

Fiduciary Obligations and CEO Social Media Activity: The Role of Gender

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3 October 2022



Universiteit
Leiden
The Netherlands



Elon Musk  @elonmusk · Oct 1



 5,793

 5,263

 88.2K



Elon Musk  @elonmusk · Sep 14

Salted butter is amazing, but should be stored at room temperature



**BUTTER WATCHING THE OTHER FOOD ITEMS
IN THE FRIDGE FROM ITS SPECIAL TRAY:**



 9,304

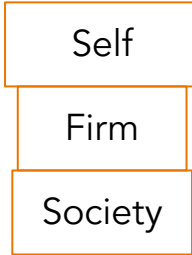
 8,690

 132.2K



Motivation for Understanding CEO Communication on Social Media

- Used by executives to...
 - Build trust, manage public perceptions, drive reputation
 - Manage stakeholders, investors
 - Engage in CEO activism
- Different topics, centred around one person (i.e., CEO)
 - Tradeoff: Self-public persona vs. fiduciary obligations (acting on behalf of shareholders)
 - Goal: which CEOs are embracing their public persona and which are embracing their role as CEO
- Public-persona and gender



After an increase in fiduciary obligations, how do female CEOs differentially use social media, relative to male CEOs?

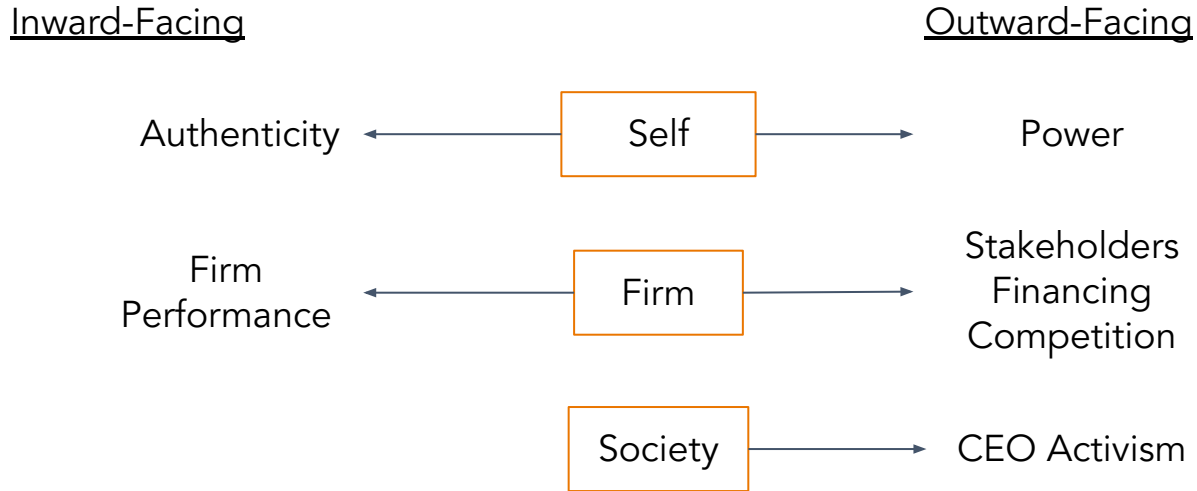
From Types of Messages...

Self

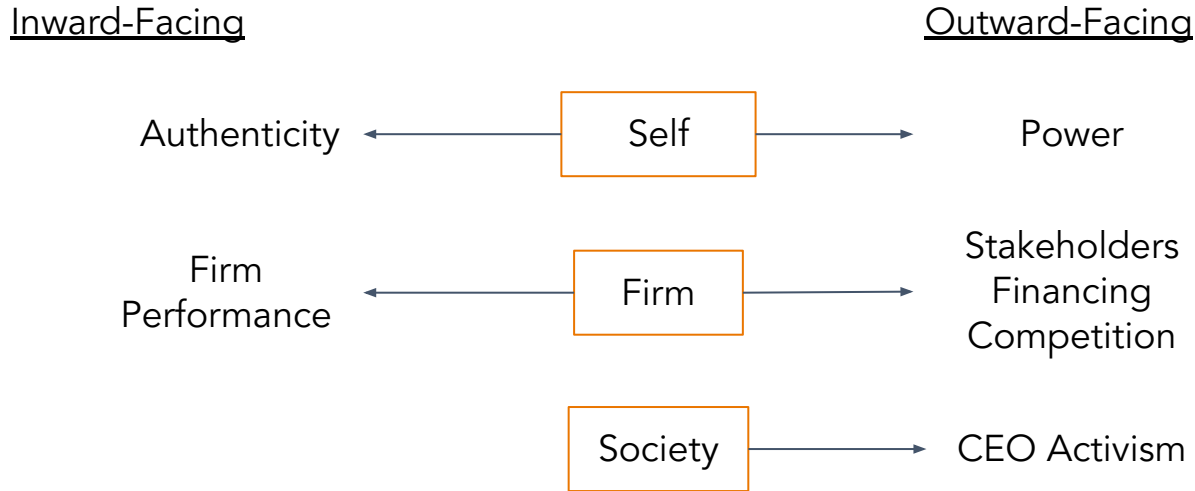
Firm

Society

... To Differentiating Between “Inward”– and “Outward”–Facing Messaging



Does Gender Lead to Differentiation?



After an increase in fiduciary obligations, how do female CEOs differentially use social media, relative to male CEOs?

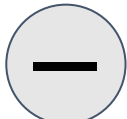
Differentiate Between Inward- and Outward-Facing Messaging

Inward-Facing

Outward-Facing



Female CEOs:



Setting

IPOs and Twitter

- Increase fiduciary obligations: sample of 2,126 companies that filed an IPO public from 2006 to 2020 from SDC
 - 1,518 completed and 608 pulled
 - 507, or 24%, of CEOs of those companies currently have Twitter account
- Final sample includes 198 firms that completed and 20 that did not
- Collected > 500,000 CEO tweets
- Imbalanced panel covering 12 quarters prior to filing and 8 quarters after for each firm
- Outcome of interest is the average “meaning” of tweets by the focal CEO in that quarter (using word embeddings)

Differentiate Between Inward- and Outward-Facing Messaging

Inward-Facing

Outward-Facing



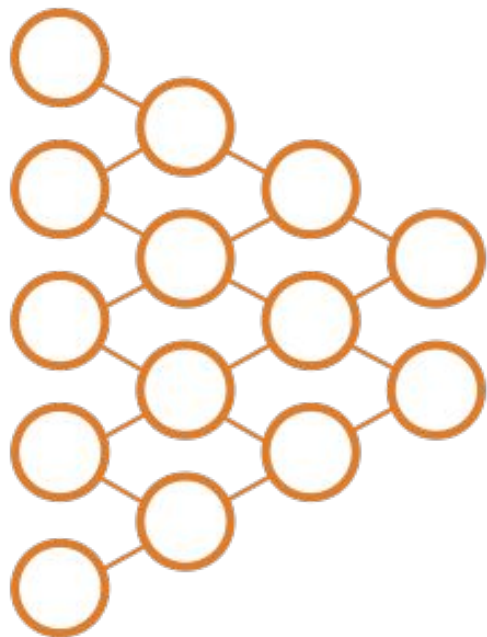
Female CEOs:



A Not-So-Technical Aside on Word Embeddings

A neural network to find a numerical representation

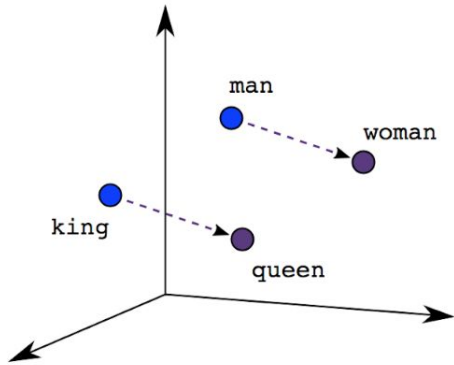
Power



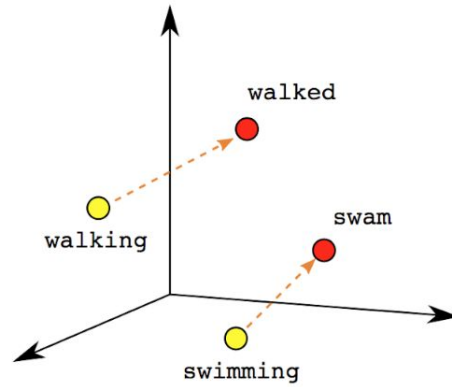
1.21
9.81
7.30

A big neural
network

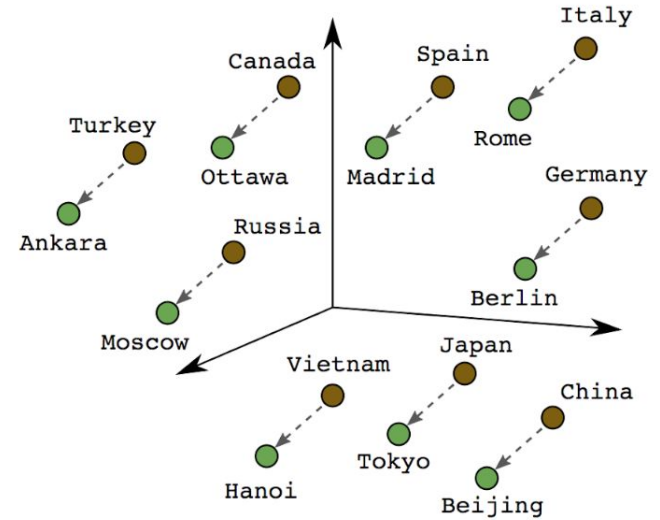
Descriptive Example of Word Embedding Meanings



Male-Female



Verb Tense



Country-Capital

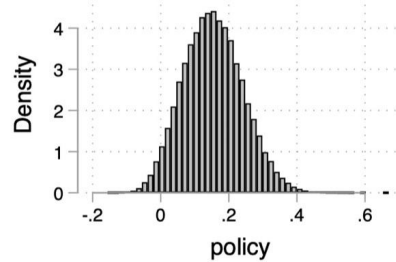
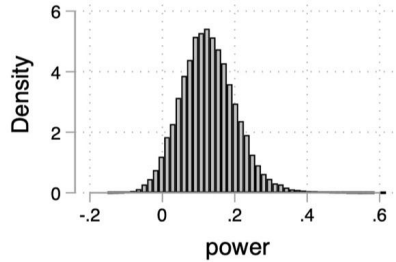
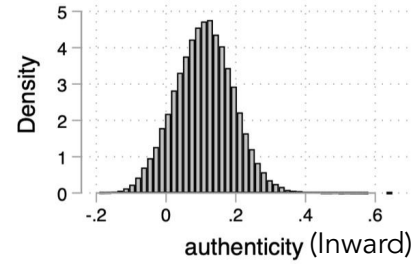
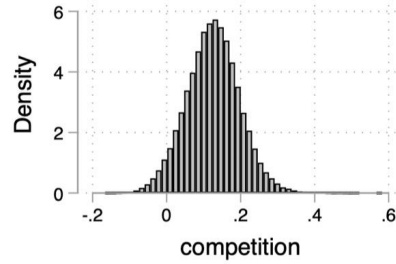
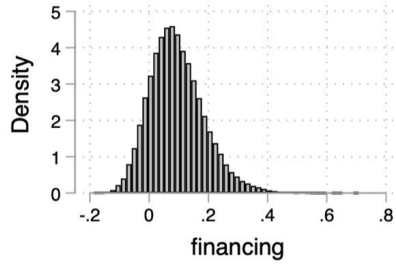
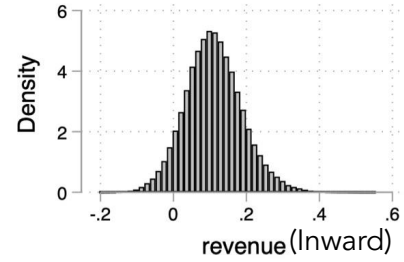
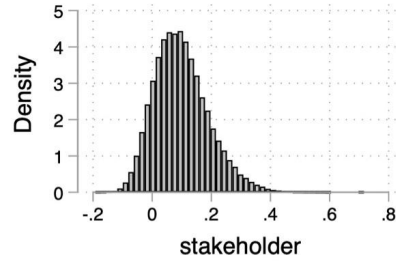
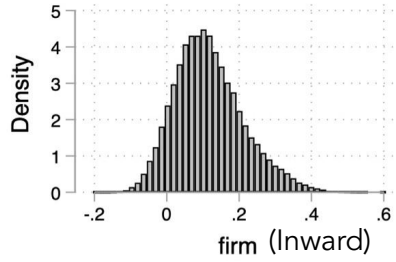
Relevant Features of Word Embeddings

- The space that a word occupies represents its meaning
- We can perform math on the word embeddings
 - A sentence is the sum of the word vectors
 - Differencing two vectors yields a relevant meaning (e.g. queen + man ~ king)
- We can assess the proximity of similar ideas (we use cosine similarity)

Our Implementation

- We use a model originally developed by Microsoft called, MPNet
 - word2vec → BERT → xlnet → MPNet → MPNet current version
- Trained on Wikipedia, BookCorpus, OpenWeb Text, CC-News and Stories (160 GB of text data)
- Word embedding consisting of 768 dimensions

Data and Specification



Tweet	financing
No windfall in early days of small-business crowdfunding https://t.co/ezZk9Fe5rC	0.537
Why I'm an angel investor http://t.co/wsXgYDUUn via @phxbizjournal Excellent!	0.439
For a #startup looking for money to help advance to a new stage of growth, the challenge isn't necessarily finding investors; it's convincing them that they're making the right choice by investing in one particular company over others. https://t.co/ceaT8eSKqO	0.411
A Case Study on Startup Equity - Planning, Startups, Stories http://t.co/yK1LCqLl3Z via @timberly	0.358
I have something amazing to give away. But not now.	0.022
Back home. Heard game of thrones was insane! Going to watch shortly. Are u over this show?	-0.099
Tweet	policy
RT @saveantibiotics: As budget process moves forward, policymakers should keep in mind what's at stake—@PatriotLedger op-ed https://t.co/Cw...	0.518
10 Guiding Principles for Agriculture Policy: A Free Market Vision: http://t.co/30fLjIuH6M	0.406
Sustainability's Strategic Worth http://t.co/VGJqk66sYt	0.391
Mars boss to competitors: 'Let's collaborate to meet UN #Sustainability Goals' https://t.co/1Y3QhVb0PJ	0.151
The secret to richer, carbon-capturing soil? Treat your microbes well http://t.co/Ssyg1XPBT1 via @grist	0.054

Identification Strategy

- Increase in fiduciary responsibility
 - Compare firms that went public to those that filed but pulled their IPO
 - Pulled IPO typically due to market conditions at the time of filing
 - Ostensibly independent of social media activity
- Compare female to male CEOs
 - Data on gender of CEOs collected by a team of three RAs
- → Triple differences model

Empirical Specification

$$Y_{cidt} = \beta_1 post_t \times treated_i \times female_c + \beta_2 post_t \times treated_i + \beta_3 post_t \times female_c + \alpha_{ci} + \gamma_{dt} + \delta_t + \varepsilon_{cidt}$$

Y_{cidt} , average meaning of tweets by CEO, c , of firm, i , industry, d , in quarter, t

β_1 , coefficient of interest

Saturated with fixed effects:

α_{ci} , CEO–firm

γ_{dt} , industry–calendar quarter

δ_t , "age" (relative to IPO announcement date)

Panel Data Summary Statistics

	Mean	Std Dev	Min	Max
authenticity	0.123	0.045	-0.081	0.329
firm	0.144	0.053	-0.079	0.441
revenue	0.116	0.046	-0.096	0.338
power	0.138	0.042	-0.134	0.344
stakeholder	0.121	0.049	-0.068	0.361
financing	0.105	0.046	-0.063	0.477
competition	0.144	0.043	-0.071	0.546
policy	0.164	0.045	-0.048	0.353
post	0.421	0.494	0.000	1.000
treated	0.920	0.271	0.000	1.000
female	0.095	0.293	0.000	1.000

n=2,650 CEO firm-quarters.

	Male	Female	
Pulled IPO	17	3	20
Completed IPO	180	18	198
	197	21	218

Results

Results: Inward Facing Messaging

DV:	authenticity	firm	revenue
post x treated x female	0.003 (0.012)	0.005 (0.019)	0.002 (0.012)
post x treated	-0.012 (0.009)	-0.002 (0.015)	0.008 (0.009)
post x female	0.004 (0.010)	0.006 (0.017)	0.007 (0.010)
CEO-Firm FE	Yes	Yes	Yes
Industry-Calendar Quarter FE	Yes	Yes	Yes
Age FE	Yes	Yes	Yes
Firm-Quarters	2,650	2,650	2,650
Firms	218	218	218
F-statistic	2.13	0.5	1.11
Adj. R-squared	0.43	0.79	0.49

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Results: Outward Facing Messaging

DV:	power	stakeholder	financing	competition	policy
post x treated x female	-0.031 ** (0.012)	-0.018 (0.16)	-0.029 ** (0.013)	-0.028 ** (0.010)	-0.036 ** (0.014)
post x treated	0.000 (0.008)	0.005 (0.10)	0.020 ** (0.009)	0.009 (0.006)	-0.003 (0.008)
post x female	0.037 *** (0.010)	0.028 * (0.013)	0.035 *** (0.010)	0.030 *** (0.008)	0.048 *** (0.012)
CEO-Firm FE	Yes	Yes	Yes	Yes	Yes
Industry-Calendar Quarter FE	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes
Firm-Quarters	2,650	2,650	2,650	2,650	2,650
Firms	218	218	218	218	218
F-statistic	7.86	2.50	4.51	6.15	10.50
Adj. R-squared	0.42	0.38	0.41	0.31	0.37
Pre-treatment Female Mean	0.129		0.108	0.135	0.158
Treatment Effect % Change	-24.03%		-26.85%	-20.74%	-22.78%

Note: *** p < 0.001, ** p < 0.01, * p < 0.05, + p < 0.10.

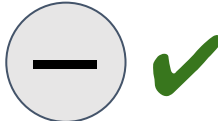
Differentiate Between Inward- and Outward-Facing Messaging

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Female CEOs:



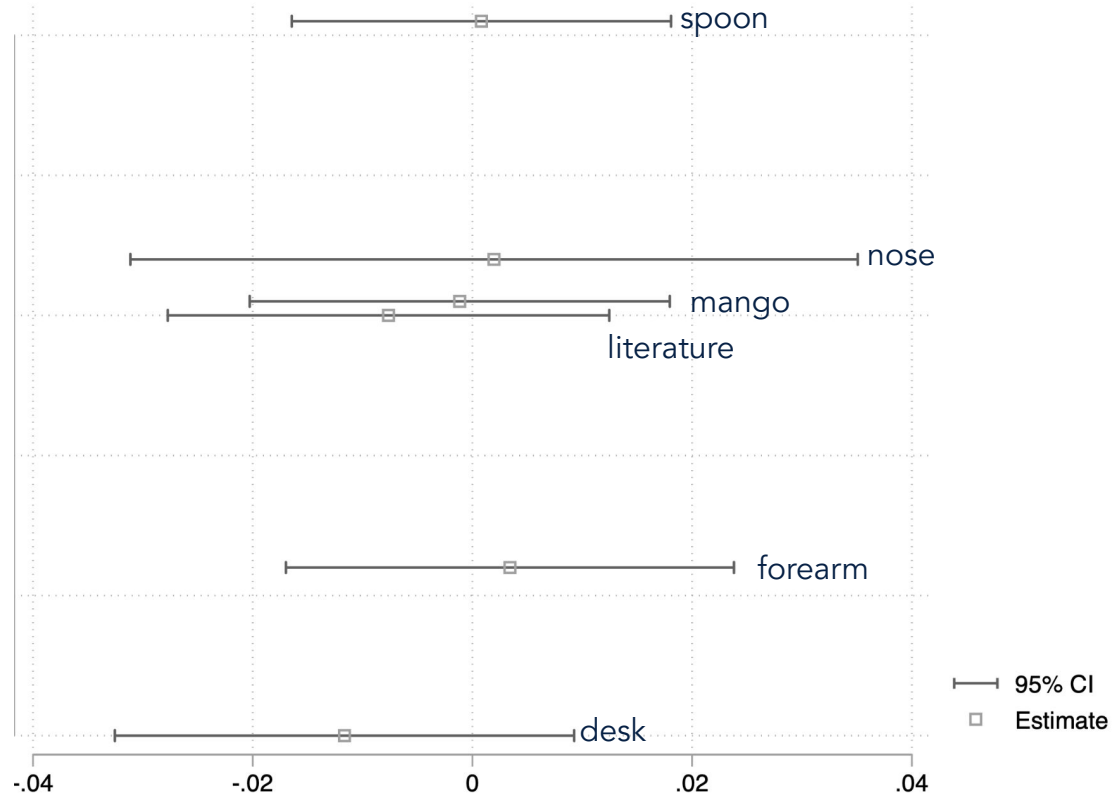
Results: Unpacking the Policy Result

DV:	climate change	sustainability	social issues
post x treated x female	-0.027 ** (0.011)	-0.033 ** (0.011)	-0.025 + (0.015)
post x treated	0.010 + (0.005)	0.007 (0.008)	-0.003 (0.007)
post x female	0.034 *** (0.010)	0.037 *** (0.009)	0.023 ** (0.010)
CEO-Firm FE	Yes	Yes	Yes
Industry-Calendar Quarter FE	Yes	Yes	Yes
Age FE	Yes	Yes	Yes
Firm-Quarters	2,650	2,650	2,650
Firms	218	218	218
F-statistic	4.80	8.46	3.05
Adj. R-squared	0.38	0.43	0.42
Pre-treatment Female Mean	0.112	0.172	0.128
Treatment Effect % Change	-24.11%	-19.19%	-19.53%

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Social issues is the sum of the vector: “poverty, gay, diversity, racism, gender, human rights, justice, and equality.”

Placebo Tests



Robustness Tests

- Robust to similar words
 - power vs domination
 - financing vs finance
 - competition vs rival
 - policy vs legislation
- Robust to ML model choice
 - Specific implementation of MPNet

Conclusion and Discussion

- Empirical study of the uses of social media by CEOs in the context of their jobs
- Not all CEOs are equally emphasizing CEO activism, given their circumstances
 - Important voices are lost or some voices get too much airtime?
- As the steward of a firm, CEOs face a natural tension between the fiduciary obligations of running a firm and their activities on social media