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The Performance of Unit Trust Industry in Malaysia

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Abstract: This study measured the efficiency of fixed income unit trust funds and equity unit trust funds for the period of January 2004 to December 2014. A total of 36 fixed income funds and 109 equity funds were evaluated using stochastic frontier analysis (SFA) technique with three inputs (expense ratio, portfolio turnover ratio, and fund management stated fee) and one output variable (return). The econometric technique was used to measure the portfolio efficiency score as well as to compare the efficiency of fixed income funds and equity funds. The results indicated that the average efficiency score for equity unit trust funds was higher than fixed income unit trust funds. Nevertheless, when the samples were categorized into panel data, the average efficiency score for fixed income funds increased throughout ten years. Meanwhile the average score for equity funds was consistent over the years. It shows that time is invariant for equity funds. However, this means that the performance efficiency for both types of funds was considered excellent and efficient. The results indicate that the mean efficiency achieved in unit trust industry is almost 100% of its potential output.

Keywords: *Stochastic frontier, efficiency, fixed income fund, equity fund, and unit trust performance*

1. Introduction

The performance of unit trust funds has received a lot of attention from both, industry and academic fields. This is due to the percentage of net asset value of unit trust funds to Bursa Malaysia market capitalization of 20.69% and 21.07% for 2014 and 2015 respectively (Securities Commission). In Malaysia for instance, the equity market and debt market are relatively large compared to the size of its economy. As shown by the nominal GDP percentage, the equity market capitalization and outstanding debt securities account for approximately 165% and 97%, respectively in 2010. Outstanding debt securities in Malaysia have contributed 97% to the nominal GDP despite showing an increasing upward trend. The 97% contribution is also a sign that the demand for fixed income unit trust funds investments should continue to be positive and significant in the near future. Moreover, in terms of growth in equity market, the market size was RM2.0 trillion in 2010 as compared to RM717.5 billion in 2000 (Securities Commission).

Most of the unit trust funds performance experts have been investigating and synthesizing the new methods that are significantly improving the unit trust funds performance. Presently, stochastic frontier analysis (SFA) has become the focus of studies among researchers. In addition, they are aiming to estimate group frontiers, and decompose the differences of performance into two components namely technical efficiency and technology gap effects. The purpose of this study is to show how a group frontier can be estimated using the SFA techniques. This study employs SFA techniques to estimate the group frontiers, and decompose the differences in performance into technical efficiency and technology gap effects. The researchers use firm-level data drawn from the fixed income unit trust firms and equity unit trust firms in Malaysia to make the inter-firms comparisons of unit trust efficiency. The second most addressed factor is to confirm that the estimation methods can be extended to deal with issues namely time-varying inefficiency effects. Thus, the importance of unit trust funds efficiency of is one of the major concerns to guide their investment decision-making, especially in choosing between fixed income unit trust funds and equity unit trust funds. The information about portfolio investment efficiency is also important to all fund managers, namely Employee Provident Fund (EPF), Permodalan Nasional Bhd (PNB), and insurance companies, to help them decide which funds should be included to improve their portfolio performance. Therefore, the researcher intends to investigate the efficiency of fixed income unit trust firms and equity unit trust firms in Malaysia.

However, to the best of researcher knowledge, there is a lack of documented evidence from previous studies to focus on the comparative analysis of both types of unit trust funds using the SFA. Most of the previous studies about the performance of Malaysian unit trusts industry focus on CAPM. These are proven according to the work done by Abdullah et al. (2002), Leong & Aw (1997), Shamsher & Annuar (1995), and Tan (1995). The results disclose no significant difference in funds return among actively and passively managed funds. Therefore, this study fills this gap. The rest of this paper is structured as follows. Section 2 describes the theoretical underpinning and performance. This is followed by research methodology in section 3. Section 4 presents the results based on some statistical tests performed. Finally, section 5 concludes the paper and discusses some future research.

2. Literature Review

Nowadays, the efficiency of unit trust funds is considered to be a proven technique of investment decision-making, which has gained an important place among retail investors in Malaysia. The evidence of unit trust performances from previous literature are solely based on the risk-adjusted return under non-parametric technique namely Treynor index, Sharpe index, and Jensen index. However, this paper is directed towards focusing on the comparison of the performance of fixed income unit trust funds with equity unit trust funds. Abdullah & Abdullah (2009); Taib & Isa (2007); Low (2007); Rozali & Abdullah (2006) addressed the unit trust funds performance in Malaysia by using a traditional risk-adjusted return techniques. Meanwhile, Li & Lin (2011), Ross et al. (2010), Mahreen et al. (2011), Fama et al. (2010), and Swinkels et al. (2009) addressed the unit trust funds performance in the international market. Recently, a study conducted by Norma et al. (2010) applied a new perspective of unit trust performance analysis by using the data envelopment analysis (DEA) technique to investigate the efficiency of selected conventional and Islamic unit trust companies in Malaysia. The empirical evidence in Western countries on the application of DEA analysis to measure the unit trust performance were conducted by Murti et al. (1997), Land et al. (1993) and Banker & Thrall (1992).

In terms of comparative performance, many studies have been done on Islamic and conventional unit trust funds as proven by Saad, Majid, Kassim, Hamid, & Yusof (2010), Rubio, Hassan, & Merdad (2012), Ahmad & Haron (2006), Alam, Tang, & Rajjaque (2013), Taib & Isa (2007), Chen, Ferson, & Peters (2010), Cao, Chang, & Wang (2008), Tenk (2012), Abdullah, Hassan, & Mohamad (2007), Kaminsky, Lyons, & Schmukler (2001), and Nur Azura Sanusi (2013). The main focus of the comparison in the previous studies were solely based on equity unit trust funds performance by using various methods including risk-adjusted return and data envelopment analysis (DEA). Therefore, this study intends to fill the gap by applying the SFA method to investigate the performance efficiency of fixed income unit trust funds and equity unit trust funds. This comparison is important and relevant to bond the market due to the liberalization which took place in fixed income securities. More fixed income securities instruments are expected to be launched in future. A study conducted by Saad et al. (2010) have used the DEA technique and discovered that Islamic unit trust performs better than their conventional counterparts. This is supported by Rubio et al. (2012), while their work added the value in terms of different economic condition, they also demonstrated that Islamic funds perform better than conventional funds. Abdullah et al. (2007) have measured the performance of both types of funds in different economic condition and demonstrated that there was over performance indicated by Islamic fund during the financial crisis period and post-crisis periods.

To our knowledge, lack of studies has been conducted on the comparison of the fixed income unit trust funds to the equity unit trust fund based on the efficiency. Two questions have motivated the study; (i) Can a group of frontiers be estimated using SFA techniques? (ii) Can the estimation techniques be extended to deal with the issue of time-varying inefficiency effects? Hence, this study is employing the SFA because of some limitations of the DEA technique which are: (i) DEA does not requires any assumption regarding the distribution of the variables (normality and linearity assumption) on the analysis, (ii) DEA analysis does not separate the noise from the overall inefficiency, and (iii) DEA does not consider time-varying inefficiency effects. Meanwhile, the noise separation identifies the existence of any inconsistent data if they are presented in the analysis. Since the non-parametric technique is more general and more flexible Norma et al. (2010); Rubio et al. (2012); Basso & Funari (2001) and Cullinane, Wang, Song, & Ji (2006)), the application of the SFA in measuring the unit trust performance has been contracted. For instance, the SFA has been used by researchers in unit trust industries abroad namely Babalos, Philippas, Doumpos, & Zopounidis (2012); Wong,

Phoon, & Lean (2008), Annaert, Van den Broeck, & Vennet (2003); Babalos, Caporale, & Philippas (2012), and Daraio & Simar (2006).

3. Methodology

This study adopted SFA approaches to estimate group frontiers, and to decompose the differences in performance into two components: technical efficiency and technology gap effects. The purpose of this study was: (i) to show how group frontiers can be estimated using the SFA techniques and (ii) to confirm that the estimation methods can be extended to deal with issues namely time-varying inefficiency effects. Sample selection was referred to the prospectus of the asset management companies that issue unit trust funds in Malaysia and the website of all asset management companies that provide the information on the list of funds under the management by each of the 41 registered asset management companies in Malaysia for the year between 2005 and 2014. The parametric econometric approach was used to measure the portfolio efficiency score as well as to compare the efficiency of the fixed income unit trust funds and equity unit trust funds. This study utilized the data from the prospectus of the asset management companies that issue unit trust funds in Malaysia in which provide the information on the inputs covering from the year 2005 until 2014. The annual data of the net asset value of fixed income funds and equity funds for this study were gathered from the Bloomberg Terminal at Bursa Malaysia.

The study employs a parametric econometric approach namely SFA to estimate the technical efficiency score of the particular funds. The likelihood ratio test was conducted to ensure that the inefficiency problem did exist. Technical efficiency is the firm's ability to produce maximum output from a given sets of inputs or to measure the degree to which a firm could minimize its inputs used in the production of given outputs. It is measured using a mathematical model known as SFA. This study employed three input variables (expenses ratio, portfolio turnover ratio, and fund management stated fee) and one output variable (return) to measure the efficiency level of Malaysian unit trust industry. Hence, the technical efficiency was estimated using the software program frontier Version 4.1, which was developed by Coelli (1996). This likelihood ratio test was conducted to ensure the SFA was valid. The samples were 41 registered asset management firms in Malaysia for the year between 2005 and 2014. In selecting the sample, the researcher gathered the information from the prospectus and the website of the asset management companies that issue unit trust funds. A thorough discussion of the input and output variables is described as follows:

Table 1: Input and output variables

	Variable	Explanation
Input	Expense Ratio	Nor Azlida Aleng Mohamad (2010); Daraio & Simar (2006); Babalos, Caporale, et al. (2012); Kerstens, Mounir, & De Woestyne (2011); Polwitoon (2006)
	Portfolio Turnover ratio	Nor Azlida Aleng Mohamad (2010); Daraio & Simar, (2006); Babalos, Caporale, et al. (2012); Kerstens et al. (2011)
	Fund Management Stated Fee	Nor Azlida Aleng Mohamad (2010); Polwitoon (2006)
Output	Return	Nor Azlida Aleng Mohamad (2010); Kerstens et al. (2011); Alexakis, Dasilas, & Grose (2013); Annaert et al. (2003); Wong et al. (2008)

To date, various methods have been developed and introduced to measure the efficiency performance namely DEA and Malmquist index. The SFA was chosen because this analysis provides a better estimation of efficiency scores according to the data's stochastic nature. Syrjänen, Bogetoft & Agrell (2006) identified several advantages of the study, this techniques separate noise from the overall efficiency analysis and provide a strong theory of significance testing by its gamma value.

Stochastic Frontier Analysis (SFA): This analysis was first introduced by Aigner, Lovell, & Schmidt (1977). A strong theory of significance testing by its gamma value and a noise separation make this analysis very valuable (Syrjänen, Bogetoft & Agrell, 2006). The efficiency functions for a firm to be generally formulated as in Equation 1.

$$y_i = f(a_i, p_i, \varepsilon_i) \qquad i = 1, \dots, n \qquad \text{(Equation 1)}$$

Where y_i is the observed cost and profit of the firm, a_i represents the vector of the quantity of output variables, p_i represents the vector for the quantity of input variables, and ε_i is the factor of composite error. Hence, this function gives a specification to minimize the cost in order to produce the output vectors, given cost-consuming factors, such as market price, management inefficiency, some economic exogenous factors, or perhaps just plain luck. The expression of ε_i, on the other hand, could be further split into two parts as below:

$$\varepsilon_i = v_i + u_i \qquad \text{(Equation 2)}$$

With v_i refers to the endogenous factors and u_i refers to exogenous factors that affect the firm's operational costs. Endogenous factor refers to a continuous internal factor, while exogenous factor refers to a continuous external factor. By that, v_i will show the increase in cost and profit that is caused by inefficiency factors which might have been caused by management mistakes, such as the quantity of employment is less than optimum, or various inputs that are based on pricing factors. Likewise, u_i represents the temporary increment or decrement of the cost and profit that is caused by random factors that might emerge from measurement errors or unpredicted factors that could not be controlled by firm's management, such as weather, luck, or war. Both the variables v_i and u_i represent the standard normal distribution, $N|(0, \sigma^2)|$.

Model Specification: An SFA can be expressed as in Equation 3, using a profit function model by Battese & Coelli (1992), where the technical efficiency of firm *i* is u_i and non-negative variable, whereas the error term component v_i is a random variable that can be either positive or negative.

$$\ln Y_i = \beta_0 + \beta_1 \ln x_{1i} + \beta_2 \ln x_{2i} + \beta_3 \ln x_{3i} + (v_i - u_i) \qquad i = 1, \dots n \qquad \text{(Equation 3)}$$

Where y_i is the output technical efficiency, β are the vectors for input and output parameters, namely x_{1i} which represents an expense ratio, x_{2i} which represents portfolio turnover ratio, x_{3i} which represents fund management stated fee , v_i which represents the random stochastic variable that is assumed to have normal distribution, and u_i which represents the random variable that refers to technical inefficiency that could affect the unit trust fund's return and is usually assumed to have normal distribution.

4. Results and Discussion

Analysis/Results: The technical efficiency of the panel data which consists of 360 observations of fixed income funds and 1090 observations of equity funds were generated using Frontier Version 4.1 software through the maximum likelihood technique according to Coelli (1996). The model verification test result is as follow:

Model verification test: To ensure the appropriateness of utilizing the maximum likelihood estimation (MLE) to fit the stochastic frontier model, the likelihood ratio test was implemented. The results of the stochastic frontier estimation are reported in Table 2 and Table 3. The table below presents the log function specified above fits the data well. The results obtained from the SFA can be compared to the fixed income funds and equity funds. Table 2 and Table 3 show the gamma test of the hypothesis of stochastic frontier model. There was a technical inefficiency effect in model 1 (panel data) and model 2 (pool data) of fixed income funds with the γ_1 score was 0.002364 and γ_2 score was 0.0000001, respectively. Moreover, the equity funds also produced the same results as γ_1 score which was 0.00010085 and γ_2 score which was 0.0000001, respectively. Hence, both models showed that the null hypothesis of no technical inefficiency that exists in the model could be rejected. The finding of this study is consistent with the work by Nor Azlida Aleng Mohamad (2010), and Basnayake & Gunaratne (2002).

Table 2: Gamma test of hypothesis of the stochastic frontier model of fixed income funds

Model	Null Hypothesis	γ -value	Decision
Model 1	$H_0 : \gamma = 0$	0.00236372	Reject H_0
Model 2	$H_0 : \gamma = 0$	0.00000001	Reject H_0

Table 3: Gamma test of hypothesis of the stochastic frontier model of equity funds

Model	Null Hypothesis	γ -value	Decision
Model 1	$H_0 : \gamma = 0$	0.00010085	Reject H_0
Model 2	$H_0 : \gamma = 0$	0.00000001	Reject H_0

Descriptive Analysis: Table 4 shows the efficiency score computed by this model. The average profit efficiency scores in fixed income funds and equity funds were 98.30% and 99.84% respectively. The mean efficiency scores for both types of unit trust funds for ten years were 90% and above. This score suggested that the unit trust funds industry has been in high demand among investors. It also means that the unit trust funds are able to reduce their inputs costs by 2% without reducing the profit, a level that is viewed as impressive as supported by (Nor Azlida Aleng Mohamad, 2010).

Table 4: Descriptive analysis for firms' technical efficiency estimates (2005-2014)

	Mean	Minimum	Maximum
Overall fixed income funds	0.98303317	0.9644458	0.9928530
Overall Equity funds	0.99836571	0.9982404	0.9984545

Results: The results shown in Table 5 indicated that the average of technical efficiency score of fixed income funds and equity funds from 2005 to 2014 slightly increased throughout the years. From the efficiency scores in Table 4, the firm's average efficiency increased slightly from 2005 to 2014 from 97.25% to 99.07% for fixed income funds.

Table 5: Descriptive analysis for overall fixed income funds and equity funds technical efficiency estimates for individual years

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Fixed Income Funds	0.96441	0.9756	0.9784	0.9808	0.9830	0.9849	0.9866	0.9882	0.9895	0.9907
Equity Funds	0.99824	0.99827	0.99829	0.99831	0.99834	0.99836	0.99838	0.99840	0.99842	0.99844

Based on the results, it can be concluded that the performance of unit trust industry in Malaysia is considered optimal efficient as they showed to waste only 2% of their inputs based on SFA throughout ten years. The mean of efficiency scores for ten years were 90% and above. In terms of comparative analysis, the fixed income funds score ranges from low mean efficiency of 0.94 in 2005 to a high value of 0.99 in 2014 compared to equity funds which produced almost constant mean efficiency scores during the period of analysis. The score also suggested that equity funds had achieved almost 100% efficiency. Further analysis showed the confirmation of the existence of technical efficiency.

From our findings, it showed that the fixed income funds with superior mean is Kenanga Bond with an annual mean of 98.69%. These results indicated that this fund manage to reduce their input cost (expense ratio, portfolio turnover, and management state fee) by less than 2% without reducing their output. It is revealed that this fund is very attractive among investors and is considered very efficient in terms of managing their cost. Meanwhile, Amanah Mutual Bhd Income trust fund indicated the lowest average efficiency score of 97.80%. On top of that, the overall efficiency scores resulted by 36 fixed income funds showed that the funds were able to maintain the profit efficiency over the years. From the equity funds analysis, it can be concluded that the efficiency scores provided by 109 equity funds showed slightly the same results year after year. On the other hand, the score remained in increasing order from 2005 to 2014.

Table 6: Maximum-likelihood estimates of the stochastic frontier model (Panel Data) for fixed income funds and equity funds

Variables	Coefficient		t-ratio	
	Fixed Income	Equity	Fixed Income	Equity
Intercept (β_0)	1.30361	1.71144	17.084621	61.53806
Expense ratio (β_1)	0.09584	0.050253	0.5058710	1.080556
Portfolio Turnover ratio (β_2)	0.01137	0.016415	0.3969302	0.777475
Fund Mgt Stated Fee (β_3)	-0.007727	-0.104631	-0.038281	-0.001365
Gamma, (γ)	0.0023637	0.0000102	0.068481	0.6012311

The results of the maximum-likelihood estimation (MLE) for both types of unit trust funds are reported in Table 6. The value of the log likelihood function for OLS and MLE allow to test whether the technical inefficiency exists or not. In the case where technical inefficiency does not exist, then technically there will be no difference in the parameters of OLS and MLE. From the panel data output, it showed that the expense ratio, portfolio turnover ratio, and fund management stated fees were not significant to returns for both types of unit trust funds. None of these differences was statistically significant. A strong relationship between return and expense ratio has been reported in the literature. The present study was designed to determine the relative efficiency of fixed income funds and equity funds in Malaysia. The results of this study did not show any significant values. However, the observed difference between return and the inputs in this study were not significant. It is encouraging to compare this figure with a study by Nor Azlida Aleng Mohamad (2010) who found that both types of unit trust funds were highly efficient. There were similarities between the input used (management fee, expense ratio) in this study and those described by (Nor Azlida Aleng Mohamad, 2010). These findings support the idea that the of type of funds do not influence the efficiency much through the years and most important findings indicated that time does not affect the technical efficiency score.

Discussion: From the overall statistical results, it showed that the efficiency score was more or less the same from 2005 to 2014. It showed that time does not affect the technical efficiency score or it can be said that the entire fund's technical inefficiency were constant during the period of analysis. Our findings of time-varying model were not taken into account in which some firms may be relatively inefficient initially but become relatively efficient in subsequent periods. The basic model of the time-varying model is presented below.

Fixed Income Funds Likelihood Ratio: To choose whether we should select the panel data or pool model for our analysis, we need to perform another test that is called likelihood ratio test was conducted by Kodde & Palm (1986) and Coelli, Rao & Battesse (1998). From the estimations, it was found that the likelihood ratio test of Model 1 (Panel Data) was 338.7254 and likelihood ratio test of Model 2 (Pool Data) was 338.1312. Therefore, we put all the information in this formula to find the likelihood ratio for both models. Therefore, the null hypothesis is not rejected at 99% of confidence level.

LR = -2 (338.1312 - 338.7254)
= 1.1884

Equity Funds Likelihood Ratio: To choose whether we should select the panel data or pool model for our analysis, we need to perform another test that is called likelihood ratio test was conducted by Kodde & Palm (1986) and Coelli, Rao & Battesse (1998). From the estimations, it was found that the likelihood ratio test of Model 1 (Panel Data) was 15.744687 and likelihood ratio test of Model 2 (Pool Data) was 15.718774. Therefore, we put all the information in this formula to find the likelihood ratio for both models.

LR = -2 (15.718774 - 15.744687)
= 0.051826

From Table 7 below, since the likelihood ratio calculated was 1.1884 and 0.0518 for fixed income funds and equity funds respectively, and the t-value that was obtained from Kodde & Palm (1986), at 99% of confidence level with a degree of freedom of 1 for the model, the value of likelihood ratio obtained from the analysis significantly fail to reject the null hypothesis. It indicated that we should use the Model 2 Pool Data instead of Model 1 Panel Data because it has time-invariant inefficiency effects. It gives almost the same technical efficiency score regardless the time and it allows variations in technical inefficiency effects over time.

Table 7: Likelihood ratio test of hypothesis of the stochastic frontier model

Model	Null Hypothesis	Likelihood-Ratio	t-value	Decision
Model 3 (Fixed Income)	$H_0 : \gamma = 0$	1.1884	5.412*	Fail to Reject H_0
Model 4 (Equity)	$H_0 : \gamma = 0$	0.0518	5.412*	Fail to Reject H_0

*significant at 1% level

The critical values are obtained from the table of Kodde & Palm (1986).

5. Conclusion

This study has provided the evidence about the fixed income funds and equity funds in Malaysia. The results indicated that the average efficiency score for equity unit trust funds was higher than fixed income unit trust funds. Nevertheless, when the sample was categorized into panel data, the average efficiency score for fixed income funds increased throughout ten years. Meanwhile the average score for equity funds was consistent over the years. It showed time-invariant for equity funds. However, this means that the performance efficiency for both types of funds was considered excellent and efficient. The results indicated that the mean efficiency achieved in unit trust industry was almost 100% of its potential output. The results were very similar to those obtained by Annaert et al. (2003) who also found higher efficiency scores where it deviated from their expected return into a noise component and efficiency scores. However, comparative analysis results suggested time-invariant for equity funds.

Recommendations: The results fail to find a link between all inputs and unit trust performance. Further studies on different variables will need to be considered to obtain more robust findings. In future investigations, it might be possible to use different output in which will produce significant results rather than focusing on the input costs of the management perspective that do not directly influence the efficiency of unit trust industry.

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