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### An Analysis of Diversification Practice of Domestic Individual Investors in the Indonesia Stock Exchange

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**Abstract:** This research aims at analyzing the practice of stock diversification by individual investors in the Indonesia Stock Exchange (IDX). The first argument underlying this research is the portfolio behavioral theory of Shefrin and Statman (2000) which stated that investors arranged their portfolio like a layered pyramid with the bottom layer for protection (downside) and the top layer for profit (upside), and they put their stock portfolio on the top layer. Another argument underlying this research is the importance of the three moment model (mean, variance and skewness) in the individual investor's decision to diversify (Mitton and Vorkink, 2007).

Using ordered logit and ordinary least squares models for the sample obtained, this study finds that skewness is the sole significant factor explaining the decision on stock underdiversification by individual investors in the IDX. This finding supports the underdiversification phenomenon of Mitton & Vorkink (2007).

**Keywords:** Skewness, individual stock investor, diversification practice.

## 1. INTRODUCTION

### 1.1 Background

Previous studies on the diversification practices and their relation with the individual characteristics of investors were conducted by Kelly (1995) dan Goetzmann and Kumar (2008). They believed that investors having a particular characteristic tend to have similar behavior in investing. Such characteristics included age, occupation, income and education. Moreover, Kelly (1995) included attitude towards risk, while Goetzmann and Kumar (2008) added the level of investor's sophistication.

In his study, Kelly (1995) wanted to know how an investor with a particular characteristic would diversify namely holding ten or more stocks; while Goetzmann and Kumar (2008) examined the independent variables of occupation and education with another diversification measure, namely normalized variance or NV as a dependent variable. In addition to the above categorical independent variables, Goetzmann and Kumar (2008) also used numerical variables of age and income, several categorical variables for investor sophistication and two control variables, namely the portfolio size and turnover.

For the purpose of portfolio management, the author thinks the categorical dependent variables, *i.e.* well-diversified portfolio, underdiversified portfolio, and the portfolio between these two extremes are better. The use of the above categorical dependent variables makes it possible to calculate the odds ratio of whether a particular investor having certain variables will diversify, not diversify or do something in between.

Unlike the studies conducted by Goetzmann and Kumar (2008) and Mitton and Verkink (2007), in this research the dependent variables of the model 1 are the categorical variables, *i.e.*, minimum diversification, moderate diversification, and extensive diversification (the diversification level suggested by textbooks). For portfolio management, the author argues that the categorical variables of the levels of diversification are better than the normalized variance in Goetzmann and Kumar (2008). This is due to the fact that the three levels of stock diversification are discrete choices of the investors while normalized variance is the quantitative measurement which cannot be directly selected by an investor. To the best of the author's knowledge, no study has ever been conducted using the dependent variables of the levels of diversification (minimum, moderate, and extensive).

## **1.2 Research Objectives**

This study aims to measure whether Indonesian individual (retail) investors diversify or not by using the accounts of the individual stock investors. How many stocks do these investors have on average? Those who do not diversify will be grouped into two: those who only have a maximum of 5 stocks (minimum diversification) and those who owns between 6 to 10 stocks (moderate diversification).

This research also means to test the variables influencing the decision, namely the level of diversification and the number of stocks in the portfolio. Do the investors forgo the benefits of diversification in an attempt to reach their upside potential aspirations because they want to move to higher economic class (chasing the positive skewness), or because they already have deposits or mutual funds, or due to other factors such as overconfidence, margin facilities, and the characteristics of the individual investor (experience)?

There are other previous researches which examine the factors that influence individual stock investors to diversify or not diversify. Goetzmann and Kumar (2008), Mitton and Vorkink (2007) and Polkovnichenko (2005) are among those conducting the studies. However, they did not include certain variables, such as the variables of the time deposit or mutual fund possession, the use of margin facilities, and the hunting for skewness return.

Specifically for the skewness variable, Simkowitz and Beedles (1978), in their simulation find that the portfolio skewness continually decreases with the increase in the number of stocks in the portfolio. The skewness which is initially positive moves towards zero when the number of stocks reaches five, and turns to negative when the number of stocks is eight. However, Simkowitz and Beedles (1978) did not test skewness as an independent variable which influenced the number of stocks in an investor's portfolio or a

factor which influenced diversification. Meanwhile, Kelly (1995) uses the logit model to test how an individual stock investor would diversify. As far as the author knows, no study has ever been conducted on the practice of diversification using the ordered logit model by using the stock investors' accounts as the sample.

In this research, a new concept in diversification, the level of diversification based on the number of stocks in the portfolio, is introduced. These levels are minimum diversification, moderate diversification, and extensive diversification. So far the use of the ordered logit model in behavioral finance has been very rare. A research on behavioral finance which uses multinomial logit was conducted by Karlsson and Norden (2007).

## **2. LITERATURE REVIEW**

### **2.1 Optimum Number of Stocks in a Portfolio**

Many textbooks have quoted the research results of Evans and Archers (1968) on the optimum number of stocks in a portfolio to obtain the benefits of diversification. Francis (1986), for example wrote:

Portfolio managers should not become overzealous and spread their assets over too many assets. If 10 or 15 different assets are selected for the portfolio, the maximum benefits from naive diversification most likely have been attained. Further spreading of the portfolio's assets is superfluous diversification and should be avoided.

Gup (1983) stated that,

Proper diversification does not require investing in a large number of different industries or securities. The diversifiable risk is reduced as the number of stocks increases from one to about eight or nine. When the number of securities is increased to about nine, almost all of the diversifiable risk is eliminated.

Regarding the optimum number of stocks, Statman (1987) had a different idea. He believed that a minimum of 30 stocks were required to obtain the maximum benefit of diversification. According to him, the perception that most of the unsystematic risk could be omitted when a portfolio contains ten stocks was not correct, without understanding the cost and benefit of diversification. The number of stocks had to be increased if the marginal benefit is greater than the marginal cost.

### **2.2 Diversification Practice of Individual Investors**

Amongst 635 individual stockholders who do not diversify, Kelly (1995) finds that 35 stockholders have ten or more stocks in their portfolio, and only 11 investors have 20 or more stocks. It is obvious that the cost of diversification is not the reason why they do not diversify as 75 per cent of the investors who belong to the top 20 per cent of stockholders have fewer than 10 stocks. The median of the number of stocks of the investors is one. If the number of stocks issued by the company where the stockholders work is taken out of the samples, the total number of which accounts for 29 per cent of the total sample, the median number of stocks becomes two stocks. Other studies, such as the one conducted by Barber and Odean (2000) in the USA, during the period of January 1991 to December 1996, shows the same result. Using a sample of 78,000 American stockholders, Barber and Odean reported that the median of the number of stocks of an investor is between 2 and 3, with an average of 4 stocks.

The research of Polkovnichenko (2005) shows almost the same result, that the number of stocks in an individual investor's portfolio in 1983 is two and increases to three in 1991. During that period, 80% of the individual investors have five stocks or fewer, and 90% have fewer than ten stocks. Furthermore, 40% have only one stock in their portfolio, and 7% of the households have the stock of the company they work for.

Goetzmann and Kumar (2008) also find that 25%-33% of the investors' portfolio contain only one stock, and more than 55% have three stocks or fewer. This pattern took place during the research period of 1991-1996 although there was an increase in the average number of stocks owned by an investor, from four to seven stocks. Only 5%-12% of the portfolio have more than 10 stocks.

Although it was initially presumed that investors who do not diversify have mutual funds, Mitton and Vorkink (2007) in their research find that the amount of mutual funds is only 9% of the portfolio. Therefore, there is no evidence that investors who do not diversify have mutual funds.

In other research, Polkovnichenko (2005) find a result which is different from that of Mitton and Vorkink (2007). Most of direct stock investors who do not diversify also own mutual funds.

In Germany, stock investors do not diversify either (Dorn and Huberman, 2010). Among 20,000 clients in a securities company, investors on average have a little more than three stocks during the period of 1995-2000. German investors in fact deviate from the recommendation of the portfolio theory, even when mutual fund ownership is taken into consideration. Finally, Bailey, *et al.* (2011) also find that the average number of stocks an individual investor has is 3.89 stocks with a median of 3 stocks.

### 2.3 The Behavioral Finance Perspective

According to Statman (2004), the optimum diversification level in the securities market in America, based on the mean-variance portfolio theory, was more than 300 stocks. However, the average individual investor has on average between three to four stocks. This diversification puzzle may be solved by understanding the behavioral finance theory. According to Statman (2004) and Bailey, *et al.* (2011), investors arrange their portfolio like a layered pyramid with the bottom layer used for protection against loss (downside) and the top layer for profits (upside-potential). Furthermore, investors generally do not treat their assets as parts of their whole portfolio (integrated). For example, many people would rather take a loan with an interest of 10% p.a. to buy a car than borrow from their education fund prepared for their children the interest of which is only 5%. Regarding this, Black (1985) writes that people keep their money in different pockets. Benartzi (2001) and Meulbroek (2002) see a bigger problem in the issue of diversification. They believe individual investors keep too many of their own company's stock, around 42% and they invest the rest of their money in big capitalization stocks.

In viewing investors, the behavioral view (Shefrin and Statman, 2000, Statman, 2004) differs from the mean-variance theory. The mean-variance investors see their portfolio as an integrated unit and they are always risk-averse; meanwhile, behavioral investors do not see their portfolios as integrated units and they are not always risk-averse. In a simple form of the behavioral diversification theory, an investor is said to divide his money into two layers of the pyramid, the layer for loss protection (downside) and the layer for profit potential (upside). In its complete form, the behavioral diversification theory suggests that an investor divides his money in many different layers where each layer represents different objective or aspiration. Mean-variance investors, on the other hand, have only one attitude toward risk, not a number of different attitudes for different layers of the pyramid of the behavioral portfolio theory.

In summary, according to the behavioral diversification theory, an investor does not diversify because a diversified portfolio gives him little hope to realize his higher aspiration. Behavioral investors emphasize the layers in their portfolio to obtain the potential of big profits. At the same time, however, they do not ignore the lower layer for their protection against big losses. The potential of big profits, according to behavioral investors, may be achieved by having just a few stocks in the portfolio.

## **2.4 The Theories of Mean, Variance, and Skewness Portfolio**

An alternative explanation about why diversification is not conducted is the diversification concept in the world with three moments initiated by an article written by Simkowitz and Beedles (1978). Previously, advice on diversification is accurately given by Sharpe (1970), who said that if the market was efficient and an investor had no information or special strong prediction, he had to do nothing but diversifying.

Scott and Horvath's (1980) research result shows that an investor may be willing to accept a lower expected value from his investment in portfolio A than in portfolio B with similar variance  $\sigma_A^2 = \sigma_B^2$  if portfolio A has a higher positive skewness ( $Sk A > Sk B$ ). Risk-averse investors also prefer the distribution of the asset return with a positive skewness than one a normal distribution or negative skewness. In other words, investors are willing to pay additional premium for assets with positive performance or for assets with positive skewness.

The research of Mitton and Vorkink (2007) supports all of the above studies that the portfolio of the investors who do not diversify is much more skewed to the right than the well-diversified ones. According to Mitton and Vorkink (2007), the inefficiency of the portfolio mean-variance of the investors who do not diversify can mostly be explained by the fact that those investors sacrifice the mean-variance efficiency for higher skewness. In other words, skewness is priced. This is in line with an article written by Barberis and Huang (2008).

## **3. RESEARCH METHODOLOGY**

### **3.1 Research Models**

In model 1, the dependent variables will be categorical variables or discrete selection (minimum diversification with an average of 1–5 stocks in a portfolio (D1), moderate diversification with 6–10 stocks (D2), and extensive diversification with more than 10 stocks (D3)), while some of the independent variables will be categorical (deposit fund, mutual fund, margin, overconfidence) and the other independent variables will be numerical variables (skewness, sizeport, turnport, and experience).

The above attributes are given, namely return skewness, ownership of deposits or retail bonds, ownership of mutual funds, the use of margin facilities, overconfidence bias, experience, and education. An individual investor with a particular size and turnover of his portfolio will have a particular probability in selecting a particular diversification strategy. Which alternative an investor selects, is believed to be related to the above attributes among the many attributes of an investor.

In model 2, we will test the relation between the average number of stocks in an investor's portfolio with the same independent variables as those in model 1, from skewness to experience.

Model 1

$$P(\text{Div}) = \beta_0 + \beta_1 \text{Skewness}_i + \beta_2 \text{Deposit}_i + \beta_3 \text{Funds}_i + \beta_4 \text{Margin}_i + \beta_5 \text{Overconfidence}_i + \beta_6 \text{Education}_i + \beta_7 \text{Size}_i + \beta_8 \text{Turnover}_i + \beta_9 \text{Experience}_i + \varepsilon$$

Model 2

$$\text{Div} = \beta_0 + \beta_1 \text{Skewness}_i + \beta_2 \text{Deposit}_i + \beta_3 \text{Funds}_i + \beta_4 \text{Margin}_i + \beta_5 \text{Overconfidence}_i + \beta_6 \text{Education}_i + \beta_7 \text{Size}_i + \beta_8 \text{Turnover}_i + \beta_9 \text{Experience}_i + \varepsilon$$

Notes

P (Div)	Probability for selecting diversification strategy, minimum (D = 1), moderate (D = 2) and extensive (D = 3) diversification.
Div	The number of stocks in the portfolio, <i>i.e.</i> , the average number of stocks of individual stock investors at the end of the month is counted to determine the level of diversification.
D1	Minimum diversification (1-5 stocks), $n = 1$
D2	Moderate diversification (6-10 stocks), $n = 2$
Skewness	Skewness of return (numerical variable)
Deposit	Ownership of bank deposit or retail bond (dummy variable)
Funds	Ownership of risky mutual funds (dummy variable)
Margin	The use of margin facilities as a proxy of the level of an investor's sophistication (dummy variable)
Overconfidence	Overconfidence bias experienced by an investor (dummy variable)
Education	Highest education of an investor (dummy variable)
Size	The natural logarithm of average size of an investor's portfolio (numerical variable)
Turnover	The turnover of an investor's portfolio (numerical variable)
Experience	The number of years of an investor's experience in direct investing in stock (numerical variable)

By using the method of estimation of the maximum likelihood (for model 1) and the ordinary least square (for model 2), we can estimate the parameters in the above models. The dependent variable of the model 1 is categorical variable. The overall model will be tested and so will an individual test for each parameter (Wald test and t test). The probability of selecting the minimum diversification, moderate diversification, and extensive diversification for each observation can be calculated. What factors influence the decision to select a particular diversification strategy?

### 3.2 Unit Analysis, Data Sources, and Research Samples

The unit analysis of this research is the individual domestic stock investors. The samples used are individual stock investors who have accounts in securities companies giving the access for this research. The data taken are the reports of trading transactions and the stock investors' portfolios for the last 16 months by using random sampling method. Around 500 stock investors of two big securities companies in Indonesia—Danareksa Sekuritas and Trimegah Securities – are the data source for this research.

The data in the form of the report on trading transaction during the sampling period and the position of the investors' portfolio at the end of the month are required to examine the diversification practice of these investors.



## 4. DATA ANALYSYS AND DISCUSSION

### 4.1 The Characteristics of Diversification Practice of Individual Investors in the Indonesia Stock Exchange

Of 477 samples for model 1 and 2, 358 investors (75.1%) own only 1-5 stocks, 86 investors (18%) own 6-10 stocks and the rest 33 investors (6.9%) have more than 10 stocks in their portfolios. The average number of stocks in the portfolio is 3.95 stocks ranging from 1 to 54.88 stocks with a median of 2.53 stocks.

**Table 1**  
Frequency of Various Levels of Diversification of Individual Investors

<i>Dependent Variable</i>			
<i>Model 1</i>	<i>Observation</i>	<i>Percentage</i>	<i>Cumulative</i>
Div 1 (minimum)	358	75.05	75.05%
Div 2 (moderate)	86	18.03	93.08%
Div 3 (extensive)	33	6.92	100%
Total	477	100	
<i>Dependent Variable</i>			
	<i>Observation</i>	<i>Mean</i>	<i>Deviation Standard</i>
Div (dummy)	477	1.3187	.5968
Div (numerical)	477	3.95	4.39

**Table 2**  
Descriptive Statistics of the Three Levels of Diversification

<i>Variable</i>	<i>Observation</i>	<i>Mean</i>	<i>Deviation Standard</i>
<i>Div = 1 (minimum diversification)</i>			
Skewness	358	.5158	.5032
Deposit	358	.3939	.4893
Funds	358	.1229	.3288
Margin	358	.0363	.1873
Overconfidence	358	.2011	.4014
<i>Div = 2 (moderate diversification)</i>			
Skewness	86	.1131	.5754
Deposit	86	.4767	.5024
Fund	86	.1744	.3817
Margin	86	.0930	.2922
Overconfidence	86	.2326	.4249

*Contd. table 2*

<i>Variable</i>	<i>Observation</i>	<i>Mean</i>	<i>Deviation Standard</i>
<i>Div = 3 (extensive diversification)</i>			
Skewness	33	-.2822	.9125
Deposit	33	.3636	.4885
Fund	33	.1515	.3641
Margin	33	.1212	.3314
Overconfidence	33	.0606	.2423

For skewness variable, the minimum diversification group has an average skewness of 0.52, higher than the moderate diversification group (0.11) and extensive diversification group (-0.28). The minimum and maximum value of the skewness of investors choosing minimum diversification is also greater than those in the moderate and extensive diversification groups. This shows that the higher the diversification level, the lower the skewness of the returns obtained by investors. This result is in line with the findings of Simkowitz and Beedles (1978) and of Mitton and Vorkink (2007).

Regarding the ownership of bank deposits and retail bonds, on average there is not much difference, *i.e.* around 36% (for extensive diversification group) to 48% (for moderate diversification group). The average ownership of risky mutual funds does not vary a lot, which is 12% (for minimum diversification group) to 17% (for moderate diversification group).

For the proxy of the sophistication level, *i.e.* the use of margin facilities, the difference among groups is quite significant. In the minimum diversification group, only 3.6% investors use margin facilities. This percentage becomes 9.3% for the moderate diversification group, and 12.1% for the extensive diversification group.

Significant difference is also present in the overconfidence bias among non-diversifying groups (minimum and moderate diversification) and diversifying group (extensive diversification). Within the non-diversifying groups, the average overconfidence bias is about the same, 20.1% and 23.3%. However, for the extensive diversification group, the bias overconfidence is much lower, only 6.1%. This means that overconfidence bias is relatively more common among non-diversifying investors.

## 4.2 Factors Influencing Diversification Practice among Individual Investors

There is a negative relation between skewness and the diversification level. This means that the more investors chase positive skewness, the lower the possibility he will choose extensive diversification (D3). This is in line with the portfolio theory in the world with three moments developed by Simkowitz and Beedles (1978), Scott and Horvath (1980), and Conine and Tamarkin (1981) who state that investors who are after positive skewness for the return have fewer stocks in their portfolios.

Other hypotheses variables have been proved not to have any relation with the levels of diversification. The dummy variables of deposit ownership, mutual funds, the use of margin facilities, and overconfidence bias have been proved not to influence the probability of selecting the levels of diversification by individual stock investors in this research sample. The following is the explanation of the insignificance of the above variables.



**Table 3**  
**The Result of Model 1**

	<i>Coefficient</i>	$\bar{z}$	$P >  \bar{z} $
Skewness	-1.5407	-6.71	0.000***
Deposit	.2004	0.80	0.212
Funds	.2330	0.70	0.242
Margin	.5085	1.05	0.148
Overconfidence	.0082	0.02	0.493
Education	-.0045	-0.01	0.497
Size	.5793	6.83	0.000***
Turnover	.0021	0.02	0.493
Experience	.0817	1.67	0.047**

The variable of deposit ownership is insignificant because non-diversifying investors do not prepare risk free investment for their protection. For the insignificant variable of ownership of risky mutual funds, investors may not consider it important to diversify their assets. Meanwhile the margin variable in this research is not significant since diversification practice does not show any relation with the sophistication of investors. Both sophisticated and unsophisticated investors in this research sample tend not to diversify. Finally, the insignificant overconfidence bias variable in this study might be due to the fact that other biases experienced by investors are not tested in this research. Such biases include disposition effect, narrow framing, and local bias (Bailey *et al.*, 2011).

For the control variables, the portfolio value and the experience of the investor have a positive relation with the level of diversification. Individual investors who have bigger portfolio or who are more experienced have more opportunities to do extensive diversification. This result is in accordance with the findings of Goetzmann and Kumar (2008) and Kelly (1995). Last, investors' education level and the turnover of the portfolio are not related to the diversification level.

### 4.3 Factors Influencing the Individual Investor's Number of Stocks

Skewness has a negative relation with the number of stocks in the portfolio. The larger the skewness, the fewer the number of stocks in the portfolio is. For every unit of increase in the skewness, the number of stocks decreased by 2. This phenomenon is in line with the statement of Simkowitz and Beedles (1978), Scott and Horvath (1980), and Conine and Tamarkin (1981) about the skewness return of a portfolio. Investors who are after the positive skewness for their portfolio tend to own fewer stocks in their portfolio compared to other investors.

Other than the skewness, no other variables are proved to have a significant influence on the number of stocks in an individual investor's portfolio. Ownership of deposits or mutual funds, the use of margin facilities, and overconfidence bias happen to be unable to explain the number of stocks in the portfolio. There is not enough proof in the sample that individual stock investors put their funds in undiversified portfolio as the top layer of their portfolio pyramid.

**Table 4**  
**The Result of Model 2**

<i>Div</i>	<i>Coefficient</i>	$\xi$	$P >  \xi $
Skewness	-2.0131	-4.66	0.000***
Deposit	.4166	1.16	0.122
Fund	.4901	1.00	0.158
Margin	.8088	0.93	0.175
Overconfidence	-.0179	-0.03	0.487
Education	-.1612	-0.23	0.410
Size	.9682	6.42	0.000***
Turnover	.0587	0.49	0.314
Experience	.1597	2.33	0.009***
Constant	-13.2752	-5.00	0.000***

From the sample, retail stock investors in the sample do not apply the behavioral diversification theory proposed by Shefrin and Sttman (2000). Other finding of the research sample is the level of the investors' sophistication, which is proxied with the use of margin facilities, and the overconfidence bias are not the factors determining the number of stocks (diversification practice). Investors in the research sample do not diversify not because of their sophistication or the lack of it. It is not because of the overconfidence bias, either.

In the mean time, the portfolio value and experience have a positive relation with the number of stocks in the portfolio, each at  $\alpha = 1\%$ . The greater the value of the portfolio, or the more the experience of the investor, the more the number of the stocks in an investor's portfolio is. For each addition of size unit (natural logarithm of size) to the portfolio value, the number of stocks increases by 0.97. For an addition of one year of experience, the number of stocks increases by 0.16. The findings of this research are similar to the findings of the researches conducted by Goetzmann and Kumar (2008), Kelly (1995), and King and Leape (1987).

## 5. CONCLUSION AND RECOMMENDATION

### 5.1 Conclusion

Stock investors in the Indonesia Stock Exchange do not diversify and the majority have only one to five stocks. There is no evidence that non-diversifying investors have bank deposit or risky mutual funds (stock fund or balanced fund). Individual stock investors are willing to forgo the benefits of diversification to obtain the opportunity of getting a positive skewness of return, which is in line with the theory of three-moment portfolio. Ownership of bank deposit or risky mutual funds, the use of margin facilities, and overconfidence bias are proved not to influence individual stock investors in deciding to diversify their stock portfolio. There is not enough evidence that individual stock investors in the research sample put their investment in separate layers as indicated by the behavioral portfolio theory.

Using the number of portfolio stocks as the dependent variable, there is a significant negative relation between the skewness of return and the diversification level as well. The greater the return skewness desired by an investors, the fewer the number of stocks in his/her portfolio will be.

In both models, the sample data show positive relation between the portfolio value and the number of stocks. The greater the value of the portfolio, the greater the number of stocks in the portfolio will be or the greater the probability the investor will choose extensive diversification. In addition, experience is also a positive factor in diversifying.

## 5.2 Recommendation

By referring to the limitations of this research, the author recommends that further researches to be conducted related to the practice of diversification of individual stock investors in the Indonesia Stock Exchange should :

1. use more securities companies or data obtained from KSEI (Indonesian Central Securities Depository) as beginning in 2012 the data at KSEI are more complete and accurate along with the implementation of single ID investor.
2. use other diversification measurements *i.e.* normalized variance (Goetzmann and Kumar, 2008) or Herfindahl indexes (Mitton and Vorkink, 2007).

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