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Negative Relationship between Risk and Return: A Contrary View

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Abstract

According to standard finance, risk and return are positively correlated, but many studies conducted in the behavioral finance and prospect theory context have revealed that risk and return are not positively correlated, but are negatively correlated. In this study, effort has been made to examine the nature of relationship between these two variables. Data used in this study is of secondary nature and its span is from 1995-2011. Spearman rank order correlation has been used to test this relationship between risk and return. Results indicated that when correlation test has been applied on the whole data set, risk and return are found to be negatively correlated in below target return companies, while these two are positively correlated in above target return companies. These findings exhibit that implications of prospect theory with respect to risk-return relationship are found true when the whole data sample is tested as one unit. But, when the same sample is subdivided into five segments or sections, results change and show a mixed pattern. Implications of prospect theory with regard to risk return relationship in such a situation are partially proved in few sectors.

Keywords: reference point, behavioral finance, risk averse, risk seeking, ex-post return

1. Introduction

Standard finance studies emphasize that risk and return are positively correlated and investors are risk averse in their attitude. This relationship is found to exist regardless of analysis being conducted at industry or firm level. This positive relationship is also found empirically irrespective of national identity of firms (Fisher & Hall, 1969; Neuman et al., 1979). But, a contrary view has been presented in various studies conducted on this topic within the perspective of behavioral finance. Prospect theory which is considered as a substitute of Expected utility theory and has been extensively applied in various fields of economics and finance has explained that relationship between risk and return is sensitive to a target or reference point. According to this theory, a company will be risk averse in its attitude in gain domain and risk seeking in its attitude in the loss domain. This situation of being in gain or loss domain will be calculated relative to a reference point. This phenomenon implies that risk and return are negatively correlated. This negative

relationship between risk and return is found to exist in various empirical studies as well when accounting measures of risk and return are used.

Likewise, when the study is conducted by dividing data into various time spans, this relationship is again found. Firm size, nature of industry and studies based on diversification strategies of firms are also favoring negative risk return relationship (Treacy, 1980; Feigenbaum & Thomas, 1985; Bettis & Mahajan, 1985).

Much of the research in areas of business, finance, economics and management assumes that individuals are risk averse in their risky choice decisions and their utility function is concave uniformly. But, prospect theory assumes that situation of individuals with respect to their behavior towards risk is attached with their state of being in gain or loss domain i.e., their utility/value function is not uniformly concaved. Rather, it is concave when they are in gain domain and convex when they are in the loss domain. Thus, it is implied that they are not all the time risk averse. Rather, they are risk averse in the gain domain and risk seeking in the loss domain (Kehneman & Tversky, 1979).

The rest of this study has been organized as under:

Section 2 presents the review of literature, section 3 relates with data and methodology used in this study, while section 4 presents data analysis and results and lastly section 5 presents conclusion of the study.

2. Literature Review

The value function of Cumulative Prospect Theory explains risk aversion of investors in the gain domain and risk seeking of investors in loss domain which implies that risk and return are negatively correlated. Bromiley & McNamara (1999) investigated this relationship with the help of two measures of return. They found that there was a significant and positive relationship between risk and interest rate return, while a negative relationship between risk and risk adjusted expected return. Hence, it can be implied that relationship between risk and return also depends upon the return measure.

Feigenbaum & Thomas (1988) have found in a study that risk and return in firms having return below than their target level is negatively correlated and risk and return are positively correlated in firms having return above than their target level return which indicates the sensitivity of this relationship to the target level return. However, positive relationship between ex- ante risk and ex- ante return, ex- post risk and ex- post return has been observed. While, negative risk return relationship between ex- post return and ex- ante risk as well as ex- ante return and ex- post risk exists (Brockett et al., 2003).

Miller & Leiblein (1996) tested the hypothesized relation between risk and return as suggested by the behavioral & Prospect Theory by introducing an other measures of risk i.e. , down side risk and found positive effect of it on the subsequent performance of companies, whereas they have found negative effect of performance on this risk measures. Impact of diversification on risk has also been studied in the context of diversification strategies of firms and a curvilinear relationship between risk and return exhibited the behavior that whenever returns were higher, the managers had inducement to take more risk in the sense of safety felt at this higher level of return and whenever level of return was lower, it again induced them to take more risk having a feeling of gambling (Chang & Thomas, 1989). Sensitivity of risk-return relationship has also been found with reference to time period because Ruefli (1990) has observed negative risk- return relationship during

the period of instability in the market and positive relationship between these two variables during the period of stability in market conditions.

Johnson (1994) has also evaluated the relationship between risk and return. He found that when data was analyzed in totality, there was no significant correlation coefficient between risk and return for above target banks and for below target banks, the said relationship was negative as well as significant. These findings indicated that Prospect Theory is supported for the below target level banks particularly when data is not divided into groups. When the same data of banks were classified on the basis of region, the results were even twice more stronger. In another study on application of Prospect Theory in banking industry of emerging economies, Goldlewski (2004) examined that whenever volume of loans, relative to total assets of bank is above target level, the bank will become risk averse and ultimately significant & negative correlation coefficient between distance to target in terms of bank loan and standard deviation will exist and when distance to target in terms of bank loans relative to total assets is on the other side i.e., below target level indicating a loss, then bank attitude will be in the style of risk seeking.

Jegers (1991) observed relationship between risk and return in Belgian companies and concluded that risk and return were negative & significantly correlated when the performance of companies in terms of their return was below than the median return of industry. The analysis was conducted across industries and was also confirmed through negative association ratio of these companies. For above target level return, the said relationship was found to be positive. Usefulness of Prospect Theory for explaining this relationship in the behavioral context is thus highly appreciable.

3. Data & Methodology

Population of this study consists of 450 companies listed on Karachi Stock Exchange excluding financial institutions. Due to data availability problem, the purposive sample of this study consists of 139 non-financial companies. Secondary data has been used in this study which has been collected from various published sources like Balance Sheets Analyses by State Bank of Pakistan, annual reports of companies, web sites of Karachi Stock Exchange and Business Recorder.

3.1 Variables of Study

Return of companies has been measured through their financial performance and two measures of financial performance have been used in this context. The first measure is return on assets (ROA) i.e., net profit before tax divided by total assets, following (Brealey & Myers, 2007), while the second measure is return on equity (ROE) i.e., net profit after tax divided by owners' equity, following (Brealey & Myers, 2007). So for as, the risk measure used in this study is concerned, Fishburn (1977) has described a risk measure. This measure of risk is based on the following three parts:

a. A reference or target level
b. Deviations from this target level and
c. Weighting of deviations

This measure defines risk as a probability weighting function of deviations from a reference level. Fishburn (1977) thus provided a generalized approach for dealing with the matter of dispersion. Using Fishburn (1977) measure of risk in this study, time series median value return of each firm is deducted from a single value cross section median return of the same

firm (which is called as target return) in order to determine each firm's distance from target return. This distance from target return is used as measure of risk in this study. Afterwards, time series standard deviation of each firm is determined in order to examine the existence of correlation between risk and return using ROA and ROE as measures of return separately.

3.2 Hypotheses

Being influenced by the argument of Feigenbaum & Thomas (1985), the following hypotheses have been developed and proposed for the purpose of testing them on the bases of the above review of literature:

- **H_1:** Negative correlation exists between risk and return of firms having return below their target level within and across the industry.
- **H_2:** Positive correlation exists between risk and return of firms having return above their target level within and across the industry.

Hypothesis 1 (negative relationship between risk and return of firms having below target level return) has been tested with the help of the following model:

$\rho_{-\text{Fin Per}i.\sigma i}$ = $-1 \leq \rho i \leq 0$ (1)

$\rho_{-\text{Fin Per}i.\sigma i}$ = Coefficient of correlation between return and risk of firms having below target level return

σ = Standard deviation of financial performance i.e., measure of risk.

The second hypothesis which relates to positive relationship between risk and return of firms with above target returns has been tested with the following regression model:

$\rho_{\text{Fin Per}i.\sigma i}$ = $0 \leq \rho i \leq 1$ (2)

$\rho_{\text{Fin Per}i.\sigma i}$ = Coefficient of correlation between return and risk in firms having above target level return

4. Analysis & Results

Regression results of both these models have been presented in the following tables:

Table 1: Overall Risk Return Relationship

Return Measure	No. of Firms	Firms With Above Target Return			Firms With Below Target Return		
		No. of Firms	Spearman Rank-Order Correlation	*t-Statistic*	No. of Firms	Spearman Rank-Order Correlation	*t-Statistic*
ROA	139	69	0.422	*3.815**	70	-0.407	*-3.672**
ROE	139	70	0.421	*3.825**	69	-0.436	*-3.962**
P ≤ 0.01= *Significant at 1 % level							

Table 1 reveals that total of 139 firms are thus divided into two categories. The first category consists of 69 firms having positive values of distance from target and 70 firms having negative values of distance from target, using ROA as measures of return. Likewise, the second category consists of 70 firms having negative values of distance from target return and 69 firms with positive values of distance from target return using ROE as a measure of return.

The table also shows the results of Spearman rank-order correlation between risk and return when Return on Assets (ROA) and Return on Equity (ROE) are used simultaneously as measures or variables of return. In order to test the hypotheses of negative relationship between risk and return of firms with return below than the target level and positive relationship between risk and return of firms with return higher than their target level, time series median return of each firm is calculated first for the entire data period using ROA and ROE as measures of return simultaneously. Later on, cross section median return is calculated using these time series median ROA and ROE. This single median of median is called as target ROA and ROE.

In order to test hypothesis of existing negative relationship between risk and return of below target firms, Spearmen rank-order correlation is used. Correlation coefficients of ROA and ROE with their risk measure which are -0.407 and -0.436 respectively indicate that risk and return are negatively correlated for firms having below target returns. Moreover, t-statistics of -3.672 and -3.962 respectively indicate that this relationship is significant for both the measures. These findings are consistent with Fishburn (1977) measure of risk which explains that negative relationship exists between negative values of distance from target return of firms and their standard deviation. Moreover, the results are as per findings of Feigenbaum & Thomas (1985) and hypothesis 1 of this study.

Positive coefficient values of Spearman rank-order correlation between risk and return, using ROA and ROE respectively, as measures of return and standard deviation as measure of risk are 0.422 and 0.421. These values indicate that hypothesis 10 of existing positive relationship between risk and return of those firms having return greater than the target is also proved. Moreover, these values are significant at 1 % level because their t-values are 3.815 and 3.825 respectively. These findings are again consistent with findings of Feigenbaum & Thomas (1985) and as per prediction of hypothesis 2 of this study.

Prospect theory describes that firms become risk averse above target which implies that greater distance above target induces less risk seeking. It means lesser dispersion around the mean value in the form of standard deviation will be in this situation. Above findings of hypothesis 2 are again consistent with Prospect Theory. But, Fishburn (1977) measure of risk is silent regarding above target return situation because this measure is normally considered as only below target risk measure.

Table 2: Classified Risk-Return Relationships Based on ROA

Sr. No	Classification of Firms	No. of Firms	Above Target Return			Below Target Return		
			No. of Firms	Spearman Rank-Order Correlation	*t-Statistic*	No. of Firms	Spearman Rank-Order Correlation	*t-Statistic*
1	Textile	73	36	0.486	*3.24**	37	-0.29	*-1.795*
2	Sugar	18	9	0	__	9	-0.183	*-0.493*
3	Paper	5	3	0.5	*0.577*	2	1	__
4	Cement	5	2	-1	__	3	0.5	*0.577*
5	Others	38	19	0.313	*1.359*	19	-0.6538	*-3.562**
Total		139	69			70		
*Significant at 1 % level								

Table 2 presents the results of Spearman rank-order correlation between risk and return when ROA is used as a measure of return and whole sample is divided into five categories based on relationship of firms with typical sectors like textile, sugar, paper, cement and others. The whole procedure described for analysis of data under Table 1 is again applied on these five sectors firms independently, in order to examine whether or not such division of sample into five subsamples causes change in correlation results.

It has been found that firms belonging to textile and others sectors jointly account for about 80% of whole sample in case of above target and below target firms, respectively with ROA as measure of return. Although, correlation coefficients of these two sectors 0.486 and 0.313 for above target, -0.29 and -0.653 for below target firms are according to hypothesis i.e., they are positive for above target firms and negative for below target firms. But out of these two sectors, coefficient of textile sector in case of above target firms and coefficient of others sector in case of below target firms is only found to be significant as their t-statistics are 3.24 and -3.562 respectively. So for as remaining three sectors namely sugar, paper and cement are concerned, their coefficient values except paper sector are not as per hypotheses. But, all these values are insignificant. Moreover, proportion of these three sectors firms in whole sample account for only 20%. These results indicate that division of whole sample into subsamples affects the results of analysis up to some extent against the predictions of hypotheses 9 and 10 and these findings are supported by Johnson (1994).

Table 3: Classified Risk-Return Relationships Based on ROE

Sr. No	Classification of Firms	No of Firms	Above Target Return			Below Target Return		
			No. of Firms	Spearman Rank-Order Correlation	*t-Statistic*	No. of Firms	Spearman Rank-Order Correlation	*t-Statistic*
1	Textile	73	36	0.2497	*1.5039*	37	-0.465	*-3.112**
2	Sugar	18	9	-0.633	*-2.165**	9	0	—
3	Paper	5	2	1	—	3	1	*4.745**
4	Cement	5	3	0.5	*0.577*	2	1	—
5	Others	38	19	-0.093	*-0.385*	19	-0.6128	*-3.197**
Total		139	70			69		
*Significant at 1 % level								

Table 3 shows the results of Spearman rank-order correlation between risk and return when ROE is used as a measure of return and whole sample is again divided into same five categories based on generic relationship of firms with various sectors or categories like textile, sugar, paper, cement and others. The whole procedure described for analysis of risk and return presented under Table 1 is again applied on these five sectors firms independently in order to examine whether such division of sample into five categories causes correlation result to change or not.

It has been found that consistent with classification of firms under Table 2, textile and others sectors jointly account for 80% of whole sample in case of above target and below target firms respectively. Correlation coefficient for above target firms belonging to textile, paper and cement sectors are positive as hypothesized. Their values are 0.2497,1 and 0.5 respectively but all are insignificant. For below target firms, values of -0.465 and -0.6128 for textile and others sector respectively are according to hypothesis i.e., they are negative. Their t-statistics of -3.112 and -3.197 indicate that these values are significant at 1% level.

So for as remaining two sectors of sugar and others in case of above target returns are concerned, their coefficient values are not according to hypothesis as these are negative. While coefficient values of sugar, paper and cement sectors for below target return are not according to hypothesis because these are positive.

5. Conclusion

Negative relationship between risk and return is implicated by the prospect theory. It has been concluded by results of this study that when whole data set is tested as one unit, risk and return of below target return firms are negatively correlated. While, these two are positively correlated in the case of above target return firms. Results remain same in both measures of financial performance. These results are according to theoretical background and hypotheses of this study. Moreover, these are supported by Jegers (1991). It has also been noticed that when data set is classified on the bases of various sectors, results do not

remain very much consistent as per theoretical background because of mixed findings in both situations of gain and loss for both measures of financial performance.

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