

# CEOs on Twitter

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## ABSTRACT

We observe many CEOs of big companies as easily as movie stars or sports players on Twitter. Why do they appear on social media and what would be the effect of their Twitter network on the corporate performance and shareholder benefit? This study explores big company CEOs on Twitter. We identify Twitter-using CEOs and examine the impact of their social media activity on the corporate performance. While academic literatures have studied the performance of publicly well-known CEOs mainly with media coverage, we focus more on the big company CEOs on the social media and test its effect on the corporate performance. We discovered the determinants of Twitter status of CEOs, in terms of personal attributes, company attributes and industry. We also found the positive impact of Twitter on corporate performance, contrary to previous evidences of negative effect.

## Categories and Subject Descriptors

G.3 [Probability and Statistics]: Regression

J. 4 [Social and Behavioral Sciences]: Economics

## General Terms

Management, Finance, Economics, Human Factors

## Keywords

Social Media, Corporate Performance, Compensation

## 1. INTRODUCTION

The behavior or characteristic of firm executives has been studied in corporate finance and behavioral economics in terms that it can possibly affect the corporate performance, and consequently the benefit of shareholders. Among the attentions to executives, public reputation is one distinct interest to both researchers and shareholders. Especially, the main interest is focused on their individual compensation and the consequences of their distinctive status on the performance. Empirical evidences have shown that public fame has positive effect on the executive compensation but negative ex-post consequences on the corporate performance, leading negative effect for the shareholders [1].

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We test such argument in the context of social media. While the previous literature used award-winning event as means of obtaining the superstar CEO status [1] or press coverage as a proxy of reputation [2, 3], we use the figures of social media to identify the CEO characteristics, as well as their personal attributes. In the literatures of corporate finance, personal attributes of CEOs, such as age [4, 5] or gender [6], have explained the different consequences in the firm's financial performance, related with CEO overconfidence. We consider these personal variables to find the determinants of social media activities of CEOs. Thereafter, we investigate its impact on the corporate performance, as social media becomes a novel channel of transmitting opinions between investors [7].

## 2. PROPOSED APPROACH

### 2.1 Hypotheses

We mainly propose two questions: What are the determinants of Twitter-using CEO? And what is the impact of Twitter on the corporate performance. These questions are described by the following hypotheses.

H1. Twitter activities of CEOs will be explained by personal attributes and firm attributes.

H2. Twitter activities of CEOs will have an impact on the corporate performance.

### 2.2 Variables

We describe the Twitter-using CEOs by personal attributes and firm attributes. Personal attributes include age, gender and total compensation of CEOs, while firm attributes include company size, return on assets (ROA), return on equity (ROE), and leverage. Industry dummies are also used.

Regarding the corporate performance, we apply stock market variables (price, trading volume, bid and ask, shares outstanding) and compute the market-based performance measures (return, spread, turnout) to build up the following models.

$$1.1 \text{ Twitter account} = \alpha_1 + \beta_{1,i} \text{personal attr}_i + \gamma_{1,j} \text{firm attr}_j + \text{industry}$$

$$1.2 \text{ Twitter status}_k = \alpha_2 + \beta_{2,i} \text{personal attr}_i + \gamma_{2,j} \text{firm attr}_j + \text{industry} + \delta_{2,k-1} \text{Twitter status}_{k-1}$$

$$2.1 \text{ Performance}_l = \alpha_3 + \gamma_{3,j} \text{firm attr}_j + \delta_{3,k} \text{Twitter status}_k$$

### 2.3 Sample

Underlying dataset is the S&P 500 constituents in 2014 and their CEOs on Twitter. Companies' financial data, and executive information are obtained from CRSP, COMPUSTAT, and

EXECUCOMP. After refining preferential/ordinary stocks with classes, we maintain 484 firms and corresponding CEOs, whose screen names and twitter status are verified through Twitter API. We discovered the CEOs who have Twitter accounts and finally identified 109 CEOs.

Table 1(a) shows the details of overall sample, in terms of age, gender and compensation. Compensation consists of salary, bonus, and other compensations with option granted. Table 1(b) shows Twitter group and NonTwitter group by industry, using GICS (Global Industry Classification Standard).

**Table 1(a). Sample Overview: Avg. Age and Compensation**

	Total	TW	NONTW
<b>#Firms</b>	<b>484</b>	<b>109</b>	<b>375</b>
m	461	100	361
f	23	9	14
<b>Age</b>	<b>57.1</b>	<b>55.7</b>	<b>57.5</b>
m	57.1	55.8	57.5
f	56.3	54.3	57.6
<b>Comp(\$1000)</b>	<b>12,095</b>	<b>15,066</b>	<b>11,232</b>
m	11,921	14,744	11,139
f	15,590	18,645	13,627

**Table 1(b). Sample Overview: Industry**

GICS Sector	GICS Industry	# Firms	# TW	# NONTW
<b>Energy</b>		<b>43</b>	<b>4</b>	<b>39</b>
	Energy	43		
<b>Materials</b>		<b>29</b>	<b>5</b>	<b>24</b>
	Materials	29		
<b>Industrials</b>		<b>61</b>	<b>13</b>	<b>48</b>
	Capital Goods	41	34	7
	Commercial & Professional Services	9	4	5
	Transportation	11	10	1
<b>Consumer Discretionary</b>		<b>81</b>	<b>24</b>	<b>57</b>
	Automobiles & Components	7	2	5
	Consumer Durables & Apparel	19	5	14
	Consumer Services	10	3	7
	Media	15	4	11
	Retailing	30	10	20
<b>Consumer Staples</b>		<b>38</b>	<b>10</b>	<b>28</b>
	Food & Staples Retailing	7	3	4
	Food, Beverage & Tobacco	25	6	19
	Household & Personal Products	6	1	5
<b>Health Care</b>		<b>52</b>	<b>13</b>	<b>39</b>
	Health Care Equipment & Services	29	9	20
	Pharmaceuticals, Biotechnology & Life Sciences	23	4	19
<b>Financials</b>		<b>84</b>	<b>12</b>	<b>72</b>
	Banks	17	3	14
	Diversified Financials	24	2	22
	Insurance	21	3	18
	Real Estate	22	4	18
<b>Information Technology</b>		<b>62</b>	<b>23</b>	<b>39</b>
	Software & Services	29	15	14
	Technology Hardware & Equipment	18	7	11
	Semiconductors & Semiconductor Equipment	15	1	14
<b>Telecommunication Services</b>		<b>5</b>	<b>3</b>	<b>2</b>
	Telecommunication Services	5	3	2
<b>Utilities</b>		<b>29</b>	<b>2</b>	<b>27</b>
	Utilities	29	2	27
<b>Total</b>		<b>484</b>	<b>109</b>	<b>375</b>

Average Twitter status of CEOs is shown in Table 2. On average, female CEOs have more followers. Considering less number of female CEOs, it seems to show the public interest toward female CEOs of big companies.

Average Twitter status is also different through industries. The industries in Consumer discretionary sector (e.g. Media, Retailing, Apparel), and IT sector (e.g. Software) turn out more active on Twitter. CEOs of IT companies tweet more, having more friends, more followers for a longer period.

**Table 2. Average Twitter Status of CEOs**

		CEO Twitter (n=109)			
		#tw	#friend	#follower	#month
<b>(a) Gender</b>					
<b>Male</b>		287	99	39402	49
<b>Female</b>		258	81	159308	54
<b>(b) Industry</b>					
<b>GICS Sector</b>	<b>GICS Industry</b>				
<b>Energy</b>		<b>0</b>	<b>1</b>	<b>14</b>	<b>35</b>
	Energy	0	1	14	35
<b>Materials</b>		<b>5</b>	<b>40</b>	<b>93</b>	<b>38</b>
	Materials	5	40	93	38
<b>Industrials</b>		<b>302</b>	<b>76</b>	<b>3126</b>	<b>46</b>
	Capital Goods	277	55	5161	37
	Commercial & Professional Services	393	118	901	58
	Transportation	28	13	4	50
<b>Consumer Discretionary</b>		<b>279</b>	<b>134</b>	<b>37618</b>	<b>52</b>
	Automobiles & Components	372	180	14820	43
	Consumer Durables & Apparel	78	95	116	30
	Consumer Services	5	2	167	34
	Media	424	41	181650	56
	Retailing	385	222	14552	69
<b>Consumer Staples</b>		<b>22</b>	<b>41</b>	<b>691</b>	<b>44</b>
	Food & Staples Retailing	3	26	57	44
	Food, Beverage & Tobacco	35	56	1060	38
	Household & Personal Products	0	0	380	81
<b>Health Care</b>		<b>216</b>	<b>103</b>	<b>2190</b>	<b>46</b>
	Health Care Equipment & Services	312	147	3159	54
	Pharmaceuticals, Biotechnology & L	0	4	12	29
<b>Financials</b>		<b>5</b>	<b>22</b>	<b>14</b>	<b>38</b>
	Banks	2	21	19	19
	Diversified Financials	0	0	2	47
	Insurance	15	60	23	59
	Real Estate	1	6	10	34
<b>Information Technology</b>		<b>750</b>	<b>181</b>	<b>191046</b>	<b>61</b>
	Software & Services	1005	231	142817	62
	Technology Hardware & Equipment	295	96	320445	59
	Semiconductors & Semiconductor E	114	12	8669	58
<b>Telecommunication Services</b>		<b>3</b>	<b>6</b>	<b>111</b>	<b>67</b>
	Telecommunication Services	3	6	111	67
<b>Utilities</b>		<b>1</b>	<b>5</b>	<b>1</b>	<b>31</b>
	Utilities	1	5	1	31
<b>Total</b>		<b>284</b>	<b>97</b>	<b>49302</b>	<b>49</b>

### 3. CURRENT RESULTS

#### 3.1 Determinants of Using Twitter

According to Table 3, age and compensation turn out as significant determinants of having Twitter accounts and holding period. The younger and the more-paid CEOs are likely to have Twitter accounts with significance. Industry dummy test shows that the CEOs of consumer service-oriented industries and IT industries have more Twitter accounts. However, variables related to twitter status (number of tweets, friends and followers) are explained mainly by other twitter status variables one another, implying the fundamental character of networking. Among company variables, only current total asset shows significance.

**Table 3. Determinants of Twitter holding and using Twitter**

	Twitter Acct	# CEO tweets	#Friends	#Followers	Holding Period
<b>Personal</b>					
Age	-0.0067 *	2.8180	-0.5884	-300	-2.35E-01
Gender	0.0272	-2.1590	-6.8470	29190	3.38E+00
Compensation	0.0060 **	1.3340	0.3477	-516	6.98E-02
<b>Company</b>					
Size	-7.E-08	0.0000	0.0000	0	-1.98E-07
Current Total Asset	7.E-06 ***	-0.0014	-0.0001	3 ***	3.75E-04 ***
ROA	-0.7296 *	-435 .	61	191600 .	-3.64E+01 *
ROE	338	-1757	-20280	-10590000	1.64E+04
Leverage	5.4920	-8865	2172	-105400	2.95E+02
<b>Industry Dummies: Yes</b>					
Energy	-0.0028	5.4420	-2.1840	-11160	6.70E-01
Materials	0.1375	-14.3700	2.5620	-9207	5.62E+00
Capital Goods	0.1054	33.6200	-4.3230	-22230	4.45E+00
Commercial & Professional S	0.5370 ***	38.8600	-2.2650	-16170	2.75E+01 ***
Transportation	0.0658	4.0520	-2.2890	-7531	5.00E+00
Automobiles & Components	0.1121	-33.5200	22.0300	-47330	1.37E+00
Consumer Durables & Appar	0.2575 *	-46.6500	13.0800	-7218	7.31E+00
Consumer Services	0.2854 .	19.4500	-11.4600	-5013	1.21E+01
Media	0.0444	49.7500	-26.5100	39390	1.01E+01
Retailing	0.3059 **	-93.3400	30.4900	-20170	1.70E+01 **
Food & Staples Retailing	0.2892 .	-0.7039	-3.5780	-46800	1.28E+01
Food, Beverage & Tobacco	0.2321 *	-8.9890	3.8330	-26830	8.75E+00
Household & Personal Produ	0.1224	25.0900	-11.2300	-28460	1.32E+01
Health Care Equipment & Sei	0.2263 *	-43.3700	13.8700	-19070	1.11E+01 *
Pharmaceuticals, Biotechnoln	0.0312	5.0300	-4.8040	-29620	1.53E+00
Banks	0.1563	0.5349	-1.5030	8664	1.58E+00
Diversified Financials	-0.0061	11.4700	-7.2940	3479	1.21E+00
Insurance	0.0879	-5.4340	-6.6930	16350	6.20E+00
Real Estate	0.1538	-19.6900	-0.6896	12300	5.98E+00
Software & Services	0.3825 ***	122.9000	1.8340	14320	1.85E+01 ***
Technology Hardware & Equi	0.2460 *	-2.0300	-2.0610	69340 *	1.44E+01 *
Semiconductors & Semicond	0.0293	35.7500	-6.4400	-18350	4.10E+00
Telecommunication Services	0.4391 *	31.0500	-28.9700	-38690	3.39E+01 ***
Utilities					
#Tweets		3.5860	1.73E-01 ***	55 **	-5.75E-03
#Friends		0.0003 ***		-63	9.88E-02 ***
#Followers		-1.0390 **	-1.83E-05		9.02E-06
Holding Period(Months)			8.61E-01 ***	268	
Adj-R2	0.1288	0.6710	0.6999	0.1395	0.2965
BP LM $\chi^2$	42.6258	339.1115	58.6408	60.4799	56.2995
(p-value)	0.0993	0.0000	0.0074	0.0048	0.01269

Meanwhile, there exists heteroskedasticity according to Breusch-Pagan LM test. However, this seems due to significant correlation between the Twitter status variables as shown in Table 4.

**Table 4. Correlation test between Twitter Status**

	Twitter account	Holding period	#Tweets	#Firend	#Follower
Twitter account	1.000				
Holding period	0.879	1.000			
#Tweets	0.000	0.000	1.000		
#Firend	0.386	0.447	0.819	1.000	
#Follower	0.179	0.192	0.206	0.166	1.000

### 3.2 Corporate performance and Twitter

To find the Twitter impact on the corporate performance, we use simple model with Twitter variables and Market capitalization as a company variable. Assuming that potential retail investors are more interested in the stock and performance variables are related to stocks, market capitalization can be tangible proxy for the company size that investors perceive.

**Return** CEO tweet has positive effect on the market return of company share with weak significance. The number of followers and holding period also shows positive effect on the return, even with less significance. Hence, being popular on social media may not always be bad to company. Even though further study will be carried for it, this positive effect opens a room for new insights.

**Spread** defines the difference between bid and ask price of share on the trading day. Therefore, it is often regarded as a measure of market efficiency, regarding the symmetry of information between traders. In our results, negative effect of CEO tweets on the spread means that CEO tweets may reveal better signal and bring less inefficiency in the share price. However, the number of friends still raises the question with its positive impact.

**Share turnout** defines the period trading volume compared to the number of shares outstanding on the same period. Therefore, it implies how volatile the market would react for specific factor. The result shows that the number of followers of CEO Twitter has significant impact on the volatile trading mood. Holding period is also showing positive effect on the share turnout. Market cap has opposite effect on the share turnout.

**Table 5. Twitter effects on Return, Spread and Share Turnout**

	RETURN	SPREAD	TURNOUT
log(MKTCAP)	0.00111	0.00498	-0.38910 ***
# ceo tweet	0.00001 .	-0.00004 ***	-0.00019
# ceo friend	-0.00006 .	0.00019 ***	0.00069
# ceo follower	0.00284	-0.00117	0.09579 *
Holding Period(Month)	0.00003	0.00014	0.00643 .
Adj-R2	0.00694	0.14810	0.2177
BP LM $\chi^2$ (5)	10.0824 .	48.9195 ***	11.3542 *
p-value	0.07293	0.00000	0.04479

## 4. Remarks

We currently work on the model, data, and measures. In order to develop the notion of the fame of CEO on Twitter, more measures from Twitter will be adopted, on top of the basic figures of Twitter. Furthermore, the influence of CEO tweets on the corporate performance will be studied on firm-specific issues. By measuring the abnormal returns on the event window of related tweets, we expect to observe its instant impact on the market response. The remaining part of this work will be better improved through the opportunity of peer review on the workshop.

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