High Risk High Return? Empirical Testing of Prospect Theory in Indonesia

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Keywords: Financial Behaviour, Prospect Theory, Risk-return

Abstract: The purpose of this research is to examine the prospect theory which show negative relation between risk and return as opposed to conventional view of "high risk high return" belief. We are testing the firm's behaviour regarding their decision making under specific circumstances. We expect firm which underperform will show risk seeking behaviour and vice versa, which will prove the prospect theory. Using the data form 2005-2012, the samples in our research are all companies listed in Indonesian Stock Exchange. The result form our model shows robust and consistent evidence that support the prospect theory. We find that firm that perform under their competitor within industry (which shown by ROE/ROA lower than median industry) show a significant negative risk and return relation. We also find that within industry regression, the negative relation between risk and return still consistent with the base model. And lastly, in the annual regression, almost all period shows negative significant relation between risk and return. All of the result strongly support premise that argue most individuals are loss averse, then perform prospect theory behaviour.

1 INTRODUCTION

During its development, research in the field of finance starting to give more contribution to the world as it is. The current researches in academic finance are usually referred to as traditional finance. The foundation of traditional finance often associated with Modern Portfolio Theory developed by Markowitz (1952). Another backbone of standard finance is known as the Efficient Market Hypothesis and led the research in finance as we know nowadays. Basically, the foundation of standard finance is under the assumption that individual always making rational decision making, which explained within the frame of Expected Utility Theory. At some point, Kahneman and Tversky (1979) emerge with this idea called Prospect theory. The basic assumption of Prospect Theory is that individual seldom rational, as they have bounded rationality, a cognitive limitation to absorb all necessary information available as guidance when an attempt to make a decision. As this happens, they will rely on their so-called "ruled of thumb," which allow them to decide faster although it is often misleading.

We try to examine whether the relation between risk and return will always be positively related as the modern portfolio theory posit that high-risk always result in high return. Under the prospect theory presented by Kahneman and Tversky (1979), the concept of high-risk, the high return will likely to be violated since the theory state that the risk preference in individual, will change relative to their current position. Being in winning condition will be different with if a person under losing condition, they likely to be more risk seeker as they have more incentive to avoid the loss.

Even though prospect theory was developed to describe an individual to make a decision, it often to predict the decision-making process within an organization. And to make it clearer, Hambrick and Finkelstein (1987) believe that, at some degree, the performance of firm or organization in the long term, will be determined by the decision made by an individual running the firm so called manager. So, in the end, the decision made by the manager will reflect in their firm future performance.

Among many research in the earlier period is Bowman (1980) posit an idea that the decision makers in an organization, especially an organization that their financial condition bad shape, have the tendency to make a more risky decision under the notion of that they have nothing to lose. Fiegenbaum and Thomas (1988) study found evidence that

company with financial performance that lies below the industry performance tend to be more aggressive in risky condition. Beside those two, many have been examined the firm decision making under irrational behaviour as posited by Prospect Theory (Sinha (1994), Lehner (2000), Chou et al (2009), Kliger and Tsur (2011), Dominguez and Raïs (2012), Diez-Esteban et al (2017), Gupta and Pathak (2018))

Most of the result from prior studies show some consistencies. Which led to the conclusion of many of the sample performing loss-aversion attitude. Kahneman and Tversky (1979) explained that there two decision factors when certain individual attempt to make a decision, especially if the result from the decision they made is a risky one. First, the deciding factor of decision making isn't the amount of utility or benefit that an individual will acquire. Instead, they will compare the results or output from their decision to the target level that already been decided beforehand. In other words, they already have a certain level of expectancy over future results. Second, people have a tendency to avoid loss. It is better not to lose \$1 that to get \$1. The level of satisfaction from losing \$1 will be different, if not worse, than to find \$1. Those two conditions explain why loss-aversion happened, and also shed some answer on why companies that underperformed tend to be bolder, in term of making risky decision.

In short, the Prospect Theory explained the decision-making behaviour of the firm in regard to their risk preference. The risk-return relation will be varied depending on firm performance position or condition. The condition that mentioned in Prospect Theory is winning or losing condition. The line that separates those two conditions is called a reference point. This reference point is so important, yet Kahneman and Tversky (1979) in their paper did not mention how the reference point is conducted. Thus, such fact will be one of the obstacles for the researcher to examine or testing the Prospect Theory. Even though they did mention that to determine the reference point, we must find the line that separate gains and losses which in the end affecting the decision maker.

Most of the prior research which examined the relation of risk and return under Prospect Theory usually measured the reference point at the industrial level by using the centre value of firm performance.

We try to find the evidence that decision maker within the firm which performed below (lose) the reference level would show some risk-seeking attitude, which will be proven by the negative association between risk and return. While the firm that able to perform better than peer company within

the industry (above the reference point) will show risk-averse attitude.

2 METHOD

The data used in this research are all of the public companies (ousting the financial industry) in Indonesia from 2005-2012 and acquired from Bloomberg database. We use all of the data from those periods without omitting the firm that delisting or recently being public in order to avoid the survivorship bias. The sequence that we do before testing the regression model is: First, we have to determine the reference point. Using the reference point method from Kliger and Tsur (2011), we measure the reference point as the median of firms' industrial return from the previous year (lag one year).

$$\text{Ref}_{i, j, t} = \text{Med}_{j, t-1}$$

Table 1: Descriptive statistics by Industry

No	Industry Name	ROE						
		N	Mean	St. Dev	Min	Q1	Median	Q3	Max
1	Basic Material	398	0,063	0,839	-7,687	-0,001	0,058	0,153	7,747
2	Communication	204	0,082	0,420	-1,916	0,008	0,064	0,167	3,286
3	Consumer, Cyclical	597	0,068	0,646	-6,124	0,005	0,077	0,175	6,361
4	Consumer, Non-Cyclical	554	0,135	0,598	-6,027	0,051	0,129	0,224	4,360
5	Energy	268	0,112	0,621	-5,714	0,005	0,067	0,223	2,829
6	Industrial	517	0,091	0,531	-5,238	0,023	0,098	0,191	8,515
7	Technology	42	0,091	0,443	-1,568	0,015	0,136	0,188	1,891
8	Utilities	25	0,120	0,158	-0,166	0,010	0,073	0,205	0,488

Table 2: Descriptive Statistics for ROA as Alternative Proxy by Industry

No	Industry Name	ROA						
		N	Mean	St. Dev	Min	Q1	Median	Q3	Max
1	Basic Material	400	0,020	0,116	-0,619	-0,015	0,019	0,064	0,796
2	Communication	205	-0,023	0,703	-9,878	0,002	0,030	0,071	0,364
3	Consumer, Cyclical	598	0,026	0,178	-1,685	0,001	0,023	0,077	2,538
4	Consumer, Non-Cyclical	557	0,070	0,179	-1,262	0,022	0,055	0,111	2,576
5	Energy	272	0,040	0,173	-0,738	0,001	0,023	0,070	1,478
6	Industrial	518	0,028	0,104	-0,756	0,005	0,035	0,075	0,445
7	Technology	42	0,101	0,417	-0,396	-0,007	0,077	0,121	2,632
8	Utilities	27	0,058	0,078	-0,074	0,006	0,025	0,097	0,222

$\text{Ref}_{i, j, t}$ is the reference point within the industry that calculated each year, and $\text{Med}_{j, t-1}$ median ROE of industry j at year $t-1$. So even though we used the data from 2004-2012, we only managed to get an eight-year span of data. In order to find the reference point, firstly, we separate our sample into industrial subsample data. Then, we find the median ROE of the previous year.

To test our hypothesis, we used a model that shows the relationship between risk and return. The basic model is in the following equation:

$$\text{Risk}_{i, j, t} = \alpha + \beta \, \text{Dumwin}_{I, j, t} + \varepsilon_{i, t}$$
$$\text{Risk}_{i, j, t} = \text{ROE}_{i, j, t} - \text{Med}_{j, t}$$

Where $\text{Risk}_{i, j, t}$ is calculated by finding the difference between $\text{ROE}_{i, j, t}$ (ROE is calculated from firm net income divided with total equity) and

Median ROE industry in the same year. While Dumwin $_{I, j, t}$ is dummy variable with the value of 1 if the ROE $_{I, j, t}$ above the Ref$_{i, j, t}$ which indicate that firm in winning condition relative to their industrial peer. The expected value of β in the base model is negative, which will support the hypothesis in this paper.

The base model will be examined using several adjustments. First is we use the complete sample to test our hypothesis. Second, we separate our full sample into industrial sub-sample and then test the model using that sub-sample in each industry. Third, we will conduct the annual cross-sectional regression for each year in our sample from 2005-2012. The configurations that we create is in an attempt to eliminate the time- and industry-specific effects. Lastly, we will conduct the three previous configurations using the ROA performance indicator. We hoped that using the different proxy of firm performance, we would find a robust model.

3   RESULTS AND DISCUSSION

3.1   Descriptive Analysis

We present the descriptive statistics by industry and by year to show the idiosyncratic effect of industry and year to the data tested. Table 1 and table 2 show the descriptive statistics by industry, and as we can see there isn't any significance difference between ROE and ROA. The data present already winsorized to avoid outliers within the observation. The highest mean ROE comes from Consumer, Non-Cyclical industry with mean 0.135 and the lowest is Basic Material with ROE 0.063. While from ROA, we can see that the highest mean comes from Technology with 0.101 and the lowest one is Communication with -0.023.

Table 3: Descriptive Statistics by Year.

Year	No of Observations	ROE				ROA			
		Min	Mean	Max	St. Dev	Min	Mean	Max	St. Dev
2005	249	-1,747	0,077	7,401	0,626	-0,601	0,008	0,903	0,124
2006	260	-5,757	0,014	5,317	0,698	-0,793	-0,006	0,324	0,121
2007	290	-15,641	1,456	7,666	25,501	-9,916	-0,029	0,588	0,596
2008	311	-2,214	0,021	1,453	0,417	-5,551	-0,361	1,453	6,381
2009	324	-7,433	-0,046	3,057	0,654	-1,721	-0,001	0,411	0,145
2010	325	-3,332	0,019	10,092	0,703	-0,763	0,011	2,511	0,185
2011	320	-7,761	-0,076	2,814	0,796	-1,252	0,036	9,712	0,578
2012	288	-4,469	0,005	3,205	0,416	-0,395	0,014	0,548	0,096

Table 3 present the descriptive statistics by year for ROE and ROA. The lowest of ROE come from year 2011 with -0.076 and the highest is 1.456 in 2007. While, the highest mean ROA is 0.036 from 2011 and th e lowest is -0.361 in 2008.

To examine the main hypothesis, we formulated the empirical model to capture the relationship between firm's risk and the return. We separate the

model into three models, first is the base model, we examine all of the data to prove whether the hypothesis is true or not. Second, we construct the model according by industry, to capture the industry effect and the last model is formulated by year to control the year effect.

Table 4: Base model of risk and return.

Coefficient	Regression			
	Model 1	Model 2	Model 3	Model 4
α	0,511	0,474	0,391	0,354
β	-0,002**	-0,002**	-0,002**	-0,002**
Industry Control	No	Yes	No	Yes
Year Control	No	No	Yes	Yes
Adj R2	0,20%	0,90%	0,60%	1,30%

Table 4 present the result from the base model using combination of control variables. In model 1 we test the risk-return association without controlling industry and year, the result shows the negative effect of risk on return. Model 2 we include industry control and the result still show negative relation between risk and return. Model 3 include year control and still show negative relation between risk and return. The last model, we control the industry and year and the result still show negative significant association between risk and return. The results from all four models corroborate the main hypothesis that firms with return above the reference point (gain) take less risk (risk-averse).

Table 5: Risk-Return Industry Analysis.

No	Industry Name	α	β	Adj R^2
1	Basic Material	0,466	-0,104***	6,08%
2	Communication	0,528	-0,523***	18,40%
3	Consumer, Cyclical	0,544	-0,381***	13,30%
4	Consumer, Non-Cyclical	0,522	-0,313***	13,60%
5	Energy	0,499	-0,155***	11,10%
6	Industrial	0,518	-0,793***	23,60%
7	Technology	0,491	-0,484***	16,70%
8	Utilities	0,308	-1,745***	32,10%

In the second examination, we estimate the risk-return association within each industry observed as presented in table 5. The result show that all of the industries observed in this research show consistent result. The negative β all similar in all industries, which show the negative relation between risk and return.

The last examination in table 6 show the annual regression analysis from all the year of observed in this research. The value of coefficient beta show negative significant which in particular similar with the beta estimated in base model and in industry-based model. Only one from eight year of observation which not significant. The result overall

strengthening the negative relationship between firm's risk level and return.

Table 6: Risk-Return Annual Analysis.

Year	α	β	Adj R²
2005	0,476	-0,277***	11,80%
2006	0,486	-0,228***	9,90%
2007	0,549	-0,001	0,10%
2008	0,464	-0,627***	27,30%
2009	0,603	-0,270***	12,70%
2010	0,528	-0,219***	8,50%
2011	0,482	-0,182***	8,20%
2012	0,473	-0,448***	13,70%

Robustness Analysis

Table 7: Base model of risk and return.

Coefficient	Regression			
	Model 1	Model 2	Model 3	Model 4
α	0,534	0,391	0,493	0,353
β	-0,012***	-0,012***	-0,011***	-0,011***
Industry Control	No	Yes	No	Yes
Year Control	No	No	Yes	Yes
Adj R²	0,30%	0,40%	1,60%	1,60%

The sample in robustness analysis is same with the earlier examination, but instead of using ROE, we change it to ROA as alternative proxy of risk and return. In this section, we will examine the negative relation between firm's risk and return using ROA. Table 7 show the base model examination of risk and return regression using ROA. All four models show negative significant result that support the result in table 4 and the hypothesis tested in this research.

Table 8: Risk-Return Industry Analysis.

No	Industry Name	α	β	Adj R²
1	Basic Material	0,493	-2,516***	34,50%
2	Communication	0,545	-0,113**	2,30%
3	Consumer, Cyclical	0,576	-0,128***	21,70%
4	Consumer, Non-Cyclical	0,524	-1,276***	19,70%
5	Energy	0,504	-0,149***	3,30%
6	Industrial	0,544	-2,713***	33,50%
7	Technology	0,438	-0,391**	8,80%
8	Utilities	0,315	-3,358***	28,70%

The industrial regression analysis in table 8 also show similar result that all of industries show negative association between risk and return. The last model is annual regression in table 9, the result show almost all observation in all year show negative beta except 2008.

Table 9: Risk-Return Annual Analysis.

Year	α	β	Adj R²
2005	0,527	-2,175***	29,60%
2006	0,544	-2,425***	28,50%
2007	0,549	-0,144***	2,60%
2008	0,437	-0,004	0,10%
2009	0,662	-1,634***	25,30%
2010	0,542	-1,133***	17,70%
2011	0,495	-0,179***	3,80%
2012	0,455	-3,286***	40%

4 CONCLUSIONS

Prospect theory by Kahneman and Tversky (1979) addressed an important issue in behavioural finance. In short, prospect theory built upon economic and psychological-experimentation foundation. It shows that individual cling on loss more heavily than gain and evaluate the expected loss and gain relative to their predetermined expectation. Our research model aims to strengthening the results from prior research.

The result form our model shows robust and consistent evidence that support the prospect theory. We find that firm that perform under their competitor within industry (which shown by ROE/ROA lower than median industry) show a significant negative risk and return relation. We also find that within industry regression, the negative relation between risk and return still consistent with the base model. And lastly, in the annual regression, almost all period shows negative significant relation between risk and return. All of the result strongly support premise that argue most individuals are loss averse, then perform prospect theory behaviour.

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