A Study of the Predictability of Google Search Volume, CEO Reputation, and Firm Reputation on SEO Performance

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complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

This paper studies the predictability of Google search volume index, CEO reputation, and firm reputation, on the stock performance of seasoned equity offering within a one-year period. The results have shown that the Google search volume indexes searched according to both firm name and firm ticker can significantly predict the stock performance in the first 3 months and the performance from the 8th month to one year. After classifying the search volume indexes by their magnitude, the predictability of the search volume index varies according to the index magnitude and the search content. Among the CEO reputation proxies, only CEO tenure shows significant but fragmented predictability. Among the three independent variables studied in this paper, firm reputation has the most protracted and significant predictability on the post-SEO performance.

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1. Introduction

Studies have confirmed the underperformance of initial price offerings (IPO) in the long run. (Ritter, 1991; Loughran et al., 1994; Loughran and Ritter, 1995) Ritter concludes that the overpricing of IPO is due to over-optimism of investors. Brav and Gompers (1997) argue that underperformance only happens to 'non-venture backed' firms. Non-venture backed firms are more likely to be held by individual investors. In contrast to large corporations where analysts can provide rational advice, individual investors are easier affected by their sentiments. Therefore, the conclusion of Brav and Gompers (1997) reinforce the conclusion that the long-run underperformance of IPO comes from the irrationality of individual investors. Like IPO, ownership of stocks is also transferred to new investors during seasoned equity offerings (SEO). Spiess and Affleck-Graves (1995) find that SEOs also face underperformance as IPOs. The authors also show that levels of underperformance are different according to the features of the firms.

Among the fact that SEO faces underperformance, a question can be derived: can we predict the long-run underperformance with models?

According to the theory proposed by Kahneman (1973), people's attention is a scare resource. Later studies prove the fact. Sims (2003) proves that investors have information-processing constraints. Gervais et al. (2001) observe that the trading volume of stock would change significantly one day or one week after the stock experiences extreme trading volume. The authors explain that the change in trading volume is caused by the change in visibility of the stock during the event. Therefore, investors would pay more attention to such stock. Hou et al. (2008) observe that, in the long run, high price momentum profits reverse whereas high earning momentum profits tend to persist. By constructing and studying portfolios of NYSE/ AMEX stocks, they find that high price momentum profits are positively correlated with high trading volume which draws attention to investors. Since investors have limited attention, they could usually pay their attention to high-volume stocks. Barber and Odean (2008) also test and confirm that individual investors are net buyers of attention since the investors, especially individual investors, could hardly search for information on thousands of stocks. Da. et al. (2011) confirm this effect by showing that the Internet search volume is significantly correlated with the stock

performance. These results highlight the importance of the inadequate attention of humans. Again, unlike large corporations with sufficient human resources and professional service such as Bloomberg, individual/ retail investors are unable to consider all the information from the market. Therefore, contrary to the traditional asset pricing model, the limitation of attention of individual investors should be carefully considered.

Among the studies on attention, scholars have shown that the attention of investors is significantly correlated with market return. Chemmanur and Yan (2009) find that stock return is positively associated with the amount of advertisement during the advertising year and decreases after the year. Yuan (2011) studies the correlation between the appearance of events and market prices. He concludes that individual investors would reduce their stock holdings in reaction to significant events. As a result, the market return would decrease. Dimpfl and Jank (2016) study the volatility of Dow Jones and search queries for index names of firms and find similar patterns between the two terms. In order to measure and study attention, previous literature applied various proxies such as trading volume, extreme returns, events, headlines, and advertising expense (Gervais et al., 2001; Hou et al., 2008; Barber and Odean, 2008; Chemmanur and Yan, 2009). However, Da et al. (2011) disagree with using[1] the mentioned proxies since they are lagged and indirect measures and cannot guarantee that investors are actually aware of the information. In order to develop a proxy that can measure the attention directly, Da et al. (2011) apply the internet searching volume as a measure of the attention of investors. Each search would only appear if an investor actually makes one.

2. Theoretical Background

In order to measure the attention of investors, a typical proxy used is 'Google Trends' [1]. 'Google Trends' is a website developed by Google to reveal the frequency of the search volume of a certain search-term relative to the total search volume on Google with classifications e.g. regions and languages. The webpage provides this frequency of internet search on Google, or Search Volume Index (SVI), since January 2004. As of April 2018, Google search composes

[1] [1] https://trends.google.com/trends
[2] https://www.statista.com/statistics/267161/market-share-of-search-engines-in-the-united-states/

63.5% of search queries in the U.S. [2] Mondria et al. (2010) first introduce this proxy in the field of finance to study international investment in 2010. Da et al. (2011) compare the correlation between SVI and other proxies for attention. The result shows that SVI, in one week, leads the extreme returns, turnover and news/events with a significant correlation. In order to test whether SVI is driven by any available proxies, the authors also consider the investor sentiment and expectation and find no significant correlation. Results show that the predictability of SVI on stock returns are significant. Bank et al. (2011) show that the German stock market would experience temporarily increase in price when the search volume on Google increases. Dimpfl and Jank (2016) show that search queries can be used to improve volatility-forecast of the stock market. Da et al. (2011) show that SVI is able to predict both of the two established facts of IPO, large first-day returns and long-run underperformance. Takeda and Wakao (2014) also confirm the capability of prediction in the Japanese market. The results show that SVI is a reliable proxy of attention.

Nonetheless, these scholars above have not considered the reputation of the CEO as a proxy for the performance. Traditional scholars have highlighted the importance of firm reputation. (Milgrom and Roberts, 1986; Fombrun and Shanley, 1990) Weng and Chen (2017) summarise from the studies of Francis et al. (2008) and Cao et al. (2015) that reputation is an important factor that affects the value and the cost of equity of a firm. Weng and Chen (2017) first raise the idea of comparing the importance of the reputation of the CEO and the reputation of the firm. By applying the industry-adjusted ROA (IAROA), the authors prove that the CEO reputation more significantly affects the performance of a firm. They conclude that a company can perform well with a good-reputation CEO and a bad-reputation firm, but not vice versa. Therefore, this paper will add this new factor as a control variable in the study.

The seasoned equity offering (SEO) is offered by already publicly traded companies. Since the publicly traded company has appeared in the market for a period, Investors would usually be expected to have more information about the company. However, scholars two decades ago have shown that underperformance follows firms completing SEOs. (Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995) Gombola et al. (1999) and Clarke et al. (2001) provide evidence to suggest that insiders attempt to sell overpriced SEOs. Clarke et al. (2001) also point out that the SEO market is an inefficient market. Therefore, we could expect that the irrational

individual investors trading during the SEO as they are during the IPO. Therefore, the purpose of this study would be to test whether the SVI could predict the performance during the SEO event and after the SEO event.

Overall, my first hypothesis is that the information proxies have a significant relation with the abnormal return of the firms during and after the event week. Underperformance in stock return after the IPO date has been proven by many scholars. Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) argue that the underperformance in stock return also appears after issuing SEO. The optimistic expectation of investors is regarded as an important reason for the underperformance afterwards. Therefore, my second hypothesis is that firms with less attention from investors should experience less underperformance and the predictability of the information proxies should be weaker for the stock with less search volume.

3. Data and Sample Construction

The secondary equity offering events are collected from the Securities Data Company (SDC) Platinum between 1 January 2004 and 31 December 2014. The offerings are restricted in the United States offered to publicly trading companies. Following the criteria applied by Hu (2012) to study the SEO market: (1) all the firms are presented in both the databases Compustat and Center for Research in Security Prices (CRSP) within the time period; (2) all of the utilities or financial firms are removed (Firms with SIC codes from 4900 to 4999 and codes from 6000 to 6999); (3) each firm has a minimum total asset of 1 million dollars. If a company holds more than one SEO in the same fiscal year, only the first event is retained. Under the criteria (2) and (3), I got 716 observations within the 10 years. Due to the fact that many of the large companies do not issue a secondary offering. 59 companies are not listed in either CRSP or Compustat. Many companies also conduct multiple SEO's within a single year. Furthermore, since Google Correlate would not provide the indexes with extreme or special patterns, I also remove the observations which do not have an output of either the name or the ticker. After filtering the sample under criteria (1), the multiple SEO restrictions, and the Google Correlate output restriction, the sample is left with 357 observations.

3.1 Firm Characteristics

The firm characteristics are used as a control variable in this study. Data about the firm is collected from the Compustat database:

(1) Firm Age: number of years from the IPO date to the date of the issuance. Some information is also collected from Bloomberg and BoardEX.

(2) Firm Size: the logarithm of the total asset of the firm.

Firm Size = LN (Total Asset)

(3) Debt Ratio:

$$\text{Debt Ratio} = \frac{Total\ Debt}{Total\ Asset} \times 100\%$$

(4) Market-to-Book Ratio (MB):

$$\text{MB} = \frac{Total\ Market\ Value}{Total\ Equity}$$

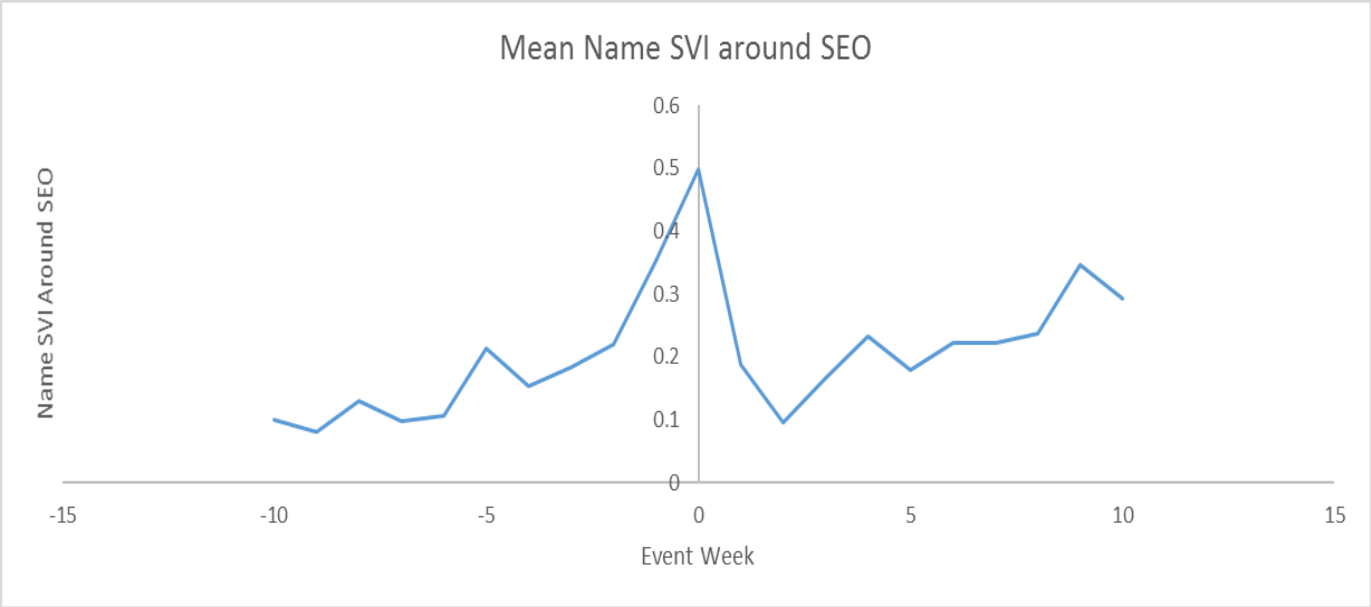
3.2 Search Queries

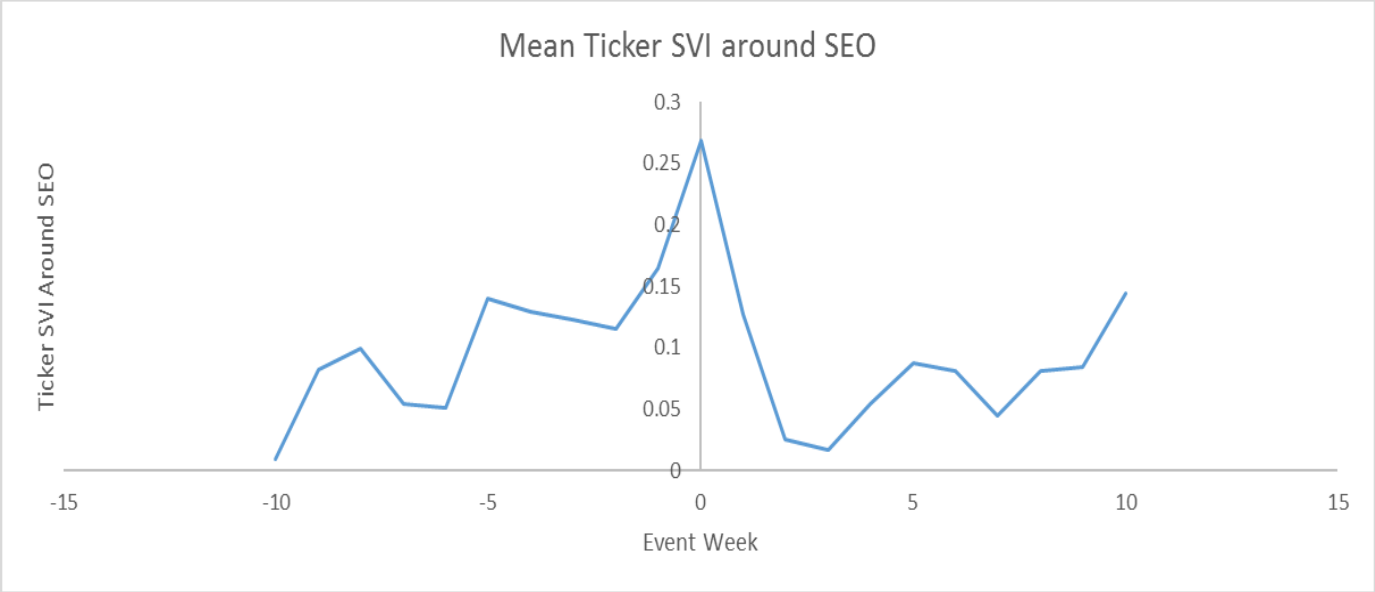
I use the search volume index of Google Correlate as the proxy of attention of the public for the study. In 2016, Google Trends changed the method of calculating the search volume index. The new search volume index is expressed as an integer between 0 and 100. Furthermore, Google Trends no longer provides weekly data. As an alternative method, Bank et al. (2011) use the search volume index from Google Insight as the proxy of attention of the Internet. Instead of showing in absolute terms, the index of Google Insight provides the index as a value normalized between 0 and 100 relative to the total number of searches on Google and then normalized between 0 and 100. Therefore, in that case, the authors would only be able to study the variation within each firm.

The search volume index of Google Correlate is the standard deviation of the search volume away from the mean. Each time series is normalized so that its mean is 0.0 and its standard deviation is 1.0. Since Google has restricted the absolute value of the search volume, the Google Correlate volume could be the best choice left. The index of Google Correlate has several advantages. First, the Google Correlate index is in 3 decimal places. The new Google Trends index provides only an integer such as 80 between 0 and 100. Since all the decimal places are removed, we could hardly expect an accurate result. Google ceased to run Google Insight in 2016. Therefore, Google Correlate is the only Google search volume index with exact values left. Second, the index provides weekly data. The result of Da et al. (2011) has shown that the search volume predicts the stock market significantly in one week at earliest. The monthly data provided by Google Trends may not capture the predictability. Finally, the indexes of Google Correlate are more suitable to compare between each other than the new Google Trends indexes. The Google Correlate indexes are calculated to compare between each other. On the other hand, the new Google Trends indexes, like the Google Insight index, can only compare within a firm.

For this paper, I collected the Google Correlate indexes with respect to each firm's name and ticker. Da et al. (2011) suggest that the index for the respective ticker is the most suitable proxy. They argue that people could search for the names of the companies in order to learn about their products instead of their shares. During the process of collecting name data, I also found that some firm names may lead to ambiguity. For example, 'DirectTV Group Inc.' is an American broadcast satellite service provider. Its customers could also search for information about the service. We could add the term 'Group' in order to reduce the ambiguity. However, investors may not keep the 'Group' term. However, the results of Bank et al. (2011) show that the index for firm names can also show a significant relationship with the share prices. Therefore, both of the indexes are collected and studied. The indexes are collected for the firm name and firm ticker during the date of the secondary equity offering. In order to further study the effect of the search volume on the stock market before the event and the change in the search volume, the index one week before the respective date of issuance is also collected. To collect the firm-name index, I follow Bank et al. (2011): in order to obtain the search volume of the common keywords, the terms of identification such as 'inc', 'Co' at the end of each firm's name are excluded. Some tickers are single letters or meaningful words. Noisy tickers such as 'G', 'SEE', 'IT' or 'AMIS' exist within the ticker sample. Da et al. (2011) report that noisy tickers hardly changes the result.

However, to avoid irrelevance, another regression will be run excluding the noisy tickers. Firm tickers often change. I use tickers which the firms use during their event periods. Finally, the region of the keywords is restricted to the United States. After plotting the mean of the SVI around the event week, we can observe a trend of increase in the mean SVI before the event week and a sharp decrease in the mean SVI afterwards.





Da et al. (2011) use the abnormal SVI (ASVI) as the independent variable. The ASVI is calculated as the logarithm of the SVI in the current week minus the median of the logarithm of the SVI during the eight consequent weeks before the current week. However, since the Google

Correlate SVI is already scaled, the maximum SVI in the sample is 7.11 and the minimum SVI in the sample is -2.327, I skip the logarithm calculation. The SVI record starts from January 2004 and some SEO events in the sample were raised in the first quarter of 2004. Therefore, in order to keep the SEO events without a record eight weeks before the event week, the abnormal return is studied with seven weeks as the benchmark. The ASVI used in this paper is the SVI in the current week minus the median of the SVI of the eight consequent weeks.

3.3 Corporate Reputation

The proxy used for the corporate reputation is the dummy variable of Fortune's America's Most Admired List. The score of America's Most Admired List has been used widely by scholars to proxy for company reputation. (Fombrun and Shanley, 1990; Roberts and Dowling, 2002; Cao et al., 2015) The score is between 0 and 1 decided according to 8 attributes: innovation, employee talent, use of corporate assets, social responsibility, financial soundness, quality of management, quality of products/services, and long-term investment. However, most of the companies in my sample are relatively small firms, and firms usually issue secondary offerings when the firms are facing difficulty in running. About only 1 in 10 firms are included in the list within each year. Therefore, I created a dummy variable which equals 1 if the company is listed and equals 0 otherwise.

3.4 CEO Reputation

Proxies for the CEO reputation are complex. The widely used proxies are: (1) CEO tenure, (2) the number of articles related to the CEO, and (3) CEO was appointed from outside of the firm. (Milbourn, 2003; Borghesi et al., 2014; Wen and Chen, 2017) CEO tenure is the number of years that the CEO stays within the company. Milbourn (2003) argues that a longer CEO tenure implies that the board tends to keep the CEO within the firm. The tendency would be

strengthened if the CEO was appointed by boards outside the company. The number of articles of the CEO also shows how reputable the CEO is.

Due to the sizes of the firms in the sample, many of the CEO are not listed in the Compustat Execucomp database. I collected information about the CEO from BoardEX and Bloomberg to fill the missing information in Compustat Execucomp. CEO tenure is calculated as the number of years from the date that the CEO joined the firm and the date of issuance including months. The number of articles of a CEO is the number of articles from Factiva database 5 years before the fiscal year. The database used is Factiva, from Dow Jones. The database has been used by many scholars to study CEO reputation. (Jian and Lee, 2011; Borghesi et al., 2014) In my sample, the number of articles for some CEO's is over 10000. The number for the others is fewer than 10 or even nil. To control the scale, I use the logarithm of the number of articles in this paper plus 1. CEO appointed by boards outside the company is shown by a dummy variable which equals to 1 if the CEO was appointed and equals to 0 otherwise.

3.5 Abnormal Return

The abnormal return studied in this paper is the buy-and-hold abnormal return (BHAR). By studying American and New York Stock Exchange (AMEX and NYSE) stocks, Loughran and Ritter (1996) have proved that, compared to buy-and-hold abnormal return, use of cumulative abnormal return (CAR) on relatively low-price stocks is affected by bid-ask spread bias. Since I will study the performance of the stocks in a period of one year, studying long-term stock market performance with CAR would be less accurate. Follow the benchmark for ASVI, I use a 7-week benchmark for the event study.

In order to avoid collinearity, I choose only one of the three CEO reputation proxies as the CEO reputation parameter. According to the correlation matrix, the 'number of articles' proxy has the most significant correlation with the abnormal return.

Table 1

Summary Statistics of the Parameters.

This table shows descriptive statistics of the variables in the sample between 1 January 2004 and 31 December 2014. The mean, the standard deviation (S.D.), skewness, kurtosis, the minimum and the maximum value of each parameter are shown in the table.

	Mean	S.D.	Skewness	Kurtosis	Min.	Max.
Abnormal Return	0.048	0.161	1.044	3.742	-0.505	0.827
Ticker ASVI	0.216	0.712	2.047	10.306	-1.796	4.775
Name ASVI	0.373	0.815	2.194	10.620	-2.040	6.436
CEO Tenure	5.901	5.065	1.694	3.113	0.080	27.200
Number of Articles	3.800	1.699	0.151	0.572	0.000	9.885
CEO Outside Dummy	0.376	0.485	0.514	-1.746	0.000	1.000
Most Admired List Dummy	0.061	0.240	3.674	11.561	0.000	1.000
Firm Age	1.196	1.367	-0.060	-0.602	-3.507	4.456
Firm Size	7.117	1.494	-0.075	-0.225	3.186	11.915
Debt Ratio	0.347	0.255	0.715	0.987	0.000	1.511
Market-to-Book Ratio	-6.261	205.309	-17.916	331.459	-3808.797	255.781
N			359			

Table 2

Correlation Matrix of the Parameters.

This table shows the correlation matrix of the variables in the sample between 1 January 2004 and 31 December 2014. The coefficients are calculated by the Pearson correlation coefficient. (Prob. > |r| under H0: Rho=0)

	Abnormal Reti	Ticker ASVI	Name ASVI	CEO Tenure	#Articles	CEO Outsider	Most Admired	Firm Age	Firm Size	Debt Ra
Ticker ASVI	0.258***									
Name ASVI	0.179***	0.095*								
CEO Tenure	0.085	0.020	-0.033							
Number of Articles	-0.117**	-0.068	-0.056	0.155***						
CEO Outsider	-0.007	0.025	-0.020	-0.072	0.004					
Most Admired List	0.060	-0.102*	-0.052	-0.034	0.223***	-0.031				
Firm Age	-0.062	-0.042	-0.035	0.029	0.260***	-0.012	0.034			
Firm Size	-0.157***	-0.086	0.038	-0.097*	0.234***	0.089*	0.316***	0.187***		
Debt Ratio	-0.028	0.022	0.030	-0.149***	-0.047	-0.085	0.061	-0.033	0.327***	
MB Ratio	0.096*	0.005	0.014	0.032	0.008	-0.076	0.016	0.034	0.091*	0.067

Table 3

Number of Observations by Fiscal Year

This table shows the number of firms by each fiscal year from January 2004 to December 2014. By the criteria previously implied, the sample keeps one SEO event for each firm within each fiscal year. The table also shows the mean, median and standard deviation of the abnormal return during the event week by the respective fiscal year.

Fiscal Year	#Observations	Mean	Median	Stdev
2004	35	0.040	0.031	0.132
2005	34	-0.004	-0.018	0.099
2006	29	0.053	0.084	0.130
2007	26	0.072	0.056	0.113
2008	2	0.421	0.421	0.407
2009	15	0.036	0.031	0.236
2010	34	0.078	0.078	0.162
2011	38	0.041	0.023	0.151
2012	42	0.048	0.041	0.150
2013	52	0.064	0.033	0.199
2014	52	0.032	0.015	0.144

Table 4

Number of Observations by Fama-French 12 Industries

This table shows the number of firms by Fama-French 12 Industries classification from January 2004 to December 2014. The table also shows the mean, median and standard deviation of the abnormal return during the event week by the respective Fama-French 12 Industry.

Fama-French 12 Industries	#Observations	Mean	Median	Stdev
Consumer Non-Durables	22	0.045	0.062	0.170
Consumer Durables	4	0.097	0.140	0.122
Manufacturing	43	0.037	0.031	0.117
Oil, Gas, and Coal Extraction and Products	29	0.052	0.018	0.179
Chemicals and Allied Products	16	0.104	0.050	0.227
Business Equipment	60	0.059	0.007	0.212
Telephone and Television Transmission	15	0.047	0.058	0.124
Wholesale, Retail, and Some Services	57	0.048	0.052	0.123
Healthcare, Medical Equipment, and Drugs	26	0.035	0.030	0.198
Utilities	-	-	-	-
Finance	-	-	-	-
Other	87	0.037	0.028	0.122

4. Methodology

The main purpose of the paper is to study the effect of information on the secondary equity offering market. To study both the Internet search volume and the reputation, I run a panel regression controlling the time effect with a year dummy.

$$AR_t = \alpha + \beta_1 \text{Ticker SVI}_t + \beta_2 \text{Ticker ASVI}_t + \beta_3 \text{Name SVI}_t + \beta_4 \text{Name ASVI}_t + \beta_5 \text{Tenure}_t + \beta_6 \text{Articles}_{t-1} + \beta_7 \text{Outsider}_t + \beta_8 \text{Firm Age}_{t-1} + \beta_9 \text{Firm Size}_{t-1} + \beta_{10} \text{Debt Ratio}_{t-1} + \beta_{11} MB_{t-1} + \beta_{12} \text{Most Admired List}_t + \text{Year Dummy} + \text{Industry Effect Dummy} + \varepsilon_i$$

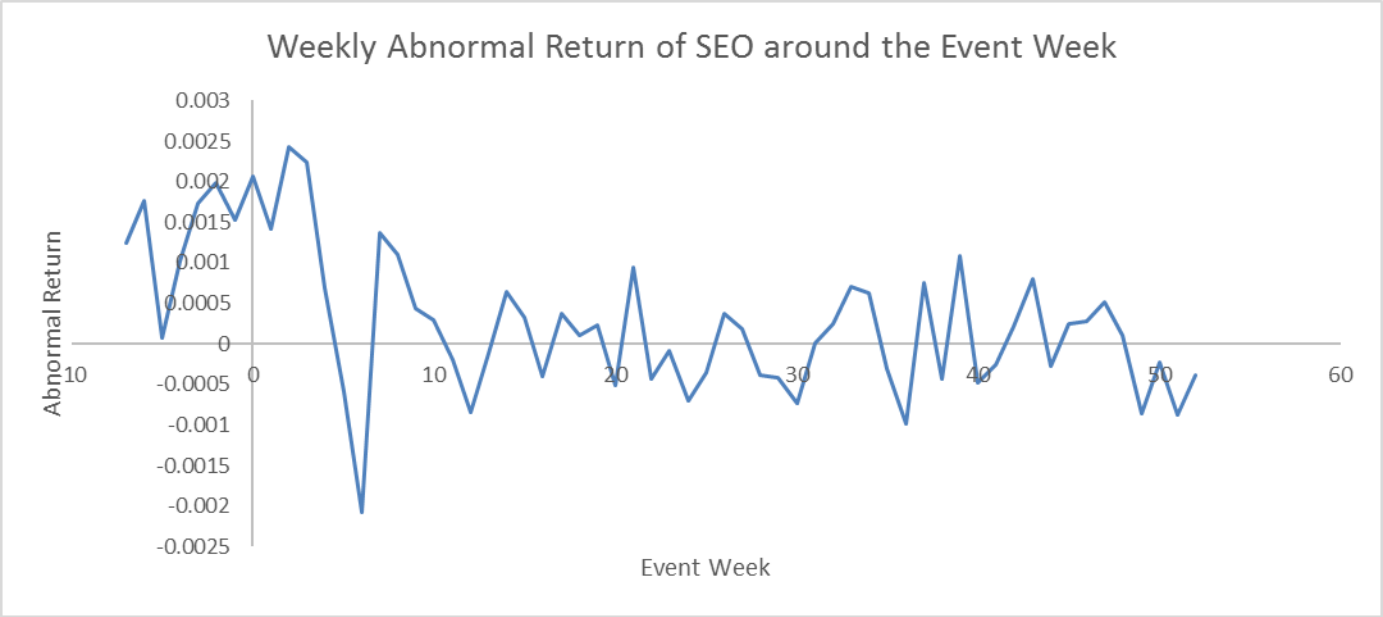
AR_t is the buy-and-hold abnormal return (BHAR) of the company's stock at time t. By studying American and New York Stock Exchange (AMEX and NYSE) stocks, Loughran and Ritter

(1996) have proved that, compared to buy-and-hold abnormal return, use of cumulative abnormal return (CAR) on relatively low-price stocks is affected by bid-ask spread bias. Therefore, studying long-term stock market performance with CAR would be less accurate. The BHAR is calculated as:

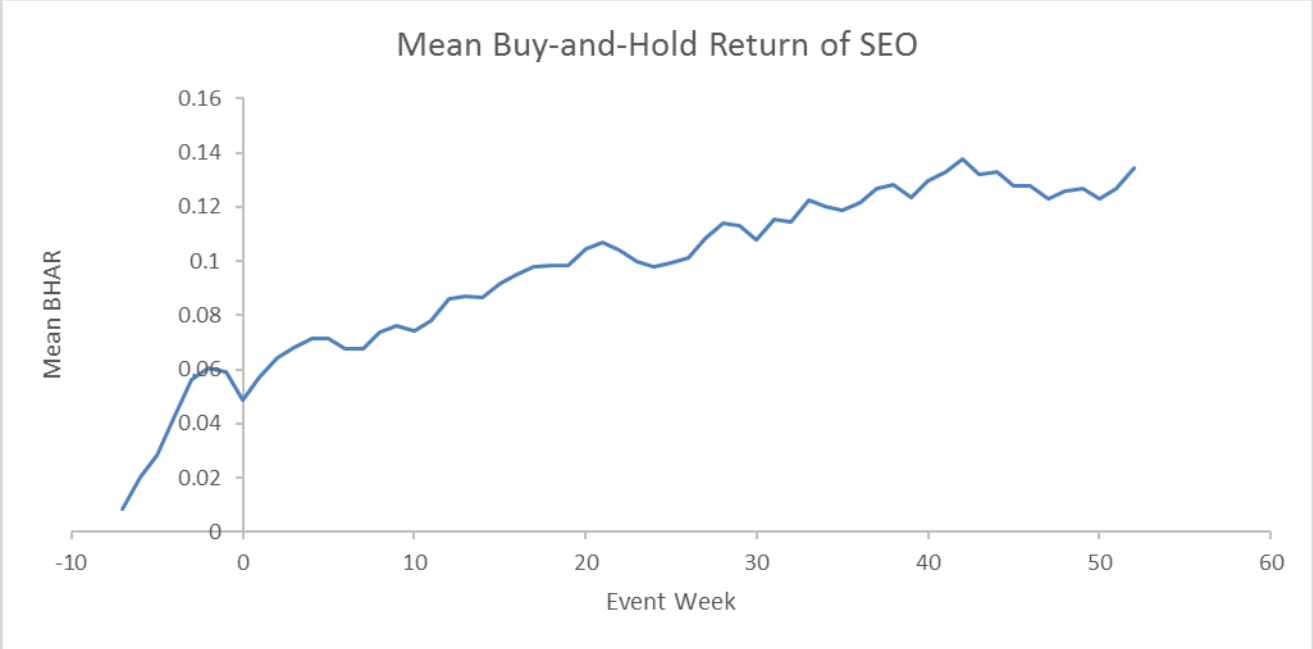
$$BHAR_t = (1 + R_{t-1})(1 + R_{t-2})(1 + R_{t-3})(1 + R_{t-4}) \dots (1+R_n) - (1 + R_{mt-1})(1 + R_{mt-2})(1 + R_{mt-3})(1 + R_{mt-4}) \dots (1+R_{mn})$$

Where t is the time for each panel, R_t is the hold-period return of the stock of the firm at time t, and R_n is the hold-period return at the week of the SEO event. R_{mt} is the value-weighted market return at time t, and R_{mn} is the value-weighted market return at the week of the event. Ticker SVI_t is the SVI of ticker in week t. Ticker $ASVI_t$ is the ASVI of the ticker in week t. Name SVI_t is the SVI of the firm name in week t. Name $ASVI_t$ is the ASVI of the firm name in week t. Da et al. (2011) have shown that increases in SVI can predict increases in stock returns 2 weeks after the respective IPO's. The authors also find reverse in the change in returns from weeks 5 to 52 after the IPO week. Following the result, I run a panel regression to study the predictability of SVI on the abnormal return of stocks within different weeks. For a study expanding along a 10-year period, the time fixed effect is necessary to be controlled. In theory, the OLS standard errors would underestimate the true standard errors. Therefore, a year dummy is added in the regression to control the time effect. For each year, the respective year dummy equals 1 if the event happens in the year and equals 0 otherwise. On the other hand, since most of the firms in the sample are not duplicated, and the SEO events of the same company only appear once in a fiscal year, the firm effect is regarded negligible in the sample. In order to study the predictability of the SVI and the reputation, I run a panel regression during the week, and one week, two weeks, three weeks, four weeks, five weeks, six weeks, seven weeks, eight weeks, 26 weeks, and 52 weeks after the event.

6. Event Study of SEO

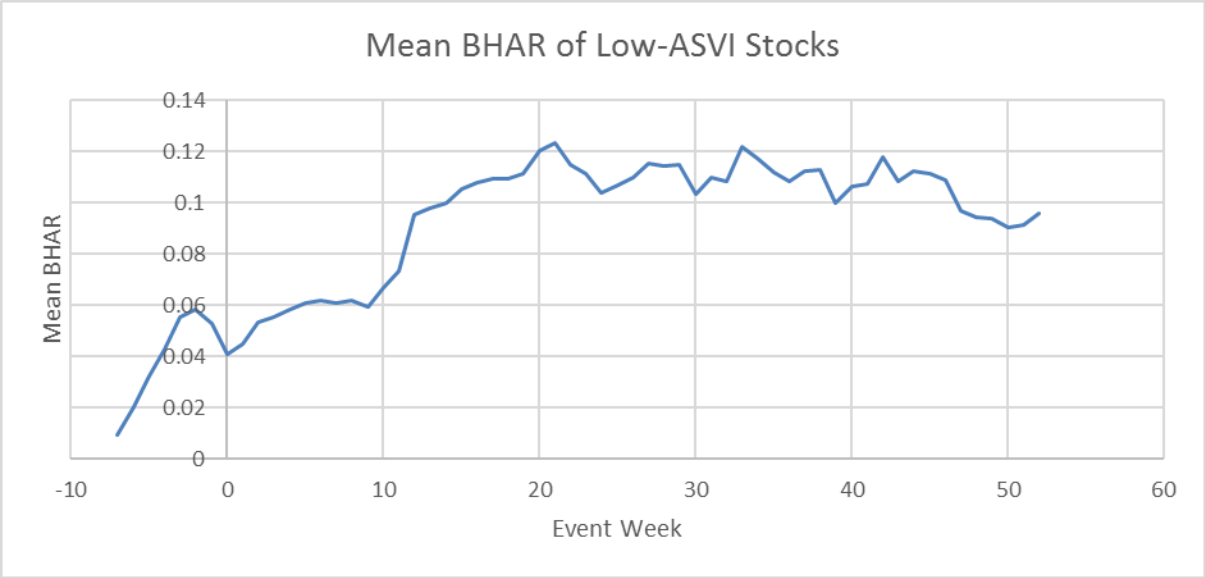


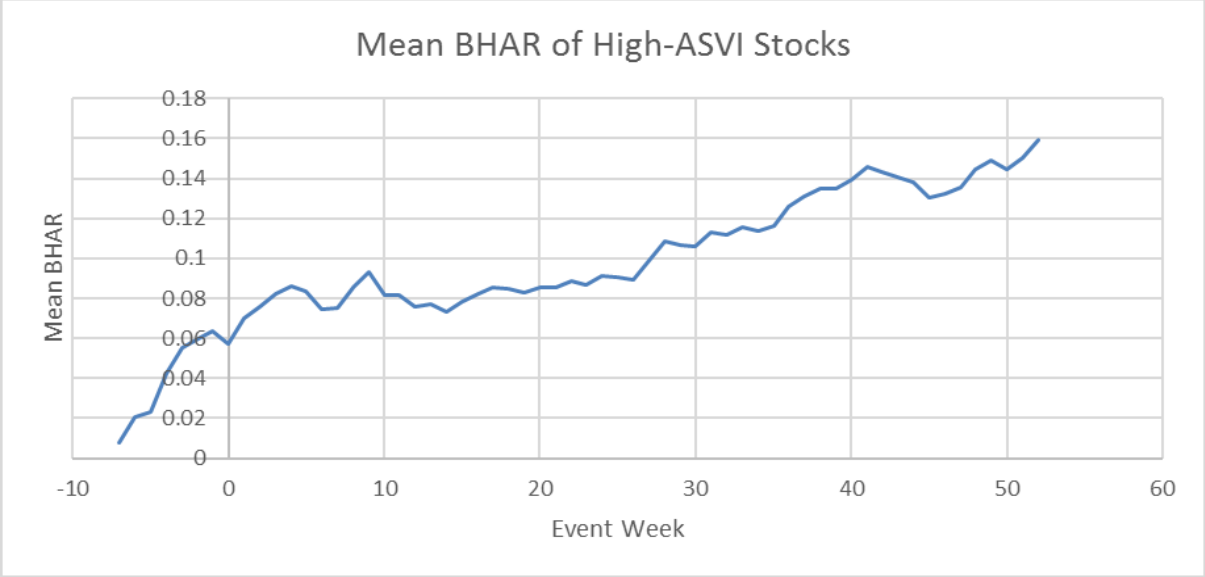
Mean Buy-and-Hold Return of SEO from January 2004 to December 2014



Setting a benchmark of 7 weeks, the graph shows that, before the event, the BHAR keeps increasing and reaches its maximum in the third week before the event week. The BHAR decreases until the event week. The stocks afterwards have a long-term trend of increase. The result is unexpected. The result could be due to the limited information provided for small

companies. Previous studies have shown long-term underperformance for stock returns after SEO events due to investors' optimistic expectations. (Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995) Therefore, I classify the sample into two parts with regard to the ASVI. Low-ASVI stocks are stocks with ASVI smaller than the median of the ASVI. High-ASVI stocks are stocks with ASVI larger than the median ASVI.





After plotting the two groups of BHAR, the result hardly changes. Brous et al. (2001) test the optimistic expectation hypothesis and report that investors do not receive unfavourable information within their event window. The authors also report that even large and famous companies do not face significant earnings announcement effects. Jeanneret (2005) also reports

that firms issuing SEO for only capital structure changing purpose do not experience long-term underperformance. The result confirms the conclusion of Brous et al. (2001) and Jeanneret (2005). The next question is whether the Google queries, and firm and CEO reputation information can capture the trend.

7. Empirical Result 1: Correlation during the SEO Week

I run a pooled regression of the BHAR of the week on the information variables. The result shows that both the Name ASVI and ticker ASVI have a significant relationship with the BHAR of the stock during the event week. The result confirms what Dimpfl and Jank (2016) have claimed that Name ASVI also has significant correlation the stock return. America's Most Admired List shows a significantly positive relationship with the BHAR. This result is confirmed by the trend of the BHAR of high-ASVI stocks that no long-term reverse is shown. On the other hand, none of the three CEO reputation proxies show any significance. Although Weng and Chen (2017) have reported that good CEO reputation should exert more affection than good firm reputation on firm performance, my sample does not include a dummy for telling good or bad companies. In this case, I infer that, for the number of articles, mixed information of CEO reputation may not significantly predict the performance of a firm.

Da et al. (2010) have also shown that adding back the noisy-ticker observations would not affect the result. In this case, I removed a total of 27 observations due to noisy readings of the tickers. After adding back the tickers with names such as ‘G’ and ‘SEE’, I get a total of 386 observations. From the result of the new regression, the significance of the two search volume proxies is hardly affected. This finding confirms the conclusion of Da et al. (2010). The power of explanation slightly weakens for the firm reputation proxy from 5% to 10% significance. The ‘Number of Articles’ proxy for CEO reputation shows a 10% significance with the BHAR. This result could be due to the noisy information included in the sample. Therefore, although the noisy-ticker observations do not affect the conclusion of Dimpfl and Jank (2016), I remove the observations from the sample to avoid irrelevance.

Table 5

Information Proxies and First-Week Return of SEO

This table reports the results from the regression of the abnormal return on the information proxies. The dependent variable is BHAR of the stock in the first week of the SEO. The three columns study the regression with the three CEO reputation proxies.

Panel A.

	(1)	(2)	(3)
Intercept	0.154***	0.191***	0.171***
Ticker ASVI	0.052***	0.052***	0.052***
CEO Tenure	0.002	-	-
Number of Articles	-	-0.008	-
CEO Outside Dummy	-	-	0.007
Most Admired List Dummy	0.107***	0.114***	0.108***
Firm Age	0.000	0.000	0.000
Firm Size	-0.023***	-0.022***	-0.024***
Debt Ratio	0.015	0.006	0.014
Market-to-Book Ratio	0.000**	0.000**	0.000**
Observation	359	359	359
R^2	0.1634	0.1649	0.1594

Panel B.

	(1)	(2)	(3)
Intercept	0.160***	0.200***	0.180***
Name ASVI	0.039***	0.038***	0.039***
CEO Tenure	0.003	-	-
Number of Articles	-	-0.007	-
CEO Outside Dummy	-	-	0.012
Most Admired List Dummy	0.099***	0.105***	0.101***
Firm Age	-0.001	0.000	-0.001
Firm Size	-0.024***	-0.023***	-0.025***
Debt Ratio	0.017	0.008	0.018
Market-to-Book Ratio	0.000**	0.000**	0.000**
Observation	359	359	359
R^2	0.1517	0.1506	0.1470

Table 6

Information Proxies and First-Week Return of SEO

This table reports the results from the regression of the abnormal return on the information proxies using a sample with the noisy-ticker observations added back. 27 observations are added back into the sample with a total of 386 observations. The dependent variable is BHAR of the stock in the first week of the SEO. The three columns study the regression with the three CEO reputation proxies.

Panel A.

	(1)	(2)	(3)
Intercept	0.154***	0.188***	0.164***
Ticker ASVI	0.052***	0.052***	0.051***
CEO Tenure	0.002	-	-
Number of Articles	-	-0.010**	-
CEO Outside Dummy	-	-	0.004
Most Admired List Dummy	0.107**	0.095***	0.086**
Firm Age	0.000	0.000	0.000
Firm Size	-0.023***	-0.019***	-0.021***
Debt Ratio	0.015	-0.009	-0.001
Market-to-Book Ratio	0.000*	0.000**	0.000**
Observation	386	386	386
R^2	0.1334	0.1383	0.1287

Panel B.

	(1)	(2)	(3)
Intercept	0.149***	0.195***	0.171***
Name ASVI	0.035***	0.033***	0.034***
CEO Tenure	0.003*	-	-
Number of Articles	-	-0.009*	-
CEO Outside Dummy	-	-	0.010
Most Admired List Dummy	0.075**	0.084**	0.078**
Firm Age	0.000	0.000	0.000
Firm Size	-0.021***	-0.020***	-0.022***
Debt Ratio	0.006	-0.004	0.005
Market-to-Book Ratio	0.000*	0.000**	0.000**
Observation	386	386	386
R^2	0.1144	0.1153	0.1081

Following Da et al. (2011), I then regress the BHAR of stocks from the first to the eighth week after the event week on the information variables to test the predictability. As time moves, the significance of the intercept weakens, and the abnormal return is explained increasingly by the information proxies. Both of the two ASVI show a significant relationship with the abnormal return from the one week after the event week to the eight weeks afterwards. CEO reputation proxies do not show significant correlations except for ‘Number of Articles' which shows a 10% significance for the first two weeks with the Name ASVI'. My explanation is that the CEO reputation originally should exert some significance. However, since the CEO reputation does not tell whether the information is positive or negative, the effects of CEO reputation is offset. The result suggests that confirming the attribute of information is important for financial studies. The Most Admired List Dummy is constantly significant. This result reinforces my conclusion that positive information is an important estimator of abnormal return. Overall, the results show that the predictability of ASVI and firm reputation keeps being significant in the first eight weeks.

Table 7

Information Proxies and First-Eight-Week Abnormal Returns of SEO

This table reports the results from the regression of the abnormal return on the information proxies for the first eight weeks after the event week. Each regression tests the predictability of each of the ASVI with each of the CEO reputation proxies.

Panel A.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.154**	0.179***	0.198***	0.176**	0.145**	0.107	0.115	0.105
Ticker ASVI	0.054***	0.057***	0.059***	0.061***	0.054***	0.048***	0.043***	0.058***
CEO Tenure	0.003	0.003	0.002	0.002	0.003	0.003	0.002	0.002
Most Admired List Dummy	0.111***	0.121***	0.139***	0.160***	0.173***	0.160***	0.164***	0.170***
Firm Age	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Firm Size	-0.025***	-0.029***	-0.032***	-0.029***	-0.026***	-0.022**	-0.023***	-0.020**
Debt Ratio	0.048	0.053	0.073*	0.086*	0.080*	0.081*	0.065	0.072
Market-to-Book Ratio	0.000**	0.000**	0.000**	0.000*	0.000*	0.000	0.000	0.000
Observation	359	359	359	359	359	359	359	359
R^2	0.1860	0.1725	0.1628	0.1440	0.1472	0.1282	0.1198	0.1456

Panel B.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.198***	0.224***	0.235***	0.219***	0.190***	0.154**	0.156**	0.138*
Ticker ASVI	0.054***	0.057***	0.059***	0.061***	0.054***	0.048***	0.043***	0.058***
Number of Articles	-0.009	-0.008	-0.009	-0.011	-0.011	-0.011	-0.009	-0.009
Most Admired List Dummy	0.120***	0.129***	0.147***	0.170***	0.183***	0.170***	0.173***	0.179***
Firm Age	0.000	0.000	-0.001	-0.001	-0.001	0.000	0.000	-0.001
Firm Size	-0.024***	-0.028***	-0.030***	-0.028***	-0.025***	-0.021**	-0.022**	-0.019**
Debt Ratio	0.037	0.042	0.063	0.075	0.068	0.069	0.055	0.063
Market-to-Book Ratio	0.000**	0.000**	0.000**	0.000*	0.000*	0.000	0.000	0.000
Observation	359	359	359	359	359	359	359	359
R^2	0.1871	0.1710	0.1650	0.1478	0.1498	0.1315	0.1213	0.1481

Panel C.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.176***	0.205***	0.214***	0.195***	0.166**	0.129*	0.136*	0.121
Ticker ASVI	0.054***	0.057***	0.059***	0.061***	0.054***	0.048***	0.043***	0.058***
CEO Outside Dummy	0.007	0.000	0.005	0.001	0.004	-0.001	0.001	-0.009
Most Admired List Dummy	0.113***	0.121***	0.140***	0.161***	0.174***	0.160***	0.165***	0.169***
Firm Age	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Firm Size	-0.026***	-0.030***	-0.032***	-0.030***	-0.027***	-0.023***	-0.024***	-0.020**
Debt Ratio	0.047	0.049	0.072	0.084*	0.078	0.078	0.063	0.068
Market-to-Book Ratio	0.000**	0.000**	0.000**	0.000*	0.000*	0.000	0.000	0.000
Observation	359	359	359	359	359	359	359	359
R^2	0.1808	0.1664	0.1605	0.1416	0.1441	0.1248	0.1168	0.1448

Panel D.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.159***	0.185***	0.202***	0.181**	0.147**	0.107	0.112	0.107
Name ASVI	0.044***	0.045***	0.050***	0.053***	0.050***	0.048***	0.049***	0.054***
CEO Tenure	0.003*	0.004*	0.003	0.003	0.003	0.003	0.003	0.002
Most Admired List Dummy	0.103***	0.112***	0.130***	0.152***	0.166***	0.154***	0.160***	0.163***
Firm Age	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Firm Size	-0.026***	-0.030***	-0.033***	-0.030***	-0.027***	-0.023***	-0.023***	-0.021**
Debt Ratio	0.051	0.055	0.076*	0.089*	0.082*	0.083*	0.066	0.074
Market-to-Book Ratio	0.000**	0.000**	0.000**	0.000*	0.000*	0.000	0.000	0.000
Observation	359	359	359	359	359	359	359	359
R^2	0.1818	0.1651	0.1608	0.1436	0.1513	0.1362	0.1334	0.1501

Panel E.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.205***	0.233***	0.242***	0.226***	0.195***	0.156**	0.156**	0.143*
Name ASVI	0.043***	0.044***	0.049***	0.052***	0.049***	0.046***	0.048***	0.053***
Number of Articles	-0.009	-0.008	-0.008	-0.010	-0.010	-0.010	-0.008	-0.008
Most Admired List Dummy	0.111***	0.119***	0.137***	0.160***	0.174***	0.163***	0.168***	0.170***
Firm Age	0.000	0.000	-0.001	-0.001	-0.001	0.000	0.000	-0.001
Firm Size	-0.025***	-0.029***	-0.032***	-0.029***	-0.026***	-0.022**	-0.023**	-0.020**
Debt Ratio	0.040	0.045	0.066	0.078	0.070	0.071	0.056	0.065
Market-to-Book Ratio	0.000**	0.000**	0.000**	0.000*	0.000*	0.000	0.000	0.000
Observation	359	359	359	359	359	359	359	359
R^2	0.1800	0.1609	0.1607	0.1450	0.1517	0.1372	0.1328	0.1510

Panel F.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.184***	0.215***	0.222***	0.202***	0.171**	0.132*	0.136*	0.126*
Name ASVI	0.044***	0.044***	0.050***	0.052***	0.049***	0.047***	0.048***	0.053***
Number of Articles	0.013	0.006	0.012	0.008	0.010	0.005	0.006	-0.003
Most Admired List Dummy	0.106***	0.113***	0.132***	0.153***	0.168***	0.155***	0.162***	0.163***
Firm Age	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Firm Size	-0.028***	-0.031***	-0.034***	-0.031***	-0.029***	-0.024***	-0.024***	-0.022**
Debt Ratio	0.051	0.053	0.076*	0.088*	0.081*	0.081*	0.065	0.071
Market-to-Book Ratio	0.000**	0.000**	0.000**	0.000*	0.000*	0.000	0.000	0.000
Observation	359	359	359	359	359	359	359	359
R^2	0.1757	0.1574	0.1578	0.1403	0.1473	0.1316	0.1294	0.1482

8. Empirical Result 2: Outliers and Heterogeneity

In order to ensure the correctness of the results, I test whether outliers and heterogeneity exist within the sample. The descriptive summary has shown that the skewness and kurtosis of most of the variables are out of the standard criteria. The outliers are detected with Studentized Residual and Cook's D. I test the heterogeneity with White's Test and Breusch-Pagan Test.

8.1 Outliers

From the result of Studentized Residuals, 6 observations are out of the criteria. Among the 6 observations, the greatest absolute value of studentized residual (254th observation in this case) is -4.522 with the criteria being:

$$|\text{Studentized Residual}| \geq 3, \text{Prob.} \leq 0.0026$$

On the other hand, 26 observations are detected as outliers by Cook's D. The greatest Cook's D (357th observation in this case) is 0.313 with the criteria being:

$$\text{Cook's D} \geq 4 / n = 0.011$$

After removing the 26 observations, outliers, including all of the observations in the year 2008, are deleted from the sample. I prepare two samples deleting all of the outliers detected by each of

the two criteria. Table 8 shows that the result is hardly affected. CEO tenure shows a 10% level of significance. Another finding is that after removing the observations in the year 2008, the year effect ceases to exist. In order to control the 2008 financial crisis effect, I add a dummy for the 2008 financial crisis in the sample. Since the variables keep their levels of significance. I study with the original sample with the financial crisis dummy. The results with Name ASVI in the regression are also the same except that CEO tenure shows a 5% level of significance.

Table 8

Regression of Abnormal Return on Information Proxies after Deleting Outliers

This table reports the results from the regression of the abnormal return on the information proxies with samples deleting outliers detected by studentized residuals and Cook's D. The results are hardly changed.

Panel A.

	(1)	(2)	(3)
Intercept	0.121**	0.153***	0.140***
Ticker ASVI	0.035***	0.035***	0.035***
CEO Tenure	0.002	-	-
Number of Articles	-	-0.006	-
CEO Outside Dummy	-	-	-0.001
Most Admired List Dummy	0.102***	0.108***	0.102***
Firm Age	-0.001	0.000	-0.001
Firm Size	-0.019***	-0.018***	-0.019***
Debt Ratio	0.022	0.014	0.019
Market-to-Book Ratio	0.000**	0.000**	0.000**
Year Effect	Yes	Yes	Yes
Industry Effect	No	No	No
Observation	353	353	353
R^2	0.1664	0.1653	0.1609

Panel B.

	(1)	(2)	(3)
Intercept	0.137***	0.163***	0.159***
Ticker ASVI	0.041***	0.040***	0.040***
CEO Tenure	0.003*	-	-
Number of Articles	-	-0.001	-
CEO Outside Dummy	-	-	0.009
Most Admired List Dummy	0.116***	0.115***	0.116***
Firm Age	0.000	0.000	0.000
Firm Size	-0.021***	-0.022***	-0.022***
Debt Ratio	0.000	-0.003	0.000
Market-to-Book Ratio	0.000	0.000	0.000
Year Effect	No	No	No
Industry Effect	No	No	No
Observation	333	333	333
R^2	0.1518	0.1413	0.1422

8.2 Heterogeneity

After testing the regression with White's Test and Breusch-Pagan Test, each of the tests shows a 1% significance. The results indicate that heterogeneity exists in the regression. Therefore, I test the predictability of the information proxies above with heteroskedastic robust standard errors in later regressions.

9. Empirical Result 3: Predictability of Information Proxies with Lags

The next question is when ASVI and the firm reputation would stop showing significance with the abnormal return. I run several regressions of the abnormal returns of later weeks from week 9 to week 52. After testing with heteroskedastic robust standard errors, my main variables do not change in the level of significance whereas some levels of significance of the control variables have changed. I record the results below.

9.1 Regression with Ticker ASVI as the Independent Variable

In the twelfth week after the event week, both the ASVI and Most Admired List Dummy stop showing significance. The Most Admired List Dummy begins showing significance after studying with heteroskedastic robust standard errors. The Most Admired List Dummy continues showing a 1% level of significance. In week 22, the CEO tenure shows a 10% level of significance. In week 32, CEO tenure shows a 5% level of significance. In week 33, the significance of the Most Admired List Dummy weakens and becomes at 5% level. In week 35, the significance of the Most Admired List Dummy rises back to 1% level. In week 40, the ASVI's show 10% level of significance. In week 49, the significance of ASVI's increase to 5% levels. In week 50, the significance of ASVI's decrease to 10% levels.

Overall, the result shows several trends. First, the firm reputation has the most significant and permanent effect on the abnormal return of a company after an SEO event. This result confirms the conclusions of many scholars. (Milgrom and Roberts, 1986; Fombrun and Shanley, 1990) Second, the search volumes stop showing significant correlation with the abnormal return from the 12^{th} week to the 39^{th} week after the event week of SEO. This discovery is new since Da et al. (2011) only study the composed Russell 3000 Stock Returns from week 5 to week 52 in one regression. However, the phenomena could be similarly explained by the long-term reverse in stock return. The long-term change is not necessarily reverse but a positive increase. The result could be due to the fact that investors have already learnt about the companies through the Internet, news and journals. This hypothesis is tested in a later next step.

The Most Admired List Dummy constantly shows significance with the abnormal return. The results again confirm that positive firm reputation has a constant positive effect on the stock return. The CEO tenure on abnormal return starts showing a 10% level of significance about 5 months (21 weeks) after the event week and starts showing a 5% level of significance 8 months (32 weeks) after the event week. The CEO tenure increases in significance with the abnormal return along the time period. This result confirms the conclusion of Weng and Chen (2017) that CEO reputation is also an important detector of firm performance. In contrast to the number of articles which cannot tell whether the information positive or negative, longer CEO tenure usually indicate better CEO reputation and vice versa. (However, longer CEO tenure may also mean that a CEO has more chances to produce bad news. I ignore this possibility in this paper.)

The information for whether a CEO is appointed outside the working firm should also show positive information. However, the results do not show any significance in the CEO Outside Dummy. I infer that the information is hard for investors to reach. Since only a limited number of firms would issue SEO and many of the companies are relatively small, investors cannot gather the information. Da et al. (2011) argue that information on journals and newspapers would be meaningless if investors do not read them. The same problem could appear in this case. Jian and Lee (2011) report that 'CEO outsiders' do matter for capital investments. However, their study focuses on more popular capital investments. Performance affected by popular capital investments may not face the same problem as a secondary equity offering would do.

Table 9

Regression of Abnormal Return on Ticker ASVI in Certain Weeks

This table reports the results from the regression of the abnormal return on Ticker ASVI and other information proxies in the weeks which levels of significance change. In week 12, Ticker ASVI ceases to show significance. In week 22, CEO tenure becomes significant with the abnormal return. In week 32, the significance of CEO tenure rises to a 5% level. In week 40, Ticker ASVI reappears to show significance and the level of significance becomes 5% in week 49.

	Week 11	Week 12	Week 22	Week 32	Week 40	Week 49
Intercept	0.129	0.233*	0.231	0.142	0.174	0.073
Ticker ASVI	0.053*	0.034	0.015	0.047	0.073*	0.092**
CEO Tenure	0.002	0.005	0.010*	0.010**	0.012**	0.014**
Most Admired List Dummy	0.168***	0.154***	0.133**	0.181***	0.259***	0.243***
Firm Age	-0.001	-0.002*	-0.002	-0.003	-0.003	-0.004
Firm Size	-0.022*	-0.031**	-0.038*	-0.028	-0.031	-0.012
Debt Ratio	0.046	-0.043	-0.005	0.091	0.067	-0.063
Market-to-Book Ratio	0.000***	0.000***	0.000***	0.000**	0.000	0.000
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	No	Yes	Yes	No	Yes	Yes
Observation	359	359	359	359	357	357
R^2	0.1463	0.0920	0.0704	0.0731	0.0989	0.1241

9.2 Regression with Name ASVI as the Independent Variable

The significance of Name ASVI performs differently from Ticker ASVI does. In week 12, Name ASVI still shows a 10% level of significance. The predictability ceases to be significant in week 13. In week 22, CEO reputation starts showing a 10% level of significance. The Name ASVI shows a 10% level of significance in several of the weeks from week 25 to week 36. The significance of CEO reputation rises to 5% in week 25. After the 39th week after the event week, the significance of the CEO tenure wavers around 1% and 5% level. The significance of Name ASVI is at 5% level in week 49.

The results show that Name ASVI has a more consistent effect on the abnormal return than Ticker ASVI does. Although Da et al. (2011) claim that measuring the search volume of tickers would be more accurate since people may search for names of companies in order to learn about their products and service instead of their stocks. However, results of Dimpfl and Jank (2016) and mine show that investors actually search for names of companies. Furthermore, names could be easier for investors to search more often on the Internet, especially on search engines such as Google. Therefore, the effect of Name ASVI exerts a longer period of the effect on the abnormal return.

Overall, results from this section have shown that the effect of ASVI continues being significant for about 3 months and after the 10th month after the event week. The effect could be explained by the long-term effect. The positive correlation could be explained by the possibility that: the more a company is searched, the better it is understood by the investors and less optimistic expectation would exist. CEO tenure starts showing significance with the abnormal return about 5 months after the event week. The short-run performance of IPO or SEO is relatively complicated. Previous studies usually focus on the relationship between reputation and post-IPO performance. (Carter et al., 1998; Krishnan et al., 2011) On the other hand, studies hardly report any predictability of CEO reputation on stock performance in the short term. However, the results of Da et al. (2011) and mine have shown that the search-query proxies have significant predictability of the stock return in the short run. My results also show that the firm reputation constantly shows a 1% or 5% level of significance within one year after the event week. Since the number of articles about a CEO does not tell whether the information is positive and negative, the predictability of the information is mixed.

Table 10

Regression of Abnormal Return on Name ASVI in Certain Weeks

This table reports the results from the regression of the abnormal return on Name ASVI and other information proxies in the weeks which levels of significance change. In week 13, Name ASVI ceases to show significance. In week 22, CEO tenure becomes significant with the abnormal return. In week 25, the significance of CEO tenure rises to a 5% level. In week 36, Name ASVI reappears to show significance and the level of significance becomes 5% in week 49.

Panel A.

	Week 11	Week 12	Week 13	Week 21	Week 22	Week 23
Intercept	0.133	0.236*	0.231*	0.257	0.221	0.170
Name ASVI	0.044***	0.027*	0.025	0.036	0.036	0.042
CEO Tenure	0.003	0.006	0.006	0.010	0.010*	0.010*
Most Admired List Dummy	0.160***	0.149***	0.132***	0.127**	0.135**	0.151***
Firm Age	-0.001	-0.002*	-0.002*	-0.002	-0.002	-0.002
Firm Size	-0.022**	-0.032**	-0.029**	-0.039*	-0.038*	-0.031
Debt Ratio	0.048	-0.042	-0.038	-0.021	-0.006	-0.001
Market-to-Book Ratio	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	No	No	No
Observation	359	359	359	359	359	359
R^2	0.1414	0.0913	0.0872	0.0702	0.0734	0.0714

Panel B.

	Week 25	Week 26	Week 28	Week 31	Week 36	Week 39	Week 49
Intercept	0.092	0.091	0.153	0.156	0.084	0.150	0.078
Name ASVI	0.050*	0.041	0.052*	0.058	0.064*	0.072*	0.079**
CEO Tenure	0.009**	0.009*	0.010**	0.011**	0.012**	0.013***	0.014***
Most Admired List Dummy	0.163***	0.154***	0.166***	0.185***	0.183***	0.248***	0.229***
Firm Age	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.004**
Firm Size	-0.023	-0.024	-0.033	-0.034	-0.024	-0.031	-0.014
Debt Ratio	0.070	0.073	0.113	0.136	0.079	0.078	-0.060
Market-to-Book Ratio	0.000***	0.000***	0.000**	0.000*	0.000	0.000	0.000
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	No	No	No	Yes	Yes	Yes
Observation	359	359	359	359	359	357	357
R^2	0.0730	0.0660	0.0771	0.0835	0.0848	0.0989	0.1238

10. Empirical Result 4: Performance of High-ASVI and Low-ASVI Firms

Scholars have contradicting views on the optimistic expectation of investors on stock performance after SEO events. Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) argue that investors are optimistic, and therefore, stock returns will experience long-term underperformance after SEO. Brous et al. (2001) report that stock returns do not experience such underperformance in reality. Jeanneret (2005) and Denis and Sarin (2001) also show that the underperformance would only appear for certain companies. According to Brous et al. (2001), firms in a hot market should be affected severely because of the information in theory. Therefore, I study whether the information proxies will show different predictabilities for firms with high and low search volumes.

Table 11

Regression of Abnormal Return on Information Proxies with High and Low ASVI

This table reports the results from two regressions of the abnormal return on Ticker ASVI and other information proxies with a high-ASVI sample and a low-ASVI sample. The results show that the Ticker ASVI in the high-ASVI sample is more significant in predicting the performance of the abnormal return.

	High-ASVI	Low-ASVI
Intercept	0.152*	0.081
Ticker ASVI	0.090***	-0.014
CEO Tenure	0.002	0.004*
Most Admired List Dummy	0.148***	0.071
Firm Age	-0.001	0.001
Firm Size	-0.023**	-0.023**
Debt Ratio	-0.014	0.082
Market-to-Book Ratio	0.000***	0.000
Year Effect	No	Yes
Industry Effect	No	Yes
Observation	179	180
R^2	0.3230	0.1404

10.1 Ticker ASVI

I first classify the sample into high and low ASVI parts according to the magnitude of Ticker ASVI. Observations with Ticker ASVI larger than the median is classified into the high-ASVI sample and the rest observations are put in the low-ASVI sample. The results in Table 11 show that the classification makes a significant difference in the predictability of abnormal return. The Ticker ASVI in the high-ASVI sample shows a 1% level significance. On the other side, Ticker ASVI in the low-ASVI sample hardly shows any significance. The Most Admired List Dummy experience the same change. However, CEO tenure shows a 10% level of significance. The result confirms a part of my second hypothesis that predictability of the information proxies should be weaker for the stock with less search volume.

The next question is when the significance of the proxies would change after the event week. After regressing abnormal return in each week on the information proxies, the significance of Ticker ASVI becomes weak in week 17. In week 21, the Ticker ASVI stops showing significance anymore. With the high-ASVI sample, the CEO tenure never shows any level of significance along the weeks. The Most Admired List Dummy shows significance throughout the period.

In the beginning, the significance is the same as it is with the full sample. However, the significance of the independent variables moves differently after Ticker ASVI stopping showing significance. My interpretation is that firms with less attention from investors should experience less underperformance, a part of my second hypothesis.

The result is different for the low-ASVI sample. The significance of CEO tenure disappears 2 weeks after the event week. The firm reputation shows weak significance in week 5, week 7, and week 8. CEO tenure shows a 10% level of significance in week 7, week 11, week 13 and week 16. After week 16, the significance of CEO tenure keeps at 10% level until week 23. From week 23, the significance of CEO tenure becomes increasingly significant. The Most Admired List Dummy has a 10% level of significance in week 5, 7, and 8. Neither number of articles of the CEO's nor dummy for CEO appointed outside the firm shows any significance.

Table 12

Regression of the High-ASVI sample in Certain Weeks

This table reports the results from the regression of abnormal return on information proxies with the high-ASVI sample. From week 17 to week 20, the significance of Ticker ASVI changes between a 10% level and no significance. From week 21 to week 52, Ticker ASVI no longer shows significance.

	Week 16	Week 17	Week 18	Week 19	Week 20	Week 21
Intercept	0.143	0.135	0.144	0.189	0.199	0.197
Ticker ASVI	0.067**	0.062	0.079*	0.076	0.070*	0.057
CEO Tenure	0.000	0.000	0.001	0.000	0.001	0.001
Most Admired List Dummy	0.183***	0.189***	0.197***	0.203***	0.214***	0.205***
Firm Age	-0.001	-0.001	-0.002	-0.002	-0.003*	-0.003**
Firm Size	-0.016	-0.016	-0.016	-0.022*	-0.025*	-0.022
Debt Ratio	0.036	0.066	0.032	0.017	0.021	0.025
Market-to-Book Ratio	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	179	179	179	179	179	179
R^2	0.2683	0.2693	0.2720	0.2731	0.2729	0.2397

Table 13

Regression of the Low-ASVI sample in Certain Weeks

This table reports the results from the regression of abnormal return on information proxies with the low-ASVI sample. The table only displays the weeks in which the significance of the information proxies has changes in the level of significance.

	Week 2	Week 5	Week 6	Week 7	Week 8	Week 9	Week 11	Week 12	Week 13
Intercept	0.125	0.071	0.036	0.055	0.038	0.019	0.061	0.190	0.215
Ticker ASVI	-0.039	-0.046	-0.043	-0.038	-0.047	-0.027	-0.019	0.065	0.089
CEO Tenure	0.003	0.004	0.005	0.005*	0.003	0.005	0.006*	0.013	0.014*
Most Admired List Dummy	0.062	0.096*	0.084	0.091*	0.113*	0.105	0.084	0.002	-0.006
Firm Age	0.001	0.000	0.001	0.001	0.000	0.000	0.000	-0.002	-0.002
Firm Size	-0.032**	-0.026	-0.025	-0.024	-0.023	-0.021	-0.023	-0.032	-0.033
Debt Ratio	0.136**	0.174**	0.180**	0.154**	0.163**	0.176**	0.170*	-0.005	-0.019
Market-to-Book Ratio	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Observation	180	180	180	180	180	180	180	180	180
R^2	0.1665	0.1687	0.1939	0.1663	0.1591	0.1469	0.1161	0.0965	0.0958

	Week 14	Week 16	Week 23	Week 31	Week 39	Week 41	Week 46	Week 50	Week 51
Intercept	0.164	0.174	0.097	0.223	0.320	0.266	0.005	-0.065	-0.049
Ticker ASVI	0.100	0.100	0.098	0.172*	0.223**	0.219**	0.207*	0.143	0.167*
CEO Tenure	0.014	0.018*	0.021**	0.020**	0.022**	0.022**	0.031***	0.029***	0.030***
Most Admired List Dummy	-0.017	-0.041	0.026	0.148	0.236*	0.205	0.167	0.168	0.154
Firm Age	-0.002	-0.002	0.001	0.002	0.002	0.001	-0.001	0.000	-0.001
Firm Size	-0.026	-0.029	-0.040	-0.067*	-0.072*	-0.058	-0.017	-0.003	-0.004
Debt Ratio	-0.040	-0.053	0.050	0.255	0.276	0.260	0.108	0.124	0.113
Market-to-Book Ratio	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Year Effect	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
Industry Effect	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes
Observation	180	180	180	180	179	179	179	179	178
R^2	0.0948	0.0913	0.0891	0.0993	0.1227	0.1240	0.1335	0.1446	0.1500

The result that the low search volume proxy has little predictability on the stock performance is obvious since only a few investors have really searched for the information. The result also tells us that the firm reputation neither has significant predictability on stock performance, showing that most of the firms with little search volume are not listed on America's Most Admired List in the respective year. Only CEO tenure shows a high level of significance about 5 months (22 weeks) after the SEO event. The results show that low-volume information proxies can hardly predict trends of stock performance in short terms after SEO event. The attention of investors are connected to stock performance only after the 38th week after SEO event, and the best predicting factor is CEO tenure.

10.2 Name ASVI

I then classify the sample into high and low ASVI sample according to the magnitude of the Name ASVI. The results show different levels of significance in CEO and firm reputation. Performance of firms with high ASVI is not significantly correlated with the respective firm reputation.

Table 14

Regression of Abnormal Return on Information Proxies with High and Low ASVI

This table reports the results from two regressions of the abnormal return on Name ASVI and other information proxies with a high-ASVI sample and a low-ASVI sample. The results show different levels of significance in CEO and firm reputation.

	High-ASVI	Low-ASVI
Intercept	0.095	0.146
Name ASVI	0.084***	-0.011
CEO Tenure	0.004*	0.000
Most Admired List Dummy	0.067	0.084**
Firm Age	-0.002*	0.001
Firm Size	-0.021*	-0.016*
Debt Ratio	-0.006	-0.021
Market-to-Book Ratio	0.000	0.000***
Year Effect	Yes	Yes
Industry Effect	Yes	Yes
Observation	179	180
R^2	0.3821	0.1605

Regressions of the high-Name-ASVI sample from week 1 to week 52 show that the significance of the ASVI decreases sharply about 3 months after the SEO event. CEO tenure becomes insignificant with the abnormal return after about one month after the SEO event and the Most Admired List Dummy is insignificant throughout the year. Regressions of the low-Name-ASVI, on the other hand, show that the low Name ASVI merely shows significance. CEO tenure shows a 10% level of significance from week 17. The Most Admired List Dummy becomes insignificant in week 13 and reappears being significant in week 37.

Table 15

Regression of the High-ASVI sample in Certain Weeks

This table reports the results from the regression of abnormal return on information proxies with the high-ASVI sample according to Name ASVI. From week 12, the significance of Name ASVI reduces to an insignificant level. From week 3, CEO tenure becomes insignificant with the abnormal return.

	Week 1	Week 3	Week 4	Week 7	Week 8	week 12	Week 13
Intercept	0.086	0.126	0.130	0.084	0.079	0.114	0.119
Name ASVI	0.049***	0.052***	0.054***	0.051***	0.052**	0.027	0.026
CEO Tenure	0.005**	0.005*	0.005	0.005*	0.003	0.003	0.002
Most Admired List Dummy	0.024	0.036	0.077	0.090	0.085	0.140*	0.095
Firm Age	-0.002**	-0.002**	-0.002**	-0.002	-0.002*	-0.002**	-0.003**
Firm Size	-0.022*	-0.029**	-0.030**	-0.025	-0.023	-0.022	-0.018
Debt Ratio	0.036	0.065	0.070	0.045*	0.060	0.089	0.086
Market-to-Book Ratio	0.000***	0.000**	0.000**	0.000*	0.000*	0.000	0.000
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	179	179	179	179	179	179	179
R^2	0.3618	0.3191	0.2767	0.2384	0.2806	0.2276	0.2238

	Week 15	Week 17	Week 18	Week 35	Week 36	Week 38	Week 40
Intercept	0.087	0.145	0.181	0.058	0.042	0.111	0.152
Name ASVI	0.035*	0.029	0.028	0.024	0.039	0.048	0.041
CEO Tenure	0.001	0.000	0.001	0.006	0.008	0.006	0.005
Most Admired List Dummy	0.104	0.142*	0.114	0.142*	0.125	0.160*	0.156
Firm Age	-0.003***	-0.003***	-0.003**	-0.006***	-0.006***	-0.006***	-0.007***
Firm Size	-0.015	-0.021	-0.029	-0.032	-0.030	-0.036	-0.033
Debt Ratio	0.109	0.159*	0.187*	0.335**	0.305**	0.285**	0.243*
Market-to-Book Ratio	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	No	Yes
Observation	179	179	179	179	179	179	178
R^2	0.1986	0.1819	0.1857	0.1931	0.1899	0.1838	0.1850

After a period of about 3 months, both the Ticker and Name ASVI lose their significance in predicting the stock performance. Under the classification according to the high and low search index, only low-volume ASVI becomes relevant with the abnormal return after the starting period, the first 4 months. Therefore, the results show that ASVI can reliably predict the abnormal return during, and 4 months after the SEO event. On the other hand, the significance in low-volume ASVI shows that firms with low search volume during the SEO week would have

their performance affected after 8 months. The positive correlation shows that, under low-ASVI firms, the more the search volume, the better the firm performance will be in long terms.

The predictabilities of CEO reputation and firm reputation under the classification of Ticker and Name ASVI are different. This result shows that Ticker ASVI and Name ASVI have different in magnitude for each firm. The difference could come from the possibility that people who search for names of the companies may only want to learn about their products. Therefore, I confirm that conclusion of Da et al. (2011) that using firm tickers as the search volume proxy is more reliable and accurate. Both firm reputation and CEO reputation have some predictability of the stock performance within one year after the SEO event. The firm reputation is relatively more reliable in predicting high-ASVI firms and CEO reputation is relatively more reliable in predicting low-ASVI firms.

Table 16

Regression of the Low-ASVI sample in Certain Weeks

This table reports the results from the regression of abnormal return on information proxies with the low-ASVI sample according to Name ASVI. The table only displays the weeks in which the significance of the information proxies has changes in the level of significance.

	Week 1	Week 2	Week 3	Week 4	Week 6	Week 7	Week 8	Week 13	Week 17
Intercept	0.134	0.185	0.208*	0.173	0.074	0.109	0.106	0.387*	0.332
Name ASVI	0.023	0.038	0.055*	0.051	0.049	0.044	0.029	0.028	0.025
CEO Tenure	0.001	0.001	0.000	0.000	0.002	0.001	0.000	0.007	0.013*
Most Admired List Dummy	0.076*	0.094**	0.114**	0.131***	0.119**	0.135***	0.125**	0.117	0.098
Firm Age	0.001	0.001	0.000	0.000	0.001	0.000	0.000	-0.001	-0.001
Firm Size	-0.016*	-0.022**	-0.026**	-0.021	-0.015	-0.016	-0.014	-0.048*	-0.048
Debt Ratio	0.016	0.034	0.056	0.078	0.084	0.058	0.049	-0.131	-0.114
Market-to-Book Ratio	0.000***	0.000***	0.000***	0.000***	0.000	0.000	0.000*	0.000***	0.000***
Year Effect	No	No	No	No	Yes	No	No	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	180	180	180	180	180	180	180	180	180
R^2	0.1611	0.1620	0.1555	0.1526	0.1830	0.1739	0.1586	0.1176	0.1117

	Week 24	Week 28	Week 37	Week 39	Week 42	Week 43	Week 44	Week 45	Week 47
Intercept	0.219	0.208	0.149	0.225	0.356	0.287	0.372	0.304	0.353
Name ASVI	0.069	0.078	0.092	0.096	0.094	0.101	0.070	0.041	0.027
CEO Tenure	0.014**	0.014**	0.016**	0.018***	0.019**	0.021***	0.019**	0.019**	0.016**
Most Admired List Dummy	0.146*	0.120	0.180*	0.247**	0.244**	0.245**	0.266**	0.267***	0.280**
Firm Age	-0.001	0.000	0.000	0.000	-0.001	-0.001	-0.002	-0.001	-0.002
Firm Size	-0.036	-0.030	-0.028	-0.039	-0.051	-0.045	-0.054	-0.041	-0.045
Debt Ratio	-0.038	-0.015	0.006	0.037	-0.054	-0.012	-0.051	-0.097	-0.139
Market-to-Book Ratio	0.000*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Year Effect	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Observation	180	180	180	179	179	179	179	179	179
R^2	0.1068	0.0970	0.1180	0.1388	0.1437	0.1520	0.1644	0.1718	0.1677

11. Conclusion

Studies since Da et al. (2011) have shown that search-volume indexes of Google have significant predictability on stock performance. This paper studies the mixed effect of the new Google Correlate search volume index, CEO reputation, and firm reputation in predicting the stock performance during, and after the respective seasoned equity offering event. I first confirm that the companies do not experience reverse in stock return within the one year after the SEO. This result confirms the conclusion of Brous et al. (2001) Second, this paper shows that Google Correlate Index, the new Google search volume index, during the SEO event week can significantly predict the first-day return at 5% level. The predictabilities are both significant for the index by firm's ticker and index by the firm's name. Including Tickers with multiple meanings such as 'SEE' and 'G' would not affect the predictability of the search volume index. The significant predictability of the search volume index lasts for about 3 months after the event week. The search volume index also predicts long-term performance after about 8 months. When considering the predictability of reputation, only CEO tenure shows significant predictability in the long run, whereas firm reputation is significantly correlated with the stock performance within one year after the event week. The number of articles related to a CEO and CEO being outsiders does not provide any predictability. Since the number of articles does not tell whether the information is positive or negative, effects could offset each other. Therefore, researches should consider the attribute of information. Finally, after classifying the sample into high search volume index and low search volume index, the predictability of the search volume indexes performs differently as expected. For the search volume index by Ticker, the level of significance of the high search volume does not change significantly, whereas low search volume merely shows any significance. On the other hand, the high search volume index by the firm name predicts short-term performance while the low search volume index predicts long-run performance. Overall, the results show that the search volume is a good predictor for studying the stock performance of SEO. However, the search volume index by firm name and firm ticker would show different predictability if they are classified by magnitude. CEO tenure shows significant but fragmented predictability over the time period after the SEO. Firm reputation shows the most significant and protracted predictability among the three independent variables.

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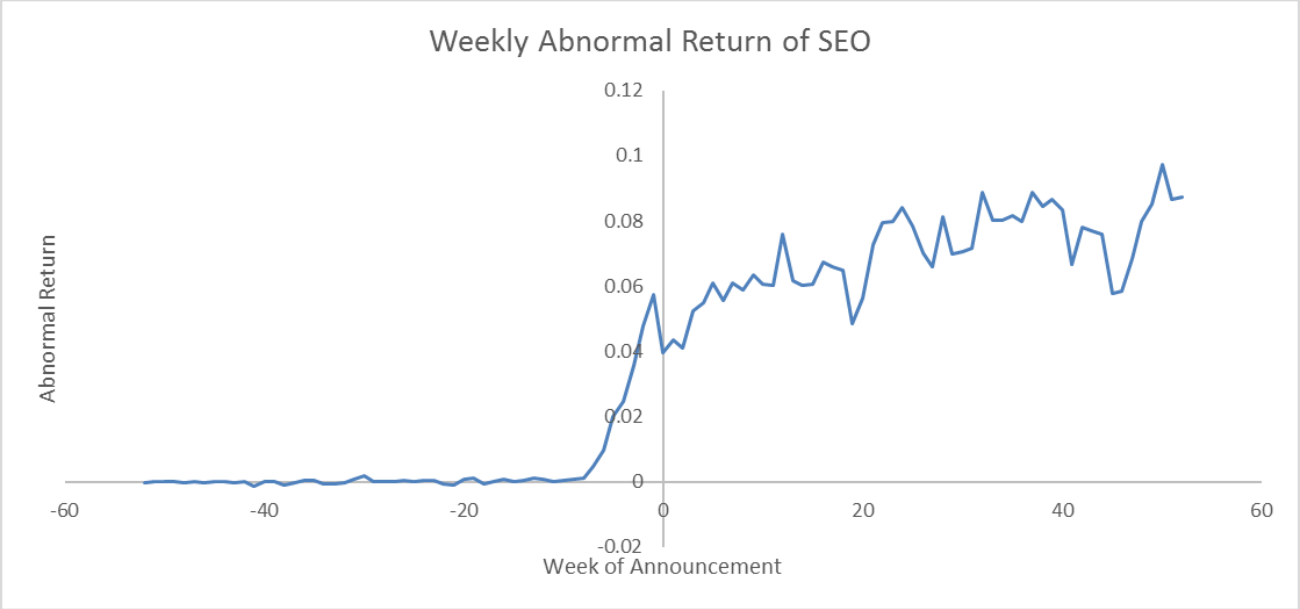
Appendix 1

Since the market should have already been reacting from the announcement of a secondary equity offering, I plot the abnormal return of the SEO performance with 0 as the week of the announcement of SEO for the x-axis. Figure A.1 plots the median of the weekly abnormal return 52 weeks before, and 52 weeks after the announcement week of SEO. The plot shows an increase in the abnormal return of the stock 8 weeks before a company announces a secondary equity offering. The result shows that the company tries to take advantage of the market. After announcing the SEO, the abnormal return drops and recovers after 2 weeks after the announcement. The abnormal return keeps increasing at a relatively lower rate.

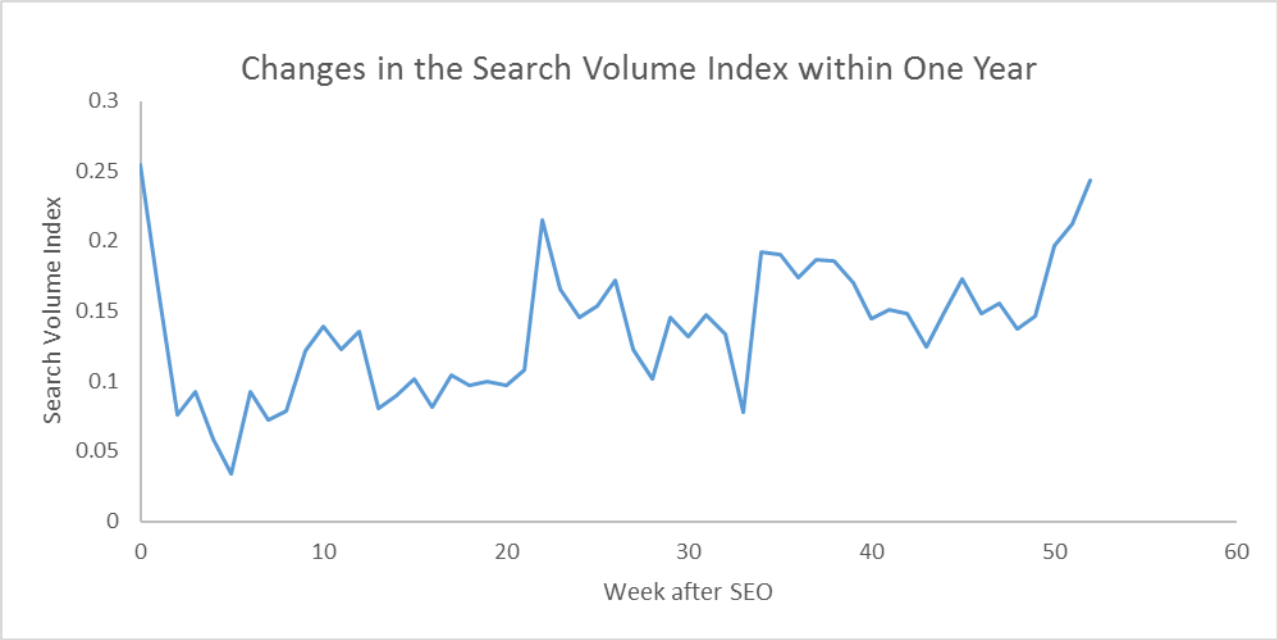
Figure A.1.



Appendix 2

From results in Empirical Result 3, the predictability of ASVI disappears between the 12th week and the 30th week after the SEO event week. In Figure A.2, I plot the mean of the Search Volume Index along the one-year period. Figure A.2 shows that SVI keeps dropping until the 5th week after the SEO event. The SVI increases until the 12th week. From the 13th week, the SVI decreases to a certain level and hardly changes. Therefore, the ASVI cannot predict the market during this time period. The SVI suddenly increases to a high level between the 21st week and the 22nd week. From the 21st week to the 30th week, the SVI shows an active change in its volume. However, from my results in Part 9, from the 12th week and the 30th week, the ASVI has no significant correlation with the SEO market. My explanation is that the financial information of a company leaks out as time goes (Brous et al., 2001). The investors may wait for the useful information from the 21st week to the 30th week. After the 30th week, the attention is again one of the determinants of the market.

Figure A.2.



Appendix 3

Table A.1.

Testing the Difference between High and Low ASVI by Quadratic Form

Instead of classifying the ASVI into a high and low volume in Section 10, I use the quadratic form to study the effect. The dependent variable is the buy-and-hold abnormal return of SEO. The first column shows the regression of the abnormal return on the Ticker ASVI and Ticker $ASVI^2$. The second column shows the regression of the abnormal return on the Name ASVI and Name $ASVI^2$. The result from Table A.3 shows a large difference between the Ticker ASVI and the Name ASVI, proving that Ticker ASVI and Name ASVI perform differently.

	Ticker	Name
Intercept	0.142**	0.186**
ASVI	0.006	0.058***
ASVI^2	0.028**	-0.005*
CEO Tenure	0.003	0.003*
Most Admired List	0.108***	0.114***
Firm Age	-0.000	-0.000
Firm Size	-0.025***	-0.031***
Debt Ratio	0.063*	0.057
MB Ratio	0.000***	0.000***
Time Effect	Yes	Yes
Industry Effect	Yes	Yes
Observation	359	359
R^2	0.2126	0.1673