RETURN DISPERSION AND PRICE VOLATILITY: A MODERATED ANALYSIS ON PORTFOLIO MANAGEMENT STRATEGIES

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Abstract: The is study aims to analyze the effect of return dispersion on price return volatility and to analyze the moderator role of book-to-market that can weaken the causal effect based on the portfolio management framework. This paper specifically examines the causal effect at sub-group level of value and growth stocks portfolios. The sample observed are stocks covered in the index SSE-50 in China, DJI-30 in the United States, LQ-45 in Indonesia, and KLCI-30 in Malaysia. The observation period was during the covid-19 pandemic from 1 April 2020 to 30 March 2021. The analytical approaches applied are the GARCH(p,q) model, the hierarchical moderated regression analysis (HMRA) procedure, and the ordinary least-squared technique. The findings of the investigation show that when the estimation models are not separated into sub-groups, return dispersion positively influences return volatility. However, when the return dispersion is grouped based on the magnitude of BMR, the estimation results on the causality effect from dispersion of return to price return volatility show an insignificant effect for all sub-groups of value, neutral, and growth stocks. Specifically, when a company has a higher BMR, increased dispersion of return on such value stock does not change in its return volatility. As an implication, portfolio managers and market participants could minimize the uncertainty of price movements and eliminate share trading delays by implementing a strategy of style investing and selecting shares to form a value-type portfolio. Moreover, the companies should manage the position of their book value to remain classified as the value stocks segment, which could maintain the interest of market participants and lower the cost of capital.

Key words: book-to-market, portfolio management, price volatility, return dispersion, style investing

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Introduction

Studies examining the volatility of return in the equity markets are still interesting to explore, which is marked by the fact that there are many researchers who pay attention to this issue. They expand and develop in terms of analytical techniques, incorporating important variables and different settings on various equity markets. For example, Li et al. (2023) employ GARCH-MIDAS (Mixed Data Sampling) approach, and Wang et al. (2023) utilize heterogeneous autoregressive model to predict equity volatility of high-frequency SandP500 involving the uncertainty of economic decisions. In the same year, Asgharian et al. (2023) analyzed with an extension of the heterogeneous autoregressive approach to detect the effect of numerous determinants of equity volatility for the SandP500 and seven international stock indices.

Byun (2016) and Demirer et al. (2019) emphasized the importance of investigating return volatility and that understanding the patterns is useful for selecting a stock portfolio, deciding market timing, assessing financial derivatives, and managing risk. Apart from portfolio managers and investors, companies and policy regulators are also interested in assessing financial fundamentals and investor sentiment factors. The equity with stable volatility that is sufficiently resistant to shocks would make it easier for market participants to predict price movements and indexes.

With the urgency of return volatility, it is necessary to trace the factors that drive changes in return volatility at the firm level. These factors are in the form of company characteristics and external drivers, including leverage (Wei and Zhang, 2006), size (Bae et al., 2004), institutional ownership (Bohl and Brzeszczyński, 2006), earnings-per-share, turnover (Li et al., 2023), investor sentiment (Yacob et al., 2020), and international market integration (Najmudin et al., 2019). One of the interesting determinants is the dispersion of return as a reflection of investors trading in the formation of share prices in the equity market.

A number of studies, such as Stivers (2003) and Ankrim and Ding (2019), show an influence of dispersion of return on firm-level volatility of return. In addition, the result of Hwang and Satchell (2005) using the GARCH-X model found evidence of a strong cross-section deviation for individual equity return on aggregate volatility. Similarly, additional empirical evidence indicates that cross-sectional variation in returns is a significant factor contributing to stock volatility at the firm level (Campbell et al., 2001). Therefore, the dispersion of firm-level return by expanding across selected portfolios should be examined.

A large dispersion of returns indicates that investors decide to give a large difference in valuing the stocks on the market. Their attention has a very marked difference to a certain group of stocks compared to other groups of stocks. Some stocks are highly favored by investors with a high rate of return, while some other stocks are less desirable, resulting in a lower rate of return. Technically, a large return dispersion is caused by extremely high returns for a group of stocks and extremely low returns for a group of other stocks relative to the average returns for all stocks.

Previous studies have not involved factors that moderate, or more specifically, variables that weaken, the causality effect from return dispersion to return volatility. Therefore, this paper proposes alternative solutions by adding variables in the research model that have the potential to negatively moderate the causality. Apart from return dispersion, existing studies have also revealed that other factors negatively affect return volatility. This paper offers a style of investing with book-to-market measurement, which can be a moderator in reducing increased volatility due to greater dispersion return. As the originality of the content, this paper contributes to developing the research model and its application in the equity market by playing portfolio management as a solution factor that weakens return dispersion in influencing stock price volatility with a more detailed discussion in subgroups.

As a part of portfolio management, style investing basically contains classifications related to company characteristics. One of the types of style investing, namely stock portfolios based on size, has been studied by Bravo (2016). The empirical evidence shows that smaller companies experience higher volatility of return. In addition, Li et al. (2011) and Bae et al. (2004) suggest that the bigger the company, the lower the return volatility. Furthermore, the second style of investing based on BMR has been studied by Rajgopal and Venkatachalam (2011) and Bushee and Noe (2000), among others. They argue that companies with larger growth opportunities can experience higher price return volatility. Therefore, the two types of style investing are expected to reduce rising volatility due to a larger return dispersion.

Literature Review

Volatility is simply a variation on a variable that changes suddenly over a certain period. Volatility serves as a statistical measure of the level of fluctuation in the variable. In equity return, it was represented by conditional variance, which is the result of the trading activity of market participants and contains several pieces of information from various important sources. Volatility in equity return occurs due to spiky variations in equity price from time to time at high data frequency (Singh et al., 2023). Based on the way of analysis, volatility measures can be classified into cross-sectional (static) and time-series (dynamic) categories. The dynamic category measures were adopted by Muharam et al. (2019) and Robiyanto et al. (2019), who assume changes in volatility over time.

Dispersion of return is related to market inefficiencies, such as frequent central bank and government intervention, weak market regulation, lack of investor education, and weak requirements for disclosing information on listed companies. This inefficiency is often found in emerging markets. Chang et al. (2000) state that the higher return dispersion results from incomplete information disclosure and the magnitude of macroeconomic influences related to investor decision-making. Furthermore, they reveal that the dispersion of return is caused by the low quantity and quality of information on macro and microeconomics, especially the fundamental information of companies.

Style investing is a strategy for managing portfolios or funds that consists of shifting from one type of investment to another due to changing conditions. The popular styles rely on size and BMR, which are classified into big vs small portfolios and value vs growth portfolios. The strategy, for example, is shifting from growth-type stocks to value (income) type stocks or from small-cap-type stocks to large-cap types that depend on various indicators. Portfolio managers and market participants do not limit their investments to growth stocks or value stocks, but they attempt to create capital gains by moving from one segment to another according to conditions.

The term style investing was popularized by Barberis and Shleifer (2003), who referred to the writings of Fama and French (1992). They explain the factors classified into a particular style of investing, one of which is related to efforts to avoid the risk of financial assets, especially unsystematic risk or idiosyncratic volatility. In other studies, Wahal and Yavuz (2013) and Ashour et al. (2023) conclude that style investing has an important influence on predicting equity return. This section contains a series of hypothesis statements proposed in this study reinforced by a number of theoretical quotes and previous studies. Return dispersion could have an economic interpretation showing a positive relationship with traditional volatility. Bekaert and Harvey (1997) found that greater return dispersion is related to increased volatility in the larger markets. They stated that the dispersion of return can represent information content at the firm level in the markets. In addition, Connolly and Stivers (2006) observed the daily return volatility of 1081 NYSE companies. They confirmed the report of Campbell et al. (2001) and Bekaert and Harvey (1997) that the magnitude of return dispersion could provide additional information about future equity volatility. Previous descriptions and empirical studies indicate possible arguments to assume that return dispersion might contain an informative explanation of price return volatility.

Fei et al. (2019) investigate the influence of return dispersion in a cross-sectional form on the volatility of price return employing daily and intraday frequency in the stock market of China and applying the models of HAR (heterogeneous autoregressive) and GJR (Glosten-Jagannathan-Runkle)-GARCH family. The empirical finding suggests that the return dispersion provides a significant variation in explaining the volatility of the industry and market levels. Likewise, Niu et al. (2023) offer the powerful estimator of HAR technique to test the impact of return dispersion proxied by cross-sectional variance of equity return to equity market volatility. They obtained evidence that return dispersion could be an estimator of return volatility that is useful in forward-looking investment strategies to increase equity return.

H_1: Dispersion of return positively influences volatility of return.

The paper of Fama and French (1992) succeeded in identifying three factors using the three-factor model (TFM) as an application of arbitrage pricing theory (APT), which can explain 95% of stock return variability. These three factors are market risk, company size (market capitalization), and BMR (Ben Mrad Douagi et al., 2021). According to this model, size and BMR are the most significant factors

influencing investors' decisions on investment. In standard finance, market capitalization and BMR are interpreted as risk measures (Kakinuma, 2020). Stocks with smaller capitalization or lower BMR are considered high-risk stocks, and this higher risk indicates a higher expected return. In the writing of Barberis and Shleifer (2003), these two factors are proxies for the concept of style investing. Therefore, the BMR has the potential variable to reduce return volatility and could be employed as a moderating variable in the empirical model between dispersion of return and volatility.

BMR is a ratio that works as an indicator to measure a company's performance through book value and its market price. The book value per share reflects the economic net worth recorded in the financial statements of a company in a certain period. Meanwhile, the market price is the price formed as a result of buying and selling activities in the equity market. A larger BMR value indicates that investors are willing to buy shares of a company at a relatively lower price than the book value. A BMR value above 1 (one) indicates that the book value of a company is greater than the value formed by investors in the equity market. Therefore, the moderating variable of BMR is expected to reduce the increase in volatility due to the increase in return dispersion values.

The findings from Bravo (2016), Bushee and Noe (2000), and Rajgopal and Venkatachalam (2011) report that BMR has a negative impact on the volatility of price return. The results of other studies analyzing the influence of BMR on volatility and risk have been scattered in a lot of literature. For example, Brandt et al. (2010) documented the significant impact of BMR on idiosyncratic risk. Similarly, Vozlyublennaia (2013) concluded that partially BMR can explain idiosyncratic risk well. Specifically, Cao et al. (2008) stated that growth companies with lower BMR tend to participate in risky projects, thereby increasing risk.

H_2: Book-to-market negatively moderates the influence of return dispersion on return volatility.

Previous studies have shown that dispersion of returns was more apparent in stocks with lower value, including the study of Lakonishok et al. (1992). In addition, Kumari et al. (2017) suggested that idiosyncratic volatility (risk) was associated with a higher BMR. Specifically, Vo (2015) found that the coefficient of the market-to-book ratio presents a positive sign, which means that the greater the market value relative to the book value, the higher the equity return volatility. In contrast, shares with lower BMR, a growth stocks portfolio, are considered more volatile.

Style investing related to return volatility has not been explicitly discussed in earlier studies at the sub-group level. However, there have been relatively many studies investigating the causality of style investing at the group level, particularly applying measures of size and BMR. For instance, studies by Bravo (2016), Bushee and Noe (2000), and Rajgopal and Venkatachalam (2011) have investigated the influence of book-to-market on the volatility of return. Their conclusion states that companies with larger growth opportunities can most likely experience higher volatility.

To examine whether there are differences in the dispersion of return conditional on different styles, this study screens the characteristics of shares in each equity market in three sub-groups based on the magnitude of BMR. This formation resulted in a research sub-sample with higher and lower BMR to represent the condition of value and growth stocks, as well as a research sub-sample with middle BMR indicating the character of neutral stocks. The description of empirical model is presented in Hypothesis 3.

H_3: Dispersion of return for value stocks sub-group has no positive influence on return volatility.

Research Methodology and Data Description

The sample companies were selected by purposive sampling, namely companies included in the leading index of each equity market with a sample period during the Covid-19 pandemic from April 1, 2020 to March 30, 2021. The sampling criteria are companies with greater share capitalization and higher trading liquidity, namely SSE-50 in China, DJI-30 in the US, LQ-45 in Indonesia, and KLCI-30 in Malaysia. The indices are reviewed periodically, and the composition of the members listed might change.

The secondary data collected to analyze the research model consist of 1). List of groups of shares that had greater share capitalization and larger trading liquidity at the leading indices for each equity market; 2). List of daily share prices for each sample company; and 3). The book value of equity and the number of shares outstanding for each sample company. The data were downloaded from available sources on the bloomberg.com data terminal, wsj.com, yahoo.finance.com website, and the respective stock exchange websites.

The techniques employed are the moderation regression, GARCH(1,1) model, and the ordinary least squared technique. The following are analysis techniques explained in each stage.

The first is HMRA (hierarchical moderated regression analysis) technique and GARCH(1,1) model. The moderation regression technique functions to test hypothesis 1 and hypothesis 2, while the GARCH(1,1) model functions to create return variance values to proxy for return volatility as an independent variable in moderation regression.

The HMRA procedure was presented by Jose (2013). The steps are worked by constructing three regression models, evaluating the difference in explained variance (ΔR^2), and conducting an overall statistical significance test and an F difference test. In the interaction test, the regression equation model is formulated as follows:

$$VOR_{i,t} = \alpha_1 + \beta_1 DIS_{i,t} + \beta_2 BMR_{i,t} + \beta_3 DIS*BMR_{i,t} + \varepsilon_{i,t} \quad (1)$$

Volatility of Return (VOR) in this study is sourced from GARCH(1,1) method generating the variance. The model positions the conditional variance as the dependent variable on its own lag and its squared residual lag (Bollerslev, 1986).

The second is ordinary least squared (OLS) technique functions to test the return dispersion on stock portfolios based on the BMR factor classification on the portfolio's volatility.
For hypothesis 3, which aims to ensure that the impact of return dispersion (DIS) on return volatility is different for the characteristics of different stock groups, the stock groups are separated based on the BMR. More specific attention is directed to the value stocks sub-group with higher BMR. The proposed model is as follows.

$$VOR_{H\text{-}BMR,i,t} = \alpha_0 + \gamma_1 DIS_{i,t}^{H-BMR} \quad (2)$$

This OLS analysis technique is complemented visually with the help of the Excel application program recommended by Jose (2013). The procedure for running additional programs in the MS Excel application can be downloaded from https://psychology.victoria.ac.nz/modgraph/downloads.php. The step in the application is to input information from the output of the moderation regression analysis in the previous section.

Empirical Results and Discussion

The estimation results of the moderation regression for models 1, 2, and 3 for each equity market are shown in Table 1 (China and the US) and Table 2 (Indonesia and Malaysia). The first equity market for BMR moderation analysis is China. The coefficient of determination (R^2) for models 1, 2, and 3 sequentially increase from 0.0196 to 0.0235 and to 0.1648, respectively. This means that the predictor variables in the estimation equation for each model are able to explain variations in the return volatility of 1.96 percent, 2.35 percent, and 16.48 percent. Moreover, gradually adding the predictor variables, the values of determination coefficient appear to increase. The difference in the coefficient of determination (incremental R^2) from model 1 to model 2 is 0.39 percent, while the incremental R^2 from model 2 to model 3 is 14.13 percent.
The estimation results obtained for the Chinese market show that the DIS variable has a positive effect, the BMR moderator variable has no effect, and the DIS*BMR interaction variable has a negative impact on equity return volatility. In addition, the estimates of model 1 and model 2 are not different but different from model 3, namely $\beta_2 = 0$ and $\beta_3 \neq 0$. Both indicators, namely the incremental R-squared and the significance of predictor coefficient sign, provide a basis for deciding that BMR is a type of negative pure moderator variable.

Table 1. Estimation Results of the Effect of Return Dispersion and Moderator Variable BMR on Return Volatility for the Equity Markets of China and the US

	CN			US		
Variable	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
VOR	Volatility of Return					
C	0.006	0.006	–0.014	0.034	0.033	0.017
DIS	0.063**	0.059**	0.063***	0.637***	0.631***	0.595***
BMR		–2.178	–0.699		–4.095***	12.349
DIS*BMR			–18.898***			–21.322**
R^2	0.0196	0.0235	0.1648	0.0702	0.0719	0.0901
Type	Negative Pure Moderator			Negative Pure Moderator		

Source: Data processed

The coefficient of determination (R^2) for models 1, 2, and 3 in the US equity market increases sequentially from 0.0702 to 0.0719 and 0.0901, respectively. The estimation results show that the DIS variable has a positive effect, the BMR moderator variable has no effect, and the DIS*BMR interaction variable has a negative impact on price return volatility. The estimations of models 1 and 2 differ from model 3, namely $\beta_2 = 0$ and $\beta_3 \neq 0$. Both indicators lead to the decision that the BMR in the US equity market is a type of negative pure moderator variable. The status of BMR as a pure moderator in the US equity market is the same as that of BMR in the Chinese equity market.

Table 2 informs the estimation results along with the coefficients of determination and regression coefficients for the Indonesian equity market. The indicators suggest that BMR is a type of negative pure moderator variable. Meanwhile, Table 2, columns 5 to 7, presents the estimation results of three models for the Malaysian equity market. Both indicators, namely the incremental R-squared and the significance of predictor variables, provide a basis for deciding that the BMR in the Malaysian equity market is classified as a negative quasi-moderator variable.

In this section, the role of BMR was tested and analyzed statistically as a moderator variable. The ordinary least square technique was employed in combination with the HMRA procedure and centering technique. According to this step, it was found that, in general, return dispersion has a positive influence on return volatility. Thereby, hypothesis 1 is accepted. In addition, BMR variable can weaken the influence of return dispersion on return volatility. The estimation results for BMR moderation are similar to the formulation of hypothesis 2. Hence, hypothesis 2, which states that

BMR negatively moderates the influence of return dispersion on return volatility, is accepted.

Table 2. Estimation Results of the Effect of Return Dispersion and Moderator Variable BMR on Return Volatility for the Markets of Indonesia and Malaysia

	ID			MY		
Variable	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
VOR	Volatility of Return					
C	–0.001	–0.002	–0.010	–0.017	–0.015	–0.015
DIS	0.819***	0.801***	0.743***	0.229***	0.228***	0.193***
BMR		–10.585***	–5.087		–3.280***	–3.721**
DIS*BMR			–8.122***			–12.769***
R^2	0.1446	0.1854	0.2078	0.1898	0.2027	0.2553
Type	Negative Pure Moderator			Negative Quasi Moderator		

Source: Data processed

The analysis presented in the previous section regarding the role of BMR as a moderator variable was continued in detail. The analysis of each sub-group was examined in more depth, as stated previously, and stocks could be classified based on the BMR into value and growth stocks groups. However, in this sub-group analysis, BMR is classified into value, neutral, and growth due to adjusting to the statistical moderation analysis procedure in making graphs and obtaining the slope of each sub-group. It usually divides the group classification into three classes: high, medium, and low.

Table 3. Estimation Results of Three Stock Sub-Groups for Markets of China and the US

	CN			US		
Variable	Value	Neutral	Growth	Value	Neutral	Growth
VOR	Volatility of Return					
C	-0.020	-0.014	-0.007	0.197	0.018	-0.161
DIS	-0.111	0.067	0.245	0.285	0.594	0.902
p-Value	0.879	0.927	0.736	0.643	0.335	0.143

Source: Data processed

Table 3 presents the estimation results for each stock sub-group based on BMR in the Chinese (CN) and The US equity markets. The values indicate that the dispersion of return on value stocks sub-group has no effect on changing return volatility. In other words, the return volatility does not become higher because of the larger return dispersion when the BMR value of company is higher.
Table 4 informs the testing results of the constant and slope for each stock sub-group based on BMR on the Indonesian (ID) and Malaysian (MY) equity markets. The p-value indicators suggest that when a company has a higher BMR, the dispersion of return for the company has no influence on increasing or decreasing its volatility of return. In other words, return volatility does not increase when the company has a higher BMR even though it experiences a larger return dispersion.

Table 4. Estimation Results of Three Stock Sub-Groups for Markets of Indonesia and Malaysia

	ID			MY		
Variable	Value	Neutral	Growth	Value	Neutral	Growth
VOR	Volatility of Return					
C	-0.173	-0.010	0.154	-0.050	-0.018	0.014
DIS	0.483	0.744	1.006	0.072	0.181	0.291
p-Value	0.536	0.341	0.199	0.878	0.699	0.537

Source: Data processed

A visual form complements the quantitative statistical description above further to make it clearer. Each sub-group of shares in the four equity markets is graphically presented in Figure 1. The estimation line for value stocks (higher BMR) in the Chinese equity market appears to have a direction from the upper right to the lower left. Such line position indicates that DIS coefficient is negative at -0.111, with the slope of the estimation line appearing slightly sloping.
The estimation line for value stocks in the US market has a positive slope with a value of 0.285. However, the slope is statistically insignificant; therefore, the meaning is not much different from the Chinese equity market. The graph for sub-group value stocks in the US equity market is almost similar to those shown in the Indonesian and Malaysian equity markets. Furthermore, the slopes of the four equity markets are all insignificant, with p-values of more than 10 percent. This suggests that all return dispersion coefficients are insignificant for all sub-group of value stocks. Therefore, the return dispersion does not increase the return volatility for the companies with a higher BMR.
According to the steps in this section, the empirical results suggest that, in general, the sub-group of value stocks that are the companies that have a higher BMR does not experience an increase in return volatility even though the dispersion of return increases. The results for the value stocks are similar to the formulation of hypothesis

3. Hence, hypothesis 3, which states that return dispersion for value stocks sub-group does not increase return volatility, is accepted.

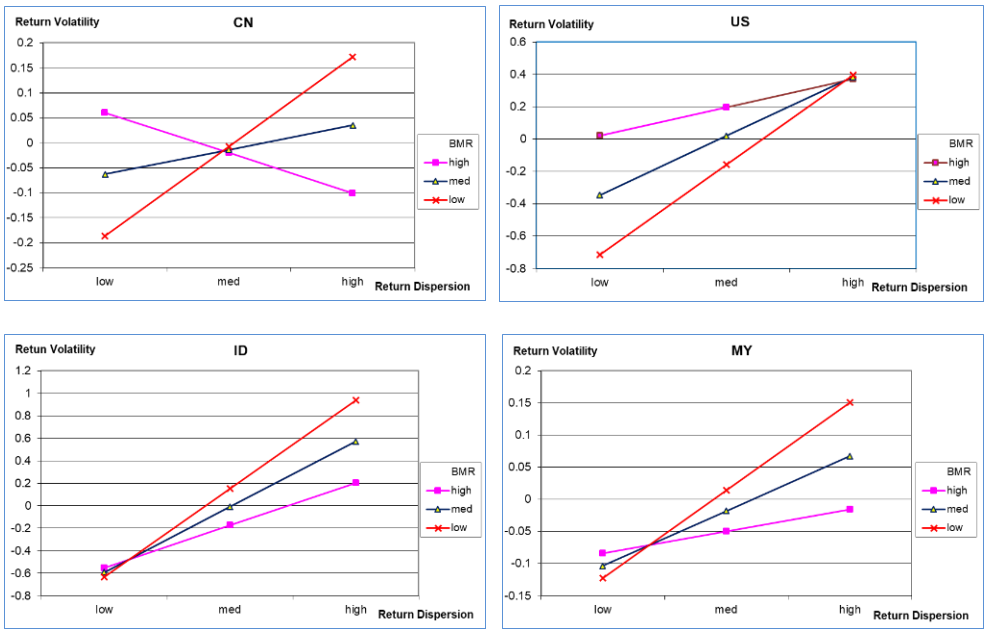

Figure 1: Graph of the causality effect from dispersion of return on return volatility for BMR sub-group in the four equity markets

The findings of this study suggest that the return dispersion variable has a positive influence on return volatility. It was similar to conclusions delivered in the previous studies, including Demirer et al. (2019), Byun (2016), Fei et al. (2019), and Niu et al. (2023). Observations from Demirer et al. (2019) informed that there were several notable spikes in return dispersion and its volatility during the periods of the Asian crisis and GFC (global financial crisis). Likewise, this is similar to previous studies presenting equity patterns in periods of recession and market stress (Schwert, 2011). Hence, the increase in return dispersion on an equity market could increase the return volatility.

The HMRA procedure presents the following results. First, return dispersion has a positive influence on price return volatility. Second, the BMR variable negatively influences volatility in the Malaysian equity market. Meanwhile, in the Chinese, the US, and Indonesian markets, the BMR has no effect on volatility. Third, the DIS-BMR interaction variable has an influence negatively on price volatility. These three results suggest that the BMR variable is able to moderate negatively the influence from dispersion of return to return volatility. For the Malaysian equity market, BMR is negatively a quasi-moderator variable. This quasi-type moderator indicates that BMR, return dispersion, and the interaction variables have a significant influence on return volatility.

Estimations generated from the Chinese, Indonesian, and the US markets show that the BMR variable has no effect on volatility. With these results, the status of BMR in the three markets is a pure moderator variable. This type indicates that the BMR is insignificant, while the return dispersion and its interaction variables have a significant influence on return volatility. This evidence is almost similar to the report of Vozlyublennaia (2013) which found that BMR was insignificant in a cross-sectional regression on volatility as measured by its residual values. This report was obtained when other independent variables were involved. However, BMR was significant when the variables were not included in the equation.

This study proposes a design by raising a sub-group of value stocks based on the classification of BMR which is a reflection of the concept of style investing. The paper of Fama and French (1992) reviewed the BMR which acts as an independent variable that has a significant influence on the individual return. Accordingly, BMR is also assumed to have an influence on its volatility of return. After that, Barberis and Shleifer (2003) revealed that a sub-group of this variable is known as style investing. Furthermore, paper of Galariotis et al. (2015) is one of the studies adopting the concept of style investing and implementing its variables. They separate the sample according to style investing, namely value and growth.

Analysis of the influence from return dispersion on conditional return volatility in the sub-group of value stocks is a specific extension from the earlier section of analyses. Consequently, the finding obtained from the sub-group analysis is relatively new, so it could not compared with previous studies. However, there are indications in the previous studies that show consistency with the finding of this study along with existing theoretical support. For instance, Vo (2015) concludes that a higher BMR makes volatility lower and more specifically portfolio of growth stocks appears to be more volatile. In addition, volatile stocks contain greater trading costs and primary risk. Therefore, such stocks were avoided by arbitragers. On the contrary, they were attractive to noise traders and extreme prices were preferred by speculators to gain returns.

Some managerial implications for related market participants, particularly for portfolio managers and investors, companies, and policymakers, originating from the findings of this paper are as follows. Financial knowledge expanded from the findings could increase the expansion of portfolio diversification and stock selection for portfolio managers and investors (Nguyen et al., 2023). They should allocate their funds to portfolios covering stocks with higher BMR by selecting stocks to form a value-type portfolio and implementing the strategy of style investing. It could minimize the uncertainty of price movements caused by greater return dispersion and eliminate share trading delays. Greater return dispersion results in higher price volatility representing uncertainty that changes over time or time-varying volatility (Chowdhury and Irfan, 2022). This condition can add to the difficulty of portfolio managers and investors in estimating stock price movements which causes them to increase waiting time, delay their decision to trade, and eliminate the opportunity to

obtain cumulative returns. Such stocks are rationally avoided for trading and are not in market demand.

Financial managers should make decisions to improve the position of their enterprise in the competition (Sedliacikova et al., 2021). It includes the movement of their share prices in the equity market. They play an important role in responding to the dynamics of return dispersion due to investment activities of stockholders, thereby they should manage the reality of financial accounts to ensure the stability and liquidity of shares in the equity market. In the context of higher price volatility caused by greater return dispersion, a company should manage the position of its book value to remain classified as the value stocks segment that could achieve a lower cost of capital and maintain the interest of market participants.

Bad volatility caused by greater return dispersion could widen a risk premium for investors making the required rate of return higher. Such return causes companies to face difficulties in increasing their capital, for example when they offer a rights issue. In other words, it could lead companies to bear increased risks so that their cost of capital becomes larger. The increased cost of capital could decrease the firm value and ultimately reduce the welfare of shareholders. Moreover, this condition could result in lower trading liquidity in the form of lower trading volume and frequency or even becoming inactive stocks. Consequently, such stocks might be delisted from the stock exchange, which is detrimental to the continuity of their capital structure.

Stock exchange authorities should regulate the market to be more efficient, which could create symmetric information for all market participants. If the information is disseminated by financial authorities to the public in an appropriate manner, then higher dispersion return should not occur. This is because investors make investment decisions based on the information and not following market sentiment. The phenomenon of dispersion of return contradicts the thinking in efficient market theory, which states that most investors have rational decisions and similar information content to form the expected share price in the same direction. As a result, share prices will reflect the information available on the market and the actual value of shares. Meanwhile, the dispersion of return indicates that investors have no rational analysis enough to determine the share price of a company, and all market participants do not always obtain complete information. Therefore, dispersion of return can destabilize the market because the share prices move away from the fundamental value.

Conclusion

The research model developed in this paper successfully answered the research questions posed with the following conclusions. First, return dispersion has a positive influence on return volatility. It was obtained by testing statistically the return dispersion partially and simultaneously with style investing. Second, style investing could negatively moderate the influence of return dispersion on return volatility. Particularly, the BMR variable can weaken the positive impact of return dispersion on return volatility. Third, return volatility does not increase when the

magnitude of BMR is higher, even though the shares experience a larger return dispersion. The condition of higher BMR for the value stocks portfolio makes it more resistant to the possibility of experiencing an increase in return volatility. In summary, BMR could act as a moderator variable that weakens the effect from dispersion of return to price return volatility, specifying that the sub-group of value stocks does not increase return volatility.

According to the findings of this paper, the implications that are beneficial for portfolio managers, investors, and financial managers are formulated as follows. First, because return dispersion could exacerbate return volatility, market players should pay more attention to trading on the stock exchange where there is a higher return dispersion. Understanding the shares with such characteristics could reduce uncertainty and prevent risks in the form of return volatility. Second, during the Covid-19 pandemic period, greater return dispersion occurred in all equity markets; therefore, they should hold back their investments in such conditions. Another alternative decision is to continue trading on the stock exchange by investing the style in value-type stocks portfolio whose return volatility is not affected by the return dispersion. In response to investors' demand, the financial managers should arrange the account of book value to achieve the value stocks classification.

This paper only investigates value stocks portfolio as one measure of style investing due to limited space reasons. Future research could explore other investing style measures as a moderator factor. In addition, further research could combine the available data into longitudinal data by utilizing the Panel-Garch model to extend the research model in the analytical techniques. Furthermore, future research might expand the setting within a certain period and for emerging equity markets.

References

Ankrim, E. M., Ding, Z., (2019). Cross-Sectional Volatility and Return Dispersion. *Financial Analysts Journal*, *58*(5), 67-73.

Asgharian, H., Christiansen, C. and Hou, A. J., (2023). The effect of uncertainty on stock market volatility and correlation. *Journal of Banking and Finance*, *154*, 106929.

Ashour, S., Hao, G. Q. and Harper, A., (2023). Investor sentiment, style investing, and momentum. *Journal of Financial Markets*, *62*, 100755.

Bae, K.-H., Chan, K. and Ng, A., (2004). Investibility and return volatility. *Journal of Financial Economics*, *71*, 239-263.

Barberis, N., Shleifer, A., (2003). Style investing. *Journal of Financial Economics*, *68*(2), 161-199.

Bekaert, G., Harvey, C. R., (1997). Emerging equity market volatility. *Journal of Financial Economics*, *43*(1), 29-77.

Ben Mrad Douagi, F. W., Chaouachi, O. and Sow, M., (2021). The Portfolio Management: Investigation of the Fama-French Five- and Six-Factor Asset Pricing Models. *Polish Journal of Management Studies*, *23*(1), 106-118.

Bohl, M. T., Brzeszczyński, J., (2006). Do institutional investors destabilize stock prices? Evidence from an emerging market. *Journal of International Financial Markets, Institutions and Money*, *16*(4), 370-383.

Bollerslev, T., (1986). Generalized autoregressive conditional heteroskedasticity. *Journal of Econometrics*, *31*(3), 307-327.

Brandt, M. W., Brav, A., Graham, J. R. and Kumar, A., (2010). The Idiosyncratic Volatility Puzzle: Time Trend or Speculative Episodes? *Review of Financial Studies*, *23*(2), 863-899.

Bravo, F., (2016). Forward-looking disclosure and corporate reputation as mechanisms to reduce stock return volatility. *Revista de Contabilidad*, *19*(1), 122-131.

Bushee, B. J., Noe, C. F., (2000). Corporate Disclosure Practices, Institutional Investors, and Stock Return Volatility. *Journal of Accounting Research*, *38*, 171-202.

Byun, S. J., (2016). The usefulness of cross-sectional dispersion for forecasting aggregate stock price volatility. *Journal of Empirical Finance*, *36*, 162-180.

Campbell, J. Y., Lettau, M., Malkiel, B. G. and Xu, Y., (2001). Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk. *The Journal of Finance*, *56*(1), 1-43.

Cao, C., Simin, T. and Zhao, J., (2008). Can Growth Options Explain the Trend in Idiosyncratic Risk?. *Review of Financial Studies*, *21*(6), 2599-2633.

Chang, E. C., Cheng, J. W. and Khorana, A., (2000). An examination of herd behavior in equity markets: An international perspective. *Journal of Banking and Finance*, *24*(10), 1651-1679.

Chowdhury, S. S. H., Irfan, M., (2022). A Study on the Time-varying Volatility Connectedness between the Sectors in the Indian Stock Market. *Montenegrin Journal of Economics*, *18*(3), 77-88.

Connolly, R., Stivers, C., (2006). Information content and other characteristics of the daily cross-sectional dispersion in stock returns. *Journal of Empirical Finance*, *13*(1), 79-112.

Demirer, R., Gupta, R., Lv, Z. and Wong, W.-K., (2019). Equity Return Dispersion and Stock Market Volatility: Evidence from Multivariate Linear and Nonlinear Causality Tests. *Sustainability*, *11*(2), 351.

Fama, E. F., French, K. R., (1992). The Cross-Section of Expected Stock Returns. *The Journal of Finance*, *47*(2), 427-465.

Fei, T., Liu, X. and Wen, C., (2019). Cross-sectional return dispersion and volatility prediction. *Pacific-Basin Finance Journal*, *58*, 101218.

Galariotis, E. C., Rong, W. and Spyrou, S. I., (2015). Herding on fundamental information: A comparative study. *Journal of Banking and Finance*, *50*, 589-598.

Hwang, S., Satchell, S. E., (2005). GARCH model with cross-sectional volatility: GARCHX models. *Applied Financial Economics*, *15*(3), 203-216.

Jose, P. E., (2013). *Doing Statistical Mediation and Moderation* (1st ed.). Guilford Press.

Kakinuma, Y., (2020). Empirical evidence of profitability anomaly in the Thai stock market. *Journal of International Studies*, *13*(4), 89-100.

Kumari, J., Mahakud, J. and Hiremath, G. S., (2017). Determinants of idiosyncratic volatility: Evidence from the Indian stock market. *Research in International Business and Finance*, *41*, 172-184.

Lakonishok, J., Shleifer, A. and Vishny, R. W., (1992). The impact of institutional trading on stock prices. *Journal of Financial Economics*, *32*(1), 23-43.

Li, D., Nguyen, Q. N., Pham, P. K. and Wei, S. X., (2011). Large Foreign Ownership and Firm-Level Stock Return Volatility in Emerging Markets. *Journal of Financial and Quantitative Analysis*, *46*(04), 1127-1155.

Li, D., Zhang, L. and Li, L., (2023). Forecasting stock volatility with economic policy uncertainty: A smooth transition GARCH-MIDAS model. *International Review of Financial Analysis*, *88*, 102708.

Muharam, H., Mawardi, W., Arfinto, E. D. and Najmudin, N., (2019). Volatility spillovers under difference in the degree of market integration: Evidence from the selected Asian and Eastern European stock markets. *Journal of International Studies*, *12*(1), 134-150.

Najmudin, Kurniasih, R., Sulistyandari and Jati, D. P., (2019). The effect of dynamic relationship between domestic market and world market on stock returns volatility. *IOP Conference Series: Earth and Environmental Science*, *255*.

Nguyen, D. S., Hoang, T. H. V., Pho, K.-H. and Nhan, D. T. T., (2023). Financial Literacy and Portfolio Diversification: Evidence from Vietnam. *Journal of Competitiveness*, *15*(3), 79-103.

Niu, Z., Demirer, R., Suleman, M. T. and Zhang, H., (2023). Cross-sectional return dispersion and stock market volatility: Evidence from high-frequency data. *Journal of Forecasting*, *42*(6), 1309-1328.

Rajgopal, S., Venkatachalam, M., (2011). Financial reporting quality and idiosyncratic return volatility. *Journal of Accounting and Economics*, *51*(1-2), 1-20.

Robiyanto, R., Santoso, M., Rambu Atahau, A. and Harijono, H., (2019). The Indonesia Stock Exchange and Its Dynamics: An Analysis of the Effect of Macroeconomic Variables. *Montenegrin Journal of Economics*, *15*(4), 59-73.

Schwert, G. W., (2011). Stock Volatility during the Recent Financial Crisis. *European Financial Management*, *17*(5), 789-805.

Sedliacikova, M., Moresova, M., Alac, P. and Drabek, J., (2021). How Do Behavioral Aspects Affect the Financial Decisions of Managers and the Competitiveness of Enterprises? *Journal of Competitiveness*, *13*(2), 99-116.

Singh, S., Parmar, K. S. and Kaur, J., (2023). Chapter 12 - Forecasting volatility in the stock market data using GARCH, EGARCH, and GJR models. In S. Eslamian and F. Eslamian (Eds.), *Handbook of Hydroinformatics* (pp. 207-220). Elsevier.

Stivers, C. T., (2003). Firm-level return dispersion and the future volatility of aggregate stock market returns. *Journal of Financial Markets*, *6*(3), 389-411.

Vo, X. V., (2015). Foreign ownership and stock return volatility – Evidence from Vietnam. *Journal of Multinational Financial Management*, *30*, 101-109.

Vozlyublennaia, N., (2013). Do firm characteristics matter for the dynamics of idiosyncratic risk? *Journal of International Financial Markets, Institutions and Money*, *27*, 35-46.

Wahal, S., and Yavuz, M. D., (2013). Style investing, comovement and return predictability. *Journal of Financial Economics*, *107*(1), 136-154.

Wang, J., Ma, F., Wang, T. and Wu, L., (2023). International stock volatility predictability: New evidence from uncertainties. *Journal of International Financial Markets, Institutions and Money*, *85*, 101781.

Wei, S. X., Zhang, C., (2006). Why Did Individual Stocks Become More Volatile? *The Journal of Business*, *79*(1), 259-292.

Yacob, N., Mustapha, M., Abdullah, S. M. M. and Ya'acob, F. F., (2020). Incorporating Investor Behaviour in Portfolio Management in Developed and Emerging OECD Stock Markets. *Polish Journal of Management Studies*, *22*(1), 611-625.

DYSPERSJA ZWROTÓW I ZMIENNOŚĆ CEN: ANALIZA MODEROWANA STRATEGII ZARZĄDZANIA PORTFELEM PRODUKTÓW

Streszczenie: Celem niniejszego badania jest analiza wpływu dyspersji zwrotów na zmienność cen zwrotu oraz zbadanie roli wskaźnika księgowej wartości rynkowej (BMR) jako moderatora, który może osłabiać efekt przyczynowy w ramach zarządzania portfelem. Artykuł ten szczególnie bada efekt przyczynowy na poziomie podgrup portfeli akcji wartościowych i wzrostowych. Próba badawcza obejmuje akcje z indeksów SSE-50 w Chinach, DJI-30 w Stanach Zjednoczonych, LQ-45 w Indonezji i KLCI-30 w Malezji. Okres obserwacji obejmował pandemię COVID-19 od 1 kwietnia 2020 r. do 30 marca 2021 r. Zastosowane podejścia analityczne to model GARCH(p,q), procedura hierarchicznej moderowanej analizy regresji (HMRA) oraz technika najmniejszych kwadratów (OLS). Wyniki badania pokazują, że gdy modele estymacyjne nie są podzielone na podgrupy, dyspersja zwrotów pozytywnie wpływa na zmienność zwrotów. Jednakże, gdy dyspersja zwrotów jest grupowana na podstawie wielkości BMR, wyniki estymacji efektu przyczynowego dyspersji zwrotów na zmienność cen zwrotów wykazują nieistotny wpływ dla wszystkich podgrup akcji wartościowych, neutralnych i wzrostowych. W szczególności, gdy firma ma wyższy wskaźnik BMR, zwiększona dyspersja zwrotów na takich akcjach wartościowych nie zmienia ich zmienności zwrotów. W konsekwencji, zarządzający portfelami i uczestnicy rynku mogliby zminimalizować niepewność ruchów cen i wyeliminować opóźnienia w handlu akcjami, wdrażając strategię inwestowania w stylu i wybierając akcje do tworzenia portfela typu wartościowego. Ponadto, firmy powinny zarządzać pozycją swojej wartości księgowej, aby pozostać zaklasyfikowane jako segment akcji wartościowych, co mogłoby utrzymać zainteresowanie uczestników rynku i obniżyć koszt kapitału.

Słowa kluczowe: wartość księgowa do rynkowej, zarządzanie portfelem, zmienność cen, dyspersja zwrotów, style inwestowania