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BOWMAN'S RISK-RETURN RELATIONSHIP: EMPIRICAL EVIDENCE IN A FRONTIER MARKET

Abstract

This paper investigates whether there exists a Bowman paradox on the relationship between risk-return for Vietnamese firms. Data in the annual audited financial statements from 2017 to 2020 of 727 enterprises listed on the Vietnamese stock market are used in this study. The data set is divided into two different groups based on the reference point, which is the average return of the whole market and by industry. Correlation analysis and ordinary least square regression according to cross sectional data were performed in this study. After controlling for size, debt-to-total assets, and debt-to-equity ratios, the research results show that the risk-return relationship of the two groups of firms is mixed and can be explained by prospect theory. There exists Bowman's paradox for a group of firms whose return is below the reference point, these firms tend to seek risk versus return, so their risk-return relationship is negative. In contrast, this relationship is positive for the group of firms whose returns are above the reference point, or which tend to avoid risk. The slope coefficient of the group of enterprises below the reference point compared to the rest of enterprises is 2.5:1, which correctly reflects the ratio of the risk-seeking area to the risk-avoiding area in prospect theory.

Keywords

Bowman paradox, prospect theory, return on assets, risk attitude, risk aversion, risk-seeking, slope of function, Vietnam

JEL Classification

G40, G41, L20, M41

INTRODUCTION

Although the topic of the risk-return relationship of enterprises has been studied, the exact answer about this relationship is still one of the 10 unsolved problems in the financial sector (Brealey et al., 2018). Empirical results on the risk-return relationship of enterprises in published studies are inconsistent. Initially, studies that found a positive relationship between risk and return of a firm (Fisher & Hall, 1969; Neuman et al., 1979) often used Von-Neumann's theory of expected utility and Morgenstern in 1944 to explain (Von Neumann & Morgenstern, 2007). It shows that the business only accepts the increased risk when the expected return increases accordingly. However, when doing the above research for US firms, Bowman (1980) showed that the risk-return relationship of firms is negative. Bowman's discovery is also known as Bowman's paradox. Von-Neumann and Morgenstern's original expected utility theory struggled to explain the Bowman paradox, therefore, later studies have often used Kahneman and Tversky's 1979 prospect theory (Kahneman & Tversky, 1979) to explain this paradox. Furthermore, Miller and Bromiley (1990) find that the performance reduces earnings uncertainty for the group of good firms and increases the earnings stream risk for the group of poor firms. Because the risk-return relationship of firms cannot be determined with certainty, this topic has attracted scholars studying



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in developed stock markets (Sinha, 1994) and emerging stock markets (Nuir & Asri, 2019; Gupta, 2017). However, the interest on this topic in the frontier stock market remains very limited.

Compared to many stock markets in the world, the development level of Vietnam's stock market is still quite low. The Vietnamese stock market is being classified as a frontier market (Phuong, 2021, 2022) and is striving to meet the criteria for an emerging market classification. Therefore, the risk-return relationship of enterprises in a stock market that is in transition to be classified as Vietnam's stock market is a concern of investors. The prospect theory of Kahneman and Tversky (1979) implies that compared to developed stock markets, stock markets in less developed countries are often more affected by psychological factors (De Bondt & Thaler, 1995), and Bowman's paradox of the risk-return relationship is also often explained by this theory. Therefore, the aim of this study is to investigate whether the risk-return relationship for Vietnamese firms follows Bowman's paradox.

1. LITERATURE REVIEW

Normative theory suggests a positive relationship between risk and return (Fisher & Hall, 1969; Cootner & Holland, 1970; Neuman et al., 1979). However, through analyzing the correlation between the average performance (a measure of return) and the variance (a measure of risk) of a company on the US stock market over time, Bowman (1980) finds that firms with higher average performance tend to have lower variance than those with lower average performance. This finding has been confirmed by Bowman (1984) and other scholars (Oviatt & Bauerschmidt, 1991; Patel et al., 2018) and called the "Bowman paradox". The prospect theory of Kahneman and Tversky (1979) and the behavioral theory of Cyert and March (1963) are often used to explain the Bowman paradox (Patel et al., 2018). Prospect theory allows determining the economic reference point for risky choice decisions, while behavioral theory allows comparison between aspirations (goals) versus expectations (outcomes) in terms of organization. The expected return of a business is the result obtained based on inferences from available information. An enterprise's goals (aspirations) are determined by three variables such as the company's goals and past performance, and comparison with the past performance of other businesses. When the two theories are combined in explaining Bowman's paradox, the terms "prospect" and "reference point" in prospect theory can be used respectively as "expectation" (performance outcome) of the enterprise and the "aspiration" (goal) of the enterprise.

Prospect theory analyzes risky choice behaviors based on reference points (business aspirations/

goals). To solve a problem, a decision maker assigns the alternatives by a series of prospects (different performance of the business) and then evaluates each prospect based on a comparison with reference point (business aspirations/goals). Most decision makers exhibit a mixture of risk-seeking and risk-avoiding behavior depending on the firm's performance relative to the reference point. If the outcome of the prospect is accompanied by a return (the performance is higher than the expectation), the decider is not risk-averse. Conversely, if the outcome of the prospect is accompanied by a loss (the performance is higher than the aspiration), the risk-seeking behavior will be chosen. The value function in prospect theory describing risk-taking behavior has a higher slope than risk-avoiding behavior.

2. EMPIRICAL STUDIES ON THE RISK-RETURN RELATIONSHIP

Behavioral studies at the firm level, risk and return should be measured against accounting data rather than market data (Bettis & Mahajan, 1985), as they are easily comparable for all types of enterprises (limited liability company, joint stock company, company with foreign ownership). In addition, market risk and accounting risk are correlated (Beaver et al., 1970; Bowman, 1979).

Fiengenbaum and Thomas (1988) used the COMPUSTAT database of companies in the United States over different periods of time from 1960–1979 to examine the risk-return relation-

ship by industry. By analyzing Spearman's risk-return correlation, Fiegenbaum and Thomas (1988) showed that there is a negative association between risk and return, over all time periods, for the companies with return on equity (ROE) below their target level. With the exception of the period 1975–1979, companies with ROE above their target level have a positive association between risk in all remaining periods. The results of Fiegenbaum and Thomas (1988) are consistent with the behavioral assumptions of prospect theory.

Fiegenbaum (1990) investigated whether prospect theory could explain the risk-return relationship at the firm level. Average of return on assets (ROA) and variance of ROA are indicative for return and risk measures, respectively. Using rate of return and risk data for companies in 85 industries in the US market from 1977 to 1984, Fiegenbaum (1990) demonstrated that companies with high rates of return below the industry average are considered risk-takers, while firms with low returns above the industry average are risk-averters. Furthermore, the slope for risk-taking firms versus risk-avoiding firms is 3:1. Although using different reference points, Fiegenbaum and Thomas (1988) use an individual company's target returns, and Fiegenbaum (1990) uses industry average returns, but both Fiegenbaum and Thomas (1988) and Fiegenbaum (1990) have demonstrated that the risk-return relationship in the US stock market can be explained by prospect theory.

Also exploring the risk-reward relationship by industry, but unlike Fiegenbaum (1990), Sinha (1994) performed on the Australian stock market. Sinha (1994) used ROA and standard deviation of ROA to measure the return and risk of each firm. Median of ROA was used as a reference point. Analyzing data for 22 industries from 1977–1985, Sinha (1994) demonstrated that the division of decisions of firms is similar to that of individual investors, or it is similar to risk-return relationship in prospect theory. Studying data from 1984–2003 for 45 sectors on the US stock market, Chou et al. (2009) showed that even with the data set there is no bias in survival rates (including delisted firms), the risk-seeking and risk-averse behavior of individual firms still strongly supports prospect theory at both industry and market levels. Performing both OLS and LTS (least trimmed square) regressions,

Chou et al. (2009) emphasize that the magnitude of the negative risk-return relationship for firms below the target level is much stronger than the positive risk-return relationship for firms above the target level, confirming the loss aversion hypothesis.

3. METHODS AND DATA

Prospect theory suggests that the risk-return relationship is represented by a utility function (Kahneman & Tversky, 1979). The decision maker's behavior will depend on their current position relative to the reference point. If return is smaller than the reference point, then decision makers tend to seek risk. Conversely, if return is already larger than the reference point, then the decision maker will tend to avoid risk. The risk-seeking area will have a larger slope than the risk-avoidance area. In other words, the ratio of the slope between these two areas is greater than 1. Therefore, assuming that the risk appetite of the decision maker and the company is similar, three research hypotheses can be proposed:

- H1: There is a positive relationship between risk-return for firms with profitability above the target level (below the reference point). It implies that firms whose returns are above the reference point tend to avoid risk according to prospect theory and refutes Bowman's paradox for these firms.*
- H2: There is a negative relationship between risk-return for firms with below-target returns (below the reference point). It implies that firms whose returns are below the reference point tend to be risk-seeking according to prospect theory and that Bowman's paradox exists for these firms.*
- H3: The risk-return relationship for firms with below-target returns is steeper than the relationship's slope for firms with above-target returns. It implies that the slopes of the two groups of firms (above and below the target level) are in accordance with prospect theory, or the risk-return relationship of firms with returns below the reference point is not stronger than the relationship for firms with profitability above the reference point.*

The research process is carried out in two steps: (i) Building a research model; and (ii) Defining return reference points to separate the data into two groups (Below and Above).

(i) Building a research model

To determine whether there is a relationship between Risk and Return of listed companies on Vietnam's stock market, the study uses control variables of size and leverage in the regression model. This approach is similar to studies on the stock markets of Indonesia (Nuir & Asri, 2019) and India (Gupta, 2017).

The general regression model (1) has the form:

$$Risk = \alpha_i + \beta_{1i}Return + \beta_{2i}Size + \beta_{3i}Leverage + \varepsilon_i, \quad (1)$$

where *Risk* is the standard deviation of the average return on assets (sdROA) for each company during the study period. α_i is the intercept of company *i*. β_{1i} is the Return of company *i*, as measured by the average return on assets (ROAA) over the study period. β_{2i} represents the Size of company *i*, measured the average logarithm of the firm's asset size during the research period. β_{3i} represents the leverage of the enterprise, obtained in two ways, by the debt-to-equity ratio and the debt-to-asset ratio for the study period. ε_i is the error.

The regression equation (1) is carried out for both the market and the industry, it is rewritten as follows:

$$sdROA = \alpha + \beta_1ROAA + \beta_2Size + \beta_3Debtequi + \varepsilon, \quad (2)$$

$$sdROA = \alpha + \beta_1ROAA + \beta_2Size + \beta_3Debtasset + \varepsilon. \quad (3)$$

The measurement of risk based on accounting data has many advantages for three reasons. First, market risk and accounting risk are correlated (Beaver et al., 1970; Bowman, 1979). Second, businesses are directly responsible for their accounting data, which is used by regulators. Third, compared to market data, accounting data is applicable to both unlisted firms and uses a uniform measure for evaluation regardless of ownership structure.

Therefore, studies related to the organization and strategic management should use accounting data rather than market data (Bettis & Mahajan, 1985).

(ii) Determining return reference points

The market return reference point is determined by: Average ROA of all companies sorted from highest to lowest, the Market Return reference point is the median ROA in the dataset. The market return reference point separates the dataset into two subgroups. The first sub-group includes companies with Return value higher than the market return reference point, and the second sub-group includes the remaining companies.

The industry return reference point is similar to the market return reference point. Therefore, each industry will have a reference point and split into two groups. Companies above the reference point of all industries will be classified as Above, and companies below the reference point of all industries will be classified as Below.

In summary, the research data will be divided into two groups, Below and Above, according to each classification (by market and industry). Each group will be regressed based on model (1).

Data: All businesses with enough data continuously from 2017–2020 according to statistics of <https://vietstock.vn/>. There are 727 listed companies on HOSE, HNX and Upcom that satisfy this condition.

Estimation method: The study uses cross-regression by an OLS estimation method with each group of companies in the data set.

4. RESULTS AND DISCUSSION

4.1. Statistical analysis

The research data set is divided into two ways: the median ROA of the entire market (Table 1) and the median ROA of each industry (Table 2). Total market return reference point, mean market average ROA (+4.44%), separate data set of 363 companies below the reference point, and 364 companies

above the reference point (Table 1). The profit reference point by industry separates the data set of 360 companies below the reference point and 367 companies above the reference point (Table 2).

Table 1. Statistics of two groups of companies classified based on market reference points (median ROA= +4.44%)

Variable	Obs	Mean	Std. Dev.	Min	Max
Below-Ref					
sdroa	363	2.532	3.250	0.010	26.940
roaa	363	1.315	2.641	-13.840	4.440
sdroa/roaa	363	0.629	14.669	-61.660	241.940
lnsize	363	13.812	1.611	9.920	19.620
debequi	363	209.209	283.295	0.460	3,376.580
debasset	363	54.220	22.527	0.460	108.740
Above-Ref					
sdroa	364	3.681	3.717	0.230	32.630
roaa	364	10.081	6.068	4.450	45.200
sdroa/roaa	364	0.393	0.350	0.020	3.240
lnsize	364	13.704	1.587	9.710	18.800
debequi	364	95.827	85.204	0.580	578.960
debasset	364	40.806	18.200	0.570	84.970

Table 2. Statistics of two groups of companies classified based on the reference point of each industry

Variable	Obs	Mean	Std. Dev.	Min	Max
Below-Ref					
sdroa	360	2.619	3.271	0.010	26.940
roaa	360	1.394	2.788	-13.840	8.500
sdroa/roaa	360	0.635	14.793	-61.660	241.940
lnsize	360	13.772	1.583	9.920	19.620
debequi	360	207.847	285.696	0.460	3,376.580
debasset	360	53.837	22.600	0.460	108.740
Above-Ref					
sdroa	367	3.586	3.725	0.090	32.630
roaa	367	9.918	6.165	3.130	45.200
sdroa/roaa	367	0.387	0.348	0.020	3.240
lnsize	367	13.727	1.608	9.710	18.800
debequi	367	97.845	86.294	0.580	578.960
debasset	367	41.196	18.460	0.570	84.970

Table 1 shows that the ROAA of companies in the group above the reference point (10.081) is significantly higher than that of the group below the reference point (1.315). This implies that on average at the market-wide level, a company below the reference point performs 8.766 less than a company profitable above the reference point. Similar to Table 1, the classification at the sector level (Table 2) shows that the difference in ROAA between the two groups is about 8.52 (9.918 versus 1.394).

Risk was measured by the standard deviation of ROA (*sdROA*) and coefficient of variation (*sdROA/ROAA*) for both groups. Tables 1 and 2 show that the *sdROA* of the group above the reference point (approximately 3.6) is larger than that of the group below the reference point (approximately 2.5), but the group above the reference point has a coefficient of variation of 0.39 which is smaller than the group below the reference point of 0.63.

This result implies that, on average, the return standard deviation of the group of firms with returns on the reference point is higher than that of the other group, but the risk per unit of return of this group of companies is low. 0.24 more than the group of companies whose profits are below the reference point. In other words, on average, a company with returns below the reference point (both at the market level and at the industry level) has greater risk than a company with returns above the reference point.

Size: The average value of *lnsize* for the two groups of companies is about 13.7 at both the market and industry levels. This shows that the mean difference in size between the two groups of firms is not significant.

Leverage (internal risk): The group of companies below the reference point has a debt-to-equity ratio (*debtequi*) greater than two times, while in the group of companies above the reference point, this coefficient is less than 1 time. This shows that, on average, a company with below-target returns is exposed to more than twice risk of a debt-to-equity ratio than those with higher-than-target returns.

The debt-to-assets ratio (*debasset*) of the group below the reference point is about 54%, which is higher than this ratio in the group above the reference point of about 41%. This result is similar to the *debtequi* coefficient of the two groups of firms. On average, a company with returns above the reference point is generally less risky than a company with returns below the reference point.

4.2. Regression results

Overall, the research results strongly support Bowman's paradox both in the market and the industry.

The existence of this paradox is based on the results of decision-making behavior of companies listed on the Vietnamese stock market under different conditions, which is explained by prospect theory. The risk-return paradox exists only for the group of firms whose returns are below the reference point, but not for the group of firms with returns above the reference point. This result is similar to the studies by Nuir and Asri (2019) and Gupta (2017). Table 3 and Table 4 show the regression results on the risk-return relationship of two groups of companies classified by market level and industry level.

4.3. Correlation analysis

The results of the correlation between the pairs of variables are presented in Table 3 and Table 4.

Table 3. Correlation results between pairs of variables by market level

Below/ Above	sdroa	roaa	lnsize	debequi	debasset
sdroa	1.0000	0.4184***	-0.0747	-0.0451	-0.1592***
roaa	-0.5344***	1.0000	-0.0886*	-0.3322***	-0.4007***
lnsize	-0.2080***	0.2132***	1.0000	0.3015***	0.3624***
debequi	0.0010	-0.1720***	0.2103***	1.0000	0.8593***
debasset	-0.2070***	0.0960**	0.3485***	0.6262*	1.0000

Table 4. Correlation results between pairs of variables by industry level

Below/ Above	sdroa	roaa	lnsize	debequi	debasset
sdroa	1.0000	0.4375***	-0.0987*	-0.0822	-0.1885***
roaa	-0.4853***	1.0000	-0.1024**	-0.3534***	-0.4165***
lnsize	-0.1858***	-0.4853***	1.0000	0.3302***	0.3822***
debequi	0.0032	-0.1858***	0.2078***	1.0000	0.8710***
debasset	-0.1958***	0.0032	0.3341***	0.6267***	1.0000

The correlation coefficient between the pair of variables (*sdroa*; *roaa*) for the group of companies with below-target profits is negative and statistically significant at 1% both by market classification and by industry classification. It predicts that the risk-reward relationship for this group of firms is also negative, or that Bowman’s paradox exists in this case. In contrast, the group of companies with profits above the target level, the correlation coefficient between the pair of variables (*sdroa*; *roaa*) is significantly positive. Therefore, the risk-return relationship of this group of companies is forecasted to follow financial common sense.

Since the correlation coefficient of the pair of variables (*debequi*; *debasset*) is greater than 0.6, these two variables are not present simultaneously in a regression equation but will be separated into two independent equations. The correlation coefficients of the remaining pairs of variables in Table 3 and Table 4 have absolute values less than 0.6 that are suitable for inclusion in the regression equations.

4.4. Analysis of results

Table 5. Regression results classified by market level

Variable	Below	Below	Above	Above
roaa	-0.788	-0.757	0.278	0.261
	0.052	0.050	0.031	0.032
	0.000	0.000	0.000	0.000
lnsize	-0.103	-0.058	-0.171	-0.111
	0.086	0.088	0.117	0.120
	0.235	0.507	0.143	0.358
debequi	-0.001		0.006	
	0.000		0.002	
	0.021		0.015	
debasset		-0.020		0.006
		0.006		0.011
		0.001		0.610
_cons	5.221	5.411	2.683	2.333
	1.160	1.140	1.598	1.604
	0.000	0.000	0.094	0.147
N	363	363	364	364
Adj R ²	0.412	0.420	0.183	0.170

Note: legend: b/se/p.

Table 6. Regression results classified by industry level

Variable	Below	Below	Above	Above
roaa	-0.694	-0.668	0.283	0.265
	0.052	0.051	0.030	0.031
	0.000	0.000	0.000	0.000
lnsize	-0.108	-0.055	-0.203	-0.140
	0.093	0.094	0.115	0.118
	0.248	0.559	0.078	0.238
debequi	-0.001		0.005	
	0.001		0.002	
	0.046		0.034	
debasset		-0.021		0.003
		0.007		0.011
		0.001		0.759
_cons	5.282	5.437	3.098	2.735
	1.251	1.227	1.570	1.570
	0.000	0.000	0.049	0.082
N	357	357	367	367
Adj R ²	0.350	0.361	0.198	0.188

Note: legend: b/se/p.

After controlling for the factors of size and leverage, the models show a significant relationship between risk and return.

4.4.1. Group of companies above the reference point (Above-Ref)

The regression coefficients of the ROAA variables of the companies on the reference points in Table 5 and Table 6 are both positive and significant at 1%. This shows that the risk-return relationship is positive and confirms hypothesis H1. When profit increases by 1%, risk increases by 0.28%, other things being equal. This result shows that when companies achieve a return above the target level, they only accept to increase risk when the increase in return is attractive enough to be able to offset the increased risk. If the return is not as expected, they tend to avoid risk, and this behavior is explained by prospect theory. This result is similar to the results in the Indian, Japanese and Korean stock markets in the study by Patel et al. (2018).

The regression coefficient of the *debequi* variable is positive and significant at 5% in both classifications (market and industry), which shows that the leverage ratio of companies on the reference point is positively related to risk. In other words, the higher the leverage, the higher the risk.

Table 6 shows that the regression coefficient of the variable *lnsize* is negative and has statistical significance of 10%. This shows that the relationship between firm size and risk is negative, or that the larger the firm size (asset value), the lower the risk (volatility in return).

4.4.2. Group of companies below the reference point (Below-Ref)

Tables 5 and 6 show that the ROAA of companies below the reference point are both negative and significant at 1%.

The results of testing hypothesis H2 show that the risk-reward relationship of companies below the reference point is negative. This result is similar to the results in emerging stock markets such as India (Gupta, 2017) and Indonesia (Nuir & Asri, 2019). The average return of companies below the reference point was more than 1.3%, significantly

lower than that of companies above the reference point of 10% (Table 4 and Table 5).

Therefore, the negative risk-return correlation of this group of firms proves that companies with returns below target will motivate them to engage in riskier decisions to increase profit margins. This behavior creates the Bowman paradox of the risk-return relationship for firms below the reference point.

The *debequi* and *debasset* variables in Tables 5 and 6 both have negative and statistically significant regression coefficients. This shows that firms with high debt use reduce profit volatility. Besides, the statistical results in Table 3 and Table 4 show that the average leverage ratio of the group of companies below the reference point is at a high level. Therefore, the ability to increase the debt ratio of this group of companies becomes more difficult than before. Although the regression coefficients of the size variable in both Table 5 and Table 6 are negative, they are not statistically significant, so it is not possible to draw conclusions about the impact of firm size on profit volatility.

4.4.3. Compare two groups of companies above and below reference points

Hypothesis H3 was tested by comparing the ROAA coefficient between two groups of companies. The test results show that the regression coefficient of the group of companies below the reference point is significantly steeper than the regression coefficient of the group of companies above the reference point, which is about -0.7 compared to +0.28. A slope ratio of 2.5 ($=0.7/0.28$) greater than 1 is similar to the study by Fiegenbaum (1990) on the US stock market. It shows that to achieve the goal, the group of firms that have returned below the reference point have a much stronger risk-seeking incentive than the group of companies that have returned above the reference point.

5. DISCUSSION

Although the results from this study were conducted for 727 companies listed on the Vietnam Stock Exchange and Miller and Bromiley (1990) for 493 companies were collected on COMPUSTAT, both

show that the performance of companies at different levels affects risk (return volatility) to different degrees. However, the detailed analysis results are very different. The results from this study strongly support the use of prospect theory to explain the risk-return relationship expressed in three aspects: higher and lower value domains relative to the reference point, and the slope between these two areas.

Group of companies above the reference point: ROAA performance has a risk-increasing effect for listed companies in Vietnam but it has a risk-reducing effect for firms in Miller and Bromiley's (1990) study. Listed companies in Vietnam with high returns are usually large companies, they only accept increased risk when the return is higher and the increase in return will increase the risk. The high-performing firms in the sample of Miller and Bromiley (1990) are expected that when dividend policy and debt value are well controlled, the increase in profit will be to reduce the debt ratio thereby reducing risk. It can be seen that the positive relationship between risk-return of firms above the reference point in Vietnam can be explained by the prospect theory of Kahneman and Tversky in 1979 and the theory of expected utility of Von Neuman and Morgenstern in 1944 to explain the risk aversion of firms. The research results for the group of companies that are higher than the reference point in the Vietnam stock market are similar to the results in the Indian, Japanese and Korean stock markets (Patel et al., 2018), in the United States from 1960 to 1974 (Fiegenbaum & Thomas, 1988).

Group of companies below the reference point: ROAA performance has a risk-reducing effect for listed companies in Vietnam, but it has a risk-increasing effect for firms in Miller and Bromiley's (1990) study. The companies listed in Vietnam with low return (-13.8% to +4.44%) are usually

small-sized companies. Therefore, compared to larger companies, they are willing to take a higher risk than expected to improve return. The increase in return of this group of companies has the effect of reducing their own risk. The firms in Miller and Bromiley's (1990) sample have all passed break-even points and the return between firms is fairly uniform. Thus, a sharp increase for the firms in Miller and Bromiley's (1990) sample would have the effect of increasing the overall risk of the group. It can be seen that the results of the group of companies lower than the reference point in Vietnam can be explained by the risk-seeking attitude in prospect theory (Kahneman & Tversky, 1979). In addition, this result confirms Bowman's conjecture that troubled firms tend to be risk-seeking. Bowman (1984) used the annual research report on three industries (food processing, computer peripherals, and containers), but this study covers a population of 727 businesses, and covers many industries in Vietnam. The research results for the group of companies that are lower than the reference point in the Vietnamese stock market are similar to the results in the stock markets of India (Gupta, 2017) and Indonesia (Nuir & Asri, 2019).

Comparison of the slope between the risk-seeking attitude (for the group of companies with a return lower than the reference point) and the risk-avoiding attitude (for the group of companies with a return higher than the reference point) in Vietnam shows that the coefficient of these two groups is 2.5:1, which is greater than 1, consistent with the utility function in prospect theory (Kahneman & Tversky, 1979). This shows that under existential pressure and increasing return in the future, the group of companies with lower returns are willing to take on average 2.5 times higher risks than the group of companies that have achieved high returns. This result is similar to Fiegenbaum's (1990) study of the US stock market.

CONCLUSION

The risk-return relationship has always been one of the concerns of stock market participants. Previous studies have shown that this relationship is quite diverse in countries around the world, so it is not feasible to apply the previous results to another country. The purpose of this study is to understand the risk-return relationship of Vietnamese enterprises. Data of 727 enterprises listed on Vietnam's stock market for the period 2017-2020 are separated into sub-samples based on the median ROA of the whole

market and of each industry. The results found that the risk-return relationship is contradictory for groups of firms on the same Vietnamese stock market. The relationship is positive for the group of firms with higher returns than the median. Conversely, the relationship is inverse (or Bowman's paradox exists) for the group of firms whose returns are below the median. It implies that the risk attitude of corporate managers seems to depend on the current business performance of the enterprise. They are quite cautious when the business is doing well (return is higher than the median), but turn to risk-seeking when the business is doing less than expected (return is lower than the median value).

RECOMMENDATIONS

The results of this study encourage investors to add criteria to link risk-return relationship in establishing and structuring investment portfolios. Leaders of businesses with below-target returns should carefully consider options before making financial decisions because risk-seeking behavior with a disproportionate return on investment has the potential to undermine firm's future performance.

Considering investors, they should be more cautious with businesses with low performance, especially those with many years of loss or low return on assets. Under pressure to increase profits, investors tend to engage more in activities that carry much higher risk than return.

Considering creditors, understanding the repayment history, past business results and the company's outlook compared to the industry average are criteria that creditors need to learn carefully to make an appropriate decision.

AUTHOR CONTRIBUTIONS

Conceptualization: Lai Cao Mai Phuong.

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Methodology: Lai Cao Mai Phuong.

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REFERENCES

1. Beaver, W., Kettler, P., & Scholes, M. (1970). The association between market determined and accounting determined risk measures. *The Accounting Review*, 45(4), 654-682. <https://www.jstor.org/stable/244204>
2. Bettis, R. A., & Mahajan, V. (1985). Risk/return performance of diversified firms. *Management Science*, 31(7), 785-799. <https://doi.org/10.1287/mnsc.31.7.785>
3. Bowman, E. H. (1980). A Risk/Return Paradox for Strategic Management. *Sloan Management Review*, 21(3), 17-31.
4. Bowman, E. H. (1984). Content analysis of annual reports for corporate strategy and risk. *Interfaces*, 14(1), 61-71. <https://doi.org/10.1287/inte.14.1.61>
5. Bowman, R. G. (1979). The theoretical relationship between systematic risk and financial (accounting) variables. *The Journal of Finance*, 34(3), 617-630. <https://doi.org/10.2307/2327430>
6. Brealey, R. A., Myers, S. C., Allen, F., & Mohanty, P. (2018). *Principles of corporate finance*, 12/e (Vol. 12). McGraw-Hill Education.
7. Chou, P. H., Chou, R. K., & Ko, K. C. (2009). Prospect theory and the risk-return paradox: some recent evidence. *Review of Quantitative Finance and Accounting*, 33(3), 193-208. <https://doi.org/10.1007/s11156-009-0109-z>
8. Cootner, P. H., & Holland, D. M. (1970). Rate of return and business risk. *The Bell Journal of Economics and Management Science*, 211-226.
9. De Bondt, W. F., & Thaler, R. H. (1995). Financial decision-making in markets and firms: A

- behavioral perspective. *Handbooks in Operations Research and Management Science*, 9, 385-410. [https://doi.org/10.1016/S0927-0507\(05\)80057-X](https://doi.org/10.1016/S0927-0507(05)80057-X)
10. Fiegenbaum, A. (1990). Prospect theory and the risk-return association: An empirical examination in 85 industries. *Journal of Economic Behavior & Organization*, 14(2), 187-203. [https://doi.org/10.1016/0167-2681\(90\)90074-N](https://doi.org/10.1016/0167-2681(90)90074-N)
 11. Fiegenbaum, A., & Thomas, H. (1988). Attitudes toward risk and the risk–return paradox: prospect theory explanations. *Academy of Management Journal*, 31(1), 85-106. <https://doi.org/10.5465/256499>
 12. Fisher, I. N., & Hall, G. R. (1969). Risk and corporate rates of return. *The Quarterly Journal of Economics*, 79-92.
 13. Gupta, R. D. (2017). Risk-attitudes of the NSE 500 firms—Bowman’s paradox and prospect theory perspectives. *IIMB Management Review*, 29(2), 76-89. <https://doi.org/10.1016/j.iimb.2017.04.001>
 14. Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), 263-291.
 15. Miller, K. D., & Bromiley, P. (1990). Strategic risk and corporate performance: An analysis of alternative risk measures. *Academy of Management Journal*, 33(4), 756-779. <https://doi.org/10.5465/256289>
 16. Neumann, M., Böbel, I., & Haid, A. (1979). Profitability, risk and market structure in West German industries. *The Journal of Industrial Economics*, 27(3), 227-242.
 17. Nuir, R. S., & Asri, M. (2019). Bowman’s Paradox: Prospect-Theory-Based Risk-Return Relationship (Some Recent Evidence in Indonesia). *The Indonesian Capital Market Review*, 11(1), 1. <https://doi.org/10.21002/icmr.v11i1.11173>
 18. Oviatt, B. M., & Bauerschmidt, A. D. (1991). Business risk and return: A test of simultaneous relationships. *Management Science*, 37(11), 1405-1423.
 19. Patel, P. C., Li, M., & Park, H. D. (2018). A replication of Bowman’s paradox across 28 countries. *Journal of Innovation & Knowledge*, 3(3), 128-142. <https://doi.org/10.1016/j.jik.2016.12.006>
 20. Phuong, L.C.M. (2021). How COVID-19 impacts Vietnam’s banking stocks: An event study method. *Banks and Bank Systems*, 16(1), 92-102. [https://doi.org/10.21511/bbs.16\(1\).2021.09](https://doi.org/10.21511/bbs.16(1).2021.09)
 21. Phuong, L.C.M. (2022). Industry-level stock returns response to COVID-19 news. *Finance: Theory and Practice*, 26(1), 103-114. <https://doi.org/10.26794/2587-5671-2022-26-1-103-114>
 22. Sinha, T. (1994). Theory and the risk return association: another look. *Journal of Economic Behavior & Organization*, 24(2), 225-231. [https://doi.org/10.1016/0167-2681\(94\)90029-9](https://doi.org/10.1016/0167-2681(94)90029-9)
 23. Von Neumann, J., & Morgenstern, O. (2007). Theory of games and economic behavior. In *Theory of Games and Economic Behavior*. Princeton University Press. <https://doi.org/10.1515/9781400829460>