“Impact of attention on rare events across industries in Indonesia”

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IMPACT OF ATTENTION ON RARE EVENTS ACROSS INDUSTRIES IN INDONESIA

Abstract

Rare events (RE) are substantial with significant impact but are difficult to predict, often deviating from regular expectations. These events trigger psychological reactions in the market and susceptible to irrational decisions that challenge logical assumptions. The rapidity of the crisis has led to highly volatile market conditions, fostering instances of asymmetric information. Therefore, this study aimed to explore the impact of attention on market dynamics by examining diverse possibilities over time. The article focused on all publicly listed industries on the Indonesian Stock Exchange (IDX/BEI). Using time series regression data from 1997 to 2020, the article comprised 5,615 observations across nine sectors. The primary model was based on three factors originating from the Fama-French and prospect theory, with attention serving as the main risk element to assess the impact of attention on abnormal returns (AR) during RE. The results disclosed that various events showed diverse effects on attention behavior, varying across all sectors. Additionally, moderation analysis showed a correlation between attention and AR. The results signified that RE mitigates the negative relationship between attention and AR. The adverse impact of attention on AR diminishes during RE. These results contributed to the literature by providing insights into the excessive attention to specific information disrupts market mechanisms, triggers disproportionate emotional responses, and alters investor preferences. Furthermore, this study established that events prompting excessive attention have varying effects on attention behavior across all sectors.

Keywords finance, crisis, size, sector, returns, irrationality, pandemic, psychology

JEL Classification G01, G11, G41

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INTRODUCTION

Asymmetric returns are observed when investors adopt positions or strategies that benefit from high-impact events, commonly called Rare Events (RE). Investors who accurately anticipate, speculate on, or hedge against RE can achieve substantial gains when these events occur. Extensive financial literature emphasizes the impact of RE on stock market imperfections, emphasizing how investors can attain

Abnormal Returns (AR) due to inefficiencies in markets caused by calamities such as the 1997 Southeast Asian monetary crisis, the 2008 Global Financial Crisis (GFC), and COVID-19. However, the current literature ignored the fundamental inquiry of explaining market behavior observed during RE from the perspective of financial psychology.

Behavior during RE is attributed to psychological factors, with attention-grabbing (referred to as "GRAB") playing a significant role in the changes. RE tends to capture investors' attention, leading to various behaviors such as overreactions, herd attitudes, and increased market volatility as investors are emotionally influenced by news. This irra-

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tional behavior develops arbitrage opportunities during RE. Consequently, investors' psychology can override rational thinking during economic shocks, leading to panic or irrational behavior in volatile market situations.

Despite the significance of attention in explaining AR during RE, it remains underexplored in the literature leading to a limited understanding of the subject. Asymmetric returns from inefficient markets during RE have not been thoroughly investigated, particularly from heuristic biases such as GRAB. Although numerous research in this field focuses on individual extreme events, the fluctuating nature that characterizes financial behavior is often ignored. The article asserts that recognizing attention as a risk factor is crucial across various RE contexts.

1. LITERATURE REVIEW AND HYPOTHESIS

RE posed a significant challenge to the Efficient Market Hypothesis (EMH), contending that financial markets were efficient and asset prices would rapidly incorporate available information. EMH asserted that prices adjusted swiftly in response to new information (Peon et al., 2019), even in the case of exceptional RE. However, the information during RE was often astonishing and extreme with the markets struggling to adapt promptly (Forbes & Rigobon, 2002). This delay in processing the rare but highly impactful events contradicted the core tenets of EMH, as prices did not immediately reflect the new information.

The theoretical argument suggested that increased attention during RE could lead to market inefficiency and the possibility of significant AR. This was primarily because investors deviated from rational and efficient information-processing strategies (Strong, 1992). When RE captured widespread attention, investors often reacted emotionally rather than relying on rigorous analysis (Daniel et al., 2002). These irrational responses caused asset prices to deviate from fundamental values, creating opportunities for traders to exploit the disparities and achieve AR.

The theoretical argument concerning cognitive bias during RE was grounded in the Prospect theory of Kahneman and Tversky (1979). According to this theory, individuals tended to make decisions based on perceived gains and losses relative to a reference point rather than focusing solely on absolute terms. The GRAB nature of RE also led investors to anchor reference points to exceptional events, creating an opportunity for mental shortcuts or memory to overtake. Therefore, investors irrationally exerted extreme buying or selling pressure on the market (Daniel et al., 2002). This anchoring effect led to market inefficiency as investors reacted irrationally (Verma & Soydemir, 2009), causing asset prices to diverge significantly from the intrinsic values.

Previous research examined the impact of RE on market efficiency such as Lim et al. (2008), which investigated the effects of the 1997 monetary crisis on the effectiveness of Southeast Asian stock markets. Lichtenberg and Vu (2015) also identified a positive connection between the 2008 GFC and abnormal stock returns worldwide. However, Dias et al. (2020) challenged the perspective that markets experienced inefficiency during RE using the COVID-19 pandemic as the context for the research.

Financial literature discussed GRAB as the behavior underlying market inefficiency or AR. Research on Initial Public Offerings (IPOs) emphasized the impact of investor attention, leading to over- and under-reaction behaviors in the market (Narayanasamy et al., 2018). Chen (2015) also showed the relevance of Google Trends as a tool to measure market patterns and potential irrationality. The results established a strong association between unusual market activity stimulating investor attention and the increase in abnormal trading volume, particularly for stocks actively discussed online. Further research by Choi and Choi (2019) showed that individual investors purchased GRAB stocks following active online discussions, contributing to market irrationality (Wulfmeyer, 2016). Additionally, Li et al. (2015) found that less affluent individuals were more inclined to pursue stocks characterized by abnormal volumes, extreme returns, and shares during IPOs.

The irrationality of market behavior during the COVID-19 pandemic was attributed to the phenomenon of GRAB, as outlined by Smales (2020). Investor attention toward COVID-19 had progressively escalated in tandem with the virus's dissemination, the surge in confirmed cases, and the effects daily lives of society. This increased attention served as a crucial factor in elucidating the variability in stock performance across diverse sectors during the unprecedented period. Furthermore, the research showed that investor attention contributed to market fluctuations and divergences in investment outcomes in distinct stock sectors.

The objective was to examine the role of representativeness bias in RE that occurred and affected the economy as well as stock markets. Specifically, the study aimed to analyze higher GRAB influences on AR during RE, with a focus on examining GRAB behavior. The following hypothesis was developed based on the results observed:

H_1: *Higher GRAB led to a significant increase in abnormal returns during rare economic events.*

Therefore, this study aims to achieve a comprehensive understanding of the impact of attention on the Indonesian stock market dynamics, considering potential fluctuations over time. The objective is to ascertain when higher levels of attention-grabbing lead to AR during RE.

2. METHOD

This study used daily data from various sources, including the Indonesian Stock Exchange (IDX/BEI) and the Central Bank of Indonesia. Daily data were obtained for each stock, such as trading volume, market capitalization, bid and ask volume, Price to Book Value, adjusted closing price, LQ45 Index, sectoral index, and BI 7-Day Reverse Repo Rate. The research period was from 1997 to 2020 with data curation using sectoral information based on the Jakarta Stock Exchange Industry Classification (JASICA). IDX launched the JASICA in 1996 to classify industrial sectors into nine industries with 56 derivative sub-sectors.

The research primary model was based on three factors derived from Fama and French (1995) and prospect theories. Fama-French three factors were adopted to explore GRAB as an additional risk element for IDX during RE. Interactions were subsequently incorporated to address the objectives by augmenting AR. This adhered to the methodology outlined by Dawson (2014) as follows:

$$\begin{aligned}\pi_t &= \beta_0 + \beta_1 GRAB_t + \beta_2 RE_t \\ &+ \beta_3 \left[GRAB \cdot RE\right]_t + \beta_4 SMB_t \\ &+ \beta_5 HML_t + \beta_6 SIZE_t + e_t.\end{aligned} \quad (1)$$

The equation represents a regression model with πt as the dependent variable, indicating a specific outcome at time $_t$. $GRAB_t$ measures stock attractiveness to investors, while RE_t serves as a dummy variable for rare event occurrences. The interaction term [$GRAB{\cdot}RE$] captures their joint effect. Additionally, SMB_t reflects the difference between small-cap and large-cap stock portfolio returns, HML_t signifies high versus low Book-to-Market Equity ratio portfolio returns, and $SIZE_t$ denotes company capitalization based on market size at time $_t$. Coefficients (β_0 to β_6) indicate the strength and direction of their relationships, while e_t captures unexplained variability. Overall, the model examines how these variables collectively influence πt.

The dependent variable adopted in this research was identified as AR. The returns of sector *i* in time *t* (R_t) were used to calculate AR (AR_t) and subsequently deducted by the market returns E[R_t]. The outcome was IDX returns at time *t,* with the following formula:

$$AR_t = R_t - E\left[R_{i,t}\right]. \quad (2)$$

The computation adopted was the method of Yu and Hsieh (2010) by using BSI as the proxy for GRAB calculation. Stocks were categorized into deciles based on the abnormal trading volume of the day. Subsequently, the decile of the stock was divided with the largest abnormal trading volume into six vingtiles representing a 6% partition. The purchases (B) and sales (S) of shares in each volume partition on day *t* were averaged, and the imbalance made on that day was calculated using the following formula:

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$$BSI_{pt} = \frac{\sum_{i=n}^{n_{pt}} NB_{it} - \sum_{i=n}^{n_{pt}} NS_{it}}{\sum_{i=n}^{n_{pt}} NB_{it} + \sum_{i=n}^{n_{pt}} NS_{it}}, \quad (3)$$

where n_{pt} represents the number of shares in partition p on day t, NB_{it} denotes the number of shares bought i on day t, and NS_{it} signifies the number of shares sold/on day t. Following this, the average time series of daily buy and sell imbalance (BSI_{pt}) was calculated for the days on which trading data for all investors were available. When a stock experiences high volume during RE, investors pay more attention to the share than others. Stocks were sorted into six deciles each day based on the previous day's adjusted volume. The average daily BSI time series for each partition on the day after volume sorting was subsequently calculated. This calculation was analogous to sorting by return.

This study added control variables (Small Minus Big (SMB), High Minus Low (HML), and company size) into the estimation model to isolate the influence of BSI on AR during RE. The details of the variable definition can be found in Appendix A.

3. RESULTS

Based on Table 1, this study observed that several variables in the agriculture, utilities, transportation, trade, and other sectors showed standard deviations twice the average value. These variables included AR, firm size, SMB, and HML, which were analyzed to understand the impact on market dynamics during RE. However, the variables GRAB, SMB, and AR in some sectors had standard deviations less than twice the average. GRAB, size, and HML were further observed to have high standard deviations in most sectors, while AR and SMB were more stable.

Table 2 provides a comprehensive overview of GRAB statistics connected with AR for each unique RE. For instance, the mean GRAB value was 0.2419 during the Monetary crisis, with a relatively high AR of 0.1357. Similarly, the average GRAB value was 0.3804 in the dot-com bubble, with an AR of 0.6885. These results emphasized the scholarly perspective that periods of RE should be marked by intensified buying pressure.

The global financial crisis witnessed high selling pressure, reflected in a negative mean GRAB value of –0.1784. This corresponded to a similarly negative average AR of -0.1222 during the crisis, signifying the impact of negative market sentiment. However, GRAB values were close to zero during periods of balanced trading activity, and insights evolved from the two events. The oil boom also witnesses a modest positive GRAB mean of 0.0341 and an average AR of 0.0267. Similarly, the GRAB and AR mean were 0.05 and 0.0154, respectively, during China's Black Monday. This suggested market outcomes varied significantly under equilibrium conditions, depending on the unique dynamics of each event. The result emphasized the importance of context in understanding market behavior. Another explanation was that the oil boom and Black Monday had no risk-return spillover on the Indonesian market.

The presence of GRAB did not signify market inefficiency, as exemplified by events such as Brexit and the COVID-19 pandemic. GRAB mean values were negative for both events with –0.1348 for

Table 1. Summary statistics

Variable	Sector 1					Sector 2					Sector 3				
	AR	GRAB	Size	SMB	HML	AR	GRAB	Size	SMB	HML	AR	GRAB	Size	SMB	HML
Mean	0.03	2.09	–16.73	18.46	0.12	0.20	1.69	–12.83	10.57	0.24	0.57	7.21	–17.84	100.48	0.03
Std Dev	0.13	0.90	–0.91	12.91	5.33	0.33	7.24	–0.73	299.05	4.00	0.42	2.31	–0.77	28.72	2.64
Variable	**Sector 4**					**Sector 5**					**Sector 6**				
Mean	0.13	2.62	–35.29	101.41	0.03	0.14	1.74	–15.96	10.37	–0.02	0.21	2.08	–13.86	36.36	0.07
Std Dev	0.21	1.16	–0.87	33.48	2.57	0.25	6.80	–1.00	500.73	3.75	0.34	10.14	–0.92	757.55	4.42
Variable	**Sector 7**					**Sector 8**					**Sector 9**				
Mean	–0.29	2.00	–12.84	21.16	0.03	0.12	2.07	–26.98	53.31	0.01	0.03	1.47	–10.14	11.80	0.13
Std Dev	0.20	8.62	–0.78	613.11	4.80	0.28	4.14	–0.95	294.94	3.48	0.31	2.21	–4.49	109.63	3.29

Note: Sector 1 (agriculture), 2 (basic and chemical industry), 3 (consumer goods industry), 4 (finance), 5 (infrastructure, utilities, and transportation), 6 (mining), 7 (miscellaneous industries), 8 (property, real estate, and construction), and 9 (trade, services, and investment).

Table 2. Summary statistics of RE

Variable	Monetary		DotCom		Terror		SARS	
	GRAB	AR	GRAB	AR	GRAB	AR	GRAB	AR
Mean	0.24	0.14	0.38	0.69	0.01	0.54	0.01	1.19
Std Dev	0.40	2.79	0.21	2.91	0.09	2.46	0.07	2.64
Variable	**GFC**		**Europe Debt**		**Fukushima**		**Oil Cycle**	
Mean	–0.18	–0.12	0.01	0.26	–0.00	0.20	0.03	0.03
Std Dev	0.12	1.35	0.07	1.41	0.06	1.31	0.08	0.71
Variable	**Black Monday**		**Brexit**		**COVID–19**			
Mean	0.05	0.02	–0.13	0.06	–0.16	0.08		
Std Dev	0.12	0.80	0.09	0.82	0.10	1.67		

Brexit and -0.1643 for COVID-19, indicating excessive selling pressure. However, AR mean values were 0.0551 and 0.0766 for Brexit and COVID-19, respectively. This discrepancy showed the multifaceted nature of market dynamics influenced by various factors beyond GRAB, supporting the time-varying hypothesis. Four events further showed low GRAB balanced trading with high AR, including War-on-Terror, SARS, the Europe Debt Problem, and the Fukushima disaster. The mean values were near zero, and the AR was considered high despite the balanced trading. The explanations were due to arbitrage opportunities and market efficiency. In this case, pricing anomalies persisted even in a balanced market and developed opportunities for traders as well as investors.

There was an average positive AR of 0.03% in agriculture, signifying the sector capability of generating AR. However, a negative value suggested inconsistent AR production which correlated with the efficient market hypothesis. This pattern extended across all sectors, capable of generating AR inconsistently with the efficient market hypothesis.

The agriculture sector had an average AR of 0.200%, ranging from 10.570% to –12.828%. The consumer goods industry averaged 0.565% of AR, with values from 100.476% to –17.481%. Furthermore, the finance sector recorded an average AR of 0.127%, varying from 101.406% to –35.292%. The infrastructure, utilities, and transportation sectors averaged 0.138%, ranging between 10.365% and – 15.960%.

The mining sector averaged 0.211% AR, with values ranging from 36.364% to –13.862%. Miscellaneous industries showed an average AR of –0.289%, ranging from 21.159% to –12.835%. Additionally, the Property, real estate, and construction sectors had an average AR of 0.118%, with values ranging from 53.308% to –26.983%. Trade, services, and investment sectors averaged at 0.029% AR, with values ranging from 11.798% to –10.136%.

The coefficient for GRAB was observed at a positive value of 0.133, signifying that GRAB occurred in agriculture on average. GRAB behavior was evident across all sectors in IDX, including the basic and chemical industry exhibiting a coefficient of 0.330. Other sectors such as consumer goods, finance, as well as infrastructure, utilities, and transportation, showed coefficients of 0.423, 0.212, and 0.253, respectively. Mining and miscellaneous industries also showed coefficients of 0.340 as well as 0.202. Property, real estate, and construction exhibited a coefficient of 0.281, while trade, services, and investment showed a value of 0.312.

All independent variables in the sectors showed a significant correlation with AR, except for GRAB and size. Exceptions were also observed in size and SMB in the basic and chemical industry and GRAB and SMB in the consumer goods sector. GRAB was observed to be the sole factor in miscellaneous industries. Furthermore, low GRAB across all sectors implied a low correlation with AR.

This study used strong OLS regressions with substantial clustered standard error to examine the level of influence of each RE on attention-driven buying. To isolate the effect of GRAB as a separate risk element, Fama-French's three risk factors were included while examining the influence on AR. Following Dawson's (2014) suggestion, Table 3 shows the estimation models considering three key effects, namely GRAB, RE, and the interaction between GRAB as well as RE.

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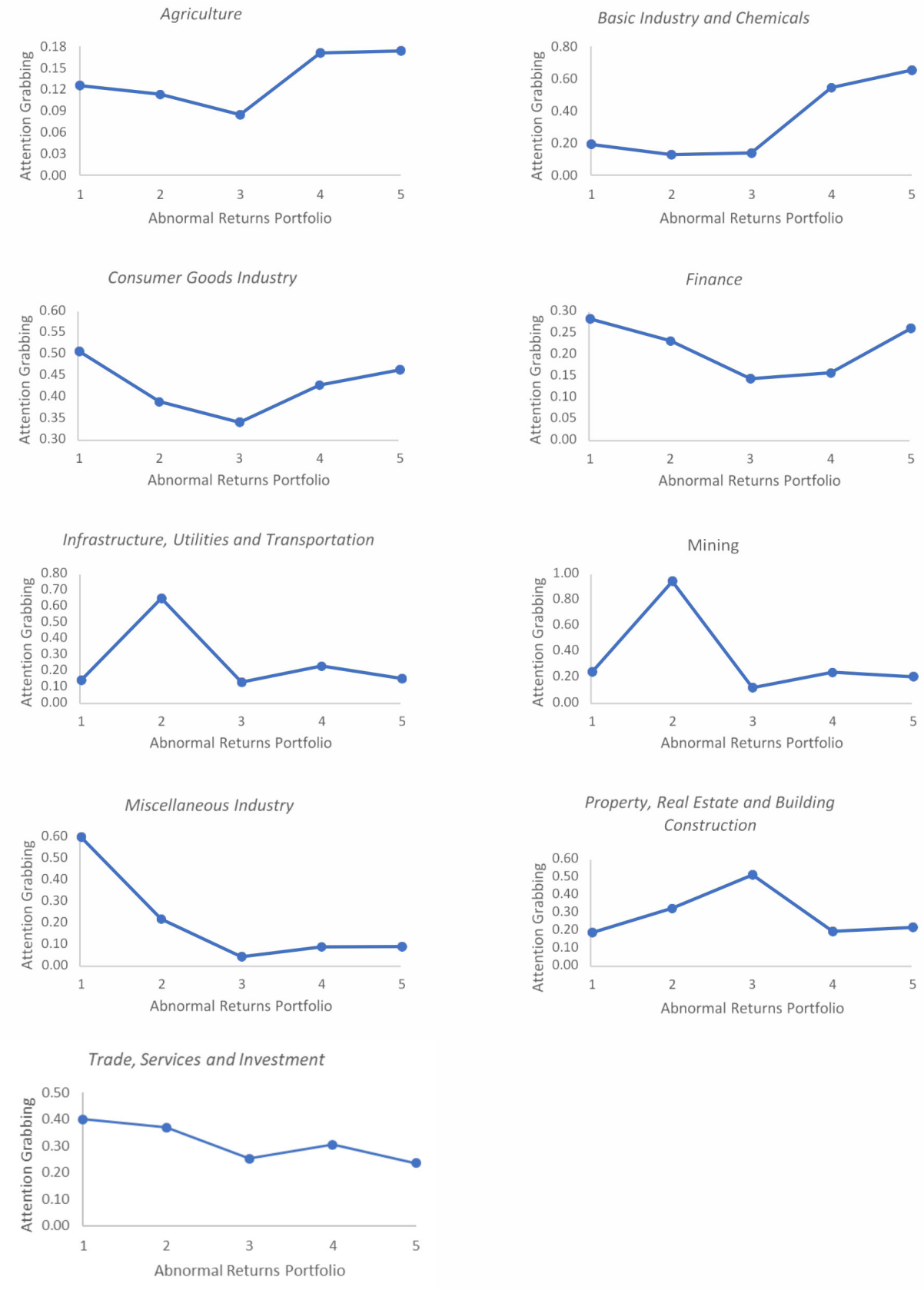

Figure 1. GRAB per quartile returns

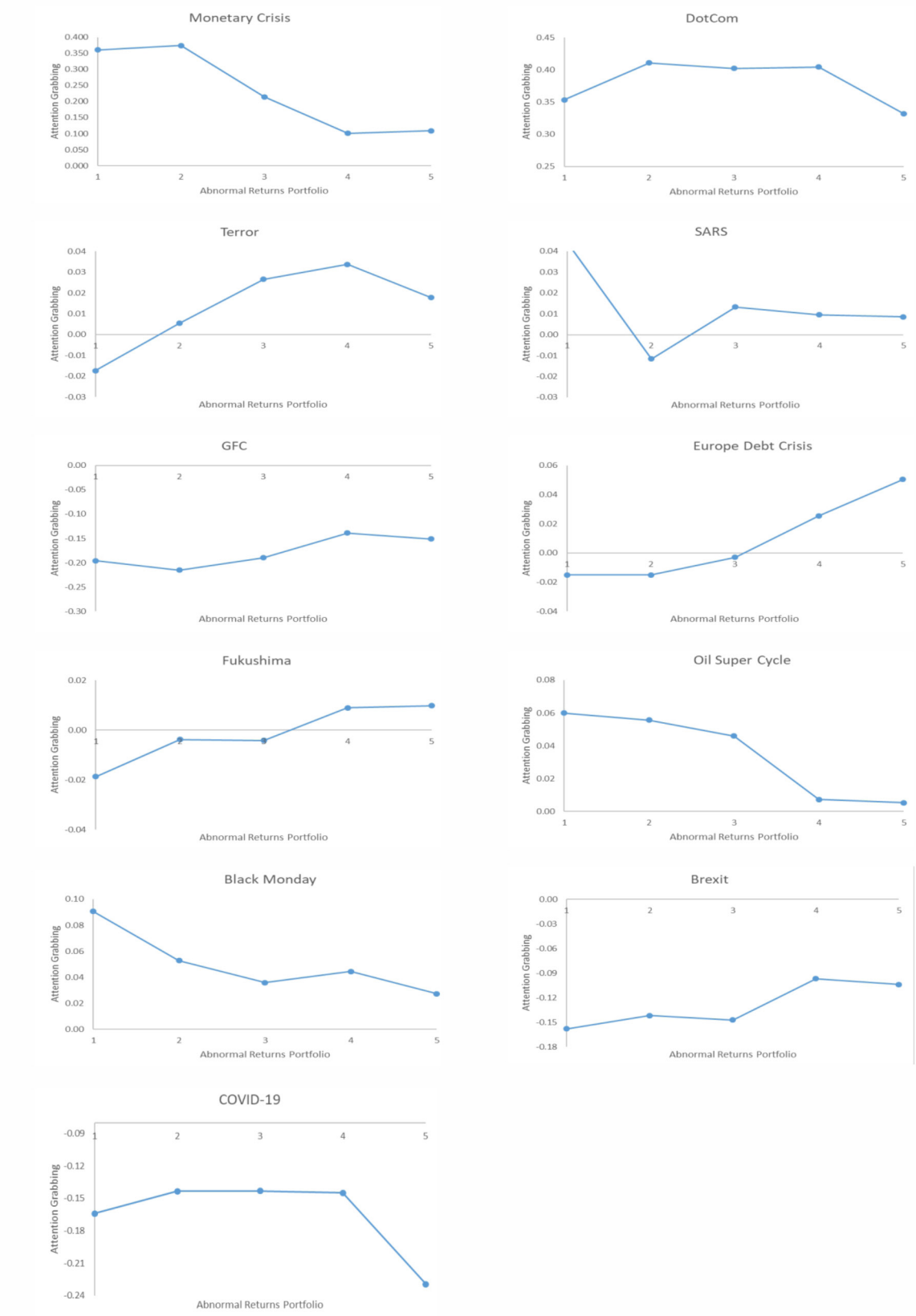

Figure 2. Attention grabbing of buy and sell imbalances according to RE as well as portfolio classes

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Table 3. Estimation results

Variable	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9
GRAB	−0.036	−0.004	−0.001	−0.009	−0.003	0.001	−0.002	−0.002	0.010
	(0.030)	(0,010)	(0.040)	(0.040)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
RE	2.725**	−0.693	−6.943*	1.206	−0.364	2.389**	−0.177	1.252*	0.883*
	(0.510)	(0.720)	(2.940)	(0.770)	(0.730)	(0.640)	(0.850)	(0.530)	(0.480)
GRAB*RE	−0.142	0.148	−0.765	−0.028	−0.040	−0.062*	0.022	−0.176	−0.264*
	(0.150)	(0.170)	(0.690)	(0.060)	(0.090)	(0.040)	(0.210)	(0.170)	(0.150)
F-Value	136.02	119.57	13.01	78.97	95.61	169.41	104.72	68.14	130.68
Adj R-squared	0.2246	0.2024	0.0256	0.1448	0.1684	0.2651	0.1819	0.1258	0.2203

Note: The figures were coefficient values except the values inside parentheses, which were strong standard errors.

RE variable showed a positive effect on AR (β = 2.725, SE = 0.51) in agriculture. This implied a significant difference of 2.725% between the presence and absence of RE. However, the variables GRAB and the interaction between GRAB and RE in this context did not reach statistical significance.

All variables did not exhibit statistical significance in the basic and chemical, finance, infrastructure, utilities, and transportation, as well as miscellaneous industries. This suggested that GRAB was not a factor for AR in those sectors during RE.

The variable RE showed a negative impact on AR (β = -6.943, SE = 2.94) in the consumer goods industry. This signified a substantial difference of −6.943% between the presence and absence of RE in the consumer goods industry. However, GRAB and the interaction between GRAB and RE variables showed no statistical significance.

The results in Table 3 showed a positive impact of the RE variable on AR (β = 2.389, SE = 0.64) in the mining sector. This showed a significant difference of 2.389% in AR between the presence and absence of RE. Furthermore, RE moderated the relationship between GRAB and AR in the subsequent interaction analysis. RE also weakened the negative relationship between GRAB and AR (β = -0.062, SE = 0.04). The negative correlation suggested partial non-support for the hypothesis that higher GRAB led to AR during RE. The adverse effect of GRAB on AR in mining diminished when RE occurred, while the variable GRAB indicated no significance.

RE variable exhibited a positive effect on AR (β = 1.252, SE = 0.53) in property, real estate, and construction, signifying a significant difference between the occurrence and absence of RE. This difference amounted to 1.252%, signifying the substantial impact of RE on AR in this sector. However, variables not exhibiting significance were GRAB and the interaction between GRAB and RE.

A significant discrepancy of 0.883% was observed between the presence and absence of BSE in the trade, services, and investment industry with the RE variable exhibiting a positive effect on AR (β = 0.883, SE = 0.48). Furthermore, the interaction between GRAB and RE showed moderation. RE moderated the negative relationship between GRAB and AR (β = -0.264, SE = 0.15), partially contradicting the hypothesis asserting that higher levels of GRAB led to AR during RE. This implied that the adverse impact of GRAB on AR in trade, services, and investment diminished as RE occurred. Significantly, only the GRAB variable did not exhibit statistical significance in this sector.

The results in total showed that GRAB had significant effects on AR during RE but only occurred in certain sectors. The outcome supported the research time-varying hypothesis, signifying that investors' reactions to GRAB events did not correlate with strict rationality. This emphasized how investors' decisions deviated from rational models to incorporate emotional or heuristic elements, particularly during exceptional market occurrences and in distinct sectors.

The study examined the effect of GRAB per RE to assess the hypothesis of time variation. The presence of only GRAB in certain RE supported the hypothesis. This observation suggested changes in investor irrationality over time, providing support for quasi-irrationality. Additionally, a sub-sampling analysis was conducted for each RE, and the results were reported in Table 4.

Table 4. Sub-sampling regression analysis results

Variable	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9
Monetary Crisis									
GRAB	0.314	0.078	–0.162	–0.445	13.194*	1.147	0.158	0.062	0.557
	(0.80)	(0.93)	(1.64)	(1.27)	(7.82)	(0.97)	(0.24)	(0.13)	(1.08)
Intercept	–7.925	5.671	0.631	–3.216	–170.401	–4.398	4.14	–8.191	1.865
	(14.97)	(12.03)	(20.01)	(7.80)	(174.12)	(5.06)	(13.41)	(6.41)	(6.44)
F(7, 125)	10.4	14.57	6.15	7.58	1.28	9.61	10.79	9.72	8.34
Adj R-squared	0.3379	0.4184	0.2144	0.2588	0.1045	0.3134	0.3417	0.3162	0.2801
DotCom									
GRAB	0.448	–0.108*	0.057	–0.078	–1.635	–0.15	–0.421	–0.39	0.39
	(0.42)	(0.05)	(0.49)	(0.67)	(7.12)	(0.29)	(0.33)	(0.49)	(0.40)
Intercept	32.837*	–17.304*	–2.813	0.42	675.507*	1.609	–10.711	–3.472	5.497
	(15.74)	(9.03)	(9.11)	(10.11)	(385.36)	(11.21)	(13.36)	(10.20)	(5.10)
F(7, 193)	61	36.1	25.11	16.21	2.68	8.45	26.33	16.18	92.33
Adj R-squared	0.6887	0.5513	0.4576	0.3474	0.2115	0.2068	0.47	0.347	0.6887
Terror									
GRAB	–0.42	–0.35	0.789*	0.21	–1.214	–1.246**	–0.045	1.070*	–0.167
	(0.40)	(0.52)	(0.41)	(0.52)	(5.12)	(0.46)	(0.14)	(0.52)	(0.34)
Intercept	25.244	–5.867	–1.245	–5.11	–93.09	0.982	–7.53	–10.638	23.631
	(16.18)	(14.13)	(7.01)	(13.86)	(233.06)	(23.54)	(12.19)	(11.29)	(20.06)
F(7, 238)	78.98	24.44	19.97	17.01	2.03	18.16	31.56	8.72	39.24
Adj R-squared	0.6902	0.4011	0.3515	0.3139	0.02	0.3289	0.4661	0.1807	0.5221
SARS									
GRAB	–0.714	–0.508	0.615	–0.173	–5.469	–1.975	–0.786	1.303	–0.438
	(1.02)	(0.93)	(0.71)	(0.88)	(5.29)	(1.33)	(1.02)	(0.97)	(0.58)
Intercept	–35.78	–7.228	–58.144	–154.975	–53.849	6.1	–31.614	–11.714	13.071
	(60.51)	(24.84)	(50.89)	(93.45)	(55.06)	(69.05)	(28.84)	(11.65)	(9.94)
F(7, 76)	8.63	4.09	4.78	6.59	0.52	3.24	7.36	1.13	21.5
Adj R-squared	0.3916	0.2069	0.2417	0.2879	0.0357	0.1591	0.3493	0.0075	0.6335
GFC									
GRAB	–0.472	0.181	0.143	–1.045*	0.079	–1.277*	0.129	–3.06	–1.193*
	(0.55)	(0.45)	(0.44)	(0.44)	(0.57)	(0.61)	(0.52)	(2.54)	(0.55)
Intercept	1.342	22.727	6.599	10.36	2.078	–13.205	35.191	–45.848	0.251
	(16.59)	(16.37)	(19.65)	(27.71)	(41.87)	(17.49)	(24.45)	(39.64)	(13.27)
F(7, 110)	13.6	6.39	8.2	10.26	5.75	6.59	5.79	17.61	5.17
Adj R-squared	0.3926	0.2454	0.3012	0.3565	0.2211	0.2507	0.2227	0.4985	0.1998
Europe Debt									
GRAB	–0.035	–0.029	–0.529	–0.867*	–0.931*	–0.903	0.146	–9.822	–0.83
	(0.48)	(0.50)	(0.41)	(0.49)	(0.46)	(0.77)	(0.64)	(6.59)	(0.71)
Intercept	–49.842	–241.658*	–2.134	–90.801	–96.211	–464.367**	–83.529	387.961	–13.458
	(57.74)	(102.28)	(37.08)	(76.36)	(152.14)	(129.09)	(72.64)	(305.54)	(15.85)
F(7, 102)	11.2	11.77	14.08	7.5	7.75	7.52	5.33	15.53	7.27
Adj R-squared	0.3957	0.4088	0.4566	0.2945	0.3865	0.2953	0.2176	0.4827	0.2872
Fukushima									
GRAB	–0.734*	–0.608	–0.538*	0.288	–0.246	–0.368	–0.483	–0.279	–0.563**
	(0.30)	(0.38)	(0.33)	(0.65)	(0.40)	(0.45)	(0.48)	(0.43)	(0.21)
Intercept	–2.423	–79.862	–19.461	–241.654**	–60.791*	–36.419	–39.99	–1.887	–9.676
	(21.49)	(60.05)	(15.44)	(73.78)	(31.18)	(31.88)	(40.47)	(15.56)	(15.74)
F(7, 314)	32.12	25.17	24.3	30.65	50.3	26.9	19.82	41.47	21.74
Adj R-squared	0.4088	0.3452	0.3369	0.3927	0.5181	0.3609	0.2909	0.4688	0.3176
Oil Cycle									
GRAB	0.037	0.947*	0.111	–0.082	1.033**	0.726*	1.041**	0.624	–0.098
	(0.26)	(0.37)	(0.28)	(0.30)	(0.26)	(0.31)	(0.29)	(0.42)	(0.36)
Intercept	–1.201	–1.011	–1.446	–6.272*	1.204	0.829	0.372	–16.872**	–11.805**
	(0.97)	(2.39)	(2.35)	(2.92)	(4.15)	(4.10)	(4.04)	(5.26)	(4.14)
F(7, 156)	32.96	8.46	7.07	7.45	8.67	7.73	8.31	14.52	7.62
Adj R-squared	0.5785	0.2427	0.2068	0.2168	0.2477	0.2242	0.239	0.3674	0.2214

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Table 4 (cont.). Sub-sampling regression analysis results

Variable	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9
Black Monday									
GRAB	−0.364	0.151	−0.415	−0.056	0.231	−0.039	−0.75	0.179	0.483
	(0.29)	(0.17)	(0.40)	(0.47)	(0.25)	(0.18)	(0.49)	(0.38)	(0.33)
Intercept	−1.351	1.166	−3.182	−3.939	4.655	−1.618	−3.746	−9.962	−5.085
	(1.72)	(2.02)	(3.32)	(4.99)	(4.32)	(3.44)	(2.66)	(6.57)	(4.01)
F(7, 128)	11.07	8.73	7.17	9.53	7.24	7.07	6.02	9.42	12.69
Adj R-squared	0.3446	0.2862	0.2424	0.3163	0.2445	0.2407	0.2067	0.3038	0.3791
Brexit									
GRAB	−0.078	0.106	−0.181	−1.462**	−0.923	0.078	−0.608	−0.561*	−0.082
	(0.28)	(0.51)	(0.41)	(0.55)	(0.77)	(0.42)	(0.56)	(0.27)	(0.21)
Intercept	−20.278*	−16.626*	2.047	1.374	15.765	−12.621*	−15.007	−23.089**	−16.487**
	(11.75)	(9.35)	(3.82)	(10.73)	(10.43)	(5.78)	(12.70)	(6.48)	(5.09)
F(7, 148)	12.69	4.64	5.43	6.38	8.28	4.06	7.68	15.49	32.81
Adj R-squared	0.347	0.1411	0.1668	0.1479	0.3809	0.1213	0.2317	0.3955	0.5896
COVID–19									
GRAB	0.331	−0.065	0.049	−0.325	0.883	0.247	−0.165	−0.278	−0.273
	(0.33)	(0.42)	(0.50)	(0.70)	(0.81)	(0.37)	(0.66)	(0.43)	(0.29)
Intercept	−8.863*	−24.555**	3.826	1.395	−15.122**	−4.842	−8.726	−4.385	−11.284*
	(4.86)	(7.06)	(4.39)	(8.89)	(5.57)	(3.70)	(6.38)	(4.27)	(5.43)
F(7, 128)	71.52	24.59	58.63	25.52	14.18	37.47	22.29	48.2	54.37
Adj R-squared	0.6946	0.4321	0.6502	0.4416	0.2984	0.5405	0.4071	0.6036	0.6325

Note: The figures were coefficient values except the values inside parentheses, which were strong standard errors.

The results of this study regarding the interaction model between RE and GRAB factors showed a substantial negative influence of GRAB variable on AR. Specifically, this effect was observed across various events such as DotCom bubble (basic and chemical industry), GFC (finance, mining, as well as trade, services, and investment), European Debt Crisis (finance, as well as infrastructure, utilities, and transportation), Fukushima incident (agriculture, consumer goods industry, as well as trade, services, and investment), and Brexit event (finance, as well as property, real estate, and construction). The significance of these intriguing negative results provided support to EMH. During these events, sectors that significantly attracted investor attention resulted from the initial exhibition of irrational behavior by rational investors. GRAB investors evaluated securities based on the fundamental value, representing the present value of future cash flows when these events occur.

4. DISCUSSION

The empirical results of this study show significant adverse effects of GRAB in mining, as well as trading, service, and investment sectors, thereby correlating with the principles of EMH. However, no significant impacts were observed in the agricultural, basic and chemical, consumer goods, finance, infrastructure, utilities and transportation, miscellaneous, as well as property, real estate, and construction sectors. The scrutiny of investors is attracted by sectors showing substantial effects because irrational behavior is initially exhibited by rational investors during RE. These discerning investors assess securities based on the intrinsic value, representing the present value of future cash flows upon the occurrence of RE. GRAB, or the focus on specific events, can induce market inefficiencies by influencing investors' information processing methods in the context of prospect theory. Excessive attention to news or events can trigger exaggerated emotional responses and shift investor preferences. Investors tend to react more to prominent news events rather than engage in rational analysis. This develops market inefficiencies as asset prices fail to rationally reflect the true values, leading to the formation of irrational GRAB. Arbitrage opportunities will also arise as savvy investors exploit these inefficiencies.

The influence of GRAB in the Indonesian stock market is evident in two sectors during RE, namely the mining and trading sectors. In these industries, GRAB affects investor investment decisions ren-

dering the sectors significant. This implies that the higher level of GRAB in the sectors corresponds to lower inefficiency and does not result in higher AR. These results confirm the postulation of prospect theory, stating that investor investment decisions are influenced by psychological factors (Brahmana et al., 2012). In the context of GRAB, investors in Indonesia are more attracted to the mining sector due to the high turnover rate and association with large, experienced government-owned or private corporations. Similarly, the trading, service, and investment sector attracts investor attention due to the diverse range of large and small-scale trading enterprises, including services such as restaurants, hotels, and tourism. The influence of GRAB weakens during RE, thereby reducing AR in the market. This signifies that a high level of GRAB in the Indonesian stock market leads to psychological biases during RE.

This study suggests that there is no influence of GRAB in several sectors and various RE in the Indonesian stock market. Therefore, GRAB does not impact investor investment decisions, rendering these sectors insignificant including agriculture, basic and chemical, consumer goods, finance, infrastructure, utilities and transportation, miscellaneous, as well as property, real estate, and construction sectors. This

implied that the absence of GRAB in the sectors also signifies efficiency in the industries. Additionally, the sectors do not signify AR when investors are not experiencing GRAB. Investors in Indonesia are attracted to the industries due to the lack of attention during RE.

Previous literature suggests that GRAB is a scarce cognitive resource, and investors with limited attention should be selective in processing information (Kahneman, 1973). This challenge worsens during RE due to the increased availability of information through the internet and social media. GRAB influences investors' decision-making process before deciding, representing a crucial behavioral concept. Boehme et al. (2009) found that investors tended to incorporate stocks into their investment choices when the attention was focused on specific shares. Investors restrict their investment choices to stocks of interest, resulting in incomplete processing and integration of information into prices. This is contrary to assumptions made by theoretical asset pricing models such as the Capital Asset Pricing Model by Lintner (1965).

Barber and Odean (2008) were the first to find that attention could increase stock prices in the short term. The results of this study are also consistent with Barber's findings in the basic and chemical, consumer goods, infrastructure, utilities and transportation, mining, miscellaneous industry, as well as property, real estate, and construction sectors. However, these results contrast with observations in the agriculture, basic and chemical, consumer goods, finance, infrastructure, utilities and transportation, mining, as well as trading, service, and investment sectors. The moderation analysis signifies the relationship between GRAB and AR, where RE weakens the negative relationship between GRAB and AR. This implies that the negative impact of GRAB on AR diminishes further during RE.

CONCLUSION

This study aimed to investigate the relationship between the increase in GRAB and AR in RE. Industry characteristics such as market capitalization were included as control variables to isolate the primary effects of GRAB on market behavior. The results showed that both in bullish and bearish market conditions, GRAB had positive and negative effects on AR. Various events showed different effects on GRAB behavior, varying across numerous sectors. The results from the moderation analysis showed a correlation between GRAB and AR. In this context, RE weakened the negative relationship between GRAB and AR, which was further diminished during RE. GRAB did not manifest in the agriculture, basic and chemical, consumer goods, finance, infrastructure, utilities, and transportation, as well as property, real estate, and construction sectors. However, it evolved in mining, as well as trade, services, and investment sectors. GRAB briefly influenced investors' behavior to prompt a temporary deviation from rationality, with the possibility of returning to irrationality. This study further contributed to investors responding to RE individually with each distinct potential and risk.

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APPENDIX A

Table A1. Variable definitions

Variable	Definition	Formula
AR	Sector returns minus market returns	$AR_t = R_t - E\left[R_{i,t}\right]$
GRAB (BSI)	Stocks with attractive quality easily capture investor interest	$BSI_{pt} = \frac{\sum_{i=n}^{n_{pt}} NB_{it} - \sum_{i=n}^{n_{pt}} NS_{it}}{\sum_{i=n}^{n_{pt}} NB_{it} + \sum_{i=n}^{n_{pt}} NS_{it}}$
RE	Dummy variable for the occurrence of rare events	1 = If it was during rare events; 0 = If it was not during rare events
SML	The difference between the average daily returns of three small-cap stock portfolios and the average daily returns of three large-cap stock portfolios denoted as Small Minus Big	$MB = \frac{1}{3}\left(\frac{S}{L} + \frac{S}{M} + \frac{S}{H}\right) - \frac{1}{3}\left(\frac{B}{L} + \frac{B}{M} + \frac{B}{H}\right)$
HML	The daily difference between the average returns of two portfolios with high and low Book-to-Market Equity (BE/ME) ratios, is expressed as High Minus Low	$HML = \frac{1}{2}\left(\frac{S}{L} + \frac{B}{H}\right) - \frac{1}{2}\left(\frac{S}{L} + \frac{B}{L}\right)$
Size	The size of company capitalization is based on market capitalization size	$Vs = Ps \cdot Ss$