

# **Do Facebook Activities Increase Sales?**

*Full Papers*

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## **Abstract**

Facebook is a one of the most popular social media platforms and its increasing adoption by business is leading to the shift of traditional marketing to social marketing (Nair 2011). This study investigates two related questions: 1) whether the use of Facebook impacts companies' sales; 2) whether the increased Facebook activities leads to higher companies' sales. We find that, on average, companies adopted Facebook have sales 0.1% higher than those not. We also find if a company increases its Facebook posts (interactions) by 1%, its annual sales will increase by roughly 0.06% (0.03%). Our study provides evidence that Facebook activities are significantly and positively associated with companies' annual sales though their impacts are relatively small in terms of effect size. We also provide caveats to the interpretation of our results and discuss directions for future research.

## **Keywords:**

Social media, Facebook, sales, posts, comments, likes, shares.

## **Introduction**

Facebook, as a popular social media platform, was launched in 2004, open to public in 2006, and available to business in late 2007 ("History of Facebook" 2014). In the past a few years, Facebook has emerged as the dominant social media platform which is supplementing traditional media outlets such as newspapers, magazines, and television programs (Melville et al. 2009). As of February 2014, Facebook has over 1.23 billion monthly active users, 757 million of them log onto Facebook daily, generating billions of likes and millions of comments and shares (Noyes 2014). And with the quick adoption of mobile devices, Facebook has become a ubiquitous information receivers and outlets. As of 2013, roughly 36% of all US public companies and 50% of S&P 1500 companies have adopted Facebook (Zhou et al. 2014).

Prior research has shown that the ultimate marketing result is through company publicity and word of mouth (Nair 2011; Trusov et al. 2008). Both company publicity and word of mouth are particularly prominent features on the Facebook. In order to attract potential customers, companies conduct a wide range of activities on Facebook, such as publishing their product information, announcing promotions, interacting with customers, and providing technical support. In response to companies' social presence on Facebook, customers (and potential) customers interact with companies by commenting, liking and sharing their posts, which usually contains product and brand information. This information diffusion process will

trigger effect of word of mouth, and eventually lead to a “sales bump” (Stephen and Galak 2010; Trusov et al. 2008). However, there is little empirical evidence with respect to whether and how these activities benefit companies. In this study, we aim to fill this gap by studying companies’ activities on Facebook and investigating relevant impacts on their annual sales<sup>1</sup>.

The rest of the paper is organized as follows. We first review related works. Second, we introduce our measures to Facebook activities followed by a description of our data sample. We then present our results, discuss implications and provide directions for future research.

## **Related Work**

The increasing popularity of Facebook<sup>2</sup> and its enormous active user base allow companies to benefit from monitoring and utilizing this new communication channel (Culnan et al. 2010). In order to help companies make their initial forays into social media, Nair (2011) provides several useful recommendations for companies. He states that companies should not consider social media as just another media-outreach program; instead, it should be viewed as an entirely new platform; and that the better way to build a business is “with” customers talking on the web, not “to” customers one-on-one in a controlled space. Kietzmann (2011) find that many company executives eschew or ignore this new form of media (i.e., social media) because they don’t understand what it is, the various forms it can take, and how to engage with and benefit from it. They present a framework that defines social media by using seven functional building blocks and also provide recommendations regarding how companies should develop strategies for monitoring, understanding, and responding to different social media activities.

Existing research has also focused on return on investment (ROI) in social media, discussing factors that companies must consider in measuring the value of social media to justify the relevant costs (Culnan et al. 2010; Fisher 2009). Some study the values of social media by analyzing their fan-base and find that, for the top 20 global brands, the value of a Facebook fan to a consumer brand has increased in the last two years (28%) to \$174 per fan (Falkow 2013). Other research tries to measure the ROI in social media using conventional advertising metrics and identified potential factors such as unique visitors, page views, and sentiment. These new ROI measures, however, are widely criticized and proved either unworkable or ineffective, mainly because it is difficult to trace and track the benefit of social media (Fisher 2009; Yu et al. 2013).

Despite of the controversial arguments for and against the use of social media, overall, previous studies demonstrate the potential advantages of social media in improving customer engagement (Kaplan and Haenlein 2010), enhancing promotion mixes (Mangold and Faulds 2009), detecting customer complaints regarding product defects (Abrahams et al. 2012), and increasing equity and business values (Culnan et al. 2010; Fan and Gordon 2014; Yu et al. 2013). Although existing studies greatly advance our understanding regarding social media, we are not aware of any research focusing on the impacts of social media marketing and its immediate target, the annual sales. In this paper, we use Facebook as a starting point and investigate the relation between companies’ social media activities and their annual sales.

## **Method and Data**

### ***Method***

Although companies from all industries are using Facebook, we select retailer industry to conduct our study. We choose retailer industry because it has the highest adoption rate (75%) on Facebook and it is also perceived to be more relied on and willing to communicate with end customers (Harvard Business Review Analytic Service 2010; Zhou et al. 2014). Zhou et al. (2014) also indicate that not all companies have adopted Facebook and even for those adopted, because of the learning curve or other restrictions, they are using Facebook at different levels of activities (intensities). In this paper, we try to answer two related questions:

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<sup>1</sup> We use the terms sales and annual sales interchangeably, until otherwise specified.

<sup>2</sup> Most studies investigate social media as a whole, not Facebook in particular. In this paper, we use the terms Facebook and social media interchangeably, until otherwise specified.

1) whether the use of Facebook impacts companies' sales; 2) whether the increased Facebook activities leads to higher companies' sales.

In order to answer our first question, we construct a dataset consists of company-year observations for all our sample companies, and the following regression model is used (Model 1).

$$\begin{aligned} \text{Model 1: } \ln(\text{sales}_{it}) &= \beta_0 + \beta_1 \text{fbDummy}_{it} + \beta_2 \ln(\text{size}_{it}) + \beta_3 \ln(\text{adExp}_{it}) + \beta_4 \ln(\text{reserachExp}_{it}) \\ &+ \beta_5 \ln(\text{mtb}_{it}) + \beta_6 \text{year}_{it} + \epsilon_{it} \end{aligned}$$

We introduce a dummy variable (*fbDummy*) to indicate whether Facebook is used for each company-year. In order to separate the impacts of our variable of interest, we control for other major determinants of annual sales identified by previous research, such as company size, advertising expense, research & development and market to book ratio (*mtb*) (Yu et al. 2013). All variables used in this study are described in Table 1.

Variable Name	Definition
sales	The gross sales of a company in a year.
fbDummy	Dummy variable, it is set to 1 Facebook is used for a company-year, 0 otherwise.
fbposts	The number of posts published by the company in a year.
fbcomments	The number of comments left by Facebook users in a year
fblikes	The number of time users like the company posts in a year
fbshares	The number of time users share the company posts in a year.
fbinteractions	The sum of fbcomments, fblikes and fbshares divided by fbposts.
size	Company size, proxied by the total asset of the company in a year.
adExp	The expense company spends on the advertisement of in a year.
researchExp	The expense company spends on research and development a year.
mtb	Market to book ratio of the company.
Year	The year of the data records.

**Table 1. Variable Description**

In order to answer our second question, we build a dataset consisting of only those company-year observations that Facebook is used, so we can better test the impacts of different levels of activities. For each company-year, we capture its Facebook activities using the following four metrics: 1) *fbposts*, the number of posts published by a company; 2) *fbcomments*, the number of comments left by Facebook users; 3) *fblikes*, the number of time users like the company posts, and 4) *fbshares*, the number of time users share the company posts.

It is not appropriate, however, to include all these four metrics in a regression model because they are highly correlated with each other (as shown in Table 3 below). In order to avoid this issue, we capture the Facebook activities from two perspectives, namely, post-activity and interaction-activity. Post-activity is measured by the total number of posts (*fbposts*), interaction-activity is measured by the number of user interactions per post (*fbinteractions*), calculated as the sum of *fbcomments*, *fblikes* and *fbshares* divided by *fbposts*. Similarly, we control for other major determinants of annual sales as shown in the regression model below (Model 2).

$$\begin{aligned} \text{Model 2: } \ln(\text{sales}_{it}) &= \beta_0 + \beta_1 \ln(\text{fbposts}_{it}) + \beta_2 \ln(\text{fbinteractions}_{it}) + \beta_3 \ln(\text{size}_{it}) + \beta_4 \ln(\text{adExp}_{it}) \\ &+ \beta_5 \ln(\text{reserachExp}_{it}) + \beta_6 \ln(\text{mtb}_{it}) + \epsilon_{it} \end{aligned}$$

In both models, we employ the double-log functional form because the variables are highly skewed. For example, sales data has a skewness of 10.5, with more than 75% of companies have sales less than 5 billion while the mean sales is 8.2 billion. In order to relief this issue, we follow the previous literature and logarithmically transform these skewed variables to make them more normally distributed (Li 2008; Benoit 2011). A brief description of dependent variable and independent variables is provided as below:

- Company sales (*sales*), represent gross sales (the amount of actual billings to customers for regular sales completed during the period) reduced by cash discounts, trade discounts, and returned sales and allowances for which credit is given to customers.
- Company size (*size*), reflects a company's operational and business environment. The Larger company has more resources and opportunities to generate sales. Follow the previous literature, we use the total asset of a company to proxy its size, we expect company size is positively associated with sales (Bloomfield 2008).
- Advertisement expense (*adExp*), represents the costs spent to market a company product or brands. The higher expense of advertisement generally means higher sales. In this research, we consider only advertisement expenses that are spent on traditional media such as newspaper, radio, and television. We expect the expense of advertisement is positively associated with the sales.
- Expense on research and development (*researchExp*), represents money a company spent on research and development in hope to make better products or create proprietary brands, which usually lead to increased sales. We expect expense on research and development is positively associated with sales.
- Market to book ratio (*mtb*). New companies usually have limited assets but have great growth potential, thus have higher market value compare to their book ratio. We expect the market-to-book ratio is positively associated with the sales.

### Data Sample

In order to find all the retailer companies, we used companies' SIC (Standard Industry Classification) code (The SEC 2014) between 5220 and 5990<sup>3</sup> and searched from COMPUSTAT between 2007 and 2013<sup>4</sup>. This gave us 481 companies (excluding subsidiaries). We then collected Facebook accounts for these companies by visiting their official websites. Public subsidiaries often use their parent companies' websites and share social media accounts as well, so we searched their parent companies' websites for their social media accounts. A small number of companies did not provide the links to their social media accounts on their official websites, in this case, we searched Internet for their Facebook accounts. If a company has more than one Facebook accounts, we collect all the readily available accounts. Out of 481 companies, we found 259 of them have adopted Facebook.

Variables	Min	1st Q	Median	Mean	3rd Q	Max
fbposts	0.69	4.48	5.51	5.10	6.13	8.18
fbinteractions	0.00	2.31	3.99	4.06	5.72	10.89
fbcomments	0.00	5.68	8.09	7.33	9.60	14.43
fblikes	0.00	6.58	9.20	8.66	11.30	16.81
fbshares	0.00	0.00	4.12	4.49	8.04	14.16
Sales	0.75	5.99	7.02	7.18	8.40	13.07
size	0.39	5.31	6.42	6.57	7.84	12.23
adExp	0.00	1.48	3.06	2.98	4.36	7.82
researchExp	0.00	0.00	0.00	0.09	0.00	7.98
mtb	0.00	0.66	1.07	1.11	1.50	4.51

**Table 2. Summary Statistics (logarithmically transformed)**

In order to collect necessary Facebook activity data for our study, for each of the 259 companies, we retrieved all their Facebook posts date back to 2007. For each company-year, we then calculate the variables of post-activity and interaction-activity. After the company-year Facebook data is ready, we collected the

<sup>3</sup> SIC codes between 5220 and 5990 are reserved for retailing companies.

<sup>4</sup> Year 2007 is chosen because Facebook was not open to business until 2007, year 2013 is chosen because financial data is not available when the data analysis is conducted.

company-year financial data from COMPUSTAT between 2007 and 2013. Finally, we merged the Facebook and financial data by company and year, and removed observations missing values required by our study. Our final dataset for Model 1 contains 438 companies (2127 observations) and dataset for Model 2 contains 223 companies (1188 observations). For the sake of simplicity, we report both summary statistics and correlations based on dataset for Model 2. The summary statistics (logarithmically transformed) are reported in Table 2.

The correlations among independent variables (logarithmically transformed) are reported in Table 3.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
fbposts (1)	1	0.59	0.82	0.83	0.62	0.15	0.15	-0.07	0.14
fbinteractions (2)	0.59	1	0.9	0.94	0.8	0.34	0.27	-0.03	0.23
fbcomments (3)	0.82	0.9	1	0.96	0.7	0.29	0.26	-0.05	0.19
fblikes (4)	0.83	0.94	0.96	1	0.81	0.29	0.23	-0.05	0.22
fbshares (5)	0.62	0.8	0.7	0.81	1	0.25	0.19	-0.09	0.2
size (6)	0.15	0.34	0.29	0.29	0.25	1	0.67	0.09	0.11
adExp (7)	0.15	0.27	0.26	0.23	0.19	0.67	1	0.13	0.03
researchExp (8)	-0.07	-0.03	-0.05	-0.05	-0.09	0.09	0.13	1	0.16
mtb (9)	0.14	0.23	0.19	0.22	0.2	0.11	0.03	0.16	1

**Table 3. Correlation among independent variables (logarithmically transformed)**

## Empirical Results

### Main Result

Table 4 reports our results. Columns under Model 1 represents results to our first research question, namely, whether companies adopted Facebook have higher sales. We find that adoption (use) of Facebook is indeed significantly related to company's sales. The results show that, all else equal, companies that adopted Facebook have sales 0.1% higher than those not using Facebook. The results also indicate that all the control variables (logarithmically transformed) size, adExp, researchExp, mtb are positively associated with annual sales, which are consistent with our general understanding that all those four factors have positive impacts on company's sale. For example, increased research and development expenses may bring in better products or more efficient processing, which will eventually lead to increased sales.

Variables	Model 1		Model 2	
	Coefficient	P-value	Coefficient	P-value
Intercept	0.926***	0.000	0.744***	0.000
fbDummy	0.096***	0.000		
fbposts			0.064***	0.000
fbinteractions			0.030***	0.000
size	0.915***	0.000	0.937***	0.000
adExp	0.056***	0.000	0.038***	0.000
researchExp	0.032*	0.068	0.056**	0.020
mtb	0.021**	0.047	0.070***	0.000
year	controlled		controlled	

**Table 4. Regression Results for Annual Sales (logarithmically transformed)**

Columns under Model 2 represents results to our second research question, namely, whether companies with a higher level of Facebook activities also have higher sales. We find the coefficients of both post-activity and interaction-activity are significant at 1% level, suggesting that number of posts is positively associated with annual sales. Specifically, if a company increases its posts on Facebook by 1%, its annual sales would increase by roughly 0.06%; similarly, if a company can increase user interactions to their posts by 1%, its annual sales would increase by roughly 0.03%. In summary, these results provide evidence that level of Facebook activities is positively associated with annual sales, suggesting companies posting more message on Facebook and attracting more interactions from users also have higher sales.

One caveat is that this study does not aim to justify the use of Facebook. Although the coefficients of our variables of interest are statistically significant, they are all small in term of effect size. In addition, although Facebook is “free” for companies to create business pages and interact with their users, companies may incur some costs by engaging social activities on Facebook. For example, they may need to part-time or full-time employees to publish posts and interact with customers. As a result, whether the benefits of Facebook on sales are also economically significant is dependent on situations of individual companies.

### ***Additional Analysis***

As we discussed above, Facebook users can interact with a post by commenting, liking and sharing. In our main analysis, we treat them indiscriminately and find that they positively impact sales. However, it is reasonable that different types of interactions may have different impacts on sales. In order to answer this question, we conduct three additional regression analysis, each analysis we replace the two activity variables (*fbposts* and *fbinteractions*) with *fbcomments*, *fblikes*, and *fbshares*, respectively. Our un-tabulated results show that if a company attracts 1% more comments (likes) on Facebook, its annual sales will increase by roughly 0.013% (0.012%). The coefficient of *fbshares* (0.017) is higher than that of *fbcomments* and *fblikes*, this can be explained as that sharing a post will make that post available to all friends of the users who shares the original post, it may even trigger further sharing of this post.

In addition, a company’s sales is usually related to number of stores it has. Unfortunately, store information is not publically available, and it may change from year to year. And because different stores have different size thus have different impacts on the final sales, so the number of stores may not be an accurate measure for company’s sale. If a company opens a new store, it will hire more employees; if a company closes a store, it will lay off employees. Thus following the previous literature, we use the number of employees to proxy the company size (Cabral and Mata 2003). We re-run our analyses and find similar results, which indicates the results are relatively robust.

### **Conclusions and Discussions**

Facebook is a one of the most popular social media platforms and the increasing adoption of social media by business is leading to the shift of traditional marketing to social marketing (or online word of mouth) (Nair 2011). In addition, Facebook employs mobile and web-based technologies to create highly interactive platforms through which companies can create, discuss and share information with users and increase business value (Fan and Gordon 2014). This study has practical implications regarding whether companies should adopt and, if already adopted, increase the use of Facebook to boost their annual sales. Our study provides evidence that Facebook activities are significantly and positively associated with companies’ annual sales. However, their impacts are relatively small in terms of effect size. We also provide caveats when interpreting our results.

This research is subject to several limitations. First, we limit our study to the retail industry, so our results may not generalize to other industries. Second, this research doesn’t take company’s fans base into consideration. This is mainly because of the limitation of Facebook API, which doesn’t provide the time information when a new user becomes a fan of a company. So it is infeasible to get the number of fans a company has in earlier years (unless the fans base information is tracked every year since the company started using Facebook). However, more posts usually attract more individuals to become fans, and bigger fans base usually leads to greater number of comments, likes, and shares. We believe fans base should also be highly correlated with number of posts and three metrics of interactions, so not including fans base as an independent variable should not have big impacts on our results. Third, this research only explores association, not causation between social activities and company sales. The results of this research cannot be interpreted as that increasing Facebook posts will lead to the sales increase. It is possible that companies with increasing sales self-selected to use Facebook as a new information distribution channel, thus increased their activities and interaction with customers on Facebook. Fourth, our sample period is from 2007 and 2013; the financial crisis began in late 2008, and it is still not ended yet, which have great economic and social impacts on both companies and individuals. Some factors impacting sales such as changes in preference and purchasing powers are not considered in our analysis. Nevertheless, by including year dummies to control for the time-fixed effect and by conducting robustness analysis, we believe the results of this research are relatively reliable.

Future research can extend this research in several ways. First, although we limit our study to the retail industry, there are many sub-industries such as Food and Electronics, it would be interesting to say how different sub-retailing industries react to the social activities. Second, the common understanding is that smaller companies benefit most through social media (Kim and Ko 2012). It is interesting to test this hypothesis by dividing companies by size into different size groups, and to find out whether the impacts of Facebook activities on sales varies across these groups. Last but not the least, the similar study can be conducted using other types of social media platform, such as Twitter and Pinterest. We encourage future research to explore these areas and advance our knowledge regarding Facebook in particular and social media in general.

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