Abstract

Social media has fundamentally changed our daily life and drawn many researchers’ attention to investigate the value and strategies of social media. Despite successful examples of social media marketing by firms in practice, there is little scholarly research that investigates whether individuals’ fan base in social media can be translated into real world monetary rewards. Also, most existing studies focus more on Facebook, rather than the second largest site, Twitter. This paper aims to fill this gap by investigating the value of the number of Twitter followers of National Basketball Association (NBA) players. This RIP reports the results of Heckman’s 2 stage selection model and we plan to employ instrument variable and propensity score matching for establishing stronger causality. Our preliminary result suggests that one more followers on Twitter is correlated with 1.514 USD more in salary for NBA players in 2013.

Keywords: Social media, Econometric analyses, NBA, popularity
Introduction

The inception of social media has greatly changed the way we communicate with each other and consequently our daily life has been reshaped. We observe that an increasingly large number of new social network sites, such as LinkedIn and Instagram, are emerging to meet different kinds of humans’ needs. According to web analytics site Statisticbrain.com, as of 2014, there are more than 1.3 billion monthly active users on Facebook and over 645 million active registered users on Twitter.

The boom of social media platforms brings firms new marketing opportunities. Firms can easily reach a vast number of audiences with direct interaction on social media. It is reported that 69% of small business owners use some kinds of social media (such as Facebook, Twitter) and about 78% of them plan to increase their budgets devoted to this medium (Rishika et al. 2013). The expenditure on social media marketing in US is expected to grow 34% and reach 3.1 billion USD in 2014 (Forrester Research 2009).

With an established large fan base on social media, it is even more cost-effective to promote firms’ products or services via social media than via traditional channels. This can be seen from the successful promotion of the electronic retailer Radio Shack by their spokesperson Lance Armstrong on social media (Slutsky 2011). The marketing tweets generated 65 million impressions within 24 hours and led to a double-digit sales increase in wireless platform.

Compared to firms, individuals who seek for popularity are more benefited from the relatively low marketing cost of social media. Take the industry of professional sports for another example. Athletes’ popularity is a key factor in determining their court time and salary. However, before the introduction of Twitter and Facebook, only superstars can obtain promotion by league and sponsorship from brands in the past. Other ordinary players have few chances to reach out to fans to improve their popularity so that they can gain in increases in court time and salary. Thanks to social media, there is a new avenue for the average athletes to manage fan loyalty: the average athletes now can interact with fans on social media and cultivate a larger fan base by posting entertaining contents on Twitter or Facebook. For example, National Basketball Association is a business valued over 19 billion USD. 75% of NBA players actively owned a Twitter account with 214,539 Twitter followers on average.

Despite successful examples of social media marketing by firms in practice (e.g. Chen and Xie 2008; Kumar et al. 2013), there is little scholarly research that investigates whether individuals’ popularity in social media can be translated into real-world monetary outcomes and what actions/strategies should individuals take to improve their popularity. This paper attempts to fill this gap and investigate the value of social media in the context of National Basketball Association (NBA).

Research Question 1: Do NBA players earn more salary after they accumulate more Twitter followers?

Research Question 2: What are the Twitter actions, such as whom to follow and what to post, the players should focus on so that they can increase the number of followers on Twitter?

Our data set consists of a cross-sectional data of 483 NBA players who are in the roster of NBA 2012-2013. Our preliminary result suggests that getting 1 more followers on Twitter is correlated with 1,514 USD more in salary. We plan to apply advanced econometrics to tease out endogeneity issues and prove stronger causality in the future.

The contribution of this paper lies in rigorously quantifying the value of using social media for marketing purpose. Our study demonstrated that popularity in social media can be translated into real world monetary rewards such as professional players’ salary. Most existing literature on the value of social media focuses on the effect of word-of-mouth within the purchasing context. Our study highlights the value of social media by investigating how the fan base on Twitter may lead to real-world monetary rewards. Our second contribution is that we shed more lights on the optimal social media action/strategy for individuals. The potential findings may benefit a variety of celebrities (stars, politicians, and professional athletes) who can use Twitter for marketing purpose.
Literature

Microblogging Platform

Microblogging is a broadcast medium that exists in the form of blogging. A microblog differs from a traditional blog in that its content is typically smaller in both actual and aggregated file size (Kaplan and Haenlein 2011). Twitter is the most famous microblogging platform on Internet. On Twitter, users can share tweets (text messages up to 140 characters long) with their followers. Followers are those who subscribe to a users’ timeline of tweets. This is like using Rich Site Summary (RSS) feed service to receive timely updates from favorite blogs. The following behavior on Twitter creates a directed social network in which there is a link from user A to user B if user A chooses to follow user B. With over 645 million active registered users, Twitter is already part of everyone’s daily life in the mobile era.

The popularity of microblogging platform has attracted increasing attentions from academic research. Extant literature, mostly in Computer Science, mainly focuses on studying the structure and nature of the Twitter social network and related issues of influence and information diffusion in this network (e.g. (Bakshy et al. 2011; Cha et al. 2010; Goel et al. 2012; Kwak et al. 2010; Romero et al. 2011; Weng et al. 2010; Wu et al. 2011)). However, academic research on Twitter from social science is still scant (Toubia and Stephen 2013). There exist only a few studies related to Twitter or microblogging platform published in top journals in Information Systems and Marketing. Ghose et al. (2012) investigated the difference of Internet browsing behavior between mobile phones and personal computer users using data from a Twitter-like microblogging platform. They found that ranking effects are higher and preferences for geographically proximate brands are also higher on the mobile Internet. Toubia and Stephen (2013) studied users’ motivation to contribute contents on Twitter with a field experiment. Their results suggested that image-related utility (the sense of self-worth and social acceptance) was larger than intrinsic utility for most users. Although these studies are conducted in the context on microblogging platform, their focuses are not directly related to our research. In this paper, we aim to empirically quantify the economic value of popularity and investigate which contents (and how to post contents) help to promote popularity on microblogging platform.

The Value and Strategy of Social Media

Our study is closely related to the IS literature on the value and strategy of social media. Aral et al. (2013) proposed a framework for social media research. Research in this area can be characterized by the level of analysis: user and society, platform and intermediaries, and firms and industries. In their framework, social media’s value and strategy describe how users, platforms, and firms create the value of welfare generated by the use of social media and how they can create strategies that best satisfy their needs. They also pointed out that social media may have both a direct effect (improving the outcomes of decisions) and a strategic effect (changing the decisions). Our paper is relevant to research conducted at the level of firms as well as users.

At the level of firms, researchers investigated the outcome of social media after firms or industries use and interact with social media. These studies mainly focus on the direct effect of social media. For instance, Goh et al. (2013) demonstrated that firm’s engagement in social media helps to promote sales and concluded that user generated content is more impactful than marketer generated content. Rishika et al. (2013) found that a firm’ social media effort is effective to induce customer participation, which leads to an increase of customers’ visit frequency and profitability. On the other hand, Wu (2013) revealed the strategic effect of social media: the introduction of social network tool not only improved employees’ productivity (the outcome of decisions) but also changed employees’ network position (changing the decisions) and found that social communication is more correlated with reduced risk of layoff than with information diversity.

Our study is conducted at the level of users. There are only a few studies focus on the effectiveness of social media and how individuals can strategically engage in social media to meet their needs. Garg and Telang (2011) studied the relationship between network tie and job offer and found that weak-ties are helpful in generating job leads while strong-ties are important in generating job interviews and job offers. Chi and Yang (2010) found that, in the 111th House election, candidates adopted Twitter with an accelerating speed to raise awareness of voters after they observed the success of past adopter.

The Monetary Value of Twitter Followers

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However, their studies are not directly related to popularity, which is the focus in our study. To the best of our knowledge, there is no empirical research quantifying the value of popularity and investigating how individuals can leverage on social media to improve popularity.

**Data Description**

In this study, we conduct our research in the context of NBA. We choose NBA, a professional sports league, as our research context for several reasons. First, compared to other celebrities on Twitter such as politicians, actors and musicians, the sample (the set) of NBA athletes is well-defined. Otherwise, we may face the sampling issue. Second, an NBA player’s performance can be measured more objectively than other professions. All major professional sports leagues regularly publish a large number of performance metrics for fans to read over the Internet. Each NBA player’s demographics are also publicly available. This provides us an adequate set of control variables in regressions.

Our data set consists of 483 NBA players and their salary, demographics, and performance statistics crawled from NBA official website and ESPN.com. For players who have a Twitter account (dummy variable account = 1), we collected their social media information such as their followers’ ID and the accounts that the focal NBA players followed on Twitter. With such information, we can establish the social network of NBA players. In addition, we scraped the content of their tweets including text, hash tags, attached pictures, as well as associated numbers of reply, retweet and favorite. We plan to apply text mining and facial recognition techniques to extract sentiments and more control variables from text and pictures, respectively.

We also developed a sophisticated Python crawler to regularly check the status (such as following and unfollowing behavior) of NBA players’ Twitter followers. This crawler runs on a weekly basis to check 99,760,873 Twitter accounts. In our sample, the average number of Twitter followers per player is 214,539. With the help of this crawler, we can monitor the responses of basketball fans to significant NBA events like the transaction of players between NBA teams.

Table 1 summarized the descriptive statistics of variables.

**Dependent variable**

Our dependent variable is players’ salary, in million USD dollars. In professional sports leagues, salary is the most important source of income for most players. Only a few superstars in the league can receive endorsement from brands. Even for those superstars, the ratio of endorsement to players’ total income drops dramatically from the most famous one to less popular ones. We can observe this trend in the list of 10 NBA’s highest-paid players (Badenhausen 2013). Kobe Bryant tops the list with his impressive income of 59.8 million USD dollars. Within his total income, 32 million dollars come from endorsement. On the other hand, in the bottom of this list, Pau Gasol earned 21.5 million USD dollars in income which largely driven by his playing salary of 19 million USD dollars.

**Independent variables**

In the developmental and educational psychology literature (e.g. Bukowski and Hoza 1989; Coie et al. 1982; Newcomb and Bagwell 1995), popularity is associated with the notion of acceptance. Popularity is different from interpersonal linking since judgment of popularity or acceptance is conducted in group level instead of dyadic level. For popular ones, even people who do not know them personally can recognize them. In this paper, we define popularity as being generally accepted by others (Scott and Judge 2009). In the microblogging platform like Twitter, popularity can be captured by the following behavior. On Twitter, we generally follow popular ones we accept or appreciate so that we can be informed about everything related to the people we are interested in.

We operationalized the construct of popularity as the number of Twitter followers (in millions). The number of followers has been employed as a measure of popularity by academics (e.g. Cha et al. 2010; Kwak et al. 2010; Toubia and Stephen 2013) and general public (e.g. Beck 2009). Having more followers means that your tweets can reach a larger audience and you have larger social influence on Twitter.

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1 This number is recorded on April 30 2014 and increasing as time goes on.
Control variables

It is intuitive that a player’s better performance can help his team to win more games and improves the probability to win championship. Since winning percentage and championships are highly correlated with the ticket sales and the market value of teams, we conjecture that a player’s salary is largely determined by his on-court performance (Massey and Thaler 2013). We include players’ primary basketball performance statistics (consisting of rebound, assist, turnover, steal, block, points, and efficiency) as our control variables. This is consistent with researches in sports economics (Ahlburg and Dworkin 1991; Kahn 1992; Massey and Thaler 2013). If we regress players’ salary on performance and Twitter popularity, and we can find economically significant coefficient of followers, we can conclude that a player’s popularity is correlated with his salary, conditional on the same performance metrics.

To account for peer influence on Twitter adoption, we generate the variable teammate_twitter, the number of players who are in the same team with the focal player and have already opened a Twitter account.

<table>
<thead>
<tr>
<th>Table 1 Descriptive Statistics</th>
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</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>salary</td>
</tr>
<tr>
<td>tenure</td>
</tr>
<tr>
<td>rebound</td>
</tr>
<tr>
<td>assist</td>
</tr>
<tr>
<td>turnover</td>
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<tr>
<td>steal</td>
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<tr>
<td>block</td>
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<tr>
<td>points</td>
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<tr>
<td>efficiency</td>
</tr>
<tr>
<td>account</td>
</tr>
<tr>
<td>followers</td>
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<tr>
<td>teammate_twitter</td>
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</tbody>
</table>

Data analysis and Preliminary Results

The Economic Value of Popularity

To investigate the impact of their popularity on players’ salaries, we cannot simply regress salary on performance statistics (including rebound, assist, turnover, steal, block, points, and efficiency) as well as popularity (followers). Players may self-select to open a Twitter account. For example, junior and American players may be more willing to engage in social media to interact with their fans than their seniors. Other unobservable traits, such as personality or offline-fan clubs, may be correlated with the effectiveness of using Twitter for building fan base. Therefore, estimated coefficients of OLS will be biased upward. We employ Heckman selection model (Heckman 1979) as our preliminary analysis tool because it

Please refer to http://stats.nba.com/ for more details.
is the most commonly employed econometric tool to correct selection bias. The bias is corrected through a two-step procedure. In step 1, we estimate a Probit model and compute the selection bias correction term from the estimates. The DV of selection equation is a latent variable, which can be considered as the propensity to be assigned to treatment group. In step 2, the correction term is included in an OLS model to obtain unbiased estimates of the treatment effect of NBA players’ popularity on their salaries.

Selection equation

\[ \text{join}_i^* = \gamma_1 \text{efficiency}_i + \gamma_2 \text{teammate_tweet}_i + \gamma_3 \text{age}_i + \epsilon_{1i} \]

Regression equation

\[ \text{salary}_i = \beta_1 \text{performance_stat}_i + \beta_2 \text{tenure}_i + \beta_3 \text{follower}_i + \epsilon_{2i} \]

where \( \epsilon_1 \sim N(0,1), \epsilon_2 \sim N(0,\sigma), \) and \( \text{corr}(\epsilon_1,\epsilon_2) = \rho. \)

In the Heckman first stage model, a player’s decision to join Twitter is expected to be related to his performance, his teammates’ peer influence, and his tenure. In the second stage model, a player’s salary is determined by his performance, online status, and demographics. Table 2 summarized the results of Heckman selection model.

### Table 2 Results of Heckman Selection Model

<table>
<thead>
<tr>
<th>Variables</th>
<th>Salary (2nd stage)</th>
<th>Select (1st stage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>rebound</td>
<td>0.255** (0.107)</td>
<td></td>
</tr>
<tr>
<td>assist</td>
<td>0.227 (0.144)</td>
<td></td>
</tr>
<tr>
<td>steal</td>
<td>-1.738*** (0.612)</td>
<td></td>
</tr>
<tr>
<td>block</td>
<td>0.946* (0.485)</td>
<td></td>
</tr>
<tr>
<td>points</td>
<td>0.386*** (0.054)</td>
<td></td>
</tr>
<tr>
<td>tenure</td>
<td>0.384*** (0.044)</td>
<td>-0.018 (0.017)</td>
</tr>
<tr>
<td>followers</td>
<td>1.514*** (0.282)</td>
<td></td>
</tr>
<tr>
<td>efficiency</td>
<td></td>
<td>0.077** (0.030)</td>
</tr>
<tr>
<td>teammate_twitter</td>
<td></td>
<td>0.031 (0.036)</td>
</tr>
<tr>
<td>constant</td>
<td>-2.086** (0.858)</td>
<td>0.669 (0.421)</td>
</tr>
<tr>
<td>observations</td>
<td>393</td>
<td>393</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

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

The estimated coefficient of followers is statistically significant with a magnitude of 1.514, suggesting getting 1 more followers on Twitter is related to 1.514 USD more in salary.
Work-in-Progress: Identification Strategies

While we found significant results for the positive impact of NBA players’ popularity on their salary, we acknowledge that this only shows correlation instead of causal relationship. To establish the causal relationship that popularity causes higher salary, we need to leverage on Propensity Score Matching and Instrument Variable.

Our first identification strategy for the impact of popularity on salary is instrument variable. Our independent variable (popularity) may be endogenous because of the issue of simultaneity: it is possible that the higher salary of a NBA player and the larger number of Twitter followers result from unobservable covariates. A potential instrument variable for the number of Twitter followers of NBA players is the number of Twitter followers of players located in the same city in other sports leagues. For example, Los Angeles Lakers in NBA and Los Angeles Dodgers in MLB are located in the same city. We plan to rank players in these two teams based on the number of Twitter followers, respectively. We then match one player in the basketball team with another player in the baseball team (e.g. the Lakers player with the largest number of Twitter followers is matched with the Dodgers player with the largest number of Twitter followers). It is obvious that the number of Twitter followers of a matched MLB player is not directly related to the residual of the salary regression of a focal NBA player. However, the numbers of Twitter followers of the focal NBA player and matched MLB player may be correlated since they share the same population in the same city and sports enthusiasts are likely to follow both players on Twitter. We also notice that the NBA players’ salaries may be correlated to MLB players’ salaries due to factors such as economic conditions of cities. However, we believe that this problem can be resolved after we include city-level fixed-effects. With valid instrument variables, we can obtain an unbiased estimate of the impact of the number of Twitter followers on salary by Two-Stage Least Square (2SLS) estimator or Generalized Method of Moments (GMM) estimator (Wooldridge 2012).

Our second identification strategy to establish causal relationship is based on Propensity Score Matching (PSM) method (Heckman et al. 1998; Rosenbaum and Rubin 1983). The basic idea of PSM is to construct a control group with the most similar attributes as the players in the treated group. In our context, we apply PSM to match players in performance (including rebound, assist, turnover, steal, block, points, and efficiency), demographics (including age, race, and citizenship) and other factors such as tenure in NBA, rookie draft rank, free agent eligibility, historical individual awards, the presence of online official personal website and offline fans club and media coverage. Media coverage and associated sentiments can be extracted from Lexis/Nexis or Factiva database and help us to incorporate more controls like participation in charity work of NBA players. With the matched player data sample, we can use a differences-in-differences estimator (DID) with panel data3 to estimate the economic impact of joining the Twitter social media platform. This is consistent with Chan and Ghose (2013) and Goh et al. (2013). With the constructed control group, we can attribute the difference of outcome variable (salary) between treatment group and control group to treatment assignment (players’ joining decision) since other confounding factors are already controlled by PSM.

Actions and Strategies to Promote Popularity

Due to the page limit, we only describe our research idea of this research question. For commercial accounts on Twitter such as brands and celebrities, they contribute informative and interesting contents to attract followers. Brands on Twitter usually follow few users and have limitation to post contents. Unlike brands, celebrities have the freedom to follow anyone they are interested and share personal information on Twitter. We argue that such freedom help celebrities to acquire more followers on Twitter and promote their popularity. We developed the following hypotheses.

First, we hypothesize that following people in the same community helps celebrities to become more popular. For NBA players, the easiest action for them is to follow all their teammates on Twitter. Actively following others (and potential being followed by others) can enhance players’ social network. The enhanced network helps players to derive economic value by raising players’ exposure (Stephen and

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3 We plan to crawled more information such as the date a player decided to join Twitter and historical number of followers to construct a panel data set.
Toubia 2010). Following the same logic, using hash tags to refer to other players or celebrities in the same social circle and to hot topics can also raise their exposure and attract more followers on Twitter.

Second, we hypothesize that posting personal information helps celebrities to become more popular. Posting content is proven to be an effective way to attract new followers (Shriver et al. 2013; Toubia and Stephen 2013). In this paper, we further examine whether celebrities’ personal information help them to gain additional benefits than brands on Twitter. Sharing personal information (e.g. having parties with friends and associated location) to public can be conceptualized as self-disclosure behavior. Self-disclosure is defined to be verbally communicating personal information about the self to another person (Forgas 2011). In such behavior, intimacies are exchanged as a means of deepening and developing a relationship (Collins and Miller 1994; Derlega et al. 1993). Celebrities show intimacy to their fans by disclosing personal information on Twitter. This helps them to establish a favorable self-image, thus leading to a large fan base and becoming more popular.

**Future Research**

There are several avenues for our future research.

First, if social media helps ordinary NBA players to promote their status and consequently increase their salaries, the Gini coefficient of income among NBA players should decrease after the emergence of social media. We can test whether there is a statistically significant difference between Gini coefficients of income before and after the rise of social media in NBA. If this is true in the NBA context, Twitter may help small and medium business in other industries. With limited marketing budget, small business especially start-ups in their initial stages cannot afford the advertising expense of traditional marketing channels like TV and newspaper. However, social media helps small business to stand out even in competitive markets (Sornoso 2014). In this sense, social media has the potential to change the competition landscape of industries in which social media is an important marketing channel.

Second, after a player is traded from one team to another, loyal fans of this player may follow their idol and shift from one team to another. With the emergence of Twitter, now we can observe the impacts of one player on a team’s fan base by checking fans’ following behavior of that player and two teams involved in the player trade. It is also interesting to investigate how team’s attendance or TV rating is affected by this shift of fans.

Finally, we can study the same research questions in other professional sports leagues (including NFL, MLB, and NHL) and investigate why Twitter is more popular among NBA players than in the other 3 leagues because our preliminary analysis shows the average number of followers of NBA players is the largest among 4 leagues, even though NFL and MLB have larger offline fan bases than NBA.\(^4\)

\(^4\)For example, the MVP of NBA (Lebron James) has 12.6 million followers whereas the MVP of NHL (Alex Ovechkin) and MLB (Miguel Cabrera) have 0.766 and 0.437 million followers, respectively. The MVP of NFL (Peyton Manning) does not have a Twitter account.
References


