**GALATASARAY UNIVERSITY**
**INSTITUTE OF SOCIAL SCIENCES**
**BUSINESS ADMINISTRATION DEPARTMENT**

# SOME INTERNATIONAL EVIDENCE ON INVESTOR ATTENTION, ABNORMAL RETURNS, STOCK LIQUIDITY AND VOLATILITY

**MASTER'S THESIS**

**Muhammet Sergen AKARSU**

**Thesis Advisor: Prof. Dr. Ömür SÜER BAKLACI**

**June 2019**

**GALATASARAY UNIVERSITY**
**INSTITUTE OF SOCIAL SCIENCES**
**BUSINESS ADMINISTRATION DEPARTMENT**

# SOME INTERNATIONAL EVIDENCE ON INVESTOR ATTENTION, ABNORMAL RETURNS, STOCK LIQUIDITY AND VOLATILITY

**MASTER'S THESIS**

**Muhammet Sergen AKARSU**

**Thesis Advisor: Prof. Dr. Ömür SÜER BAKLACI**

**June 2019**

**PREFACE**

I would like to thank my family, my advisor Prof. Dr. Ömür Süer, and Prof. Dr. Volkan Demir for their support and excellent guidance that they showed during this study.

**TABLE OF CONTENT**

**ABBREVATIONS**

| | |
|---|---|
| ADR | American Depositary Receipts |
| CAPM | Capital Asset Pricing Model |
| CPI | Consumer Price Index |
| CRSP | Center for Research in Security Prices |
| CSI | China Securities Index |
| CVS | Chinese Values Survey |
| EDGAR | Electronic Data Gathering, Analysis, and Retrieval |
| EMEA | Europe-Middle East-Africa |
| EMU | The Economic and Monetary Union |
| FX | Foreign Exchange |
| GARCH | Generalized Autoregressive Conditional Heteroskedasticity |
| GSVI | Google Search Volume Index |
| I/B/E/S | Institutional Brokers' Estimate System |
| IBM | International Business Machines |
| KOSPI | The Korea Composite Stock Price Index |
| LEI | Leading Economic Index |
| MSCI | Morgan Stanley Capital International |
| OLS | Ordinary Least Squares |
| PBV | Price-to-book-value |
| PEAD | Post-earnings-announcement-drift |
| REIT | Real Estate Investment Trusts |
| SEC | Securities and Exchange Commission |
| SME Board | Small and Medium Enterprises Board |
| SSE | Shanghai Stock Exchange |
| SVI | Search Volume Index |
| TWSE | Taiwan Securities Exchange |
| VAR | Vector Autoregression |
| WFE | World Federation of Exchanges |

## LIST OF SYMBOLS

| | |
|---|---|
| $AR_{i,t}$ | Abnormal Return |
| $ASVI_{i,t}$ | Abnormal Search Volume Index |
| $AVOL_{i,t}$ | Abnormal Trading Volume |
| $BM_{i,t}$ | Book-to-Market Ratio |
| $E(r)_{i,t}$ | Expected Return |
| $Illiq_{i,t}$ | Amihud (2002) Illiquidity Ratio |
| IND | Individualism |
| $MV_{i,t}$ | Market Value |
| $ph_{i,t}$ | Daily High Price |
| $pl_{i,t}$ | Daily Low Price |
| $r_{i,t}$ | Stock Return |
| UAI | Uncertainty Avoidance Index |
| $VOL_{i,t}$ | Trading Volume |
| $\sigma_{i,t}$ | Standard Deviation of Returns |

**LIST OF FIGURES**

**LIST OF TABLES**

## RÉSUMÉ

Dans un marché efficient, les investisseurs disposent de capacités de traitement de l'information illimitées et toutes les informations disponibles sont intégrées dans les prix. Cependant, il existe des preuves contre cette hypothèse dans la littérature de psychologie. Étant donné que l'attention est une ressource rare, il peut avoir des effets importants sur le marché. Cette étude examine les effets de l'attention limitée des investisseurs sur les rendements anormaux, la liquidité des actions et la volatilité.

Les études dont l'objet porte sur l'impact de l'attention des investisseurs sur les marchés financiers peuvent être divisées en quatre groupes. Dans le cadre du premier groupe d'études, les chercheurs examinent si l'attention des investisseurs affecte les rendements des actifs, la liquidité et la volatilité. Barber et Odean (2008) affirment que les investisseurs individuels ont des choix limités, et ils prennent leurs décisions de trading pour les actions ayant attiré leur attention en premier. Comme il existe un grand nombre d'actions disponibles à l'achat par opposition à un nombre limité d'actions disponibles à la vente, les investisseurs individuels sont des acheteurs nets des actions qui reçoivent une grande attention. Da et al. (2011) ont constaté qu'une attention accrue des investisseurs prédit une hausse des cours des actions dans les deux semaines qui suivent. Aouadi et al. (2013) montrent que l'attention des investisseurs est positivement associée à la liquidité des actions en France. Ding et Hou (2015) constatent que les actions deviennent plus liquides grâce à l'attention accrue des investisseurs. Guo et al. (2015) et Hsu et Chen (2017) constatent qu'il existe une relation positive entre l'attention des investisseurs et la volatilité. Le deuxième groupe est constitué d'études qui étudient la relation entre l'attention des investisseurs et leurs réactions contre les informations. Dellavigna et Pollet (2009), Hirshleifer et al. (2009) et Loh (2010) constatent que les investisseurs soumis à une contrainte de l'attention ne réagissent pas suffisamment à de nouvelles informations lorsque le flux d'informations est élevé. Hur et Singh (2016) montrent que les actions réagissent avec retard aux informations spécifiques à l'entreprise et que leur réponse ralentit à mesure que l'attention des investisseurs diminue. Les études qui se trouvent dans le troisième groupe examinent l'allocation d'attention des investisseurs. Peng et Xiong (2006) suggèrent qu'en raison d'une attention limitée, les investisseurs sont enclins à traiter davantage d'informations relatives au marché que des informations spécifiques à une entreprise. Quant au quatrième groupe d'études, ce groupe comprend des recherches sur l'impact de l'attention des investisseurs comme but secondaire. Mamun et Mishra (2012) ont constaté que l'attention réduisent le rendement du capital requis en réduisant l'asymmétrie de l'information. Borgers et al. (2013) suggèrent que l'attention des investisseurs réduit la rentabilité des stratégies de négociation basées sur un indice de relations avec les parties prenantes.

Bien que les études fournissent des preuves sur les hypothèses de cette étude, elles se sont concentrées aux États-Unis et en Chine. Ces relations peuvent être différentes ou inexistantes dans d'autres pays. Par conséquent, cette étude examine les effets de l'attention des investisseurs au niveau international. En outre, cette étude vise à contribuer à la finance culturelle et à examiner les effets de l'attention limitée des investisseurs dans différentes cultures. Cette étude se concentre sur les actions individuelles de 27 pays de 3 régions. Sept pays sont originaires de la région Amériques, sept de la région Asie-Pacifique et treize pays d'Europe. Ces pays ont les capitalisations boursières les plus grandes dans leurs régions respectives et utilisent l'alphabet latin dans au moins une langue officielle / reconnue. L'échantillon comprend 769 actions parmi les indices qui couvrent les actions les plus liquides ayant les plus

grandes capitalisations boursières. La période d'échantillonnage va de mars 2014 au janvier 2018.

À la suite des études précédentes, cette étude utilise la popularité de recherche sur internet des noms de sociétés pour mesurer l'attention des investisseurs. Les données de popularité de recherche sont publiées par Google Trends. L'attention des investisseurs est la variable indépendante dans cette étude. Trois variables dépendantes différentes et trois modèles de régression différents sont utilisés dans cette étude. La première variable dépendante est le rendement anormal ajusté au risque de marché. La deuxième variable dépendante est le volume anormal des transactions qui est utilisé pour mesurer la liquidité des actions. Finalement, l'écart type des rendements est la troisième variable dépendante, qui mesure la volatilité. En tant que mesure de la robustesse, cette étude utilise différentes variables pour mesurer l'attention des investisseurs, la liquidité et la volatilité. Le volume anormal des transactions est utilisé pour mesurer l'attention des investisseurs. Le ratio d'illiquidité d'Amihud (2002) est utilisé pour mesurer la liquidité des actions, tandis que les fourchettes de prix intra-journalières sont utilisées pour mesurer la volatilité. Le ratio d'illiquidité d'Amihud (2002) montre l'impact des transactions sur les prix puisqu'il mesure la réaction quotidienne des prix au volume des transactions. Pour mesurer les dimensions culturelles nationales, les dimensions culturelles de Hofstede (1983) sont utilisées. En particulier, l'individualisme et le contrôle d'incertitude sont utilisés pour déterminer si l'impact de l'attention des investisseurs diffère selon la culture nationale.

Pour étudier les relations susmentionnées, cette étude utilise des régressions de Fama-Macbeth. Les erreurs types sont calculées avec la formule de Newey-West afin de résoudre les problèmes d'autocorrélation et d'hétéroscédasticité dans les termes d'erreur. Pour des raisons de robustesse, des régressions à effets fixes et des régressions à effets fixes avec erreurs types robustes sont utilisées selon des résultats des tests de Hausman et de l'hétéroscédasticité.

Cette étude montre que le pouvoir prédictif de l'attention des investisseurs sur les rendements anormaux n'est pas valable à l'échelle internationale. Dans la plupart des pays, on n'observe pas de relation statistiquement significative entre l'attention des investisseurs et les rendements anormaux. Lorsque l'ensemble de l'échantillon est divisé en sous-échantillons construits selon les dimensions de la culture nationale, les pays ayant des scores d'indice du contrôle d'incertitude élevés (faibles) ont commencé à prédire négativement (positivement) les rendements anormaux. Cependant, lorsque l'attention des investisseurs est mesurée par le volume de transaction anormal, les deux groupes présentent une relation positive entre l'attention des investisseurs et les rendements anormaux. Cela peut être lié à la demande d'informations capturée par l'indice de volume de recherche, comme le soutiennent Vlastakis et Markellos (2012), et aux différences possibles dans les choix d'attribution de l'attention des différentes cultures. Les résultats de la relation entre l'attention des investisseurs et le rendement anormal sont robustes à l'utilisation de techniques de régression différentes. De plus, cette étude montre qu'il existe une relation positive entre l'attention des investisseurs et la liquidité des actions. Cette relation positive est plus prononcée dans les pays qui ont des scores élevés sur des indices d'individualisme et du contrôle de l'incertitude. Chui et al. (2010) constatent que le biais de confiance excessive est plus prononcé pour les investisseurs des pays individualistes, ce qui se traduit par une augmentation du volume des transactions dans ces pays. Les résultats de cette étude sont parallèles à cette conclusion. Les transactions fondées sur la confiance excessive peuvent être la principale cause de l'effet plus prononcé. En outre, une réaction plus forte dans les pays qui ont des scores élevés sur d'index du contrôle de l'incertitude pourrait être liée au rôle de l'attention des investisseurs dans la réduction de l'incertitude. Les

investisseurs qui augment davantage leur attention approfondissent également leurs connaissances sur une entreprise donnée, ce qui se traduit par une plus grande familiarité. Il est normal de s'attendre à ce que les investisseurs des pays qui ont des scores élevés sur d'index du contrôle de l'incertitude soient plus sensibles à la diminution de l'incertitude. L'utilisation du ratio d'illiquidité d'Amihud (2002) comme variable dépendante révèle que l'attention des investisseurs ne peut pas saisir l'impact des transactions sur les prix. L'attention des investisseurs prédit de manière significative le ratio d'illiquidité dans six pays. Enfin, cette étude montre que la volatilité augmente simultanément avec l'attention des investisseurs. Cet effet est plus prononcé dans les pays individualistes, ce qui est cohérent avec l'hypothèse de l'étude et les résultats précédents. Il semble que les transactions fondées sur la confiance excessive dans les pays individualistes créent plus de volatilité que le volume des transactions augmente dans ces pays avec plus d'attention. De plus, cette étude obtient des résultats mitigés sur le pouvoir prédictif de l'attention des investisseurs sur la volatilité. La mesure de l'attention ne permet pas de prédire l'écart-type des rendements, mais permet de prévoir les fourchettes de prix intra-journalières dans dix pays.

Brièvement, cette étude fournit des preuves internationales sur les effets de l'attention des investisseurs dans les marchés boursiers. Plus précisément, les résultats de cette étude montrent que l'attention des investisseurs ne peut pas prévoir les rendements des actions anormaux. De plus, l'attention limitée des investisseurs a des effets nettement positifs sur la liquidité des actions et la volatilité. Les études à venir pourraient utiliser un échantillon plus grand comprenant des actions de petite capitalisation et de moyenne capitalisation. Une nouvelle méthode permettant de mieux capturer l'attention des investisseurs sur les actions de sociétés à petite et à moyenne capitalisation donnerait de meilleurs résultats, car les activités de recherche sur Internet sont également plus petites pour ces actions.

## ABSTRACT

In an efficient market, investors have unlimited information processing capabilities and all available information is incorporated into prices. However, empirical finance literature shows that some anomalies such as post-earnings-announcement-drift exist in the financial markets (Ball and Brown, 1968). Kahneman (1973) states that people do not have infinite attention and they have to allocate it across different stimuli. Since attention is a scarce resource, it may have important implications in the market. This study investigates the effects of limited investor attention on abnormal stock returns, stock liquidity, and stock return volatility.

The studies that investigate the impact of investor attention can be divided into four groups. The first group of studies investigate whether investor attention affects asset returns, asset liquidity, and return volatility. Barber and Odean (2008) argue that individual investors have limited choice set, meaning, they make their trading decisions for stocks that caught their attention first. Since there are high number of stocks available to buy as opposed to limited number of stocks available to sell, individual investors who face short-selling constraints are net buyers of attention-grabbing stocks. Da et al. (2011) find that an increase in investor attention predicts higher stock prices in the following two weeks. Aouadi et al. (2013) show that investor attention is positively associated with stock liquidity in France. Ding and Hou (2015) find that stocks become more liquid with increased investor attention. Guo et al. (2015) and Hsu and Chen (2017) find that there is a positive relationship between investor attention and return volatility. The second group consists of studies that investigate the relationship between investor's attention and their reactions to new information. Dellavigna and Pollet (2009), Hirshleifer et al. (2009), and Loh (2010) find that attention-constraint investors underreact to new information when the information flow is high, which causes post-earnings announcement drift and post-recommendation drift. Hur and Singh (2016) show that stocks respond with delay to firm-specific information and response gets slower as investor attention decreases. The studies in the third group examine the attention allocation of investors. Peng and Xiong (2006) suggest that due to limited attention, investors are leaned to process more market-wide information than firm-specific information. Lastly, fourth group of studies comprises studies which investigates the investor attention's impact as a secondary purpose. Mamun and Mishra (2012) find that firms that receive high attention reduce the required return on firm's capital by reducing information asymmetry. Borgers et al. (2013) suggest that investor attention reduces profitability of trading strategies that are based on a stakeholder-relations index.

While studies provide evidence on the hypotheses of this study, they are concentrated on USA and China. These relationships can be different or be non-existent in other countries. Therefore, this study investigates the effects of investor attention internationally. Also, this study aims to contribute to cultural finance literature and examine the effects of limited investor attention in different cultures. This study focuses on individual stocks from 27 countries from 3 regions. Seven countries are from Americas region, seven countries are from Asia – Pacific region and 13 countries are from Europe. These countries have the largest market capitalizations in their respective regions and use Latin script in at least one official/recognized language. The sample consists of 769 stocks from the indices that cover the most liquid and the largest stocks. The sample period is from March 2014 to January 2018.

Following the prior studies, this study uses internet search popularity of company names to measure investor attention. The search popularity data ~~is~~ are

published by Google Trends. This study has three different dependent variables for three different regression models. First dependent variable is market risk adjusted abnormal returns. Second dependent variable is abnormal trading volume, which is used to measure stock liquidity. Lastly, standard deviation of returns is the third dependent variable, which measures volatility. As robustness measures, this study uses different variables to proxy investor attention, liquidity and volatility. To proxy investor attention, abnormal trading volume is used. Amihud (2002) illiquidity ratio is used to measure stock liquidity while intraday price ranges are used to measure volatility. Amihud (2002) illiquidity ratio shows the price impact of trading as it measures the daily price response to trading volume. To measure the national cultural dimensions Hofstede (1983)'s national culture dimensions are used. Specifically, individualism vs. collectivism index, and uncertainty avoidance index scores are employed to see whether investor attention's impact differs with national culture.

To investigate the abovementioned relationships, this study employs Fama-Macbeth regressions, which is designed to correct for cross sectional correlations. Standard errors are computed with Newey-West formula with eight lags to address for autocorrelation and heteroskedasticity in the error terms. For robustness purposes, fixed effects regressions and fixed effects regressions with robust standard errors are used on account of Hausman test results and heteroskedasticity.

This study finds that the predictive power of investor attention on abnormal returns is not internationally valid. Most countries in the study do not exhibit statistically significant relationship between investor attention and abnormal returns. When whole sample is divided into subsamples based on national culture dimensions, countries that have high (low) uncertainty avoidance index scores started to negatively (positively) predict abnormal returns. Attention allocation choices of investors from different cultures may be the reason for this difference. However, when investor attention is measured with abnormal trading volume, both high uncertainty avoidance countries and low uncertainty avoidance countries exhibit positive relationship between investor attention and abnormal stock returns. This may be related to the information demand captured by Google search volume index as argued by Vlastakis and Markellos (2012). The results of the relationship between investor attention and abnormal return are robust to using different regression techniques. Moreover, this study shows that there is a positive relationship between investor attention and stock liquidity. This positive relationship is more pronounced in countries that score high on individualism and uncertainty avoidance indices. One percent increase in investor attention results in more trading volume in these countries. Chui et al. (2010) find that overconfidence bias is more pronounced for investors in individualist countries resulting in more trading volume in these countries. The results of this study are in parallel to this finding. Overconfidence-driven trading may be the primary cause for the more pronounced effect. In addition, stronger reaction in high uncertainty avoidance countries may be related to the uncertainty reduction role of investor attention. Investors who increase their attention also increase their knowledge on a given firm and this results in more familiarity. It is normal to expect that investors in uncertainty avoidance countries to be more sensitive to decreases in uncertainty. Using Amihud (2002) illiquidity ratio as dependent variable reveal that investor attention cannot capture the price impact type of liquidity. Investor attention significantly predicts illiquidity ratio in 6 countries. Finally, this study shows that volatility simultaneously increases with more investor attention. This effect is more pronounced in individualist countries, which is consistent with the study's hypothesis and earlier findings. It appears that overconfidence-driven trading in individualist countries creates more volatility as trading volumes increase in these countries with more

attention. Moreover, this study obtains mixed results on the predictive power of investor attention on volatility. Attention measure cannot predict standard deviation of returns in most of the countries but can predict intraday price ranges in ten countries.

Overall, this study provides some international evidence on the impacts of investor attention on stock markets. Specifically, the results of this study show that abnormal investor attention cannot predict abnormal returns in majority of the countries. Moreover, limited investor attention has significantly positive effects on stock liquidity and stock return volatility. Future studies may use a larger sample which contains small capitalization (small-cap) and medium capitalization (mid-cap) stocks. A new proxy to better capture investors' attention to small-cap and mid-cap stocks would give better results since internet search activity is also smaller for these stocks.

## ÖZET

Etkin bir pazarda yatırımcılar sınırsız bilgi işleme yeteneğine sahiptir ve varlık fiyatları mevcut tüm bilgileri işlenmiş bir biçimde içermektedir. Ancak psikoloji literatüründe bu varsayıma karşıt bulgular yer almaktadır. Kahneman (1973) insanların sonsuz dikkat (ilgi) kaynağına sahip olmadıklarını ve dikkatlerini farklı uyaranlara yöneltmeleri gerektiğini belirtir. Dikkat kısıtlı bir kaynak olduğu için finansal piyasalarda önemli etkileri olabilir. Bu çalışma, sınırlı yatırımcı dikkatinin anormal getiri, hisse senedi likiditesi ve getiri oynaklığı üzerindeki etkilerini incelemektedir.

Yatırımcı dikkatinin etkilerini inceleyen çalışmalar dört gruba ayrılabilir. İlk grupta yer alan çalışmalar, yatırımcı dikkatinin varlık getirilerini, varlık likiditesini ve getiri oynaklığını etkileyip etkilemediğini araştırır. Barber ve Odean (2008) yatırımcıların dikkat kısıtları nedeniyle sınırlı bir seçim setine sahip olduklarını ve önce dikkatlerini çeken hisselerle ilgili işlem yapma kararı aldıklarını iddia eder. Bireysel yatırımcıların alım kararı verebilecekleri hisse senedi sayısının, satım kararı verebilecekleri hisse senedi sayısından daha fazla olması sebebiyle açığa satış kısıtları bulunan bireysel yatırımcılar dikkat çekici hisseler için net alıcı konumundadırlar. Da ve diğ. (2011) yatırımcı dikkatindeki artışın iki hafta içinde daha yüksek hisse senedi fiyatlarını öngerebildiğini bulmaktadır. Aouadi ve diğ. (2013), Fransa'da yatırımcı dikkati ile hisse senedi likiditesinin pozitif ilişkiye sahip olduklarını göstermektedir. Ding ve Hou (2015), yatırımcıların dikkatlerinin artmasıyla birlikte hisse senetlerinin daha likit hale geldiğini tespit eder. Guo ve diğ. (2015) ve Hsu ve Chen (2017) yatırımcı dikkati ile getiri oynaklığı arasında pozitif bir ilişki olduğunu bulmuşlardır. İkinci grup, yatırımcıların dikkat kısıtları ve gösterdikleri tepkiler arasındaki ilişkiyi araştıran çalışmalardan oluşmaktadır. Dellavigna ve Pollet (2009), Hirshleifer ve diğ. (2009) ve Loh (2010) bilgi akışı yüksek olduğunda dikkat kısıtı bulunan yatırımcıların piyasaya gelen yeni bilgilerin bazılarını işleyemediklerini ve az tepki gösterdiklerini tespit etmişlerdir. Hur ve Singh (2016), hisse senetlerinin firmaya özgü bilgilere gecikme ile yanıt verdiğini ve yatırımcı dikkatinin azalmasıyla birlikte yanıtın daha da yavaşladığını göstermektedir. Üçüncü gruptaki çalışmalar, yatırımcıların dikkatlerini çeşitli bilgi kaynaklarına nasıl dağıttıklarını inceler. Peng ve Xiong (2006), sınırlı dikkat nedeniyle, yatırımcıların şirkete özgü bilgilerdense, pazarın genelini kapsayan bilgileri işlemeye daha eğilimli olduklarını öne sürmektedir. Son olarak, dördüncü gruptaki çalışmalar yatırımcı dikkatinin etkilerini ikincil amaç olarak araştıran çalışmalardır. Mamun ve Mishra (2012), dikkat çeken firmaların bilgi asimetrisini azaltarak firma sermayesi için gerekli getiriyi düşürdüğünü tespit etmişlerdir. Borgers ve diğ. (2013) ise, yatırımcının dikkatinin, paydaş ilişkileri endeksine dayanan alım satım stratejilerinin karlılığını azalttığını ileri sürmektedir.

Bugüne dek yapılan çalışmalar, bu tez çalışmasının kapsamında bulunan ilişkiler hakkında çeşitli bulgular sunarken, bu bulgular genel olarak ABD ve Çin'e odaklanmaktadır. Bu ilişkilerin diğer ülkelerde farklı olabileceği veya mevcut olmayabileceği varsayımından yola çıktığımız çalışmamızda, yatırımcı dikkatinin anormal getiriler, hisse senedi likiditesi ve getiri oynaklığı üzerindeki etkileri uluslararası seviyede incelenmektedir. Öte yandan bu çalışma, kültürel finans literatürüne katkıda bulunmayı ve sınırlı yatırımcı dikkatinin farklı kültürlerdeki etkilerini incelemeyi de amaçlamaktadır. Bu çalışma, 3 coğrafi bölgeden 27 ülkenin piyasalarında işlem gören hisse senetlerine odaklanmaktadır. Çalışmaya konu olan ülkelerin yedisi Amerika, diğer yedisi Asya-Pasifik, onüçü de Avrupa bölgesindendir. Bu ülkeler kendi bölgelerinde en büyük piyasa değerlerine sahip ülkelerdir ve Latin alfabesini en az bir resmi / tanınmış dillerinde kullanırlar. Örneklem, en likit ve en

büyük hisse senetlerini kapsayan endekslerde yer alan 769 hisse senedinden oluşmaktadır. Çalışmanın odaklandığı dönem, Mart 2014 ile Ocak 2018 arasıdır.

Bu çalışma, ilgili literatürde yer alan çalışmaların pek çoğunda olduğu gibi, yatırımcı dikkatini ölçmek için şirket isimlerinin internet arama popülerliğini kullanmaktadır. Arama popülaritesine ilişkin veriler, Google Trends tarafından yayınlanmaktadır. Arama popülerliği verisi çalışmanın bağımsız değişkenidir. Ayrıca bu çalışmada, üç farklı regresyon modeli için üç farklı bağımlı değişken kullanılmaktadır. İlk bağımlı değişken, piyasa riskine göre düzeltilmiş anormal getirilerdir. İkinci bağımlı değişken, hisse senedi likiditesini ölçmek için kullanılan anormal işlem hacmidir. Üçüncü bağımlı değişken getirilerin standart sapmasıdır ve getiri oynaklığını ölçmek için kullanılır. Elde edilen analiz sonuçlarının güvenilirliğini artırmak amacıyla, bu değişkenleri temsil eden birden fazla indikatör kullanılmıştır. Bu kapsamda, yatırımcı dikkati anormal işlem hacmi ile, likidite Amihud (2002) likidite oranı ile ölçülürken; gün içi fiyat aralıkları oynaklığı ölçmek için kullanılmaktadır.. Amihud (2002) likidite oranı, işlem hacminin fiyat etkisini göstermektedir. Ulusal kültür boyutlarını ölçmek için Hofstede'nin (1983) ulusal kültür boyutları kullanılmıştır. Bireysellik endeksi ve belirsizlikten kaçınma endeksi puanları, yatırımcı dikkatinin etkilerinin farklı ulusal kültürlerde değişip değişmediğini görmek için kullanılmıştır.

Çalışmamızda Fama-Macbeth (1973) regresyon yöntemi kullanılmıştır. Verilerde gözlemlenen otokorelasyon ve heteroskedastisite sorunlarını çözebilmek amacıyla standart hataların hesaplanmasında Newey-West formülü kullanılmıştır. Ana yöntemin dışında, Hausman test sonuçları ışığında sabit etkiler regresyon modeli; heteroskedastisite nedeniyle de sağlam (robust) standart hatalarla sabit etkiler regresyon modeli kullanılmıştır.

Bu çalışma, yatırımcı dikkatinin anormal getiri üzerindeki öngörü gücünün uluslararası olarak geçerli olmadığını tespit etmiştir. Çalışmadaki çoğu ülke, yatırımcı dikkati ile anormal getiriler arasında istatistiksel olarak anlamlı bir ilişki sergilememektedir. Tüm örneklem ulusal kültür boyutlarına göre alt örneklemlere bölündüğünde, yüksek belirsizlikten kaçınma puanlarına sahip olan ülkelerde anormal getiriler ile yatırımcı dikkati arasında negatif bir ilişki görülmüştür. Bunun yanında, düşük belirsizlikten kaçınma puanına sahip ülkelerde yatırımcı dikkati ile anormal getiriler arasında pozitif ilişki saptanmıştır. Fakat, yatırımcı dikkati, anormal işlem hacmi ile ölçüldüğünde her iki kültür grubu da anormal hisse senedi getirileri ile yatırımcı dikkati arasında pozitif ilişki göstermeye başlamıştır. Bu farklılık Vlastakis ve Markellos'ta (2012) bahsedildiği gibi Google arama verilerinin yatırımcıların bilgi talebini yansıtması ile ve kültürler arasındaki muhtemel dikkat dağıtımı farklılıkları ile açıklanabilir. Yatırımcı dikkati ile anormal getiriler arasındaki ilişkinin sonuçları, farklı regresyon teknikleri kullanmaya karşı güvenilirdir. Ayrıca, bu çalışma yatırımcı dikkatiyle hisse senedi likiditesi arasında pozitif bir ilişki olduğunu göstermektedir. Bu olumlu ilişki, bireysellik ve belirsizlikten kaçınma endekslerinde yüksek puan alan ülkelerde daha belirgindir. Yatırımcı dikkatindeki yüzde birlik bir artış, bu ülkelerde daha fazla işlem hacmine neden olmaktadır. Chui ve diğ. (2010), bireysel ülkelerdeki yatırımcılarda aşırı güven yanlılığının daha belirgin olduğunu ve bu ülkelerde daha fazla işlem hacmi sağladığını tespit etmiştir. Bu çalışmanın sonuçları bu bulguya paraleldir. Aşırı güvene dayalı işlem hacmi, yatırımcı dikkatinin bu ülkelerde daha belirgin bir etkiye sahip olmasının ana nedeni olabilir. Ayrıca, yüksek belirsizlikten kaçınma endeksi skoruna sahip olan ülkelerde görülen daha güçlü tepkiler, yatırımcı dikkatinin belirsizliği azaltmadaki rolüyle ilgili olabilir. Dikkatini artıran yatırımcılar aynı zamanda belirli bir firmayla ilgili bilgilerini de arttırır ve bu bilgi artışı yatırımcılara daha fazla aşinalık sağlar. Belirsizlikten kaçınan ülkelerdeki

yatırımcıların belirsizlikteki düşüşlere karşı daha duyarlı olmaları beklenebilir. Amihud (2002) likidite oranının bağımlı değişken olarak kullanılması, yatırımcı dikkatinin likiditenin fiyat etkisini yakalayamadığını ortaya koymaktadır. Yatırımcı dikkati 6 ülkede likidite oranını istatistiksel olarak anlamlı biçimde öngörebilmektedir. Son olarak bu çalışma, oynaklığın daha fazla yatırımcı dikkatiyle eşzamanlı olarak arttığını göstermektedir. Bu etki, çalışmanın hipotezi ve daha önceki bulgularla tutarlı olarak bireysel ülkelerde daha belirgindir. Yatırımcı dikkatinin artmasıyla artan işlem hacmine pararlel olarak, bireysel ülkelerdeki aşırı güvene dayalı işlemlerin daha fazla oynaklık yarattığı görülmektedir. Ayrıca, bu çalışma yatırımcı dikkatinin oynaklığı öngörü gücü konusunda karışık sonuçlar elde etmektedir. Yatırımcı ilgisi ölçümü çoğu ülkede getirilerin standart sapmasını öngöremezken, 10 ülkede gün içi fiyat aralıklarını öngörebilmektedir.

Genel olarak, bu çalışma yatırımcı dikkatinin finansal piyasalardaki etkileri üzerine bazı uluslararası kanıtlar sunmaktadır. Spesifik olarak, bu çalışmanın sonuçları, sınırlı yatırımcı dikkatinin, incelenen ülkelerin çoğunda anormal hisse senedi getirilerini öngöremediğini göstermektedir. Bunun yanı sıra, yatırımcı dikkatinin hisse senedi likiditesi ve getiri oynaklığı üzerinde istatistiksel olarak anlamlı biçimde olumlu etkileri olduğu görülmektedir. Gelecekteki çalışmalarda, küçük ve orta ölçekteki hisse senetlerini içeren daha büyük çaplı örneklemler kullanılabilir. İnternet arama etkinliği bu tip hisseler için daha düşük düzeyde olduğundan, yatırımcıların küçük ve orta ölçekteki hisse senetlerine ayırdıkları dikkati ölçebilmek için farklı değişkenler kullanmak daha gerçekçi sonuçlar verebilir.

## 1. INTRODUCTION

Traditional models of financial markets assume that asset prices reflect all available information. With the arrival of new information, investors update their beliefs immediately and changes in prices occur. These models assume that investors are able to pay attention to every available information. However, evidence from psychology literature contradicts with what financial models assume. Kahneman (1973) argue that attention is not an infinite resource but a scarce one. Therefore, people have limited information-processing capabilities. Peng and Xiong (2006) show that attention constraints make investors to prioritize market-wide information over firm-specific information. Attention constraints and limited information-processing capabilities may significantly impact returns, liquidity and volatility in the financial markets.

To test the effects of investor attention, researchers proposed a number of proxies. Barber and Odean (2008) use abnormal trading volume, extreme returns, and media coverage as attention proxies and examine attention-driven buying behavior. They hypothesize that individual investors are more likely to buy stocks that grab their attention first because they have to pick stocks to buy among thousands of alternatives. This enlarged choice set is not the same as the choice set of selling decisions because individual investors sell stocks that they already have. Barber and Odean (2008) find that buy orders are larger than sell orders for stocks that receive high attention. Dellavigna and Pollet (2009) examine the investors' reactions to Friday announcements to test the effects of limited attention. They posit that investors' reaction may be different for announcements that are made on Friday because upcoming weekend may distract them. Hirshleifer et al. (2009) use the intensity of announcements made on a single day as an inattention factor. When there is high number of new information, investors may not be able to sufficiently pay attention to them. Loh (2010) follows a similar logic and argues that limited investor attention may prevent investors to efficiently process information and create differences in reactions when there is a high number of stock recommendations in a single day. These three studies investigating the inattention's impact on investors' reactions find evidence of unprocessed information and underreaction.

In addition to the passive attention proxies where investors' attention is assumed to be grabbed, internet search activity is also used as an active attention proxy

(Ding and Hou, 2015). Da et al. (2011) suggest that search activity is a better choice to measure investor attention because when investors are searching for a stock, they are undoubtedly paying attention to that stock. They test the Barber and Odean (2008)'s attention hypothesis and examine whether there is a positive price pressure on high-attention stocks. They find that abnormal investor attention predicts positive returns.

Following Da et al. (2011), the literature used internet search activity as investor attention proxy intensively. Zhang et al. (2013), Ying et al. (2015), and Zhang and Wang (2015) find that there is a positive relationship between investor attention and stock returns in China. Guo et al. (2015) find positive relationship between investor attention and volatility in USA. Fan et al. (2017) find the same result in China. A positive relationship between liquidity and attention is found by Ding and Hou (2015) in USA, by Fan et al. (2017) in China, by Aouadi et al. (2013) in France, and by Adachi et al. (2017) in Japan.

Nevertheless, other attention proxies are continued to be used. Guo et al. (2015) use tweets of individual investors to proxy investor attention and find that they are positively associated with volatility in USA. Similar results have been found by Hsu and Chen (2017) who use past high returns as an attention proxy. Kaniel and Parham (2017) measure investor attention by using the top 10 list of funds prepared by Wall Street Journal and find that there is a positive relationship between attention and liquidity.

While the number of studies of investor attention are high, there are not many international studies. Besides, existing international studies are mostly concerned with index level relationship (Vozlyublennaia, 2014; Tantaopas et al., 2016; Chen, 2017). In this context, the aim of this study is to extend the literature to different countries and investigate whether prior findings of investor attention literature are internationally valid. This study focuses on cross-section of individual stocks in twenty-seven countries and investigate the impact of investor attention on abnormal stock returns, stock liquidity and stock return volatility. Moreover, this study investigates whether the impact of investor attention differs according to national culture and market development. This study contributes to:

(i) investor attention literature by providing some new international findings on the relationships of attention-stock return, attention-stock liquidity, and attention-stock return volatility;

(ii) cultural finance literature by examining whether the relationships of attention-return, attention-liquidity, and attention-volatility differ from culture to culture.

The sample of the study includes twenty-seven countries from three regions: Americas, Asia-Pacific, and Europe. Stock exchanges from these regions are sorted by market capitalizations and the countries that have the largest stock exchanges and at least one official/recognized language written in Latin script are included in the study. The data of World Federation of Exchanges (WFE)[1] are used to find the market capitalizations of exchanges. The empirical research covers the period March 2014 to January 2018 for 769 stocks from twenty-seven countries.

Fama-MacBeth (1973) regressions are used as main research model and standard errors are calculated with Newey-West (1987) formula. This methodology controls for autocorrelation and heteroskedasticity. For robustness purposes, fixed effects regressions and fixed effects regressions with robust standard errors are also employed. Fixed effects regressions are used after the results of Hausman test, and robust standard errors are computed to address heteroskedasticity.

Three regression models form the base of research methodology of this study. Independent variable in these regressions is investor attention. This study follows the literature and measures the investor attention by Google Search Volume Index (GSVI). The data of search volume index are obtained from Google Trends. As a robustness measure, abnormal trading volume is also used as an attention proxy. Dependent variables are abnormal return, stock liquidity, and volatility. Abnormal returns are calculated by subtracting the expected returns calculated by capital asset pricing model (CAPM) from the realized returns. Stock liquidity is measured by abnormal trading volume, which is computed by subtracting the natural logarithm of mean trading volume of prior 52 weeks from the realized trading volume. Volatility is calculated by standard deviation of returns. Additionally, Amihud (2002) illiquidity ratio and intraday price ranges are employed as additional measures of liquidity and volatility, respectively. Amihud (2002) illiquidity ratio shows the price impact of trading as it measures the daily price response to trading volume. Data on stocks and indices are obtained from Thomson Reuters Datastream.

[1] WFE is a trade association of publicly regulated exchanges. https://www.world-exchanges.org/our-work/statistics

To investigate investor attention's effect at a broader level, this study divides 769 stocks into subsamples based on their region, national culture and market development. National culture is measured by Hofstede's (1983) national culture dimensions. Specifically, individualism vs. collectivism and uncertainty avoidance dimensions are used in this study since earlier studies that examine the role of culture in finance (such as Chui et al., 2010, Schmeling, 2009) use these dimensions extensively. Data on national culture dimensions are obtained from Hofstede Insights[2]. The stock markets are divided into two groups based on market development: developing and developed. In order to do that, Morgan Stanley Capital Investment's (MSCI) market classifications[3] are used.

After running the regression models, this study finds that:

1) The investor attention cannot predict abnormal returns in twenty-one countries. Four countries have statistically significant positive relationship between investor attention and abnormal returns and two countries have statistically significant negative relationship between the two. Using abnormal trading volume as another investor attention proxy reveals similar results. These findings contradict with studies that find a positive relationship between investor attention and stock returns (such as Da et al., 2011, Zhang et al., 2013, Adachi et al., 2017). Moreover, in high uncertainty avoidance countries, investor attention positively predicts abnormal returns while it predicts abnormal returns negatively in low uncertainty avoidance countries. This may be caused by the possible differences between attention allocation choices of high uncertainty avoidance countries and low uncertainty avoidance countries. However, both culture groups exhibit significantly positive relationship between investor attention and abnormal stock returns, when investor attention is measured by abnormal trading volume. Vlastakis and Markellos (2012) argue that Google search volume index captures investors' information demand. Different results emerging from using different investor attention proxies may be related to this argument. The findings are robust to different regression techniques.
2) There is a positive relationship between abnormal trading volume and investor attention in twenty countries. The results indicate that investor attention has a

[2] https://www.hofstede-insights.com/product/compare-countries/
[3] https://www.msci.com/market-classification

role in uncertainty reduction as mentioned in Ding and Hou (2015). As investors increase their attention to a stock, they become more familiar with it, which results in more trading. This positive relationship is more pronounced in individualist countries and countries that score high on uncertainty avoidance index. These findings are in parallel with those of Chui et al. (2010). Investors in individualist countries are subject to more overconfidence bias which results in more trading volume in these countries. Investors from individualist cultures who are more inclined to exhibit overconfidence-driven excess trading respond more to increases in investor attention. Additionally, stronger reaction in high uncertainty avoidance countries may be related to the uncertainty reduction role of investor attention. Using Amihud (2002) illiquidity ratio shows that investor attention cannot capture the price-impact type of illiquidity. In only six countries, investor attention significantly predicts lower Amihud (2002) illiquidity. Low number of countries exhibiting significant relationship may be related to individual investors' trading volume, which is arguably low (Ding and Hou, 2015). Since Amihud (2002) illiquidity ratio captures the price impact of the liquidity, investor attention's effect on stock liquidity is diminished when it is used. Using different regression techniques does not change the results.

3) Increases in investor attention are positively associated with stock return volatility. Twenty countries show statistically significant positive relationship between investor attention and volatility. More processed information resulted from increases in investor attention may be the cause of contemporaneous increases in stock return volatility (Goddard et al., 2015, Andrei and Hasler, 2015, Hsu and Chen, 2017). This relationship is stronger in individualist countries. Overconfidence-driven trading in individualist countries may be the primary cause for this finding since excess trading observed in individualist countries creates more volatility in these countries (Chui et al., 2010).
4) Investor attention cannot predict stock return volatility in twenty-three countries when standard deviation of returns is used to measure volatility. However, attention measure can predict weekly average of intraday price ranges in eighteen countries. This study obtains mixed results regarding the investor attention's predictive power on stock return volatility.

The rest of the study is organized as follows. Section 2 covers a detailed investor attention literature review. Section 3 explains research methodology used in this study. Section 4 present empirical results and finally section 5 includes concluding remarks.

## 2. LITERATURE REVIEW

This study divides the investor attention literature into four groups. First group of studies investigate whether attention-constraint investors make biased investment decisions and whether investor attention have any impact on stock returns, volatility and liquidity. Studies in this group not only have similar research purposes, but also similar research methodologies. Most studies examine the impacts of investor attention by regression analysis, VAR (Vector Autoregression) and various GARCH (Generalized Autoregressive Conditional Heteroskedasticity) frameworks and also by Granger causality tests. Second group of the literature concentrates on the investors' reaction to information. Arguably, attention-constraint investors cannot sometimes sufficiently process available information. Studies usually examine this hypothesis by analyzing the reactions of inattentive investors, which can be distracted by the high number of new information, the psychological effects of certain days (i.e. Friday effect), holidays or popular events. Attention literature usually concludes that inattentive investors underreact to new information. Although not high in numbers, third group of studies try to identify attention allocation behavior of investors. Since attention is a scarce resource and the information flow is generally high, how investors allocate their limited attention across different types of information stands as an important question. These studies point out a tendency of investors to focus on market-wide and salient information. Last group of studies consists of related studies that primarily investigate other parts of the business literature. These studies usually examine whether their findings change with different levels of investor attention.

Subsections of the literature review is as follows: Section 2.1. will cover the studies that investigate the impact of investor attention on stock returns, stock liquidity and stock return volatility. Section 2.2. explains the part of the investor attention literature that focuses on the investors' reaction to information. Section 2.3. explains studies about attention allocation of investors. Section 2.4. briefly describes other relevant studies, section 2.5 briefly presents investor attention proxies used in the literature and explains Google search volume index. Finally, section 2.6 presents a brief review of the literature on overconfidence, individualism, and uncertainty avoidance. A tabulated version of the investor attention literature can be found in Appendix 1.

## 2.1. Investor Attention, Returns, Volatility, and Liquidity of Stocks

This section reviews the studies that investigate the impact of investor attention on stock returns, stock liquidity, and stock volatility. Section 2.1.1 reviews the investor attention – stock return literature. Section 2.1.2 reviews the studies that investigate the relationship between investor attention and stock volatility, while section 2.1.3. covers the studies that investigate the relationship between investor attention and stock liquidity.

### 2.1.1. Investor Attention and Stock Returns

The impact of investor attention on stock returns has been investigated extensively in the literature, in the last decade. Da et al. (2011) investigate the relationship between stock returns and investor attention by proposing a new attention proxy, namely internet search volume. They suggest that internet search volume measures investors' active attention, unlike traditional proxies of investor attention, such as abnormal volume, extreme returns and news coverage, which measure investors' passive attention. The idea behind this proposal is straightforward: When investors search information about an asset, they definitely and actively pay attention to it. However, it is important to note that internet search volume captures attention of individual investors and not institutional investors since the latter use more advanced information services such as Reuters and Bloomberg terminals. Using Google search volumes provided by Google Trends, Da et al. (2011) examine Russell 3000 stocks between 2004 and 2008. Their results show that increases in search volume index (SVI) predict positive returns in the next two weeks following with a price reversal within the same year, starting from the fourth week.

Bae and Wang (2012) investigate whether a firm's name affects its returns through an increase in investor attention. They hypothesize that during the boom period of Chinese stock market, firms that have the word "China" in their names attract more investor attention than the firms without the word "China" and this increased investor attention leads to higher returns. Their empirical study focuses on Chinese firms listed in US stock exchanges between September 2006 and October 2008. Using cross-sectional regression analysis, they find that having the word China in a company's name results in more than 100% higher buy-and-hold returns[4] during the

[4] $\prod_{t=1}^{T}(1 + R_{i,t}) - 1$ where $R_{i,t}$ is the daily return of stock i at day t.

boom period September 2006 to October 2007. In addition to that, during the bust period November 2007 to October 2008, China-name stocks experience a greater price reversal.

In addition to market data and internet search volumes, stock spams also used in the literature to study the investor attention. The idea is that the stock spam mails can guide investors' attention to targeted stocks and can lead to price appreciation. Nelson et al. (2013) examine 639 spam messages for 423 U.S. companies between 1999 and 2006 and find that content of the messages has impact on stock returns. They conduct an event study in which they take the date of the spam message as the day 0 of a spam event. Their findings indicate a higher trading volume over the window (−3, +5) and significantly positive mean return in the 3-day window surrounding the spam event date. They also conduct multivariate regressions by creating dummy variables according to the content of spam messages. Specifically, they look for the implied return of the spam message and whether it quotes old press releases. They show that spams involving optimistic target prices result in higher returns and volumes following the spam campaign. Hu and McInish (2013) also study the stock spams and trading activity. Their sample period covers the period between November 2004 and August 2007 and they examine 41,135 spam messages targeting 785 US firms. They identify a spam campaign "*as a period of spamming activity with no more than five consecutive days without a spam e-mail"*. Their findings suggest that spam campaigns increase trading and returns are higher on the peak day of the spam campaigns than non-spam dates. They also look for whether having a target price affects the impact of spam campaigns. They create a dummy variable that takes value depending on whether the spam message contains a target price or not. They find that spams with target prices create higher returns.

Yuan (2015) uses record breaking events and front-page market news as a proxy for investor attention to test its impact on the U.S. companies between 1983 and 2005. Unlike many other studies, cross-sectional regressions show that attention grabbing events predict abnormally higher selling activity. Yuan (2015) states that both proxies of attention-grabbing events cause investors to pay more attention to their holdings which results in more trading decisions.

Google SVI may be the first alternative that comes to mind to measure the internet search activity, but it is important to consider the user density of search engines. Zhang et al. (2013) propose that it is more appropriate to use Baidu search

index instead of Google SVI considering Baidu is far more common in China than Google is. In their study, they examine the effects of investor attention on stock returns for a sample of Chinese stocks trading in ChiNext, SME Board, and Main Board. Using daily data for the period between March 1, 2011 and March 30, 2012, they find that investor attention has a predictive power of stock returns. They also apply Granger Causality Tests to find the direction of the relationship and find that investor attention granger causes the abnormal return and the abnormal return granger causes the investor attention but the latter direction is weaker.

Like Zhang et al. (2013), studies which investigate investor attention's effect in Chinese exchanges predominantly use Baidu search index as a proxy. Yuan and Wenbin (2014) examine daily returns of 803 shares from the Shanghai A-share stock market between April 1, 2012 and March 31, 2013 and find that internet search volume has a predictive power on higher daily stock returns. Their results also reveal that prices reverse following the first day. Ying et al. (2015) use cross-sectional regression analysis of Chinese firms for the period between June 2006 and March 2011 and show that investor attention significantly and positively affects stock returns. They state that positive effect exists within the first week and is reversed starting from the second week. Zhang and Wang (2015) test the effect of limited attention of investors on companies listed in ChiNext market. Their empirical analysis covers daily stock returns between 23 October 2009 and 30 December 2011. Their findings indicate that limited attention creates positive price pressure that is reversed in one week. In addition to that, increased attention on non-trading days significantly affect the price gap for the next week's opening price. Shen et al. (2017) investigate the ChiNext, the SME Board and the Main Board from China between March 1st 2011 and March 30th 2012 using daily search volume from Baidu index. Their results reveal that Baidu index has a predictive power on next day's price changes. Attention's effect on returns is negative and not considering transaction costs, a trading strategy following this negative relationship outperforms benchmark returns.

Peng et al. (2016) follow a different approach to study the effect of investor attention. They state that price limits of Chinese stock market create a perfect environment to test the effect of attention since hitting the daily upper limit[5] means

[5] Regulations in Shanghai Stock Exchange set an upper price limit of 10% for stocks. This limit means that stocks may close at most 10% higher than its previous closing price. Trading does not stop after hitting the upper price limit, but only trades at or within the limit prices are executed. "Special Treat" (ST) stocks have an upper price limit of 5% but they are not included in Peng et al. (2016).

similar performance for stocks. They use top 10 list of daily-return leaders, reported by the financial media to compare the investor attention that the stocks get. Specifically, they compare the limit-hitting stocks that made to the daily top 10 list with the limit-hitting stocks that are not on the list and test whether being on the list attracts more investor attention. Their results show that between 2006 and 2009 investors are more attentive to limit-hitting stocks on the top 10 list, leading to higher abnormal returns on the first post-event day.

Liu and Ye (2016) investigate investor attention's nature by trying to distinguish news-driven search volume from self-initiated search volume. They argue that investors' information search initiated by themselves for their trading decisions and not by the existence of news put more price pressure. They use internet search volume data from Baidu index and measure news-related searches by using news coverage data from Baidu, which includes news from newspapers, magazines, popular financial websites, and official websites of organizations. They hypothesize that when there is more news about a company in online media, it is more likely that the attention the company gets is more news-driven. They examine a sample of CSI 300 (China Securities Index 300) stocks from 2009 to 2013 and find that the effect of investor attention is mediated negatively by news coverage, which is measured by the number of online news based on stock ticker. Self-initiated search volume predicts higher returns than news-driven search volume.

Another Asian market studied in the literature is Japanese startup exchanges. Proxied by Google SVI, investor attention's effect on stock returns of Mothers and JASDAQ[6] exchanges is examined by Adachi et al. (2017). Their study focuses on 108 stocks traded on Mothers between January 2014 and March 2016 and 100 stocks traded on JASDAQ between April 1, 2012 to June 30, 2016. According to their results, there is a positive relationship between investor attention and stock returns. Additionally, a positive relationship between attention and liquidity is also found.

Pyo (2017) explores attention-return relationship and trading strategies based on search queries in the Korean market. Granger causality tests and Bivariate GARCH Model show that attention has negative effect on KOSPI index returns. Another finding of the study is that stock returns don't have any significant impact on investor attention. Finally, a trading strategy constructed on the basis of negative relationship between attention and returns outperforms the benchmark strategy. Tan and Taş (2019)

[6] Mothers and JASDAQ are Tokyo Stock Exchange's sections where the shares of startups are traded.

examine the relationship between investor attention and stock returns in Turkey for the period 2013-2017 by using Google SVI to proxy investor attention. They find that high attention firms earn higher returns and this relationship is stronger small cap stocks.

Although examining individual stock returns is a common purpose, attention literature comprises studies that investigate its impact on stock indices. Vozlyublennaia (2014) investigates the effect of investor attention on different asset classes in the U.S. market. She examines stock market indices, bond indices, and commodities between 2004 – 2012. Granger causality tests and VAR models show the bidirectional causal relationships. Additionally, predictability of index returns is diminished with more investor attention resulting in increased efficiency. Tantaopas et al. (2016) use Google SVI to study relationship between investor attention and market return, market volatility, and market trading volume. Their study is focused on stock market indices from ten Asia-Pacific countries, for the period 2004 and 2014. They argue that studying the attention's effect on broad index level is better than stock-specific examination since the former better reflects the individual investor's investment style, i.e. they invest through financial intermediaries, which offer investment alternatives such as broad market indices. Their results show one-way Granger causalities. Changes in attention are caused by changes in return, volatility and trading volume. Additionally, they find that market efficiency is improved with more investor attention since it reduces return and volatility predictability.

Perlin et al. (2016) investigate the impact of investor attention on returns, volatility and trading volume by examining search frequency of finance related words and not stock names or tickers. Their study is focused on the USA, the UK, Australia and Canada between 2005 – 2014. Results suggest that the words "stock", "finance", and "market" have the ability to forecast index volatility. While this relationship is in a positive way, the predictive power of the words "finance", "stock", and "debt" on index returns is in a negative way. Chen (2017) examines attention's impact on global benchmark indices from sixty-seven countries for the period between 2004 – 2014. He uses internet searches from Google about index tickers to proxy investor attention. Results suggest that investor attention has negative effect on index returns and this effect is stronger during positive sentiment periods, which is measured by a dummy variable that takes value depending on the monthly index return. Han et al. (2018a) examine the impact of investor attention on stock markets in six developed and nine developing markets. They measure investor attention with Google SVI for the period

2004-2015 and find that investor attention's impact on market efficiency is mixed. They state that investor attention diminishes market efficiency by increasing the predictability of returns, but increases it by decreasing the autocorrelation of returns.

Chronopoulos et al. (2018) examine the predictive power of investor attention through volatility predictability that is improved by investors' information demand. Their information demand proxy is Google SVI of "S&P500" and research period is between January 2, 2004 and December 31, 2016. Using various GARCH models, they show that investor attention improves the predictability of volatility. They also show that signs, unlike levels, of daily stock returns are predictable, meaning investors may use SVI to predict the direction of the market.

Abundance of studies demonstrating the predictive power of investor attention leads to empirical investigation of investment strategies constructed on the basis of attention theories. Wang (2017) argues that a spike in options volume after a week of dormant period, meaning zero trading volume, can be considered as a proxy for investor attention. He constructs portfolios that follow spikes in option volumes for the period 1996 – 2003 and finds that this strategy generates a monthly abnormal return of 68 basis points, which translates into 8.16% annualized abnormal return. His findings suggest that investors can generate abnormal returns by following attentive investors from options market.

Beside stocks, investor attention's effect is investigated for different securities. For instance, Eichler (2012) uses search volume to test whether more investor attention results in less mispricing of American Depositary Receipts (ADRs hereafter). Unlike Da et al. (2011), Eichler (2012) uses internet search queries of AOL users and not Google SVI as a proxy for investor attention. Applying cross-sectional two stage least squares regressions to test for a sample of ADRs between March 1, 2006 and May 31, 2006, he shows that ADR mispricing is reduced with higher level of investor attention. A similar study to Eichler's (2012) is conducted by Tang and Zhu (2017). They investigate the price reaction to a surge in investor attention by using the Google SVI for ADRs between 2004 - 2015. Using the Carhart Four-Factor Regression Model, they find that increase in investor attention results in same-day price increases. However, positive price pressure reverses quickly, between one day and fourteen days. They also examine if there are any cross-country differences and find that ADRs from developing markets and developed markets behave and respond to attention changes similarly. Han et al. (2018b) investigate the effects of investor attention on foreign

exchange (FX) market. They use Google SVI to measure investor attention for the period 2004-2010 and find that with more investor attention, currency returns increase simultaneously but decreases at the weekly third lag. They state that the magnitude of these impact is affected by the sign of past currency returns. Han et al. (2018c) measures investor attention with Google SVI, for the period 2007-2015, and find a positive relationship between currency returns and investor attention.

Gao and Mei (2013) investigate investor attention and timberland asset pricing relationship. They use Google search volumes of twenty timberland investment related keywords, such as bioenergy, biomass, climate change, hardwood, housing etc. They state that investor attention to the majority of the keywords used in the study significantly affects the abnormal returns of timberland investments.

Like many other markets and assets, Real Estate Investment Trusts (REITs hereafter) are also examined in attention-based empirical settings. Yung and Nafar (2017) examine 182 REITs in the Center for Research in Security Prices (CRSP) and use Google SVI to measure investor attention between 2004 – 2012 and find that REITs that grab more attention perform better than REITs with less attention. The effect of attention is reversed over time.

Baur and Dimpfl (2016) extend the literature to commodities market by studying gold, silver, palladium and platinum. By using Google SVI to measure investor attention for the period between 2004 and 2015, they find that gold attracts more attention than other commodities examined in the study. Return and volatility significantly influence internet searches for gold and this effect is either weaker or non-existent for silver, palladium and platinum. This implies that investors' information demand is higher for gold. They add that when gold experiences negative returns, search queries for gold increase more than it does when gold experiences positive returns. It seems that investors seek the information related to this negative performance by googling news about gold. Another attention based study that examines commodity market is made by Han et al. (2017a). They examine the impact of attention on commodity futures' prices between 2004 and 2017, using Google SVI. Their results show that attention has statistically significant impact on futures prices. They add that investor attention increases market efficiency by increasing information efficiency. However, for some commodities such as cotton, natural gas and gold, market efficiency is reduced with more investor attention through herding behavior channel. They find that the impact of attention is more powerful when the past returns

are negative, which implies that investors are more likely to follow others' behaviors when they are pessimistic. Han et al. (2017b) focus on predictive power of investor attention on oil prices between January 2004 and March 2016. Their study also uses Google SVI to measure investor attention. Results indicate that Google SVI has statistically significant predictive power for oil prices for short run. Kou et al. (2018) examine the agriculture futures market in China for the period 2011-2015. They use Baidu search index to measure investor attention and argue that investor attention's effects on asset returns are affected by short-selling constraints. They find that investor attention has no significant impact in agriculture futures market where short-selling constraint is relaxed.

Table 2.1 summarizes the studies that investigate the relationship between investor attention and individual stock returns. Most of the studies reviewed in this section find a positive relationship between investor attention and asset returns. Only three studies find that the relationship between the two variables is negative. Another important point is that the relationship between investor attention and stock returns is usually examined in the U.S. and Chinese exchanges. Out of 14 studies 5 of them focus on the U.S., 7 of them on China, 1 on Japan, 1 on Korea, and 1 on Turkey.

### 2.1.2. Investor Attention and Stock Return Volatility

In addition to stock returns, investor attention can have an impact on the volatility of the markets. By increasing their attention, investors may collect more information, resulting in an increase in familiarity and a decrease in uncertainty (Ding and Hou, 2015). This, in turn, may decrease volatility. Alternatively, more investor attention may increase volatility by allowing more information to be processed (Goddard et al., 2015, Aouadi et al., 2013, Andrei and Hasler, 2015). Accordingly, studies that investigate the relationship between volatility and investor attention present mixed results.

Andrei and Hasler (2015) study the impacts of investor attention in an economy which includes a risky asset that pays an unknown amount of dividend. The representative investor estimates dividends by paying attention to the information. The representative investor's attention fluctuates according to the state of the economy. The model predicts an increased volatility and risk premium with increasing attention and uncertainty. The reason for this is the speed of information incorporation into

prices. High attention leads to immediate incorporation of information, which results in higher return volatility. They state that this positive relationship is quadratic.

Table 2.1: Relationship Between Investor Attention and Individual Stock Return

| Countries | Studies Finding Positive Relationship | Studies Finding Negative Relationship | Studies Finding No Relationship |
|---|---|---|---|
| **USA** | Da et al. (2011), Bae and Wang (2012), Nelson et al. (2013), Hu and McInish (2013) | Yuan (2015) | - |
| **China** | Zhang et al. (2013), Yuan and Wenbin (2014),Ying et al. (2015), Zhang and Wang (2015), Peng et al. (2016), Liu and Ye (2016) | Shen et al. (2017) | - |
| **Japan** | Adachi et al. (2017) | - | - |
| **Korea** | - | Pyo (2017) | - |
| **Turkey** | Tan and Taş (2019) | | |

Aouadi et al. (2013) examines the impact of investor attention on liquidity and volatility of French stock market between 2004 and 2010. They proxy investor

attention with Google SVI and use Amihud (2002) illiquidity ratio[7] to measure market illiquidity, and standard deviation of returns to measure volatility. By using time-series regressions and Quandt-Andrews breakpoint test, they find economically stable[8] positive relationship between investor attention and stock market liquidity. Additionally, they find mixed evidence on the relationship between investor attention and stock market volatility i.e. significant coefficients have mixed signs for 11 out of 27 stocks. The results indicate that volatility increases with more processed information and decreases with reduced uncertainty. Similarly, Moussa et al. (2017) also find mixed results from France. They investigate whether information demand and supply have any effects on stock market returns and volatility. They use Google Search Volume Index to measure information demand and news headlines to measure information supply. Their sample consists of 25 largest stocks traded in CAC40 index of France for the period between 2007 and 2014. GARCH and multiple correspondence analysis show that the information demand has mixed effects on volatility. They find that some stocks show a positive relation between investor attention and volatility, while some other stocks show a negative relation. Additionally, they show that information effects volatility more importantly than it does stock returns. Guo et al. (2015), on the other hand, examine the changes in investor attention in response to price fluctuations by examining the tweets between individual investors and their advisors between 2008 and 2011. Their sample consists 680,000 tweets from interactions between investors and 300 volunteered financial advisors from a national financial planning association. They use two-sample t-test and OLS regressions and find that large price fluctuations lead to more investor attention. Additionally, they state that attention allocation of investors differs with stock performance. Investors show more attention, meaning tweet frequency between individual investors and their financial advisors increase, to smaller gains and large losses than to smaller losses and large gains. Fan et al. (2017) study the stocks in Shanghai Stock Exchange (SSE) 50 Index between 2011 and 2015 and find that abnormal investor attention measured by Baidu search index is positively correlated with trading volume and volatility. Chen and Lo (2019) examine investor attention's impact on stock return volatility in Taiwan, for the period 2004-2016. They find that

[7] This ratio is widely used in measuring liquidity and is calculated by dividing the daily absolute stock returns to its dollar volume.

[8] The purpose of the Quandt–Andrews breakpoint test is to find whether global financial crises created any instability in their model since their sample period runs from January 2004 to June 2010.

investor attention measure of Google SVI is positively associated with stock return volatility.

Hsu and Chen (2017) examine investors' attention and profitability of low-volatility strategy[9]. They examine US stocks between 1965-2015 and find that profitability of low-volatility strategy increases with stocks that grab higher investor attention stocks.

The relationship between investor attention and volatility is studied in FX market and commodities market as well. Goddard et al. (2015) examine the FX market between 2004 and 2011. They find a positive relationship between investor attention and FX volatility. Peltomäki et al. (2018) investigate the effects of investor attention on both FX market volatility and stock market volatility for the period 2004-2014. They examine emerging markets and find that stock volatility increases with more investor attention, measured by Google SVI and abnormal trading volume. However, they find no significant evidence on the relationship between FX market volatility and investor attention. Li et al. (2015) examine the impact of investor attention on crude oil price volatility by using Google SVI to measure investor attention. They find that attention and volatility are positively associated. Afkhami et al. (2017) examines the predictive power of Google SVI of energy related 90 keywords for the period 2004-2016. They specifically concentrate on crude oil, gasoline, heating oil, and natural gas. Their GARCH analysis and Granger causality tests reveal that Google SVI of energy related keywords are significant predictors of volatilities of energy commodities. For instance, the term “Corn ethanol” Granger causes volatilities of Brent oil and gasoline, while the term “Gasoline” Granger causes volatilities of all energy commodities. Ordinary Least Squares (OLS) estimates show that while most keywords predict an increased volatility with more investor attention; some keywords such as “Fracking” predict lower Brent and natural gas volatility with increases in investor attention.

Table 2.2 summarizes the studies that investigate the relationship between investor attention and volatility. As can be seen from Table 2.2 the relationship between return volatility and investor attention is investigated in eleven studies. Seven of these studies examine volatility in stock market, one study examines the foreign exchange (FX) market, one study (Peltomäki et al., 2018) examines both stock market and FX market, and two studies examine commodities market. Table 2.2 clearly

[9] Low volatility strategy refers to a documented fact that, in the U.S., low volatility stocks tend to outperform high volatility stocks (Hsu and Chen, 2017).

demonstrates that mixed results are found in the literature. Eight studies find a positive relationship between the two variables. Three studies find evidence that support both positive and negative relationship. Peltomäki et al. (2018) find that there is a significant relationship between investor attention and volatility in stock market but not in FX market.

Table 2.2: Relationship Between Investor Attention and Volatility

| Country/Market | Studies Finding Positive Relationship | Studies Finding Negative Relationship | Studies Finding Mixed Results |
|---|---|---|---|
| **USA** | Andrei and Hasler (2015), Guo et al. (2015), Hsu and Chen (2017) | | |
| **China** | Fan et al. (2017) | | |
| **France** | | | Aouadi et al. (2013), Moussa et al. (2017) |
| **Taiwan** | Chen and Lo (2019) | | |
| **Emerging Countries** | Peltomäki et al. (2018) | | |
| **FX Market** | Goddard et al. (2015) | Peltomäki et al. (2018) | |
| **Commodities** | Li et al. (2015) | | Afkhami et al. (2017) |

### 2.1.3. Investor Attention and Stock Liquidity

Besides its impact on volatility, increased investor attention can increase the liquidity in the markets through the channels of increased familiarity and decreased uncertainty. A few studies examined the investor attention's effects on market liquidity and tested this hypothesis. Nelson et al. (2013) and Hu and McInish (2013) investigate whether stock spam messages affect stock liquidity in USA. Both studies find that there is a positive relationship between investor attention and trading volumes of stocks. Ding and Hou (2015) examine the impact of investor attention on the shareholder base, which is measured by the number of shareholders, and stock liquidity in USA for the period 2004-2009. They measure investor attention by Google SVI, Google news and advertising expenditure. Their methodology consists of OLS regressions, VAR and Granger causality test. They find that increased investor attention is a significant factor in having a broader shareholder base. Also, investor attention's negative relationship with bid-ask spread and its positive relationship with turnover rate indicate that higher the attention, higher the stock liquidity. Kaniel and Parham (2017) explore whether investor attention, which is measured by the presence in the media, causes differences in investment behavior. They measure investor attention by the number of mentions in Wall Street Journal's "Category Kings"[10] ranking list and examine US stocks between 2000 and 2012. By using regression discontinuity design, they find that having been mentioned in Wall Street Journal's "Category Kings" ranking table leads to more capital flows to that fund. This simply means that, if a mutual fund is mentioned in the Category Kings list, it attracts a lot of additional investor attention such that capital flows to that mutual fund increase on average 31% after being in the list. The effects of media attention on flows continue even when the appearance in the media does not convey new information.

Fan et al. (2017) examine Shanghai Stock Exchange (SSE) 50 Index between 2011 and 2015 and find that there is a positive correlation between investor attention and stock liquidity. Aouadi et al. (2013) investigate the relationship between investor attention and stock liquidity in France between 2004 and 2010. They find that there is a positive relationship between stock liquidity and investor attention. Adachi et al. (2017) examine the Japanese startup exchanges for the period 2012 and 2016. They find that there is a positive relationship between investor attention and stock liquidity.

[10] Category Kings is published by Wall Street Journal every quarter since 1994 and is the top ten list of mutual funds. Rankings are based on previous 12-month returns.

Chen and Lo (2019) finds that the turnover ratio and trading volume are positively correlated with Google SVI in Taiwan for the period 2004-2016

Similar to stocks, a positive association is also found for currencies. Goddard et al. (2015) examine the relationship between investor attention and the currency prices between 2004 and 2011. They use Google SVI to measure investor attention and perform OLS regressions, GARCH and VAR analysis. They find a positive association between changes in investor attention and changes in trading volume in the FX market.

Table 2.3 summarizes the studies that examine the relationship between investor attention and stock liquidity. Contrary to the relationship between investor attention and return volatility, there exists a straightforward relationship between investor attention and liquidity. As can be seen in Table 2.3, all of the nine studies that examined this relationship found significant positive results. Two of these studies focus on emerging markets, China and Taiwan, the rest examines the impact of investor attention on liquidity in developed markets.

## 2.2. Investor Attention and Investors' Reaction to Information

In an environment with plenty of information, limited attention of investors can decrease efficiency of markets by leaving value-relevant information unprocessed. Studies investigate this possibility by examining investors' reactions to information, under conditions that cause inattention. Various types of information such as firm announcements, news, analyst recommendations, and recent market performance have been analyzed in the finance literature. Studies usually find that when information flow is high, investors underreact to some of them. Therefore, limited investor attention is proposed as an explanation to some of the well-known phenomena such as post-earnings-announcement-drift (PEAD)[11] and post-recommendation-drift[12].

Section 2.2.1 reviews the studies that examine investors' reaction to firm announcements. Section 2.2.2 reviews the studies that examine investors' reaction to news and analyst recommendations. Section 2.2.3 covers the studies that examine investors' reaction to recent market performance. Lastly, section 2.2.4 reviews studies that investigate investors' reaction during value-irrelevant distractive events.

[11] Post-earnings-announcement-drift (PEAD) is the tendency of a stock to perform in the same direction of an earnings surprise for several weeks (Ball and Brown, 1968)

[12] Post-recommendation-drift refers to the predictable drift of prices after stock recommendation in the same direction as the initial price reaction (Stickel, 1995)

Table 2.3: Relationship Between Investor Attention and Liquidity

| Country/Market | Studies Finding Positive Relationship | Studies Finding Negative Relationship | Studies Finding Mixed Results |
|---|---|---|---|
| **USA** | Nelson et al. (2013), Hu and McInish (2013), Ding and Hou (2015), Kaniel and Parham (2017) | - | - |
| **China** | Fan et al. (2017) | - | - |
| **France** | Aouadi et al. (2013) | - | - |
| **Japan** | Adachi et al. (2017) | - | - |
| **Taiwan** | Chen and Lo (2019) | | |
| **FX Market** | Goddard et al. (2015) | - | - |

### 2.2.1. Investors' Reaction to Firm Announcements

Dellavigna and Pollet (2009) consider the day-of-the-week effect and hypothesize that investors have lower attention on Fridays. They compare the reactions to earnings announcements made on Friday to the reactions made on other days. By examining 228,651 announcements from the US companies between 1984 and 2006, they find that investors react less to announcements made on Friday due to inattention. In addition, they state that a portfolio strategy based on this finding gains considerable

abnormal returns. Specifically, by longing Friday drift and shorting non-Friday drift, an investor may make an abnormal return of four percentage points per month. Hirshleifer et al. (2009) follow a similar approach to test the relationship between investor attention and market underreactions. They hypothesize that when the number of earnings announcements in a day is high, investors can allocate lower attention to those individual announcements. Therefore, they state that high number of announcements can distract investors and cause them to underreact. They analyze US companies between 1995 and 2004. Their study reveals similar results to those of Dellavigna and Pollet (2009). They find that when the number of earnings announcements in a day are high, investors become less attentive, which causes them to underreact and causes prices to drift subsequently. They also find that announcements made by the firms that operate in the same sector and announcements that have small earnings surprise have less distraction effect. Jacobs and Weber (2016) construct a composite industry-wide attention index and explore post-earnings-announcement-drift, momentum and pairs trading strategies[13] in US market. For the period 1995-2008, they find that their composite industry-wide inattention proxy positively predicts the PEAD. Additionally, investor attention positively (negatively) predicts the success of pairs trading (momentum) strategies. Wang et al. (2018) uses option trading volume prior to earnings announcements to measure investor attention for the period 1996-2014. They find that underreaction to earnings announcements and PEAD decrease with the investor attention measure. Barber et al. (2013) examine earnings announcement premium[14] globally for the period 1990-2009. They measure investor attention using abnormal trading volume and find contradicting results with attention literature. For instance, Lamont and Frazzini (2007) state that increased investor attention may be partly responsible for the earnings announcement premium as increased investor attention may create positive price pressure. Therefore, investors' attention to earnings announcements may be the reason of the premium. However, the results of Barber et al. (2013) are the opposite of this hypothesis. They find that low-attention stocks have the largest average earnings announcement premium while high-

[13] Pairs trading strategy refers to neutralizing the market direction by matching a long position with a short position. The strategy needs to be performed in a pair of highly correlated instruments. It is a high-frequency trading strategy, which, arguably, its profitability comes from distraction effects (Jacobs and Weber, 2016).

[14] Earning announcement premium is the documented fact that the U.S. stocks earn higher returns in month when earnings are announced (Frazzini and Lamont, 2007). Barber et al. (2013) show that this empirical fact is valid globally.

attention stocks have the smallest. Chapman (2018), on the other hand, states that investor attention has an important explanatory power on earnings announcement premium. He uses searches made in the SEC's repository of firm filings to measure investors' attention to earnings announcements for the period 1999-2002 and finds that investor attention, trading volumes, and stock returns increase around earnings notification days.

Investigation of investors' reaction to stock repurchases, merger announcements, and alliance announcements reveal similar results of inattentiveness. Cheng et al. (2015) examine the relationship between limited investor attention and underreaction to repurchase announcements in Taiwan Securities Exchange (TWSE) between 2001-2011. They measure investor attention using prior trading turnover and conduct event study and regression analysis. Their study shows that firms that grab low attention underreact more to repurchase announcements and are associated with larger positive long-run excess returns than firms that grab high attention. To examine the same relationship, Pinto-Gutiérrez (2016) proxy investor attention with media coverage and examine U.S firms between 2003-2012. The results show that the highest cumulative abnormal returns correspond to low-attention firms. Louis and Sun (2010) focus on investors' reaction to merger announcements and examine whether market response to stock swap announcements made on Friday is different from announcements made on other days. Their study covering 1994-2006 shows that abnormal trading volume is lower for Friday announcements. Cao et al. (2016) focus on companies' alliance announcements and the impact of an alliance partner's stock return on that of the firm. They measure investor attention in a way similar to that of Hirshleifer et al. (2009). They take the ratio of number of alliance announcements made in a day to the prior year's daily average number. High ratio implies that investors are more inattentive in that day. The results show that when announcements are made on high inattention days, the announcement returns become significantly lower.

Evidence supporting investors' limited ability to process high volume of information led to the investigation of strategic behavior of economic agents. D'Souza et al. (2010) examine the companies' earnings announcement behavior and find that managers try to guide investor attention to summarized financial information. Segal and Segal (2016) study whether firms use inattention of distracted investors to their benefit. They use announcements made on Fridays and after trading hours as a measure

of investor inattention and explore whether firms try to benefit from attention constraints. They investigate US firms between 2005 and 2013 by using textual analysis procedure and regression analysis. The study reveals that managers report bad news at times when investors are inattentive. These results particularly apply to public firms than nonpublic firms. Boulland et al. (2016) study the effects of technology on news dissemination and investor reaction for the period 1991-2010. Their regression analysis show that technologic improvements provide better news dissemination. They find that English-language electronic wire service results in a stronger initial reaction to earnings surprises, a lower PEAD, and larger abnormal trading volume near earnings announcements in comparison to non-electronic format with continental European languages. Boulland and Dessaint (2017) examine the firms' behavior of earnings announcements and find that when firms give longer advance notice period, earnings surprises are more likely to be more positive. These findings mean that firms prefer to make advanced notices and attract more investor attention when there is going to be an important earnings surprise. Their sample covers 52,872 press releases from 3897 companies in the period between 2007-2012. They state that firms' strategic behavior regarding announcements is more pronounced for firms that have low investor attention, which is measured by Google SVI and abnormal trading volume. Louis and Sun (2011) examine the firms' earnings management behavior. They find that negative relationship between changes in cash flows and accrual management becomes weaker over time, because investors are more attentive to the anomalies. Lou (2014) investigates whether managers arrange firm advertising to attract investor attention and to influence stock prices in the short-term. The study reveals that managers opportunistically adjust advertising in order to exploit its temporary return effect. Stock prices rise simultaneously with more advertising spending, and this is followed by a complete return reversal. Madsen and Niessner (2019) investigate whether advertising spending of companies attracts investor attention in USA. They measure investor attention by using Google SVI for the period 2008-2013. They find that there is a positive relationship between daily advertising spending and investor attention along with trading volumes. Alldredge and Cicero (2015) study the behavior of corporate insiders. They hypothesize that corporate insiders are attentive to information related to their firms and make profit when outside investors are inattentive. They examine the insider trading in a setting of customer-supplier relationship where trading is related to firms that sell a large fraction of their products

to principal customers. The results suggest that insiders trade more when public information about their principal customers predict a profitable trade. Louis and Sun (2016) examine the effects of investor attention on reporting behavior of acquiring managers around stock-for-stock[15] acquisitions. They use firm size, institutional ownership, analyst coverage, and media coverage as attention proxies for the period 1994 - 2010. Their results show that acquirers that have the most inflated earnings tend to avoid investor attention and announce mergers on Fridays. Additionally, negative relationship between pre-announcement abnormal accruals and post-announcement market performance is stronger for Friday announcers.

In contrast to abovementioned studies, Michaely et al. (2016) argue that inattentive market responses to Friday announcements are due to selection bias and that the differences in reactions are results of firm characteristics. To test their hypothesis, they examine a sample of firms that is relatively homogeneous in terms of firm characteristics. Their study covers the period between 1995 and 2010, and shows no evidence in support of inattention theory after the selection bias is corrected.

Though attention literature is concentrated on individual investors, Ben-Rephael et al. (2017) focus on institutional investors. They use news searching and news reading activity on Bloomberg terminals to test the institutional investors' attention for 2,669 stocks from Russell 3000 index between 2010-2015. Bloomberg's data gives the number of times a news article about a stock is read and the number of searches made about a stock's news. Since the Bloomberg terminal is almost exclusively used by finance professionals, the data reflect institutional investors' attention. They show that institutional investors respond more quickly to major news events. The authors find this result as expected since institutional investors have more resources and that is why they are more likely to allocate their attention effectively to react immediately. Their results indicate that post-earnings-announcements-drifts and post-analyst-recommendation-drifts (PARD) are driven by announcements which do not get sufficient attention from institutional investors.

Table 2.4 summarizes the studies that investigate the relationship between investor attention and investors' reactions. Table 2.4 shows that studies usually find that investors underreact to new information due to their limited attention. This underreaction cause low immediate and high delayed price reaction. Moreover, the

[15] The exchange of stocks between acquiring company and acquired company at a predetermined rate (https://www.investopedia.com/terms/s/stockforstock.asp)

literature suggests that firms strategically try to use investors' attention constraints to their benefit. Generally, managers announce good news when inattention is low and bad news when inattention is high. Only 2 studies' results contradict with the earlier evidence. Barber et al. (2013) find a negative relationship with investor attention and earnings announcement premium. Michaely et al. (2016), on the other hand, argue that selection bias is the cause of inattentive reactions to Friday announcements.

### 2.2.2. Investors' Reaction to News and Analyst Recommendations

Chen et al. (2016) examine the investor attention around scheduled macroeconomic announcements. They use Baidu search index as a proxy for investor attention and focus on the period between 2011 and 2014. Their regression analysis reveals that investors are more attentive to news related to consumer price index (CPI hereafter) than news related to other macroeconomic indicators. Additionally, CSI 300 index futures prices react more strongly to CPI announcements when realized CPI is higher than expected. They also find that CPI announcements get less reaction on Fridays. Birz (2017) investigates the impacts of unemployment news in the newspapers on stock prices. The research shows that, in the period of 1991-2004, unemployment news in the newspapers are significantly correlated with daily stock prices for two weeks after the day of unemployment news.

Giglio and Shue (2014) use the time between initial merger announcement and its resolution as a measure of no-news period. They find that between 1970 and 2010, no-news period contains important information about the merger completions and investors underreact to this information. Information in no-news periods is less salient than information in traditional news and therefore, investors fail to pay sufficient attention to information in no-news periods.

Attention literature comprises studies that examine market reaction to the absence of information or to the non-relevant information such as old information. These studies show that the markets sometimes confuse non-relevant information with value-relevant information and react to them. Gilbert et al. (2012) focus on monthly announcements of U.S. Leading Economic Index (LEI) which releases previously published macroeconomic data between 1997-2009. They find that due to limited attention, investors are sometimes unable to distinguish new information from the old one. They show that announcements of LEI significantly impact on market-level returns, return volatility, and trading volume.

Table 2.4: Relationship Between Investor Attention and Investors' Reaction to Firm Announcements

| **Article** | **Subject of the Study** | **Main Findings** |
|---|---|---|
| Dellavigna and Pollet (2009) | Earnings Announcement | Low immediate, high delayed response to earnings announcements due to inattention |
| Hirshleifer et al. (2009) | Earnings Announcement | Low immediate, high delayed response to earnings announcements due to inattention |
| Louis and Sun (2010) | Merger Announcement | Lower abnormal trading volume for Friday announcements (caused by inattention) |
| D'Souza et al. (2010) | Strategic Behavior | Managers try to guide investor attention to summarized financial information |
| Louis and Sun (2011) | Earnings Management and PEAD | Investor attention reduces the relationship between negative cash flows and increased accruals |
| Barber et al. (2013) | Earnings Announcement | Negative relationship between investor attention and earnings announcement premium |
| Lou (2014) | Strategic Behavior of Advertising | Managers adjust advertising in order to exploit its temporary return effect |
| Alldredge and Cicero (2015) | Strategic Behavior | Insiders trade more when public information about their principal customers predict a profitable trade |
| Cheng et al. (2015) | Repurchase Announcement | Greater underreaction to announcements due to inattention |

| | | |
|---|---|---|
| Michaely et al. (2016) | Announcements of repurchases, mergers, dividend changes, and earnings | Inattentive market responses to Friday announcements are due to selection bias |
| Segal and Segal (2016) | Strategic Behavior | Managers strategically report negative news after trading hours |
| Pinto-Gutiérrez (2016) | Repurchase Announcement | Low attention firms have the highest cumulative abnormal returns |
| Jacobs and Weber (2016) | Earnings Announcement | Positive prediction of post-earnings announcement drift |
| Cao et al. (2016) | Alliance Announcements | Lower returns during high-inattention days |
| Louis and Sun (2016) | Strategic Behavior | Acquirers with the most inflated earnings tend to announce mergers on Fridays (avoiding attention) |
| Boulland et al. (2016) | Impact of Technology | Technologic improvements provide better news dissemination |
| Boulland and Dessaint (2017) | Strategic Behavior | Advance notice period is predictive of earnings surprises, the relationship is more pronounced in low attention firms |
| Ben-Rephael et al. (2017) | Institutional Investors' Attention | PEAD and PARD are driven by announcements which do not get sufficient attention from institutional |
| Chapman (2018) | Earnings Announcement | Investor attention is important in explaining earnings announcement premium |
| Wang et al. (2018) | Earnings Announcement | Underreaction to earnings announcement and PEAD decrease with more investor attention |
| Madsen and Niessner (2019) | Strategic Behavior | Investor attention and trading volume increase with advertising spending |

Similarly, Ferretti et al. (2016) argue that investor attention caused by the media coverage can influence the stock returns even the information involved in the news is already publicly available. They examine investors' reactions to announcements of price-to-book value (PBV) ratios of Italian companies, made by Il Sole 24 Ore, the most popular financial newspaper in Italy. Their event study covers the period between February 1, 2012 and March 28, 2012. The results indicate that investors react to news that contain information already publicly available, PBV ratios in this case. This reaction results in an increase in prices for low PBV stocks and the positive performance disappears two weeks after the event.

Investors' reactions to analyst recommendations are also investigated in the literature. Loh (2010) uses prior share turnover as attention proxy and investigates whether investor inattention is a reasonable explanation for post-recommendation drift. He obtains data on analyst recommendations from Thomson Financials' I/B/E/S US Detail File and focus on recommendation changes. I/B/E/S's classification of recommendations is on a five-point scale in which 1 refers to strong buy, whereas 5 refers to sell. Loh (2010) reverses this classification so that, five refers to the most favorable recommendations. The event study focuses on the US stocks between 1993-2006 and finds that stocks that receive less investor attention react less to stock recommendations and experience greater recommendation drift. Athanasakou and Simpson (2016) hypothesize that inattentive investors focus on salient information in their decision-making process in order to efficiently allocate their resources. They state that roundness[16] of analysts' EPS forecasts reflects salient feature of lower forecast precision. They investigate whether investors notice rounding and react to it. They find that, between 1984-2012, investors notice rounding although its information content is potentially little. They capture investors' awareness of rounding by the lower absolute returns, which are weaker for forecasts that have rounded EPS numbers. Repetition of rounding enhances the reaction of investors. Welagedara et al. (2017) explore analyst recommendations' revisions in the equity market between 2004-2012 for all stocks on the Russell 3000 Index. They follow the literature and re-sort I/B/E/S's classification on a new five-point scale in which 5 refers to strong buy and 1 refers to sell. Similar to Loh (2010), they compute recommendation changes as the current recommendation point minus the last recommendation point by the same analyst. They measure investor attention by Google SVI and find that prices of high-

[16] In this study, roundness refers to forecasts that end in either zero or five ($1.00, $1.05, $1.10 etc.)

attention stocks drift greater after analyst recommendation upgrades. They also find that after recommendation downgrades, high-attention stocks experience greater price overreaction and subsequent price reversal. Lin et al. (2014) examine the impact of investor attention and analyst coverage on the information dissemination between 1984 and 2011. They use trading turnover as a proxy for investor attention and find that, information diffusion is slower for stocks that have less analyst coverage.

Table 2.5 summarizes the studies that investigate the role of investor attention on the investors' reaction to news and analyst recommendations. This section is homogeneous in results, meaning no study finds any contradicting results. Table 2.5 shows that investors usually underreact to analyst recommendations because of limited attention and they sometimes confuse value-relevant information with non-value-relevant information. They also sometimes react to old information that is already processed.

### 2.2.3. Investors' Reaction to Recent Market Performance

Evidence in investor attention literature suggests that inattentive investors sometimes underreact to recent market performance. Dahlquist and Martinez (2015) argue that if past performance of funds contains information about managers' skills and funds' future performance, then fund flows should have a relationship with past performance. They analyze the relationship between fund flows and performance with regression analysis and consider lack of sensitivity to past performance as a sign of inattention. They analyze the Swedish funds for the period 2000-2008 and find that pension investors are mostly inattentive to the past market performance. The share of assets in the worst-performing funds are larger for the investors of pension funds than investors of retail mutual funds. One possible reason for this is that investors of pension funds are involuntary investors as pensions are mandatory. Some of the investors of pension funds may not simply care about their investments and/or may be less sophisticated than mutual fund investors. Another possibility is that investors might have a mental account that cause inattentiveness for their investments in pension funds because of their long-term nature. Jiang and Zhu (2017) examine market reaction to jumps in stock prices, between 1975-2012. They find that overnight jumps significantly predict returns over the subsequent days. They also state that consistent with limited attention hypothesis, high-attention jumps receive weaker under-reaction.

Table 2.5: Relationship between Investor Attention and Investors' Reaction to News and Analysts Recommendations

| **Article** | **Subject of the Study** | **Main Finding** |
|---|---|---|
| Loh (2010) | Analyst Recommendations | Stocks that receive less attention react less to stock recommendations |
| Gilbert et al. (2012) | Monthly Announcements of U.S. Leading Economic Index | Investors are sometimes unable to distinguish new information from the old one |
| Lin et al. (2014) | Analyst Coverage | Information diffusion is slower for stocks that have less analyst coverage |
| Giglio and Shue (2014) | The Time Between Initial Merger Announcement and Its Resolution (No-news period) | Investors do not pay sufficient attention to salient information in no-news period |
| Ferretti et al. (2016) | Price-to-Book Value (PBV) Announcements | Investors react to stale news |
| Chen et al. (2016) | Scheduled Macroeconomic Announcements | Investors are more attentive to consumer price index announcements than others |
| Athanasakou and Simpson (2016) | Roundness of Analysts' EPS Forecasts | Rounded forecasts are associated with lower price reactions |
| Welagedara et al. (2017) | Analyst Recommendations | High-attention stocks experience greater price drift (overreaction) after recommendation upgrades (downgrades) |
| Birz (2017) | Newspaper Coverage of Unemployment News | Significant correlation between unemployment news and cumulative daily stock returns for two weeks |

Hur and Singh (2016) investigate the relation between momentum, investor reaction and investor attention. They use institutional ownership, analyst coverage, shareholder base, and firm age as attention proxies. They find that underreaction of investors to information is the primary cause of the momentum. Firm-specific information gets delayed response because investors cannot pay attention to them due to low visibility of these information. Firm characteristics such as size, value, and riskiness are partly responsible for this low visibility. Lin et al. (2016) measure investor attention by trading volume and study momentum investing in Taiwan between 1971 and 2014. Their results suggest that positive momentum profit is concentrated on high-attention stocks.

Bali et al. (2014) investigate investor attention's impact on the stock market's reactions to stock-level liquidity shocks, which are measured by the negative difference between Amihud (2002) illiquidity ratio and its past 12-month average. They use stock size measured by market capitalization and the number of analysts that covers the stock, as proxies of investor attention. They find that between 1963-2010, stock level liquidity shocks and one-month future returns are positively associated and this relationship is stronger for stocks that receive less attention. Because of lower investor attention, predictive power of liquidity shocks extends to two to four months. Qian et al. (2017) explore the positive relationship between turnover and price delay in China's A-share market between 2008 and 2014. They find positive relationship between turnover and attention measures and also state that the prices of low investor attention firms give delayed response to information. Hur and Singh (2017) use Google SVI and abnormal trading volume between 1962 and 2014. They show that investor attention is connected with the return reversal of stocks that experienced extreme daily returns.

Certain studies reveal that due to limited investor attention, information dissemination from one market/industry to another is slow and therefore, some markets/industries have predictive power on others' returns. Wu and Shamsuddin (2014) use industry size, liquidity and financial analyst coverage as attention proxies to investigate incorporation of information from industries to the market. Their sample covers Australian shares in the period between 1990-2009. Their time-series regressions reveal that industry returns have a predictive power on market returns and the proxies for investor attention significantly moderate this predictive power. They conclude that information in small and illiquid industries receive less investor attention

and therefore, these industries are more informative in leading the markets. Valcarcel et al. (2017) examine 47 industry level portfolios and 25 different commodities to investigate whether equity market underreacts to the changes in commodity prices between 1985 and 2014. Their study shows that information in commodity prices is incorporated into industry returns within several weeks. They also find strong predictive links between most commodities examined in the study. For instance, precious metals Granger cause almost all other commodities examined. The results point out to limited information-processing capabilities of traders and the existence of neglected value-relevant information.

Li and Yu (2012) and Woodhouse et al. (2016) focus on psychological anchors and examine how investors react to these anchors. These psychological anchors may be perceived by investors as informative and attract their attention. Li and Yu (2012) analyze the nearness to the Dow 52-week high and to the Dow historical high between 1958-2009. They find that nearness to the 52-week high positively predicts returns whereas nearness to the historical high negatively predicts returns. Woodhouse et al. (2016) argue that some psychological barriers, (ex. multiples of 100) may draw more attention from investors and lead to market reaction. They examine the final two integer digits of closing values of the NASDAQ Composite Index for the period 1990-2012. They find that the index closes less frequently in the values that are multiples of 100, which shows the existence of psychological barrier effects.

Studies that investigate whether investor attention affect investors' reaction past performance are summarized in Table 2.6. This part of the literature mainly suggest that investor attention affects investors' behavior to recent performance. While investors usually consider recent performance, they overlook the recent performance of low-attention firms or industries. Studies also suggest that increased investor attention leads to better information dissemination in the markets.

Table 2.6: Relationship between Investor Attention and Investors' Reaction to Recent Market Performance

| **Article** | **Subject of the Study** | **Main Finding** |
|---|---|---|
| Li and Yu (2012) | Nearness to Historical Highs | Nearness to the 52-week high (historical high) positively (negatively) predicts future returns |
| Bali et al. (2014) | Stock-level Liquidity Shocks | Positive relation between stock level liquidity shocks and one-month future returns is more pronounced in less attention stocks. |
| Wu and Shamsuddin (2014) | Information Dissemination Within Markets | Industry returns have a predictive power on market returns, which is moderated by investor attention. |
| Dahlquist and Martinez (2015) | Past performance and Fund Flows | Pension investors are mostly inattentive to the past market performance |
| Hur and Singh (2016) | Momentum | Stocks respond with delay to firm-specific information. Slower reaction for low-attention stocks. |
| Lin et al. (2016) | Momentum | Positive momentum profit is concentrated on high-attention |

| | | |
|---|---|---|
| Woodhouse et al. (2016) | Nearness to Psychological Barriers | NASDAQ Composite Index closes less frequently around levels that have final two integer digit of 00s. Existence of psychological barriers. |
| Hur and Singh (2017) | Past Returns | Investor attention is responsible for subsequent month reversal of returns for stocks with extreme daily returns |
| Jiang and Zhu (2017) | Jumps in Stock Prices | Overnight jumps have significant predictive power on returns over the subsequent days |
| Qian et al. (2017) | Price Delay | Low-attention firms are high price delay firms |
| Valcarcel et al. (2017) | Equity Market's Reaction to Commodity Prices | Several weeks are needed for full information incorporation |

### 2.2.4. Investors' Reaction to Information During Value-Irrelevant Distractive Events

Investors may lose their attention to new information because of value-irrelevant distractive events at a specific time. Attention literature mostly focuses on popular sports events and their impact on investor attention and markets. Docherty and Melia (2015) examine The Melbourne Cup's - Australia's most famous horse race - effects on investor attention and trading volumes. Their event study reveals that the Melbourne Cup reduces trading volumes in 5 to 10 minutes before and after the race. Drake et al. (2016) use March Madness -NCAA basketball tournament- as a distractive event and find that investors react less to earnings news during March Madness, especially to earnings of firms that have low institutional ownership. Ehrmann and Jansen (2017) analyze stock market trading in 15 countries[17] during the 2010 and 2014 soccer FIFA World Cups. They find that investors are distracted by football and, the trading activities are significantly lower during matches. In a study that investigate the differences in market response to qualitative and quantitative information, Von Beschwitz et al. (2017) find that qualitative news has a smaller effect when investor attention is distracted by the 2008 Olympic Games. Brown (2014) examine Betfair betting exchange data of Wimbledon Tennis Championship between 2011 and 2012 as a natural quasi-experiment. He finds that because of information processing constraints, there is a delayed value updates for certain assets.

Similar to popular sports events, holidays may also distract investors and affect trading activities. Hood and Lesseig (2017) analyze this possibility by examining stock market holidays in USA between 2002-2014. They find that from 2003 to 2014, NYSE has less trading volume one day before and one day after the holidays. Jacobs and Weber (2012) also use regional holidays in Germany, as a measure of inattention between 1988 and 2009. They find that stocks of firms located in holiday regions have less trading volumes than similar stocks of firms located in non-holiday regions.

Table 2.7 summarizes the studies that investigate whether investors' reactions differ during value-irrelevant distractive events. This subsection includes seven studies and five of them use sports events to analyze the effects of value-irrelevant distractive events on investors' reactions. Two papers examined the effects of holidays, one in

[17] Countries whose national team played at least one match in the respective World Cup during trading hours.

Germany and one in USA. All of these studies found that investors are distracted by these events either during the event or before and after it. Distraction results in significantly less trading activities or less price reaction to new information.

Table 2.7: Investors' Reaction to Information During Value-Irrelevant Distractive Events

| **Article** | **Distractive Event** | **Main Finding** |
|---|---|---|
| Jacobs and Weber | Regional Holidays | Less trading volume for stocks of holiday regions |
| Brown (2014) | Wimbledon Tennis Championship | Delayed value update for some assets |
| Docherty and Melia (2015) | The Melbourne Cup | Less trading volume in 10 minutes around the Melbourne Cup |
| Drake et al. (2016) | March Madness | During March Madness investors react less to earnings news |
| Ehrmann and Jansen (2017) | 2010 and 2014 FIFA World Cups | Less trading activity during football matches |
| Hood and Lesseig (2017) | Market Holidays | Less trading volume one day before and one day after the holidays |
| Von Beschwitz et al. (2017) | 2008 Olympic Games | Qualitative news has a smaller effect |

### 2.3. Attention Allocation of Investors

In addition to understanding the impacts of attention constraints, researchers examined the attention allocation behavior of investors across different types of information. Peng and Xiong (2006) model investors' attention allocation in learning process, when faced with new information and fundamental factors and its effects on asset-price dynamics. Their theoretical model suggests that investors tend to categorize information and when they have to deal with high number of new information or when they face with macroeconomic shocks, they prioritize market-level and sector-level

information over firm-specific information. They also find that return correlations between firms are higher than their fundamental correlations, mainly because of investors' category-learning behavior. When investors allocate more attention to industry-level or market-level information, they overlook firm-specific information and for that reason returns of different firms with different fundamentals within same industry or market correlate more than their fundamentals. Investors collect and process new information more easily thanks to technological improvements. Therefore, limited attention's impacts are decreasing over time. That is why return correlations decrease with technological developments. Peng et al. (2007) examine the relation between uncertainty on information flow and asset price co-movements between 1993 and 2002. They measure market-wide macroeconomic shocks by the realized daily volatility of the 30-year US Treasury Bond futures contract. VAR framework shows that return volatility of S&P500 and the co-movement of individual stocks with the market increase simultaneously when market-wide macroeconomic shocks appear, but decrease significantly in the following five trading days. These results support the category-learning hypothesis, which states that investors chose to allocate their attention to market-level information when market-wide uncertainty increases, before subsequently paying attention to asset-specific information. A similar study is conducted by Drake et al. (2016) who examine attention co-movements. They use internet searches, forecast revisions, the number of business press mentions, and the number of EDGAR[18] downloads of a firm's financial statements as attention proxies for the period 2007 - 2011. They find that returns for a stock are more idiosyncratic when there are more stock-focused information flows.

Acker and Duck (2015) study the Scottish Independence referendum. They compare election polls and betting data and find that investors appear to allocate their attention to the most visible information about the likely referendum result. The results suggest that salience is an important factor for investors in attention allocation.

Sicherman et al. (2016) use daily investor online account logins to examine the behavior of individual investors between 2007 and 2008. They find that following a market decline, investors login less by 9.5%. The results also indicate that investors diminish their attention when the VIX[19] volatility index is high. Similarly, Li et al. (2016) use tweets as a proxy for investor attention. Their results point to the existence

[18] Abbreviation of *"the Electronic Data Gathering, Analysis, and Retrieval"*. EDGAR is the electronic filing system created by the Securities and Exchange Commission (SEC).
[19] VIX is the ticker of Chicago Board Options Exchange Volatility Index.

of “social proof” seeking behavior in attention allocation. This behavior suggests that when investors’ attention is not independent from the attention of others, they pay attention to similar information. A contagion effect is said to be present, when an investor is leaned to pay attention to a specific asset because of other investors’ allocated attention to that asset. Li et al. (2016) also examine the role of other important properties, such as trend and volatility in attention allocation. They state that contagion effects are stronger in high-volatility or strong momentum periods. Huang et al. (2016) investigate whether there is a local bias in investor attention allocation. They analyze Chinese internet stock messages for the period 2008-2010 and find evidence of local bias in attention allocation. Local bias is stronger in underdeveloped regions. Large, non-CSI 30, and low-turnover stocks and stocks with names that contain information about the company’s geographic location demonstrate more local bias in investor attention.

As can be seen in Table 2.8, the number of studies that investigate the attention allocation of investors is not high. Studies usually examine investors allocation choices based on the characteristics of information, such as salience and level. It is evident that more study is needed to gain a better understanding of attention allocation behavior of investors.

### 2.4. Other Related Studies

Mamun and Mishra (2012) find that firms that receive high attention reduce information asymmetry in an industry experiencing merger activity, and consequently reduce the required return on firm’s capital. Borgers et al. (2013) suggest that trading strategies that are based on a stakeholder-relations index became useless over time as attention for stakeholder issues increased. Gwilym et al. (2014) use Google SVI of US penny stocks to examine investors' speculative demand. They show that there is a negative relationship between investors’ speculative demand and returns. A trading strategy based on this negative relationship earns significantly more than the buy-and-hold strategy. Similarly, Gwilym et al. (2016) examine the relationship between speculative demand and Chinese stocks’ returns. Their results suggest that for the period 2004-2011, speculative demand experiences an increase after high market return periods and predicts subsequent return reversals.

Table 2.8: Attention Allocation of Investors

| **Article** | **Allocation Criteria** | **Main Finding** |
|---|---|---|
| Peng and Xiong (2006) | Level of Information (Market-wide, Sector-wide, Firm-specific) | More allocation of attention to market-level and sector-level information than to firm-specific information |
| Peng et al. (2007) | Level of Information (Market-wide, Sector-wide, Firm-specific) | When market-wide uncertainty increases, investors allocate more attention to market-wide information and subsequently shift their attention to firm-specific information |
| Acker and Duck (2015) | Salience of Information | The most visible information receives more attention |
| Li et al. (2016) | Social Proof | When attention of investors is not independent from one another, they pay attention to similar information |
| Huang et al. (2016) | Local Bias | Local bias in attention is stronger in underdeveloped regions, in China and for large, non-CSI 30, and low-turnover stocks |
| Sicherman et al. (2016) | Volatility | Investors diminish their attention when the VIX volatility index is high |
| Drake et al. (2016) | Type of Information Flow | When information is more stock-focused, stock returns are more idiosyncratic |

Jacobs and Weber (2015) investigate the determinants of pairs trading profitability for the period 2000-2013. They find that pairs trading is more profitable when cumulative daily returns of stocks initially diverge during phases of high distraction. Chi and Shanthikumar (2017) examine the local bias in investor attention and its effect on the market reaction around earnings announcements. They show that with more local bias in investor attention, liquidity reduces, which is measured by bid-ask spreads and trading volumes. Moreover, they find that public information is more important for non-local investors compared to local investors. Ruan and Zhang (2016) propose a theoretical model about the relationship between investor attention and market microstructure. Their model suggests a positive relationship between investor attention and trading intensity of retail investors. Peltomäki and Vähämaa (2015) examine the investor attention to the Eurozone crisis and its effects on the herding behavior of investors. They measure herding effects by using deviations of national bank stock indexes from the cross-sectional average return. They find a negative relationship between investor attention and herding effects in the EMU region. Lee et al. (2019) measure investor attention with size and analyst coverage and find that investor attention decreases the predictive power of returns of technology-linked firms on returns of focal firms[20].

Summarized and tabulated version of the other studies related to the investor attention literature can be found in Table 2.9.

## 2.5. Investor Attention Proxies

The literature comprises many proxies to measure the attention of investors. Table 2.10 summarizes the attention proxies and shows the number of studies that used these proxies. As can be seen from Table 2.10, using internet search volume as investor attention proxy is the most common approach in the literature. While other proxies measure passive attention of investors, internet search volume data measure active attention. Da et al. (2011) explain that when investors are searching for a stock, they are actively paying attention to it. Therefore, using internet search volume data captures investor attention better than other proxies.

[20] *"A focal firm is the initiator of an international business transaction, including MNEs (multinational enterprises) and SMEs (small- and medium-sized enterprises), that conceives, designs, and produces the offerings intended for consumption by customers worldwide.* (Cavusgil, Knight, Riesenberger, 2008, p.62)

Table 2.9: Other Studies Related to Investor Attention

| **Article** | **Main Findings** |
|---|---|
| Mamun and Mishra (2012) | High attention firms reduce information asymmetry in an industry experiencing merger activity |
| Borgers et al. (2013) | Attention for stakeholder issues made stakeholder-relations index based trading strategies ineffective |
| Gwilym et al. (2014) | Negative relationship between GSVI of US penny stocks and returns |
| Jacobs and Weber (2015) | Pairs trading is more profitable if stocks initially diverged during phases of high distraction |
| Peltomäki and Vähämaa (2015) | Increased investor attention lead to a decrease in herding behavior during Eurozone crisis |
| Gwilym et al. (2016) | High market returns make speculative demand of Chinese stocks increase |
| Ruan and Zhang (2016) | Positive relationship between attention and trading intensity of retail investors |
| Chi and Shanthikumar (2017) | Local bias in investor attention causes stocks to experience lower liquidity and lower trading volume during earnings announcements |
| Lee et al. (2019) | Investor attention decreases the predictive power of returns of technology-linked firms on returns of focal firms[20]. |

Table 2.10: Investor Attention Proxies

| Investor Attention Proxies | Number of Studies |
|---|---|
| Internet Search Data | 48 |
| Abnormal Trading Volume | 8 |
| Analyst Coverage | 7 |
| Media Coverage | 5 |
| Activity in Social Media | 5 |
| Institutional Ownership | 4 |
| Past Returns | 4 |
| Firm Size | 4 |
| Prior Trading Turnover | 3 |
| Top 10 List and Stock Watch List | 3 |
| Advertising expenditure | 2 |
| The Number of Shareholders | 2 |
| Stock Spam Mails | 2 |
| Option trading volume | 2 |
| Firm Age | 1 |
| Analyst Forecast Revision | 1 |
| The Number of Employees | 1 |
| Industry Size | 1 |
| Specific Word in a Company's Name | 1 |
| Searches made in the SEC's repository of firm filings | 1 |
| Activity on Bloomberg terminals | 1 |

To measure the investor attention with search volume, one would have to identify the keywords to use. As stated in Da et al. (2011), using company names to measure investor attention comes with problems. Firstly, choosing related keywords is difficult since people may search for a company with different terms and/or abbreviations. Secondly, people may search company names with purposes other than investing. A person searching for the word “Apple” may be considering to buy a new smartphone, may be trying to collect information about the company and the stock or, simply, may be collecting information about health benefits of the fruit. Conversely, Vlastakis and Markellos (2012) argue using company names as keywords captures

information demand more broadly since investors may search information not only for the stocks but also for the firms as well. Both company names and stock tickers are used extensively in the literature.

### 2.6. Overconfidence, Individualism, and Uncertainty Avoidance

While the main purpose of this study is to examine the impact of investor attention on abnormal stock returns, stock liquidity and stock return volatility, these relationships might be affected by some other factors, such as behavioral biases and national culture. This study investigates whether the impact of investor attention on abnormal stock returns, stock liquidity, and stock return volatility differs from culture to culture. Hofstede (2011) defines culture as *"the collective programming of the mind that distinguishes the members of one group or category of people from others"*. From that definition, it can be argued that behaviors of individuals in different cultures can be different from each other, including their financial behavior. Two dimensions from Hofstede's (1983) national culture dimensions, namely, individualism and uncertainty avoidance are examined in prior studies that investigate the role of national culture in financial markets. These dimensions have been usually associated with overconfidence bias. Therefore, I include a brief review of literature on overconfidence, individualism, and uncertainty avoidance. This subsection aims to briefly present the links between overconfidence and the two dimensions.

Odean (1998) states that people tend to overestimate *"the precision of their knowledge"* and *"their ability to do well on tasks"*. He develops financial market models in which some actors are overconfident. In his models, he shows that trading volume and volatility are positively associated with overconfidence. Daniel et al. (1998) form a theoretical model in which they define an overconfident investor as *"one who overestimates the precision of his private information signal, but not of information signals publicly received by all."* Their model indicates that overconfidence may be the cause of positive return autocorrelations. They also show that overconfidence creates excess volatility. Barber and Odean (2001) try to explain the high levels of trading volumes in stock markets with overconfidence. They hypothesize that men are more overconfident than women and test whether the differences in overconfidence between men and women create differences in trading volumes. They acquire trading activities of accounts opened by men and opened by women from a large discount brokerage firm for the period 1991-1996. They find that

average trading turnover is higher for men than for women. They also find that women earn greater returns because more trading activity hurts men's returns. Gervais and Odean (2001) propose a theoretical model in which investors evaluate their successes and failures, which are measured by returns they obtain. In the model, investors overestimate their abilities in their successes and this overestimation makes them overconfident. They state that overconfidence causes increased trading volumes and volatility. The model of Gervais and Odean (2001) argue that overconfidence is more evident when investors are early in their careers, and its effects such as increased trading volume diminish with age.

Chui et al. (2010) examine the momentum profits in fifty-five countries for the period 1980-2003 and investigate whether there are any cross-cultural differences. Their study focuses on individualism dimension of national cultures. By using regression analysis, they find that individualism has statistically significant positive relationship with trading volume and market volatility. Moreover, their study shows that average monthly returns of momentum portfolios increase with individualism scores of countries. They argue that these findings are results of overconfidence and self-attribution biases that individualist cultures are more prone to.

Schmeling (2009) examines the role of national cultures in investor sentiment and stock return relationship following the arguments of Chui et al. (2010) and Hofstede (2001). Chui et al. (2010) suggest that people in collectivist societies may put more weight on to the consensus opinion and this may result in "*herd-like overreaction to the conventional wisdom.*" Hofstede (2001) suggests that individuals in high uncertainty avoidance countries give more emotional reactions than individuals in low uncertainty avoidance countries. Following these arguments, Schmeling (2009) hypothesizes that investor sentiment's effects on financial markets are stronger in collectivist societies and high uncertainty avoidance countries because they tend to manifest herd behavior and overreact to information. He measures investor sentiment with consumer confidence indices for eighteen countries for the period 1985-2005 and perform predictive regression analysis. His results show that investor sentiment's impact on stock returns is more pronounced in collectivist countries and high uncertainty avoidance countries.

Todea (2018) investigates whether national culture is an important factor in the incorporation of private information into stock prices. They measure information-based trading by positive return autocorrelations in periods of high volume. She uses

two dimensions from Hofstede (1983): individualism and uncertainty avoidance. They analyze the period 2004-2016 and find that more private information is incorporated into prices in individualist countries and less in uncertainty avoidance countries. They attribute this finding to the holistic thinking observed in collectivist countries where investors give weak responses to firm-specific information and analyze stocks jointly. Liu (2018) investigates whether national culture affects market volatility. He analyzes fifteen countries and uses volatility indices of each country to measure volatility levels. By using generalized additive model, he finds volatility levels to be higher in individualist and high uncertainty avoidance countries. Zhan (2019) investigates whether national culture have any impacts on herding behavior and stock volatility. In his study, herding is measured with the synchronized stock market movements, which is defined as *"the fraction of stock price movement in the same direction"*. He examines forty-seven countries around the globe for the period 2003-2012 and find that collectivist countries are associated with higher number of synchronized stock price movements and higher stock volatility.

Brief literature review in this subsection demonstrates that investors usually overestimate their abilities and are overconfident. As a result of overconfidence, investors trade more and create more volatility in the markets. Moreover, studies show that investors in individualist countries are more prone to overconfidence. Investors in high uncertainty avoidance countries, on the other hand, are associated with overreaction to information.

# 3. RESEARCH METHODOLOGY

This study investigates whether investor attention has an impact on stock returns, stock liquidity and stock volatility in twenty-seven countries around the globe for the period from March 2014 to January 2018. This period is chosen because Google Trends limits the weekly internet search volume data to five years.[21] Seven countries from Americas region, seven countries from Asia Pacific region, and thirteen countries from Europe are subject to this thesis. Fama and MacBeth (1973) regressions are used to test the impact of investor attention on abnormal stock returns, stock liquidity and stock return volatility. Dependent variables for the three main regression model are as follows: Market risk adjusted abnormal returns, stock liquidity measured by abnormal trading volume and stock return volatility measured by standard deviations of returns. While the independent variable is abnormal investor attention measured by abnormal Google search volume index (published by Google Trends); the main control variables are as follows: Book to market ratio, market capitalization of stocks, and one-week lagged dependent variable.

This study also examines whether national culture has any effect on the relationship between investor attention, stock returns, stock liquidity, and stock volatility. To measure the national culture, Hofstede (1983)'s national culture dimensions are used. Specifically, we examine whether uncertainty avoidance and individualism dimensions cause any differences on the impacts of limited investor attention. The data on the culture dimensions are obtained from the website of Hofstede Insights[22]. Stock and market data are retrieved from Thomson Reuters Datastream.

The following sections present the details of the research methodology. Specifically, section 3.1 explains hypotheses development, section 3.2. explains sample selection procedure, section 3.3. covers the details on data collection and data analysis techniques. Section 3.4. explains the variables used in the study. Finally, section 3.5. explains the econometric models of the study in detail.

[21] First year of data is extracted to calculate expected values and abnormalities.
[22] https://www.hofstede-insights.com/product/compare-countries/

### 3.1. Hypotheses Development

This study attempts to answer five main research questions:

1. Does investor attention predict abnormal returns?
2. Is there a significant relationship between investor attention and stock liquidity?
3. Does investor attention have any impact on volatility?
4. Do these relationships are internationally observable?
5. Do region, culture, and market development have any impact on these relationships?

According to Barber and Odean (2008), individual investors are net buyers of stocks that receive higher attention. Therefore, an increase in individual investor attention can put positive price pressure on stocks and induce abnormal returns. This relationship is examined in numerous studies. However, most of them are concentrated on the U.S. and Chinese markets. This study attempts to provide international evidence on the relationship between investor attention and abnormal returns. Therefore, the study's first hypothesis is as follows:

**H1**: One-week lagged investor attention positively predicts abnormal stock returns.

Secondly, an increased investor attention may have direct relationship with the uncertainty in the market and this can therefore affect liquidity and volatility in the stock market. Reduced uncertainty may make stocks more liquid and studies provide evidence in support of this argument (Aouadi et al., 2013, Ding and Hou, 2015). Based on this premise, the second hypothesis of this study is as follows:

**H2**: There is a positive relationship between one-week lagged investor attention and stock liquidity.

Similarly, the role of investor attention in uncertainty reduction may impact volatility (Andrei and Hasler, 2015, Afkhamiet al., 2017, Goddard et al., 2015). This study hypothesizes that with more investor attention, more information is processed and volatility is therefore contemporaneously increases with more attention. However, more processed information leads to less uncertainty and less volatility in the

upcoming weeks. Therefore, I examine both the contemporaneous relationship and one-week lagged relationship between investor attention and stock return volatility. So, third and fourth hypotheses of this study are the followings:

**H3**: There is a positive contemporaneous relationship between investor attention and stock return volatility.

**H4**: One-week lagged investor attention negatively predicts stock return volatility.

Additionally, this study examines whether culture affect the aforementioned relationships. According to Hofstede (1983), culture is the conditioning which individuals share with their regions or groups and not with others. Hofstede (1983) describes culture as a collective mental programming. According to this definition of culture, there are behavioral differences between different groups and these differences may reveal themselves in financial markets and create cross-cultural differences in the latter.

Chui et al. (2010) argue that in more collectivist societies, investors weigh their knowledge less. Therefore, in countries with low individuality score, overconfidence and self-attribution biases are less evident and investors in these countries are more prone to herd behavior. They find that individualism is positively associated with trading volume and volatility. Schmeling (2009) argue that collectivist societies are more likely to overreact to information and show herd behavior. Hofstede (2001) suggests that individuals in countries with high uncertainty avoidance index score give more emotional reactions than individuals in low uncertainty avoidance countries.

Considering prior evidence from Chui et al. (2010), this study hypothesizes that the impact of investor attention on liquidity may be more pronounced in countries that have high individualism score. In other words, investors of individualist countries may be more sensitive to increases in attention as they are already prone to more trading. So, the fifth hypothesis is as follows:

**H5**: The impact of one-week lagged investor attention on stock liquidity is more pronounced in individualist countries.

As Ding and Hou (2005) suggest, more investor attention increases stock familiarity and reduces uncertainty in the markets. Therefore, investors from high uncertainty avoidance countries may be more sensitive to increases in investor attention and trade more when they have more information about stocks. Therefore, this study expects the impact of investor attention on stock liquidity to be more pronounced in high uncertainty avoidance countries. Thus, the sixth hypothesis of the study is as follows:

**H6**: The impact of one-week lagged investor attention on stock liquidity is more pronounced in high uncertainty avoidance countries.

Overconfident trading behavior observed in investors from individualist countries generates excess volatility (Chui et al., 2010). For that reason, this study hypothesizes that more attention results in more contemporaneous volatility in individualist countries. Thus, the seventh hypothesis of the study is as follows:

**H7**: Positive contemporaneous relationship between investor attention and stock return volatility is stronger in individualist countries.

On the other hand, countries that have high uncertainty avoidance scores may be more sensitive to reduction in uncertainty. Therefore, volatility response to decreased uncertainty may be more in high uncertainty avoidance countries. I expect one-week lagged investor attention to predict lower volatility in high uncertainty avoidance countries than it does in low uncertainty avoidance countries.

**H8**: One-week lagged investor attention reduces volatility at a greater magnitude in high uncertainty avoidance countries than it does in low uncertainty avoidance countries.

### 3.2. Sample and Data

This section gives information related to the sampling, data collection and data analysis processes. Specifically, section 3.2.1 explains the construction of the sample, section 3.2.2 explains classification of the sample, and section 3.2.3 presents data collection and analysis techniques.

### 3.2.1. Construction of the Sample

To select the countries which will be examined in the study, I first divide the world into three regions: Americas, Asia-Pacific, and Europe. Then, I select the largest stock markets from each region. To sort out the markets by their market capitalizations, data of World Federation of Exchanges (WFE) are used. WFE is a global industry group for exchanges around the world. WFE exchanges includes just about 45,000 listed companies, and the market capitalization of these entities is over $86.2 trillion.[23] Table 3.1 lists the exchanges sorted by their market capitalizations in USD terms.

Table 3.1: Largest Stock Exchanges in the World by Market Capitalization

| **Americas** | | |
|---|---|---|
| **Country** | **Exchange** | **Market Capitalization (in millions of $)** |
| USA | NYSE | 20,679,477 |
| USA | Nasdaq – US | 9,756,836 |
| Canada | TMX Group | 1,937,903 |
| Brazil | BM&FBOVESPA S.A. | 916,824 |
| Mexico | Bolsa Mexicana de Valores | 385,051 |
| Chile | Bolsa de Comercio de Santiago | 250,740 |
| Colombia | Bolsa de Valores de Colombia | 103,848 |
| Peru | Bolsa de Valores de Lima | 93,385 |
| Argentina | Bolsa de Comercio de Buenos Aires | 45,986 |
| Panama | Bolsa de Valores de Panama | 15,648 |
| Jamaica | Jamaica Stock Exchange | 12,057 |
| Barbados | Barbados Stock Exchange | 3,542 |
| Costa Rica | Bolsa Nacional de Valores | 2,401 |
| Bermuda | Bermuda Stock Exchange | 2,393 |
| **Asia-Pacific** | | |

[23] https://www.world-exchanges.org/about

| Country | Exchange | Market Capitalization (in millions of $) |
|---|---|---|
| Japan | Japan Exchange Group Inc. | 5,296,811 |
| China | Shanghai Stock Exchange | 3,919,420 |
| Hong Kong | Hong Kong Exchanges and Clearing | 3,819,215 |
| China | Shenzhen Stock Exchange | 2,405,460 |
| India | BSE India Limited | 2,083,483 |
| India | National Stock Exchange of India Limited | 2,056,337 |
| South Korea | Korea Exchange | 1,413,717 |
| Australia | Australian Securities Exchange | 1,262,800 |
| Taiwan | Taiwan Stock Exchange | 959,220 |
| Singapore | Singapore Exchange | 687,257 |
| Thailand | The Stock Exchange of Thailand | 500,741 |
| Indonesia | Indonesia Stock Exchange | 486,766 |
| Malaysia | Bursa Malaysia | 398,019 |
| Philippines | Philippine Stock Exchange | 258,156 |
| Vietnam | Hochiminh Stock Exchange | 124,345 |
| Taiwan | Taipei Exchange | 92,478 |
| New Zealand | NZX Limited | 86,133 |
| Bangladesh | Dhaka Stock Exchange | 39,762 |
| Bangladesh | Chittagong Stock Exchange | 37,629 |
| Sri Lanka | Colombo Stock Exchange | 15,575 |
| Vietnam | Hanoi Stock Exchange | 8,308 |

**Europe - Africa - Middle East**

| Country | Exchange | Market Capitalization (in millions of $) |
|---|---|---|
| Belgium, France, Portugal, Netherlands, Ireland | Euronext | 3,730,398 |
| England | LSE Group | 3,637,996 |
| Germany | Deutsche Boerse AG | 1,755,173 |

| | | |
|---|---|---|
| Switzerland | SIX Swiss Exchange | 1,441,160 |
| Denmark, Sweden, Finland, Iceland, Estonia, Latvia, Lithuania | Nasdaq Nordic Exchanges | 1,322,817 |
| South Africa | Johannesburg Stock Exchange | 865,328 |
| Spain | BME Spanish Exchanges | 723,691 |
| Russia | Moscow Exchange | 576,116 |
| Saudi Arabia | Saudi Stock Exchange (Tadawul) | 496,353 |
| Norway | Oslo Bors | 267,382 |
| Israel | Tel-Aviv Stock Exchange | 187,466 |
| Qatar | Qatar Stock Exchange | 163,047 |
| Poland | Warsaw Stock Exchange | 160,483 |
| Turkey | Borsa Istanbul | 149,264 |
| Iran | Tehran Stock Exchange | 143,548 |
| United Arab Emirates | Abu Dhabi Securities Exchange | 137,617 |
| Austria | Wiener Borse | 116,802 |
| Ireland | Irish Stock Exchange | 110,154 |
| United Arab Emirates | Dubai Financial Market | 93,760 |
| Morocco | Bourse de Casablanca | 61,081 |
| Luxembourg | Luxembourg Stock Exchange | 49,483 |
| Egypt | The Egyptian Exchange | 42,006 |
| Greece | Athens Stock Exchange (ATHEX) | 38,371 |
| Kazakhstan | Kazakhstan Stock Exchange | 37,005 |
| Nigeria | Nigerian Stock Exchange | 31,521 |
| Hungary | Budapest Stock Exchange | 28,945 |
| Iran | Iran Fara Bourse Securities Exchange | 26,912 |
| Jordan | Amman Stock Exchange | 22,740 |
| Bahrain | Bahrain Bourse | 21,863 |
| Romania | Bucharest Stock Exchange | 20,854 |
| Croatia | Zagreb Stock Exchange | 20,509 |
| Oman | Muscat Securities Market | 18,782 |
| Mauritius | Stock Exchange of Mauritius | 9,848 |
| Lebanon | Beirut Stock Exchange | 9,675 |

| | | |
|---|---|---|
| West Africa (Regional Exchange) | BRVM | 8,453 |
| Tunis | Tunis Stock Exchange | 8,329 |
| Slovenia | Ljubljana Stock Exchange | 7,267 |
| Malta | Malta Stock Exchange | 5,054 |
| Ukraine | Ukrainian Exchange | 4,415 |
| Palestine | Palestine Exchange | 3,735 |
| Cyprus | Cyprus Stock Exchange | 3,313 |
| Namibia | Namibian Stock Exchange | 2,462 |
| Seychelles | Trop-X | 284 |

Source: World Federation of Exchanges[24]

I exclude countries that do not have at least one official/recognized language written in Latin script. For that reason, regional division includes Europe and not Europe-Middle East-Africa (EMEA) since most countries in the Middle East and Africa either do not have stock markets large enough to be included or do not use Latin script. Additionally, because of the language criterion, stock exchanges from Japan, China, Hong Kong, South Korea, and Taiwan are not included in the study, even though they are among the largest stock exchanges in the Asia-Pacific region.

For each country, I choose the representative indices of the largest and the most liquid stocks. To overcome survivorship bias, I include every stock that has ever taken part in the respective index during our sampling period from March 2014 to January 2018. This period is chosen because Google Trends limits the weekly internet search volume data to five years.[25] I then eliminate dead stocks and stocks with zero search volumes. After the elimination process, 769 stocks and 156,876 weekly stock level observations are left.

### 3.2.2. Classification of the Sample

The sample of the study is divided into subsamples based on their geographic location, market development and national culture of respective countries.

In this study, Morgan Stanley Capital International (MSCI) country classification is used to determine a country's market development. MSCI classifies

[24] https://www.world-exchanges.org/our-work/statistics
[25] First year of data is extracted to calculate expected values and abnormalities.

countries as frontier markets, emerging markets, and developed markets.[26] Argentina is the only frontier market in the sample. Since there is only one country in that class, I forgo frontier markets category and divide the sample in two: emerging markets and developed markets. Therefore, Argentina is accepted as an emerging market.

Additionally, I group stocks based on national culture of respective countries by using two dimensions from Hofstede (1983)'s national culture dimensions: Individualism versus Collectivism and Uncertainty Avoidance Index (UAI).

Hofstede's (1983) original study was carried out between 1967 and 1973. His study uses an original dataset from employee value scores collected from IBM's (International Business Machines)[27] employees. The dataset comprises 116,000 questionnaires from forty countries. The 1983 paper included four national culture dimensions, namely; individualism-collectivism, power distance, uncertainty avoidance, and masculinity-femininity. After the works of Hofstede and Bond (1988) and Hofstede (1991), a fifth dimension is added: long term versus short term orientation. Based on a study of students' values in 23 countries around the world, using a Chinese Values Survey (CVS), the new dimension tries to distinguish the difference in thinking between the East and West. Lastly, Hofstede, et al. (2010) added a sixth dimension to the model, named indulgence versus restraint.

As a result, the national culture dimensions model currently comprises of six dimensions. The data are available for over 100 countries and the scores are indexed roughly from 0 to 100.

The short descriptions of two dimensions that are used in this study are given below. I choose to analyze these dimensions as they have been previously used in the cultural finance literature.

**Individualism versus Collectivism Index (IDV):** This index measures the degree of individualism of a country's citizens. Individualism, in this context, refers to individuals' tendency to put themselves before others. In individualistic societies, people are expected to take care of themselves and their immediate families. Collectivism, on the other hand, refers to tightly-knit societies in which individuals' self-image is reflected in the word "we". People in collectivist societies are leaned to offer unquestioning loyalty to their relatives or groups, which they belong to and

[26] https://www.msci.com/market-classification
[27] IBM is an information technology company headquartered in USA at the time of writing this thesis. https://www.ibm.com/ibm/us/en/?lnk=fab

expect to be taking care of. High score in this index represents individualism while low score represents collectivism.[28]

**Uncertainty Avoidance Index (UAI):** This index measures how comfortable people feel when confronting with uncertainty. An uncertainty avoidant culture often tries to control the future to deal with the fact that it can never be known. These societies usually have rigid codes of belief and are intolerant of unorthodox behavior and ideas. Countries with low UAI score are usually relaxed in response to uncertainty. They have a tendency to let the future happen and they loosen up strict principles.[27]

For each of these two indices, I calculate the median score of every country. Then I group them based on their score relative to the median (Index scores are obtained from website of Hofstede Insights.[29]). If a country's individualism score is higher (lower) than the median, that country is considered as an individualist (collectivist) country. Similarly, if a country's uncertainty avoidance score is higher (lower) than the median, that country is conserved as a high uncertainty avoidance (low uncertainty avoidance) country. Table 3.2 provides information about countries and indices in the sample.

### 3.2.3. Determination of Data Collection and Data Analysis Techniques

To calculate abnormal returns, liquidity and volatility, I obtain essential stock data, interbank rates, and index prices from Thomson Reuters Datastream. Google Search Volume Index is obtained from Google Trends[30]. Data on national culture dimensions are obtained from Hofstede Insights[31].

After obtaining the data, I check for possible autocorrelation and heteroskedasticity. I use Wooldridge test to check for autocorrelation and Wald test to check for heteroskedasticity. Table 3.3 reports the results of Wooldridge test and Table 3.4 reports the results of Wald test, for the whole sample. Appendix 2 provides the results for each country. Natural logarithms of variables are taken to ensure normality since returns, liquidity and volatility of stocks usually exhibit skewed distribution (Roll & Subrahmanyam, 2010, Andersen, 2001, Chen et al., 2001).

[28] https://www.hofstede-insights.com/models/national-culture/
[29] https://www.hofstede-insights.com/product/compare-countries/
[30] https://trends.google.com/trends
[31] https://www.hofstede-insights.com/country-comparison/

Table 3.2: Countries and Indices Examined in the Study

| Country | Index | Market Development | Individualism vs. Collectivism Index (IDV) | Uncertainty Avoidance Index (UAI) |
|---|---|---|---|---|
| **Americas Region** | | | | |
| Argentina | Merval | Developing | Low IDV | High UAI |
| Brazil | IbrX 50 | Developing | Low IDV | High UAI |
| Canada | S&P/TSX 60 | Developed | High IDV | Low UAI |
| Chile | IPSA | Developing | Low IDV | High UAI |
| Mexico | S&P/BMV IPC | Developing | Low IDV | High UAI |
| Peru | S&P/BVL Lima | Developing | Low IDV | High UAI |
| USA | NASDAQ 100 | Developed | High IDV | Low UAI |
| **Asia-Pacific Region** | | | | |
| Australia | S&P/ASX 20 | Developed | High IDV | Low UAI |
| India | Nifty 50 | Developing | Low IDV | Low UAI |
| Indonesia | LQ45 | Developing | Low IDV | Low UAI |
| Malaysia | KLCI | Developing | Low IDV | Low UAI |
| New Zealand | S&P NZX 50 | Developed | High IDV | Low UAI |
| Philippines | PSEi | Developing | Low IDV | Low UAI |
| Singapore | FTSE STI | Developed | Low IDV | Low UAI |
| **European Region** | | | | |
| Belgium | BEL 20 | Developed | High IDV | High UAI |
| Denmark | OMXC 20 | Developed | High IDV | Low UAI |
| Finland | OMXH 25 | Developed | High IDV | Low UAI |
| France | CAC 40 | Developed | High IDV | High UAI |
| Germany | DAX | Developed | High IDV | High UAI |
| Netherlands | AEX | Developed | High IDV | Low UAI |
| Norway | OBX | Developed | High IDV | Low UAI |
| Portugal | PSI 20 | Developed | Low IDV | High UAI |
| Spain | IBEX 35 | Developed | Low IDV | High UAI |
| Sweden | OMXS 30 | Developed | High IDV | Low UAI |
| Switzerland | SMI | Developed | High IDV | Low UAI |
| Turkey | BIST 30 | Developing | Low IDV | High UAI |
| UK | FTSE 100 | Developed | High IDV | Low UAI |

The results presented in tables 3.3 and 3.4 point out to autocorrelation and heteroskedasticity. For that reason, I use Newey-West (1987) formula to compute standard errors. Newey-West (1987) is used to address for autocorrelation and heteroskedasticity in the error terms, which is a common problem in cross-sectional regression.

Throughout this study, Fama and MacBeth (1973) regressions are used to test the hypotheses of the study. Fama-Macbeth regression is a way of testing how returns are exposed to risk factors and is designed to correct for cross sectional correlation. It is a two-stage regression in which factor loadings are determined in the first step by regressing portfolio/asset returns and risk factors. In the first step, βs are obtained for all portfolios. The second step consists of computing cross-sectional regressions of the returns on the estimates of the βs from the first step for each period. In this step, the estimates for each factor are computed. Lastly, averaging those estimates gives the risk premium for each factor.

Skoulakis (2008) argues that Fama-Macbeth regressions estimate more accurate t-statistics than OLS regressions if the data have a long time series. Petersen (2009) suggest that Fama-Macbeth regressions are a better choice and produce unbiased estimates when there is a time effect. Additionally, Fama-MacBeth (1973) method has been previously used in the investor attention literature (Da et al. 2011). For these reasons this study uses Fama-Macbeth regressions as its main method.

Table 3.3: Wooldridge Test for Autocorrelation in Panel Data

| | F(1,748) | Prob > F |
|---|---|---|
| Model for Abnormal Return | 9738.081 | 0.0000 |
| Model for Stock Liquidity | 10604.712 | 0.0000 |
| Model for Volatility | 7821.263 | 0.0000 |

Null hypothesis states no autocorrelation

Table 3.4: Modified Wald Test for Groupwise Heteroskedasticity

| | chi2 (1,749) | Prob > chi2 |
|---|---|---|
| Model for Abnormal Return | 120000 | 0.0000 |
| Model for Stock Liquidity | 18511 | 0.0000 |
| Model for Volatility | 49049 | 0.0000 |

Null hypothesis states no autocorrelation

As a robustness measure, fixed-effect regressions and fixed effect regression with robust standard errors are used throughout the study and results are reported in Appendix 3 and Appendix 4. I use fixed-effect regressions since Hausmann test resulted in rejection of the null hypothesis, which means that fixed effect regression is a better choice than random effects regression. Result of the Hausmann test is reported in appendix 2. Moreover, fixed effect regression with robust standard errors[32] allows to control for heteroskedasticity (Huber, 1967, White, 1980).

In this study, econometric analyses have been done by using STATA and R.

### 3.3. Variables

This study uses abnormal returns, liquidity and return volatility as dependent variables for three different regression models. Abnormal returns refer to market risk adjusted abnormal returns and its measurement is explained in section 3.3.1. Liquidity is measured by abnormal trading volume and Amihud (2002) illiquidity ratio. Measurement of these variables are explained in 3.3.2. Standard deviation of returns and weekly averages of intraday price ranges are used to calculate return volatility, which is covered in section 3.3.3. Main independent variable is abnormal investor attention and its measurement is explained in detail in section 3.3.4.

Three main control variables used in this study are as follows: Market value, book to market ratio, and lagged dependent variable. The details of control variables are given in section 3.3.5.

Table 3.5 defines and shows the calculations for all variables used in the study. Appendix 3 contains descriptive statistics for abnormal return, abnormal volume, standard deviation, Google search volume index and abnormal search volume index.

[32] Also known as Huber/White/sandwich estimator.

Table 3.5: Variables Used in This Study

| Variables | Definition | Calculation |
|---|---|---|
| | **Dependent Variables** | |
| AR | Market risk adjusted abnormal returns | $\ln(1 + \mathrm{r_{i,t}} - (\mathrm{r_{f,t}} + \beta_{\mathrm{i}}(\mathrm{r_{M,t}} - \mathrm{r_{f,t}})))$ |
| AVOL | Abnormal trading volume | $\ln(\mathrm{VOL_{i,t}}) - \ln[\mathrm{Mean}(VOL_{\mathrm{i,t-1}}, \dots, VOL_{\mathrm{i,t-52}})]$ |
| Illiq | Amihud (2002) illiquidity ratio | $\frac{1}{\mathrm{D_{i.t}}} \sum_{\mathrm{d=1}}^{\mathrm{D_{i,t}}} \frac{\lvert r_{\mathrm{i,t,d}} \rvert}{\mathrm{VOL_{i,t,d}}}$ |
| St_Dev | Standard deviation of returns | $\sigma_{r,i,t}$ |
| P_Range | Intraday price range | $\frac{1}{\mathrm{D_{i.t}}} \sum_{\mathrm{d=1}}^{\mathrm{D_{i,t}}} \ln(\mathrm{ph}_{i,t,d}) - \ln(pl_{i,t,d})$ |
| | **Independent Variables** | |
| ASVI | Abnormal search volume index calculated by using search index of company names | $\ln(\mathrm{SVI_{i,t}}) - \ln[\mathrm{Med}(\mathrm{SVI_{i,t-1}}, \dots, \mathrm{SVI_{i,t-8}})]$ |
| AVOL | Abnormal trading volume | $\ln(\mathrm{VOL_{i,t}}) - \ln[\mathrm{Mean}(VOL_{\mathrm{i,t-1}}, \dots, VOL_{\mathrm{i,t-52}})]$ |
| | **Control Variables** | |
| MV | Market value | Natural logarithm of share price multiplied by the number of ordinary shares in issue |
| BM | Book to market ratio | Natural logarithm of book value divided by market value of the common ordinary equity |

### 3.3.1. Abnormal Return

Abnormal returns are calculated by subtracting the weekly expected return of firm i at time t from realized return.

$$AR_{i,t} = r_{i,t} - E(r)_{i,t} \quad (1)$$

where:

$AR_{i,t}$ represents abnormal return for firm i at week t

$r_{i,t}$ represents actual return for firm i at week t

$E(r)_{i,t}$ represents expected return for firm i at week t

Weekly expected returns are calculated by using the CAPM formula. Stock indices from Table 3.2 are used to calculate market returns for each country. Risk-free rates are proxied by weekly interbank rates for respective countries. Betas are estimated by regressing each stocks' prior 52 weeks returns on the respective market return.

$$E(r)_{i,t} = \mathrm{r_{f,t}} + \beta_{\mathrm{i,t}}(\mathrm{r_{M,t}} - \mathrm{r_{f,t}}) \quad (2)$$

Where:

$E(r)_{i,t}$ represents expected return for firm i at week t

$\mathrm{r_{f,t}}$ represents risk-free rate at week t

$\beta_{\mathrm{i,t}}$ represents beta of the stock i at week t

$\mathrm{r_{M,t}}$ represents market return at week t

### 3.3.2. Stock Liquidity

In this study, abnormal trading volume is used as the main proxy of stock liquidity. For robustness tests, Amihud (2002) illiquidity ratio is also used to measure stock liquidity. These measures have been previously used in studies investigating the relationship between investor attention and stock liquidity (Aouadi et al., 2013, Ding and Hou, 2015, Fan et al., 2017).

To compute abnormal trading volume, I first calculate the expected trading volume for stock i at time t by taking natural logarithm of the mean trading volume of the prior 52 weeks. I, then, subtract it from the natural logarithm of the actual trading volume of stock i at time t to find the abnormal trading volume.

$$\mathrm{AVOL_{i,t}} = \ln(\mathrm{VOL_{i,t}}) - \ln[\mathrm{Mean}(\mathrm{VOL_{i,t-1}}, \dots, \mathrm{VOL_{i,t-52}})] \quad (3)$$

Where:

$AVOL_{i,t}$ represents abnormal trading volume for firm i at week t

$VOL_{i,t}$ represents trading volume for firm i at week t

Amihud (2002) illiquidity ratio is illustrated in Equation 8. To calculate the ratio, daily absolute return for each firm's stock is divided by trading volume of the corresponding stock. Consequently, averaging daily ratios provide weekly illiquidity ratio for each firm's stock.

$$Illiq_{i,t} = \frac{1}{\mathrm{D_{i.t}}} \sum_{\mathrm{d=1}}^{\mathrm{D_{i,t}}} \frac{|r_{\mathrm{i,t,d}}|}{\mathrm{VOL_{i,t,d}}} \quad (4)$$

Where:

$Illiq_{i,t}$ represents weekly Amihud (2002) illiquidity ratio for firm i at week t

$|r_{\mathrm{i,t,d}}|$ represents absolute return for firm i at day d

$\mathrm{VOL_{i,t,d}}$ represents trading volume for firm i at day d

$\mathrm{D_{i.t}}$ represents number of trading days in a week

### 3.3.3. Stock Return Volatility

The main model of this study uses standard deviation of returns as a measure of stock volatility (as previously used by Aouadi et al., 2013, Fan et al., 2017).

$$Volatility_{i,t} = \sigma_{r,i,t} \quad (5)$$

Where:

$Volatility_{i,t}$ represents weekly volatility of returns for firm i at week t

$\sigma_{r,i,t}$ represents standard deviations of daily returns for firm i at week t

For the sake of robustness, I employ a second volatility measure. This measure takes into account differences of intra-day high and intra-day low values. Range based volatility measures, first offered by Parkinson (1980), have been frequently used in the finance literature (Alizadeh et al., 2002, Degiannakis and Livada, 2013, Blau and

Whitby, 2017). For each firm i, for each day in each week t, we calculate the intra-day high minus low values and average them over open days of the week.

$$Volatility_{i,t} = \frac{1}{\mathrm{D_{i.t}}} \sum_{\mathrm{d=1}}^{\mathrm{D_{i,t}}} \ln(\mathrm{ph}_{i,t,d}) - \ln(pl_{i,t,d}) \quad (6)$$

Where:

$Volatility_{i,t}$ represents weekly volatility of returns for firm i at week t

$\mathrm{ph}_{i,t,d}$ represents highest intra-day price of firm i at day d in week t

$\mathrm{pl}_{i,t,d}$ represents lowest intra-day price of firm i at day d in week t

$\mathrm{D_{i.t}}$ represents number of trading days in a week

### 3.3.4. Investor Attention

This study follows the attention literature and uses Google SVI to capture the investor attention.

Google Trends[33] shares search volume data of its users, dating back to 2004. It is important to note that search volume data does not reflect absolute search volumes. Google Trends normalizes the data by dividing the number of searches at a time by the total searches of the geography and time range it represents. For example, to calculate the search popularity of a keyword in Turkey for a specific time range, search frequency is divided to total searches made in Turkey in that time range. This normalization process increases comparability of the relative search popularity. The normalized search popularity is then scaled on a range from 0 to 100 based on a topic's proportion to all searches on all topics. This means that same score could and most likely would mean different absolute search volume. On the scale used by Google Trends, 100 represents the highest search popularity while 0 represents the lowest. For rarely searched keywords, search popularity is generated as 0.[34] Figure 3.1 illustrates an example of search popularity for the term "Akbank".

[33] https://trends.google.com/trends

[34] https://support.google.com/trends/answer/4365533?hl=en&ref_topic=6248052

Figure 3.1: Google Search Volume Index for the term “Akbank”


Source: Google Trends[35]

The main model of this study uses company names as search queries, instead of stock tickers. Employing stock tickers as search queries limits the sample size drastically since Google does not share search volumes when the term is rarely searched. Not having enough search volume for Google to produce data is either related to individual investors’ usage of company names during information search or individual investors’ lack of information demand for the stock. Therefore, using stock tickers may sometimes hide the level of attention that the stock gets. For that reason, I follow the method of Vlastakis and Markellos (2012) and use the company names to capture individual investors’ information demand more broadly.

To remove time trends and low-frequency seasonality, Da et al. (2011) define normal attention level as the median of prior 8 weeks’ SVI.[36] Since then, investor attention literature mainly defines the normal level of attention in the same way. I follow the consensus and calculate abnormal investor attention for firm i at time t as the log of SVI for firm i at time t minus the log of the median SVI of the prior eight weeks for firm i at time t.

$$ASVI_{i,t} = \ln(\mathrm{SVI_{i,t}}) - \ln[\mathrm{Med}(\mathrm{SVI_{i,t-1}}, \ldots, \mathrm{SVI_{i,t-8}})] \quad (7)$$

Where:

$ASVI_{i,t}$ represents abnormal search volume index for firm i at week t

$\mathrm{SVI_{i,t}}$ represents search volume index for firm i at week t

[35] https://trends.google.com.tr/trends/explore?date=2014-05-01%202018-05-12&geo=TR&q=akbank
[36] Da et al. (2011) state that their results are robust to different lengths of the rolling window (4 weeks, 6 weeks, 10 weeks, etc.).

In addition to internet search volume data, this study uses abnormal trading volume as another attention proxy. Barber and Odean (2008) argue that when a stock experiences abnormal trading volume, it is likely that it gets more attention from investors. Although using trading volume is not as common as using internet search, it is the second most used proxy in the literature. Accordingly, abnormal trading volume is computed in a manner similar to Barber and Odean (2008). Firstly, the expected trading volume for firm i at time t is defined as the natural logarithm of mean trading volume of prior 52 weeks. Then, I subtract the expected trading volume from the natural logarithm of realized trading volume to find the abnormal trading volume for firm i at time t.

$$AVOL_{i,t} = \ln(\mathrm{VOL_{i,t}}) - \ln[\mathrm{Mean}(VOL_{\mathrm{i,t-1}}, \dots, VOL_{\mathrm{i,t-52}})] \quad (8)$$

Where:

$AVOL_{i,t}$ represents abnormal trading volume for firm i at week t

$VOL_{\mathrm{i,t}}$ represents trading volume for firm i at week t

### 3.3.5. Control Variables

Fama and French (1993) reports that value stocks outperform growth stocks and small-cap stocks tend to outperform large-cap stocks. To account for size and value factors, book-to-market ratios and market capitalizations are added into regression models as control variables. Additionally, lagged dependent variables are also included to remove the effects of previous values of dependent variables on the coefficients of independent variables.

## 3.4. Econometric Models

This study uses three main regression models. Section 3.4.1 explains regression models used to examine the relationship between investor attention and abnormal stock returns. Section 3.4.2 explains regression models used in the examination of the relationship between investor attention and stock liquidity. Lastly, section 3.4.3 covers the regression models used to examine the relationship between investor attention and stock volatility.

### 3.4.1. Investor Attention – Abnormal Stock Return Relationship

To investigate the predictive power of investor attention on abnormal stock returns, the following regression model is used. Book-to-market ratios and market capitalizations are added into regression model to control for size and value factors mentioned in Fama and French (1993). One week lagged abnormal returns are added into the model to control for momentum effects.

$$AR_{i,t} = \beta_0 + \beta_1 ASVI_{i,t-1} + \beta_2 MV_{i,t} + \beta_3 BM_{i,t} + \beta_4 AR_{i,t-1} + \varepsilon_t \qquad \text{(Model 1)}$$

Where:

$AR_{i,t}$ represents abnormal return for firm i at week t

$ASVI_{i,t-1}$ represents abnormal search volume index for firm i at week t-1

$MV_{i,t}$ represents market value of firm i at week t

$BM_{i,t}$ represents book-to-market ratio of firm i at week t

$AR_{i,t-1}$ represents abnormal return for firm i at week t-1

$\varepsilon_t$ represents error term

For robustness purposes, I employ abnormal trading volume as additional investor attention proxy and run the following model.

$$AR_{i,t} = \beta_0 + \beta_1 AVOL_{i,t-1} + \beta_2 MV_{i,t} + \beta_3 BM_{i,t} + \beta_4 AR_{i,t-1} + \varepsilon_t \qquad \text{(Model 2)}$$

Where:

$AR_{i,t}$ represents abnormal return for firm i at week t

$AVOL_{i,t-1}$ represents abnormal trading volume index for firm i at week t-1

$MV_{i,t}$ represents market value of firm i at week t

$BM_{i,t}$ represents book-to-market ratio of firm i at week t

$AR_{i,t-1}$ represents abnormal return for firm i at week t-1

$\varepsilon_t$ represents error term

### 3.4.2. Investor Attention – Stock Liquidity Relationship

I test the predictive power of investor attention on stock liquidity with the following regression equation. In addition to control variables in model 1 and model

2, stock return is added into the model as done in Aouadi et al. (2013) and Ding and Hou (2015).

$$AVOL_{i,t} = \beta_0 + \beta_1 ASVI_{i,t-1} + \beta_2 MV_{i,t} + \beta_3 BM_{i,t} + \beta_4 r_{i,t-1} + \beta_5 AVOL_{i,t-1} + \varepsilon_t \quad \text{(Model 3)}$$

Where:

$AVOL_{i,t}$ represents abnormal trading volume for firm i at week t

$ASVI_{i,t-1}$ represents abnormal search volume index for firm i at week t-1

$MV_{i,t}$ represents market value of firm i at week t

$BM_{i,t}$ represents book-to-market ratio of firm i at week t

$r_{i,t-1}$ represents actual return for firm i at week t-1

$AVOL_{i,t-1}$ represents abnormal trading volume for firm i at week t-1

$\varepsilon_t$ represents error term

As a robustness check, liquidity is also measured with Amihud (2002) illiquidity ratio and the following regression equation is employed.

$$Illiq_{i,t} = \beta_0 + \beta_1 ASVI_{i,t-1} + \beta_2 MV_{i,t} + \beta_3 BM_{i,t} + \beta_4 r_{i,t-1} + \beta_5 Illiq_{i,t-1} + \varepsilon_t \quad \text{(Model 4)}$$

Where:

$Illiq_{i,t}$ represents weekly Amihud (2002) illiquidity ratio for firm i at week t

$ASVI_{i,t-1}$ represents abnormal search volume index for firm i at week t-1

$MV_{i,t}$ represents market value of firm i at week t

$BM_{i,t}$ represents book-to-market ratio of firm i at week t

$r_{i,t-1}$ represents actual return for firm i at time t-1

$Illiq_{i,t-1}$ represents weekly Amihud (2002) illiquidity ratio for firm i at week t-1

$\varepsilon_t$ represents error term

### 3.4.3. Investor Attention – Stock Return Volatility Relationship

I use the following regression equation to investigate the predictive power of investor attention on stock volatility, measured by standard deviation of returns.

$$St\_Dev_{i,t} = \beta_0 + \beta_1 ASVI_{i,t-1} + \beta_2 MV_{i,t} + \beta_3 BM_{i,t} + \beta_4 St\_Dev_{i,t-1} + \varepsilon_t \qquad \text{(Model 5)}$$

Where:

$St\_Dev_{i,t}$ represents standard deviation of returns of firm i at week t

$ASVI_{i,t-1}$ represents abnormal search volume index for firm i at week t

$MV_{i,t}$ represents market value of firm i at week t

$BM_{i,t}$ represents book-to-market ratio of firm i at week t

$St\_Dev_{i,t-1}$ represents standard deviation of returns of firm i at week t-1

$\varepsilon_t$ represents error term

As a robustness check, I use another volatility measure, the weekly average range between intraday high and intraday low prices. Thus, the following regression equation is employed.

$$P\_Range_{i,t} = \beta_0 + \beta_1 ASVI_{i,t-1} + \beta_2 MV_{i,t} + \beta_3 BM_{i,t} + \beta_4 P\_Range_{i,t-1} + \varepsilon_t \qquad \text{(Model 6)}$$

Where:

$P\_Range_{i,t}$ represents weekly average of intraday price ranges of firm i at week t

$ASVI_{i,t-1}$ represents abnormal search volume index for firm i at week t-1

$MV_{i,t}$ represents market value of firm i at week t

$BM_{i,t}$ represents book-to-market ratio of firm i at week t

$P\_Range_{i,t-1}$ represents weekly volatility of firm i at week t-1

$\varepsilon_t$ represents error term

# 4. EMPIRICAL RESULTS

In this section, the empirical results are presented. Section 4.1. reports the results of the relationship between investor attention and abnormal stock returns. Section 4.2. explains the impact of investor attention on stock liquidity. Finally, the results about the relationship between investor attention and stock volatility are presented in section 4.3. Each subsection includes additional robustness tests.

## 4.1. Investor Attention and Abnormal Stock Returns

Section 4.1.1 presents the results of the main models and section 4.1.2 presents the results of the robustness tests.

### 4.1.1. Main Models

Table 4.1 reports regression estimates of the Model 1. The results suggest that one-week lagged abnormal search volume index calculated by using search index of company names ($ASVI_{t-1}$), as the proxy of abnormal investor attention, has predictive power on abnormal returns in only six countries out of twenty-seven. Consistent with prior literature, one-week lagged abnormal investor attention positively predicts abnormal returns in USA. Additionally, the results show that there is a significant positive relationship in India, Norway, and Turkey. While most studies point out to a positive relationship between one-week lagged investor attention and abnormal stock returns (Da et al., 2011, Zhang et al., 2013, Adachi et al., 2017), we can observe a significant negative relationship in Germany and Spain. The results also suggest that the significant impact of one-week lagged investor attention may not be internationally valid. 21 out of 27 countries do not exhibit statistically significant relationship between one-week lagged investor attention and abnormal returns at 0.1 level.

To see if any relationship exists between $ASVI_{t-1}$ and abnormal stock returns at different stock categories, we divide the sample consisting of 769 stocks into different types of subsamples. The categorization is based on geographical location, market development and national culture. The results presented in Table 4.2 indicate that we can observe a positive association between one-week lagged investor attention and abnormal returns in the Asia-Pacific region while the coefficients are not significant in other regions. The subsample analysis reveals that one-week abnormal investor attention positively predicts abnormal returns in individualistic countries.

Table 4.1: Estimation Results of the Relationship Between One-Week Lagged Investor Attention and Abnormal Stock Returns

| | $ASVI_{(t-1)}$ | MV | BM | $AR_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | 0.0155 | -0.0055 | 0.00307 | 0.0772 | 0.0599 | 1218 | 0.847 |
| Australia | 0.00158 | -0.0000159 | -0.00112 | -0.0465 | -0.00042 | 3248 | 0.396 |
| Belgium | 0.00015 | 0.000682 | 0.000545 | -0.00022 | -0.00549 | 2233 | 0.498 |
| Brazil | -0.00281 | 0.00125** | -0.00138* | 0.00688 | -0.0123** | 9362 | 0.161 |
| Canada | 0.00196 | -0.000197 | -0.003*** | 0.00871 | 0.000361 | 9374 | 0.22 |
| Chile | 0.000342 | -0.000437 | -0.00170* | -0.0489** | 0.00569 | 4466 | 0.282 |
| Denmark | 0.00127 | -0.000429 | -0.00074 | -0.0293 | 0.00451 | 2639 | 0.377 |
| Finland | -0.00241 | -0.000341 | -0.00075 | -0.00268 | 0.00277 | 3654 | 0.293 |
| France | -0.000748 | 0.000498 | -0.0021** | -0.0470** | -0.00571 | 7511 | 0.225 |
| Germany | -0.0057*** | -0.000266 | -0.00159* | 0.0233 | 0.00186 | 5632 | 0.251 |
| India | 0.00518*** | 0.000504 | -0.00139 | -0.0288* | -0.00783 | 11527 | 0.165 |
| Indonesia | -0.00135 | 0.000741 | -0.00001 | -0.0209 | -0.0129 | 6090 | 0.169 |
| Malaysia | 0.00052 | 0.00121* | -0.00068* | -0.094*** | -0.0127* | 5481 | 0.23 |
| Mexico | -0.00121 | 0.00137 | -0.003** | -0.071*** | -0.0189* | 5835 | 0.246 |
| Netherlands | -0.00343 | 0.00106* | -0.00249* | 0.017 | -0.0124* | 2899 | 0.417 |
| New Zealand | 0.00189 | 0.000497 | -0.00177 | -0.0364 | -0.00422 | 2639 | 0.341 |
| Norway | 0.0103*** | -0.000151 | -0.00202 | -0.0288 | 0.000929 | 2191 | 0.503 |
| Peru | -0.00859 | -0.00218 | -0.00458 | 0.00823 | 0.0152 | 1657 | 0.575 |
| Philippines | -0.000558 | 0.000763 | 0.000327 | -0.068*** | -0.0097 | 3248 | 0.314 |
| Portugal | 0.00543 | -0.000637 | -0.00322 | -0.0631 | 0.00657 | 1624 | 0.606 |
| Singapore | 0.00128 | 0.000398 | 0.000316 | -0.0242 | -0.00327 | 4060 | 0.266 |
| Spain | -0.00627** | 0.000864* | -0.00078 | -0.0176 | -0.00852* | 6179 | 0.256 |
| Sweden | 0.00024 | -0.00041 | 0.00148 | 0.0393 | 0.00725 | 4196 | 0.351 |
| Switzerland | 0.00196 | -0.00102** | -0.00226* | -0.0341 | 0.00888* | 3248 | 0.427 |
| Turkey | 0.00467* | -0.000332 | -0.0089 | -0.051*** | 0.00305 | 5379 | 0.241 |
| UK | -0.00027 | 0.000708** | -0.00067 | -0.0211 | -0.00700* | 15262 | 0.132 |
| USA | 0.00237* | 0.000844*** | -0.002*** | -0.0174 | -0.012*** | 16802 | 0.096 |

This table reports the estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on market risk adjusted abnormal returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's abnormal returns (AR(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1 .

Table 4.2: Estimation Results of the Relationship Between One-Week Lagged Investor Attention and Abnormal Stock Returns (Subsample Analysis)

| | $ASVI_{(t-1)}$ | MV | BM | $AR_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | |
| Americas | 0.000708 | 0.0004*** | -0.0016*** | -0.0049 | -0.006*** | 48714 | 0.048 |
| Asia-Pacific | 0.00125* | -0.00002 | -0.00119** | -0.024*** | -0.00051 | 36293 | 0.049 |
| Europe | -0.000818 | 0.00031** | -0.00104** | -0.02 | -0.0034* | 62647 | 0.061 |
| Americas_excl_USA | 0.000187 | 0.00024 | -0.0022*** | -0.00535 | -0.004* | 31912 | 0.07 |
| **Culture** | | | | | | | |
| Collectivist Countries | -0.00039 | 0.0001 | -0.00140*** | -0.019*** | -0.002** | 66126 | 0.033 |
| Individualist Countries | 0.00109** | 0.0003** | -0.00109*** | -0.0144 | -0.003** | 81528 | 0.045 |
| Individualist_excl_USA | 0.00086 | 0.0002 | -0.00130** | -0.0138 | -0.0026* | 64726 | 0.06 |
| Low UAI Countries | 0.00136*** | 0.00008 | -0.00108*** | -0.0191** | -0.002** | 96558 | 0.032 |
| Low UAI_excl_USA | 0.00129*** | 0.00003 | -0.00118** | -0.0192** | -0.0009 | 79756 | 0.038 |
| High UAI Countries | -0.00180** | 0.0002* | -0.00174*** | -0.0123 | -0.003** | 51096 | 0.052 |
| **Market Development** | | | | | | | |
| Developing Countries | 0.000778 | 0.00008 | -0.0016*** | -0.02*** | -0.0021* | 54263 | 0.037 |
| Developed Countries | 0.000308 | 0.0003** | -0.0001*** | -0.014 | -0.004** | 93391 | 0.041 |
| Developed_excl_USA | 0.000004 | 0.0003* | -0.00109** | -0.0128 | -0.003** | 76589 | 0.054 |

I divide the total sample based on geographical location, market development and national culture. I use MSCI market classification to assess the market development and Hofstede's culture dimensions to assess the national culture. This table reports the estimation results of these subsamples for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on market risk adjusted abnormal returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's abnormal returns (AR(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

However, the significance of this relationship is driven by the USA. When USA is excluded from the Americas sample, the coefficient of $ASVI_{t-1}$ becomes insignificant. Moreover, a clear difference is observable between countries that have low uncertainty avoidance index scores and those who have high scores.

The coefficient of $ASVI_{t-1}$ is significantly positive for low uncertainty avoidance countries, while it is significantly negative for high uncertainty avoidance countries. Baur and Dimpfl (2016) suggest that when gold realizes negative returns, investors increase their internet searches and search more news about gold. Vlastakis and Markellos (2012) state that investors demand more information as their level of risk aversion increases. This tendency may be more pronounced in high uncertainty avoidance countries and attention allocation preferences may be the reason for the different signs of coefficients. Investors in high uncertainty avoidance countries may be more sensitive to negative news and increase their internet searches when negative sentiment in the market increases. This, in turn, may lead to negative $ASVI_{t-1}$ coefficient. To limit the scope of the study, I leave the examination of this possibility to future studies. When the sample is divided into two by market development, no significant relationship is observed for neither developing markets nor developed markets.

### 4.1.2. Robustness Tests

This subsection includes some additional analyses for the robustness checks. Firstly, the Model 1 is rerun by using another investor attention proxy, namely abnormal trading volume ($AVOL_{t-1}$). Table 4.3 gives estimation results, which are partly different from those of the main model (Model 1). No statistically significant relationship is found between one-week lagged investor attention and abnormal stock return in 22 countries out of a total of 27. When $ASVI_{t-1}$ is replaced by $AVOL_{t-1}$, a significant relationship with abnormal stock return cannot be observed in the countries displaying significant relationship in the main model. When using $AVOL_{t-1}$, as the investor attention proxy, Denmark has significantly negative coefficient, while Indonesia, Malaysia, Mexico, and Philippines have significantly positive coefficients.

Table 4.4 reports the estimation results of the subsample analysis using $AVOL_{t-1}$ as investor attention proxy. It can be seen from the Table 4.4 that using different investor attention proxies in subsample analysis gives mixed results.

Table 4.3: Estimation Results of the Relationship Between One-Week Lagged Trading Volume and Abnormal Stock Returns

| | $AVOL_{(t-1)}$ | MV | BM | $AR_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | -0.00582 | -0.00218 | 0.00114 | 0.432 | 0.018 | 1218 | 0.851 |
| Australia | -0.000752 | -0.000268 | -0.00191 | -0.0540* | 0.0023 | 3248 | 0.412 |
| Belgium | 0.00449 | 0.000266 | -0.00265 | -0.0185 | -0.00463 | 2233 | 0.505 |
| Brazil | -0.000167 | 0.00113* | -0.00148* | 0.00364 | -0.0112* | 9313 | 0.17 |
| Canada | 0.000428 | -0.000256 | -0.0033*** | 0.0111 | 0.00103 | 9371 | 0.229 |
| Chile | 0.000904 | -0.000336 | -0.00167 | -0.0488** | 0.00453 | 4464 | 0.292 |
| Denmark | -0.0052*** | -0.000661 | -0.000796 | -0.021 | 0.00729 | 2639 | 0.352 |
| Finland | -0.000585 | -0.000131 | -0.001 | 0.00083 | 0.00157 | 3654 | 0.31 |
| France | 0.000059 | 0.00054 | -0.00207** | -0.052*** | -0.00562 | 7511 | 0.23 |
| Germany | -0.0014 | -0.0000982 | -0.00159* | 0.0175 | 3.77E-06 | 5632 | 0.256 |
| India | -0.00073 | 0.000334 | -0.00146 | -0.0252* | -0.00572 | 11527 | 0.162 |
| Indonesia | 0.0047*** | 0.000452 | -0.000332 | -0.0459** | -0.0076 | 6088 | 0.186 |
| Malaysia | 0.00144* | 0.000919 | -0.00083** | -0.094*** | -0.0098 | 5477 | 0.235 |
| Mexico | 0.00310** | 0.00068 | -0.00221* | -0.0709** | -0.00939 | 5739 | 0.262 |
| Netherlands | 0.0050 | 0.00179** | -0.00176 | 0.000442 | -0.0183** | 2899 | 0.413 |
| New Zealand | 0.00093 | -0.000089 | -0.00203 | -0.0308 | 0.000152 | 2639 | 0.357 |
| Norway | -0.0024 | 0.000799 | -0.00168 | -0.0412 | -0.00963 | 2191 | 0.518 |
| Peru | 0.00289 | -0.00313 | -0.00596 | -0.0422 | 0.0233 | 1657 | 0.584 |
| Philippines | 0.0058*** | 0.000492 | -0.000946 | -0.084*** | -0.00597 | 3248 | 0.329 |
| Portugal | -0.00098 | -0.000311 | -0.000911 | -0.0842 | -0.00035 | 1623 | 0.616 |
| Singapore | 0.00035 | 0.0000935 | 0.000198 | -0.0202 | -0.00053 | 4060 | 0.268 |
| Spain | -0.0008 | 0.00105** | -0.00102 | -0.00845 | -0.0103** | 6179 | 0.248 |
| Sweden | 0.0017 | -0.0000713 | 0.00118 | 0.0297 | 0.00289 | 4196 | 0.36 |
| Switzerland | -0.0009 | -0.000720* | -0.00198* | -0.031 | 0.00618 | 3248 | 0.422 |
| Turkey | -0.00002 | -0.000782 | -0.000736 | -0.059*** | 0.00764 | 5379 | 0.242 |
| UK | -0.0005 | 0.000606* | -0.000678 | -0.0189 | -0.00674* | 15262 | 0.137 |
| USA | -0.00095 | 0.000862*** | -0.0019*** | -0.0165 | -0.012*** | 16802 | 0.088 |

This table reports the estimation results for the effect of lagged Abnormal Trading Volume (AVOL(t-1)) on market risk adjusted abnormal returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's abnormal returns (AR(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4.4: Estimation Results of the Relationship Between One-Week Lagged Trading Volume and Abnormal Stock Returns (Subsample Analysis)

| | $AVOL_{(t-1)}$ | MV | BM | $AR_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | |
| Americas | 0.00114** | 0.000436*** | -0.00146*** | -0.00823 | -0.00585*** | 48609 | 0.05 |
| Asia-Pacific | 0.00209*** | 0.0000417 | -0.000236* | -0.0258*** | -0.000288 | 36331 | 0.05 |
| Europe | -0.0000815 | 0.000271* | -0.00104** | -0.0205* | -0.00304* | 62916 | 0.06 |
| Americas_excl_USA | 0.00149*** | 0.000268* | -0.00210*** | -0.00795 | -0.00385* | 31807 | 0.07 |
| **Culture** | | | | | | | |
| Collectivist Countries | 0.00170*** | 0.000139*** | -0.000337*** | -0.0202*** | -0.00147** | 66061 | 0.03 |
| Individualist Countries | 0.000136 | 0.000232* | -0.00113*** | -0.0151 | -0.00306* | 81795 | 0.05 |
| Individualist_excl_USA | 0.000187 | 0.00017 | -0.00135** | -0.0134 | -0.00233 | 64993 | 0.06 |
| Low UAI Countries | 0.00147*** | 0.0000841 | -0.000406*** | -0.0185** | -0.000903 | 96863 | 0.03 |
| Low UAI_excl_USA | 0.00179*** | 0.0000519 | -0.000367*** | -0.0182** | -0.000422 | 80061 | 0.03 |
| High UAI Countries | 0.00105** | 0.000234* | -0.00162*** | -0.0151* | -0.00297** | 50993 | 0.05 |
| **Market Development** | | | | | | | |
| Developing Countries | 0.00193*** | 0.000153** | -0.000341*** | -0.0222*** | -0.00173* | 54194 | 0.03 |
| Developed Countries | 0.0001683 | 0.0002723* | -0.0010052** | -0.01482 | -0.0032681** | 93662 | 0.04 |
| Developed_excl_USA | 0.000223 | 0.000234* | -0.00114** | -0.0125 | -0.00276* | 76860 | 0.05 |

I divide the total sample based on geographical location, market development and national culture. I use MSCI market classification to assess the market development and Hofstede's culture dimensions to assess the national culture. This table reports the estimation results of these subsamples for the effect of lagged Abnormal Trading Volume (AVOL(t-1)) on market risk adjusted abnormal returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's abnormal returns (AR(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

$AVOL_{t-1}$ coefficients of Americas region, collectivist countries, and developing countries are statistically significant, unlike the main model. Additionally, $AVOL_{t-1}$ coefficient of individualist countries loses its significance and coefficient of high uncertainty avoidance countries changes signs. This study obtains mixed results with different investor attention proxies in subsample analysis and cannot conclude robustly that there are significant differences in the relationship between one-week lagged investor attention and abnormal stock returns between national cultures.

Second robustness check is employing two different regression methods: fixed effects regression and fixed effects regression with robust standard errors. The estimation results of the former can be found in Appendix 4.1, while those of the latter can be found in Appendix 5.1. These models reveal mostly similar results to Fama-Macbeth regressions. Table 4.5 summarizes the results of the analyses conducted by using three different methods. Germany and Spain reveal significant negative coefficients in all models. Norway, India, Asia-Pacific region and Low UAI countries exhibit significant positive relationship between investor attention and abnormal returns.

To sum up, the results imply that for only six countries out of twenty-seven, abnormal investor attention is a significant stock return predictor. Hypothesis 1 of this study expects a significant positive relationship between investor attention and abnormal returns. However, this study cannot find a significant relationship between the two variables in twenty-one countries and only four countries have significant positive coefficients. While earlier studies provide evidence on the positive relationship in USA and China, this study cannot validate the predictive power of one-week lagged investor attention on abnormal returns at international level. On the other hand, this study obtains mixed results in subsample analysis. Using different investor attention proxies reveal different results in cultural examination. The relationship between investor attention and abnormal returns is positive in low UAI countries, and negative in high UAI countries when investor attention is measured by abnormal search volume index. However, measuring investor attention with abnormal trading volume results in significantly positive coefficients for both high UAI countries and low UAI countries. Different signs of $ASVI_{t-1}$ and $AVOL_{t-1}$ for high UAI countries may be related to $ASVI_{t-1}$'s ability to capture investors' information demand which is argued by Vlastakis and Markellos (2012). Baur and Dimpfl (2016) suggest that

investors google more news about gold when gold exhibits negative returns. Vlastakis and Markellos (2012) state that investors' information demand increases as with their level of risk aversion. Investors in high UAI countries may increase their internet searches when market sentiment is negative and this may be the reason of negative $ASVI_{t-1}$ coefficient. To limit the scope of this study, investigation of this possibility is left to future studies.

Table 4.5: Summary of Results – One-Week Lagged Investor Attention and Abnormal Stock Returns

| | **Fama-Macbeth** | **Fixed Effect** | **Fixed Effect, Robust** |
|---|---|---|---|
| **Individual Countries** | | | |
| Positive Relationship | India, Norway, Turkey, USA | Canada, India, Norway, USA | Canada, India, Norway |
| Negative Relationship | Germany, Spain | Germany, Spain | Germany, Spain |
| **Region** | | | |
| Positive Relationship | Asia-Pacific | Asia-Pacific | Asia-Pacific |
| Negative Relationship | - | - | - |
| **Culture** | | | |
| Positive Relationship | Individualist, Low UAI | Individualist, Low UAI | Low UAI |
| Negative Relationship | High UAI | High UAI | High UAI |
| **Market Development** | | | |
| Positive Relationship | - | - | - |
| Negative Relationship | - | - | - |

### 4.2. Investor Attention and Stock Liquidity

Section 4.2.1 presents the results of the main models investigating the relationship between investor attention and stock liquidity and section 4.2.2 presents the results of the robustness tests.

### 4.2.1. Main Models

Table 4.6 presents the results of Fama-Macbeth regressions for the relationship between one-week lagged abnormal search volume index ($ASVI_{t-1}$) and stock liquidity measured by abnormal trading volume. The results show that increases in investor attention can predict increases in stock liquidity in twenty countries. In other words, when companies receive more attention from individual investors, their stocks are traded more. Positive coefficients of $ASVI_{t-1}$ may be related to the increases in familiarity, as mentioned in Ding and Hou (2015). When investors collect more information about a firm, they get more familiar with it and firm-specific uncertainty decreases. Increased familiarity and decreased uncertainty result in more trading. These findings are consistent with the findings of Ding and Hou (2015), Fan et al. (2017), Aouadi et al. (2013), and Adachi et al. (2017) who find that there is a positive relationship between stock liquidity and investor attention.

Table 4.7 shows the estimation results for the subsample analysis. It can be seen from the results that each subsample exhibit positive relationship between investor attention abnormal trading volume. Moreover, we can see that the impact of investor attention is slightly more pronounced in individualist countries and high UAI countries. One percent increase in $ASVI_{t-1}$ results in 0.13% increase in collectivist countries vs. 0.14% in individualist countries; and 0.136% in low UAI countries vs. 0.147% in high UAI countries. These results may be related to overconfidence-driven trading observed in individualistic countries (Chui et al., 2010). More liquidity observed in uncertainty avoidant countries supports the argument that with more information, investors reduce their uncertainty about the firm and trade more after the uncertainty is reduced. In brief, while the differences of coefficients between different cultures are small, the findings of the study support the argument that investor attention is important in uncertainty reduction.

### 4.2.2. Robustness Tests

For robustness check, firstly, I measure stock illiquidity with Amihud (2002) illiquidity ratio. Amihud (2002) illiquidity ratio is calculated by dividing the absolute daily returns by the daily trading volume. A low ratio means more liquidity. Since I use weekly data, I convert the daily measures into weekly frequencies by calculating the weekly averages. The estimation results for individual countries are reported in Table 4.8. The estimation results of the subsample analysis are reported in Table 4.9.

Table 4.6: Estimation Results of the Relationship Between One-Week Lagged Investor Attention and Stock Liquidity

| | $ASVI_{(t-1)}$ | MV | BM | $r_{(t-1)}$ | $AVOL_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| Argentina | 5.041 | 1.916 | -1.651 | -17.96 | 0.288 | -23.3 | 1218 | 0.98 |
| Australia | 0.101*** | -0.00169 | 0.0161 | -0.770*** | 0.368*** | -0.003 | 3248 | 0.522 |
| Belgium | 0.123*** | 0.0123 | 0.0315* | -0.562 | 0.629*** | -0.122 | 2233 | 0.755 |
| Brazil | 0.0803*** | 0.0114*** | -0.00845** | -0.274* | 0.719*** | -0.14*** | 9306 | 0.582 |
| Canada | 0.0997*** | 0.00511 | -0.00716 | 0.12 | 0.505*** | -0.096** | 9370 | 0.402 |
| Chile | 0.038 | 0.0612*** | 0.0552** | -1.443*** | 0.458*** | -0.96*** | 4462 | 0.467 |
| Denmark | 0.160*** | 0.0108 | 0.00356 | -0.317 | 0.470*** | -0.168 | 2639 | 0.57 |
| Finland | 0.115*** | 0.00751 | 0.00172 | -0.386* | 0.500*** | -0.09** | 3654 | 0.503 |
| France | 0.0913*** | -0.00531 | 0.00513 | -0.379*** | 0.499*** | 0.0284 | 7511 | 0.419 |
| Germany | 0.268*** | 0.0310*** | 0.0319** | 0.167 | 0.427*** | -0.49*** | 5632 | 0.385 |
| India | 0.194*** | 0.00623 | 0.0110* | -0.483*** | 0.511*** | -0.12** | 11527 | 0.382 |
| Indonesia | 0.0208 | 0.0319*** | -0.00235 | -1.127*** | 0.614*** | -0.67*** | 6087 | 0.505 |
| Malaysia | 0.0701** | 0.0500*** | 0.0171 | -0.148 | 0.574*** | -0.58*** | 5476 | 0.495 |
| Mexico | 0.0421 | 0.0342*** | -0.0109 | -0.255 | 0.471*** | -0.49*** | 5739 | 0.44 |
| Netherlands | 0.173*** | -0.00938 | 0.0042 | -0.363 | 0.466*** | 0.05 | 2899 | 0.596 |
| New Zealand | 0.0527 | 0.0312** | -0.0450* | -0.918 | 0.350*** | -0.38*** | 2639 | 0.527 |
| Norway | 0.0519 | 0.00536 | -0.0268 | -0.332 | 0.608*** | -0.125 | 2191 | 0.74 |
| Peru | 0.421** | -0.0198 | 0.226* | 1.239 | 0.417*** | -0.0529 | 1657 | 0.737 |
| Philippines | 0.0729 | 0.0237 | -0.0047 | -0.0239 | 0.498*** | -0.4 | 3248 | 0.519 |
| Portugal | 0.0235** | -0.0189 | -0.00527 | 0.84 | 0.677*** | 0.168 | 1622 | 0.878 |
| Singapore | 0.1000*** | 0.00885 | -0.00614 | -0.728 | 0.600*** | -0.118* | 4060 | 0.569 |
| Spain | 0.177*** | 0.000991 | 0.00793* | -0.289* | 0.636*** | -0.049* | 6179 | 0.557 |
| Sweden | 0.117*** | 0.00886 | 0.000873 | -0.507** | 0.517*** | -0.127* | 4196 | 0.547 |
| Switzerland | 0.0944*** | -0.00251 | 0.0150* | -0.577*** | 0.500*** | 0.0338 | 3248 | 0.546 |
| Turkey | 0.0932*** | 0.0144** | 0.00531 | -1.215*** | 0.657*** | -0.172** | 5379 | 0.571 |
| UK | 0.106*** | -0.00554* | 0.0000644 | -0.374*** | 0.501*** | 0.0308 | 15262 | 0.347 |
| USA | 0.150*** | -0.00630** | 0.00759 | -0.448*** | 0.469*** | 0.0318 | 16802 | 0.297 |

This table reports the estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on stock liquidity measured by abnormal trading volume. Market Value (MV), Book to Market Ratio (BM), preceding week's return (r(t-1)), and preceding week's abnormal trading volume (AVOL(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table 4.7: Estimation Results of the Relationship Between One-Week Lagged Investor Attention and Stock Liquidity (Subsample Analysis)

| | $ASVI_{(t-1)}$ | MV | BM | r(t-1) | $AVOL_{(t-1)}$ | Cons. | Obs. | R2 |
|---|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | | |
| Americas | 0.119*** | 0.00392* | -0.0139*** | -0.332*** | 0.528*** | -0.114*** | 48554 | 0.321 |
| Asia-Pacific | 0.124*** | -0.000356 | -0.00853 | -0.318*** | 0.525*** | -0.0748*** | 36285 | 0.334 |
| Europe | 0.149*** | 0.000928 | -0.000731 | -0.299*** | 0.551*** | -0.0533*** | 62645 | 0.351 |
| Americas_excl_USA | 0.100*** | 0.00642** | -0.0138*** | -0.299*** | 0.542*** | -0.147*** | 31752 | 0.341 |
| **Culture** | | | | | | | | |
| Collectivist Countries | 0.132*** | 0.000796 | -0.00746* | -0.335*** | 0.552*** | -0.0854*** | 65960 | 0.338 |
| Individualist Countries | 0.140*** | 0.00243 | 0.0014 | -0.255*** | 0.486*** | -0.0679*** | 81524 | 0.285 |
| Individualist_excl_USA | 0.132*** | 0.00392** | -0.000491 | -0.183** | 0.497*** | -0.0844*** | 64722 | 0.298 |
| Low UAI Countries | 0.136*** | -0.00435** | -0.00283 | -0.280*** | 0.507*** | -0.00699 | 96546 | 0.307 |
| Low UAI_excl_USA | 0.130*** | -0.00428** | -0.00578 | -0.241*** | 0.516*** | -0.0102 | 79744 | 0.32 |
| High UAI Countries | 0.147*** | 0.00424** | -0.00409 | -0.389*** | 0.554*** | -0.117*** | 50938 | 0.342 |
| **Market Development** | | | | | | | | |
| Developing Countries | 0.121*** | 0.00233 | -0.00847** | -0.344*** | 0.542*** | -0.112*** | 54099 | 0.329 |
| Developed Countries | 0.144*** | 0.00346** | 0.0011 | -0.254*** | 0.510*** | -0.0771*** | 93385 | 0.305 |
| Developed_excl_USA | 0.139*** | 0.00478*** | -0.000208 | -0.195*** | 0.523*** | -0.0907*** | 76583 | 0.32 |

I divide the total sample based on geographical location, market development and national culture. I use MSCI market classification to assess the market development and Hofstede's culture dimensions to assess the national culture. This table reports the estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on stock liquidity measured by abnormal trading volume. Market Value (MV), Book to Market Ratio (BM), preceding week's return (r(t-1)), and preceding week's abnormal trading volume (AVOL(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

From Table 4.8, we can observe statistically significant negative coefficients of $ASVI_{t-1}$ for six countries, implying that stock liquidity increases with more attention. Nonetheless, the number of countries that have significant investor attention coefficient is less than the number of countries that have significant relationship between attention and abnormal volume. Furthermore, Table 4.9 shows that none of the subsamples exhibit statistically significant relationship between Amihud (2002) illiquidity ratio and investor attention. The difference between measuring liquidity with abnormal trading volume and Amihud (2002) illiquidity ratio may be related to ASVI's ability to capture the attention of individual investors (Da et al., 2011). Ding and Hou (2015) suggest that investor attention might not diminish the price-impact type of illiquidity since individual investors' trading volumes are more likely to be small. The findings of this study are consistent with this explanation as significant coefficients disappear when liquidity is measured with Amihud (2002) illiquidity ratio.

Secondly, I re-run the models using fixed effects regression and fixed effects regression with robust standard errors. Appendix 4.2. reports the estimates obtained from the fixed effects regression and Appendix 5.2. reports the estimates obtained from the fixed effects regression with robust standard errors.

The summary of the results is presented in Table 4.10. While Fama-Macbeth regressions give significant positive coefficients for twenty countries, the other two models provide significant positive coefficients for all of the twenty-seven countries and subsamples. This subsection shows that the impact of investor attention on stock liquidity is robust, but limited since it cannot capture the price-impact aspect of liquidity.

All in all, the results mostly confirm the hypothesis 2 of the study. Investor attention significantly predicts stock liquidity and the direction of the relationship is positive. This finding is consistent with the earlier evidence (Ding and Hou, 2015, Fan et al., 2017, Aouadi et al., 2013, and Adachi et al., 2017). Unlike the mixed results of the abnormal returns, this relationship is consistent internationally. Moreover, hypothesis 5 and hypothesis 6 are also confirmed. Though the differences are fairly small, investor attention's impact is more pronounced in individualist countries and countries that have high uncertainty avoidance index scores.

Table 4.8: Estimation Results of the Relationship Between One-Week Lagged Investor Attention and Amihud (2002) Illiquidity Ratio

| | $ASVI_{(t-1)}$ | MV | BM | $r_{(t-1)}$ | $Illiq_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| Argentina | -129.1 | 147.4 | -326.7 | 3063 | 2.759*** | -1860 | 1218 | 1 |
| Australia | -0.128 | -0.075*** | -0.223*** | -2.523 | 0.935*** | 0.867*** | 3248 | 0.852 |
| Belgium | -3.259 | -5.107*** | 5.085** | -26.46 | 0.980*** | 56.62*** | 2233 | 0.912 |
| Brazil | -21.47 | -30.78 | -55.58 | -1495 | 1.974 | 338.7 | 9311 | 0.88 |
| Canada | -0.625** | -1.522*** | -1.229*** | -2.229 | 0.735*** | 17.47*** | 9369 | 0.663 |
| Chile | -129.1 | -92.73** | -81.10** | -816.6 | 1.195*** | 1,393** | 4464 | 0.571 |
| Denmark | -7.464*** | 2.177*** | 1.634*** | -18.05 | 1.103*** | -23.9*** | 2639 | 0.987 |
| Finland | -0.18 | -4.449*** | -2.497*** | -2.781 | 0.771*** | 42.76*** | 3654 | 0.785 |
| France | -1.099** | -0.585*** | -1.127*** | -2.052 | 0.871*** | 6.901*** | 7511 | 0.783 |
| Germany | -810.4 | -892.6*** | -990.0*** | 806.1 | 0.818*** | 9,955*** | 5632 | 0.67 |
| India | -0.384 | -0.362 | -0.218 | -13.77 | 1.065*** | 4.864 | 11527 | 0.93 |
| Malaysia | -5.52 | 1.527 | -9.225*** | 13.45 | 2.892*** | -28.03 | 5477 | 0.832 |
| Mexico | -5.448 | -11.11*** | 2.184 | -202.3** | 1.118*** | 134.8*** | 5743 | 0.751 |
| Netherlands | -0.575 | -2.035*** | -0.816*** | -5.515 | 0.771*** | 21.70*** | 2899 | 0.834 |
| New Zealand | -17.58 | -7.787** | 32.91 | 175.6 | 1.602*** | 60.90** | 2639 | 0.837 |
| Norway | 6.674 | 2.455 | 1.372 | -5.954 | 1.558*** | -32.62 | 2191 | 0.945 |
| Peru | 342 | 274.5 | 580.4** | -842.4 | 1.235*** | -1892 | 1657 | 0.837 |
| Philippines | 0.893 | -2.231** | -5.117*** | 43.93** | 1.064*** | 25.32** | 3248 | 0.825 |
| Portugal | -1.979 | -0.24 | 0.902 | -5.175 | 1.055*** | 1.687 | 1622 | 0.959 |
| Singapore | -0.959 | 1.249*** | -0.679** | 1.117 | 2.417*** | -15.9*** | 4060 | 0.956 |
| Spain | -1.525** | -0.517*** | -0.158 | -10.11 | 0.974*** | 5.484*** | 6179 | 0.865 |
| Sweden | -0.219 | -0.539*** | -0.654*** | 0.854 | 0.731*** | 6.994*** | 4196 | 0.739 |
| Switzerland | -0.98 | -2.534*** | -3.012*** | -10.55 | 0.839*** | 27.40*** | 3248 | 0.873 |
| Turkey | -1.07 | -0.598*** | -1.901*** | -2.885 | 0.966*** | 5.406*** | 5379 | 0.886 |
| UK | -0.473*** | -0.557*** | -0.398*** | 0.196 | 0.835*** | 5.843*** | 15262 | 0.737 |
| USA | -0.218** | -0.566*** | -0.485*** | 1.415 | 0.792*** | 6.175*** | 16802 | 0.73 |

This table reports the estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on stock liquidity measured by Amihud (2002) illiquidity ratio. Amihud (2002) illiquidity ratio is multiplied by $10^6$. Market Value (MV), Book to Market Ratio (BM), preceding week's return (r(t-1)), and preceding week's average illiquidity ratio (Illiq(t-1)) are used as control variables. Illiquidity ratios are multiplied by $10^6$. Information about respective indices can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table 4.9: Estimation Results of the Relationship Between One-Week Lagged Investor Attention and Amihud (2002) Illiquidity Ratio (Subsample Analysis)

| | $ASVI_{(t-1)}$ | MV | BM | $r_{(t-1)}$ | $Illiq_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | | |
| Americas | -2.561 | -10.07*** | 0.886 | -10.92 | 1.336*** | 114.1*** | 48467 | 0.575 |
| Asia_Pacific | -11.56 | 6.938 | 4.886** | 82.17 | 1.953*** | -80.46 | 35909 | 0.582 |
| Europe | -17.65 | 6.105*** | -22.13*** | -148.4 | 0.916*** | 18.14 | 62856 | 0.65 |
| Americas_excl_USA | 7.604 | -13.04*** | -7.04 | -112.7 | 1.336*** | 148.7*** | 31665 | 0.574 |
| **Culture** | | | | | | | | |
| Collectivist Countries | 5.829 | -4.681 | -6.421 | 385.9 | 1.289*** | 61.94 | 65555 | 0.526 |
| Individualist Countries | -6.457 | -2.888 | 2.504 | -86.77 | 0.911*** | 100.9*** | 81677 | 0.646 |
| Individualist_excl_USA | -7.464 | -1.397 | -22.93*** | -153.2 | 0.910*** | 86.25*** | 64875 | 0.645 |
| Low UAI Countries, | -1.805 | 5.125** | 3.529** | 6.857 | 1.737*** | -54.12* | 96434 | 0.558 |
| Lowuai_excl_USA | -2.001 | 5.354** | 3.908** | 12.32 | 1.740*** | -56.60* | 79632 | 0.558 |
| High UAI Countries | -29.98 | -22.33*** | -46.42*** | -884.8 | 0.956*** | 321.3*** | 50798 | 0.61 |
| **Market Development** | | | | | | | | |
| Developing Countries | 9.636 | -7.159 | -7.108 | 466.3 | 1.300*** | 96.69 | 53705 | 0.53 |
| Developed Countries | -7.564 | 0.0135 | -0.231 | -92.23 | 0.911*** | 61.70** | 93527 | 0.645 |
| Developed_excl_USA | -9.684 | 2.443 | -19.96*** | -145.5 | 0.910*** | 38.75 | 76725 | 0.645 |

I divide the total sample based on geographical location, market development and national culture. I use MSCI market classification to assess the market development and Hofstede's culture dimensions to assess the national culture. This table reports the estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on stock liquidity measured by Amihud (2002) illiquidity ratio. Amihud (2002) illiquidity ratio is multiplied by $10^6$. Market Value (MV), Book to Market Ratio (BM), preceding week's return (r(t-1)), and preceding week's average illiquidity ratio (Illiq(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table 4.10: Summary of Results – One-Week Lagged Investor Attention and Stock Liquidity

| | **Fama-Macbeth** | **Fixed Effect** | **Fixed Effect, Robust** |
|---|---|---|---|
| **Individual Countries** | | | |
| Positive Relationship | 20 countries | All 27 countries | All 27 countries |
| Negative Relationship | - | - | - |
| **Region** | | | |
| Positive Relationship | All regions | All regions | All regions |
| Negative Relationship | - | - | - |
| **Culture** | | | |
| Positive Relationship | All culture dimensions | All culture dimensions | All culture dimensions |
| Negative Relationship | - | - | - |
| **Market Development** | | | |
| Positive Relationship | All market types | All market types | All market types |
| Negative Relationship | - | - | - |

### 4.3. Investor Attention and Stock Return Volatility

Section 4.3.1 presents the results of the main models investigating the relationship between investor attention and stock return volatility and section 4.3.2 presents the results of the robustness tests.

#### 4.3.1. Main Models

Hypothesis 3 of this study expects positive contemporaneous relationship between abnormal search volume index (ASVI) and volatility. Table 4.11 reports regression estimates of the contemporaneous relationship between investor attention, proxied by ASVI and standard deviation of returns. By analyzing the results in Table 4.11, it can be seen that the findings are consistent with hypothesis 3. There is a positive contemporaneous relationship between investor attention and return volatility in twenty-one countries, and negative relationship in one country.

Table 4.11: Estimation Results of the Contemporaneous Relationship Between Investor Attention and Stock Return Volatility

| | **ASVI** | **MV** | **BM** | **St_dev$_{(t-1)}$** | **Cons.** | **Obs.** | **$R^2$** |
|---|---|---|---|---|---|---|---|
| Argentina | -0.00574 | 0.000226 | 0.00076 | 0.207*** | 0.012*** | 1218 | 0.822 |
| Australia | 0.00293*** | -0.00119*** | 0.00137*** | 0.346*** | 0.0215*** | 3248 | 0.486 |
| Belgium | 0.00589*** | -0.00141*** | -0.00098* | 0.402*** | 0.0202*** | 2233 | 0.557 |
| Brazil | 0.00286*** | -0.00094*** | 0.00191*** | 0.336*** | 0.0236*** | 9402 | 0.291 |
| Canada | 0.00250*** | -0.00189*** | 0.00264*** | 0.462*** | 0.0276*** | 9379 | 0.463 |
| Chile | 0.000613 | -0.00068*** | 0.00215*** | 0.346*** | 0.0187*** | 4466 | 0.384 |
| Denmark | 0.00459*** | 0.000469** | -0.00010 | 0.243*** | 0.0054*** | 2639 | 0.381 |
| Finland | 0.00220*** | -0.00136*** | 0.00202*** | 0.280*** | 0.0250*** | 3654 | 0.372 |
| France | 0.00271*** | -0.00108*** | 0.00197*** | 0.252*** | 0.0224*** | 7511 | 0.293 |
| Germany | 0.00304*** | -0.00131*** | 0.00083*** | 0.207*** | 0.0246*** | 5632 | 0.294 |
| India | 0.00433*** | -0.00217*** | 0.00139*** | 0.191*** | 0.0443*** | 11571 | 0.27 |
| Indonesia | -0.00034 | -0.0014*** | 0.00003 | 0.247*** | 0.0385*** | 6090 | 0.255 |
| Malaysia | 0.00259*** | -0.00208*** | 0.00075*** | 0.363*** | 0.0284*** | 5481 | 0.375 |
| Mexico | 0.000438 | -0.00054*** | 0.00099*** | 0.270*** | 0.0176*** | 5835 | 0.279 |
| Netherlands | 0.00477*** | -0.00087*** | 0.00108*** | 0.239*** | 0.0192*** | 2899 | 0.435 |
| New Zealand | 0.00223*** | -0.00072*** | 0.00299*** | 0.143*** | 0.0170*** | 2639 | 0.384 |
| Norway | 0.00243** | -0.00135*** | 0.00098** | 0.281*** | 0.0268*** | 2191 | 0.578 |
| Peru | -0.00271** | -0.000626 | 0.00341*** | 0.325*** | 0.0156*** | 1657 | 0.644 |
| Philippines | 0.000308 | -0.00166*** | -0.00022 | 0.212*** | 0.0314*** | 3248 | 0.347 |
| Portugal | 0.00329** | -0.00028 | 0.00110* | 0.608*** | 0.0097*** | 1624 | 0.648 |
| Singapore | 0.00210*** | -0.00092*** | 0.00036*** | 0.284*** | 0.0162*** | 4060 | 0.328 |
| Spain | 0.00592*** | -0.00127*** | 0.00122*** | 0.328*** | 0.0222*** | 6184 | 0.398 |
| Sweden | 0.00473*** | -0.00251*** | 0.00004 | 0.301*** | 0.0392*** | 4399 | 0.455 |
| Switzerland | 0.00287*** | -0.00083*** | 0.00232*** | 0.316*** | 0.0189*** | 3248 | 0.526 |
| Turkey | 0.00172*** | -0.00119*** | 0.00096*** | 0.178*** | 0.0250*** | 5379 | 0.319 |
| UK | 0.00372*** | -0.00077*** | 0.00109*** | 0.300*** | 0.0174*** | 15324 | 0.235 |
| USA | 0.00391*** | -0.00067*** | -0.00051*** | 0.234*** | 0.0169*** | 16802 | 0.159 |

This table reports the estimation results for the effect of Abnormal Search Volume Index (ASVI) on stock return volatility measured by standard deviation of stock returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's standard deviation (St_dev(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

These findings support the argument that increased investor attention allows more information to be processed as argued in Goddard et al. (2015) and Andrei and Hasler (2015). As investors increase their attention, they obtain more information about a stock. More information results in more price movements and therefore we observe a contemporaneous increase in volatility. The findings are consistent with the findings of Hsu and Chen (2017) and Fan et al. (2017)

Examination of one-week lagged relationship between investor attention and stock return volatility, on the other hand, reveals different results. Hypothesis 4 of this study expects one-week lagged abnormal search volume index ($ASVI_{t-1}$) to predict lower stock return volatility as more attention reduces uncertainty. Table 4.12 shows that the results are not consistent with this study's expectations. Investor attention negatively predicts return volatility in only four countries. Therefore, it can be concluded that the results do not support hypothesis 4.

Hypotheses 7 and 8 of this study expect cultural differences in the relationship between investor attention and stock return volatility. To test these hypotheses, subsample analysis is conducted as done in earlier subsections. Estimation results of the contemporaneous relationship between investor attention and volatility is presented in Table 4.13, while estimation results of the relationship between one-week lagged investor attention and volatility can be found in Table 4.14.

As expected in hypothesis 7, positive contemporaneous relationship between investor attention and volatility is stronger in individualist countries. The coefficient of ASVI of individualist countries is 1.5 times more than the coefficient of ASVI of collectivist countries. As shown in section 4.2, an increase in investor attention causes more trading in individualist countries, which, in turn, creates extra volatility. However, this study cannot confirm the hypothesis 8, which expects one-week lagged abnormal investor attention to reduce volatility at a greater magnitude in high uncertainty avoidance countries than it does in low uncertainty avoidance countries as a result of uncertainty reduction role of investor attention. Conversely, Table 4.14 shows that low UAI countries have significant negative coefficient, while high UAI countries do not exhibit a significant relationship between the two variables.

Table 4.12: Estimation Results of the Relationship Between One-Week Lagged Investor Attention and Stock Return Volatility

| | $ASVI_{(t-1)}$ | MV | BM | $St\_dev_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | 0.0024 | 0.0019*** | -0.00409* | 0.157 | -0.004*** | 1218 | 0.839 |
| Australia | 0.0003 | -0.0012*** | 0.00124*** | 0.365*** | 0.0217*** | 3248 | 0.465 |
| Belgium | -0.0011 | -0.0014*** | -0.00135** | 0.428*** | 0.0203*** | 2233 | 0.542 |
| Brazil | 0.0001 | -0.0009*** | 0.00196*** | 0.334*** | 0.0234*** | 9402 | 0.286 |
| Canada | -0.0010*** | -0.0019*** | 0.00267*** | 0.460*** | 0.0275*** | 9379 | 0.457 |
| Chile | 0.0002 | -0.0006*** | 0.00233*** | 0.341*** | 0.0178*** | 4466 | 0.38 |
| Denmark | -0.0022** | 0.0004** | -0.000152 | 0.269*** | 0.0057*** | 2639 | 0.369 |
| Finland | -0.0003 | -0.0013*** | 0.00203*** | 0.282*** | 0.0247*** | 3654 | 0.37 |
| France | 0.0004 | -0.0010*** | 0.00191*** | 0.258*** | 0.0220*** | 7511 | 0.281 |
| Germany | -0.0002 | -0.0013*** | 0.00084*** | 0.204*** | 0.0248*** | 5632 | 0.289 |
| India | -0.0002 | -0.0022*** | 0.00133*** | 0.201*** | 0.0446*** | 11571 | 0.254 |
| Indonesia | -0.0005 | -0.0014*** | 0.0000275 | 0.246*** | 0.0388*** | 6090 | 0.258 |
| Malaysia | -0.0002 | -0.0021*** | 0.000725*** | 0.368*** | 0.0284*** | 5481 | 0.37 |
| Mexico | 0.0012** | -0.0005*** | 0.00107*** | 0.269*** | 0.0177*** | 5835 | 0.279 |
| Netherlands | -0.0005 | -0.0010*** | 0.00111*** | 0.254*** | 0.0204*** | 2899 | 0.399 |
| New Zealand | 0.0003 | -0.0007*** | 0.00310*** | 0.143*** | 0.0171*** | 2639 | 0.386 |
| Norway | -0.0005 | -0.0013*** | 0.00135*** | 0.270*** | 0.0263*** | 2191 | 0.569 |
| Peru | -0.0031 | -0.0007 | 0.00401*** | 0.228** | 0.0176*** | 1657 | 0.652 |
| Philippines | -0.0001 | -0.0019*** | -0.000254 | 0.225*** | 0.0336*** | 3248 | 0.339 |
| Portugal | -0.0004 | -0.0007** | 0.000579 | 0.608*** | 0.0125*** | 1624 | 0.651 |
| Singapore | 0.0004 | -0.00098*** | 0.000396*** | 0.270*** | 0.0170*** | 4060 | 0.317 |
| Spain | 0.0004 | -0.0013*** | 0.00115*** | 0.348*** | 0.0225*** | 6184 | 0.37 |
| Sweden | -0.0015** | -0.0026*** | 0.00000624 | 0.311*** | 0.0399*** | 4399 | 0.443 |
| Switzerland | -0.0007 | -0.0008*** | 0.00240*** | 0.311*** | 0.0192*** | 3248 | 0.518 |
| Turkey | 0.0000 | -0.0012*** | 0.00101*** | 0.187*** | 0.0253*** | 5379 | 0.311 |
| UK | -0.0004 | -0.0008*** | 0.00109*** | 0.308*** | 0.0173*** | 15324 | 0.218 |
| USA | -0.0012*** | -0.0007*** | -0.00046** | 0.243*** | 0.0170*** | 16802 | 0.147 |

This table reports the estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on stock volatility measured by standard deviation of stock returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's standard deviation (St_dev(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table 4.13: Estimation Results of the Contemporaneous Relationship Between Investor Attention and Stock Return Volatility (Subsample Analysis)

| | ASVI | MV | BM | $St\_dev_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Region | | | | | | | |
| Americas | 0.00296*** | -0.000818*** | 0.00126*** | 0.374*** | 0.0196*** | 48759 | 0.233 |
| Asia-Pacific | 0.00237*** | 0.000401*** | 0.00010*** | 0.353*** | 0.0047*** | 36337 | 0.203 |
| Europe | 0.00455*** | -0.000817*** | 0.00109*** | 0.297*** | 0.0189*** | 62917 | 0.196 |
| Americas_excl_USA | 0.00235*** | -0.000745*** | 0.00173*** | 0.424*** | 0.0183*** | 31957 | 0.299 |
| Culture | | | | | | | |
| Collectivist Countries | 0.00265*** | -0.000106*** | 0.000182*** | 0.393*** | 0.0111*** | 66215 | 0.192 |
| Individualist Countries | 0.00406*** | -0.000625*** | 0.000696*** | 0.323*** | 0.0162*** | 81798 | 0.177 |
| Individualist_excl_USA | 0.00402*** | -0.000599*** | 0.00128*** | 0.339*** | 0.0159*** | 64996 | 0.209 |
| Low UAI Countries | 0.00345*** | 0.000137*** | 0.000199*** | 0.360*** | 0.0079*** | 96872 | 0.169 |
| Low UAI_excl_USA | 0.00333*** | 0.000167*** | 0.000230*** | 0.387*** | 0.0072*** | 80070 | 0.195 |
| High UAI Countries | 0.00341*** | -0.000704*** | 0.00128*** | 0.355*** | 0.0182*** | 51141 | 0.226 |
| Market Development | | | | | | | |
| Developing Countries | 0.00216*** | -0.000186*** | 0.000167*** | 0.379*** | 0.0126*** | 54347 | 0.185 |
| Developed Countries | 0.00417*** | -0.000659*** | 0.000640*** | 0.331*** | 0.0163*** | 93666 | 0.182 |
| Developed_excl_USA | 0.00418*** | -0.000660*** | 0.00114*** | 0.347*** | 0.0162*** | 76864 | 0.211 |

I divide the total sample based on geographical location, market development and national culture. I use MSCI market classification to assess the market development and Hofstede's culture dimensions to assess the national culture. This table reports the estimation results for the effect of Abnormal Search Volume Index (ASVI(t)) on volatility measured by standard deviation of returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's standard deviation (St_dev(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table 4.14: Estimation Results of the Relationship Between One-Week Lagged Investor Attention and Stock Return Volatility (Subsample Analysis)

| | $ASVI_{(t-1)}$ | MV | BM | $St\_dev_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Region | | | | | | | |
| Americas | -0.000625** | -0.000799*** | 0.00125*** | 0.377*** | 0.0193*** | 48759 | 0.228 |
| Asia-Pacific | -0.000387* | 0.000392*** | 9.75e-05*** | 0.356*** | 0.0048*** | 36337 | 0.199 |
| Europe | -0.000566*** | -0.000805*** | 0.00106*** | 0.307*** | 0.0186*** | 62917 | 0.178 |
| Americas_excl_USA | -0.000205 | -0.000732*** | 0.00173*** | 0.426*** | 0.0182*** | 31957 | 0.295 |
| Culture | | | | | | | |
| Collectivist Countries | -0.000388* | -0.000114*** | 0.000178*** | 0.396*** | 0.0111*** | 66215 | 0.189 |
| Individualist Countries | -0.000821*** | -0.000607*** | 0.000686*** | 0.331*** | 0.0160*** | 81798 | 0.162 |
| Individualist_excl_USA | -0.000723*** | -0.000586*** | 0.00126*** | 0.347*** | 0.0157*** | 64996 | 0.194 |
| Low UAI Countries | -0.000834*** | 0.000128*** | 0.000194*** | 0.365*** | 0.0079*** | 96872 | 0.16 |
| Low UAI_excl_USA | -0.000743*** | 0.000156*** | 0.000224*** | 0.392*** | 0.0072*** | 80070 | 0.186 |
| High UAI Countries | -0.0000881 | -0.000697*** | 0.00126*** | 0.359*** | 0.0180*** | 51141 | 0.218 |
| Market Development | | | | | | | |
| Developing Countries | -0.000426* | -0.000194*** | 0.000164*** | 0.381*** | 0.0127*** | 54347 | 0.184 |
| Developed Countries | -0.000723*** | -0.000645*** | 0.000631*** | 0.340*** | 0.0161*** | 93666 | 0.167 |
| Developed_excl_USA | -0.000626*** | -0.000649*** | 0.00112*** | 0.355*** | 0.0160*** | 76864 | 0.195 |

I divide the total sample based on geographical location, market development and national culture. I use MSCI market classification to assess the market development and Hofstede's culture dimensions to assess the national culture. This table reports the estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on volatility measured by standard deviation of returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's standard deviation (St_dev(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

### 4.3.2. Robustness Tests

For robustness purposes, I use another volatility measure, intraday price range, which is calculated by averaging the differences between daily intraday high and intraday low values. Table 4.15 shows the estimation results of the contemporaneous relationship between investor attention and intraday price range, the second volatility measure. Twenty countries have significant positive coefficients and one country, Peru, has significant negative coefficient, which shows that the results are mostly robust to using different volatility measure. Two countries, New Zealand and Portugal, lose their significant coefficients when volatility is measured with intraday price range. Chile, on the other hand, demonstrates a significantly positive relationship between investor attention and volatility, measured by intraday price range. Other countries show same results with two different volatility measures.

Subsample analysis with intraday price range also reveal similar results to the main model. As estimation results reported in Table 4.16 shows, every subsample demonstrates significantly positive relationship between investor attention and intraday price range. ASVI coefficient of individualist countries is 1.3 times more than the ASVI coefficient of collectivist countries. Though the difference is smaller, this finding shows that the more pronounced effect of investor attention on volatility in individualist countries is robust to using different volatility measure. Additionally, Table 4.16 shows that the effect of investor attention on volatility is stronger in developed countries than developing countries. ASVI coefficient of developed countries is 1.9 times more than the ASVI coefficient of developing countries, confirming the findings of the main model.

Table 4.15: Estimation Results of the Contemporaneous Relationship Between Investor Attention and Stock Return Volatility (Measured by Intraday Price Range)

| | ASVI | MV | BM | $P\_Range_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | 0.0057 | -0.00219* | -0.00113 | 0.227** | 0.0509*** | 1218 | 0.846 |
| Australia | 0.00116*** | -0.00121*** | 0.000572*** | 0.570*** | 0.0198*** | 3248 | 0.676 |
| Belgium | 0.00353*** | -0.00103*** | -0.000739** | 0.748*** | 0.0140*** | 2233 | 0.774 |
| Brazil | 0.00230*** | -0.00117*** | 0.00109*** | 0.637*** | 0.0241*** | 9351 | 0.571 |
| Canada | 0.00195*** | -0.00129*** | 0.00162*** | 0.742*** | 0.0191*** | 9374 | 0.726 |
| Chile | 0.00121* | 0.000425*** | 0.00303*** | 0.563*** | 0.00414** | 4458 | 0.514 |
| Denmark | 0.00315*** | 0.00012 | -0.000249* | 0.533*** | 0.0078*** | 2639 | 0.514 |
| Finland | 0.00244*** | -0.00110*** | 0.00115*** | 0.669*** | 0.0181*** | 3654 | 0.632 |
| France | 0.00181*** | -0.00083*** | 0.00176*** | 0.630*** | 0.0170*** | 7511 | 0.591 |
| Germany | 0.00313*** | -0.00074*** | 0.00144*** | 0.559*** | 0.0170*** | 5632 | 0.506 |
| India | 0.00346*** | -0.00271*** | 0.00119*** | 0.466*** | 0.0529*** | 11571 | 0.535 |
| Indonesia | -0.000277 | -0.00190*** | 0.0000204 | 0.508*** | 0.0475*** | 5908 | 0.464 |
| Malaysia | 0.00171*** | -0.00188*** | 0.000580*** | 0.578*** | 0.0272*** | 5477 | 0.535 |
| Mexico | 0.000612 | -0.00138*** | 0.00158*** | 0.472*** | 0.0312*** | 5743 | 0.478 |
| Netherlands | 0.00274*** | -0.00060*** | 0.000722*** | 0.606*** | 0.0138*** | 2899 | 0.624 |
| New Zealand | 0.000637 | 0.000210* | 0.00257*** | 0.335*** | 0.0097*** | 2639 | 0.455 |
| Norway | 0.00118* | -0.00134*** | 0.00106*** | 0.538*** | 0.0256*** | 2191 | 0.736 |
| Peru | -0.00348* | 0.0000303 | 0.00239** | 0.524*** | 0.0058** | 1657 | 0.659 |
| Philippines | 0.000492 | -0.00257*** | -0.000204 | 0.409*** | 0.0443*** | 3248 | 0.446 |
| Portugal | 0.00147 | -0.000491* | 0.00125** | 0.852*** | 0.00857*** | 1622 | 0.803 |
| Singapore | 0.00115*** | -0.00082*** | 0.000327*** | 0.583*** | 0.0144*** | 4060 | 0.51 |
| Spain | 0.00481*** | -0.00102*** | 0.000918*** | 0.685*** | 0.0171*** | 6184 | 0.676 |
| Sweden | 0.00292*** | -0.00208*** | -0.000129 | 0.618*** | 0.0317*** | 4399 | 0.705 |
| Switzerland | 0.00197*** | -0.00051*** | 0.00138*** | 0.733*** | 0.0115*** | 3248 | 0.793 |
| Turkey | 0.00170*** | -0.00169*** | 0.000602*** | 0.557*** | 0.0271*** | 5379 | 0.608 |
| UK | 0.00228*** | -0.00059*** | 0.000845*** | 0.623*** | 0.0143*** | 15324 | 0.485 |
| USA | 0.00220*** | -0.00056*** | -0.00044*** | 0.636*** | 0.0126*** | 16802 | 0.49 |

This table reports the estimation results for the effect of Abnormal Search Volume Index (ASVI) on stock volatility measured by intraday price range. Market Value (MV), Book to Market Ratio (BM), and preceding week's intraday price range (P_Range(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table 4.16: Estimation Results of the Contemporaneous Relationship Between Investor Attention and Stock Return Volatility (Measured by Intraday Price Range) (Subsample Analysis)

| | ASVI | MV | BM | P_Range(t-1) | Cons. | Obs. | R2 |
|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | |
| Americas | 0.00195*** | -0.000447*** | 0.000801*** | 0.728*** | 0.0121*** | 48603 | 0.586 |
| Asia-Pacific | 0.00161*** | 0.000399*** | 8.75e-05*** | 0.673*** | 0.00284*** | 36151 | 0.516 |
| Europe | 0.00327*** | -0.000813*** | 0.000858*** | 0.631*** | 0.0165*** | 62915 | 0.514 |
| Americas_excl_USA | 0.00165*** | -0.000436*** | 0.000885*** | 0.738*** | 0.0120*** | 31801 | 0.603 |
| **Culture** | | | | | | | |
| Collectivist Countries | 0.00197*** | -7.83e-05** | 0.000108*** | 0.703*** | 0.00865*** | 65876 | 0.512 |
| Individualist Countries | 0.00264*** | -0.000462*** | 0.000414*** | 0.675*** | 0.0116*** | 81793 | 0.51 |
| Individualist_excl_USA | 0.00275*** | -0.000453*** | 0.000859*** | 0.670*** | 0.0118*** | 64991 | 0.523 |
| Low UAI Countries | 0.00224*** | 0.000156*** | 0.000138*** | 0.698*** | 0.00509*** | 96681 | 0.509 |
| Low UAI_excl_USA | 0.00225*** | 0.000182*** | 0.000161*** | 0.702*** | 0.00473*** | 79879 | 0.519 |
| High UAI Countries | 0.00269*** | -0.000436*** | 0.000782*** | 0.704*** | 0.0123*** | 50988 | 0.554 |
| **Market Development** | | | | | | | |
| Developing Countries | 0.00152*** | -0.000166*** | 9.27e-05*** | 0.689*** | 0.0104*** | 54010 | 0.496 |
| Developed Countries | 0.00282*** | -0.000504*** | 0.000397*** | 0.682*** | 0.0118*** | 93659 | 0.522 |
| Developed_excl_USA | 0.00297*** | -0.000515*** | 0.000775*** | 0.679*** | 0.0121*** | 76857 | 0.534 |

I divide the total sample based on geographical location, market development and national culture. I use MSCI market classification to assess the market development and Hofstede's culture dimensions to assess the national culture. This table reports the estimation results for the effect of Abnormal Search Volume Index (ASVI(t) on volatility measured by intraday price range. Market Value (MV), Book to Market Ratio (BM), and preceding week's intraday price range average (P_range(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

The same things cannot be said about the relationship between one-week lagged investor attention and intraday price range. The estimation results are shown in Table 4.17. Ten countries have significant negative coefficients in the robustness test, whereas this number was only four in the main model. All countries that have significant negative coefficients in the main model continue to exhibit significant negative relationship between one-week lagged investor attention and volatility. Moreover, six additional countries start to have significantly negative one-week lagged investor attention coefficients. Mexico, who demonstrates a positive relationship between one-week lagged investor attention and standard deviation of returns, loses its significant coefficient when volatility is measured with intraday price range.

Subsample analysis for the relationship between one-week lagged investor attention and intraday price ranges is somewhat similar to the main model. The estimation results are reported in Table 4.18. Unlike main model, $ASVI_{t-1}$ coefficient of high UAI countries is significantly negative. Nevertheless, Hypothesis 8, cannot still be supported by these results since $ASVI_{t-1}$ coefficient of low UAI countries is higher than the $ASVI_{t-1}$ coefficient of high UAI countries.

Another robustness check is conducted using different regression techniques as done in previous sections. Table 4.19 and Table 4.20 summarize the results from these regressions. Estimates can be found in Appendix 4.3 and Appendix 5.3.

As Table 4.19 shows, the results of the contemporaneous relationships are robust to using different regression techniques. Table 4.20 shows that results differ across different regression models though Fama-Macbeth regressions and fixed effect regressions with robust standard errors give somewhat similar results. Coefficients of Mexico, USA, individualist countries, and developed countries are significant in the same direction for all of the three techniques.

Table 4.17: Estimation Results of the One-Week Lagged Relationship Between Investor Attention and Stock Return Volatility (Measured by Intraday Price Range)

| | $ASVI_{(t-1)}$ | MV | BM | $P\_Range_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | 0.00181 | -0.00276*** | -0.000535 | 0.262** | 0.0580*** | 1218 | 0.838 |
| Australia | -0.000014 | -0.00122*** | 0.000546*** | 0.582*** | 0.0198*** | 3248 | 0.669 |
| Belgium | -0.0016** | -0.00089*** | -0.000497 | 0.769*** | 0.0127*** | 2233 | 0.769 |
| Brazil | -0.00045 | -0.00115*** | 0.00116*** | 0.635*** | 0.0240*** | 9351 | 0.569 |
| Canada | -0.0013*** | -0.00124*** | 0.00163*** | 0.747*** | 0.0185*** | 9374 | 0.723 |
| Chile | -0.000384 | 0.000463*** | 0.00314*** | 0.561*** | 0.0037** | 4458 | 0.509 |
| Denmark | -0.0022*** | 0.000199 | -0.000288* | 0.554*** | 0.0067*** | 2639 | 0.507 |
| Finland | -0.0012** | -0.00115*** | 0.00116*** | 0.660*** | 0.0188*** | 3654 | 0.63 |
| France | -0.000191 | -0.00081*** | 0.00169*** | 0.636*** | 0.0166*** | 7511 | 0.587 |
| Germany | -0.0014** | -0.00077*** | 0.00146*** | 0.563*** | 0.0174*** | 5632 | 0.499 |
| India | -0.0011*** | -0.00267*** | 0.00111*** | 0.482*** | 0.0520*** | 11571 | 0.527 |
| Indonesia | -0.000122 | -0.00191*** | 0.0000205 | 0.508*** | 0.0478*** | 5908 | 0.462 |
| Malaysia | -0.000464 | -0.00183*** | 0.000579*** | 0.582*** | 0.0265*** | 5477 | 0.53 |
| Mexico | 0.000786 | -0.00139*** | 0.00165*** | 0.474*** | 0.0316*** | 5743 | 0.476 |
| Netherlands | -0.0013** | -0.00060*** | 0.000674*** | 0.651*** | 0.0129*** | 2899 | 0.604 |
| New Zealand | 0.000151 | 0.000256** | 0.00223*** | 0.366*** | 0.0087*** | 2639 | 0.456 |
| Norway | -0.000505 | -0.00141*** | 0.00113*** | 0.493*** | 0.0273*** | 2191 | 0.735 |
| Peru | -0.00101 | -0.000302 | 0.00287*** | 0.410*** | 0.0101*** | 1657 | 0.655 |
| Philippines | -0.000834 | -0.00275*** | -0.000266 | 0.404*** | 0.0465*** | 3248 | 0.444 |
| Portugal | -0.00134 | -0.000559* | 0.000556 | 0.844*** | 0.0092*** | 1622 | 0.807 |
| Singapore | 0.000146 | -0.00087*** | 0.000336*** | 0.583*** | 0.0148*** | 4060 | 0.504 |
| Spain | -0.00067 | -0.00101*** | 0.000797*** | 0.716*** | 0.0165*** | 6184 | 0.661 |
| Sweden | -0.0026*** | -0.00197*** | -0.0000083 | 0.639*** | 0.0301*** | 4399 | 0.701 |
| Switzerland | -0.0009** | -0.00053*** | 0.00130*** | 0.739*** | 0.0114*** | 3248 | 0.79 |
| Turkey | -0.000769 | -0.00167*** | 0.000649*** | 0.572*** | 0.0266*** | 5379 | 0.603 |
| UK | -0.000206 | -0.00058*** | 0.000829*** | 0.631*** | 0.0142*** | 15324 | 0.479 |
| USA | -0.0015*** | -0.00053*** | -0.00041*** | 0.639*** | 0.0124*** | 16802 | 0.485 |

This table reports the estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on stock volatility measured by intraday price range. Market Value (MV), Book to Market Ratio (BM), and preceding week's intraday price range (P_Range(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.

Table 4.18: Estimation Results of the Relationship Between One-Week Lagged Investor Attention and Stock Return Volatility (Measured by Intraday Price Range) (Subsample Analysis)

| | $ASVI_{(t-1)}$ | MV | BM | $P\_Range_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | |
| Americas | -0.000750*** | -0.000432*** | 0.000789*** | 0.731*** | 0.0119*** | 48603 | 0.585 |
| Asia_Pacific | -0.000732*** | 0.000393*** | 7.95e-05*** | 0.676*** | 0.00284*** | 36151 | 0.515 |
| Europe | -0.000947*** | -0.000794*** | 0.000829*** | 0.640*** | 0.0161*** | 62915 | 0.506 |
| Americas_excl_USA | -0.000351 | -0.000422*** | 0.000881*** | 0.740*** | 0.0118*** | 31801 | 0.602 |
| **Culture** | | | | | | | |
| Collectivist Countries | -0.000687*** | -8.53e-05*** | 0.000103*** | 0.706*** | 0.00869*** | 65876 | 0.51 |
| Individualist Countries | -0.00115*** | -0.000444*** | 0.000411*** | 0.681*** | 0.0113*** | 81793 | 0.505 |
| Individualist_excl_USA | -0.00101*** | -0.000439*** | 0.000839*** | 0.677*** | 0.0115*** | 64991 | 0.517 |
| Low UAI Countries, | -0.00111*** | 0.000150*** | 0.000130*** | 0.702*** | 0.00506*** | 96681 | 0.506 |
| Lowuai_excl_USA | -0.000992*** | 0.000174*** | 0.000151*** | 0.706*** | 0.00473*** | 79879 | 0.516 |
| High UAI Countries | -0.000684*** | -0.000429*** | 0.000757*** | 0.708*** | 0.0121*** | 50988 | 0.551 |
| **Market Development** | | | | | | | |
| Developing Countries | -0.000618*** | -0.000172*** | 8.71e-05*** | 0.691*** | 0.0104*** | 54010 | 0.496 |
| Developed Countries | -0.00113*** | -0.000488*** | 0.000394*** | 0.690*** | 0.0115*** | 93659 | 0.516 |
| Developed_excl_USA | -0.00101*** | -0.000501*** | 0.000752*** | 0.688*** | 0.0118*** | 76857 | 0.528 |

I divide the total sample based on geographical location, market development and national culture. I use MSCI market classification to assess the market development and Hofstede's culture dimensions to assess the national culture. This table reports the estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1) on volatility measured by intraday price range. Market Value (MV), Book to Market Ratio (BM), and preceding week's intraday price range average (P_range(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. Fama-Macbeth regressions are used and standard errors are calculated by using the Newey-West (1987) formula with 8 lags. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table 4.19: Summary of Results - Contemporaneous Relationship Between Investor Attention and Stock Return Volatility

| | **Fama-Macbeth** | **Fixed Effect** | **Fixed Effect, Robust** |
|---|---|---|---|
| **Individual Countries** | | | |
| Positive Relationship | 21 countries | 26 countries | 24 countries |
| Negative Relationship | 1 country | - | - |
| **Region** | | | |
| Positive Relationship | Americas, Asia-Pacific, Europe | Americas, Asia-Pacific, Europe | Americas, Asia-Pacific, Europe |
| Negative Relationship | - | - | - |
| **Culture** | | | |
| Positive Relationship | Collectivist, Individualist, Low UAI, High UAI | Collectivist, Individualist, Low UAI, High UAI | Collectivist, Individualist, Low UAI, High UAI |
| Negative Relationship | - | - | - |
| **Market Development** | | | |
| Positive Relationship | Developing, Developed | Developing, Developed | Developing, Developed |
| Negative Relationship | - | - | - |

Table 4.20: Summary of Results – One-week Lagged Investor Attention and Stock Return Volatility

| | **Fama-Macbeth** | **Fixed Effect** | **Fixed Effect, Robust** |
|---|---|---|---|
| **Individual Countries** | | | |
| Positive Relationship | Mexico | Brazil, Mexico, Norway, | Mexico |
| Negative Relationship | Canada, Denmark, Sweden, USA | Argentina, Canada, France, Germany, Portugal, Turkey, USA | Argentina, Denmark, France, Germany, Portugal, Turkey, USA |
| **Region** | | | |
| Positive Relationship | - | - | - |
| Negative Relationship | Americas, Asia-Pacific, Europe | - | Asia-Pacific, Europe |
| **Culture** | | | |
| Positive Relationship | - | - | - |
| Negative Relationship | Collectivist, Individualist, Low UAI | Individualist | Individualist |
| **Market Development** | | | |
| Positive Relationship | - | - | - |
| Negative Relationship | Developing, Developed | Developed | Developed |

Overall, the results mostly confirm the hypothesis 3 which expects a positive contemporaneous relationship between ASVI and volatility. Twenty-one countries out of twenty-seven have expected results, while only one country, Peru, has the negative contemporaneous relationship as can be seen in Table 4.11. The results are robust to different volatility measure and different regression techniques and confirm the findings of Hsu and Chen (2017), Fan et al. (2017), and Goddard et al. (2015) at international level. Nevertheless, this study obtains mixed results on hypothesis 4, which expects investor attention to negatively predict return volatility. While investor attention does not have a predictive power on standard deviation of returns in twenty-two countries, it has on weekly average of intraday price range in ten countries. Moreover, in other regression models used in the study, seven countries exhibit negative relationship between one-week lagged investor attention and volatility. Therefore, this study cannot robustly confirm the hypothesis 4.

Cultural examination also partly meets this study's expectations. Hypothesis 7, which expects stronger positive contemporaneous relationship between ASVI and stock return volatility in individualist countries, is confirmed while Hypothesis 8, which expects $ASVI_{t-1}$ to reduce volatility at a greater magnitude in high uncertainty avoidance countries than it does in low uncertainty avoidance countries cannot be accepted.

# 5. CONCLUSION AND SUGGESTIONS FOR FURTHER RESEARCH

Investor attention, as being a scarce resource, has important asset pricing implications. To date, studies that investigate the role of investor attention on stock market are focused on the USA, (Barber and Odean, 2008; Hirshleifer et al., 2009; Da et al., 2011; Ding and Hou, 2015), China, (Zhang et al., 2013; Ying et al., 2015; Zhang and Wang, 2015), Japan (Adachi et al., 2017), and France (Aouadi et al., (2013). Moreover, existing international studies examine the investor attention at index level (Vozlyublennaia, 2014; Tantaopas et al., 2016; Chen, 2017). This study extends the investor attention literature by examining the cross-section of individual stocks in twenty-seven countries, for the period March 2014 to January 2018. The pairwise relationships of investor attention - abnormal stock returns, investor attention – stock liquidity, and investor attention – stock return volatility are the main focus of this study. Additionally, by dividing the whole sample into subsamples, this study attempts to find whether investor attention's impact on stock return, stock liquidity, and stock return volatility differs according to geographic region, national culture, and market development. Cultural examination is done by using two of Hofstede's (1980) national culture dimensions: Individualism vs collectivism index and uncertainty avoidance index (UAI). Morgan Stanley Capital Investment's (MSCI) market classification is used to divide the sample based on market development.

This study measures investor attention by internet search popularity data obtained from Google Trends. Company names are used as search keywords and predictive Fama-Macbeth regressions are used to examine the impact of investor attention on abnormal stock return, stock liquidity, and stock return volatility. Additionally, fixed effects regressions and fixed effects regressions with robust standard errors are used for robustness purposes. Abnormal returns refer to the market risk adjusted returns. Stock liquidity is measured with abnormal trading volume and Amihud (2002) illiquidity ratio. Standard deviation of returns and weekly averages of intraday price ranges are used to measure stock return volatility.

Table 5.1 summarizes the hypotheses and the results of this study. The results suggest that the positive price pressure of investor attention and hypothesis 1 of this study, which expects one-week lagged investor attention to positively predict

abnormal returns are not valid for most of the countries, i.e. only six out of twenty-seven countries have statistically significant results. Of those six, four countries have significant positive one-week lagged abnormal search volume index ($ASVI_{t-1}$) coefficients. These results mostly do not support hypothesis 1 and contradict with earlier evidence that find a positive relationship between investor attention and stock returns (Da et al., 2011, Zhang et al., 2013, Adachi et al., 2017). For robustness purposes, I employ abnormal trading volume as another investor attention proxy and do the same analysis. Though the countries that have significant coefficients are different from the main model, robustness test also showed that the predictive power of abnormal search volume index on abnormal returns are not internationally valid; 22 countries had insignificant results. Nevertheless, this study obtains mixed results in cultural examination. When investor attention is measured with ASVI, the relationship between one-week lagged abnormal investor attention and abnormal stock returns is significantly negative for high uncertainty avoidance countries while it is significantly positive for low uncertainty avoidance countries. However, when investor attention is measured by using abnormal search volume index, both groups of countries have statistically significant positive coefficients. Vlastakis and Markellos (2012) argue that Google search volume index captures investors' information demand and this difference may be related to that. Baur and Dimpfl (2016) suggest that investors search more news about gold when gold realizes negative returns. Vlastakis and Markellos (2012) state that investors' information demand increases as with their level of risk aversion. Similarly, investors in high UAI countries may choose to increase their information demand more than investors in low UAI countries when there is negative sentiment in the markets and this may be the reason of negative $ASVI_{t-1}$ coefficient. To limit the scope of the study, this hypothesis is not investigated in this study. Future studies may investigate this possibility.

Additional tests show that the results are robust to using different regression techniques. Four countries have significantly positive $ASVI_{t-1}$ coefficients when fixed effects regressions are used; and three countries have significantly positive relation $ASVI_{t-1}$ coefficients when fixed effects regressions with robust standard errors are used. Germany and Spain have significantly negative $ASVI_{t-1}$ coefficients in all three of the regression models used in the study.

Table 5.1: Summary of Results

| | **Finding of this study** | **Comparison of the finding with earlier evidence** |
|---|---|---|
| H1: One-week lagged investor attention positively predicts abnormal returns. | Mostly Not Supported | Contradict at International Level |
| H2: There is a positive relationship between one-week lagged investor attention and stock liquidity. | Supported | Confirm at International Level |
| H3: There is a positive contemporaneous relationship between investor attention and stock return volatility. | Supported | Confirm at International Level |
| H4: One-week lagged investor attention negatively predicts stock return volatility. | Mixed Results | Partly Confirm at International Level |
| H5: The impact of one-week lagged investor attention on stock liquidity is more pronounced in individualist countries. | Supported | New Finding[37] |
| H6: The impact of one-week lagged investor attention on stock liquidity is more pronounced in high uncertainty avoidance countries. | Supported | New Finding[37] |
| H7: Positive contemporaneous relationship between investor attention and stock return volatility is stronger in individualist countries. | Supported | New Finding[37] |
| H8: One-week lagged investor attention reduces volatility at a greater magnitude in high uncertainty avoidance countries than it does in low uncertainty avoidance countries. | Not Supported | New Finding[37] |

Moreover, this study shows that investor attention is positively associated with stock liquidity. Twenty out of twenty-seven countries exhibit statistically significant positive results about the relationship between one-week lagged abnormal investor attention and abnormal trading volume. In addition, I employ another liquidity measure, namely Amihud (2002) illiquidity ratio and find that the stock illiquidity is decreased with more attention in only 6 countries. As Ding and Hou (2015) argue, individual investors are most likely to have low trading volumes and therefore, investor attention's effect is diminished when Amihud (2002) illiquidity ratio is used,

[37] To the best of my knowledge, there are no prior studies that investigate whether the impact of investor attention on stock market differs with different national cultural dimensions.

which captures the price impact of the liquidity. The results are robust to using different regression techniques, such as fixed effects regression, and fixed effect regression with robust standard errors. The findings of this study support the hypothesis 2, which expects a positive relationship between investor attention and stock liquidity. The results also confirm the earlier evidence (Ding and Hou, 2015, Fan et al., 2017, Aouadi et al., 2013, and Adachi et al., 2017) at international level. Furthermore, this study finds that investor attention's effect on stock liquidity is stronger in individualist countries and high uncertainty avoidance countries. One percent increase in investor attention creates slightly more trading volume in individualist and high uncertainty avoidance countries than collectivist and low uncertainty avoidance countries. Individualist countries are associated with overconfidence bias, which leads to higher trading volumes (Chui et al., 2010). It appears that investors that are inclined to trade more give larger trading response to increases in investor attention. Additionally, slightly more trading volume response observed in high uncertainty avoidance countries point out to uncertainty reduction role of investor attention as mentioned in Ding and Hou (2005). The findings imply that investors trade more after the uncertainty is reduced with more attention, proportionally with their uncertainty avoidance.

Finally, this study finds that there is a positive contemporaneous relationship between investor attention and stock return volatility. Twenty-one countries show statistically significant positive contemporaneous relationship between investor attention and stock return volatility, measured by standard deviation of returns. Concerning the earlier models and findings of Goddard et al. (2015), Andrei and Hasler (2015), Hsu and Chen (2017) and Fan et al. (2017), this study attributes this positive relationship to the increases in processed information resulting from increases in investor attention. Additionally, positive contemporaneous relationship between investor attention and stock return volatility is stronger in individualist countries as expected in hypothesis 7. Stock return volatility increases 1.5 times more in individualist countries than collectivist countries in response to one percent increase in investor attention. This may be related to the excess trading volume that is found in individualist countries (Chui et al., 2010). More attention results in more trading, and more trading creates more volatility.

Nevertheless, this study obtains mixed results on hypothesis 4, which expects one-week lagged investor attention to negatively predict stock returns. Different

results with different volatility measures, such as standard deviation of returns and intraday price ranges, are obtained. While $ASVI_{t-1}$ does not significantly predict standard deviation of returns in twenty-two countries out of twenty-seven, it predicts the intraday price range in ten countries. The results are also obtained differently when different regression techniques, such as fixed effects regression, and fixed effect regression with robust standard errors, are used. Canada and USA are the only two countries that exhibit statistically significant negative relationship between one-week lagged investor attention and stock return volatility in all three regression models. Thus, this study cannot conclude that one-week lagged investor attention has predictive power on stock return volatility and hypothesis 4 of this study is neither accepted nor rejected. Furthermore, hypothesis 8, which expects one-week lagged investor attention to reduce volatility at a greater magnitude in high uncertainty avoidance countries than it does in low uncertainty avoidance countries is not supported by the findings of this study. One-week lagged investor attention coefficient of high uncertainty avoidance countries is not statistically significant.

This study uses the stocks listed in representative indices of the largest and the most liquid stocks in each of the 27 countries. Total sample comprises 769 stocks and 156,876 weekly stock level observations. Arguably, investor attention's effect may be more pronounced in small stocks. Therefore, future research may examine the impact of investor attention by using a larger sample which includes small cap and mid cap stocks. On the other hand, it may be hard to obtain search popularity of small cap stocks since Google Trends do not share search volume data if the search popularity of a word is very low. Hence, future research may use another investor attention proxy that captures active attention of investors and which is accessible for small and mid-cap stocks.

As the literature review demonstrates, the number of studies that investigate the attention allocation of investors is very low. To have a better understanding of how investors allocate their limited attention may provide better information dissemination and increase efficiency of the markets. Linking attention allocation and social behavior may also provide essential knowledge to understand better the mechanisms of investment choices and herding behavior, which would help overcoming transmission biases and attention constraints.

**REFERENCES**

Acker, D., & Duck, N. W. (2015). Political risk, investor attention and the Scottish Independence referendum. *Finance Research Letters*, *13*, 163–171. https://doi.org/10.1016/j.frl.2015.01.008

Adachi, Y., Masuda, M., & Takeda, F. (2017). Google search intensity and its relationship to the returns and liquidity of Japanese startup stocks. *Pacific-Basin Finance Journal*, *46*, 243–257. https://doi.org/10.1016/j.pacfin.2017.09.009

Afkhami, M., Cormack, L., & Ghoddusi, H. (2017). Google search keywords that best predict energy price volatility. *Energy Economics*, *67*, 17–27. https://doi.org/10.1016/j.eneco.2017.07.014

Alizadeh, S., Brandt, M. W., & Diebold, F. X. (2002). Range-Based Estimation of Stochastic Volatility Models. *The Journal of Finance*, *57*(3), 1047–1091. https://doi.org/10.1111/1540-6261.00454

Alldredge, D. M., & Cicero, D. C. (2015). Attentive insider trading. *Journal of Financial Economics*, *115*(1), 84–101. https://doi.org/10.1016/j.jfineco.2014.09.005

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

Andersen, T. (2001). The distribution of realized stock return volatility. *Journal of Financial Economics*, *61*(1), 43–76. https://doi.org/10.1016/S0304-405X(01)00055-1

Andrei, D., & Hasler, M. (2015). Investor Attention and Stock Market Volatility. *Review of Financial Studies*, *28*(1), 33–72. https://doi.org/10.1093/rfs/hhu059

Aouadi, A., Arouri, M., & Teulon, F. (2013). Investor attention and stock market activity: Evidence from France. *Economic Modelling*, *35*, 674–681. https://doi.org/10.1016/j.econmod.2013.08.034

Athanasakou, V., & Simpson, A. (2016). Investor attention to rounding as a salient forecast feature. *International Journal of Forecasting*, *32*(4), 1212–1233. https://doi.org/10.1016/j.ijforecast.2016.02.011

Bae, K.-H., & Wang, W. (2012). What's in a "China" Name? A Test of Investor Attention Hypothesis. *Financial Management*, *41*(2), 429–455. https://doi.org/10.1111/j.1755-053X.2012.01197.x

Bali, T. G., Peng, L., Shen, Y., & Tang, Y. (2014). Liquidity Shocks and Stock Market Reactions. *Review of Financial Studies*, *27*(5), 1434–1485. https://doi.org/10.1093/rfs/hht074

Ball, R., & Brown, P. (1968). An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research*, *6*(2), 159. https://doi.org/10.2307/2490232

Barber, B. M., & Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. The quarterly journal of economics, 116(1), 261-292

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. https://doi.org/10.1093/rfs/hhm079

Barber, B. M., De George, E. T., Lehavy, R., & Trueman, B. (2013). The earnings announcement premium around the globe. *Journal of Financial Economics*, *108*(1), 118–138. https://doi.org/10.1016/j.jfineco.2012.10.006

Baur, D. G., & Dimpfl, T. (2016). Googling gold and mining bad news. *Resources Policy*, *50*, 306–311. https://doi.org/10.1016/j.resourpol.2016.10.013

Ben-Rephael, A., Da, Z., & Israelsen, R. D. (2017). It Depends on Where You Search: Institutional Investor Attention and Underreaction to News. *The Review of Financial Studies*, *30*(9), 3009–3047. https://doi.org/10.1093/rfs/hhx031

Birz, G. (2017). Stale economic news, media and the stock market. *Journal of Economic Psychology*, *61*, 87–102. https://doi.org/10.1016/j.joep.2017.03.002

Blau, B. M., & Whitby, R. J. (2017). Range-based volatility, expected stock returns, and the low volatility anomaly. *PLOS ONE*, *12*(11), e0188517. https://doi.org/10.1371/journal.pone.0188517

Borgers, A., Derwall, J., Koedijk, K., & ter Horst, J. (2013). Stakeholder relations and stock returns: On errors in investors' expectations and learning. *Journal of Empirical Finance*, *22*, 159–175. https://doi.org/10.1016/j.jempfin.2013.04.003

Boulland, R., & Dessaint, O. (2017). Announcing the announcement. *Journal of Banking & Finance*, *82*, 59–79. https://doi.org/10.1016/j.jbankfin.2017.05.007

Boulland, R., Degeorge, F., & Ginglinger, E. (2016). News Dissemination and Investor Attention. *Review of Finance*, rfw018. https://doi.org/10.1093/rof/rfw018

Brown, A. (2014). Information Processing Constraints and Asset Mispricing. *The Economic Journal*, *124*(575), 245–268. https://doi.org/10.1111/ecoj.12057

Cao, J., Chordia, T., & Lin, C. (2016). Alliances and Return Predictability. *Journal of Financial and Quantitative Analysis*, *51*(05), 1689–1717. https://doi.org/10.1017/S0022109016000600

Cavusgil, S. T., Knight, G. A., & Riesenberger, J. R. (2008). International business: Strategy, management, and the new realities. Pearson Prentice Hall.

Chapman, K. (2018). Earnings notifications, investor attention, and the earnings announcement premium. *Journal of Accounting and Economics*, *66*(1), 222–243. https://doi.org/10.1016/j.jacceco.2018.05.002

Chen, T. (2017). Investor Attention and Global Stock Returns. Journal of Behavioral Finance, 18(3), 358–372. https://doi.org/10.1080/15427560.2017.1331235

Chen, H.-Y., & Lo, T.-C. (2019). Online search activities and investor attention on financial markets. *Asia Pacific Management Review*, *24*(1), 21–26. https://doi.org/10.1016/j.apmrv.2018.11.001

Chen, Jing, Liu, Y.-J., Lu, L., & Tang, Y. (2016). Investor Attention and Macroeconomic News Announcements: Evidence from Stock Index Futures: Investor Attention and Macroeconomic News Announcements. *Journal of Futures Markets*, *36*(3), 240–266. https://doi.org/10.1002/fut.21727

Chen, Joseph, Hong, H., & Stein, J. C. (2001). Forecasting crashes: trading volume, past returns, and conditional skewness in stock prices$. *Journal of Financial Economics*, 37.

Cheng, L.-Y., Yan, Z., Zhao, Y., & Gao, L.-M. (2015). Investor Inattention and Under-Reaction to Repurchase Announcements. *Journal of Behavioral Finance*, *16*(3), 267–277. https://doi.org/10.1080/15427560.2015.1065264

Chi, S. S., & Shanthikumar, D. M. (2017). Local Bias in Google Search and the Market Response around Earnings Announcements. *The Accounting Review*, *92*(4), 115–143. https://doi.org/10.2308/accr-51632

Chronopoulos, D. K., Papadimitriou, F. I., & Vlastakis, N. (2018). Information demand and stock return predictability. *Journal of International Money and Finance*, *80*, 59–74. https://doi.org/10.1016/j.jimonfin.2017.10.001

Chui, A. C. W., Titman, S., & Wei, K. C. J. (2010). Individualism and Momentum around the World. *The Journal of Finance*, *65*(1), 361–392. https://doi.org/10.1111/j.1540-6261.2009.01532.x

D'Souza, J., Ramesh, K., & Shen, M. (2010). Disclosure of GAAP line items in earnings announcements. *Review of Accounting Studies*, *15*(1), 179–219. https://doi.org/10.1007/s11142-009-9100-0

Da, Z., Engelberg, J., & Gao, P. (2011). In Search of Attention. *The Journal of Finance*, *66*(5), 1461–1499. https://doi.org/10.1111/j.1540-6261.2011.01679.x

Dahlquist, M., & Martinez, J. V. (2015). Investor Inattention: A Hidden Cost of Choice in Pension Plans?: Investor Inattention. *European Financial Management*, *21*(1), 1–19. https://doi.org/10.1111/j.1468-036X.2013.12008.x

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

Degiannakis, S., & Livada, A. (2013). Realized volatility or price range: Evidence from a discrete simulation of the continuous time diffusion process. *Economic Modelling*, *30*, 212–216. https://doi.org/10.1016/j.econmod.2012.09.027

Dellavigna, S., & Pollet, J. M. (2009). Investor Inattention and Friday Earnings Announcements. *The Journal of Finance*, *64*(2), 709–749. https://doi.org/10.1111/j.1540-6261.2009.01447.x

Ding, R., & Hou, W. (2015). Retail investor attention and stock liquidity. *Journal of International Financial Markets, Institutions and Money*, *37*, 12–26. https://doi.org/10.1016/j.intfin.2015.04.001

Docherty, P., & Melia, A. (2015). The race that stops the equity market. *Applied Economics Letters*, *22*(14), 1179–1183. https://doi.org/10.1080/13504851.2015.1023935

Drake, M. S., Gee, K. H., & Thornock, J. R. (2016). March Market Madness: The Impact of Value-Irrelevant Events on the Market Pricing of Earnings News.

*Contemporary Accounting Research*, *33*(1), 172–203. https://doi.org/10.1111/1911-3846.12149

Drake, M. S., Jennings, J., Roulstone D. T., & Thornock, J. R. (2016). The comovement of investor attention. *Management Science*, 63(9), 2847-2867. https://doi.org/10.1287/mnsc.2016.2477

Ehrmann, M., & Jansen, D.-J. (2017). The Pitch Rather Than the Pit: Investor Inattention, Trading Activity, and FIFA World Cup Matches. *Journal of Money, Credit and Banking*, *49*(4), 807–821. https://doi.org/10.1111/jmcb.12398

Eichler, S. (2012). Limited investor attention and the mispricing of American Depositary Receipts. *Economics Letters*, *115*(3), 490–492. https://doi.org/10.1016/j.econlet.2011.12.111

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, *33*(1), 3–56. https://doi.org/10.1016/0304-405X(93)90023-5

Fama, E. F., & MacBeth, J. D. (1973). Risk, Return, and Equilibrium: Empirical Tests. *Journal of Political Economy*, *81*(3), 607–636. https://doi.org/10.1086/260061

Fan, X., Yuan, Y., Zhuang, X., & Jin, X. (2017). Long memory of abnormal investor attention and the cross-correlations between abnormal investor attention and trading volume, volatility respectively. *Physica A: Statistical Mechanics and Its Applications*, *469*, 323–333. https://doi.org/10.1016/j.physa.2016.11.009

Ferretti, R., Cipollini, A., & Pattarin, F. (2016). Can an unglamorous non-event affect prices? The role of newspapers. *Cogent Ec onomics & Finance*, *4*(1), 1142847. https://doi.org/10.1080/23322039.2016.1142847

Gao, L., & Mei, B. (2013). Investor attention and abnormal performance of timberland investments in the United States. *Forest Policy and Economics*, *28*, 60–65. https://doi.org/10.1016/j.forpol.2013.01.003

Gervais, S., & Odean, T. (2001). Learning to be overconfident. *The Review of Financial Studies*, 14(1), 1-27. https://doi.org/10.1093/rfs/14.1.1

Giglio, S., & Shue, K. (2014). No News Is News: Do Markets Underreact to Nothing? *Review of Financial Studies*, *27*(12), 3389–3440. https://doi.org/10.1093/rfs/hhu052

Gilbert, T., Kogan, S., Lochstoer, L., & Ozyildirim, A. (2012). Investor Inattention and the Market Impact of Summary Statistics. *Management Science*, *58*(2), 336–350. https://doi.org/10.1287/mnsc.1110.1475

Goddard, J., Kita, A., & Wang, Q. (2015). Investor attention and FX market volatility. *Journal of International Financial Markets, Institutions and Money*, *38*, 79–96. https://doi.org/10.1016/j.intfin.2015.05.001

Guo, T., Finke, M., & Mulholland, B. (2015). Investor attention and advisor social media interaction. *Applied Economics Letters*, *22*(4), 261–265. https://doi.org/10.1080/13504851.2014.937030

Gwilym, O., Kita, A., & Wang, Q. (2014). Speculate against speculative demand. *International Review of Financial Analysis*, *34*, 212–221. https://doi.org/10.1016/j.irfa.2014.03.001

Gwilym, O. A., Hasan, I., Wang, Q., & Xie, R. (2016). In Search of Concepts: The Effects of Speculative Demand on Stock Returns: In Search of Concepts. *European Financial Management*, *22*(3), 427–449. https://doi.org/10.1111/eufm.12067

Han, L., Li, Z., & Yin, L. (2017a). The effects of investor attention on commodity futures markets. *Journal of Futures Markets*, *37*(10), 1031–1049. https://doi.org/10.1002/fut.21853

Han, L., Lv, Q., & Yin, L. (2017b). Can investor attention predict oil prices? *Energy Economics*, *66*, 547–558. https://doi.org/10.1016/j.eneco.2017.04.018

Han, L., Li, Z., & Yin, L. (2018a). Investor Attention and Stock Returns: International Evidence. *Emerging Markets Finance and Trade*, *54*(14), 3168–3188. https://doi.org/10.1080/1540496X.2017.1413980

Han, L., Xu, Y., & Yin, L. (2018b). Does investor attention matter? The attention-return relationships in FX markets. *Economic Modelling*, *68*, 644–660. https://doi.org/10.1016/j.econmod.2017.06.015

Han, L., Wu, Y., & Yin, L. (2018c). Investor attention and currency performance: International evidence. *Applied Economics*, *50*(23), 2525–2551. https://doi.org/10.1080/00036846.2017.1403556

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. https://doi.org/10.1111/j.1540-6261.2009.01501.x

Hofstede, G. (1983). The Cultural Relativity of Organizational Practices and Theories. *Journal of International Business Studies, 14*(2), 75–89. https://doi.org/10.1057/palgrave.jibs.8490867

Hofstede, G. (1991). Cultures and Organizations: Software of the Mind. London: McGraw-Hill.

Hofstede, G. (2001). Culture's consequences: Comparing values, behaviors, institutions and organizations across nations. Sage publications.

Hofstede, G. (2011). Dimensionalizing cultures: The Hofstede model in context. *Online readings in psychology and culture*, 2(1), 8. . http://dx.doi.org/10.9707/2307-0919.1014

Hofstede, G., & Bond, M. H. (1988). The Confucius connection: From cultural roots to economic growth. *Organizational Dynamics,* 16(4), 5-21.

Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software of the mind ; intercultural cooperation and its importance for survival* (Rev. and expanded 3. ed). New York: McGraw-Hill.

Hood, M., & Lesseig, V. (2017). Investor inattention around stock market holidays. *Finance Research Letters*, *23*, 217–222. https://doi.org/10.1016/j.frl.2017.07.015

Hsu, C.-C., & Chen, M.-L. (2017). The timing of low-volatility strategy. *Finance Research Letters*, *23*, 114–120. https://doi.org/10.1016/j.frl.2017.05.014

Hu, B., & McInish, T. (2013). Greed and Fear in Financial Markets: The Case of Stock Spam E-Mails. *Journal of Behavioral Finance*, *14*(2), 83–93. https://doi.org/10.1080/15427560.2013.761630

Huang, Y., Qiu, H., & Wu, Z. (2016). Local bias in investor attention: Evidence from China's Internet stock message boards. *Journal of Empirical Finance*, *38*, 338–354. https://doi.org/10.1016/j.jempfin.2016.07.007

Huber, P. J. (1967). The behavior of maximum likelihood estimates under nonstandard conditions. In Proceedings of the fifth Berkeley symposium on mathematical statistics and probability, Vol. 1, No. 1, pp. 221-233)

Hur, J., & Singh, V. (2016). Reexamining momentum profits: Underreaction or overreaction to firm-specific information? *Review of Quantitative Finance and Accounting*, *46*(2), 261–289. https://doi.org/10.1007/s11156-014-0469-x

Hur, J., & Singh, V. (2017). Cross-Section of Expected Returns and Extreme Returns: The Role of Investor Attention and Risk Preferences. Financial Management, 46(2), 409-431.

Jacobs, H., & Weber, M. (2012). The Trading Volume Impact of Local Bias: Evidence from a Natural Experiment*. *Review of Finance*, *16*(4), 867–901. https://doi.org/10.1093/rof/rfr022

Jacobs, H., & Weber, M. (2015). On the determinants of pairs trading profitability. *Journal of Financial Markets*, *23*, 75–97. https://doi.org/10.1016/j.finmar.2014.12.001

Jacobs, H., & Weber, M. (2016). Losing sight of the trees for the forest? Attention allocation and anomalies. *Quantitative Finance*, *16*(11), 1679–1693. https://doi.org/10.1080/14697688.2016.1169311

Jiang, G. J., & Zhu, K. X. (2017). Information Shocks and Short-Term Market Underreaction. *Journal of Financial Economics*, *124*(1), 43–64. https://doi.org/10.1016/j.jfineco.2016.06.006

Kahneman, D. (1973). *Attention and effort*. Englewood Cliffs, N.J: Prentice-Hall.

Kaniel, R., & Parham, R. (2017). WSJ Category Kings – The impact of media attention on consumer and mutual fund investment decisions. *Journal of Financial Economics*, *123*(2), 337–356. https://doi.org/10.1016/j.jfineco.2016.11.003

Kou, Y., Ye, Q., Zhao, F., & Wang, X. (2018). Effects of investor attention on commodity futures markets. *Finance Research Letters*, *25*, 190–195. https://doi.org/10.1016/j.frl.2017.10.014

Lamont, O., & Frazzini, A. (2007). *The Earnings Announcement Premium and Trading Volume* (NBER Working Paper, No. w13090). https://doi.org/10.3386/w13090

Lee, C. M. C., Sun, S. T., Wang, R., & Zhang, R. (2019). Technological links and predictable returns. *Journal of Financial Economics*, *132*(3), 76–96. https://doi.org/10.1016/j.jfineco.2018.11.008

Li, J., & Yu, J. (2012). Investor attention, psychological anchors, and stock return predictability. *Journal of Financial Economics*, *104*(2), 401–419. https://doi.org/10.1016/j.jfineco.2011.04.003

Li, Xin, Ma, J., Wang, S., & Zhang, X. (2015). How does Google search affect trader positions and crude oil prices? *Economic Modelling*, *49*, 162–171. https://doi.org/10.1016/j.econmod.2015.04.005

Li, Xian, Hendler, J. A., & Teall, J. L. (2016). Investor Attention on the Social Web. *Journal of Behavioral Finance*, *17*(1), 45–59. https://doi.org/10.1080/15427560.2015.1095752

Lin, C., Ko, K.-C., Feng, Z.-X., & Yang, N.-T. (2016). Market dynamics and momentum in the Taiwan stock market. *Pacific-Basin Finance Journal*, *38*, 59–75. https://doi.org/10.1016/j.pacfin.2016.03.009

Lin, M.-C., Wu, C.-H., & Chiang, M.-T. (2014). Investor attention and information diffusion from analyst coverage. *International Review of Financial Analysis*, *34*, 235–246. https://doi.org/10.1016/j.irfa.2014.03.006

Liu, W. H. (2018). National culture effects on stock market volatility level. Empirical Economics, 1-25

Liu, X., & Ye, Q. (2016). The different impacts of news-driven and self-initiated search volume on stock prices. *Information & Management*, *53*(8), 997–1005. https://doi.org/10.1016/j.im.2016.05.009

Loh, R. K. (2010). Investor Inattention and the Underreaction to Stock Recommendations. *Financial Management*, *39*(3), 1223–1252. https://doi.org/10.1111/j.1755-053X.2010.01110.x

Lou, D. (2014). Attracting Investor Attention through Advertising. *Review of Financial Studies*, *27*(6), 1797–1829. https://doi.org/10.1093/rfs/hhu019

Louis, H., & Sun, A. (2010). Investor Inattention and the Market Reaction to Merger Announcements. *Management Science*, *56*(10), 1781–1793. https://doi.org/10.1287/mnsc.1100.1212

Louis, H., & Sun, A. X. (2011). Earnings Management and the Post-earnings Announcement Drift. *Financial Management*, *40*(3), 591–621. https://doi.org/10.1111/j.1755-053X.2011.01154.x

Louis, H., & Sun, A. X. (2016). Abnormal Accruals and Managerial Intent: Evidence from the Timing of Merger Announcements and Completions. *Contemporary Accounting Research*, *33*(3), 1101–1135. https://doi.org/10.1111/1911-3846.12171

Madsen, J., & Niessner, M. (2019). Is Investor Attention for Sale? The Role of Advertising in Financial Markets. *Journal of Accounting Research*, *57*(3), 763–795. https://doi.org/10.1111/1475-679X.12257

Mamun, A., & Mishra, D. (2012). Industry Merger Intensity and Cost of Capital: Industry Merger Intensity and Cost of Capital. *International Review of Finance*, *12*(4), 469–490. https://doi.org/10.1111/j.1468-2443.2012.01157.x

Michaely, R., Rubin, A., & Vedrashko, A. (2016). Are Friday announcements special? Overcoming selection bias. *Journal of Financial Economics*, *122*(1), 65–85. https://doi.org/10.1016/j.jfineco.2016.05.006

Moussa, F., Delhoumi, E., & Ouda, O. B. (2017). Stock return and volatility reactions to information demand and supply. *Research in International Business and Finance*, *39*, 54–67. https://doi.org/10.1016/j.ribaf.2016.07.016

Nelson, K. K., Price, R. A., & Rountree, B. R. (2013). Are Individual Investors Influenced by the Optimism and Credibility of Stock Spam Recommendations?. *Journal of Business Finance & Accounting*, *40*(9–10), 1155–1183. https://doi.org/10.1111/jbfa.12053

Newey, W. K., & West, K. D. (1987). A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix. *Econometrica*, *55*(3), 703–708. https://doi.org/10.2307/1913610

Odean, T. (1998). Volume, volatility, price, and profit when all traders are above average. *The Journal of Finance*, 53(6), 1887-1934.

Parkinson, M. (1980). The Extreme Value Method for Estimating the Variance of the Rate of Return. *The Journal of Business*, *53*(1), 61-65. https://doi.org/10.1086/296071

Peltomäki, J., Graham, M., & Hasselgren, A. (2018). Investor attention to market categories and market volatility: The case of emerging markets. *Research in International Business and Finance*, *44*, 532–546. https://doi.org/10.1016/j.ribaf.2017.07.124

Peltomäki, J., & Vähämaa, E. (2015). Investor attention to the Eurozone crisis and herding effects in national bank stock indexes. *Finance Research Letters*, *14*, 111–116. https://doi.org/10.1016/j.frl.2015.05.009

Peng, D., Rao, Y., & Wang, M. (2016). Do Top 10 Lists of Daily Stock Returns Attract Investor Attention? Evidence from a Natural Experiment: Top 10 Lists and Investor Attention. *International Review of Finance*, *16*(4), 565–593. https://doi.org/10.1111/irfi.12091

Peng, L., & Xiong, W. (2006). Investor attention, overconfidence and category learning. *Journal of Financial Economics*, *80*(3), 563–602. https://doi.org/10.1016/j.jfineco.2005.05.003

Peng, L., Xiong, W., & Bollerslev, T. (2007). Investor Attention and Time-varying Comovements. *European Financial Management*, *13*(3), 394–422. https://doi.org/10.1111/j.1468-036X.2007.00366.x

Perlin, M. S., Caldeira, J. F., Santos, A. A. P., & Pontuschka, M. (2016). Can We Predict the Financial Markets Based on Google's Search Queries?. *Journal of Forecasting*.36(4), 454-467. https://doi.org/10.1002/for.2446

Petersen, M. A. (2009). Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *Review of Financial Studies*, *22*(1), 435–480. https://doi.org/10.1093/rfs/hhn053

Pinto-Gutiérrez, C. (2016). The role of financial media in share repurchases. *Review of Business Management*, *18*(61), 473–496. https://doi.org/10.7819/rbgn.v18i61.2845

Pyo, D.-J. (2017). Can Big Data Help Predict Financial Market Dynamics?: Evidence from the Korean Stock Market. *East Asian Economic Review*, *21*(2), 147–165. https://doi.org/10.11644/KIEP.EAER.2017.21.2.327

Qian, M., Sun, P.-W., & Yu, B. (2017). High turnover with high price delay? Dissecting the puzzling phenomenon for China's A-shares. *Finance Research Letters*, *22*, 105–113. https://doi.org/10.1016/j.frl.2017.06.004

Roll, R., & Subrahmanyam, A. (2010). Liquidity skewness. *Journal of Banking & Finance*, *34*(10), 2562–2571. https://doi.org/10.1016/j.jbankfin.2010.04.012

Ruan, X., & Zhang, J. E. (2016). Investor attention and market microstructure. *Economics Letters*, *149*, 125–130. https://doi.org/10.1016/j.econlet.2016.10.032

Schmeling, M. (2009). Investor sentiment and stock returns: Some international evidence. *Journal of Empirical Finance*, *16*(3), 394–408. https://doi.org/10.1016/j.jempfin.2009.01.002

Segal, B., & Segal, D. (2016). Are managers strategic in reporting non-earnings news? Evidence on timing and news bundling. *Review of Accounting Studies*, *21*(4), 1203–1244. https://doi.org/10.1007/s11142-016-9366-y

Shen, D., Zhang, Y., Xiong, X., & Zhang, W. (2017). Baidu index and predictability of Chinese stock returns. *Financial Innovation*, *3*(1),4. https://doi.org/10.1186/s40854-017-0053-1

Sicherman, N., Loewenstein, G., Seppi, D. J., & Utkus, S. P. (2016). Financial Attention. *Review of Financial Studies*, *29*(4), 863–897. https://doi.org/10.1093/rfs/hhv073

Stickel, S. E. (1995). The Anatomy of the Performance of Buy and Sell Recommendations. *Financial Analysts Journal*, *51*(5), 25–39. https://doi.org/10.2469/faj.v51.n5.1933

Skoulakis, G. (2008). Panel data inference in finance: Least-squares vs Fama-MacBeth. Available at SSRN 1108865: https://ssrn.com/abstract=1108865 or http://dx.doi.org/10.2139/ssrn.1108865.

Tan, S., & Taş, O. (2019). Investor attention and stock returns: Evidence from Borsa Istanbul. *Borsa Istanbul Review, 19*(2), 106–116. https://doi.org/10.1016/j.bir.2018.10.003

Tang, W., & Zhu, L. (2017). How security prices respond to a surge in investor attention: Evidence from Google Search of ADRs. *Global Finance Journal, 33*, 38–50. https://doi.org/10.1016/j.gfj.2016.09.001

Tantaopas, P., Padungsaksawasdi, C., & Treepongkaruna, S. (2016). Attention effect via internet search intensity in Asia-Pacific stock markets. *Pacific-Basin Finance Journal, 38*, 107–124. https://doi.org/10.1016/j.pacfin.2016.03.008

Todea, A. (2018). Culture and Stock Price Reaction to Private Information. *Review of Economic and Business Studies,* 11(1), 117-130. https://doi.org/10.1515/rebs-2018-0067

Valcarcel, V. J., Vivian, A. J., & Wohar, M. E. (2017). Predictability and underreaction in industry-level returns: Evidence from commodity markets. *Journal of Commodity Markets*, *6*, 1–15. https://doi.org/10.1016/j.jcomm.2017.02.003

Vlastakis, N., & Markellos, R. N. (2012). Information demand and stock market volatility. *Journal of Banking & Finance*, *36*(6), 1808–1821. https://doi.org/10.1016/j.jbankfin.2012.02.007

von Beschwitz, B., Chuprinin, O., & Massa, M. (2017). Why Do Short Sellers Like Qualitative News? *Journal of Financial and Quantitative Analysis*, *52*(02), 645–675. https://doi.org/10.1017/S0022109017000151

Vozlyublennaia, N. (2014). Investor attention, index performance, and return predictability. *Journal of Banking & Finance*, *41*, 17–35. https://doi.org/10.1016/j.jbankfin.2013.12.010

Wang, X. W., Yan, Z., Zhang, Q., & Gao, X. (2018). Investor attention and stock market under-reaction to earnings announcements: Evidence from the options market. *Journal of Futures Markets*, *38*(4), 478–492. https://doi.org/10.1002/fut.21890

Wang, X. (Wesley). (2017). Investor Attention Strategy. *Journal of Behavioral Finance*, *18*(4), 390–399. https://doi.org/10.1080/15427560.2017.1344674

Welagedara, V., Deb, S. S., & Singh, H. (2017). Investor attention, analyst recommendation revisions, and stock prices. *Pacific-Basin Finance Journal*, *45*, 211–223. https://doi.org/10.1016/j.pacfin.2016.05.010

White, H. (1980). A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica*, *48*(4), 817-838. https://doi.org/10.2307/1912934

Woodhouse, S. A., Singh, H., Bhattacharya, S., & Kumar, K. (2016). Invisible walls: Do psychological barriers really exist in stock index levels? *The North American Journal of Economics and Finance*, *36*, 267–278. https://doi.org/10.1016/j.najef.2016.01.006

Wu, Q., & Shamsuddin, A. (2014). Investor attention, information diffusion and industry returns. *Pacific-Basin Finance Journal*, *30*, 30–43. https://doi.org/10.1016/j.pacfin.2014.06.002

Ying, Q., Kong, D., & Luo, D. (2015). Investor Attention, Institutional Ownership, and Stock Return: Empirical Evidence from China. *Emerging Markets Finance and Trade*, *51*(3), 672–685. https://doi.org/10.1080/1540496X.2015.1046339

Yuan, Y. (2015). Market-wide attention, trading, and stock returns. *Journal of Financial Economics*, *116*(3), 548–564. https://doi.org/10.1016/j.jfineco.2015.03.006

Yuan, & Wenbin. (2014). *The impact of investors' attention on stock returns — Study based on Baidu Index*. 1–5. https://doi.org/10.1109/ICSSSM.2014.6874058

Yung, K., & Nafar, N. (2017). Investor attention and the expected returns of reits. *International Review of Economics & Finance*, *48*, 423–439. https://doi.org/10.1016/j.iref.2016.12.009

Zhan, F. (2019). Individualism, synchronized stock price movements, and stock market volatility. *International Journal of Managerial Finance*.

Zhang, B., & Wang, Y. (2015). Limited attention of individual investors and stock performance: Evidence from the ChiNext market. *Economic Modelling*, *50*, 94–104. https://doi.org/10.1016/j.econmod.2015.06.009

Zhang, W., Shen, D., Zhang, Y., & Xiong, X. (2013). Open source information, investor attention, and asset pricing. *Economic Modelling*, *33*, 613–619. https://doi.org/10.1016/j.econmod.2013.03.018

**Internet Sources**

https://www.world-exchanges.org/our-work/statistics

https://www.hofstede-insights.com/product/compare-countries/

https://www.msci.com/market-classification

https://www.world-exchanges.org/about

https://www.world-exchanges.org/our-work/statistics

https://www.ibm.com/ibm/us/en/?lnk=fab

https://www.investopedia.com/terms/s/stockforstock.asp

https://www.hofstede-insights.com/models/national-culture/

https://trends.google.com/trends

https://www.hofstede-insights.com/country-comparison/

https://support.google.com/trends/answer/4365533?hl=en&ref_topic=6248052

https://trends.google.com.tr/trends/explore?date=2014-05-01%202018-05-12&geo=TR&q=akbank

## APPENDICES

### Appendix 1: Tabulated Literature Review

Table Appendix 1: Studies That Investigate the Relationship Between Investor Attention and Individual Stock Returns

| Source | Attention Proxy | Country | Sample Period | Method | Main Findings |
|---|---|---|---|---|---|
| Da, et al. (2011) | Google SVI | USA | 2004 - 2008 | VAR, Regressions Analysis | • Increase in investor attention predicts higher stock returns. |
| Bae and Wang (2012) | Having the word "China" in a firm's name | USA | 2006 - 2008 | Cross Sectional Regression Analysis | • The word China in a company's name result in more than 100% higher buy-and-hold returns<br>• China-name stocks experience a greater price reversal. |
| Nelson, et al. (2013) | Stock spams | USA | 1999 - 2006 | Panel Data Regression Analysis | • Content of the messages effect stock returns<br>• Optimistic target prices result in higher returns and volumes following the spam campaign |
| Hu and McInish (2013) | Stock spams | USA | 2004 – 2007 | Panel Data Regression Analysis | • Spam campaigns increase trading and returns are higher on the peak day of the spam campaigns |

| | | | | | |
|---|---|---|---|---|---|
| Yuan (2015) | Record breaking events and front-page market news | USA | 1983 - 2005 | Panel Data Regression Analysis | • Attention grabbing events predict abnormally higher selling activity<br>• More attention to their holdings results in more trading decisions |
| Zhang et al. (2013) | Baidu SVI | China | 2011 – 2012 | Simple Linear Regression Analysis, Granger Causality Test | • Predictive power of investor attention<br>• Investor attention granger causes the abnormal return and the abnormal return granger causes the investor attention |
| Yuan and Wenbin (2014) | Baidu SVI | China | 2012 – 2013 | Panel Data Regression Analysis | • Attention has predictive power of higher daily stock returns<br>• Price reversal following the first day |
| Ying et al. (2015) | Baidu SVI | China | 2006 – 2011 | Cross-Sectional Regression Analysis | • Positive relationship between attention and stock returns.<br>• Price reversal starting from the second week |
| Zhang and Wang (2015) | Baidu SVI | China | 2009 – 2011 | Panel Data Regression Analysis | • Limited attention creates positive price pressure<br>• Increased attention on non-trading days significantly affect the price gap for the next week's opening price |
| Peng et al. (2016) | Being on the Top 10 list | China | 2006 – 2009 | Matched-sample approach, Regression analysis, Regression discontinuity design | • Limit-hitting stocks on the top 10 list attract more investor attention<br>• Higher abnormal returns on the first post-event day |
| Liu and Ye (2016) | Baidu SVI | China | 2009 – 2013 | Panel Data Regression Analysis | • Effect of investor attention is mediated negatively by news coverage<br>• Self-initiated search volume predicts higher returns than news-driven search volume |

| | | | | | |
|---|---|---|---|---|---|
| Shen et al. (2017) | Baidu SVI | China | 2011 - 2012 | Regression Analysis | • Predictive power of attention on next day's price changes<br>• Attention's effect on returns is negative |
| Adachi et al. (2017) | Google SVI | Japan | 2012 – 2016 | Panel Data Regression Analysis | • Positive relationship between investor attention and stock returns<br>• Positive relationship between attention and liquidity |
| Pyo (2017) | Search frequency | Korea | 2009 – 2017 | Granger Causality Test, Bivariate GARCH Model | • Negative effect of attention on KOSPI index returns<br>• Stock returns don't have any significant impact on investor attention |
| Tan and Taş (2019) | Google SVI | Turkey | 2013 - 2017 | Regression Analysis | • Positive relationship between investor attention and stock returns, especially for small cap stocks |

Table Appendix 2: Studies That Investigate the Relationship Between Investor Attention and Returns of Stock Indices

| Source | Attention Proxy | Country | Sample Period | Method | Main Findings |
|---|---|---|---|---|---|
| Tantaopas et al. (2016) | Google SVI | 10 Asia-Pacific countries | 2004 - 2014 | Granger Causality Test, VAR, Quantile Regression Model (QRM) | • Changes in attention is caused by changes in return, volatility and trading volume<br>• Investor attention improves market efficiency |
| Perlin et al. (2016) | Search frequency of finance related words | USA, UK, Australia, Canada | 2005 - 2014 | Granger Causality Test, VAR | • The words “stock”, “finance”, and “market” has the ability to forecast index volatility (positive direction)<br>• The words “finance”, “stock”, and “debt” has the ability to forecast index returns (negative direction) |
| Vozlyublennaia (2014) | Google SVI | USA | 2004 - 2012 | Granger Causality Test, VAR | • Predictability of index returns is diminished with more investor attention |
| Chen (2017) | Google SVI | Benchmark indices from 67 countries | 2004 - 2014 | Regression Analysis | • Investor attention has negative effect on index returns<br>• The effect is stronger during positive sentiment periods |
| Chronopoulos et al. (2018) | Google SVI | USA | 2004 - 2016 | GARCH, GJR-GARCH, EGARCH | • Investor attention improves the predictability of volatility<br>• More predictability of signs of daily stock returns |
| Han et al. (2018a) | Google SVI | Benchmark indices from 15 countries | 2004 - 2015 | Var, In-Sample Analysis, Out-of-Sample Analysis | • Investor attention diminishes market efficiency by increasing the predictability of returns but increases the efficiency by decreasing the autocorrelation of returns. |

Table Appendix 3: Studies That Investigate the Relationship Between Investor Attention and Other Securities

| Source | Asset | Attention Proxy | Country | Sample Period | Method | Main Findings |
|---|---|---|---|---|---|---|
| Wang (2017) | Stock Options | Volume spikes after dormant period | USA | 1996 - 2003 | Regression Analysis | • Following spikes in options volume generates monthly abnormal return of 68 basis points |
| Eichler (2012) | American Depositary Receipts (ADRs) | Search queries of AOL users | USA | 01/03/2006 – 31/05/2006 | Cross Sectional Two Stage Least Squares (2SLS) Regressions | •ADR mispricing is reduced with higher level of investor attention |
| Tang and Zhu (2017) | American Depositary Receipts (ADRs) | Google SVI | USA | 2004 - 2015 | Carhart Four-Factor Regression Model | • Increase in investor attention result in same-day price increases<br>• Price reversal starts between one day and fourteen days<br>• Same behavior is observed in both developing markets and developed markets |
| Yung and Nafar (2017) | Real Estate Investment Trusts (REITs) | Google SVI | USA | 2004 – 2012 | Fama-French Three-Factor Model, Carhart Four-Factor Model | • REITs that grab more attention perform better than REITs with less attention with higher returns<br>• The effect of attention is reversed over time |
| Gao and Mei (2013) | Timberland Investment | Google SVI | NA | NA | Time-Series Regression Analysis | • Investor attention has significant effects on the abnormal returns of timberland investments |

| | | | | | | |
|---|---|---|---|---|---|---|
| Han et al. (2018b) | FX Market | Google SVI | - | 2004 - 2010 | Granger Causality Test, VAR | • With more investor attention, currency returns increase simultaneously. |
| Han et al. (2018c) | FX Market | Google SVI | - | 2007 - 2015 | Var, In-Sample Analysis, Out-of-Sample Analysis | Positive relationship between investor attention and currency returns, especially returns of emerging country currencies |
| Baur and Dimpfl (2016) | Gold, Silver, Palladium, Platinum | Google SVI | - | 2004 - 2015 | Autoregressive Models | • Gold attracts more attention than other commodities<br>• Return and volatility significantly influence internet searches for gold and this effect is either weaker or non-existent for silver, palladium and platinum |
| Han et al. (2017a) | Commodity Futures | Google SVI | - | 2004 - 2017 | Regression Analysis, Out of Sample Analysis | • Attention has statistically significant impact on futures prices<br>• Attention increases market efficiency by increasing information efficiency<br>• For some commodities market efficiency is reduced with more investor attention through herding behavior channel |
| Kou et al. (2018) | Commodity Futures | Baidu Search Index | - | 2011 - 2015 | Regression Analysis | • No relationship between investor attention and returns in futures market |
| Han et al. (2017b) | Oil | Google SVI | - | 2004 – 2016 | GARCH, PSO-LSSVM, WN Model | • Google SVI has statistically significant predictive power for oil prices for short run |

Table Appendix 4: Studies That Investigate the Relationship Between Investor Attention and Liquidity

| Source | Attention Proxy | Country/Market | Sample Period | Method | Main Findings |
|---|---|---|---|---|---|
| Nelson et al. (2013) | Stock spams | USA | 1999 - 2006 | Panel Data Regression Analysis | • Content of the messages effect stock returns<br>• Optimistic target prices result in higher returns and volumes following the spam campaign |
| Hu and McInish (2013) | Stock spams | USA | 2004 – 2007 | Panel Data Regression Analysis | • Spam campaigns increase trading<br>• Returns are higher on the peak day of the spam campaigns |
| Ding and Hou (2015) | Google SVI, Google News, Advertising expenditure | USA | 2004-2009 | OLS Regressions, VAR, Granger Causality Test | • Increased investor attention leads to higher number of shareholders and more liquidity |
| Kaniel and Parham (2017) | Mentions in WSJ's "Category Kings" Top 10 ranking list | USA | 2000 - 2012 | Regression Discontinuity Design | • A single mention of a fund in a prominent WSJ "Category Kings" Top 10 list contribute to more capital flows |

| | | | | | |
|---|---|---|---|---|---|
| Fan et al. (2017) | Baidu Search Index | China | 2011 - 2015 | Detrended Fluctuation Analysis, Detrended Cross-correlation Analysis, Rescaled Range Analysis | • Positive correlation between AIA and trading volume<br>• Positive correlation between AIA and volatility |
| Aouadi et al. (2013) | Google SVI | France | 2004 - 2010 | Regression Analysis, Quandt-Andrews Breakpoint Test | • Positive relationship between investor attention and stock liquidity.<br>• Both positive and negative relationship is observed between investor attention and volatility |
| Adachi et al. (2017) | Google SVI | Japan | 2012 – 2016 | Panel Data Regression Analysis | • Positive relationship between investor attention and stock returns<br>• Positive relationship between attention and liquidity |
| Chen and Lo (2019) | Google SVI | Taiwan | 2004 - 2016 | Regression Analysis | Positive correlation between investor attention and stock liquidity |
| Goddard et al. (2015) | Google SVI | FX Market | 2004 - 2011 | Regression Analysis, GARCH, VAR | • Significant association between investor attention and trading volume<br>• Significantly positive association between attention and volatility |

Table Appendix 5: Studies That Investigate the Relationship Between Investor Attention and Volatility

| Source | Attention Proxy | Country/Market | Sample Period | Method | Main Findings |
|---|---|---|---|---|---|
| Andrei and Hasler (2015) | Theoretical Model | Theoretical Model | Theoretical Model | Theoretical Model | • More attention and uncertainty lead to more volatility. This relationship is quadratic |
| Guo et al. (2015) | Tweets between individual investors and their advisors | USA | 2008 - 2011 | Two-sample t-test, Regression Analysis | • Large price fluctuations lead to more investor attention<br>• Smaller gains receive more attention than smaller losses |
| Hsu and Chen (2017) | The average of the 5 highest daily returns | USA | 1965 - 2015 | Panel Data Regression Analysis | • Profitability of low-volatility strategies increase with high attention stocks |
| Fan et al. (2017) | Baidu Search Index | China | 2011 - 2015 | Detrended Fluctuation Analysis, Detrended Crosscorrelation Analysis | • Positive correlation between AIA and trading volume<br>• Positive correlation between AIA and volatility |
| Aouadi et al. (2013) | Google SVI | France | 2004 - 2010 | Regression Analysis, Q-A Breakpoint Test | • Positive relationship between investor attention and stock liquidity.<br>• Both positive and negative relationship is observed between investor attention and volatility |

| | | | | | |
|---|---|---|---|---|---|
| Moussa et al. (2017) | Google SVI | France | 2007 - 2014 | GARCH, Multiple Correspondence Analysis | Mixed results. Some stocks show a positive relation between investor attention and volatility, while some other stocks show a negative relation |
| Chen and Lo (2019) | Google SVI | Taiwan | 2004 - 2016 | Regression Analysis | Positive correlation between investor attention and stock liquidity |
| Peltomäki et al. (2018) | Google SVI, Abnormal Trading Volume | Emerging Countries | 2004 - 2014 | Regression Analysis | Positive relationship between investor attention and stock return volatility in emerging countries. No relationship between investor attention and FX market volatility |
| Goddard et al. (2015) | Google SVI | FX Market | 2004 - 2011 | Regression Analysis, GARCH, VAR | • Significant association between investor attention and trading volume<br>• Significantly positive association between attention and volatility |
| Li et al. (2015) | Google SVI | Commodities | 2004 - 2014 | Granger Causality Test, Regression Analysis | • Significantly positive contemporaneous correlation between GSVI and price volatility |
| Afkhami et al. (2017) | Google SVI | Commodities | 2004 - 2016 | Granger Causality Test, GARCH | • Search popularity of energy related keywords significantly predict volatility |

Table Appendix 6: Studies That Investigate the Relationship Between Investor Attention, Investors' Reaction to Firm Announcements and Firm Behavior

| Source | Subject | Attention Proxy | Country/Market | Sample Period | Method | Main Findings |
|---|---|---|---|---|---|---|
| Dellavigna and Pollet (2009) | Earnings Announcements | Announcements made on Friday (Proxy of inattention) | USA | 1984 - 2006 | Event Study | • Lower immediate and higher delayed response for Friday announcements.<br>• Profitable trading strategy based on this evidence |
| Hirshleifer et al. (2009) | Earnings Announcements | Number of earnings announcements in a day | USA | 1995 - 2004 | Event Study, Multivariate Regression Analysis | • High number of announcements in a day cause weaker price reaction, a lower volume reaction, and stronger subsequent post-earnings announcement drift. Profitable trading strategy based on this evidence<br>• Announcements made by the firms that operate in the same sector and announcements that have small earnings surprise have less distraction effect. |
| Louis and Sun (2010) | Merger Announcements | Announcements made on Friday (Proxy of inattention) | USA | 1994 - 2006 | Event Study, Multivariate Regression Analysis | • Lower cumulative abnormal trading volume for Friday announcements |
| D'Souza et al. (2010) | Strategic Behavior of Firms | - | USA | 2000 - 2003 | Regression Analysis, Factor Analysis | • Managers try to guide investor attention to summary financial information |

| | | | | | | |
|---|---|---|---|---|---|---|
| Louis and Sun (2011) | Earnings Management | - | USA | 1990 - 2016 | Regression Analysis | • Investor attention reduces the relationship between negative cash flows and increased accruals |
| Barber et al. (2013) | Earnings Announcement Premium | Abnormal Trading Volume | 46 countries | 1990 - 2009 | Regression Analysis | • Negative relationship between earnings announcement premium and investor attention |
| Lou (2014) | Strategic Behavior of Firms | Advertising Expenses | USA | 1974 - 2010 | Calendar-Time Portfolio Analysis, Fama-Mach-Beth Regression Analysis | • Stock prices increase with more advertising spending. Prices experience complete reversal subsequently<br>• Managers adjust advertising in order to exploit this effect |
| Alldredge and Cicero (2015) | Strategic Behavior of Firms | Behavior of Corporate Insiders | USA | 1986 - 2010 | Regression Analysis | • Insiders sell more stock when information about their principal customers predict profitable trading |
| Cheng et al. (2015) | Repurchase Announcement | Trading Turnover | Taiwan | 2001 - 2011 | Event Study, Multivariate Regression Analysis | • Low attention firms experience greater underreaction and return drift |
| Michaely et al. (2016) | Market Reaction to Friday Announcements | Market Reaction to Friday Announcements | USA | 1995 - 2010 | Event Study | • Differential response to Friday announcements is caused by selection bias, (Differences in the characteristics of firms that make announcements and of those that do not) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Segal and Segal (2016) | Strategic Behavior of Firms | Announcements made on Friday and after trading hours | USA | 2005 - 2013 | Textual Analysis Procedure, Regression Analysis | • Managers, especially in public firms, strategically report bad news when investors are inattentive and good news when investors are attentive. |
| Pinto-Gutiérrez (2016) | Repurchase Announcements | Financial Media Coverage | USA | 2003 - 2012 | Regression Analysis | • Low attention firms have the highest cumulative abnormal returns<br>• Only those firms that do not attract sufficient investor attention to the announcements follow through on their repurchase programs |
| Jacobs and Weber (2016) | Earnings Announcement | Composite industry-wide attention index | USA | 1995 - 2008 | Regression Analysis | • Positively prediction of post-earnings announcement drift |
| Cao et al. (2016) | Alliance Announcements | Announcement Intensity | USA | 1985 - 2012 | Regression Analysis | • Lower returns during high-inattention days |
| Louis and Sun (2016) | Strategic Behavior of Firms | Firm Size, Institutional Ownership, Analyst and Media Coverage | USA | 1994 - 2010 | Regression Analysis | • Acquirers with the most inflated earnings tend to avoid investor attention and announce mergers on Fridays |
| Boulland et al. (2016) | Impact of Technology | Delayed Price Reaction to Earnings | 14 European Countries | 1991 - 2010 | Regression Analysis | • Technologic improvements provide better news dissemination, resulting in stronger initial reaction, and lower drift. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Boulland and Dessaint (2017) | Strategic Behavior of Firms | Google SVI, Abnormal Trading Volume | USA | 2007 - 2012 | Regression Analysis | • Advance notice period is predictive of earnings surprises; the relationship is more pronounced in low attention firms |
| Chapman (2018) | Earnings Announcement Premium | Searches made in the SEC's repository of firm filings | USA | 1999 - 2002 | Regression Analysis | Investor attention is an important explanatory of earnings announcement premium |
| Wang et al. (2018) | Earnings Announcement | Option Trading Volume Prior to Earnings Announcement | USA | 1996 - 2014 | Regression Analysis | Underreaction to earnings announcement and PEAD decreases with more investor attention |
| Madsen and Niessner (2019) | Firm Behavior | Google SVI | USA | 2008 - 2013 | Two-Stage Least Squares Regression Analysis | Investor attention increases with advertisement |

Table Appendix 7: Studies That Investigate the Relationship Between Investor Attention and Investors' Reaction to News and Analyst Recommendation

| Source | Subject | Country/Market | Sample Period | Method | Main Findings |
|---|---|---|---|---|---|
| Loh (2010) | Analyst Recommendations | USA | 1993 – 2006 | Event Study, Regression Analysis | • Less immediate reaction and more delayed reaction from low-attention stocks to analyst recommendations |
| Gilbert et al. (2012) | Monthly Announcements of U.S. Leading Economic Index | USA | 1997 – 2009 | Event Study, Regression Analysis | • Investors react to stale information and LEI has impact on market-level returns, volatility, and trading volume |
| Lin et al. (2014) | Analyst Coverage | USA | 1984 – 2011 | Regression Analysis | • Slow diffusion of information for stocks that have less analyst coverage |
| Giglio and Shue (2014) | The Time Between Initial Merger Announcement and Its Resolution (No-news period) | USA | 1970 – 2010 | Regression Analysis | • The passage of time can predict merger completion and investors salient information in no-news period do not get sufficient attention |
| Ferretti et al. (2016) | Price-to-Book Value (PBV) Announcements by Il Sole 24 Ore | Italy | 02/2002 – 05/2002 | Event Study | • Investors confuse old information with new information and react to already publish PBV ratios. That is why low PBV stocks experience price increases after announcements. |

| | | | | | |
|---|---|---|---|---|---|
| Chen et al. (2016) | Scheduled Macroeconomic Announcements | China | 2011 – 2014 | Regression Analysis | • Investors are more attentive to consumer price index announcements than other macroeconomic indicators |
| Athanasakou and Simpson (2016) | Roundness of Analysts' EPS Forecasts | USA | 1984 – 2012 | Regression Analysis | • Investors react less to rounded forecasts, which receive weaker price response |
| Welagedara et al. (2017) | Analyst Recommendations | USA | 2004 – 2012 | Regression Analysis | • Investors underreact to analyst recommendation upgrades. High attention stocks experience higher price drift (price overreaction) after recommendation upgrades (downgrades). |
| Birz (2017) | Newspaper Coverage of Unemployment News | USA | 1991 – 2004 | Regression Analysis | • Significant correlation between unemployment news and cumulative daily stock returns for two weeks |

Table Appendix 8: Studies That Investigate the Relationship Between Investor Attention and Investors' Reaction to Past Market Performance

| Source | Attention Proxy | Country/Market | Sample Period | Method | Main Findings |
|---|---|---|---|---|---|
| Li and Yu (2012) | Nearness to Historical Highs | USA | 1958 - 2009 | Regression Analysis, Subsample Analysis, Monte Carlo Simulation | • Nearness to the 52-week high (historical high) positively (negatively) predicts future returns |
| Bali et al. (2014) | Stock Size, Analyst Coverage | USA | 1963 - 2010 | Univariate Analysis, Regression Analysis | • Positive relation between stock level liquidity shocks and one-month future returns. More pronounced in less attention stocks and existent in different subsample periods. |
| Wu and Shamsuddin (2014) | Industry Size, Liquidity, Financial Analyst Coverage | Australia | 1990 - 2009 | Time Series Regression Analysis | • Investor attention moderates the predictive power of industry returns on market returns. |
| Dahlquist and Martinez (2015) | Sensitivity to past performance of pension funds (Lack of it is a sign of inattention) | Sweden | 2000 - 2008 | Pooled Cross-section Time-Series Regression | • Pension investors are less attentive to past performance |

| | | | | | |
|---|---|---|---|---|---|
| Hur and Singh (2016) | "Institutional ownership, The number of analysts, The number of shareholders, Firm age | USA | 1965 - 2009 | Regression Analysis | • Primary cause of momentum is underreaction<br>• Firm-specific information gets delayed response because investors cannot pay attention to them due to low visibility of these information |
| Lin et al. (2016) | Trading Volume | Taiwan | 1971 - 2014 | Regression Analysis | • High-attention stocks receive significantly positive momentum returns |
| Woodhouse et al. (2016) | Index levels that have final two integer digit of 00 | USA | 1990 - 2012 | Regression Analysis | • Barrier effects are present in NASDAQ Composite index<br>• The index closes less frequently around levels that have final two integer digit of 00 |
| Hur and Singh (2017) | Abnormal Trading Volume, Google SVI | USA | 1962 - 2014 | Univariate Analysis, Cross-Sectional Regression Analysis | • Investor attention is connected with the return reversal of stocks that experienced extreme daily returns |
| Jiang and Zhu (2017) | The magnitude of jump returns and excess trading volume | USA | 1975 - 2012 | Variance Swap Jump Test, Cross-Sectional Regression Analysis | • Jumps that receive higher attention experience weaker underreaction |
| Qian et al. (2017) | Number of shareholders, Analyst coverage, Institutional ownership | China | 2008 - 2014 | Regression Analysis | • Low investor attention firms have high price delay |

| | | | | | |
|---|---|---|---|---|---|
| Valcarcel et al. (2017) | Changes in commodity spot prices (Information) | USA | 1985 - 2014 | Granger Causality Test, Regression Analysis | • Because of limited investors' limited information processing capabilities, information in commodity prices is incorporated into industry returns within several weeks |

Table Appendix 9: Studies That Investigate the Relationship Between Investor Attention and Investors' Reaction to Information During Distractive Events

| Source | Distractive Event | Country/Market | Sample Period | Method | Main Findings |
|---|---|---|---|---|---|
| Jacobs and Weber | Regional Holidays | Germany | 1988 - 2009 | Event Study, Regression Analysis | • Less trading volume for stocks of holiday regions |
| Brown (2014) | Wimbledon Tennis Championship | Betting Market | 2011 and 2012 | Regression Analysis | • Delayed value update for some assets |
| Docherty and Melia (2015) | The Melbourne Cup | Australia | 2003 - 2013 | Event Study | • Less trading volume 10 minutes around the Melbourne Cup |
| Drake et al. (2016) | March Madness | USA | 2000 - 2012 | Event Study | • During March Madness investors react less to earnings news |
| Ehrmann and Jansen (2017) | 2010 and 2014 FIFA World Cups | 15 countries in 2010<br>5 countries in 2014 | 2010 and 2014 FIFA World Cups | Event Study | • Less trading activity during football matches |

| | | | | | |
|---|---|---|---|---|---|
| Hood and Lesseig (2017) | Market Holidays | USA | 2002 - 2014 | Event Study | • Less trading volume one day before and one day after the holidays |
| Von Beschwitz et al. (2017) | 2008 Olympic Games | USA | 2006 - 2008 | Event Study, Regression Analysis | • Qualitative news has a smaller effect when investor attention is distracted by the Olympic Games |

Table Appendix 10: Studies That Investigate the Attention Allocation of Investors

| Source | Attention Proxy | Country/Market | Sample Period | Method | Main Findings |
|---|---|---|---|---|---|
| Peng and Xiong (2006) | - | Theoretical Model | Theoretical Model | Theoretical Model | • Investors prioritize market-level and sector-level information over firm-specific information, which leads to high return correlation between firms. Technological improvements decrease these correlations |
| Peng et al. (2007) | Return Comovement | USA | 1993 - 2002 | VAR | • he co-movement of individual stocks with the market increase simultaneously when market-wide macroeconomic shocks appear. This effect starts to reverse after 5 days.<br>• Supportive to the hypothesis that investors chose to allocate their attention to market-level information when market-wide uncertainty increase, before subsequently paying attention to asset-specific information |
| Acker and Duck (2015) | Election Polls and Betting Data | UK | 06/2013 – 09/2014 | Regression Analysis | • The most visible information receives higher attention |
| Li et al. (2016) | Asset-specific tweets | USA | 05/2011 – 12/2012 | Regression Analysis, ARMA Model | • “Social proof” is important in attention allocation |

| | | | | | |
|---|---|---|---|---|---|
| Huang et al. (2016) | Internet Stock Message Boards | Internet Stock Message Boards | 2008 - 2010 | Regression Analysis | • There is local bias in attention allocation which means that local companies receive more attention from investors |
| Sicherman et al. (2016) | Daily investor online account logins | Investment account logins | 2007 - 2008 | Regression Analysis | • Investors diminish their attention when the VIX volatility index is high |
| Drake et al. (2016) | Internet search volume, forecast revisions, Business press mentions | USA | 2007 - 2011 | Regression Analysis | • Returns for a stock are more idiosyncratic when there are more stock-focused information flows |

Table Appendix 11: Other Related Studies

| Source | Attention Proxy | Sample Period | Main Findings |
|---|---|---|---|
| Mamun and Mishra (2012) | Media Coverage, Analyst Coverage | 1990 - 2005 | • High investor attention reduces information asymmetry and the required return on firm's capital |
| Borgers et al. (2013) | Yearly number of shareholder proposals on corporate social policy issues (Attention to stakeholders) | 1992 - 2009 | • Attention for stakeholder issues made stakeholder-relations index based trading strategies ineffective |
| Gwilym et al. (2014) | Google SVI | 2004 - 2012 | • Negative relationship between GSVI of US penny stocks and returns. Profitable long-short trading strategy |
| Jacobs and Weber (2015) | The number of simultaneous events, Absolute investor sentiment, Public holidays | 2000 - 2013 | • Pairs trading is up to 60 bps per month more profitable if stocks initially diverged during phases of high distraction |
| Peltomäki and Vähämaa (2015) | Google SVI | 2008 - 2014 | • Negative relationship between investor attention and herding effects |

| | | | |
|---|---|---|---|
| Gwilym et al. (2016) | Google SVI | 2004 - 2011 | • Speculative demand, proxied by Google SVI, increases following high market returns |
| Ruan and Zhang (2016) | Theoretical Model | Theoretical Model | • Positive relationship between investor attention and trading intensity of retail investors |
| Chi and Shanthikumar (2017) | Google SVI | 2005 - 2011 | • Local bias in investor attention causes stocks to experience lower liquidity, lower trading volume during earnings announcements |
| Lee et al. (2019) | Size, Analyst Coverage | 1963 - 2012 | • Investor attention decreases the predictive power of returns of technology-linked firms on focal firm returns |

## Appendix 2: Results of Hausman Test, Autocorrelation Tests and Heteroskedasticity Tests

Table Appendix 12: Hausman Test Result for Abnormal Stock Return Model

| | Coefficients (b) fe | (B) re | (b-B) Difference | sqrt(diag(V_b-V_B)) S.E. |
|---|---|---|---|---|
| lagged_asvi | .0002808 | .0002973 | -.0000165 | .0000199 |
| logmv | .0057742 | .0001246 | .0056495 | .0004507 |
| logbm | -.0049101 | -.0012723 | -.0036378 | .00036 |
| lagged_abn~t | -.0253812 | -.0166065 | -.0087747 | .0001716 |

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 4363.36
Prob>chi2 = 0.0000

Null hypothesis states that random effects regression is more suitable

Table Appendix 13: Hausman Test Result for Stock Liquidity Model

| | Coefficients (b) fe | (B) re | (b-B) Difference | sqrt(diag(V_b-V_B)) S.E. |
|---|---|---|---|---|
| lagged_asvi | .2275428 | .2206483 | .0068945 | . |
| logmv | -.0057468 | -.0015389 | -.0042079 | .0054971 |
| logbm | .0203885 | -.0042022 | .0245906 | .0043838 |
| lagged_ret | -.5712103 | -.615012 | .0438018 | . |
| lagged_abn~l | .4351283 | .4882036 | -.0530753 | .0005922 |

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 8033.08
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Null hypothesis states that random effects regression is more suitable

Table Appendix 14: Hausman Test Result for Stock Return Volatility Model

| | Coefficients (b) fe | (B) re | (b-B) Difference | sqrt(diag(V_b-V_B)) S.E. |
|---|---|---|---|---|
| asvi | 2.015865 | 1.414693 | .6011721 | . |
| logmv | 3.451569 | 1.908854 | 1.542714 | .3530402 |
| logbm | -.1862374 | -.7388196 | .5525822 | .2765392 |
| ret | -4.330686 | -10.66782 | 6.337137 | . |
| lagged_st_~v | .1775704 | .726412 | -.5488416 | .0018401 |

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 88972.37
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Null hypothesis states that random effects regression is more suitable

Table Appendix 15: Hausman Test Result for Stock Return Volatility Model (One-Week Lagged Investor Attention)

| | Coefficients (b) fe | (B) re | (b-B) Difference | sqrt(diag(V_b-V_B)) S.E. |
|---|---|---|---|---|
| lagged_asvi | -.2116293 | -1.549901 | 1.338271 | . |
| logmv | 3.476846 | 1.909414 | 1.567432 | .3531041 |
| logbm | -.1716068 | -.7370295 | .5654227 | .2765984 |
| ret | -4.32506 | -10.55993 | 6.23487 | . |
| lagged_st_~v | .177753 | .7264834 | -.5487303 | .0018415 |

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 88804.12
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Null hypothesis states that random effects regression is more suitable

Table Appendix 16: Wooldridge Test for Autocorrelation in Panel Data for Abnormal Stock Return Model

| | F (1, n-1) | Prob > F |
|---|---|---|
| Argentina | 280.668 | 0.0000 |
| Australia | 1338.03 | 0.0000 |
| Belgium | 203.676 | 0.0000 |
| Brazil | 1194.46 | 0.0000 |
| Canada | 1462.9 | 0.0000 |
| Chile | 663.764 | 0.0000 |
| Denmark | 1203.45 | 0.0000 |
| Finland | 1787.45 | 0.0000 |
| France | 504.163 | 0.0000 |
| Germany | 1717.96 | 0.0000 |
| India | 3967.64 | 0.0000 |
| Indonesia | 458.761 | 0.0000 |
| Malaysia | 1714.04 | 0.0000 |
| Mexico | 727.783 | 0.0000 |
| Netherlands | 5916.34 | 0.0000 |
| New Zealand | 1352.67 | 0.0000 |
| Norway | 165.191 | 0.0000 |
| Peru | 744.465 | 0.0000 |
| Philippines | 433.694 | 0.0000 |
| Portugal | 395.975 | 0.0000 |
| Singapore | 2582.62 | 0.0000 |
| Spain | 225.044 | 0.0000 |
| Sweden | 3180.64 | 0.0000 |
| Switzerland | 2076.58 | 0.0000 |
| Turkey | 1158.44 | 0.0000 |
| UK | 2168.18 | 0.0000 |
| USA | 6133.05 | 0.0000 |

Null hypothesis states no autocorrelation

Table Appendix 17: Wooldridge Test for Autocorrelation in Panel Data for Stock Liquidity Model

| | F (1, n-1) | Prob > F |
|---|---|---|
| Argentina | 1246.974 | 0.0000 |
| Australia | 507.113 | 0.0000 |
| Belgium | 773.668 | 0.0000 |
| Brazil | 718.696 | 0.0000 |
| Canada | 2776.609 | 0.0000 |
| Chile | 380.189 | 0.0000 |
| Denmark | 937.853 | 0.0000 |
| Finland | 726.979 | 0.0000 |
| France | 1794.708 | 0.0000 |
| Germany | 708.158 | 0.0000 |
| India | 3032.421 | 0.0000 |
| Indonesia | 756.33 | 0.0000 |
| Malaysia | 644.305 | 0.0000 |
| Mexico | 1449.429 | 0.0000 |
| Netherlands | 703.833 | 0.0000 |
| New Zealand | 402.687 | 0.0000 |
| Norway | 477.226 | 0.0000 |
| Peru | 342.448 | 0.0000 |
| Philippines | 1337.045 | 0.0000 |
| Portugal | 219.733 | 0.0000 |
| Singapore | 424.554 | 0.0000 |
| Spain | 1279.336 | 0.0000 |
| Sweden | 1374.387 | 0.0000 |
| Switzerland | 1075.35 | 0.0000 |
| Turkey | 1237.604 | 0.0000 |
| UK | 3576.187 | 0.0000 |
| USA | 4197.464 | 0.0000 |

Null hypothesis states no autocorrelation

Table Appendix 18: Wooldridge Test for Autocorrelation in Panel Data for Stock Return Volatility Model

| | F (1, n-1) | Prob > F |
|---|---|---|
| Argentina | 1148.041 | 0.0000 |
| Australia | 357.238 | 0.0000 |
| Belgium | 178.944 | 0.0000 |
| Brazil | 863.061 | 0.0000 |
| Canada | 1483.282 | 0.0000 |
| Chile | 781.591 | 0.0000 |
| Denmark | 265.216 | 0.0000 |
| Finland | 1463.422 | 0.0000 |
| France | 1391.202 | 0.0000 |
| Germany | 765.984 | 0.0000 |
| India | 1404.634 | 0.0000 |
| Indonesia | 630.609 | 0.0000 |
| Malaysia | 319.107 | 0.0000 |
| Mexico | 1408.43 | 0.0000 |
| Netherlands | 89.226 | 0.0000 |
| New Zealand | 404.211 | 0.0000 |
| Norway | 194.776 | 0.0000 |
| Peru | 403.532 | 0.0000 |
| Philippines | 255.527 | 0.0000 |
| Portugal | 1826.665 | 0.0000 |
| Singapore | 795.279 | 0.0000 |
| Spain | 695.336 | 0.0000 |
| Sweden | 1869.906 | 0.0000 |
| Switzerland | 152.942 | 0.0000 |
| Turkey | 670.843 | 0.0000 |
| UK | 687.672 | 0.0000 |
| USA | 2408.225 | 0.0000 |

Null hypothesis states no autocorrelation

Table Appendix 19: Modified Wald Test for Groupwise Heteroskedasticity for Abnormal Stock Return Model

| | chi2 (1, n) | Prob > chi2 |
|---|---|---|
| Argentina | 37.26 | 0.0000 |
| Australia | 2537.96 | 0.0000 |
| Belgium | 1975.11 | 0.0000 |
| Brazil | 6160.48 | 0.0000 |
| Canada | 16183.24 | 0.0000 |
| Chile | 3791.71 | 0.0000 |
| Denmark | 304.77 | 0.0000 |
| Finland | 1644.57 | 0.0000 |
| France | 1235.78 | 0.0000 |
| Germany | 1198.68 | 0.0000 |
| India | 2974.59 | 0.0000 |
| Indonesia | 6067.56 | 0.0000 |
| Malaysia | 3525.33 | 0.0000 |
| Mexico | 7983.56 | 0.0000 |
| Netherlands | 1435.73 | 0.0000 |
| New Zealand | 1010.76 | 0.0000 |
| Norway | 1521.47 | 0.0000 |
| Peru | 342.84 | 0.0000 |
| Philippines | 706.46 | 0.0000 |
| Portugal | 1127.97 | 0.0000 |
| Singapore | 925.17 | 0.0000 |
| Spain | 3978.61 | 0.0000 |
| Sweden | 2238.63 | 0.0000 |
| Switzerland | 2220.75 | 0.0000 |
| Turkey | 2446.44 | 0.0000 |
| UK | 3629.87 | 0.0000 |
| USA | 3093.77 | 0.0000 |

Null hypothesis states homoscedasticity

Table Appendix 20: Modified Wald Test for Groupwise Heteroskedasticity for Stock Liquidity Model

| | chi2 (1, n) | Prob > chi2 |
|---|---|---|
| Argentina | 9.02 | 0.1726 |
| Australia | 24.27 | 0.0838 |
| Belgium | 138.7 | 0.0000 |
| Brazil | 837.41 | 0.0000 |
| Canada | 169.73 | 0.0000 |
| Chile | 1452.49 | 0.0000 |
| Denmark | 33.31 | 0.0015 |
| Finland | 77.11 | 0.0000 |
| France | 74.17 | 0.0003 |
| Germany | 210.89 | 0.0000 |
| India | 299.01 | 0.0000 |
| Indonesia | 2191.66 | 0.0000 |
| Malaysia | 835.6 | 0.0000 |
| Mexico | 615.65 | 0.0000 |
| Netherlands | 27.36 | 0.0260 |
| New Zealand | 216.88 | 0.0000 |
| Norway | 67.21 | 0.0000 |
| Peru | 51.18 | 0.0000 |
| Philippines | 144.51 | 0.0000 |
| Portugal | 202.45 | 0.0000 |
| Singapore | 141.95 | 0.0000 |
| Spain | 136.2 | 0.0000 |
| Sweden | 104.4 | 0.0000 |
| Switzerland | 15.08 | 0.5189 |
| Turkey | 312.3 | 0.0000 |
| UK | 278 | 0.0000 |
| USA | 397.16 | 0.0000 |

Null hypothesis states homoscedasticity

Table Appendix 21: Modified Wald Test for Groupwise Heteroskedasticity for Volatility Model

| | chi2 (1, n) | Prob > chi2 |
|---|---|---|
| Argentina | 10.24 | 0.1148 |
| Australia | 393.19 | 0.0000 |
| Belgium | 1060.67 | 0.0000 |
| Brazil | 3141.12 | 0.0000 |
| Canada | 6721.44 | 0.0000 |
| Chile | 968.12 | 0.0000 |
| Denmark | 125.13 | 0.0000 |
| Finland | 155.25 | 0.0000 |
| France | 414.81 | 0.0000 |
| Germany | 252.45 | 0.0000 |
| India | 3097.22 | 0.0000 |
| Indonesia | 743.16 | 0.0000 |
| Malaysia | 535.83 | 0.0000 |
| Mexico | 10469.19 | 0.0000 |
| Netherlands | 642.86 | 0.0000 |
| New Zealand | 1528.52 | 0.0000 |
| Norway | 305.84 | 0.0000 |
| Peru | 84.5 | 0.0000 |
| Philippines | 165.12 | 0.0000 |
| Portugal | 526.66 | 0.0000 |
| Singapore | 261.45 | 0.0000 |
| Spain | 1492.22 | 0.0000 |
| Sweden | 733.93 | 0.0000 |
| Switzerland | 189.22 | 0.0000 |
| Turkey | 374.88 | 0.0000 |
| UK | 3411.85 | 0.0000 |
| USA | 2994.88 | 0.0000 |

Null hypothesis states homoscedasticity

**Appendix 3: Descriptive Statistics**

Table Appendix 22: Descriptive Statistics for Google Search Volume Index and Abnormal Search Volume Index

| | GSVI | | | | | ASVI | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Observation** | **Mean** | **Std. Dev.** | **Min** | **Max** | **Observation** | **Mean** | **Std. Dev.** | **Min** | **Max** |
| Argentina | 1224 | 49.8464 | 21.0887 | 5 | 100 | 1224 | -0.0042 | 0.2398 | -1.2829 | 2.06263 |
| Australia | 3264 | 49.4942 | 23.0009 | 3 | 100 | 3264 | 3264 | -0.0101 | 0.25609 | -1.674 |
| Belgium | 2448 | 39.8064 | 20.5619 | 2 | 100 | 2448 | -0.0096 | 0.31842 | -1.5805 | 1.66073 |
| Brazil | 10404 | 43.3358 | 20.8412 | 1 | 100 | 10404 | -0.0055 | 0.25532 | -1.8326 | 3.50656 |
| Canada | 9792 | 41.8859 | 20.1034 | 2 | 100 | 9792 | -0.0114 | 0.30948 | -2.5055 | 2.12026 |
| Chile | 4488 | 48.1308 | 22.3548 | 5 | 100 | 4488 | 0.00036 | 0.25959 | -2.069 | 2.16282 |
| Denmark | 2856 | 47.6005 | 19.6364 | 4 | 100 | 2856 | -0.013 | 0.3034 | -2.3865 | 1.80181 |
| Finland | 3876 | 37.6414 | 19.2628 | 3 | 100 | 3876 | -0.0153 | 0.30947 | -1.8458 | 1.93565 |
| France | 7548 | 50.2048 | 21.6205 | 4 | 100 | 7548 | -0.0038 | 0.22456 | -2.0477 | 2.26176 |
| Germany | 5712 | 52.9422 | 21.291 | 3 | 100 | 5712 | -0.0052 | 0.21514 | -2.2407 | 2.73337 |
| India | 11628 | 42.0061 | 19.4018 | 2 | 100 | 11628 | -0.0018 | 0.26801 | -2.3026 | 1.83258 |
| Indonesia | 6120 | 34.8132 | 19.1238 | 1 | 100 | 6120 | -0.0218 | 0.33761 | -2.3026 | 2.15543 |
| Malaysia | 5712 | 41.5207 | 19.6287 | 2 | 100 | 5712 | -0.011 | 0.32079 | -2.0794 | 1.84055 |
| Mexico | 6732 | 41.1465 | 19.9621 | 1 | 100 | 6732 | -0.0075 | 0.30253 | -2.3514 | 2.40795 |
| Netherlands | 3060 | 40.3399 | 18.3802 | 5 | 100 | 3060 | -0.0033 | 0.26636 | -1.8056 | 1.36649 |
| New Zealand | 3876 | 46.37 | 18.3889 | 3 | 100 | 3876 | -0.0173 | 0.28387 | -2.6912 | 1.18744 |
| Norway | 2244 | 45.0459 | 21.2333 | 1 | 100 | 2244 | -0.0211 | 0.34691 | -2.7568 | 1.32176 |
| Peru | 1836 | 41.3382 | 18.6863 | 5 | 100 | 1836 | -0.0213 | 0.31842 | -1.9357 | 1.30891 |
| Philippines | 3264 | 45.4767 | 19.9432 | 6 | 100 | 3264 | -0.0161 | 0.28559 | -1.5983 | 1.63476 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Portugal | 1632 | 43.2592 | 17.9823 | 4 | 100 | 1632 | -0.0079 | 0.27725 | -1.6818 | 1.22078 |
| Singapore | 4080 | 44.1326 | 20.5512 | 1 | 100 | 4080 | 0.00042 | 0.31317 | -2.0149 | 1.75667 |
| Spain | 6528 | 40.9933 | 22.1024 | 2 | 100 | 6528 | 0.00233 | 0.27767 | -1.8827 | 2.52573 |
| Sweden | 4692 | 46.0757 | 21.6537 | 1 | 100 | 4692 | -0.0095 | 0.30967 | -2.3514 | 3.10109 |
| Switzerland | 3264 | 50.8928 | 21.6631 | 4 | 100 | 3264 | -0.0159 | 0.29406 | -1.7636 | 1.96611 |
| Turkey | 6324 | 39.3325 | 23.9622 | 1 | 100 | 6324 | 0.0093 | 0.28504 | -1.6582 | 3.50656 |
| UK | 16524 | 39.3325 | 23.9622 | 1 | 100 | 16524 | 0.0093 | 0.28504 | -1.6582 | 3.50656 |
| USA | 17748 | 45.1685 | 20.0115 | 1 | 100 | 17748 | -0.0088 | 0.26773 | -2.4423 | 2.2538 |

GSVI stands for Google Search Volume Index, ASVI stands for Abnormal Search Volume Index

Table Appendix 23: Descriptive Statistics for Abnormal Return and Abnormal Trading Volume

| | AR | | | | | AVOL | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Observation** | **Mean** | **Std. Dev.** | **Min** | **Max** | **Observation** | **Mean** | **Std. Dev.** | **Min** | **Max** |
| Argentina | 1224 | 0.00064 | 0.045 | -0.206 | 0.312 | 1224 | -0.161 | 0.566 | -2.399 | 2.879 |
| Australia | 3264 | 0.00056 | 0.028 | -0.248 | 0.304 | 3264 | -0.063 | 0.358 | -1.929 | 1.700 |
| Belgium | 2448 | -0.00012 | 0.038 | -0.347 | 0.332 | 2448 | -0.090 | 0.481 | -2.462 | 2.617 |
| Brazil | 10404 | 0.00010 | 0.056 | -0.514 | 1.365 | 10334 | -0.140 | 0.640 | -5.415 | 4.879 |
| Canada | 9792 | 0.00051 | 0.038 | -0.311 | 0.486 | 9788 | -0.079 | 0.421 | -1.759 | 2.623 |
| Chile | 4488 | 0.00020 | 0.033 | -0.250 | 0.481 | 4486 | -0.215 | 0.741 | -6.943 | 5.099 |
| Denmark | 2856 | 0.00075 | 0.031 | -0.179 | 0.265 | 2856 | -0.094 | 0.432 | -2.184 | 2.339 |
| Finland | 3876 | 0.00050 | 0.037 | -0.262 | 0.369 | 3876 | -0.088 | 0.423 | -1.792 | 3.421 |
| France | 7548 | 0.00058 | 0.029 | -0.202 | 0.500 | 7548 | -0.063 | 0.362 | -1.868 | 1.820 |
| Germany | 5712 | 0.00001 | 0.027 | -0.206 | 0.186 | 5712 | -0.282 | 0.629 | -3.168 | 3.030 |
| India | 11628 | 0.00094 | 0.040 | -0.319 | 0.530 | 11628 | -0.088 | 0.470 | -2.217 | 3.356 |
| Indonesia | 6120 | -0.00004 | 0.048 | -0.273 | 0.539 | 6118 | -0.241 | 0.780 | -8.994 | 3.478 |
| Malaysia | 5712 | -0.00014 | 0.029 | -0.344 | 0.348 | 5708 | -0.152 | 0.625 | -3.855 | 2.778 |
| Mexico | 6732 | -0.00123 | 0.050 | -0.985 | 1.481 | 6392 | -0.167 | 0.568 | -4.934 | 3.307 |
| Netherlands | 3060 | -0.00003 | 0.037 | -0.508 | 1.040 | 3060 | -0.062 | 0.385 | -1.773 | 2.669 |
| New Zealand | 3876 | 0.00000 | 0.033 | -0.297 | 0.356 | 3875 | -0.357 | 0.837 | -5.107 | 5.294 |
| Norway | 2244 | 0.00151 | 0.047 | -0.312 | 0.909 | 2244 | -0.080 | 0.504 | -2.754 | 2.383 |
| Peru | 1836 | -0.00176 | 0.045 | -0.485 | 0.529 | 1836 | -0.476 | 1.006 | -4.985 | 3.315 |
| Philippines | 3264 | -0.00038 | 0.031 | -0.193 | 0.269 | 3264 | -0.190 | 0.588 | -3.231 | 2.754 |
| Portugal | 1632 | 0.00125 | 0.040 | -0.240 | 0.222 | 1631 | -0.131 | 0.607 | -3.254 | 4.107 |
| Singapore | 4080 | 0.00001 | 0.022 | -0.122 | 0.242 | 4080 | -0.078 | 0.496 | -3.583 | 2.286 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Spain | 6528 | 0.00005 | 0.040 | -0.923 | 0.983 | 6528 | -0.109 | 0.449 | -2.840 | 4.505 |
| Sweden | 4692 | 0.00112 | 0.035 | -0.384 | 0.459 | 4692 | -0.076 | 0.417 | -2.846 | 1.911 |
| Switzerland | 3264 | 0.00034 | 0.030 | -0.226 | 0.445 | 3264 | -0.025 | 0.380 | -1.567 | 2.371 |
| Turkey | 6324 | 0.00087 | 0.035 | -0.223 | 0.380 | 6324 | -0.114 | 0.548 | -2.458 | 2.910 |
| UK | 16524 | 0.00087 | 0.035 | -0.223 | 0.380 | 16524 | -0.114 | 0.548 | -2.458 | 2.910 |
| USA | 17748 | 0.00001 | 0.036 | -0.399 | 0.397 | 17748 | -0.090 | 0.409 | -1.732 | 2.166 |

AR stands for Abnormal Return, AVOL stands for Abnormal Trading Volume

Table Appendix 24: Descriptive Statistics for Standard Deviation of Returns

| | ST_DEV | | | | |
|---|---|---|---|---|---|
| | **Observation** | **Mean** | **Std. Dev.** | **Min** | **Max** |
| Argentina | 1224 | 0.02295 | 0.01369 | 0.00318 | 0.11283 |
| Australia | 3264 | 0.01242 | 0.00874 | 0.00051 | 0.08051 |
| Belgium | 2448 | 0.01432 | 0.01166 | 0.00097 | 0.16789 |
| Brazil | 10404 | 0.02203 | 0.01858 | 0.00000 | 0.58214 |
| Canada | 9792 | 0.01436 | 0.01245 | 0.00000 | 0.17815 |
| Chile | 4488 | 0.01229 | 0.00948 | 0.00000 | 0.16399 |
| Denmark | 2856 | 0.01377 | 0.00938 | 0.00068 | 0.09614 |
| Finland | 3876 | 0.01564 | 0.01107 | 0.00081 | 0.11219 |
| France | 7548 | 0.01412 | 0.00902 | 0.00085 | 0.10457 |
| Germany | 5712 | 0.01373 | 0.00824 | 0.00083 | 0.10898 |
| India | 11628 | 0.01684 | 0.01072 | 0.00080 | 0.20914 |
| Indonesia | 6120 | 0.01890 | 0.01338 | 0.00000 | 0.14713 |
| Malaysia | 5712 | 0.01105 | 0.00926 | 0.00000 | 0.13396 |
| Mexico | 6732 | 0.01522 | 0.01544 | 0.00000 | 0.44560 |
| Netherlands | 3060 | 0.01421 | 0.01140 | 0.00019 | 0.23606 |
| New Zealand | 3876 | 0.01262 | 0.00953 | 0.00000 | 0.19773 |
| Norway | 2244 | 0.01607 | 0.01230 | 0.00099 | 0.16513 |
| Peru | 1836 | 0.01538 | 0.01351 | 0.00000 | 0.15189 |
| Philippines | 3264 | 0.01409 | 0.00936 | 0.00000 | 0.16276 |
| Portugal | 1632 | 0.01799 | 0.01370 | 0.00000 | 0.14511 |

| | | | | | |
|---|---|---|---|---|---|
| Singapore | 4080 | 0.01055 | 0.00706 | 0.00000 | 0.09009 |
| Spain | 6528 | 0.01622 | 0.01480 | 0.00000 | 0.31392 |
| Sweden | 4692 | 0.01501 | 0.01260 | 0.00073 | 0.27531 |
| Switzerland | 3264 | 0.01261 | 0.00961 | 0.00020 | 0.10138 |
| Turkey | 6324 | 0.01714 | 0.01016 | 0.00000 | 0.11971 |
| UK | 16524 | 0.01714 | 0.01016 | 0.00000 | 0.11971 |
| USA | 17748 | 0.01468 | 0.01091 | 0.00058 | 0.17980 |

ST_DEV stands for standard deviation of returns

## Appendix 4: Fixed Effect Regression Estimates

### Appendix 4.1. Investor Attention and Abnormal Stock Returns

Table Appendix 25: One-Week Lagged Investor Attention and Abnormal Stock Returns – Fixed Effect Regression Estimates

| | $ASVI_{(t-1)}$ | MV | BM | $AR_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | 0.000407 | 0.00199 | -0.00038 | -0.00284 | -0.0205 | 1218 | 0 |
| Australia | 0.00117 | 0.0013 | -0.0146** | -0.0275 | -0.0243 | 3248 | 0.009 |
| Belgium | 0.0011 | -0.00143 | -0.00829 | 0.0182 | 0.00764 | 2233 | 0.002 |
| Brazil | -0.00275 | 0.0076*** | -0.004*** | -0.0165 | -0.074*** | 9362 | 0.007 |
| Canada | 0.00272** | 0.00271 | -0.0053** | 0.0279*** | -0.0293 | 9374 | 0.004 |
| Chile | 0.000328 | 0.00461 | -0.00402 | 0.00321 | -0.0679 | 4466 | 0.003 |
| Denmark | -0.00161 | 0.0047 | -0.007 | 0.00639 | -0.0618 | 2639 | 0.006 |
| Finland | 0.000388 | 0.00207 | -0.015*** | -0.018 | -0.0293 | 3654 | 0.009 |
| France | -0.00025 | 0.0065*** | -0.005** | -0.0244** | -0.067*** | 7511 | 0.006 |
| Germany | -0.0039** | 0.00537** | -0.006*** | 0.0208 | -0.059*** | 5632 | 0.008 |
| India | 0.0053*** | -0.0037** | -0.013*** | -0.031*** | 0.0375* | 11527 | 0.006 |
| Indonesia | -0.00067 | 0.0168*** | 0.000893 | -0.00978 | -0.290*** | 6090 | 0.01 |
| Malaysia | -0.00040 | 0.00336 | -0.0069** | -0.099*** | -0.038 | 5481 | 0.014 |
| Mexico | 0.000069 | 0.00057 | -0.00696* | -0.0238* | -0.0138 | 5835 | 0.002 |
| Netherlands | 0.00223 | 0.00859 | -0.016*** | -0.132*** | -0.0940** | 2899 | 0.027 |
| New Zealand | 0.00246 | -0.00156 | -0.0120** | -0.0312 | 0.00495 | 2639 | 0.006 |
| Norway | 0.0072*** | 0.00366 | 0.00327 | -0.119*** | -0.0363 | 2191 | 0.017 |
| Peru | -0.00434 | 0.0136** | -0.00141 | -0.0462* | -0.115** | 1657 | 0.011 |
| Philippines | 0.000504 | 0.00787* | -0.0097** | -0.058*** | -0.105** | 3248 | 0.011 |
| Portugal | 0.000512 | 0.0108 | -0.00735 | -0.0623** | -0.0869 | 1624 | 0.019 |
| Singapore | 0.000603 | 0.00305 | -0.00426 | -0.051*** | -0.0307 | 4060 | 0.005 |
| Spain | -0.009*** | 0.0147*** | -0.00034 | -0.00615 | -0.133*** | 6179 | 0.013 |
| Sweden | 0.00029 | -0.008*** | -0.023*** | -0.0169 | 0.0639** | 4196 | 0.012 |
| Switzerland | 0.00145 | 0.00787** | 0.00119 | -0.0245 | -0.0795** | 3248 | 0.003 |
| Turkey | 0.00215 | 0.0097*** | -0.008*** | -0.071*** | -0.090*** | 5379 | 0.015 |
| UK | -0.00029 | 0.0121*** | -0.005*** | -0.039*** | -0.115*** | 15262 | 0.009 |
| USA | 0.00037* | 0.0054*** | -0.003*** | -0.036*** | -0.060*** | 16802 | 0.006 |

This table reports the fixed effects regression estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on market risk adjusted abnormal returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's abnormal returns (AR(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table Appendix 26: One-Week Lagged Investor Attention and Abnormal Stock Returns – Fixed Effect Regression Estimates (Subsample)

| | $ASVI_{(t-1)}$ | MV | BM | $AR_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | |
| Americas | 0.000169 | 0.00529*** | -0.00387*** | -0.0145*** | -0.0589*** | 48714 | 0.004 |
| Asia-Pacific | 0.00155** | 0.000848 | -0.0108*** | -0.0326*** | -0.0183 | 36293 | 0.006 |
| Europe | -0.000407 | 0.00725*** | -0.00554*** | -0.0331*** | -0.0735*** | 62647 | 0.007 |
| Americas_excl_USA | 0.000105 | 0.00524*** | -0.00410*** | -0.00694 | -0.0579*** | 31912 | 0.004 |
| **Culture** | | | | | | | |
| Collectivist Countries | -0.000298 | 0.00604*** | -0.00494*** | -0.0261*** | -0.0723*** | 66126 | 0.005 |
| Individualist Countries | 0.000764* | 0.00553*** | -0.00487*** | -0.0246*** | -0.0585*** | 81528 | 0.005 |
| Individualist_excl_USA | 0.000867* | 0.00501*** | -0.00624*** | -0.0217*** | -0.0531*** | 64726 | 0.005 |
| Low UAI Countries | 0.00117*** | 0.00484*** | -0.00569*** | -0.0301*** | -0.0573*** | 96558 | 0.005 |
| Low UAI_excl_USA | 0.00132*** | 0.00372*** | -0.00760*** | -0.0291*** | -0.0463*** | 79756 | 0.006 |
| High UAI Countries | -0.00179*** | 0.00706*** | -0.00416*** | -0.0178*** | -0.0735*** | 51096 | 0.005 |
| **Development** | | | | | | | |
| Developing Countries | 0.000542 | 0.00535*** | -0.00523*** | -0.0267*** | -0.0676*** | 54263 | 0.005 |
| Developed Countries | 0.000124 | 0.00614*** | -0.00459*** | -0.0242*** | -0.0634*** | 93391 | 0.005 |
| Developed_excl_USA | 0.000099 | 0.00610*** | -0.00542*** | -0.0216*** | -0.0622*** | 76589 | 0.005 |

This table reports the fixed effects regression estimation results of the subsample analysis for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on market risk adjusted abnormal returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's abnormal returns (AR(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

## Appendix 4.2. Investor Attention and Stock Liquidity

Table Appendix 27: One-Week Lagged Investor Attention and Stock Liquidity– Fixed Effect Regression Estimates

| | $ASVI_{(t-1)}$ | MV | BM | $r_{(t-1)}$ | $AVOL_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| Argentina | 0.122*** | 0.140*** | 0.012 | 0.209 | 0.429*** | -1.53*** | 1218 | 0.226 |
| Australia | 0.254*** | -0.0285 | 0.153** | -1.16*** | 0.361*** | 0.379 | 3248 | 0.216 |
| Belgium | 0.259*** | 0.015 | 0.0391 | -0.60*** | 0.539*** | -0.148 | 2233 | 0.361 |
| Brazil | 0.221*** | -0.0347** | -0.0168** | -0.22*** | 0.539*** | 0.261* | 9306 | 0.307 |
| Canada | 0.196*** | -0.0736*** | 0.0372* | -0.54*** | 0.417*** | 0.701*** | 9370 | 0.211 |
| Chile | 0.111*** | 0.517*** | 0.208*** | -1.18*** | 0.358*** | -7.48*** | 4462 | 0.159 |
| Denmark | 0.347*** | -0.112* | -0.0607 | -0.70*** | 0.319*** | 1.115* | 2639 | 0.185 |
| Finland | 0.226*** | -0.0265 | 0.0212 | -0.64*** | 0.375*** | 0.185 | 3654 | 0.178 |
| France | 0.272*** | -0.113*** | -0.0444* | -1.16*** | 0.382*** | 1.070*** | 7511 | 0.214 |
| Germany | 0.460*** | -0.0231 | 0.0746* | -0.209 | 0.402*** | 0.117 | 5632 | 0.208 |
| India | 0.274*** | -0.00093 | 0.0457** | -0.35*** | 0.427*** | 0.00932 | 11527 | 0.22 |
| Indonesia | 0.149*** | 0.138** | 0.207*** | -0.31** | 0.514*** | -2.370** | 6087 | 0.265 |
| Malaysia | 0.163*** | 0.0752 | 0.0856 | -0.84*** | 0.482*** | -0.777 | 5476 | 0.246 |
| Mexico | 0.142*** | -0.0285 | 0.200*** | -0.56*** | 0.362*** | 0.413 | 5739 | 0.158 |
| Netherlands | 0.274*** | -0.0918* | 0.0209 | -0.93*** | 0.427*** | 0.853** | 2899 | 0.258 |
| New Zealand | 0.217*** | 0.107 | -0.0234 | -0.55 | 0.355*** | -0.908 | 2639 | 0.142 |
| Norway | 0.271*** | 0.578*** | 0.647*** | -0.182 | 0.440*** | -5.97*** | 2191 | 0.283 |
| Peru | 0.246*** | 0.476*** | 0.342*** | -0.525 | 0.228*** | -4.21*** | 1657 | 0.07 |
| Philippines | 0.164*** | 0.105 | 0.11 | 0.112 | 0.422*** | -1.311 | 3248 | 0.187 |
| Portugal | 0.163*** | -0.466*** | -0.560*** | -0.272 | 0.562*** | 3.503*** | 1622 | 0.369 |
| Singapore | 0.173*** | 0.417*** | 0.513*** | -1.06*** | 0.483*** | -3.61*** | 4060 | 0.28 |
| Spain | 0.331*** | -0.0580** | -0.0388** | -0.55*** | 0.495*** | 0.441* | 6179 | 0.33 |
| Sweden | 0.264*** | 0.188*** | 0.257*** | -0.40*** | 0.445*** | -1.89*** | 4196 | 0.284 |
| Switzerland | 0.290*** | 0.0788* | 0.0978** | -1.17*** | 0.387*** | -0.730* | 3248 | 0.253 |
| Turkey | 0.167*** | 0.0295 | -0.00742 | -0.93*** | 0.564*** | -0.322 | 5379 | 0.326 |
| UK | 0.242*** | -0.079*** | 0.0362*** | -0.97*** | 0.392*** | 0.751*** | 15262 | 0.229 |
| USA | 0.235*** | -0.0138 | 0.0246*** | -0.75*** | 0.372*** | 0.129 | 16802 | 0.178 |

This table reports the fixed effects regression estimation results for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on stock liquidity measured by abnormal trading volume. Market Value (MV), Book to Market Ratio (BM), preceding week's return (r(t-1)), and preceding week's abnormal trading volume (AVOL(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table Appendix 28: One-Week Lagged Investor Attention and Stock Liquidity – Fixed Effect Regression Estimates (Subsample)

| | $ASVI_{(t-1)}$ | MV | BM | $r_{(t-1)}$ | $AVOL_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | | |
| Americas | 0.199*** | -0.00325 | 0.00768 | -0.502 | 0.399*** | -0.0343 | 48554 | 0.174 |
| Asia-Pacific | 0.199*** | 0.0491*** | 0.102*** | -0.415 | 0.459*** | -0.598*** | 36285 | 0.225 |
| Europe | 0.265*** | -0.0111 | 0.0236*** | -0.726 | 0.446*** | 0.0795 | 62645 | 0.249 |
| Americas_excl_USA | 0.185*** | 0.00322 | 0.000497 | -0.424 | 0.405*** | -0.122 | 31752 | 0.174 |
| **Culture** | | | | | | | | |
| Collectivist Countries | 0.199*** | 0.00676 | 0.00737 | -0.435*** | 0.458*** | -0.152 | 65960 | 0.221 |
| Individualist Countries | 0.255*** | -0.0165** | 0.0386*** | -0.747*** | 0.400*** | 0.151** | 81524 | 0.208 |
| Individualist_excl_USA | 0.259*** | -0.012 | 0.0516*** | -0.747*** | 0.406*** | 0.111 | 64722 | 0.215 |
| Low UAI Countries | 0.225*** | -0.00174 | 0.0497*** | -0.601*** | 0.432*** | 0.0179 | 96546 | 0.218 |
| Low UAI_excl_USA | 0.223*** | 0.0129 | 0.0714*** | -0.578*** | 0.440*** | -0.131 | 79744 | 0.224 |
| High UAI Countries | 0.234*** | 0.00382 | -0.00749 | -0.529*** | 0.438*** | -0.13 | 50938 | 0.211 |
| **Development** | | | | | | | | |
| Developing Countries | 0.188*** | 0.0108 | 0.0109 | -0.400*** | 0.449*** | -0.208* | 54099 | 0.21 |
| Developed Countries | 0.253*** | -0.0171*** | 0.0307*** | -0.723*** | 0.417*** | 0.146** | 93385 | 0.221 |
| Developed_excl_USA | 0.256*** | -0.0163* | 0.0353*** | -0.719*** | 0.425*** | 0.137* | 76583 | 0.229 |

This table reports the fixed effects regression estimation results of the subsample analysis for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on stock liquidity measured by abnormal trading volume. Market Value (MV), Book to Market Ratio (BM), preceding week's returns (r(t-1)), and preceding week's abnormal trading volume (AVOL(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

## Appendix 4.3. Investor Attention and Stock Return Volatility

Table Appendix 29: Investor Attention and Stock Return Volatility – Fixed Effect Regression Estimates

| | ASVI | MV | BM | $St\_dev_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | -0.000694 | -0.00788*** | -0.0040*** | 0.193*** | 0.0958*** | 1218 | 0.113 |
| Australia | 0.00412*** | -0.00118 | 0.0121*** | 0.189*** | 0.0320** | 3248 | 0.185 |
| Belgium | 0.00865*** | -0.000955 | -0.000692 | 0.174*** | 0.0200* | 2233 | 0.109 |
| Brazil | 0.00469*** | -0.00780*** | -0.00139*** | 0.207*** | 0.0897*** | 9402 | 0.094 |
| Canada | 0.00374*** | -0.00818*** | 0.00166*** | 0.300*** | 0.0909*** | 9379 | 0.198 |
| Chile | 0.00120** | 0.00220*** | 0.00271*** | 0.249*** | -0.0212* | 4466 | 0.067 |
| Denmark | 0.00699*** | -0.00514*** | -0.00215 | 0.161*** | 0.0664*** | 2639 | 0.096 |
| Finland | 0.00395*** | -0.00917*** | 0.00299*** | 0.114*** | 0.0929*** | 3654 | 0.102 |
| France | 0.00330*** | -0.00637*** | 0.00173*** | 0.258*** | 0.0754*** | 7511 | 0.136 |
| Germany | 0.00500*** | -0.00569*** | 0.0000814 | 0.243*** | 0.0685*** | 5632 | 0.118 |
| India | 0.00547*** | -0.00475*** | -0.00197*** | 0.104*** | 0.0769*** | 11571 | 0.05 |
| Indonesia | 0.00148*** | -0.00324*** | 0.0000863 | 0.255*** | 0.0705*** | 6090 | 0.074 |
| Malaysia | 0.00277*** | -0.00619*** | 0.000976 | 0.237*** | 0.0710*** | 5481 | 0.112 |
| Mexico | 0.00223*** | -0.000905 | -0.000118 | 0.219*** | 0.0217** | 5835 | 0.052 |
| Netherlands | 0.00752*** | 0.00138 | 0.0119*** | 0.323*** | 0.00631 | 2899 | 0.207 |
| New Zealand | 0.00265*** | 0.0000532 | 0.00323 | 0.0539*** | 0.0129 | 2639 | 0.016 |
| Norway | 0.00431*** | 0.00335* | 0.0102*** | 0.240*** | -0.0187 | 2191 | 0.132 |
| Peru | 0.00234*** | -0.00835*** | 0.0013 | 0.287*** | 0.0798*** | 1657 | 0.168 |
| Philippines | 0.00113** | -0.00285** | 0.00355*** | 0.207*** | 0.0490*** | 3248 | 0.062 |
| Portugal | 0.00382*** | -0.0211*** | -0.0157*** | 0.268*** | 0.177*** | 1624 | 0.134 |
| Singapore | 0.00286*** | -0.00388*** | 0.00319** | 0.235*** | 0.0460*** | 4060 | 0.121 |
| Spain | 0.00815*** | -0.0151*** | -0.00127** | 0.193*** | 0.148*** | 6184 | 0.187 |
| Sweden | 0.00749*** | -0.00107 | 0.00249** | 0.244*** | 0.0263*** | 4399 | 0.115 |
| Switzerland | 0.00541*** | -0.00538*** | 0.00213** | 0.216*** | 0.0672*** | 3248 | 0.141 |
| Turkey | 0.00191*** | -0.000459 | -0.00230*** | 0.130*** | 0.0177*** | 5379 | 0.025 |
| UK | 0.00461*** | -0.00886*** | 0.00163*** | 0.281*** | 0.0931*** | 15324 | 0.185 |
| USA | 0.00492*** | -0.00363*** | 0.000075 | 0.127*** | 0.0496*** | 16802 | 0.049 |

This table reports the fixed effects regression estimation results for the effect of Abnormal Search Volume Index (ASVI(t)) on volatility measured by standard deviation of returns. Market Value (MV), Book to Market Ratio (BM), stock return (r(t)), and preceding week's standard deviation (St_dev(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table Appendix 30: One-Week Lagged Investor Attention and Stock Return Volatility – Fixed Effect Regression Estimates

| | $ASVI_{(t-1)}$ | MV | BM | $St\_dev_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | -0.00282* | -0.00785*** | -0.00409*** | 0.193*** | 0.0955*** | 1218 | 0.115 |
| Australia | 0.000348 | -0.00147 | 0.0119*** | 0.194*** | 0.0348** | 3248 | 0.167 |
| Belgium | -0.000686 | -0.00121 | -0.00117 | 0.200*** | 0.0215* | 2233 | 0.039 |
| Brazil | 0.00103** | -0.00774*** | -0.00137*** | 0.208*** | 0.0892*** | 9402 | 0.086 |
| Canada | -0.000501* | -0.00805*** | 0.00179*** | 0.305*** | 0.0897*** | 9379 | 0.184 |
| Chile | 0.00000183 | 0.00221*** | 0.00267*** | 0.250*** | -0.0214* | 4466 | 0.066 |
| Denmark | -0.000769 | -0.00460*** | -0.00178 | 0.181*** | 0.0605*** | 2639 | 0.041 |
| Finland | 0.000411 | -0.00912*** | 0.00294*** | 0.116*** | 0.0923*** | 3654 | 0.089 |
| France | -0.000932** | -0.00628*** | 0.00185*** | 0.263*** | 0.0744*** | 7511 | 0.129 |
| Germany | -0.000786* | -0.00543*** | 0.000294 | 0.255*** | 0.0658*** | 5632 | 0.1 |
| India | -0.000113 | -0.00460*** | -0.00196*** | 0.113*** | 0.0747*** | 11571 | 0.027 |
| Indonesia | -0.000399 | -0.00322*** | 0.0000916 | 0.255*** | 0.0701*** | 6090 | 0.073 |
| Malaysia | 0.000113 | -0.00627 | 0.000898 | 0.238*** | 0.0717*** | 5481 | 0.1 |
| Mexico | 0.000969* | -0.000927 | -0.000149 | 0.218*** | 0.0219** | 5835 | 0.049 |
| Netherlands | 0.000409 | 0.00169 | 0.0120*** | 0.338*** | 0.00323 | 2899 | 0.169 |
| New Zealand | 0.00000766 | 0.000216 | 0.00348* | 0.055*** | 0.0118 | 2639 | 0.009 |
| Norway | 0.00110* | 0.00369** | 0.0108*** | 0.234*** | -0.0221 | 2191 | 0.112 |
| Peru | -0.000631 | -0.00823*** | 0.00134 | 0.291*** | 0.0786*** | 1657 | 0.165 |
| Philippines | -0.000281 | -0.00282** | 0.00359*** | 0.207*** | 0.0487*** | 3248 | 0.061 |
| Portugal | -0.00178* | -0.0211*** | -0.0157*** | 0.274*** | 0.177*** | 1624 | 0.128 |
| Singapore | 0.000393 | -0.00372*** | 0.00330** | 0.236*** | 0.0446*** | 4060 | 0.104 |
| Spain | 0.000517 | -0.0151*** | -0.00122** | 0.212*** | 0.148*** | 6184 | 0.146 |
| Sweden | 0.0000428 | -0.000982 | 0.00212** | 0.261*** | 0.0246*** | 4399 | 0.074 |
| Switzerland | 0.000287 | -0.00519*** | 0.00244** | 0.228*** | 0.0653*** | 3248 | 0.106 |
| Turkey | -0.000961** | -0.000348 | -0.00227*** | 0.134*** | 0.0167*** | 5379 | 0.022 |
| UK | -0.000229 | -0.00874*** | 0.00172*** | 0.294*** | 0.0918*** | 15324 | 0.165 |
| USA | -0.00077*** | -0.00344*** | 0.0000798 | 0.133*** | 0.0476*** | 16802 | 0.032 |

This table reports the fixed effects regression estimation results for the effect of Lagged Abnormal Search Volume Index (ASVI(t-1)) on volatility measured by standard deviation of returns. Market Value (MV), Book to Market Ratio (BM), stock return (r(t)), and preceding week's standard deviation (St_dev(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table Appendix 31: Investor Attention and Stock Return Volatility – Fixed Effect Regression Estimates (Subsample)

| | ASVI | MV | BM | St_dev | Cons. | Obs. | R2 |
|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | |
| Americas | 0.00371*** | -0.00496*** | 0.000126 | 0.215*** | 0.0641*** | 48759 | 0.081 |
| Asia-Pacific | 0.00312*** | -0.00423*** | 0.000111* | 0.190*** | 0.0639*** | 36337 | 0.062 |
| Europe | 0.00532*** | -0.00586*** | 0.000917*** | 0.246*** | 0.0681*** | 62917 | 0.125 |
| Americas_excl_USA | 0.00316*** | -0.00612*** | -0.000271 | 0.247*** | 0.0766*** | 31957 | 0.1 |
| **Culture** | | | | | | | |
| Collectivist Countries | 0.00337*** | -0.00471*** | 0.0000174 | 0.216*** | 0.0664*** | 66215 | 0.075 |
| Individualist Countries | 0.00497*** | -0.00516*** | 0.00127*** | 0.228*** | 0.0628*** | 81798 | 0.113 |
| Individualist_excl_USA | 0.00493*** | -0.00568*** | 0.00191*** | 0.253*** | 0.0673*** | 64996 | 0.136 |
| Low UAI Countries | 0.00433*** | -0.00522*** | 0.000256*** | 0.218*** | 0.0679*** | 96872 | 0.095 |
| Low UAI_excl_USA | 0.00421*** | -0.00579*** | 0.000249*** | 0.237*** | 0.0745*** | 80070 | 0.107 |
| High UAI Countries | 0.00406*** | -0.00590*** | -0.000779*** | 0.230*** | 0.0712*** | 51141 | 0.089 |
| **Development** | | | | | | | |
| Developing Countries | 0.00289*** | -0.00406*** | 0.0000318 | 0.208*** | 0.0616*** | 54347 | 0.064 |
| Developed Countries | 0.00503*** | -0.00564*** | 0.00104*** | 0.231*** | 0.0666*** | 93666 | 0.117 |
| Developed_excl_USA | 0.00501*** | -0.00641*** | 0.00134*** | 0.252*** | 0.0731*** | 76864 | 0.138 |

This table reports the fixed effects regression estimation results of the subsample analysis for the effect of Abnormal Search Volume Index (ASVI(t)) on volatility measured by standard deviation of returns. Market Value (MV), Book to Market Ratio (BM), stock returns (r(t)), and preceding week's standard deviations (St_dev(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. The sample period is from March 2014 to January 2018.
*** p<0.01, ** p<0.05, * p<0.1

Table Appendix 32: One-Week Lagged Investor Attention and Stock Return Volatility – Fixed Effect Regression Estimates (Subsample)

| | $ASVI_{(t-1)}$ | MV | BM | $St\_dev_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | |
| Americas | -0.000131 | -0.00487*** | 0.000139 | 0.217*** | 0.0631*** | 48759 | 0.072 |
| Asia-Pacific | -0.000107 | -0.00418*** | 0.000120** | 0.192*** | 0.0632*** | 36337 | 0.053 |
| Europe | -0.000202 | -0.00573*** | 0.00101*** | 0.257*** | 0.0667*** | 62917 | 0.101 |
| Americas_excl_USA | 0.00021 | -0.00607*** | -0.000261 | 0.249*** | 0.0761*** | 31957 | 0.094 |
| **Culture** | | | | | | | |
| Collectivist Countries | 0.0000184 | -0.00465*** | 0.0000261 | 0.218*** | 0.0657*** | 66215 | 0.066 |
| Individualist Countries | -0.000259** | -0.00502*** | 0.00134*** | 0.237*** | 0.0614*** | 81798 | 0.091 |
| Individualist_excl_USA | -0.000205* | -0.00555*** | 0.00202*** | 0.262*** | 0.0659*** | 64996 | 0.114 |
| Low UAI Countries | -0.000143 | -0.00514*** | 0.000274*** | 0.224*** | 0.0668*** | 96872 | 0.078 |
| Low UAI_excl_USA | -0.0000647 | -0.00573*** | 0.000266*** | 0.242*** | 0.0737*** | 80070 | 0.091 |
| High UAI Countries | -0.0000534 | -0.00583*** | -0.000758*** | 0.235*** | 0.0704*** | 51141 | 0.079 |
| **Development** | | | | | | | |
| Developing Countries | -0.0000433 | -0.00400*** | 0.0000391 | 0.210*** | 0.0609*** | 54347 | 0.058 |
| Developed Countries | -0.000207* | -0.00551*** | 0.00110*** | 0.240*** | 0.0652*** | 93666 | 0.095 |
| Developed_excl_USA | -0.000155 | -0.00629*** | 0.00143*** | 0.261*** | 0.0719*** | 76864 | 0.115 |

This table reports the fixed effects regression estimation results of the subsample analysis for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on volatility measured by standard deviation of returns. Market Value (MV), Book to Market Ratio (BM), stock returns (r(t)), and preceding week's standard deviations (St_dev(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

## Appendix 5: Fixed Effect Regression with Robust Standard Errors Estimates

### Appendix 5.1. Investor Attention and Abnormal Stock Returns

Table Appendix 33: One-Week Lagged Investor Attention and Abnormal Stock Returns– Estimates from Fixed Effect Regression with Robust Standard Errors

| | $ASVI_{(t-1)}$ | MV | BM | $AR_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | 0.000407 | 0.00199 | -0.000383 | -0.00284 | -0.0205 | 1218 | 0 |
| Australia | 0.00117 | 0.0013 | -0.0146*** | -0.0275** | -0.0243 | 3248 | 0.009 |
| Belgium | 0.0011 | -0.00143 | -0.00829 | 0.0182 | 0.00764 | 2233 | 0.002 |
| Brazil | -0.00275 | 0.00757*** | -0.00418*** | -0.0165 | -0.0742*** | 9362 | 0.007 |
| Canada | 0.00272* | 0.00271 | -0.00527 | 0.0279 | -0.0293 | 9374 | 0.004 |
| Chile | 0.000328 | 0.00461 | -0.00402 | 0.00321 | -0.0679 | 4466 | 0.003 |
| Denmark | -0.00161 | 0.0047 | -0.007 | 0.00639 | -0.0618 | 2639 | 0.006 |
| Finland | 0.000388 | 0.00207 | -0.0149*** | -0.018 | -0.0293 | 3654 | 0.009 |
| France | -0.000254 | 0.00648*** | -0.00496** | -0.0244 | -0.0672*** | 7511 | 0.006 |
| Germany | -0.00386* | 0.00537* | -0.00599** | 0.0208 | -0.0588** | 5632 | 0.008 |
| India | 0.00531*** | -0.00371 | -0.0131*** | -0.0312** | 0.0375 | 11527 | 0.006 |
| Indonesia | -0.000674 | 0.0168*** | 0.000893 | -0.00978 | -0.290*** | 6090 | 0.01 |
| Malaysia | -0.000401 | 0.00336 | -0.00687 | -0.0997*** | -0.038 | 5481 | 0.014 |
| Mexico | 0.0000619 | 0.00057 | -0.00696 | -0.0238 | -0.0138 | 5835 | 0.002 |
| Netherlands | 0.00223 | 0.00859 | -0.0157 | -0.132** | -0.094 | 2899 | 0.027 |
| New Zealand | 0.00246 | -0.00156 | -0.012 | -0.0312 | 0.00495 | 2639 | 0.006 |
| Norway | 0.00720* | 0.00366 | 0.00327 | -0.119* | -0.0363 | 2191 | 0.017 |
| Peru | -0.00434 | 0.0136* | -0.00141 | -0.0462 | -0.115* | 1657 | 0.011 |
| Philippines | 0.000504 | 0.00787* | -0.00973 | -0.0575* | -0.105** | 3248 | 0.011 |
| Portugal | 0.000512 | 0.0108 | -0.00735 | -0.0623 | -0.0869 | 1624 | 0.019 |
| Singapore | 0.000603 | 0.00305 | -0.00426 | -0.0512*** | -0.0307 | 4060 | 0.005 |
| Spain | -0.00917* | 0.0147** | -0.000342 | -0.00615 | -0.133** | 6179 | 0.013 |
| Sweden | 0.00029 | -0.00771*** | -0.0227*** | -0.0169 | 0.0639*** | 4196 | 0.012 |
| Switzerland | 0.00145 | 0.00787** | 0.00119 | -0.0245 | -0.0795** | 3248 | 0.003 |
| Turkey | 0.00215 | 0.00970*** | -0.00790** | -0.0714*** | -0.0904*** | 5379 | 0.015 |
| UK | -0.000294 | 0.0121*** | -0.00458*** | -0.0394** | -0.115*** | 15262 | 0.009 |
| USA | 0.000372 | 0.00539*** | -0.00339*** | -0.0359*** | -0.0603*** | 16802 | 0.006 |

This table reports the estimation results from the fixed effects regression with robust standard errors for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on market risk adjusted abnormal returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's abnormal returns (AR(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table Appendix 34: One-Week Lagged Investor Attention and Abnormal Stock Returns– Estimates from Fixed Effect Regression with Robust Standard Errors (Subsample)

| | $ASVI_{(t-1)}$ | MV | BM | $AR_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | |
| Americas | 0.000169 | 0.00529*** | -0.00387*** | -0.0145 | -0.0589*** | 48714 | 0.004 |
| Asia-Pacific | 0.00155** | 0.000848 | -0.0108*** | -0.0326*** | -0.0183 | 36293 | 0.006 |
| Europe | -0.000407 | 0.00725*** | -0.00554*** | -0.0331*** | -0.0735*** | 62647 | 0.007 |
| Americas_excl_USA | 0.000105 | 0.00524*** | -0.00410*** | -0.00694 | -0.0579*** | 31912 | 0.004 |
| **Culture** | | | | | | | |
| Collectivist Countries | -0.000298 | 0.00604*** | -0.00494*** | -0.0261*** | -0.0723*** | 66126 | 0.005 |
| Individualist Countries | 0.000764 | 0.00553*** | -0.00487*** | -0.0246*** | -0.0585*** | 81528 | 0.005 |
| Individualist_excl_USA | 0.000867 | 0.00501*** | -0.00624*** | -0.0217** | -0.0531*** | 64726 | 0.005 |
| Low UAI Countries | 0.00117** | 0.00484*** | -0.00569*** | -0.0301*** | -0.0573*** | 96558 | 0.005 |
| Low UAI_excl_USA | 0.00132** | 0.00372*** | -0.00760*** | -0.0291*** | -0.0463*** | 79756 | 0.006 |
| High UAI Countries | -0.00179* | 0.00706*** | -0.00416*** | -0.0178 | -0.0735*** | 51096 | 0.005 |
| **Development** | | | | | | | |
| Developing Countries | 0.000542 | 0.00535*** | -0.00523*** | -0.0267** | -0.0676*** | 54263 | 0.005 |
| Developed Countries | 0.000124 | 0.00614*** | -0.00459*** | -0.0242*** | -0.0634*** | 93391 | 0.005 |
| Developed_excl_USA | 0.0000994 | 0.00610*** | -0.00542*** | -0.0216** | -0.0622*** | 76589 | 0.005 |

This table reports the estimation results from the fixed effects regression with robust standard errors for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on market risk adjusted abnormal returns. Market Value (MV), Book to Market Ratio (BM), and preceding week's abnormal returns (AR(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

## Appendix 5.2. Investor Attention and Stock Liquidity

Table Appendix 35: One-Week Lagged Investor Attention and Stock Liquidity– Estimates from Fixed Effect Regression with Robust Standard Errors

| | $ASVI_{(t-1)}$ | MV | BM | $r_{(t-1)}$ | $AVOL_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| Argentina | 0.122* | 0.140** | 0.012 | 0.209 | 0.429*** | -1.525*** | 1218 | 0.226 |
| Australia | 0.254*** | -0.0285 | 0.153 | -1.164*** | 0.361*** | 0.379 | 3248 | 0.216 |
| Belgium | 0.259*** | 0.015 | 0.0391 | -0.603* | 0.539*** | -0.148 | 2233 | 0.361 |
| Brazil | 0.221*** | -0.0347* | -0.0168** | -0.222** | 0.539*** | 0.261 | 9306 | 0.307 |
| Canada | 0.196*** | -0.0736** | 0.0372** | -0.535*** | 0.417*** | 0.701** | 9370 | 0.211 |
| Chile | 0.111** | 0.517*** | 0.208*** | -1.181*** | 0.358*** | -7.479*** | 4462 | 0.159 |
| Denmark | 0.347*** | -0.112 | -0.0607 | -0.702*** | 0.319*** | 1.115 | 2639 | 0.185 |
| Finland | 0.226*** | -0.0265 | 0.0212 | -0.640*** | 0.375*** | 0.185 | 3654 | 0.178 |
| France | 0.272*** | -0.113*** | -0.0444 | -1.155*** | 0.382*** | 1.070*** | 7511 | 0.214 |
| Germany | 0.460*** | -0.0231 | 0.0746 | -0.209 | 0.402*** | 0.117 | 5632 | 0.208 |
| India | 0.274*** | -0.000926 | 0.0457 | -0.353*** | 0.427*** | 0.00932 | 11527 | 0.22 |
| Indonesia | 0.149*** | 0.138** | 0.207*** | -0.313 | 0.514*** | -2.370** | 6087 | 0.265 |
| Malaysia | 0.163*** | 0.0752 | 0.0856 | -0.843 | 0.482*** | -0.777 | 5476 | 0.246 |
| Mexico | 0.142*** | -0.0285 | 0.200** | -0.560* | 0.362*** | 0.413 | 5739 | 0.158 |
| Netherlands | 0.274*** | -0.0918** | 0.0209 | -0.933*** | 0.427*** | 0.853** | 2899 | 0.258 |
| New Zealand | 0.217*** | 0.107 | -0.0234 | -0.55 | 0.355*** | -0.908 | 2639 | 0.142 |
| Norway | 0.271*** | 0.578** | 0.647** | -0.182 | 0.440*** | -5.969* | 2191 | 0.283 |
| Peru | 0.246** | 0.476* | 0.342** | -0.525 | 0.228*** | -4.205* | 1657 | 0.07 |
| Philippines | 0.164*** | 0.105 | 0.11 | 0.112 | 0.422*** | -1.311 | 3248 | 0.187 |
| Portugal | 0.163*** | -0.466 | -0.560* | -0.272 | 0.562*** | 3.503 | 1622 | 0.369 |
| Singapore | 0.173*** | 0.417 | 0.513 | -1.056*** | 0.483*** | -3.605 | 4060 | 0.28 |
| Spain | 0.331*** | -0.058 | -0.0388 | -0.553*** | 0.495*** | 0.441 | 6179 | 0.33 |
| Sweden | 0.264*** | 0.188*** | 0.257*** | -0.404 | 0.445*** | -1.890*** | 4196 | 0.284 |
| Switzerland | 0.290*** | 0.0788* | 0.0978* | -1.170*** | 0.387*** | -0.730* | 3248 | 0.253 |
| Turkey | 0.167*** | 0.0295 | -0.00742 | -0.925*** | 0.564*** | -0.322 | 5379 | 0.326 |
| UK | 0.242*** | -0.0788*** | 0.0362* | -0.965*** | 0.392*** | 0.751*** | 15262 | 0.229 |
| USA | 0.235*** | -0.0138 | 0.0246** | -0.750*** | 0.372*** | 0.129 | 16802 | 0.178 |

This table reports the estimation results from the fixed effects regression with robust standard errors for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on stock liquidity measured by abnormal trading volume. Market Value (MV), Book to Market Ratio (BM), preceding week's return (r(t-1)), and preceding week's abnormal trading volume (AVOL(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table Appendix 36: One-Week Lagged Investor Attention and Stock Liquidity – Estimates from Fixed Effect Regression with Robust Standard Errors (Subsample)

| | $ASVI_{(t-1)}$ | MV | BM | $r_{(t-1)}$ | $AVOL_{(t-1)}$ | Cons. | Obs. | R2 |
|---|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | | |
| Americas | 0.199*** | -0.00325 | 0.00768 | -0.502*** | 0.399*** | -0.0343 | 48554 | 0.174 |
| Asia-Pacific | 0.199*** | 0.0491* | 0.102** | -0.415*** | 0.459*** | -0.598* | 36285 | 0.225 |
| Europe | 0.265*** | -0.0111 | 0.0236 | -0.726*** | 0.446*** | 0.0795 | 62645 | 0.249 |
| Americas_excl_USA | 0.185*** | 0.00322 | 0.000497 | -0.424*** | 0.405*** | -0.122 | 31752 | 0.174 |
| **Culture** | | | | | | | | |
| Collectivist Countries | 0.199*** | 0.00676 | 0.00737 | -0.435*** | 0.458*** | -0.152 | 65960 | 0.221 |
| Individualist Countries | 0.255*** | -0.0165 | 0.0386*** | -0.747*** | 0.400*** | 0.151 | 81524 | 0.208 |
| Individualist_excl_USA | 0.259*** | -0.012 | 0.0516*** | -0.747*** | 0.406*** | 0.111 | 64722 | 0.215 |
| Low UAI Countries | 0.225*** | -0.00174 | 0.0497*** | -0.601*** | 0.432*** | 0.0179 | 96546 | 0.218 |
| Low UAI_excl_USA | 0.223*** | 0.0129 | 0.0714*** | -0.578*** | 0.440*** | -0.131 | 79744 | 0.224 |
| High UAI Countries | 0.234*** | 0.00382 | -0.00749 | -0.529*** | 0.438*** | -0.13 | 50938 | 0.211 |
| **Development** | | | | | | | | |
| Developing Countries | 0.188*** | 0.0108 | 0.0109 | -0.400*** | 0.449*** | -0.208 | 54099 | 0.21 |
| Developed Countries | 0.253*** | -0.0171 | 0.0307** | -0.723*** | 0.417*** | 0.146 | 93385 | 0.221 |
| Developed_excl_USA | 0.256*** | -0.0163 | 0.0353 | -0.719*** | 0.425*** | 0.137 | 76583 | 0.229 |

This table reports the estimation results from the fixed effects regression with robust standard errors for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) stock liquidity measured by abnormal trading volume. Market Value (MV), Book to Market Ratio (BM), preceding week's returns (r(t-1)), and preceding week's abnormal trading volume (AVOL(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

## Appendix 5.3. Investor Attention and Stock Return Volatility

Table Appendix 37: Investor Attention and Stock Return Volatility– Estimates from Fixed Effect Regression with Robust Standard Errors

| | ASVI | MV | BM | $St\_dev_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | -0.000694 | -0.00788*** | -0.00402* | 0.193*** | 0.0958*** | 1218 | 0.113 |
| Australia | 0.00412*** | -0.00118 | 0.0121*** | 0.189*** | 0.032 | 3248 | 0.185 |
| Belgium | 0.00865** | -0.000955 | -0.000692 | 0.174*** | 0.02 | 2233 | 0.109 |
| Brazil | 0.00469*** | -0.00780*** | -0.00139 | 0.207*** | 0.0897*** | 9402 | 0.094 |
| Canada | 0.00374*** | -0.00818*** | 0.00166 | 0.300*** | 0.0909*** | 9379 | 0.198 |
| Chile | 0.0012 | 0.0022 | 0.00271 | 0.249*** | -0.0212 | 4466 | 0.067 |
| Denmark | 0.00699*** | -0.00514 | -0.00215 | 0.161*** | 0.0664* | 2639 | 0.096 |
| Finland | 0.00395*** | -0.00917*** | 0.00299** | 0.114*** | 0.0929*** | 3654 | 0.102 |
| France | 0.00330*** | -0.00637*** | 0.00173 | 0.258*** | 0.0754*** | 7511 | 0.136 |
| Germany | 0.00500*** | -0.00569*** | 0.0000814 | 0.243*** | 0.0685*** | 5632 | 0.118 |
| India | 0.00547*** | -0.00475*** | -0.00197** | 0.104*** | 0.0769*** | 11571 | 0.05 |
| Indonesia | 0.00148*** | -0.00324** | 8.63e-05*** | 0.255*** | 0.0705*** | 6090 | 0.074 |
| Malaysia | 0.00277*** | -0.00619*** | 0.000976 | 0.237*** | 0.0710*** | 5481 | 0.112 |
| Mexico | 0.00223*** | -0.000905 | -0.000118 | 0.219*** | 0.0217 | 5835 | 0.052 |
| Netherlands | 0.00752** | 0.00138 | 0.0119* | 0.323*** | 0.00631 | 2899 | 0.207 |
| New Zealand | 0.00265*** | 0.0000532 | 0.00323 | 0.0539 | 0.0129 | 2639 | 0.016 |
| Norway | 0.00431** | 0.00335 | 0.0102* | 0.240*** | -0.0187 | 2191 | 0.132 |
| Peru | 0.00234 | -0.00835*** | 0.0013 | 0.287*** | 0.0798*** | 1657 | 0.168 |
| Philippines | 0.00113** | -0.00285 | 0.00355 | 0.207*** | 0.049 | 3248 | 0.062 |
| Portugal | 0.00382*** | -0.0211** | -0.0157** | 0.268*** | 0.177*** | 1624 | 0.134 |
| Singapore | 0.00286*** | -0.00388 | 0.00319 | 0.235*** | 0.0460* | 4060 | 0.121 |
| Spain | 0.00815*** | -0.0151*** | -0.00127 | 0.193*** | 0.148*** | 6184 | 0.187 |
| Sweden | 0.00749** | -0.00107 | 0.00249** | 0.244*** | 0.0263* | 4399 | 0.115 |
| Switzerland | 0.00541*** | -0.00538*** | 0.00213 | 0.216*** | 0.0672*** | 3248 | 0.141 |
| Turkey | 0.00191*** | -0.000459 | -0.0023*** | 0.130*** | 0.0177* | 5379 | 0.025 |
| UK | 0.00461*** | -0.00886*** | 0.00163*** | 0.281*** | 0.0931*** | 15324 | 0.185 |
| USA | 0.00492*** | -0.00363*** | 0.000075 | 0.127*** | 0.0496*** | 16802 | 0.049 |

This table reports the estimation results from the fixed effects regression with robust standard errors for the effect of Abnormal Search Volume Index (ASVI(t)) on volatility measured by standard deviation of returns. Market Value (MV), Book to Market Ratio (BM), stock returns (r(t)), and preceding week's standard deviation (St_dev(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table Appendix 38: One-Week Lagged Investor Attention and Stock Return Volatility– Estimates from Fixed Effect Regression with Robust Standard Errors

| | $ASVI_{(t-1)}$ | MV | BM | $St\_dev_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| Argentina | -0.00282** | -0.00785*** | -0.00409* | 0.193*** | 0.0955*** | 1218 | 0.115 |
| Australia | 0.000348 | -0.00147 | 0.0119*** | 0.194*** | 0.0348 | 3248 | 0.167 |
| Belgium | -0.000686 | -0.00121 | -0.00117 | 0.200*** | 0.0215 | 2233 | 0.039 |
| Brazil | 0.00103 | -0.00774*** | -0.00137 | 0.208*** | 0.0892*** | 9402 | 0.086 |
| Canada | -0.000501 | -0.00805*** | 0.00179 | 0.305*** | 0.0897*** | 9379 | 0.184 |
| Chile | 0.00000183 | 0.00221 | 0.00267 | 0.250*** | -0.0214 | 4466 | 0.066 |
| Denmark | -0.000769* | -0.0046 | -0.00178 | 0.181*** | 0.0605* | 2639 | 0.041 |
| Finland | 0.000411 | -0.00912*** | 0.00294** | 0.116*** | 0.0923*** | 3654 | 0.089 |
| France | -0.00093*** | -0.00628*** | 0.00185 | 0.263*** | 0.0744*** | 7511 | 0.129 |
| Germany | -0.000786** | -0.00543*** | 0.000294 | 0.255*** | 0.0658*** | 5632 | 0.1 |
| India | -0.000113 | -0.00460*** | -0.00196** | 0.113*** | 0.0747*** | 11571 | 0.027 |
| Indonesia | -0.000399 | -0.00322** | 9.16e-05*** | 0.255*** | 0.0701*** | 6090 | 0.073 |
| Malaysia | 0.000113 | -0.00627*** | 0.000898 | 0.238*** | 0.0717*** | 5481 | 0.1 |
| Mexico | 0.000969* | -0.000927 | -0.000149 | 0.218*** | 0.0219 | 5835 | 0.049 |
| Netherlands | 0.000409 | 0.00169 | 0.0120** | 0.338*** | 0.00323 | 2899 | 0.169 |
| New Zealand | 0.00000766 | 0.000216 | 0.00348 | 0.0547* | 0.0118 | 2639 | 0.009 |
| Norway | 0.0011 | 0.00369 | 0.0108** | 0.234*** | -0.0221 | 2191 | 0.112 |
| Peru | -0.000631 | -0.00823*** | 0.00134 | 0.291*** | 0.0786*** | 1657 | 0.165 |
| Philippines | -0.000281 | -0.00282 | 0.00359 | 0.207*** | 0.0487 | 3248 | 0.061 |
| Portugal | -0.00178** | -0.0211** | -0.0157** | 0.274*** | 0.177*** | 1624 | 0.128 |
| Singapore | 0.000393 | -0.00372 | 0.0033 | 0.236*** | 0.0446* | 4060 | 0.104 |
| Spain | 0.000517 | -0.0151*** | -0.00122 | 0.212*** | 0.148*** | 6184 | 0.146 |
| Sweden | 0.0000428 | -0.000982 | 0.00212 | 0.261*** | 0.0246 | 4399 | 0.074 |
| Switzerland | 0.000287 | -0.00519*** | 0.00244 | 0.228*** | 0.0653*** | 3248 | 0.106 |
| Turkey | -0.000961** | -0.000348 | -0.00227*** | 0.134*** | 0.0167* | 5379 | 0.022 |
| UK | -0.000229 | -0.00874*** | 0.00172*** | 0.294*** | 0.0918 | 15324 | 0.165 |
| USA | -0.000766** | -0.00344*** | 0.0000798 | 0.133*** | 0.0476*** | 16802 | 0.032 |

This table reports the estimation results from the fixed effects regression with robust standard errors for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) on volatility measured by standard deviation of returns. Market Value (MV), Book to Market Ratio (BM), stock returns (r(t)), and preceding week's standard deviation (St_dev(t-1)) are used as control variables. Information about respective indices can be found at Table 3.2. The sample period is from March 2014 to January 2018. *** p<0.01, ** p<0.05, * p<0.1

Table Appendix 39: Investor Attention and Stock Return Volatility – Estimates from Fixed Effect Regression with Robust Standard Errors (Subsample)

| | ASVI | MV | BM | St_dev | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | |
| Americas | 0.00371*** | -0.00496*** | 0.000126 | 0.215*** | 0.0641*** | 48759 | 0.081 |
| Asia-Pacific | 0.00312*** | -0.00423*** | 0.000111*** | 0.190*** | 0.0639*** | 36337 | 0.062 |
| Europe | 0.00532*** | -0.00586*** | 0.000917** | 0.246*** | 0.0681*** | 62917 | 0.125 |
| Americas_excl_USA | 0.00316*** | -0.00612*** | -0.000271 | 0.247*** | 0.0766*** | 31957 | 0.1 |
| **Culture** | | | | | | | |
| Collectivist Countries | 0.00337*** | -0.00471*** | 0.0000174 | 0.216*** | 0.0664*** | 66215 | 0.075 |
| Individualist Countries | 0.00497*** | -0.00516*** | 0.00127*** | 0.228*** | 0.0628*** | 81798 | 0.113 |
| Individualist_excl_USA | 0.00493*** | -0.00568*** | 0.00191*** | 0.253*** | 0.0673*** | 64996 | 0.136 |
| Low UAI Countries | 0.00433*** | -0.00522*** | 0.000256* | 0.218*** | 0.0679*** | 96872 | 0.095 |
| Low UAI_excl_USA | 0.00421*** | -0.00579*** | 0.000249** | 0.237*** | 0.0745*** | 80070 | 0.107 |
| High UAI Countries | 0.00406*** | -0.00590*** | -0.000779* | 0.230*** | 0.0712*** | 51141 | 0.089 |
| **Development** | | | | | | | |
| Developing Countries | 0.00289*** | -0.00406*** | 0.0000318 | 0.208*** | 0.0616*** | 54347 | 0.064 |
| Developed Countries | 0.00503*** | -0.00564*** | 0.00104*** | 0.231*** | 0.0666*** | 93666 | 0.117 |
| Developed_excl_USA | 0.00501*** | -0.00641*** | 0.00134*** | 0.252*** | 0.0731*** | 76864 | 0.138 |

This table reports the estimation results from the fixed effects regression with robust standard errors for the effect of Abnormal Search Volume Index (ASVI(t)) volatility measured by standard deviation. Market Value (MV), Book to Market Ratio (BM), stock returns (r(t)), and preceding week's standard deviation (St_dev(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. The sample period is from March 2014 to January 2018.
*** p<0.01, ** p<0.05, * p<0.1

Table Appendix 40: One-Week Lagged Investor Attention and Stock Return Volatility – Estimates from Fixed Effect Regression with Robust Standard Errors (Subsample)

| | $ASVI_{(t-1)}$ | MV | BM | $St\_dev_{(t-1)}$ | Cons. | Obs. | $R^2$ |
|---|---|---|---|---|---|---|---|
| **Region** | | | | | | | |
| Americas | -0.000131 | -0.00487*** | 0.000139 | 0.217*** | 0.0631*** | 48759 | 0.072 |
| Asia-Pacific | -0.000107 | -0.00418*** | 0.000120*** | 0.192*** | 0.0632*** | 36337 | 0.053 |
| Europe | -0.000202 | -0.00573*** | 0.00101** | 0.257*** | 0.0667*** | 62917 | 0.101 |
| Americas_excl_USA | 0.00021 | -0.00607*** | -0.000261 | 0.249*** | 0.0761*** | 31957 | 0.094 |
| **Culture** | | | | | | | |
| Collectivist Countries | 0.0000184 | -0.00465*** | 0.0000261 | 0.218*** | 0.0657*** | 66215 | 0.066 |
| Individualist Countries | -0.000259** | -0.00502*** | 0.00134*** | 0.237*** | 0.0614*** | 81798 | 0.091 |
| Individualist_excl_USA | -0.000205 | -0.00555*** | 0.00202*** | 0.262*** | 0.0659*** | 64996 | 0.114 |
| Low UAI Countries | -0.000143 | -0.00514*** | 0.000274** | 0.224*** | 0.0668*** | 96872 | 0.078 |
| Low UAI_excl_USA | -0.0000647 | -0.00573*** | 0.000266** | 0.242*** | 0.0737*** | 80070 | 0.091 |
| High UAI Countries | -0.0000534 | -0.00583*** | -0.000758 | 0.235*** | 0.0704*** | 51141 | 0.079 |
| **Development** | | | | | | | |
| Developing Countries | -0.0000433 | -0.00400*** | 0.0000391 | 0.210*** | 0.0609*** | 54347 | 0.058 |
| Developed Countries | -0.000207* | -0.00551*** | 0.00110*** | 0.240*** | 0.0652*** | 93666 | 0.095 |
| Developed_excl_USA | -0.000155 | -0.00629*** | 0.00143*** | 0.261*** | 0.0719*** | 76864 | 0.115 |

This table reports the estimation results from the fixed effects regression with robust standard errors for the effect of lagged Abnormal Search Volume Index (ASVI(t-1)) volatility measured by standard deviation. Market Value (MV), Book to Market Ratio (BM), stock returns (r(t)), and preceding week's standard deviation (St_dev(t-1)) are used as control variables. Information about examined countries can be found at Table 3.2. The sample period is from March 2014 to January 2018.
*** p<0.01, ** p<0.05, * p<0.1

**TEZ ONAY SAYFASI**

| | |
|---|---|
| Üniversite | : T.C. GALATASARAY ÜNİVERSİTESİ |
| Enstitü | : SOSYAL BİLİMLER ENSTİTÜSÜ |
| Hazırlayanın Adı Soyadı | : Muhammet Sergen AKARSU |
| Tez Başlığı (İngilizce) | : Some International Evidence on Investor Attention, Abnormal Returns, Stock Liquidity, and Volatility |
| Tez Başlığı (Türkçe) | : Yatırımcı İlgisinin, Anormal Getiriler, Likidite ve Volatilite Üzerindeki Etkilerine İlişkin Uluslararası Kanıtlar |
| Savunma Tarihi | : 27/06/2019 |
| Danışmanı | : Prof. Dr. Ömür SÜER BAKLACI |

JÜRİ ÜYELERİ

| Unvanı, Adı Soyadı | İmza |
|---|---|
| Prof. Dr. Ömür SÜER BAKLACI | |
| Prof. Dr. Volkan DEMİR | |
| Prof. Dr. Cenktan ÖZYILDIRIM | |

Enstitü Müdürü
Prof. Dr. M. Yaman ÖZTEK