Decision Support Systems xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Decision Support Systems

journal homepage: www.elsevier.com/locate/dss

The power of the "like" button: The impact of social media on box office

Chao Ding [a,*], Hsing Kenneth Cheng [b], Yang Duan [c], Yong Jin [d]

[a] Innovation and Information Management, Faculty of Business and Economics, The University of Hong Kong, Pok Fu Lam, Hong Kong
[b] Department of Information Systems and Operations Management, Warrington College of Business Administration, University of Florida, Gainesville, FL 32611-7150, USA
[c] Department of Finance and Decision Sciences, School of Business, Hong Kong Baptist University, Kowloon, Hong Kong
[d] School of Accounting and Finance, The Hong Kong Polytechnic University, Kowloon, Hong Kong

ARTICLE INFO

Article history:
Received 8 March 2016
Received in revised form 7 November 2016
Accepted 8 November 2016
Available online xxxx

Keywords:
Box office
Facebook "like"
Social impact
Social marketing

ABSTRACT

The mainstream research of social factors and box office performance has concentrated on post-consumption opinion mining and sentiment analysis, which are difficult to operationalize to the benefits of the industry practitioners whose objective is to maximize box office sales. In this study, we propose the Facebook "like" as an effective social marketing tool before the release of movies for several reasons. Firstly, people's prerelease "liking" of movies can be influenced by marketing campaigns. Secondly, the clicks of "likes" create social impact, as suggested by the Social Impact Theory, on moviegoers' consumption behaviors. And thirdly, Facebook "like" provides practitioners with real-time visible updates. By studying the impact of prerelease "likes" on box office sales, we not only contribute to the literature by offering a new social metric to evaluate the box office performance, but also provide the industry practitioners with quantitative support for the effectiveness of their social marketing activities. Our empirical results indicate that the prerelease "likes" exert a significantly positive impact on box office performance. More specifically, 1% increase in the number of "likes" in the one week prior to release is associated with an increase of the opening week box office by about 0.2%. As it approaches the release date, the prerelease "like" impact becomes stronger, suggesting that the latest prerelease "likes" are more effective in driving box office performance.

1. Introduction

Movie studios typically run week-long or even month-long marketing campaigns of their movie productions before releasing to theaters. Traditionally, these marketing practices include advertising through such channels as TV, newspapers, cinemas, and public transit systems. McKinsey & Company [43] reports that the global cinema advertising expenditure reached roughly US$2.1 billion in 2014, and is expected to grow to US$2.8 billion in 2018. These traditional marketing activities, however, are costly and sometimes not as effective as expected. Elberse and Anand [18] estimate that, on average, every dollar increase in advertising increases box office sales expectation by only up to $0.65, a bad news for the decision maker. Another downside of traditional marketing is the limited coverage of audience. Because of the costly nature, studios allocate a majority of the marketing budget to potentially more lucrative movie productions (blockbusters) and to more mature markets. As Eliashberg et al. [19] indicates, it is still unclear to what extent marketing affects box office performance.

The advent of social platforms, for instance, Facebook, Twitter, Google + and LinkedIn, has offered studios new marketing opportunities. Businesses have been employing social platforms as a low-cost marketing venue to increase brand awareness [3,40,52], attract web traffic [57], grow demand [8,9,10,11,62], discover product information [1,23] and enhance firm value [41,61]. Among the many social marketing tools, the Facebook "like" button is overwhelmingly popular in the business world [38,57], evidenced by the ubiquitous "like" campaigns both online and offline.

In the motion picture industry, the "like" button is also widely embedded in most movie-related promotions and marketing campaigns long before movies are released, so that people could tap on the "likes" and help spread the words. People's prerelease "liking" of movies is generally based on one's preference, which is largely influence by external factors like advertisements and marketing campaigns. Unlike traditional marketing efforts that have limited coverage of audience, the clicks of "likes" create social impact that could become viral [26]. To study the social impact, we borrow from Latané [36]'s Social Impact Theory (to introduce in Section 2) in Psychology and examine the number of prerelease "likes", which is also in line with prior studies like Kuan et al. [34]. We develop our empirical analyses in three stages. We first run cross-sectional regression to understand the basic relationship between prerelease "likes" and box office performance. We examine the

* Corresponding author.
E-mail addresses: chao.ding@hku.hk (C. Ding), kenny.cheng@warrington.ufl.edu (H.K. Cheng), yangduan@hkbu.edu.hk (Y. Duan), jimmy.jin@polyu.edu.hk (Y. Jin).

http://dx.doi.org/10.1016/j.dss.2016.11.002
0167-9236/

prerelease "likes" up to one month and box office performance up to one month. Then we construct a panel data and apply the Fama-MacBeth regression [22] to estimate the prerelease "like" impact over time. Lastly, to address the potential endogeneity issues, we employ Two-Stage Least Squares (2SLS) method and Instrument Variable – Generalized Method of Moments (IV-GMM) in the empirical test.

Our empirical results indicate that the prerelease "likes" exert a significantly positive impact on box office performance. More specifically, 1% increase in the number of "likes" in the one week prior to release is associated with an increase of the opening week box office by about 0.2%. As it approaches the release date, the prerelease "like" impact becomes stronger, suggesting that the latest prerelease "likes" are more effective in driving box office performance.

It is our belief that scholarly outputs should benefit both the academic community and the industry practitioners. Therefore, it is equally important to contribute to the academia effective metrics/methodologies/theories, and to offer to the motion picture industry insightful marketing strategies/plans. By studying the impact of prerelease "likes" on box office sales, we do not only contribute to literature by offering a new social metric to evaluate the box office performance, but also we are able to provide the industry practitioners with quantitative support for the effectiveness of their social marketing activities. We demonstrate that the prerelease "like" impact is significantly positive, encouraging practitioners to employ such social marketing tools in campaigning endeavors. Compared to traditional marketing efforts whose outcomes are difficult to observe and manage in a timely manner, Facebook "like" provides real time updates that are instantly visible by both the moviegoers and the practitioners, so that the latter can take immediate decision and actions. Our empirical results suggest that, to improve box office performance, practitioners should invest more in Facebook "like" marketing as movies approach the release dates since the "like" impact is stronger.

The remainder of the paper is organized as follows. In Section 2, we present a review of related literature. In Section 3, we describe data collection and summary statistics. We then demonstrate empirical results in Section 4, and conclude with discussions and limitations in Section 5.

2. Literature review

There is a rich literature in the information systems and marketing areas that explores the various factors associated with box office performance. We categorize them as social metrics and non-social metrics. Non-social metrics are those that create little or no word-of-mouth over social platforms. They include ads expenditure [18,25,63], prerelease piracy [12,13,42], reviews and ratings [6,7,11,15,16,20,32,39], prerelease search activities [35], the number of concurrent movie showings [2], political views of the moviegoers [53], Wikipedia status [44], and Hollywood Stock Exchange [18,55]. Delen et al. [14] have devised a web-based decision support system to make forecast on box office sales. The system incorporates many of the measurements mentioned.

On the social metrics side, the mainstream research of social metrics and box office performance has concentrated on extracting and evaluating Twitter sentiments [5,28,54,59], and blog reviews [25,45,48]. Hennig-Thurau et al. [28] test the "Twitter Effect", which generates word-of-mouth that potentially influences moviegoers, and find support for a negativity bias. Rui et al. [54] also use public tweets to evaluate box office revenue. They find that the effect of Twitter chatters is significant, however, the magnitude and direction of the effect depend on the content and sources. Jansen et al. [31] show that Twitter is a good tool for brand management. Although these studies all provide effective social metrics to evaluate or predict the box office performance, three issues may arise concerning sample bias and the lack of applications to the industry practitioners. First, there is potential sample bias with Twitter users. Duggan and Brenner [17] report that "US-based Twitter users were disproportionately young, urban or suburban, and black." Therefore, the extracted Twitter sentiments are only a partial representation of the public.

The second issue with the existing social metrics studies is the lack of practical use to the movie producers whose objective is to maximize box office sales. Currently, scholars have made a great effort to improve the algorithms, text mining, and methodologies. For examples, Pak and Paroubek [49] focus on performing linguistic analysis to create a corpus which can be used to build Twitter sentiment classifier. Khan et al. [33] adopt a hybrid approach to address sentiment classification problems. Ghiassi et al. [24] utilize *n*-gram and statistical analysis techniques to develop a Twitter sentiment lexicon. For a detailed summary of the opinion mining and sentiment analysis, see Pang and Lee [50]. They make meaningful contribution to the academic world but not as much to the industry.

The third issue is that the composing of the relevant tweets or reviews is fundamentally opinion-oriented, in which it serves to express one's *post*-consumption state of mind. Both prerelease and post-release movie related tweets are mainly moviegoers' opinions after movie consumption, and they are hardly the results of a studio's marketing endeavors. In addition, from a more practical perspective, it is highly unlikely that a moviegoer scrutinizes the aggregate Twitter data, as the scholars do, before going to a movie. Therefore, although such data analytics produce effective metrics that contribute to the literature, they provide little actionable guidance to producers, studios and filmmakers to improve the box office performance.

This study aims to not only provide an additional social metric, Facebook "like", but more importantly, to help the practitioners gain useful insights that can be operationalized for their own benefits. To study the impact of Facebook "like", we refer to the Social Impact Theory from the field of Psychology. Latané [36] describes in his Social Impact Theory (SIT) that the behaviors of people (the target) are impacted by other sources through three social forces. They are: number, immediacy, and strength. Number refers to the number of sources, immediacy refers to the distance between the target and the sources, and strength refers to the importance of the sources. Studies have confirmed that the larger the social size [4,47,56], the more important the sources [27,30], and the more immediate to the source [4,51], will lead to stronger social impact. For instance, Jackson [29] argues that a large number of strangers will be somewhat more effective than a small number of strangers in persuading a target to make a donation, given that they are of equal importance and immediacy. Therefore, a stronger social impact on a target may convert to more consumption.

3. Data collection and summary statistics

3.1. Data collection

Internet Movie Database (IMDb) is an online database of movies, television programs, and video games. It keeps records of a movie's trailer, production particulars, casting information, summary of plot, reviews, rankings, and more. Accessing IMDb is a common practice for potential moviegoers who would like to have a first glance at movies of interest. IMDb has also embedded the Facebook "like" button on each movie's pages. We created a web crawler to collect data from three sources: IMDb, Box Office Mojo and Facebook, throughout the 2013 calendar year. On IMDb, we obtained movie-specific characteristics, including the movie's name, genre, MPAA rating, production budget and release date. From Box Office Mojo, we collected time series data on movies' box offices and number of screens. We also linked to the Facebook API (Application Programming Interface) to fetch the time series data of "likes" activities on the movie's IMDb page. We then combined the three databases by matching a movie title's name and ID.

We construct the sample as follows: 1) we keep titles that have complete data from one month prior to and one month after the release date; 2) for each title, we compute the gross box office on the opening day, in the opening week, in the opening month and the final total revenue; 3) we record the total number of prerelease "likes"; 4) we calculate the corresponding incremental number of "likes" on the opening

Please cite this article as: C. Ding, et al., The power of the "like" button: The impact of social media on box office, Decision Support Systems (2016), http://dx.doi.org/10.1016/j.dss.2016.11.002