To put these numbers in economic perspective, our regression analysis implies that, all other things being equal, having an official Facebook page leads to an increase of \$6.36 (=18.50×0.344) million in opening weekend box office revenue and \$15.71 (=60.90×0.258) million in overall box office revenue, respectively.

The coefficient estimates on control variables are generally consistent with expectations and results of existing studies. We find the volume of consumer reviews (Log (*WOM\_VOL*)) is significant ( $p < 0.05$ ), whereas the valence (*WOM\_VAL*) is not. These results are documented by prior WOM studies which generally show that the awareness effect of WOM (volume) is positively related to product sales, while mixed results are found for the persuasive effect (valence) (e.g., Duan et al. 2008; Liu 2006; Lu et al. 2013). Consistent with study of Basuroy et al. (2003), the percentage of positive critical reviews is highly significant, whereas the total number is not. In line with prior movie studies, the number of theaters is closely related to movie revenues (Chintagunta et al. 2010; Liu 2006). It is a bit surprising that the coefficient of traditional marketing expenditure is insignificant. Product budget is positively related to the overall movie revenue, which is in accordance with our common belief (Liu 2006). Star power seems to have only marginal effect on driving the total grosses.

#### 4.2 Self-Selection Issue

It is possible that movie- or marketer-specific unobserved factors may jointly influence studios' choice of having a Facebook page and movies' revenues. To adjust for this self-selection bias, we plan to adopt the endogenous switching regression model (Heckman 1979; Maddala 1983; Thirumalai and Sinha 2013). In our context, whether movie studios choose to set up a Facebook page or not depends on whether they believe the benefit of adopting it is nonnegative. The two-step endogenous switching regression model is described as follows:

The first step models marketers' Facebook choice.

$$FB\_benefit_i = X_i\gamma + \epsilon_i \quad (3)$$

$FB\_benefit_i$  represents the unobserved benefit of setting up a Facebook page for marketer  $i$ , where  $X_i$  is the vector of independent variables representing movie-specific characteristics such as production budget,

star power, genres, MPAA rating, and so on. Marketers will decide to set up a Facebook page if they believe  $FB\_benefit_i > 0$ . Then we model the marketers' choice in a probit model:

$$\begin{aligned} FACEBOOK_i &= 1 && \text{if } FB\_benefit_i > 0 \\ &= 0 && \text{otherwise.} \end{aligned} \quad (4)$$

Table 4 reports the results of probit model.

*Table 4 Probit Regression for Facebook Marketing Choice*

VARIABLES	(1) FACEBOOK
Log(BUDGET)	0.262** (0.128)
STAR_POWER	-0.507 (0.342)
SEQUEL	0.043 (0.551)
OFFICIAL_SITE	1.061** (0.418)
GENRE	Yes
Constant	-0.383 (0.560)
Observations	161
Prob>chi2 (df)	0.055(8)

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

We evaluate the normative effect of a Facebook page in the second step and take the selection process into consideration.

$$Rev_{i1} = W_i \beta_1 + \theta_{i1} \quad (5)$$

$$Rev_{i0} = W_i \beta_0 + \theta_{i0} \quad (6)$$

$Rev_{ij}$  is the opening or overall box office revenue of movie  $i$ , and  $j$  denotes the choice of having a Facebook page.  $j=1$  means the marketer chooses to set up an official Facebook page, and  $j=0$  otherwise.  $W_i$  represents explanatory variables that affect movie revenues, including  $X_i$ . If self-selection does exist, then  $E[\theta_{i1} | \epsilon_i > -X_i \gamma] \neq 0$  and  $E[\theta_{i0} | \epsilon_i \leq -X_i \gamma] \neq 0$ , leading to biased estimates of  $\beta_1$  and  $\beta_0$ . We respecify the expected movie revenues as

$$E[Rev_{i1} | j=1] = W_i \beta_1 - \sigma_1 \left[ \frac{\phi(X_i \gamma)}{\Phi(X_i \gamma)} \right]. \quad (7)$$

$$E[Rev_{i0} | j=0] = W_i \beta_0 - \sigma_0 \left[ \frac{\phi(X_i \gamma)}{1 - \Phi(X_i \gamma)} \right]. \quad (8)$$

$\left[ \frac{\phi(X_i \gamma)}{\Phi(X_i \gamma)} \right]$  and  $\left[ \frac{\phi(X_i \gamma)}{1 - \Phi(X_i \gamma)} \right]$  represent the expected value of the error terms  $\theta_{i1}$  and  $\theta_{i0}$ , given the truncation in  $\epsilon_i$ . The truncated density of the error term  $\epsilon_i$  is known as the inverse Mills ratio, calculated from the first step.  $\phi(\cdot)$  and  $\Phi(\cdot)$  are the probability density function and cumulative density function of the standard normal distribution, respectively. Self-selection bias can be corrected after adding the inverse Mills ratio into the regression model.  $\sigma_1 \neq 0$  or  $\sigma_0 \neq 0$  indicates the presence of endogeneity. Results of Table 5 show that coefficients of inverse Mills Ratio are all insignificant, indicating that self-selection bias is not a serious issue in our case.

*Table 5 Movie Box Office Revenues Estimates for Facebook Marketing Choice*

VARIABLES	(1) Log(OPENINGGROSS)	(2)	(3) Log(REVENUE)	(4)
Log(WOM_VOL)			0.180*** (0.056)	0.032 (0.058)
WOM_VAL			0.311 (0.190)	0.262 (0.139)
Log(CRITIC_VOL)	0.072 (0.114)	0.157 (0.605)	0.153** (0.070)	-0.325* (0.159)
CRITIC_POS	0.703** (0.330)	0.013 (0.448)	0.205 (0.158)	0.190 (0.232)
Log(THEATRES)	0.661*** (0.064)	0.700*** (0.185)	1.108*** (0.091)	1.087*** (0.098)
Log(TRAD)	0.070 (0.067)	0.058 (0.239)	-0.151** (0.074)	0.034 (0.072)
Log(BUDGET)	0.254*** (0.079)	-0.103 (0.339)	0.135*** (0.044)	0.111 (0.061)
STAR_POWER	0.072 (0.135)	-0.296 (1.085)	0.038 (0.059)	0.199 (0.159)
MPAA	Yes		Yes	
GENRE	Yes		Yes	
Inverse Mills Ratio for FB	0.154 (0.754)		0.624 (0.392)	
Inverse Mills Ratio for No FB		-0.712 (1.340)		-0.193 (0.250)
Constant	8.757*** (0.458)	9.075*** (0.471)	9.231*** (0.538)	7.637*** (0.543)
Observations	146	15	146	15
R-squared	0.911	0.911	0.948	0.948

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: because of the limited numbers of observations, MPAA and GENRE are eliminated from regressions for movie without Facebook page (Column (2) and (4)) to save degree of freedom.

## 5 SUMMARY AND FOLLOW-UP ANALYSES

Setting up a Facebook page doesn't guarantee you a successful financial performance. The estimations assessed above are just effects on average. How studios carry out their posting plans will make a huge difference. Next, we will continue explore studios' posting behaviour and learn about the effective practice. Particularly, we will focus on two aspects: (1) Facebook marketing intensity, e.g., the volume of page post ( $PAGEPOSTS_t$ ) and the number of consumer comments ( $COMMENTS_t$ ), and (2) content management. For the first point, we measure the Facebook marketing intensity by using the number of page posts. We test the serial correlation of the dependent variable movies' weekly gross, and find there is statistically significant first-order serial correlation ( $p < 0.001$ ). Therefore we will run OLS and GMM (generalized method of moments) to test the impact of Facebook marketing intensity on movie sales in opening week and the subsequent periods, respectively. For the second part, we will do text mining to inspect how informative and persuasive those post contents are and inspect the sentiment of consumer comments. Our study will contribute to both social media marketing literature and movie studies, and provide managerial implications for social media marketing practitioners.

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