Spring 2015

Two Essays on Investor Attention and Asset Pricing

Nadia Asmaa Nafar
Old Dominion University

Two Essays on Investor Attention and Asset Pricing

by

Nadia Asmaa Nafar
Master of Business Administration, May 2007, Old Dominion University, USA
Bachelor of Business Administration, May 2005, Al Akhawayn University, Morocco

A Thesis Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

Ph.D in Business Administration

Finance

OLD DOMINION UNIVERSITY
May 2015

Approved by:

Kenneth Yung (Director)

Mohammad Najand (Member)

Douglas Ziegenfuss (Member)

ABSTRACT

TWO ESSAYS ON INVESTOR ATTENTION AND ASSET PRICING

Nadia Asmaa Nafar
Old Dominion University, 2015
Director: Dr. Kenneth Yung

This dissertation explores the effect of investor attention, as measured by Google Search Volume Index, on security prices. It seeks to answer the following research questions: 1) what is the effect of investor attention on the expected returns of EREITs? And 2) what is the impact of investor attention on the open market repurchases post announcement returns?

Classic theory suggests that information is immediately incorporated into stock prices. However, existing empirical evidence shows that investors are limited in terms of the amount of information they can process. Kahneman (1973) advances that attention is a scarce cognitive resource. Individuals suffer from bounded rationality. When faced with large amounts of information, they are limited in terms of how much they can process. This implies that prices may not reflect all available information due to limited investor attention.

Essay 1 investigates the effect of investor attention on the expected returns of EREITs. The attention hypothesis of Barber and Odean (2008) suggests that increased attention leads to increased buying, which pushes prices and returns higher temporarily, but is followed by a reversal. We test the attention hypothesis on EREITs from 2004 to 2012 using Search Volume Index (SVI) data in Google Trends. We find that EREITs that generate high investor attention, as measured by SVI, earn higher returns compared to EREITs that generate no investor attention. The results are driven by small stocks and stocks with high book to market ratio. We report that the SVI effect is not due to impediments to trade and conjecture that SVI increases investor recognition among EREITs that are characterized by information incompleteness, leading to higher returns. Over time, this increase in returns is followed by a reversal.

Essay 2 uses the attention hypothesis to generate insights into stock repurchases price drift. Using a sample of 318 firms that made repurchase announcements between 2004 and 2008 and which have weekly search volume data in Google Trends, we find that investor attention has an effect on the repurchase drift for stocks during the first year following the announcement. More specifically, high abnormal search volume leads to a positive effect on cumulative returns during the first year following the announcement for small stocks, stocks with high idiosyncratic risk, low market to book ratio, and low past

return. Prior research has shown that for such stocks, the repurchase drift lasts for three years due to limits to arbitrage. As these stocks are dominated by retail investors, an increase in retail investors' attention results in increased buying, which pushes prices and cumulative returns higher. Low abnormal search volume signals a decrease in investor attention and results in negative returns among all stocks. The results provide further support to the attention hypothesis.

Both essays find evidence that the level of investor attention has an effect on security prices. This is contrary to the predictions of the classical theory that postulates that information is immediately incorporated into stock prices.

This thesis is dedicated to my family

ACKNOWLEDGMENTS

I would like to express my deepest gratitude to my dissertation chair, Dr. Kenneth Yung, for his excellent guidance, timely feedback, patience, and encouragement throughout this process. I would also like to thank Dr. Mohammad Najand and Dr. Douglas Ziegenfuss for their valuable feedback, tremendous encouragement, and continuous support. Special thanks to Dr. Qian Sun for providing some of the data needed for this study.

TABLE OF CONTENTS

LIST OF TABLES vii
INTRODUCTION 1
INVESTOR ATTENTION AND THE EXPECTED RETURNS OF EREITS 4
ABSTRACT 4
INTRODUCTION 4
LITERATURE REVIEW 7
SAMPLE AND DATA 10
RESULTS 12
Descriptive statistics 12
Comparative Statistics 14
SVI and other investor attention measures 15
SVI and the cross section of EREITs returns 17
SVI and returns in different time horizons 26
SVI and excess returns 31
SUMMARY 37
REFERENCES 38
INVESTOR ATTENTION AND THE OPEN MARKET REPURCHASES POST ANNOUNCEMENT RETURNS 42
ABSTRACT 42
INTRODUCTION 42
THEORETICAL DEVELOPMENT 45
SAMPLE AND DATA 50
RESULTS 54
SUMMARY 63
REFERENCES 64
CONCLUSION 70
VITA 72

LIST OF TABLES

Table	Title	Page
I	Variables Definition	11
II	Descriptive Statistics	13
III	SVI and EREIT characteristics	15
IV-A	Correlation between SVI and other investor attention measures	16
IV-B	SVI and alternative measures of attention	17
V	Search Volume Index and EREITS Returns: Univariate Comparisons	19
VI	SVI-Related Trading Profits by Firm Characteristics, Illiquidity and Investor Recognition measures	22
VII	SVI and returns over time	28
VIII	The effect of SVI and other investor attention measures on returns	33
IX-A	The effect of SVI by analyst coverage	34
IX-B	The effect of SVI by analyst coverage, controlling for investor recognition	35
X-A	Variables Definition	52
X-B	Descriptive Statistics	53
XI	Abnormal Search Volume Index and Cumulative Returns: Univariate Comparisons	58
XII	ASVI and Returns following Repurchase Announcements	60
XIII	The effect of ASVI on Cumulative Returns during the first year following the repurchase announcement	62

INTRODUCTION

According to the efficient market hypothesis, stock prices reflect all available information (Fama 1970). However, the existing empirical evidence has documented several instances where this hypothesis was violated. Ikenberry, Lakonishok, and Vermaelen (1995) document stock price under-reaction following open market repurchase announcements. Barberis, Shleifer and Vishny (1998) find evidence of under-reaction to earnings announcements as well as momentum effects. Michaely, Thaler and Womack (1995) document evidence of drift following dividend initiations and omissions. Similarly, Ikenberry, Rankine and Stice (1996) find evidence of drift following stock splits.

Kahneman (1973) suggests that attention is a scarce cognitive resource. Individuals have bounded rationality. When faced with large amounts of information, they are limited in terms of how much they can process. Consequently, they must be selective about the type of information to which they can dedicate their attention. This implies that limited investor attention may be the driver behind the slow incorporation of information into stock prices.

Several studies have examined the effect of investor attention on asset pricing. For example, Engelberg, Sasseville, and Williams (2012) find that stocks that Jim Cramer mentions in his popular CNBC TV show Mad Money earn significantly positive overnight returns. Da, Engelberg, and Gao (2011) report that, in the case of IPOs, increased attention results in high abnormal returns in the first two weeks and the effect is reversed in one year. Tetlock (2011) reports that stale news result in temporary price movements among stocks dominated by individual investors. DellaVigna and Pollet (2009) find that investor inattention is high on Fridays. Earnings announcements made on Fridays have a 15% lower immediate response and a 70% higher delayed response. Hirshleifer, Lim and Teoh (2009) document that investor inattention increases on days crowded with earnings announcements. As a result, the immediate price response to earnings surprises is weaker and the post-earnings announcement drift is stronger. Fang and Peress (2009) suggest that investors' limited attention is behind the finding that stocks highly covered by mass media have lower returns than stocks not covered by the

media, controlling for other risk factors. Barber and Odean (2008) postulate that individuals are net-buyers of attention grabbing stocks. Individuals only buy the stocks that catch their attention, which has repercussions on security pricing.

This thesis investigates the role that investor attention plays in explaining the pricing of EREITs and the open market repurchases post announcement price drift. Essay 1 examines the impact of investor attention on the expected returns of EREITs. It is important to consider this research question for several reasons. Recent studies report evidence suggesting that investor attention has an effect on common stocks. REITs are considered to be a "distinct asset" class. As a result, existing research examining the effect of investor attention on stock returns excludes REITs from their sample (Barber and Odean (2008), Hou, Peng, and Xiong (2009), Chemmanur and Yan (2009), and Da et al (2011)). We contribute to the literature by examining the effect of investor attention on EREITs returns. We focus on EREITs as they comprise the majority of REITs publicly traded. In addition, we use a novel and direct proxy of retail investor attention, which is Google's Search Volume Index (SVI). SVI is considered an appropriate measure of retail investor attention. Given that EREITs behave like small stocks and are characterized by information opaqueness (Damodaran and Liu (1993), Danielsen and Harrison (2000) and Devos, Ong, and Spieler (2007)), they are more likely to attract retail investors (Barber and Odean (2008)). EREITs' limited information dissemination and lack of transparency provide an appropriate setting to directly test the effect of investor attention on returns.

Essay 2 explores the impact of investor attention on the open market repurchases post announcement returns. Addressing this research question is important for several reasons. First, post repurchase price drift has not been studied from the perspective of investor attention. Most studies examine the link between under-reaction and the attention hypothesis in the context of earnings (Hirshleifer and Teoh (2003), Hirshleifer, Hou, Teoh, and Zhang (2004), Hou and Moskowitz (2005), Cohen and Frazzini (2008), Hou, Peng, and Xiong (2008), Hirshleifer et al 2009, and DellaVigna and Pollet (2009)). The impact of attention on returns following stocks buybacks is lacking. Second, under-reaction is stronger among firms characterized by high idiosyncratic risk (Ikenberry et al (1995)). Such mispricing persists due to limits to arbitrage that result from high

idiosyncratic risk (Pontiff (2006), Shleifer and Vishny 1997, Gromb and Vayanos (2002), Chen, Hong, and Stein (2002), Hirshleifer and Teoh (2003), and Doukas, Kim, and Pantzalis (2010)). This paper seeks to identify the impact that investor attention has on the post repurchase price drift given different levels of limits to arbitrage and idiosyncratic risk. Finally, this paper adds to the existing literature by using a novel and direct proxy of individual investor attention; Google's SVI (Da et al 2011).

Both essays use SVI to proxy for investor attention. SVI represents a term's total number of searches scaled by its time-series average and is produced weekly using Google's aggregate search frequency. Given that search is a measure of attention and that Google is a commonly used search engine, its reported search logs are likely to be representative of that of the entire population and, as a result, appropriate in measuring investor attention (Da et al 2011). SVI is also considered a proxy that is specific to retail investors because they are likely to use the internet to obtain financial information (Da et al 2011). More sophisticated institutional investors use information services such as Reuters and Bloomberg terminals. SVI is obtained using each company's ticker symbol (Da et al 2011). This allows accounting for search logs made for financial and investment purposes. In addition, all SVI reports are obtained from the Finance Category in Google Trends to reduce noise.

CHAPTER 1

INVESTOR ATTENTION AND THE EXPECTED RETURNS OF EREITS

ABSTRACT

This study investigates the effect of investor attention on the expected returns of EREITs. The attention hypothesis of Barber and Odean (2008) suggests that increased attention leads to increased buying, which pushes prices and returns higher temporarily, but is followed by a reversal. We test the attention hypothesis on EREITs from 2004 to 2012 using Search Volume Index (SVI) data in Google Trends. We find that EREITs that generate high investor attention, as measured by SVI, earn higher returns compared to EREITs that generate no investor attention. The results are driven by small stocks and stocks with high book to market ratio. We report that the SVI effect is not due to impediments to trade and conjecture that SVI increases investor recognition among EREITs that are characterized by information incompleteness, leading to higher returns. Over time, this increase in returns is followed by a reversal.

INTRODUCTION

Real Estate Investment Trusts (REITs) are investment tools used to facilitate investor participation in the real estate market; as directly investing in this market can be costly in terms of resources and information. REITs are closed- end investment companies that are traded like stocks. These stocks have gained increased popularity in the last two decades as they are used as tools for diversification (Goetzmann and Ibbotson, 1990), are liquid (Han and Liang 1995), and constitute an economic way to purchase real estate due to the reduction in transaction and information costs they provide (Ghosh, Miles and Sirmans (1996)).

According to the National Association of Real Estate Investment Trusts' (NAREIT) website[1], there were 202 USA publicly traded REITs with a market

[1] http://www.reit.com/nareit

capitalization of over $670 billion at the end of 2013. Two major categories comprise the REITs market. These are Equity REITs (EREITs) and Mortgage REITs (MREITs). EREITs are real estate investment companies that generate their income from rent. MREITs are real estate investment companies that generate their revenue from interest earned from mortgage loans and mortgage-backed securities. EREITs constitute the majority of these publicly traded REITS with a total of 161 publicly traded stocks and a total market capitalization of over $608 billion as of the end of 2013.

Classic theory suggests that information is immediately incorporated into stock prices. However, existing empirical evidence shows that investors are limited in terms of the amount of information they can process. Kahneman (1973) reports that attention is a scarce cognitive resource. Prices, therefore, may not reflect all available information due to limited investor attention.

Recent studies report evidence suggesting that investor attention has an effect on common stocks. REITs are considered to be a "distinct asset" class. As a result, existing research examining the effect of investor attention on stock returns excludes REITs from their sample (Barber and Odean (2008), Hou, Peng, and Xiong (2009), Chemmanur and Yan (2009), Da, Engelberg, and Gao (2011)). We contribute to the literature by examining the effect of investor attention on EREITs returns. We focus on EREITs as they comprise the majority of REITs publicly traded. In addition, we use a novel and direct proxy of retail investor attention, which is Google's Search Volume Index (SVI). SVI is considered an appropriate measure of retail investor attention. Given that EREITs behave like small stocks and are characterized by information opaqueness (Damodaran and Liu (1993), Danielsen and Harrison (2000) and Devos, Ong, and Spieler (2007)), they are more likely to attract retail investors (Barber and Odean (2008)). EREITs' limited information dissemination and lack of transparency provide an appropriate setting to directly test the effect of investor attention on returns.

We find that SVI is a unique measure of investor attention among EREITs and does not merely reflect other investor attention measures, such as trading volume, analyst coverage, or excess returns. We also find that EREITs that attract high investor attention, as measured by SVI, generate higher returns than EREITs with no investor attention. The univariate analysis shows that average returns are especially higher for the EREITs that

are small, with high book to market ratio, low past month return, low price, and are highly illiquid.

The SVI effect is explained by the Attention hypothesis of Barber and Odean (2008). The hypothesis posits that individual investors are net-buyers of "attention-grabbing" stocks. Prior to buying, investors consider a set of stocks they research and to which they devote attention. When buying, they choose from this set of stocks. However, when selling, they can only sell what they already own. The attention hypothesis proposes that increased attention leads to increased buying, which temporarily pushes prices higher and results in higher returns. Over the long-term, this price pressure is reversed. Da et al (2011) reports that in the case of IPOs, increased attention results in high abnormal returns in the first two weeks and the effect is reversed in one year.

Controlling for risk factors using the CAPM, the Fama-French (1993) three-factor model, and the Carhart (1997) four-factor model, we find that increased investor attention results in higher average returns among stocks that are small and with high book to market ratio. To ensure that the SVI effect is not spurious, we investigate whether impediments to trade are behind the effect. The impediments-to-trade hypothesis suggests that limits to arbitrage, due to severe market frictions, cause mispricing to persist. As a result, the SVI effect may be due to illiquidity and lack of professional investors' involvement. Our findings suggest that the SVI effect is not explained by impediments to trade. Using illiquidity proxies, such as Amihud's (2002) illiquidity ratio, the dollar trading volume, and price, we find insignificant profits among highly illiquid stocks. We conclude that although the SVI effect is strong among small stocks, we find no support that the effect is due to impediments to trade.

Rather, the SVI effect is due to improvement in investor recognition. Merton's (1987) investor recognition hypothesis suggests that in markets with incomplete information, investors are not aware of all securities. As a result, a stock that has low investor recognition needs to offer higher returns to compensate its holders for being imperfectly diversified. Lehavy and Sloan (2008) explain that investor recognition increases returns over the short term, but decreases expected returns over the long run. We find that SVI improves investor recognition among stocks with no analyst coverage

and poor information dissemination and results in higher returns. Over time, however, the positive effect of SVI on returns is reversed.

Finally, controlling for alternative measures of attention, we find that SVI has a positive and significant effect on excess returns. Splitting the sample between EREITs with no analyst coverage and those with analyst coverage, we find that the effect is driven by stocks with no analyst coverage. We conclude that SVI improves investor recognition among stocks that suffer from poor information dissemination and high information incompleteness, which results in high excess returns. This lends support to the Attention hypothesis of Barber and Odean (2008) and Merton's (1987) investor recognition hypothesis. The results also support the assertion that EREITs behave similarly to common stocks.

The remainder of the paper is organized as follows. Section I presents the literature review. Sample description and data are described in Section II. Section III summarizes the findings. The final section concludes the paper.

LITERATURE REVIEW

Our paper relates to two strands of literature. It contributes to the strand of literature that examines the effect of investor attention on stock returns and to the literature that investigates the determinants of REITs returns.

According to the efficient market hypothesis, stock prices reflect all available information (Fama 1970). This hypothesis, however, is challenged by the argument that investors have limited attention. Kahneman (1973) suggests that attention is a scarce cognitive resource. Individuals have bounded rationality. When faced with large amounts of information, they are limited in terms of how much they can process. Consequently, they must be selective about the type of information to which they can dedicate their attention.

Several studies have examined the effect of investor attention on asset pricing. Engelberg, Sasseville, and Williams (2012) find that stocks that Jim Cramer mentions in his popular CNBC TV show Mad Money earn significantly positive overnight returns. Da et al (2011) report that, in the case of IPOs, increased attention results in high

abnormal returns in the first two weeks and the effect is reversed in one year. Tetlock (2011) reports that stale news result in temporary price movements among stocks dominated by individual investors. DellaVigna and Pollet (2009) find that investor inattention is high on Fridays. Earnings announcements made on Fridays have a 15% lower immediate response and a 70% higher delayed response. Hirshleifer, Lim and Teoh (2009) document that investor inattention increases on days crowded with earnings announcements. As a result, the immediate price response to earnings surprises is weaker and the post-earnings announcement drift is stronger. Fang and Peress (2009) suggest that investors' limited attention is behind the finding that stocks highly covered by mass media have lower returns than stocks not covered by the media, controlling for other risk factors. Barber and Odean (2008) postulate that individuals are net-buyers of attention grabbing stocks. Individuals only buy the stocks that catch their attention, which has repercussions on security pricing. Hou, Peng, and Xiong (2008) provide evidence that price under-reaction to earnings news weakens with increased investor attention while over-reaction strengthens with increased investor attention. Cohen and Frazzini (2008) find that there is return predictability among firms that are economically linked, which suggests that investor inattention exists. Hou and Moskowitz (2005) report that limited investor recognition is associated with the delay in the incorporation of information into stock prices. Hirshleifer, Hou, Teoh, and Zhang (2004) find evidence that investors' high attention to accounting profitability compared to cash profitability results in the former predicting long-term returns. Huberman and Regev (2001) report the case of a pharmaceutical firm called EntreMed whose price soared following the publication of the news story that the company is potentially developing cancer cure drugs in the New York Times. The news, however, was stale as it was already published in the journal Nature and other media outlets five month earlier but received no attention.

We contribute to the literature on investor attention by using a novel and direct proxy of individual investor attention. We use Google's Search Volume Index (SVI) obtained from Google Trends (http://www.google.com/trends). SVI represents a term's total number of searches scaled by its time-series average and is produced weekly using Google's aggregate search frequency. It is a direct measure of attention because investors only search those stocks that they pay attention to. SVI is considered an

investor measure specific to retail investors. Institutional investors do not use Google to get information. Instead, they have access to more sophisticated information services, such as Reuters and Bloomberg terminals and are not as limited in terms of attention as they devote significant amount of time and energy to research stocks.

Prior studies have used different proxies to measure investor attention. They include trading volume (Gervais, Kaniel, and Mingelgrin (2001), Barber and Odean (2008), and Hou, Peng, and Xiong (2008)), advertising expenditures (Chemmanur and Yan (2009)), Grullon, Kanatas, and Weston (2004), and Lou (2014)), prior excess returns (Barber and Odean (2008), price limits (Seasholes and Wu (2007), and news media coverage ((Barber and Odean (2008), Yuan (2008), and Fang and Peress (2009)). Da et al (2011) propose that such proxies are indirect measures of investor attention. They argue that these measures involve the assumption that appearance in the media, an increase in trading volume, or high excess returns are automatically linked to investor attention. However, an increase in trading volume or high returns may be due to other factors besides investor attention. Huberman and Regev (2001) assert that though a firm may appear in the media, increased investor attention is not guaranteed. Cohen and Frazzini (2008) report that investors are often overwhelmed by the amount of information reported in the media and they cannot effectively process it.

This paper is also related to the literature that investigates the determinants of REITs returns. One strand of this literature uses market factors and firm characteristics to explain the returns of REITs. Findings suggest that REITs behave like small capitalization stocks (Chan, Hendershott, and Sanders (1990), Han and Liang (1995) and Peterson and Hsieh (1997)), that they behave similarly to a portfolio composed of stocks and bonds (Sanders (1998)), and that they are more affected by the maturity rate spread between short and long term treasuries than by the credit rate spread between commercial bonds and treasuries (Swanson, Theis and Casey (2002)). Chui, Titman and Wei (2003) propose that the 1990s marked an increase in the effect of market momentum on REITs returns. REITs are also found to be sensitive to firm size and market to book ratio (Sanders (1998) and Chen, Hsieh, Vines, and Chiou (1998)). Sun and Yung (2009) find that idiosyncratic risk is positively related to EREITs returns.

The other strand of literature uses behavioral models to explain REITs returns. Lin, Rahman, and Yung (2009) examine the effect of investor sentiment on REIT returns. They find that when investors are optimistic (pessimistic), REIT returns get higher (lower). Pyles (2009) document that Seasonal Affective Disorder (SAD), commonly known as "winter blues" has an effect on the returns of REITs. In the fall months when the amount of daylight declines, SAD results in low returns as SAD inflicted investors sell their risky holdings, which result in lower returns. Returns climb higher in winter months as the amount of daylight increases. The results are driven by the smallest forty percent of REITs in the sample. Lin, Rahman, and Yung (2010) report that realized returns lead trading volume, which suggests that investor overconfidence has an effect on REITs returns.

Our paper is closely related to Sun, Yung, and Rahman (2010) who investigate the effect of investor recognition on EREIT returns. Using Merton's (1987) model of investor recognition, they argue that EREITs returns are positively related to shadow cost. Shadow cost refers to the additional returns required by investors to hold stocks for which there is incomplete information. A zero cost trading strategy that longs high shadow cost EREIT stocks and shorts low shadow cost EREIT stocks is associated with significant positive returns. Our results reveal that investor attention, as measured by SVI, has a significant positive effect on returns even after controlling for shadow cost. This is especially true among stocks with no analyst coverage.

SAMPLE AND DATA

Our sample consists of EREIT firms listed in the Center for Research in Security Prices (CRSP) between 2004 and 2012. The analysis starts in 2004 because it is the first year for which SVI data is available. Our main explanatory variable, SVI, is obtained through Google Trends at (http://www.google.com/trends). SVI constitutes a term's total number of searches scaled by its time-series average and is produced weekly using Google's aggregate search frequency. It is considered an appropriate measure of investor attention as search is a measure of attention and is representative of the entire population due to the fact that Google is a commonly and frequently used search engine (Da et al (2011)). SVI is obtained using each company's ticker symbol (Da et al 2011). This

allows accounting for search logs made for financial and investment purposes. In addition, all SVI reports are obtained from the Finance Category in Google Trends to reduce noise.

Return, market capitalization, and trading volume data are obtained from CRSP. Accounting data is obtained from Compustat. Analyst coverage data is collected from the I/B/E/S summary files and Institutional ownership is obtained from the 13f filings. The final sample comprises 182 EREITs firms with complete data. Table I reports all variables used in the study along with their definitions.

Table I
Variables Definition

Variable	Definition
SVI	Monthly Google's search volume index
Size	The natural logarithm of the previous calendar year's average market capitalization in thousands of dollars
Book-to-Market or Log(mtb)	The natural logarithm of the book value of equity divided by the market value of equity, as of the previous year end
Past Month Return	Previous month's stock return
Beta	A stock's systematic risk
Share Price or Price	Previous month's stock price
Illiquidity or Iliqd	Amihud illiquidity ratio and is daily absolute stock return to daily dollar trading volume, scaled by 10^{-5}
Dollar trading volume	daily closing price times daily trading volume, averaged over days in a year
Daily absolute stock return	absolute value of the stock's daily closing price
Mkt-rf	Monthly excess return on the market
SMB	Monthly performance of small stocks relative to big stocks
HML	Monthly performance of value stocks relative to growth stocks
UMD	Monthly performance of high past 12 month return stocks relative to low past 12 month return stocks
12 month momentum	return on company's stock over the past 12 months
Instown	monthly fraction of the number of shares owned by institutional investors to the number of common shares outstanding

idiosyncratic volatility or Idiovol	monthly volatility of stock's return unexplained by fama french's three factor model
Log(size)	Logarithm of total assets
Analyst coverage or ANUM	logarithm of 1 plus the yearly number of analysts following a stock
Fraction of Individual Ownership	1- the monthly fraction of the number of shares owned by institutional investors to the number of common shares outstanding
Idiosyncratic Volatility per Investor	the ratio of idiosyncratic volatility to the number of shareholders
logmarketcap	Logarithm of monthly market capitalization
logturnover	Logarithm of monthly trading volume
absabnreturn	Absolute value of monthly equally weighted excess return
Monthly analyst coverage	logarithm of 1 plus the monthly number of analysts following a stock
Advtosales	Ratio of advertising expense to sales in the previous fiscal year. If missing on Compustat, advertising expense is set to 0
Shadow cost	Shadow cost of incomplete information. It equals 2.5 * idiovol * X_i *(1-M)/M
X_i	the capitalization of the firm divided by total EREITS market cap
M	the ratio of the number of shareholders to the total number of investors in the market
logyTvol	Logarithm of yearly trading volume

RESULTS

Descriptive statistics

Table II displays the mean, median, and standard deviation of the main variables used in the study. SVI is the monthly Google's search volume index number. SVI's mean value among EREITs used in the sample is 40.70 with a standard deviation of 76.63. Size is the natural logarithm of the previous calendar year's average market capitalization in thousands of dollars. The mean size of companies in the sample is 13.65 and the standard deviation is 1.67. The book to market ratio is measured as the natural logarithm of the book value of equity divided by the market value of equity, as of the previous year end. The average value of the book to market ratio is -0.59 with a standard deviation of 0.76. The mean past month return of EREIT firms in the sample is 0.8% and the standard

deviation is 11%. Share price depicts the previous month's stock price. The average monthly share price for the EREITs in the sample is 29.21with a median value of 20.26 and a standard deviation of 36.46. Illiquidity is measured using the Amihud illiquidity ratio, which is the daily absolute stock return to daily dollar trading volume, scaled by 10^{-5}. The average value of the illiquidity measure is 11.32, a median of 0.02, and a standard deviation of 359.75. Momentum is the return on company's stock over the past 12 months. The mean value is 0.11 with a standard deviation of 0.37. The average number of analysts following an EREIT is 1.67 with a standard deviation of 0.59. Institutional ownership is the fraction of the number of shares owned by institutional investors to the number of common shares outstanding. The mean of institutional ownership is 74% with a standard deviation of 47%. Idiosyncratic volatility is the monthly volatility of stock's return unexplained by Fama French's three factor model. The mean idiosyncratic volatility is 2% with a standard deviation of 48%. Advtosales is the ratio of advertising expense to sales in the previous fiscal year. If missing on Compustat, advertising expense is set to 0. The mean value is 0.7% with a standard deviation of 3%.

Table II
Descriptive Statistics

This table displays the mean, median, and standard deviation of the main variables used in the study. The sample consists of 182 firms EREIT firms from 2004 to 2012. SVI is the monthly Google's search volume index number. Size is the natural logarithm of the previous calendar year's average market capitalization in thousands of dollars. BM is the book to market ratio is measured as the natural logarithm of the book value of equity divided by the market value of equity, as of the previous year end. The past month return is the previous month's stock return. Share price is the previous month's stock price. ILLIQ*10^{-5} is measured using the Amihud illiquidity ratio, which is the daily absolute stock return to daily dollar trading volume, scaled by10^{-5}. Momentum is the return on company's stock over the past 12 months. ANUM is logarithm of 1 plus the yearly number of analysts following a stock. Instown is the fraction of the number of shares owned by institutional investors to the number of common shares outstanding. Idiovol is the monthly volatility of stock's return unexplained by fama french's three factor model. Advtosales is the ratio of advertising expense to sales in the previous fiscal year. If missing on Compustat, advertising expense is set to 0.

Variable	Mean	Median	Std Dev
SVI	40.70	0	76.63
size	13.65	13.88	1.67
BM	-0.59	-0.55	0.76
Past month return	0.008	0.01	0.11
Share price	29.21	20.26	36.46
ILLIQ*10^{-5}	11.32	0.02	359.75
Momentum	0.11	0.13	0.37
ANUM	1.67	1.79	0.59
instown	0.74	0.79	0.47
idiovol	0.02	0.01	0.48
Advtosales	0.007	0	0.03

Comparative Statistics

In Table III, we identify no SVI and high SVI stocks and compare their firm characteristics. The mean (median) level of size for high SVI stocks is 13.78 (13.97) compared to 13.36 (13.55) for no SVI stocks. High SVI stocks are significantly larger than no SVI stocks. Using book to market ratio, we find that the mean (median) levels are -0.49 (-0.53) for high SVI stocks compared to -0.55 (-0.52) for stocks with no SVI. The mean difference shows that high SVI stocks have significantly higher of book to market ratio. The median difference, however, shows that high SVI stocks have significantly lower book to market than no SVI stocks. The mean (median) level of share

price is 27.43 (20.02) for high SVI stocks compared to 31.75 (17.00) for no SVI stocks. The mean difference of share price is significantly lower for high SVI stocks relative to no SVI stocks. The median difference of share price, however, is significantly higher for high SVI stocks relative to no SVI stocks. As for illiquidity, the mean (median) of high SVI stocks is 22.67 (0.019) relative to 6.18 (0.0038) for no SVI stocks. The mean difference shows that high SVI stocks are highly and more significantly illiquid than no SVI stocks. The median difference, however, shows that high SVI stocks are less illiquid. The mean (median) of analyst coverage for high SVI stocks is 1.78 (1.79) compared to 1.53(1.60) for no SVI stocks. High SVI stocks have significantly more analyst coverage than no SVI stocks. We can conclude that high SVI stocks tend to be larger and generate more analysts following relative to no SVI stocks.

Table III
SVI and EREIT characteristics

Table III reports the mean and median of different EREITs characteristics for no SVI and high SVI stocks and the difference between them. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively.

	No SVI	High SVI	Difference in mean (p-value)	Difference in median (p-value)
Size	13.36 (13.55)	13.78 (13.97)	-0.41***(<.0001)	-0.42*** (<.0001)
Book-market	-0.55 (-0.52)	-0.49 (-0.53)	-0.06 *** (<.0001)	0.01*** (<.0001)
Share price	31.75 (17.00)	27.43 (20.02)	4.31*** (<.0001)	-3.02*** (<.0001)
Illiquidity*10^{-5}	6.18 (0.038)	22.67 (0.019)	-16.49 *** (<.0001)	0.019*** (<.0001)
Analyst coverage	1.53 (1.60)	1.78 (1.79)	-0.24*** (<.0001)	-0.19*** (<.0001)

SVI and other investor attention measures

In this section, we examine whether SVI is related to other investor attention measures and whether it provides explanatory power to EREITs beyond that provided by these alternative measures. Table IV-A displays the correlation between SVI and other

investor attention measures. The table shows that, in general, log (SVI) has a relatively low correlation with other investor measures. The correlation between log (SVI) and logmarketcap, logturnover, absabnreturn, analystcoverage, and advtosales are 4.856%, 14.708%, 2.352%, 11.094%, and -6.111% respectively. Although the correlations between log (SVI) and logmarketcap, logturnover, analystcoverage, and advtosales are significant, all correlations remain low.

In Table IV-B, we regress monthly log (SVI) on alternative monthly measures of investor attention. Logmarketcap is negatively and significantly related to log(SVI) in columns (1), (2), and (3). This suggests that stocks that generate high SVI tend to be small stocks. Logturnover is positively and significantly related to log (SVI) in columns (1), (2), and (3), which means that an increase in trading volume increases investor attention. Absabnreturn and Advtosavles are significantly negatively related to log (SVI) in all columns while log (SVI) and analyst coverage is positively related.
The R^2 for the regression reported in column (1) is 3.08% and 2.01% for columns (2) and (3). The values of R^2 in all regressions are very small, which means that alternative measures of attention explain a small fraction of the variation in SVI. This is similar to the findings of Da et al (2011). SVI, therefore, is a unique investor attention measure among EREITs.

Table IV-A
Correlation between SVI and other investor attention measures

	logSVI	logmarketcap	logturnover	absabnreturn	analystcoverage	Advtosales
logSVI	1	0.048569***	0.14708***	0.02352***	0.11094***	-0.06111***
		<.0001	<.0001	0.0088	<.0001	<.0001
	12406	12406	12405	12406	5776	10776
logmarketcap	0.04856***	1	0.76130***	-0.20991***	0.26871***	0.08641***
	<.0001		<.0001	<.0001	<.0001	<.0001
	12406	13439	13435	13366	6039	10852
logturnover	0.14708***	0.76130***	1	0.05292***	0.36141***	0.05621***
	<.0001	<.0001		<.0001	<.0001	<.0001
	12405	13435	13501	13362	6046	10851

absabnreturn	0.02352***	-0.20991***	0.05292***	1	0.01759	-0.03267***
	0.0088	<.0001	<.0001		0.1718	0.0007
	12406	13366	13362	13366	6038	10809
analystcoverage	0.11094***	0.26871***	0.36141***	0.01759	1	-0.03768***
	<.0001	<.0001	<.0001	0.1718		0.0062
	5776	6039	6046	6038	6051	5266
Advtosales	-0.06111***	0.08641***	0.05621***	-0.03267***	-0.03768***	1
	<.0001	<.0001	<.0001	0.0007	0.0062	
	10776	10852	10851	10809	5266	10906

Table IV-B

SVI and alternative measures of attention

The dependent variable is the monthly log(SVI). Independent variables are defined in Table I. P-values are reported in brackets. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. The sample period is from January 2004 to December 2012.

	(1)	(2)	(3)
Intercept	1.07626***	0.91094**	1.29983***
	(<.0001)	(0.0127)	(0.0010)
logmarketcap	-0.20990***	-0.14082***	-0.12578***
	(<.0001)	(<.0001)	(0.0002)
logturnover	0.30252***	0.21402***	0.17291***
	(<.0001)	(<.0001)	(<.0001)
absabnreturn	-0.61900**	-1.47058***	-1.25422***
	(0.0114)	(0.0005)	(0.0073)
Monthly analystcoverage		0.40042***	0.36778***
		(<.0001)	(<.0001)
Advtosales			-4.27303***
			(<.0001)
Observations	12405	5776	5256
R^2	0.0308	0.0201	0.0201

SVI and the cross section of EREITs returns

We investigate the impact of SVI on the cross section of EREITs returns. We first conduct a univariate analysis examining average returns and then conduct a

multivariate analysis by forming subsamples of firms sorted by firm characteristics, illiquidity, and investor recognition and controlling for various risk factors.

Univariate Analysis

Table V reports the average monthly returns of stocks double sorted by SVI and firm characteristics. Each month, stocks are sorted into terciles by size, BM, past month return, price, and illiquidity. Terciles 1 and 3 refer to the lowest and highest value of each characteristic, respectively. Stocks in each characteristic-based tercile are sorted into three SVI portfolios: no SVI, low SVI, and high SVI. Stocks with no SVI are first identified. The remaining stocks are divided into low and high SVI groups using the median value of SVI. The table displays the equal-weighed return of each portfolio during the following month.

Examining all stocks in the sample, the table shows that the average monthly return for stocks with no, low, and high SVI are 0.81%, 0.86% and 1.08%, respectively. The average return between no SVI and high SVI stocks is -0.26%, which is significant at the 1% level. The results show that, overall, stocks that generate high SVI earn higher returns.

Double sorting stocks by SVI and size in panel A, we find that small stocks that generate high SVI earn significantly higher returns than small stocks that generate no SVI. Panel B shows that high book to market stocks with high SVI earn significantly higher returns than high book to marker stocks with no SVI. Low book to market stocks with high SVI, however, earn significantly lower returns than low book to market stocks with no SVI. Panel C displays stocks double sorted by past month return and SVI. The panel shows that for stocks that earned low to medium past month returns, high SVI results in higher average returns than similar stocks with no SVI. Double sorting by price and SVI, panel D shows that low and medium priced stocks that generate high SVI earn significantly higher returns than similar no SVI stocks. Panel D reports that highly illiquid stocks with high SVI earn significantly higher returns than highly illiquid stocks with no SVI.

The table shows that stocks that generate high SVI earn higher returns compared to stocks with no SVI. Double sorting by SVI and firm characteristics, we find that the

results are driven by stocks that are more mispriced. High SVI stocks that are small, with high book to market ratio, low past month return, low price, and are highly illiquid earn higher average returns than similar stocks with no SVI.

This provides support the Barber and Odean (2008) attention hypothesis. Retail investors are net-buyers of "attention-grabbing" EREIT stocks. As attention increases, buying increases. This results in higher price pressure and higher returns.

Table V
Search Volume Index and EREITS Returns: Univariate Comparisons

This table presents average monthly returns for EREIT stocks with no, low, and high Google's Search Volume Index (SVI). Each month, we sort stocks into terciles by size, BM, past month return, price, and illiquidity. Terciles 1 and 3 refer to the lowest and highest value of each characteristic, respectively. We sort each characteristic-based tercile into three SVI portfolios: no SVI, low SVI, and high SVI. Stocks with no SVI are first identified. The remaining stocks are divided into low and high SVI groups using the median value of SVI. We then compute the equal-weighed return of each portfolio during the following month. The results are reported and p-values are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Average Monthly Return						
	SVI			t- Statistics for for		P-value
	No	Low	High	No-High	No-High	No-High
All Stocks	0.81797	0.86019	1.08466	-0.267***	-3.85	(0.0001)
Panel A: By Size						
1	-0.0585417	0.2903	0.9702	-1.03***	-7.02	(<.0001)
2	0.97916	0.94523	0.88608	0.0931	0.88	(0.3782)
3	1.53916	1.33946	1.3922	0.147	1.44	(0.1508)
Panel B: By Book-to-Market						
1	1.32433	1.05041	0.46279	0.862***	9.14	(<.0001)
2	0.57964	0.84489	0.54277	0.0369	0.36	(0.7188)
3	0.57406	0.61462	1.89715	-1.32***	-8.91	(<.0001)
Panel C: By Past Month Return						
1	0.84345	1.19374	1.18825	-0.345**	-2.49	(0.0127)
2	0.8498	0.81601	1.32888	-0.479***	-4.51	(<.0001)
3	0.74739	0.58069	0.71166	0.0357	0.31	(0.7563)
Panel D: By Price						
1	0.69432	0.77523	1.30787	-0.614**	-3.72	(0.0002)
2	0.75761	0.79793	1.00259	-0.245***	-2.58	(0.0098)
3	1.00009	1.00713	0.94387	0.0562	0.68	(0.4991)
Panel E: By Illiquidity						
1	0.92479	0.8911	0.99242	-0.068	-0.68	(0.4960)
2	1.06935	0.85394	1.04899	0.0204	0.18	(0.8570)
3	0.50543	0.90733	1.21352	-0.708***	-4.91	(<.0001)

Multivariate analysis

We next identify the subsamples where the SVI effect is strongest. Table VI, Part A, examines the profitability of an SVI-based trading strategy in subsamples of firms sorted by firm characteristics and controlling for risk factors. We use three different factor models: the CAPM, the Fama-French (1993) three-factor model, and the Carhart (1997) four-factor model. Each month, we sort stocks into terciles by size, BM, price, and momentum. Terciles 1 and 3 refer to the lowest and highest value of each characteristic, respectively. Stocks are then sorted into three portfolios: no SVI, low SVI, and high SVI. Stocks with no SVI are first identified, and then the remaining stocks are divided into the low and high SVI groups using the median value of SVI. We create zero-cost portfolios that long high SVI stocks and short no SVI stocks in the following month. Portfolio weights are rebalanced monthly. Reported numbers are alphas from regressing the resulting time series of zero-investment portfolio returns on the CAPM, FF-3 and FF-4.

Table VI, Part A, shows that the SVI effect is strong among small stocks but has no effect on large stocks. We find significantly positive alphas among small stocks, stocks with high book to market ratio, and stocks with medium past momentum. These are stocks that are typically characterized by poor information dissemination and are highly mispriced. This begs the question as to whether the SVI effect results in higher returns due to reduction in mispricing or whether it is spurious and simply persists due to limits of arbitrage.

In Table VI, Part B and C, we seek to explain the SVI effect. We investigate the role of the "impediments-to-trade" hypothesis and the "investor recognition" hypothesis in explaining the investor attention effect.

The "Impediments-to-trade" hypothesis postulates that severe market frictions constitute "impediments-to-trade" that limit arbitrageurs' involvement, which causes mispricing to persist. We examine whether impediments to trade are behind the SVI effect. If impediments to trade are behind the SVI effect, then abnormal returns should be prevalent among highly illiquid stocks. To proxy for illiquidity, we use the Amihud's (2002) illiquidity ratio, dollar trading volume, and price. Table VI, Part B, reports the alphas related to a trading strategy that longs high SVI stocks and shorts no SVI stocks

for subgroups sorted based on these illiquidity proxies. We find positive but insignificant alphas among highly illiquid stocks. This suggests that impediments to trade are not behind the SVI effect.

The investor recognition hypothesis advanced by Merton (1987) suggests that in markets with incomplete information, investors are not aware of all securities. As a result, a stock that has low investor recognition needs to offer higher returns to compensate its holders for the risk borne. Lehavy and Sloan (2008) find that increased investor recognition results in higher contemporaneous returns, but decreases expected returns over the long run. We conjecture that when investors pay attention to a stock, the level of investor recognition related to the stock increases, which increases returns. If SVI results in higher investor recognition, then the SVI effect should be stronger among stocks characterized by low investor recognition and high information incompleteness.

Two measures are used to proxy for the degree of information incompleteness. These are analyst coverage and the fraction of individual ownership. Stocks with poor analyst coverage and high fraction of individual ownership are stocks characterized by high information incompleteness and therefore have low investor recognition.

In Table VI, part C, Panels A and B, we report the alphas related to a trading strategy that longs high SVI stocks and shorts no SVI stocks for subgroups sorted based on investor recognition measures. We find that the SVI effect is particularly strong among stocks with no analyst coverage. These are stocks characterized by poor information dissemination. SVI, therefore, increases investor recognition among these stocks. This means that SVI plays an important role in increasing investor recognition.

Two other measures are used to proxy for the cost of poor investor recognition. Idiosyncratic volatility measures the risk that shareholders bear as a result of imperfect diversification. Institutional ownership is a proxy for short sale constraints (Chen, Hong, and Stein (2002)). In Table VI, part C, Panels C and D, we report the alphas related to a trading strategy that longs high SVI stocks and shorts no SVI stocks for subgroups sorted based on idiosyncratic volatility and institutional ownership. We find that the SVI effect has no significant effect on idiosyncratic volatility or short sale constraints.

Overall, table VI shows that the SVI effect is strong among stocks that are small and with poor information dissemination. The high returns witnessed among these stocks

as a result of high SVI is due to improvement in investor recognition. As investor attention, as measured by SVI, increases, investor recognition of the stock increases, which results in higher returns.

Table VI
SVI-Related Trading Profits by Firm Characteristics, Illiquidity and Investor Recognition measures

This table examines the profitability of an SVI-based trading strategy in subsamples of firms sorted by firm characteristics (Part A), illiquidity (Part B), and investor recognition (Part C). Each month, we sort stocks into terciles by size, BM, price, momentum, and different liquidity and investor attention measures. Terciles 1 and 3 refer to the lowest and highest value of each characteristic, respectively. Stocks are then sorted into three portfolios: no SVI, low SVI, and high SVI. Stocks with no SVI are first identified, and then the remaining stocks are divided into the low and high SVI groups using the median value of SVI. We create zero-cost portfolios that long high SVI stocks and short no SVI stocks in the following month. Portfolio weights are rebalanced monthly. Reported numbers are alphas from regressing the resulting time series of zero-investment portfolio returns on the CAPM, FF-3 and FF-4. P-values are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Part A: By Firm Characteristics

CAPM Factor	FF Three-Factor	Carhart Four-
Panel A: By Firm Size		
Small		
0.0120**	0.0126**	0.0122**
(0.0499)	(0.0365)	(0.0409)
Medium		
-0.000609	-0.000983	-0.001036
(0.1440)	(0.7873)	(0.7772)
Large		
-0.000567	-0.000314	-0.000383
(0.8709)	(0.9281)	(0.9128)
Panel B: By Book-to-Market		
Low		
-0.003870	-0.003632	-0.003833
(0.2016)	(0.2284)	(0.1995)
Medium		

0.002955	0.002882	0.002691
(0.4943)	(0.5079)	(0.5360)
High		
0.0104*	0.0109*	0.0107*
(0.0764)	(0.0599)	(0.0656)
Panel C: By Price		
Low		
0.005444	0.005807	0.005420
(0.3556)	(0.3158)	(0.3444)
Medium		
0.004796	0.004878	0.004598
(0.2098)	(0.1988)	(0.2197)
High		
0.000921	0.000943	0.000998
(0.7260)	(0.7222)	(0.7079)
Panel D: By 12-month Momentum		
Low		
0.000263	0.000279	0.000118
(0.9523)	(0.9493)	(0.9786)
Medium		
0.006357*	0.006312*	0.006327*
(0.0570)	(0.0613)	(0.0622)
High		
0.003541	0.004054	0.003637
(0.4805)	(0.4123)	(0.4535)

Part B: By Illiquidity measures

CAPM	FF Three-Factor	Carhart Four-Factor
Panel A: By Amihud's (2002) Illiquidity Ratio		
Low		
0.000970	0.001195	0.001151
(0.7011)	(0.6185)	(0.6329)
Medium		
0.002060	0.002064	0.002049
(0.4617)	(0.4538)	(0.4596)
High		
0.004757	0.005259	0.005095
(0.3046)	(0.2515)	(0.2668)

Panel B: By Dollar Trading Volume		
Low		
0.003608	0.004128	0.003940
(0.4619)	(0.3953)	(0.4171)
Medium		
0.003590	0.003606	0.003520
(0.3500)	(0.3444)	(0.3576)
High		
0.000811	0.000973	0.001025
(0.7891)	(0.7444)	(0.7323)
Panel C: By Price		
Low		
0.005771	0.006218	0.005951
(0.2812)	(0.2459)	(0.2647)
Medium		
0.000674	0.000829	0.000900
(0.8577)	(0.8253)	(0.8114)
High		
-0.000173	-0.000106	-0.000157
(0.9405)	(0.9617)	(0.9435)

Part C: By Investor Recognition Measures

CAPM Factor	FF Three-Factor	Carhart Four-Factor
Panel A: By Analyst Coverage		
No		
0.008222	0.008604*	0.008819*
(0.1076)	(0.0930)	(0.0848)
Low		
-0.003879	-0.004080	-0.004381
(0.3769)	(0.3531)	(0.3129)
High		
0.001622	0.001896	0.002019
(0.7197)	(0.6710)	(0.6518)
Panel B: By the Fraction of Individual Ownership		
Low		
0.004133	0.004372	0.004236

(0.2163)	(0.2163)	(0.2308)
Medium		
-0.000127	-0.000127	-0.000446
(0.9802)	(0.9802)	(0.9296)
High		
0.001997	0.001997	0.002245
(0.6581)	(0.6581)	(0.6168)
Panel C: By Idiosyncratic Volatility		
Low		
0.000488	0.000139	-0.000320
(0.9026)	(0.9708)	(0.9290)
Medium		
0.003525	0.004090	0.004347
(0.2828)	(0.1916)	(0.1567)
High		
0.002188	0.002530	0.002499
(0.7270)	(0.6867)	(0.6920)
Panel D: By Institutional Ownership		
Low		
0.001519	0.001997	0.002245
(0.7390)	(0.6581)	(0.6168)
Medium		
-0.000060	-0.000127	-0.000446
(0.9907)	(0.9802)	(0.9296)
High		
0.004133	0.004372	0.004236
(0.2467)	(0.2163)	(0.2308)

SVI and returns in different time horizons

We examine returns associated with SVI over time. We sort stocks into deciles based on SVI to identify high SVI and no SVI stocks during the 1 month formation period. High SVI stocks are stocks in the winner decile while no SVI stocks are stocks in the loser decile. We hold winner and loser stocks for K months [t+1, t+k]. We skip a month between the formation period and the holding period to avoid serial correlation. In any month, we identify winner (High SVI) and loser (No SVI) stocks and calculate the equally weighted raw return of stocks held for K months.

Table VII shows the results with the winner and loser stocks as well as the difference between the winner and loser stocks over the K months holding period. This corresponds to a zero cost trading strategy that longs High SVI stocks and shorts no SVI stocks. The table reports average raw returns, the CAPM alpha, and the Fama French three factor model alpha. Panel A shows the results corresponding to the 1-month formation period for the whole sample. Panels B, C, and D report the results corresponding to the 1-month formation period for stocks with high book to market ratio, small size, and low price, respectively.

Table VII shows the performance of portfolios with [t+1, t+3], [t+1, t+6], [t+7, t+12], and [t+13, t+24] holding periods. Panel A indicates that a zero cost strategy that longs high SVI stocks and shorts no SVI stocks results in negative returns, though not significant. Controlling for the CAPM and the Fama French three factor model, we find that the zero cost strategy results in a reversal within three months.

Prior results show that the zero cost trading strategy that longs high SVI stocks and shorts no SVI stocks results in significant profits among high book to market and small stocks. We explore the performance of the zero cost trading strategy over time among high book to market stocks, small size and low priced stocks. Panel B reports the results of a zero cost trading strategy that longs high SVI and shorts no SVI stocks over time among high book to market stocks. We find that the strategy results in reversal in the 3, 6, 7 to 12, and 13 to 24 months holding periods. The CAPM and the Fama French three factor alphas show that we have a reversal in the 3 month and 6 month holding periods. Panel C shows that the zero cost trading strategy results in negative average raw returns during the 3, 6, and 13 to 24 months holding periods. The CAPM and the Fama French three factor model alphas show reversal during the 3 month holding period. Panel D shows that the zero cost trading strategy among low priced stocks results in negative average returns in the 3 month and 6 month holding periods. The CAPM and the Fama French three factor model alphas show reversal in the 3 month holding period.

We find evidence of negative returns if we long high SVI stocks and short no SVI stocks over time. Although our results are not significant, they are in line with the predictions of the attention hypothesis of Barber and Odean (2008). Attention results in increased buying, which temporarily pushes prices and returns higher. Over time, the

price pressure is reversed. Da et al (2011) report similar findings. They find that in the case of IPOs, increased attention results in high abnormal returns in the first two weeks and the effect is reversed in one year.

Table VII
SVI and returns over time

This table reports momentum returns. We require at least 24 monthly observations. Winner (loser) portfolios represent the ten percent of stocks with the highest (lowest) SVI over the formation period [t-J, J-1]. Equally-weighted calendar-time portfolios are reported during the holding periods [t+1, t+k] for K= 3, 6, [t+7, t+k] for k=12, and [t+13, t+k] for k=24. Panel A reports the results corresponding to the 1- month formation period for the whole sample. Panels B, C, and D report the results corresponding to the 1-month formation period for stocks with high book to market, small size, and low price, respectively. P-values are reported in brackets.

	Mean Return				CAPM Alpha				Fama-French Alpha			
	Months 1-3	Months 1-6	Months 7-12	Months 13-24	Months 1-3	Months 1-6	Months 7-12	Months 13-24	Months 1-3	Months 1-6	Months 7-12	Months 13-24
Panel A: Whole Sample - Formation period (-1, -1)												
Winners-Losers	-0.005 (0.15)	-0.004 (0.30)	-0.003 (0.40)	-0.003 (0.37)	-0.001 (0.71)	0.0004 (0.90)	0.001 (0.67)	0.0007 (0.83)	-0.001 (0.68)	0.0002 (0.94)	0.001 (0.71)	0.0006 (0.85)
Winners	0.009 (0.13)	0.01 (0.12)	0.01 (0.11)	0.01 (0.10)	0.003 (0.32)	0.004 (0.28)	0.004 (0.27)	0.004 (0.24)	0.002 (0.40)	0.003 (0.34)	0.003 (0.33)	0.003 (0.29)
Losers	0.03*** (0.005)	0.03*** (0.005)	0.03*** (0.004)	0.03*** (0.004)	0.007 (0.21)	0.008 (0.19)	0.008 (0.17)	0.008 (0.17)	0.008 (0.10)	0.008* (0.09)	0.009*** (0.008)	0.009* (0.08)
Panel B: High Book to Market- Formation period (-1, -1)												
Winners-Losers	-0.01 (0.15)	-0.01 (0.22)	-0.007 (0.46)	-0.003 (0.73)	-0.004 (0.65)	-0.001 (0.86)	0.003 (0.71)	0.002 (0.77)	-0.005 (0.55)	-0.002 (0.75)	0.002 (0.76)	0.002 (0.78)

Winners	0.008 (0.23)	0.007 (0.33)	0.008 (0.29)	0.01 (0.18)	0.002 (0.60)	0.001 (0.74)	0.002 (0.70)	0.004 (0.42)	0.002 (0.66)	0.0009 (0.84)	0.001 (0.81)	0.003 (0.52)
Losers	0.04*** (0.006)	0.04*** (0.005)	0.04*** (0.005)	0.04*** (0.005)	0.015 (0.18)	0.01 (0.16)	0.01 (0.16)	0.01 (0.16)	0.016* (0.08)	0.017* (0.07)	0.01* (0.07)	0.01* (0.07)
Panel C: Small size Sample - Formation period (-1, -1)												
Winners-Losers	-0.009 (0.37)	-0.002 (0.78)	0.001 (0.91)	-0.002 (0.84)	-0.0005 (0.95)	0.006 (0.47)	0.01 (0.30)	0.008 (0.36)	-0.004 (0.63)	0.002 (0.77)	0.006 (0.49)	0.004 (0.58)
Winners	0.003 (0.56)	0.006 (0.33)	0.007 (0.21)	0.007 (0.21)	-0.001 (0.68)	0.0008 (0.85)	0.002 (0.55)	0.002 (0.56)	-0.002 (0.59)	0.0003 (0.93)	0.002 (0.62)	0.001 (0.65)
Losers	0.02 (0.11)	0.02 (0.10)	0.026* (0.09)	0.02* (0.09)	0.003 (0.75)	0.003 (0.70)	0.004 (0.62)	0.004 (0.61)	0.007 (0.40)	0.008 (0.36)	0.009 (0.30)	0.009 (0.30)
Panel D: Low price Sample - Formation period (-1, -1)												
Winners-Losers	-0.002 (0.69)	-0.0003 (0.96)	0.008 (0.35)	0.002 (0.71)	-0.002 (0.77)	0.002 (0.77)	0.01 (0.23)	0.003 (0.57)	-0.003 (0.84)	0.0004 (0.94)	0.009 (0.27)	0.002 (0.66)
Winners	0.008 (0.38)	0.008 (0.36)	0.01 (0.22)	0.01 (0.16)	0.0006 (0.92)	0.001 (0.83)	0.005 (0.51)	0.005 (0.40)	-0.0004 (0.94)	0.0004 (0.95)	0.003 (0.61)	0.004 (0.50)
Losers	0.022* (0.07)	0.02* (0.06)	0.02* (0.08)	0.02* (0.08)	0.007 (0.36)	0.007 (0.34)	0.006 (0.42)	0.006 (0.43)	0.009 (0.15)	0.009 (0.14)	0.008 (0.19)	0.008 (0.20)

SVI and excess returns

In this section, we investigate the effect of investor attention on EREITs excess returns. We control for variables that the literature reported as having an effect on EREITs returns as well as alternative measures of investor attention.

To show that SVI provides additional explanatory power, it is important to control for short sale constraints. To do so, we use institutional ownership, which is a proxy for short-sale constraints (Chen et al (2002)). Merton (1997) finds that idiosyncratic volatility has an effect on returns. While Ang, Hodrick, Xing, and Zhang (2006) find a negative relationship, Boehme, Danielsen, Kumar, and Sorescu (2009) report a positive relationship. Illiquidity, logTA, and logMB, and systematic risk (beta) are also important controls (Sun et al (2010)).

Momentum is another variable that proved to have a significant effect on REIT returns (Hung and Glascock (2008) and Ooi, Wang and Webb (2009)). Sun et al (2010) report that it is important to consider shadow cost as it has a significant effect on REITs returns. Analyst coverage is also another important variable. Khoo, Hartzeil, and Hoesli (1993) find that analyst coverage is related to lower REIT returns due to the lower risk associated with increased information dissemination. Chemmanur and Yan (2009) use advertising expenditures as a proxy for investor attention and find that it has effect on short-run and long-run stock returns. Gervais, Kaniel, and Mingelgrin (2001) use trading volume as proxy for stock's visibility and study its impact on returns.

Table VIII presents the cross sectional time series regressions used. Column (1) shows that SVI has a significant positive effect on EREITs excess returns at the 1% level. Other controls that have significant effect on EREITs returns are beta, logMB, illiquidity, and momentum at the 1% level.

Controlling for shadow cost, which is a measure of investor recognition, SVI continues to have a significant positive effect on excess returns at the 10% level. Shadow cost along with beta, logMB, illiquidity, and momentum are all controls that have a significant effect on EREITs returns at the 1% level. LogTA has a significant effect on returns at the 10% level. We conclude that SVI provides explanatory power to EREITs beyond the effect of investor recognition.

Columns (3), (4), and (5) show a positive, though insignificant, impact of SVI on EREITs excess returns controlling for analyst coverage, advertising expenditures, and trading volume; respectively. In column (3), institutional ownership, beta, illiquidity, and momentum are all controls that have a significant impact on excess returns at the 1% level. Idiosyncratic volatility and logMB have a significant impact at the 5% level. In column (4), institutional ownership, beta, idiosyncratic volatility, illiquidity, and momentum all are controls that have a significant impact on excess returns at the 1% level. In column (5), beta, logMB, illiquidity, momentum, and trading volume (logyTvol) have a significant impact on returns at the 1% level. LogTA has a significant impact on excess returns at the 5% level.

As previously suggested, Khoo et al (1993) find that analyst coverage is related to lower REIT returns due to the lower risk associated with increased information dissemination. Merton (1987) also suggests that analyst coverage reduces information incompleteness and increases investor recognition. This implies that stocks followed by analysts and that have high investor attention are likely to generate lower returns than stocks with no analyst coverage and high investor attention.

Table IX-A shows the effect of investor attention on excess returns by splitting the sample between stocks with no analyst following and stocks with analyst following. The table shows that, for the full sample, SVI results in significantly positive excess returns at the 1% level. It also shows that stocks with no analyst following generate significantly positive excess return at the 1% level. Stocks with analyst following have a positive effect on excess returns, though not significant. The results show that the positive effect of investor attention on excess returns in the full sample is driven by stocks with no analyst coverage.

Table IX-B presents the effect of investor attention on excess returns by controlling for investor recognition. The table shows the results for the whole sample as well as by subsamples of no analyst coverage and with analyst coverage. The table shows that, for the whole sample, SVI results in positive and significant excess returns. For stocks with no analyst coverage, SVI results in positive and significant EREITs excess returns. For the subsample of stocks with analyst following, SVI results in negative but insignificant excess returns. Therefore, controlling for investor recognition,

increased SVI results in positive and significant excess returns and the results are driven by stocks with no analyst coverage.

In summary, we find that increased investor attention, measured by SVI, results in positive price pressure and higher excess returns, even after controlling for investor recognition among EREITs. The effect is driven by stocks that are characterized by information incompleteness and opacity, such as stocks with no analyst coverage. We conclude that our results provide further support to the attention hypothesis of Barber and Odean (2008) and Merton's (1987) investor recognition hypothesis.

Table VIII
The effect of SVI and other investor attention measures on returns

In this table, we perform monthly regressions examining the effect of SVI on return along with alternative measures of attention. The dependent variable is monthly excess returns on the company stock. Independent variables are SVI, institutional ownership, idiosyncratic risk, size, MB, illiquidity, and momentum. Regression (1) examines the effect of SVI on returns. Regression (2), (3), (4), and (5) control for shadow cost, analyst coverage, advertising expenditures to sales, and annual turnover. Definitions are available in Table I. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Intercept	-0.00220*	-0.00382***	-0.00138	-0.09045	-0.00615***
	(0.0766)	(0.0021)	(0.4082)	(0.4474)	(0.0005)
SVI	0.00000782***	0.00000419*	0.00000360	0.00030235	0.00000307
	(0.0025)	(0.0977)	(0.1763)	(0.1850)	(0.2387)
instown	-0.00059772	-0.00058815	0.00300***	0.22399***	-0.00052411
	(0.1759)	(0.1761)	(0.0010)	(<.0001)	(0.2429)
beta	0.00049137***	0.00051572***	0.00102***	0.00627***	0.00049418***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
idiovol	0.00041174	0.00045579	-0.04143**	2.87212***	0.00060470
	(0.5315)	(0.4759)	(0.0130)	(<.0001)	(0.3548)
logTA	-0.00002806	0.00029605*	-0.00029395	-0.01915	-0.00073560**
	(0.8653)	(0.0728)	(0.2665)	(0.1923)	(0.0104)
logMB	0.00116***	0.00075462***	0.00072020**	-0.00014470	0.00100***
	(<.0001)	(0.0066)	(0.0269)	(0.9966)	(0.0005)
ILLIQ*10^{-5}	0.00000308***	0.00000426***	-0.00048306***	-0.07230***	0.00000421***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Momentum	0.04182***	0.04063***	0.04090***	0.08538***	0.04183***
	(<.0001)	(<.0001)	(<.0001)	(0.0016)	(<.0001)
Shadow cost		0.00090850***			
		(<.0001)			
ANUM			-0.00034059		
			(0.4843)		
Advtosales				-0.01267	
				(0.5343)	
logyTvol					0.00074508***
					(0.0010)
Observations	234319	224465	208345	2276	229412
R^2	0.0237	0.0244	0.0265	0.1089	0.0240

Table IX-A
The effect of SVI by analyst coverage

In this table, we perform monthly regressions examining the effect of SVI on returns controlling for alternative measures of attention. The dependent variable is monthly excess returns on the company stock. Independent variables are SVI, institutional ownership, idiosyncratic risk, size, MB, illiquidity, and momentum. The results for the full sample are reported. Results for subsamples with no analyst coverage and with analyst coverage are also reported. Definitions are available in Table I. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	Full sample	No ANUM	With ANUM
Intercept	-0.00220	-0.01384***	-0.00101
	(0.0766)*	(0.0001)	(0.5237)
SVI	0.00000782***	0.00013789***	0.00000326
	(0.0025)	(<.0001)	(0.2131)
instown	-0.00059772	-0.00147***	0.00298***
	(0.1759)	(0.0099)	(0.0011)
beta	0.00049137***	-0.00446***	0.00102***
	(<.0001)	(<.0001)	(<.0001)
idiovol	0.00041174	0.00060718	-0.04001**
	(0.5315)	(0.4019)	(0.0157)
logTA	-0.00002806	0.00171***	-0.00041333**
	(0.8653)	(0.0068)	(0.0408)
logMB	0.00116***	0.00142*	0.00072938**
	(<.0001)	(0.0733)	(0.0249)
ILLIQ*10^{-5}	0.00000308***	0.00000237***	-0.00048237***
	(<.0001)	(0.0007)	(<.0001)
Momentum	0.04182***	0.05068***	0.04091***
	(<.0001)	(<.0001)	(<.0001)
Observations	234319	25974	208345
R^2	0.0237	0.0466	0.0265

Table IX-B

The effect of SVI by analyst coverage, controlling for investor recognition

In this table, we perform monthly regressions examining the effect of SVI on returns controlling for alternative measures of attention. The dependent variable is monthly excess returns on the company stock. Independent variables are SVI, institutional ownership, idiosyncratic risk, size, MB, illiquidity, momentum, and shadow cost. The results for the full sample are reported. Results for subsamples with no analyst coverage and with analyst coverage are also reported. Definitions are available in Table I. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	Full Sample	No ANUM	With ANUM
Intercept	-0.00382***	-0.00305	-0.01365***
	(0.0021)	(0.4580)	(<.0001)
SVI	0.00000419*	0.00017264***	-0.00000159
	(0.0977)	(<.0001)	(0.5298)
instown	-0.00058815	-0.00119**	0.00381***
	(0.1761)	(0.0471)	(<.0001)
beta	0.00051572***	-0.00438***	0.00113***
	(<.0001)	(<.0001)	(<.0001)
idiovol	0.00045579	0.00107	0.33733***
	(0.4759)	(0.2160)	(<.0001)
logTA	0.00029605*	-0.00031893	0.00037988*
	(0.0728)	(0.6601)	(0.0553)
logMB	0.00075462***	0.00317***	0.00194***
	(0.0066)	(0.0002)	(<.0001)
ILLIQ*10^{-5}	0.00000426***	0.00000270***	-0.00007202
	(<.0001)	(0.0004)	(0.5499)
Momentum	0.04063***	0.05867***	0.03936***
	(<.0001)	(<.0001)	(<.0001)
Shadow cost	0.00090850***	-0.00113	0.00097512***
	(<.0001)	(0.2578)	(<.0001)
Observations	224465	22335	202130
R^2	0.0244	0.0504	0.0280

SUMMARY

Traditional asset pricing models assume that prices immediately adjust to reflect all available information. However, Kahneman (1973) reports that attention is a scarce cognitive resource. This means that investors are limited in terms of the amount of information they can process, which suggests that prices may not immediately adjust to reflect all available information.

In this study, we investigate the effect of investor attention on EREITs returns. We find that an increase in SVI, a direct investor attention proxy, results in significant positive returns. The univariate analysis shows that this is especially true for EREITs that are small, with high book to market ratio, low past month return, low price, and are highly illiquid. The multivariate analysis using the CAPM, the Fama-French (1993) three-factor model, and the Carhart (1997) four-factor model shows that increased investor attention results in higher returns for stocks that are small and with high book to market ratio. We show that the SVI effect does not persist due to impediments to trade. Rather, SVI improves investor recognition, which results in high average returns. Investigating the effect of SVI on returns over time, we find evidence of return reversal, which is in line with the expectations of the attention hypothesis.

We also investigate the impact of SVI on excess returns controlling for alternative investor attention measures and other EREITs returns determinants. We find that increases in SVI results in high excess returns. Splitting the sample between EREITs with no analyst coverage and those with analyst coverage, we find that the effect is driven by stocks with no analyst coverage.

We conclude that SVI improves investor recognition and results in significant excess returns among EREITs that suffer from poor information dissemination and high information incompleteness. These findings are in line with the expectations of the attention hypothesis of Barber and Odean (2008) and Merton's (1987) investor recognition hypothesis.

REFERENCES

Amihud, Y. (2002). "Illiquidity and stock returns: cross-section and time-series effects." Journal of Financial Markets 5(1): 31-56.

Ang, A., et al. (2006). "The cross-section of volatility and expected returns." The Journal of Finance 61(1): 259-299.

Barber, B. M. and T. Odean (2008). "All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors." Review of Financial Studies 21(2): 785-818.

Bhasin, V., et al. (1997). "Changes in REIT Liquidity 1990–1994: Evidence from Intra-day Transactions." Real Estate Economics 25(4): 615-630.

Boehme, R. D., et al. (2009). "Idiosyncratic risk and the cross-section of stock returns: Merton (1987) meets Miller (1977)." Journal of Financial Markets 12(3): 438-468.

Brennan, M. J., et al. (1993). "Investment analysis and the adjustment of stock prices to common information." Review of Financial Studies 6(4): 799-824.

Brockman, P., French, D. W., & Tamm, C. (2014). "REIT organizational structure, institutional ownership, and stock performance." Journal of Real Estate Portfolio Management, 20(1), 21-36.

Buttimer Jr, R. J., et al. (2012). "REIT performance and market timing ability." Managerial Finance 38(3): 249-279.

Carhart, M. M. (1997). "On persistence in mutual fund performance." The Journal of Finance 52(1): 57-82.

Chan, K. C., et al. (1990). "Risk and return on real estate: evidence from equity REITs." Real Estate Economics 18(4): 431-452.

Chan, S. H., et al. (2002). "Real Estate Investment Trusts: Structure: Structure, Performance, and Investment Opportunities." OUP Catalogue.

Chemmanur, T. J. and A. Yan (2009). "Advertising, attention, and stock returns." Attention, and Stock Returns (February 10, 2009).

Chen, J., et al. (2002). "Breadth of ownership and stock returns." Journal of financial Economics 66(2): 171-205.

Chen, S.-J., et al. (1998). "Macroeconomic variables, firm-specific variables and returns to REITs." Journal of Real Estate Research 16(3): 269-278.

Chui, A. C., et al. (2003). "Intra-industry momentum: the case of REITs." Journal of Financial Markets 6(3): 363-387.

Cohen, L. and A. Frazzini (2008). "Economic links and predictable returns." The Journal of Finance 63(4): 1977-2011.

Da, Z., et al. (2011). "In search of attention." The Journal of Finance 66(5): 1461-1499.

Damodaran, A. and C. H. Liu (1993). "Insider trading as a signal of private information." Review of Financial Studies 6(1): 79-119.

Danielsen, B. R. and D. M. Harrison (2000). "The impact of potential private information on REIT liquidity." Journal of Real Estate Research 19(1): 49-71.

DellaVigna, S. and J. M. Pollet (2009). "Investor inattention and Friday earnings announcements." The Journal of Finance 64(2): 709-749.

Devos, E., et al. (2007). "Analyst activity and firm value: evidence from the REIT sector." The Journal of Real Estate Finance and Economics 35(3): 333-356.

Edelstein, R. H., et al. (2005). "Ownership dynamics of REITs." The Journal of Real Estate Finance and Economics 30(4): 447-466.

Engelberg, J., et al. (2012). "Market madness? The case of mad money." Management Science 58(2): 351-364.

Fama, E. F. (1970). "Efficient capital markets: A review of theory and empirical work*." The Journal of Finance 25(2): 383-417.

Fama, E. F. and K. R. French (1993). "Common risk factors in the returns on stocks and bonds." Journal of financial Economics 33(1): 3-56.

Fang, L. and J. Peress (2009). "Media Coverage and the Cross-section of Stock Returns." The Journal of Finance 64(5): 2023-2052.

Gervais, S., et al. (2001). "The high-volume return premium." The Journal of Finance 56(3): 877-919.

Ghosh, C., et al. (1996). "Are REITS stocks?" Real Estate Finance 13: 46-53.

Goetzmann, W. N. and R. G. Ibbotson (1990). "The performance of real estate as an asset class." Journal of Applied Corporate Finance 3(1): 65-76.

Grullon, G., et al. (2004). "Advertising, breadth of ownership, and liquidity." Review of Financial Studies 17(2): 439-461.

Han, J. and Y. Liang (1995). "The historical performance of real estate investment trusts." Journal of Real Estate Research 10(3): 235-262.

Hirshleifer, D., et al. (2004). "Do investors overvalue firms with bloated balance sheets?" Journal of Accounting and Economics 38: 297-331.

Hirshleifer, D., et al. (2009). "Driven to distraction: Extraneous events and underreaction to earnings news." The Journal of Finance 64(5): 2289-2325.

Hou, K. and T. J. Moskowitz (2005). "Market frictions, price delay, and the cross-section of expected returns." Review of Financial Studies 18(3): 981-1020.

Hou, K., et al. (2009). "A tale of two anomalies: The implications of investor attention for price and earnings momentum." Available at SSRN 976394.

Huberman, G. and T. Regev (2001). "Contagious speculation and a cure for cancer: A nonevent that made stock prices soar." The Journal of Finance 56(1): 387-396.

Hung, S.-Y. K. and J. L. Glascock (2008). "Momentum profitability and market trend: evidence from REITs." The Journal of Real Estate Finance and Economics 37(1): 51-69.

Kahneman, D. (1973). Attention and effort, Citeseer.

Khoo, T., et al. (1993). "An investigation of the change in real estate investment trust betas." Real Estate Economics 21(2): 107-130.

Lehavy, R. and R. G. Sloan (2008). "Investor recognition and stock returns." Review of Accounting Studies 13(2-3): 327-361.

Lin, C. Y., et al. (2009). "Investor sentiment and REIT returns." The Journal of Real Estate Finance and Economics 39(4): 450-471.

Lin, C. Y., et al. (2010). "Investor Overconfidence in REIT Stock Trading." Journal of Real Estate Portfolio Management 16(1): 39-57.

Lou, D. (2014). "Attracting investor attention through advertising." Review of Financial Studies: hhu019.

Merton, R. C. (1987). "A simple model of capital market equilibrium with incomplete information." The Journal of Finance 42(3): 483-510.

Najand, M., et al. (2006). "The conditional CAPM and time varying risk premium for equity REITs." Journal of Real Estate Portfolio Management 12(9): 167-176.

Ooi, J. T., et al. (2009). "Idiosyncratic risk and REIT returns." The Journal of Real Estate Finance and Economics 38(4): 420-442.

Peterson, J. D. and C. H. Hsieh (1997). "Do common risk factors in the returns on stocks and bonds explain returns on REITs?" Real Estate Economics 25(2): 321-345.

Pyles, M. K. (2009). "The influence of seasonal depression on equity returns: Further evidence from real estate investment trusts." Quarterly Journal of Finance and Accounting: 63-83.

Sanders, A. B. (1998). "The historical behavior of REIT returns: a capital markets perspective." Real estate investment trusts: structure, analysis, and strategy: 277-305.

Seasholes, M. S. and G. Wu (2007). "Predictable behavior, profits, and attention." Journal of Empirical Finance 14(5): 590-610.

Sias, R. W. and L. T. Starks (1997). "Return autocorrelation and institutional investors." Journal of financial Economics 46(1): 103-131.

Sun, Q. and K. Yung (2009). "Idiosyncratic risk and expected returns of equity real estate investment trusts." Journal of Real Estate Portfolio Management 15(1): 45-57.

Sun, Q., et al. (2010). "Investor Recognition and Expected Returns of EREITs." Journal of Real Estate Portfolio Management 16(2): 153-169.

Swanson, Z., et al. (2002). "REIT risk premium sensitivity and interest rates." The Journal of Real Estate Finance and Economics 24(3): 319-330.

Tetlock, P. C. (2011). "All the news that's fit to reprint: Do investors react to stale information?" Review of Financial Studies 24(5): 1481-1512.

Whitten, D. (2004). Investor Insight. Published in Japan Inc.

Yuan, Y. (2008). "Attention and trading." Unpublished Working Paper. University of Pennsylvania.

CHAPTER 2

INVESTOR ATTENTION AND THE OPEN MARKET REPURCHASES POST ANNOUNCEMENT RETURNS

ABSTRACT

Investors are limited in terms of the information they can process. According to the attention hypothesis, under-reaction in asset pricing is a result of the brain's limitations in processing large amounts of information. The attention hypothesis is used to generate insights into stock repurchases price drift. Using a sample of 318 firms that made repurchase announcements between 2004 and 2008 and which have weekly search volume data in Google Trends, we find that investor attention has an effect on the repurchase drift for stocks during the first year following the announcement. More specifically, we find that high abnormal search volume leads to a positive effect on cumulative returns during the first year following the announcement for small stocks, stocks with high idiosyncratic risk, low market to book ratio, and low past return. Low abnormal search volume signals a decrease in investor attention and results in negative returns among all stocks. The results provide further support to the attention hypothesis.

INTRODUCTION

The efficient market hypothesis suggests that stock prices reflect all available information (Fama 1970). However, empirical evidence has shown several instances where the market efficiency hypothesis was violated. For example, Ikenberry, Lakonishok, and Vermaelen (1995) document stock price under-reaction following open market repurchase announcements. Barberis, Shleifer and Vishny (1998) find evidence of under-reaction to earnings announcements as well as momentum effects. Michaely, Thaler and Womack (1995) document evidence of drift following dividend initiations and omissions. Similarly, Ikenberry, Rankine and Stice (1996) find evidence of drift following stock splits.

Prior research has shown that the existence of pricing anomalies is due to limits to arbitrage (Pontiff (2006), Shleifer and Vishny (1997), Gromb and Vayanos (2002), Chen,

Hong, and Stein (2002), Hirshleifer and Teoh (2003), and Doukas, Kim, and Pantzalis (2010)). The arbitrage risk hypothesis suggests that asset mispricing is due to the presence of idiosyncratic risk, which acts as a deterrent to arbitrage activity. Thus, the higher a firm's idiosyncratic risk, the more likely it is to be mispriced. By the same token, the lower a firm's idiosyncratic risk, the more likely it is to trade close to fundamental value due to arbitrage activity and involvement of professional traders. Another strand of literature attributes mispricing to investor psychological biases. Hong, Harrison and Stein 1999). Barberis et al (1998) and Daniel, Hirshleifer, and Subrahmanyam (1998)) attribute mispricing to cognitive biases, such as sentiment, conservatism, or over-confidence.

This paper focuses of the anomaly of stock price under-reaction following repurchase announcements. Open market share repurchases offer a situation where the efficient market hypothesis is violated. In a now classical paper, Ikenberry et al (1995) examine the long-run stock price performance of firms that announced open market repurchase programs between 1980 and 1990. They show that the average abnormal four year returns following the repurchase announcement is 12.1%. The average abnormal return is even higher for value stocks, amounting to 45.3%. Later papers have supported these findings and found that open market share repurchases are associated with positive abnormal returns up to three years following the announcement (Stephens and Weisbach (1998), Ikenberry, Lakonishok, and Vermaelen (2000), Jagannathan, Murali, and Stephens (2003), Chan, Ikenberry, and Lee (2004), Chan, Ikenberry, Lee and Wang (2010)). Ikenberry et al (1995) suggest that the reason for such drift is that the market fails to immediately incorporate information following a repurchase announcement. In other words, the delayed response shows evidence of under-reaction.

To explain the stock price post repurchase drift anomaly, we use a model that accounts for limits to arbitrage as well as uses a finance behavioral concept, which is investor attention. It is important to consider this question for several reasons. First, post repurchase price drift has not been studied from the perspective of investor attention. Most studies examine the link between under-reaction and the attention hypothesis in the context of earnings (Hirshleifer and Teoh (2003), Hirshleifer et al 2004, Hou and Moskowitz (2005), Cohen and Frazzini (2008), Hou et al 2008, Hirshleifer et al 2009,

and DellaVigna and Pollet (2009). The impact of attention on returns following stock buybacks is lacking. Second, under-reaction is stronger among firms characterized by high idiosyncratic risk (Ikenberry et al (1995)). Such mispricing persists due to limits to arbitrage that result from high idiosyncratic risk (Pontiff (2006), Shleifer and Vishny 1997, Gromb and Vayanos (2002), Chen et al (2002), Hirshleifer and Teoh (2003), and Doukas et al (2010)). This paper seeks to identify the impact that investor attention has on the post repurchase price drift given different levels of limits to arbitrage and idiosyncratic risk. Finally, this paper adds to the existing literature by using a novel and direct proxy of individual investor attention; Google's Search Volume Index (SVI) (Da et al 2011). SVI represents a term's total number of searches scaled by its time-series average and is produced weekly using Google's aggregate search frequency. Given that search is a measure of attention and that Google is a commonly used search engine, its reported search logs are likely to be representative of that of the entire population and, as a result, appropriate in measuring investor attention (Da et al 2011).

The univariate analysis shows that an increase in Google's search volume, as measured by Abnormal Search Volume Index (ASVI), results in positive and significant cumulative returns for all stocks. The univariate analysis also shows that ASVI has the largest and most significant impact on stocks that are small, with low market to book ratio, are low priced, are more illiquid and are with low analyst coverage. The multivariate analysis reports that ASVI results in higher cumulative returns during the first year following the repurchase announcement. The results are driven by small stocks. Further analysis shows that high ASVI results in positive and significant effect on cumulative returns among stocks with high idiosyncratic risk, low market to book ratio, and low past return. We conclude that retail investor attention, as measured by Google's ASVI, increases buying among stocks that suffer from limits to arbitrage. This reduces mispricing and results in the impounding of the repurchase announcement information into stock prices. This is in line with the predictions of investor attention hypothesis.

The rest of the paper is organized as follows. The first section presents the theoretical development. Methodology and sample description are provided in the second section. The third section summarizes the findings. The final section concludes the paper.

THEORETICAL DEVELOPMENT

Ikenberry et al (1995) suggest that the reason for the stock price post repurchase drift is that the market fails to immediately incorporate information following a repurchase announcement. The delayed response shows evidence of under-reaction. Under-reaction refers to the slow incorporation of information in the stock price of a firm following good news shock (Ikenberry et al 1995). It causes the stock price to trade below fundamental value and to exhibit short term trends in returns (Barberis et al (1998)).

In the behavioral finance literature, under-reaction is attributed to two reasons; conservatism (Barberis et al 1998) and investors' limited attention/ recognition (Merton (1987), Hirshleifer and Teoh (2003), DellaVigna and Pollet (2009), Peng (2005), DellaVigna and Pollet (2007), Peng and Xiong (2006), Hou, Peng, and Xiong (2008), and Hirshleifer, Seongyeon and Teoh (2009)).

Conservatism suggests that "individuals are slow to change their beliefs in the face of new evidence" Barberis et al (1998, p. 315). Under conservatism, investors are aware of the newly available information, but they react to it partially. According to Griffin and Tversky (1992), under-reaction is a result of the weight and strength given to a news item. Strength refers to the importance given to the new evidence. Weight refers to the credence and plausibility that is given to that news item. Under-reaction results when a piece of news that is credible is given less importance. This means that under-reaction happens when a news item that has high weight is given less strength.

According to the attention hypothesis, under-reaction is not so much a result of conservatism, but is a result of investor inattention. Under-reaction, thus, is a result of the brain's limitations in processing large amounts of information.

Attention is a scarce cognitive resource that helps an individual deploy more mental faculty to one object or thought relative to others (Kahneman (1973)). Due to the large amount of information that investors receive and given that attention is a scarce cognitive resource, investors are limited in terms of the information they can process (Cohen and Frazzini 2008). As a result, they select the type of information to which they can devote attention. Attention helps investors incorporate available information into

their wealth (Karlsson et al 2005). Inattention results in the slow incorporation of information in asset pricing, which results in under-reaction.

The Attention hypothesis of Barber and Odean (2008) suggests that individual investors are net-buyers of "attention-grabbing" stocks. Prior to buying, investors consider a set of stocks they research and to which they pay attention. When buying, they choose from this set of stocks. The attention hypothesis advances that increased attention leads to increased buying, which temporarily pushes prices higher and results in higher returns.

The attention hypothesis is closely related to the investor recognition hypothesis advanced by Merton (1987). The hypothesis suggests that in markets with incomplete information, investors do not know about all securities. Consequently, the lower the number of investors that know about a security, the lower is its investor recognition and vice versa. Merton posits that stocks with low investor recognition require high returns to compensate their holders for the risk they bear. Before investors recognize a stock, they must first pay attention to it. Attention is, therefore, a pre-requisite to investor recognition (Ding and Hou 2011).

Several models have examined asset pricing using the attention hypothesis. Huberman and Regev (2001) document the case of a firm's stock whose price soared dramatically following the publication of a related news item in the New York Times. The news was stale, though, because it was published in other media outlets months earlier but received no attention. Hirshleifer, Hou, Teoh, and Zhang (2004) show that investors pay more attention to accounting profitability compared to cash profitability, which leads to the former predicting long-run returns. Hou and Moskowitz (2005) find that stock price delay is related to proxies of investor recognition. Cohen and Frazzini (2008) provide evidence that investor inattention exists, which explains the return predictability for firms that are economically linked. Barber and Odean (2008) show that investors' buying and selling is driven by highly publicized news and events, which suggests that investor attention is instrumental in asset pricing. Hou, Peng, and Xiong (2008) find that over-reaction in stock prices is associated with increased investor attention; whereas under-reaction is caused by investor inattention. Hirshleifer, Lim and Teoh (2009) suggest that the immediate price response to earnings surprises is weaker

and the post-earnings announcement drift is stronger when a firm's earnings are announced in a day that is crowded by other earnings announcements. This suggests that investor attention and distraction play a role in asset pricing. DellaVigna and Pollet (2009) find that earnings announcements made on Fridays have a 15% lower immediate response and a 70% higher delayed response. The authors attribute these results to high investor inattention on Fridays. Engelberg, Sasseville, and Williams (2012) provide further evidence that supports the effect of investor attention on asset pricing. Their research documents the positive relationship between total viewership, especially among wealthy viewers, and the overnight returns associated with stocks mentioned by Jim Cramer in his popular CNBC show Mad Money.

All in all, these studies have found that limited investor attention is responsible for under-reaction. The more attention a firm receives, the more quickly new information is incorporated into its stock price. When a firm receives less attention, new information is not immediately incorporated into its stock price, which results in price under-reaction.

Prior studies have used different measures to capture investor attention. Gervais, Kaniel, and Mingelgrin (2001) used trading volume as an indicator of stock's visibility and investigated its impact on future abnormal returns. Hou et al (2008) used it to assess price and momentum strategies. Chemmanur and Yan (2009), Grullon, Kanatas, and Weston (2004), and Lou (2014) used advertising expenditures as a proxy for investor attention to study its effect on short-run and long-run stock returns, the presence of individual and institutional investors and stock liquidity, and short-term stock excess returns and manager timing; respectively. Barber and Odean (2008) used prior excess returns to measure investor attention and found that it predicts future abnormal returns. They also used a stock's appearance in the media as a proxy of investor attention and found that it results in excess returns. Similarly, Yuan (2008) investigated news headlines' influence on investor trading behavior. Seasholes and Wu (2007) used price limits as a proxy for investor attention and found that Shanghai stocks that reach price limits enjoy higher returns, higher turnover, and higher media attention.

Da et al (2011) argue that proxies such as trading volume, advertising, excess returns, news and media reports, and price limits do not truly reflect investor attention. They suggest that a stock's excess returns or abnormal trading volume may not only be

due to abnormal investor attention, but to other factors. In addition, appearance in the news may result in increased investor attention, but not always (Huberman and Regev (2001)). In fact, often times, investors are overwhelmed by the amount of financial news and information reported in the media (Cohen and Frazzini 2008). Therefore, a more direct proxy, such as SVI, is needed to measure investor attention.

SVI is considered a proxy that is specific to individual investors because these latter use the internet to obtain financial information (Da et al 2011). More sophisticated institutional investors use information services such as Reuters and Bloomberg terminals. SVI, thus, enables the examination of the direct impact of retail investors' attention on the stocks of firms that announced stock buybacks.

Individual investors are considered for the purpose of this study because they are more likely to buy "attention grabbing" stocks (Barber and Odean 2008). Attention is not as limited for institutional investors as it is for individual investors. Institutional investors allocate a significant amount of time to stock research as well as use advanced technology to aid in their search. Thus, to study the effect of attention on the returns following stock buybacks, a measure of individual investor attention, such as the SVI, is appropriate.

More specifically, we look at Abnormal SVI (ASVI), which is defined as "the (log) SVI during the current week minus the (log) median SVI during the previous eight weeks" Da et al (2011. p 1463). ASVI depicts abnormal attention or attention shock. We measure the ASVI for each week following the repurchase announcement and study its impact on prices and returns.

An increase in ASVI is expected to result in positive abnormal returns following the repurchase announcement. The attention hypothesis of Barber and Odean (2008) predicts that attention results in increased buying, which pushes returns higher. This implies that as investors' attention increases, the repurchase announcement news gets incorporated in the stock price. We hypothesize that:

H1: An increase in ASVI results in positive abnormal returns following the repurchase announcement

In the finance literature, mispricing anomalies, such as under-reaction, are due to the presence of idiosyncratic risk and limits to arbitrage (Doukas et al 2010). The arbitrage risk hypothesis suggests that mispricing is higher among high idiosyncratic risk stocks compared to low idiosycraytic risk stocks (Pontiff (1996), Shleifer and Vishny (1997), Gromb andVayanos (2002), Chen, Hong, and Stein (2002), and Hirshleifer and Teoh (2003), and Doukas et al (2010). To hedge against fundamental risk, arbitrageurs have to take an opposite position in a stock that is a close substitute to the mispriced stock. Given that arbitrageurs are risk averse (Pontiff 2006) and that high idiosyncratic risk stocks have fewer close substitutes, such stocks continue to be mispriced due to lack of professional investors' involvement.

Idiosyncratic risk is a risk that is specific to the firm and that is independent of the market risk (Fu 2009). The Fama French model is used to estimate it. Each week, excess returns are regressed on the excess returns on the market portfolio, the difference in returns between small and large stocks, and the difference in returns between high market to book stocks and low market to book stocks.

$$Ri(t) - Rf(t) = \alpha + \beta 1(Rm(t) - Rf(t)) + \beta 2SMB(t) + \beta 3HML(t) + \varepsilon_i(t) \qquad (1)$$

Idiosyncratic risk is measured as the standard error of the model's residuals. Weekly stock returns obtained from the Center for Research in Security Prices (CRSP) and weekly factor data are obtained from the Kenneth R. French's website.[2] Market to book ratio and past week return are two other measures used to proxy for limits to arbitrage.

Stocks that are characterized by high idiosyncratic risk, low market to book ratio and low past week return are stocks that suffer from limits to arbitrage. Such stocks tend to be mispriced. Brandt, Brav, Graham, and Kumar (2009) also report that these stocks tend to be dominated by retail investors. An increase in ASVI results from an increase in retail investor attention. This latter in turn results in increased buying, which pushes prices and returns higher (Barber and Odean (2008)).

[2] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

We expect that following a repurchase announcement, an increase in ASVI among firms with high idiosyncratic risk, low market to book ratio, and low past return to result in increased buying, which results in higher cumulative returns. We hypothesize that:

H2: An increase in ASVI among stocks with high idiosyncratic risk, low market to book ratio, and low past return results in positive and significant cumulative returns

SAMPLE AND DATA

The sample is comprised of all NYSE, NASDAQ, and AMEX listed firms that announced open market repurchase announcements between 2004 and 2008. The analysis starts in 2004 because it is the first year for which SVI data is available. It ends in 2008 to allow studying the effect of the announcement on stock returns three years following the announcement date. Similar to Da et al (2011), the American Deposit Receipts (ADRs), closed-end funds, real estate investment trusts (REITs), limited partnerships (LPs), and stocks below five dollars are excluded from the sample. Firms that have announced accelerated repurchase announcements are excluded from this study. Stock repurchase announcements are obtained from the Thomson One database. Firm accounting data is obtained from COMPUSTAT and returns are obtained from CRSP. Analyst data is obtained from I/B/E/S, news coverage is obtained from Factiva, and Sentiment data is from Barron's through Factiva. Closely held shares and the number of common shares outstanding are obtained from Worlscope.

To be included in the sample, a firm must have complete information in Google Trends, COMPUSTAT, CRSP, I/B/E/S, Factiva, and Worldscope databases. Of the 2,452 companies that announced open share repurchase announcements, 318 companies are included in the study with a total of 49,600 firm-week observations.

Cumulative returns are calculated every week for up to three years following the repurchase announcement. SVI reports are obtained through Google Trends at (http://www.google.com/trends). In this study, SVI is obtained using each company's ticker symbol (Da et al 2011). The ticker symbol is used to capture the search logs that are made for financial and investment purposes. It is also used to avoid accounting for

searches that pertain to the companies' products and services. For example, to obtain the amount of searches done by investors interested in Bank of America, we input its ticker symbol "BAC" in Google trends instead of "Bank of America". The use of the bank's name may include searches done by the bank's customers instead of interested investors. In addition, all SVI reports are obtained from the Finance Category in Google Trends to reduce noise.

In this study, the Abnormal SVI (ASVI) for each week following the repurchase announcement is used. To examine the impact of Abnormal SVI on cumulative abnormal returns, we follow Da et al (2011) method in using Fama-Macbeth (1973) regression for panel data. We regress weekly cumulative returns on ASVI and control for other attention proxies such as news coverage, turnover, analyst coverage, advertising expenditures, and last week's excess returns. Investor sentiment, measured using the consumer confidence index and published by the Conference Board, is also used as a control variable in this study. We also include other controls used in the share repurchase literature. These are firm size, undervaluation measured by the market to book ratio, excess cash flow, excess debt capacity, ownership concentration, the size of the repurchase program, and the number of times the same company announced a repurchase program during the three years following the announcement.

To account for the effect of news on post-repurchase announcement returns, we use Tetlock (2010) news variables; "News dummy" and "log (1 + log(number of news in the last 52 weeks)". Prior research indicates that the presence of news has a significant effect on ASVI, and as a result on returns (Da et al 2011). In addition, the log of the number of news reported in the last 52 weeks has a significant and negative relationship with ASVI. This is expected because no abnormal attention is given to stocks that are widely covered. Therefore, for each week following the repurchase announcement, we identify whether news stories related to each firm have been reported. The dummy variable takes on the value of 1 if news concerning the company appears in the newswires that week and a value of 0 otherwise. News data is obtained from the Dow Jones archive, which encompasses the Dow Jones News Service as well as the Wall Street Journal articles. The Dow Jones archive is accessed through Factiva.

Weekly trading volume is obtained from Compustat. Analyst coverage is measured using the variable log(1+ # of analysts). The number of analysts is obtained from the I/E/B/S database. Advertising expenditures are measured using last year's ratio of advertising expense to sales. Advertising and sales data are obtained from COMPUSTAT. If a firm's data is missing from the database, the ratio takes the value of 0. Another independent variable that is used is last week's absolute excess returns.
A variable that has influential impact on retail investors' attention is sentiment (Da et al 2011). Investor Sentiment is defined as "a belief about future cash flows and investment risks that is not justified by the facts at hand." Baker and Wurgler (2007, p. 129). It is important to examine this variable because individual investors are more likely to be affected by sentiment compared to institutional investors (Da et al 2011). We use the American Association of Individual Investors (AAII) weekly sentiment measure. AAII data was hand collected from Barron's through Factiva. Investor sentiment is calculated using the spread between the percentage of bullish investors and bearish investors each week (Brown 2004).

We also use share repurchases literature controls. These include market capitalization, market to book ratio, excess cash, debt to assets, ownership concentration measured by closely held shares, size of the repurchase program, and the number of times the repurchase announcement is made during the period of study. Table X-A presents the variables used in the study and their definitions

Table X-A
Variables Definition

Variable	Definition
SCAR	Standardized Cumulative Abnormal Returns
SVI	Monthly Google's search volume index using each company's ticker symbol
ASVI	Calculated using the (log) SVI during the current week minus the (log) median SVI during the previous eight weeks
News dummy or Newsd	Takes the value of 1 if the company has news reported in the week in the Dow Jones News Service and the Wall Street Journal; 0 otherwise
News	log (1 + log(number of news in the last 52 weeks)
Trading volume	Weekly trading volume obtained from Compustat
Analyst	Calculated using log(1+ # of analysts). The number of analysts is obtained from the I/E/B/S database
Adv to sales	last year's ratio of advertising expense to sales. Advertising and sales data are obtained from COMPUSTAT. If a firm's data is missing from the database, the ratio takes the value of 0
Xret	last week's absolute excess returns to the value weighted index
Sentiment	The American Association of Individual Investors (AAII) weekly sentiment measure
MKTcap	the year-end log (market capitalization) prior to the announcement
MB	Year-end market to book value ratio prior to the announcement
Excess cash	Compustat's operating income after depreciation to total assets prior to the repurchase announcement
Debt to assets	Year-end ratio of total debt to total assets prior to the repurchase announcement
Closelyheld	Year-end ratio of closely held shares to the total number of common stocks at the company's year-end prior to the announcement. Data is obtained from Worldscope
Program size	The ratio of the value of the buyback program to the year-end value of common total equity prior to the repurchase announcement, expressed as a percentage
Announce times	The number of times the same company announced a repurchase program during the three years following the announcement
IR	Standard error of residuals in the Fama French three factor model

RESULTS

Table X-B displays the summary statistics. Panel A shows the descriptive statistics for the whole sample. Panel B gives descriptive statistics for firms with low idiosyncratic risk and Panel C displays the results for firms with high idiosyncratic risk. We can see that stocks with low idiosyncratic risk have slightly higher ASVI, higher market capitalization, higher advertising expenses, more analyst coverage, higher trading volume, higher market to book ratio, make more repurchase announcements, higher debt, and have more news coverage compared to stocks with high idiosyncratic risk. Low idiosyncratic firms tend to also make repurchase announcements during times with positive sentiment. Firms with high idiosyncratic risk make repurchase announcements during times characterized by negative sentiment.

On the other hand, stocks with high idiosyncratic risk have higher cumulative returns, higher prior excess returns, more closely held shares, higher repurchase program size, and higher excess cash.

Table X-B
Descriptive Statistics

Panel A: Descriptive Statistics for the whole sample

Variable	N	Mean	Median	Std Dev	Range
SCAR	50552	0.1122	0.12871	1.054389	24.2164
ASVI	51324	0.003186	0	0.086261	2.109145
Log market cap	51324	3.540039	3.568993	0.881031	4.13109
XRET	51324	0.034989	0.021836	0.046589	2.355841
adv to sales	51324	0.014392	0	0.033133	0.322015
analyst	51324	0.257771	0.30103	0.241388	1.255273
Trading Volume	51324	19.79639	5.738012	43.77001	958.9926
Sentiment	51324	0.887279	0.9	17.60135	107.6
MB	51324	3.237076	2.251	9.345449	212.857
announ times	51324	1.920973	2	1.071817	7
Debt to assets	51324	0.207484	0.180272	0.19027	1.599878
closelyheld	51324	0.179327	0.121732	0.220211	1.702658

program size	51324	95.12553	14.48069	1001.9	15530.36
Excesscash	51324	0.107341	0.091006	0.093767	0.749614
news	51324	1.684787	1.633469	0.666394	3.863025
news dummy	51324	0.491505	0	0.501722	9
IR	51324	0.054722	0.0491	0.024721	0.2232

Panel B: Descriptive Statistics for stocks with low idiosyncratic risk

Variable	N	Mean	Median	Std Dev	Range
SCAR	16619	0.06348	0.072359	0.90981	9.41378
ASVI	17114	0.003225	0	0.08188	1.633469
Log market cap	17114	4.009809	4.054024	0.749787	3.865352
XRET	17114	0.020714	0.014869	0.020619	0.238994
adv to sales	17114	0.0168	0	0.043158	0.322015
analyst	17114	0.299819	0.30103	0.246574	1.255273
Trading Volume	17114	26.80179	9.227263	56.50214	880.0171
Sentiment	17114	4.333248	4.8	17.56832	107.6
MB	17114	3.68872	2.743	15.54106	212.857
announ times	17114	2.475167	2	1.278219	7
Debt to assets	17114	0.225921	0.196981	0.171447	0.683427
closelyheld	17114	0.107525	0.037814	0.148247	1.1352
program size	17114	9.763087	14.01044	278.4333	13798.9
Excesscash	17114	0.110443	0.08197	0.104047	0.705612
news	17114	1.907308	1.869232	0.710281	3.480295
news dummy	17114	0.583674	1	0.498386	9

Panel C: Descriptive Statistics for stocks with high idiosyncratic risk

Variable	N	Mean	Median	Std Dev	Range
SCAR	16676	0.181889	0.175609	1.210754	21.83687
ASVI	17143	0.00311	0	0.089437	2.109145
Log market cap	17143	3.170043	3.130262	0.82642	3.767566
XRET	17143	0.052297	0.033747	0.067116	2.35584
adv to sales	17143	0.014455	0	0.027366	0.172483
analyst	17143	0.230358	0.30103	0.234822	0.90309
Trading Volume	17143	16.39409	2.846451	39.37906	958.9924
Sentiment	17143	-2.23538	-1.2	17.1013	98.3
MB	17143	3.32886	2.103	4.150611	32.744
announ times	17143	1.467538	1	0.717536	3

Debt to assets	17143	0.210862	0.180272	0.227314	1.599878
closelyheld	17143	0.227266	0.151981	0.219212	0.811141
program size	17143	149.7983	14.6008	1295.38	13689.58
Excesscash	17143	0.112995	0.104466	0.09136	0.476368
news	17143	1.537582	1.462398	0.60543	3.863025
news dummy	17143	0.415972	0	0.492903	1

Table XI reports the cumulative returns of stocks double sorted by ASVI and different firm characteristics. Stocks are first sorted into terciles by size, market to book ratio, past weekly return, price, illiquidity, and analyst coverage. Terciles 1 and 3 refer to the lowest and highest value of each characteristic, respectively. Each characteristic-based tercile is further sorted into three ASVI portfolios: no ASVI, low ASVI, and high ASVI. Stocks with no ASVI are first identified. The remaining stocks are divided into low and high ASVI groups using the median value of ASVI. The cumulative return of each portfolio is then computed.

Examining all stocks in the sample, the table shows that the average cumulative return for stocks with no, low, and high ASVI are –0.07, 0.08, and 0.09 respectively. The difference in the average cumulative return between no ASVI and high ASVI stocks is -0.16, which is significant at the 1% level. The results show that, overall, stocks that generate high ASVI earn higher cumulative returns.

Double sorting stocks by ASVI and size in panel A, we find that stocks that generate high ASVI, regardless of size, earn significantly higher cumulative returns than stocks with no ASVI. Small stocks with high ASVI generate the highest cumulative returns compared to small stocks with no ASVI. Panels B shows that all stocks with high ASVI earn higher returns than stocks with no ASVI. Stocks characterized by high ASVI and low market to book ratio earn the highest cumulative returns compared to low market to book ratio stocks with no ASVI. Panel C reports that all stocks with high ASVI, regardless of their past return, earn significantly higher returns relative to stocks with no ASVI. Panels D, E, and F support prior findings and show that stocks with high ASVI earn higher cumulative returns than stocks with no ASVI. High ASVI stocks that are low

priced, are highly illiquid, and with low analyst coverage earn the highest cumulative returns.

Table XII examines the effect of ASVI on cumulative abnormal returns during the first 4 weeks, 5 to 52 weeks, 53 to 104 weeks, and 105 to 156 weeks following the announcement. It shows that, controlling for other attention measures, an increase in ASVI in the first year following the repurchase announcement has a positive and significant impact on cumulative returns. During the second and the third year, ASVI shocks do not have a significant impact on returns.

The interaction between market cap and ASVI has a negative and significant impact on cumulative returns during the first year. This suggests that the increase in cumulative returns following shocks in attention is stronger for small firms. The table also shows that firm size, measured by market capitalization, is negatively and significantly related to cumulative returns from week 4 to the end of the third year. This indicates that smaller firms have stronger cumulative returns and the strongest post repurchase stock price drift.

The table also shows that lagged absolute abnormal returns have a negative and significant impact on cumulative returns during the first year following the announcement. However, during the second and third year, an increase in lagged absolute abnormal returns results in positive and significant impact on future cumulative returns. Advertising expenses is another attention measure that is used as a control. We see that it has a positive and significant effect on cumulative returns during the second and third year following the repurchase announcement. Advertising has no significant impact during the first year after the repurchase announcement. Analyst coverage and trading volume are both attention measures that have a significant and positive impact on returns during the first, second, and third year after the repurchase announcement. News coverage has no significant effect on cumulative returns during the first year following the repurchase announcement and a negative and significant impact during the second and the third year.

Sentiment has a negative and significant impact on cumulative returns starting the fourth week following the repurchase announcement. This suggests that a positive increase in sentiment is likely to decrease future cumulative returns.

A high market to book ratio is associated with negative future cumulative returns during the first year. During the second and third year, market to book has a positive and significant impact on returns. However, it is important to keep in mind that the coefficient is very small. This suggests that value stocks have the strongest post repurchase stock price drift.

The number of times a company makes a repurchase announcement after the initial announcement accounted for in the study has significant effects on cumulative returns. Table XII shows that an increase in the number of repurchase announcements made during the first year following the initial announcement the study accounts for is likely to have positive and significant effect on cumulative returns. However, it has a negative and significant impact on returns during the second and the third year.

The higher the debt to assets ratio, the more likely the stock will experience positive cumulative returns during the first, second and the third year. The higher a company's percentage of closely held shares, the more negative and significant the impact is on cumulative returns following the repurchase announcement. However, the higher the repurchase program size, the higher the cumulative returns during the three years following the announcement. Finally, companies that hold excess cash and pay their shareholders by engaging in repurchase programs are likely to incur negative cumulative returns during the second year, but positive returns during the third year.

Prior evidence has shown that under-reaction following a repurchase announcement can last up to three years for value stocks (Stephens and Weisbach (1998), Ikenberry et al (2000), Jagannathan et al (2003), Chan et al (2004), and Chan et al (2010)). Table XII shows that ASVI results in positive and significant cumulative returns during the first year following the repurchase announcement and that value stocks with high ASVI have the most significant and positive cumulative returns. As value stocks are dominated by retail investors (Brandt et al (2009)), an increase in ASVI among these stocks as a result of an increase in retail investors' attention leads to buying, which in turn results in higher price pressure and higher returns. ASVI, therefore, reduces mispricing and accelerates the impounding of information following the repurchase announcement among small stocks.

Table XI

Abnormal Search Volume Index and Cumulative Returns: Univariate Comparisons

This table presents the cumulative returns of stocks with no, low, and high Abnormal Search Volume Index (ASVI). Stocks are sorted into terciles by size, market to book ratio, past weekly return, price, illiquidity, and analyst coverage. Terciles 1 and 3 refer to the lowest and highest value of each characteristic, respectively. Each characteristic-based tercile is further sorted into three ASVI portfolios: no ASVI, low ASVI, and high ASVI. Stocks with no ASVI are first identified. The remaining stocks are divided into low and high ASVI groups using the median value of ASVI. The cumulative return of each portfolio is then computed. The results are reported p=values are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively

	ASVI			t- Statistics	P-value	
	No	Low	High	No-High	No-High	No-High
All Stocks	-0.0735121	0.0827432	0.0928819	-0.1664***	-16.23	(<.0001)
Panel A: By Size						
1	-0.2263958	0.0396213	0.0588854	-0.28***	-12.50	(<.0001)
2	0.0355774	0.1714139	0.1847463	-0.14***	-9.70	(<.0001)
3	-0.0295490	0.0283520	0.0261442	-0.05***	-3.98	(<.0001)
Panel B: By Market to Book						
1	-0.1230634	0.1531669	0.1715438	-0.29***	-14.29	(<.0001)
2	-0.0322455	0.0985199	0.0960595	-0.12***	-8.92	(<.0001)
3	-0.0651711	0.000213531	0.0159545	-0.08***	-4.50	(<.0001)
Panel C: By Past Weekly Return						
1	-0.1187620	0.0596210	0.0718402	-0.190***	-10.13	(<.0001)
2	-0.0545088	0.0856760	0.0605215	-0.115***	-6.93	(<.0001)
3	-0.0578798	0.1010800	0.1474130	-0.205***	-11.09	(<.0001)
Panel D: By Price						
1	-0.2767978	0.0879406	0.0954320	-0.372***	-15.85	(<.0001)
2	0.0107945	0.0847685	0.1115680	-0.10***	-7.17	(<.0001)
3	0.0292351	0.0757460	0.0705464	-0.0413***	-2.75	(0.0059)
Panel E: By Illiquidity						
1	-0.0203413	0.0825773	0.0907410	-0.11***	-6.64	(<.0001)
2	0.0329474	0.1173183	0.1213146	-0.088***	-6.46	(<.0001)
3	-0.2261452	0.0677560	0.0844814	-0.31***	-14.16	(<.0001)
Panel F: By Analyst Coverage						
1	-0.1536937	0.0948041	0.1132155	-0.26***	-14.69	(<.0001)
2	-0.0333731	0.0501141	0.0604299	-0.09***	-5.21	(<.0001)
3	-0.0103628	0.0996655	0.1011391	-0.11***	-6.81	(<.0001)

Table XII
ASVI and Returns following Repurchase Announcements

This table reports Fama Macbeth (1973) results. The dependent variable is the standardized cumulative abnormal returns of stocks that have announced repurchase programs between 2004 and 2008 and for which ASVI data is available. Cumulative abnormal returns are reported during the first 4 weeks after the repurchase announcement, 5 to 52 weeks, 53 to 104 weeks, and 105 to 156 weeks following the announcement. All independent variables are standardized. P-values are reported below the coefficients.

	Week 1	Week 2	Week 3	Week 4	Week 5-52	Week 53-104	Week 105-156
ASVI	-0.13253	0.148167	0.029184	0.088496	0.20734*	-0.00983	-0.01597
	(0.6691)	(0.5003)	(0.8737)	(0.7444)	(0.0794)	(0.8041)	(0.5996)
Logmarketcap*ASVI	0.14789	-0.21859	-0.10258	-0.07752	-0.2397*	0.017114	0.013591
	(0.6796)	(0.3782)	(0.5966)	(0.7605)	(0.0881)	(0.6788)	(0.6535)
zlogmarketcap	0.01338	-0.00601	-0.10495	-0.217**	-0.15***	-0.13***	-0.10***
	(0.9209)	(0.9537)	(0.2181)	(0.0252)	(<.0001)	(<.0001)	(<.0001)
XRET	0.13441	0.042982	0.302921	0.038319	-0.047**	0.047***	0.0205**
	(0.3301)	(0.6904)	(0.1058)	(0.8076)	(0.025)	(<.0001)	(0.0312)
Adv to sales	-0.02032	-0.03247	-0.05976	-0.06916	0.00297	0.0178**	0.0231***
	(0.7562)	(0.5456)	(0.3621)	(0.2954)	(0.6819)	(0.0186)	(0.0023)
log analyst	0.02225	0.106605	0.1123*	0.1638**	0.0355***	0.055***	0.0278***
	(0.7603)	(0.1111)	(0.0885)	(0.018)	(0.0005)	(<.0001)	(0.0012)
volume	-0.2066*	-0.272**	-0.04655	-0.04741	0.0657***	0.083***	0.1145***
	(0.0864)	(0.0213)	(0.4861)	(0.4341)	(0.0007)	(<.0001)	(<.0001)
sentiment	-0.00285	-0.11**	-0.03471	-0.096*	-0.06***	-0.078***	0.0323***
	(0.9657)	(0.0213)	(0.4707)	(0.0501)	(<.0001)	(<.0001)	(<.0001)
MB	-0.02874	-0.0352	-0.0486*	-0.02021	-0.008*	1.62E-02***	-0.011***
	(0.5381)	(0.2743)	(0.0853)	(0.532)	(0.0908)	(0.0004)	(0.0079)
announc times	-0.02788	0.020884	0.060385	0.070322	0.045***	-0.01855**	-0.077***
	(0.6644)	(0.715)	(0.3317)	(0.2535)	(<.0001)	(0.038)	(<.0001)
debt to assets	-0.02986	0.010295	0.050808	0.069317	0.0184**	0.0583***	0.0457***
	(0.6724)	(0.8397)	(0.3461)	(0.1634)	(0.022)	(<.0001)	(<.0001)
closelyheld	0.126**	0.01822	0.012606	0.016592	-0.079***	-0.131***	-0.165***
	(0.0447)	(0.721)	(0.8016)	(0.6993)	(<.0001)	(<.0001)	(<.0001)
program size	0.083446	0.043174	0.009931	0.044107	0.0132*	0.02***	0.084***
	(0.2939)	(0.3066)	(0.7319)	(0.3078)	(0.0948)	(0.0082)	(<.0001)
excess cash	-0.0276	-0.06531	-0.07101	-0.085*	-3.71E-03	-0.012*	0.014*
	(0.6175)	(0.2211)	(0.1952)	(0.0759)	(0.6447)	(0.0996)	(0.0907)
news	-0.05512	0.006843	-0.00883	0.152708	-0.01665	-0.029**	-0.025**
	(0.6576)	(0.9423)	(0.93)	(0.1271)	(0.2283)	(0.0353)	(0.0454)
news dummy	0.087611	-0.01335	0.133926	-0.18933	-0.02426	-0.088***	-0.08***
	(0.5931)	(0.927)	(0.3217)	(0.2158)	(0.2141)	(<.0001)	(<.0001)
Obs	318	318	318	318	15264	16536	16528
R square	0.0595	0.0662	0.0814	0.0612	0.0239	0.0406	0.0501

Table XIII investigates the effect of ASVI on cumulative returns controlling for different proxies of limits to arbitrage. In Table XIII, we examine the effect of ASVI on cumulative returns given different levels of idiosyncratic risk, market to book ratio, and past week return. First, we group stocks into quintiles based on investor attention. We then select the top and bottom quintiles and sort stocks in each quintile based on the level of idiosyncratic risk, market to book ratio, and past week return. We, then, examine the effect of ASVI on cumulative returns for these portfolios, controlling for the independent variables included in regression in Table XII. Table XIII reports the coefficients of ASVI on cumulative returns.

Panels A, B and C show that high ASVI results in positive and significant effect on cumulative returns among stocks characterized by high idiosyncratic risk, low market to book ratio, and low past week return. The results are significant at the 1% level and confirm the findings in Table XII. ASVI accelerates the impounding of the repurchase information in stocks that are highly mispriced. These stocks are dominated by retail investors and an increase in ASVI results in increased buying, which pushes returns higher and reduces mispricing. The findings are in line with the predictions of the attention hypothesis of Barber and Odean (2008).

The table shows mixed results on the effect of ASVI on stocks that tend to be less mispriced. The effect of high ASVI is negative and significant on stocks with low idiosyncratic risk at the 10% level (Panel A), negative though insignicant for high market to book stocks (Panel B), and positive and significant at the 1% level among stocks with high past week return (Panel C).

Table XIII also reports the effects of ASVI on cumulative returns among stocks with low ASVI. It shows that ASVI results in negative returns among all stocks with low ASVI. This can be explained by the fact that the stocks in the lowest ASVI quintile have negative ASVI. Such stocks suffer from reduced investor attention compared to previous weeks. The reduction in investor attention results in less buying, which reduces price pressure and results in negative returns. The attention hypothesis postulates that inattention results in under-reaction. The results reported in Table XIII regarding stocks with low ASVI support this prediction.

Table XIII
The effect of ASVI on Cumulative Returns during the first year following the repurchase announcement

The table reports of the effect of ASVI on cumulative returns, during the first year following the repurchase announcement and controlling for the variables listed in Table XII. The results are presented by subsamples of idiosyncratic risk, market to book ratio and past week return. The dependent variable is the standardized cumulative abnormal returns of stocks that have announced repurchase programs between 2004 and 2008 and for which ASVI data is available. The table gives results across portfolios constructed based on abnormal attention (ASVI) and idiosyncratic risk (IR). IR is calculated using the model $Ri(t) - Rf(t) = \alpha + \beta1(Rm(t) - Rf(t)) + \beta2SMB(t) + \beta3HML(t) + \varepsilon_i(t)$. IR is the standard deviation of the error term. The results are reported and p-values are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively

ASVI Portfolio	
Low	High
Panel A: By Idiosyncratic Risk (IR)	
Low	
-0.50186**	-0.32102*
(0.0405)	(0.0646)
Medium	
-0.36604*	0.15903
(0.0595)	(0.2076)
High	
-0.66388***	1.21214***
(0.0007)	(<.0001)
Panel B: By Market to Book	
Low	
-0.76695***	0.93605***
(<.0001)	(<.0001)
Medium	
-0.00561	-0.07797
(0.9777)	(0.6275)
High	
-0.06596	-0.00311
(0.7771)	(0.9828)
Panel C: By Past Week Return	
Low	
-0.37668*	1.16164***
(0.0634)	(<.0001)
Medium	

-0.04995	-0.17068
(0.7782)	(0.1863)
High	
-0.72771***	0.74410***
(0.0006)	(<.0001)

SUMMARY

In this paper, we set out to study the effect of investor attention on the stock price repurchases drift. We find that investor attention, measured by Google's ASVI, results in positive cumulative returns one year after the repurchase announcement. The results are driven by small stocks, stocks with high idiosyncratic risk, stocks with low market to book ratio, and stocks with low past return. Prior research has shown that for such stocks, the repurchase drift lasts for three years due to limits to arbitrage. As these stocks are dominated by retail investors, an increase in retail investors' attention as measured by ASVI results in increased buying, which pushes prices and cumulative returns higher. A decrease in ASVI is caused by investors' inattention, which causes negative cumulative returns. We conclude that an increase in ASVI accelerates the impounding of the repurchase announcement into the prices of stocks that tend to be mispriced. The findings in this paper provide further support to the attention hypothesis.

REFERENCES

Andriosopoulos, D., & Hoque, H. (2013). The determinants of share repurchases in Europe. International Review of Financial Analysis, 27, 65-76.

Au, A. S., Doukas, J. A., & Onayev, Z. (2009). Daily short interest, idiosyncratic risk, and stock returns. Journal of Financial Markets, 12(2), 290-316.

Bagwell, L. S., & Shoven, J. B. (1988). Share repurchases and acquisitions: An analysis of which firms participate. In Corporate takeovers: Causes and consequences (pp. 191-220). University of Chicago Press.

Baker, M., & Wurgler, J. (2007). Investor sentiment in the stock market. Journal of Economic Perspectives, 21, 129–151.

Banyi, M. L., Dyl, E. A., & Kahle, K. M. (2008). Errors in estimating share repurchases. Journal of Corporate Finance, 14(4), 460-474.

Barber, B. M., & Odean, T. (2008). All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors. Review of Financial Studies, 21(2), 785-818.

Barber, B. M., & Odean, T. (2000). Trading is hazardous to your wealth: The common stock investment performance of individual investors. The journal of Finance, 55(2), 773-806.

Barberis, N., Shleifer, A., & Vishny, R. (1998). A model of investor sentiment. Journal of financial economics, 49(3), 307-343.

Bartram, S. M., Brown, P. R., How, J. C., & Verhoeven, P. (2012). Agency conflicts and corporate payout policies: a global study. Available at SSRN 1068281.

Bonaime, A. A., & Ryngaert, M. D. (2013). Insider trading and share repurchases: Do insiders and firms trade in the same direction?. Journal of Corporate Finance, 22, 35-53.

Brandt, M. W., Brav, A., Graham, J. R., & Kumar, A. (2009). The idiosyncratic volatility puzzle: Time trend or speculative episodes?. Review of Financial Studies, hhp087.

Brown, G. W., & Cliff, M. T. (2004). Investor sentiment and the near-term stock market. Journal of Empirical Finance, 11(1), 1-27.

Chan, K., Ikenberry, D., & Lee, I. (2004). Economic sources of gain in stock repurchases. Journal of Financial and Quantitative Analysis, 39(03), 461-479.

Chan, K., Ikenberry, D. L., & Lee, I. (2007). Do managers time the market? Evidence from open-market share repurchases. Journal of Banking & Finance, 31(9), 2673-2694.

Chan, K., Ikenberry, D. L., Lee, I., & Wang, Y. (2010). Share repurchases as a potential tool to mislead investors. Journal of Corporate Finance, 16(2), 137-158.

Chemmanur, T. J., Cheng, Y., & Zhang, T. (2010). Why do firms undertake accelerated share repurchase programs?. Available at SSRN 1107217

Chemmanur, T. (2009). Advertising, attention, and stock returns (Doctoral dissertation, School of Business Administration, Fordham University).

Chen, J., Hong, H., & Stein, J. C. (2002). Breadth of ownership and stock returns. Journal of financial Economics, 66(2), 171-205.

Chordia, T., Huh, S. W., & Subrahmanyam, A. (2007). The cross-section of expected trading activity. Review of Financial Studies, 20(3), 709-740.

Cohen, L., & Frazzini, A. (2008). Economic links and predictable returns. The Journal of Finance, 63(4), 1977-2011.

Da, Z., Engelberg, J., & Gao, P. (2011). In search of attention. The Journal of Finance, 66(5), 1461-1499.

Daniel, K., Hirshleifer, D., & Subrahmanyam, A. (1998). Investor psychology and security market under-and overreactions. the Journal of Finance, 53(6), 1839-1885.

DellaVigna, S., & Pollet, J. M. (2007). Demographics and industry returns. The American Economic Review, 1667-1702.

DellaVigna, S., & Pollet, J. M. (2009). Investor inattention and Friday earnings announcements. The Journal of Finance, 64(2), 709-749.

Ding, R., & Hou, W. (2014). Retail investor attention and stock liquidity. Available at SSRN 1786762.

Dittmar, A. K. (2000). Why Do Firms Repurchase Stock. The Journal of Business, 73(3), 331-355.

Doukas, J., Kim, C., & Pantzalis, C. (2010). Arbitrage risk and stock mispricing. Journal of Financial and Quantitative Analysis.

Doukas, J. A., Kim, C. F., & Pantzalis, C. (2005). The two faces of analyst coverage. Financial Management, 34(2), 99-125.

Easterbrook, F. H. (1984). Two agency-cost explanations of dividends. The American Economic Review, 650-659.

Engelberg, J., Sasseville, C., & Williams, J. (2012). Market madness? The case of mad money. Management Science, 58(2), 351-364.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. The journal of Finance, 25(2), 383-417.

Fama, E. F., & MacBeth, J. D. (1973). Risk, return, and equilibrium: Empirical tests. The Journal of Political Economy, 607-636.

Fu, F. (2009). Idiosyncratic risk and the cross-section of expected stock returns. Journal of Financial Economics, 91(1), 24-37.

Gervais, S., Kaniel, R., & Mingelgrin, D. H. (2001). The high-volume return premium. The Journal of Finance, 56(3), 877-919.

Gromb, D., & Vayanos, D. (2002). Equilibrium and welfare in markets with financially constrained arbitrageurs. Journal of financial Economics, 66(2), 361-407.

Grullon, G., & Michaely, R. (2002). Dividends, share repurchases, and the substitution hypothesis. The Journal of Finance, 57(4), 1649-1684.

Grullon, G., & Michaely, R. (2004). The information content of share repurchase programs. The Journal of Finance, 59(2), 651-680.

Grullon, G., Kanatas, G., & Weston, J. P. (2004). Advertising, breadth of ownership, and liquidity. Review of Financial Studies, 17(2), 439-461.

Hirshleifer, D., & Hong Teoh, S. (2003). Herd behaviour and cascading in capital markets: A review and synthesis. European Financial Management, 9(1), 25-66.

Hirshleifer, D., Hou, K., Teoh, S. H., & Zhang, Y. (2004). Do investors overvalue firms with bloated balance sheets?. Journal of Accounting and Economics, 38, 297-331.

Hirshleifer, D., Lim, S. S., & Teoh, S. H. (2009). Driven to distraction: Extraneous events and underreaction to earnings news. The Journal of Finance, 64(5), 2289-2325.

Hong, H., & Stein, J. C. (1999). A unified theory of underreaction, momentum trading, and overreaction in asset markets. The Journal of Finance, 54(6), 2143-2184.

Hou, K., & Moskowitz, T. J. (2005). Market frictions, price delay, and the cross-section of expected returns. Review of Financial Studies, 18(3), 981-1020.

Hou, K., Xiong, W., & Peng, L. (2008). A tale of two anomalies: The implications of investor attention for price and earnings momentum. Available at SSRN 976394.

Hovakimian, A., Opler, T., & Titman, S. (2001). The debt-equity choice. Journal of Financial and Quantitative analysis, 36(01), 1-24.

Huberman, G., & Regev, T. (2001). Contagious speculation and a cure for cancer: A nonevent that made stock prices soar. The Journal of Finance, 56(1), 387-396.

Ikenberry, D. L., Rankine, G., & Stice, E. K. (1996). What do stock splits really signal?. Journal of Financial and Quantitative analysis, 31(3).

Ikenberry, D., Lakonishok, J., & Vermaelen, T. (1995). Market underreaction to open market share repurchases. Journal of financial economics, 39(2), 181-208.

Ikenberry, D., Lakonishok, J., & Vermaelen, T. (2000). Stock repurchases in Canada: Performance and strategic trading. The Journal of Finance, 55(5), 2373-2397.

Ikenberry, D., Lakonishok, J., & Vermaelen, T. (2000). Stock repurchases in Canada: Performance and strategic trading. The Journal of Finance, 55(5), 2373-2397.

Jagannathan, M., & Stephens, C. (2003). Motives for multiple open-market repurchase programs. Financial Management, 71-91.

Jensen, M. C. (1986). Agency cost of free cash flow, corporate finance, and takeovers. Corporate Finance, and Takeovers. American Economic Review, 76(2).

Kahneman, D. (1973). Attention and effort (p. 246). Englewood Cliffs, NJ: Prentice-Hall.

Kaniel, R., Saar, G., & Titman, S. (2008). Individual investor trading and stock returns. The Journal of Finance, 63(1), 273-310.

Karlsson, N., Seppi, D. J., & Loewenstein, G. (2005). The'ostrich effect': Selective attention to information about investments. Available at SSRN 772125.

Lasfer, M. A. (2000). The market valuation of share repurchases in Europe. City University Business School.

Lie, E., & Lie, H. J. (1999). The role of personal taxes in corporate decisions: An empirical analysis of share repurchases and dividends. Journal of Financial and Quantitative Analysis, 34(04), 533-552.

Lou, D. (2014). Attracting Investor Attention through Advertising. Review of Financial Studies, 27(6), 1797-1829.

Masulis, R. W. (1980). Stock repurchase by tender offer: An analysis of the causes of common stock price changes. The Journal of Finance, 35(2), 305-319.

McNally, W. J. (1999). Open Market Stock Repurchase Signaling. Financial Management, 28(2), 55-67

Merton, R. C. (1987). A simple model of capital market equilibrium with incomplete information. The journal of finance, 42(3), 483-510.

Michaely, R., Thaler, R. H., & Womack, K. L. (1995). Price reactions to dividend initiations and omissions: Overreaction or drift?. The Journal of Finance, 50(2), 573-608.

Michel, A., Oded, J., & Shaked, I. (2010). Not all buybacks are created equal: The case of accelerated stock repurchases. Financial Analysts Journal, 66(6), 55-72.

Mitchell, J. D., & Dharmawan, G. V. (2007). Incentives for on-market buy-backs: Evidence from a transparent buy-back regime. Journal of Corporate Finance, 13(1), 146-169.

Odean, T. (1998). Are investors reluctant to realize their losses?. The Journal of finance, 53(5), 1775-1798.

Oded, J. (2005). Why do firms announce open-market repurchase programs?. Review of Financial Studies, 18(1), 271-300.

Peng, L., & Xiong, W. (2006). Investor attention, overconfidence and category learning. Journal of Financial Economics, 80(3), 563-602.

Peng, L. (2005). Learning with information capacity constraints. Journal of Financial and Quantitative Analysis, 40(02), 307-329.

Peyer, U., & Vermaelen, T. (2009). The nature and persistence of buyback anomalies. Review of Financial Studies, 22(4), 1693-1745.

Pontiff, J. (2006). Costly arbitrage and the myth of idiosyncratic risk. Journal of Accounting and Economics, 42(1), 35-52.

Rau, P. R., & Vermaelen, T. (2002). Regulation, Taxes, and Share Repurchases in the United Kingdom. The Journal of Business, 75(2), 245-282.

Seasholes, M. S., & Wu, G. (2007). Predictable behavior, profits, and attention. Journal of Empirical Finance, 14(5), 590-610.

Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. The journal of finance, 52(2), 737-783.

Shleifer, A., & Vishny, R. W. (1997). The limits of arbitrage. The Journal of Finance, 52(1), 35-55.

Stephens, C. P., & Weisbach, M. S. (1998). Actual share reacquisitions in open-market repurchase programs. The Journal of Finance, 53(1), 313-333.

Tetlock, P. C. (2010). Does public financial news resolve asymmetric information?. Review of Financial Studies, 23(9), 3520-3557.

Vermaelen, T. (1981). Common stock repurchases and market signalling: An empirical study. Journal of financial economics, 9(2), 139-183.

Wurgler, J., & Zhuravskaya, E. (2002). Does Arbitrage Flatten Demand Curves for Stocks?*. The Journal of Business, 75(4), 583-608.

Yuan, Y. (2008). Attention and trading. Unpublished Working Paper. University of Pennsylvania.

Zhang, H. (2005). Share price performance following actual share repurchases. Journal of Banking & Finance, 29(7), 1887-1901.

CONCLUSION

This thesis sought to investigate the impact of investor attention, as measured by SVI, on the expected returns of EREITs and the open market repurchases post announcement returns. Essay 1 shows that investor attention has a significant impact on EREITs returns. More specifically, EREITs that attract high investor attention, as measured by SVI, generate higher returns than EREITs with no investor attention. The univariate analysis shows that average returns are especially higher for the EREITs that are small, with high book to market ratio, low past month return, low price, and are highly illiquid. Controlling for different risk factors, we find that increased investor attention results in higher average returns among stocks that are small and with high book to market ratio. We also report that the SVI effect is not spurious. The positive and significant effect of SVI on stocks is not driven by impediments to trade. Rather, the SVI effect is due to improvement in investor recognition. SVI improves investor recognition among stocks that suffer from poor information dissemination and high information incompleteness, which results in high returns. This lends support to the Attention hypothesis of Barber and Odean (2008) and Merton's (1987) investor recognition hypothesis.

Essay 2 shows that abnormal investor attention, as measured by ASVI, results in positive and significant cumulative returns in the stocks of firms that have made repurchase announcements. The univariate analysis shows that ASVI has the largest and most significant impact on the stocks that are small, with low market to book ratio, are low priced, are more illiquid and are with low analyst coverage. The multivariate analysis shows that ASVI results in positive and significant returns during the first year following the repurchase announcement. The analysis also shows that the results are driven by small stocks. Further analysis indicates that high ASVI results in positive and significant effect on cumulative returns during the first year following the announcement among stocks with high idiosyncratic risk, low market to book ratio, and low past return. Prior studies have documented that such stocks under-react to the repurchase announcement for up to three years due to limits to arbitrage. We conclude that abnormal retail investor attention, as measured by Google's ASVI, increases buying among stocks that suffer

from limits to arbitrage. ASVI, therefore, reduces mispricing and results in the impounding of the repurchase announcement information into stock prices. This is in line with the predictions of the investor attention hypothesis.

VITA

Nadia Asmaa Nafar
PhD Candidate

Old Dominion University
Strome College of Business
2159 Constant Hall
Norfolk, VA 23529

Email:anafar@odu.edu
Phone: 757-677-6151

Education

2010-present: **Ph.D.** in Business Administration, Old Dominion University, Norfolk, VA
Expected Graduation: May 2015
Concentration: Finance
Support Area: International Business

2005-2007: **M.B.A.** in Marketing, Old Dominion University, Norfolk, VA

2000-2005: **B.B.A.** in Finance, Al Akhawayn University, Ifrane, Morocco

Dissertation

Title: Two Essays on Investor Attention and Asset Pricing
• Essay 1: Investor Attention and the Expected Returns of Equity Real Estate Investment Trusts
• Essay 2: Investor Attention and the Open Market Repurchases Post Announcement Returns
Committee: Professor Kenneth Yung (Chair), Professor Mohammad Najand, Professor Douglas Ziegenfuss
Current Stage: Dissertation Proposal Defended

Peer-reviewed Publications

Yung, K., & **Nafar, N. A.** (2014). Creditor rights and corporate cash holdings: International evidence. *International Review of Economics & Finance*, 33, 111-127.

Teaching Experience

2012-2013: Introduction to Contemporary Business – Undergraduate Requirement

Awards and Honors

• Outstanding Doctoral student in Finance Award, Old Dominion University, 2013
• Graduate Student Fellowship Award, Old Dominion University, 2010

Languages

Fluent in Arabic, French, and English

Skills

Expert in Microsoft Office, Blackboard, SAS, Compustat and CRSP