Investigating Equity Style Portfolio Risk using VaR: An Empirical Study based on Malaysian Mutual Funds

Wee–Yeap Lau

Abstract

The knowledge of equity style of mutual funds has benefited investors by mitigating the issue of asymmetric information between fund managers and investors. Having information of portfolio risk enables investors to do risk budgeting. In this study, style analysis by Sharpe (1992) is used to decompose the fund returns into various asset classes. Subsequently, Value–at–Risk (VaR) measure is applied to calculate the portfolio risk based on Jorion (2007). Notably, this study finds that: First, VaR of value style funds is higher than VaR of growth style funds for both diversified and undiversified VaR. Second, adding international stocks as an asset class increases the undiversified VaR for both value and growth style funds. Third, growth style funds exhibit more portfolio diversification effect than value style funds as measured by reduction in diversified VaR. Fourth, adding international stocks to the portfolio intensifies the diversification effect. This study highlights the importance of estimating portfolio risk in addition to using style–based classification in the context of Malaysian fund management industry.

JEL classifications: G11, G18, G23, L51
Keywords: style analysis, equity style management, mutual fund, portfolio risk, value at risk

1. Introduction

Mutual funds or unit trust funds are investment products created by asset management companies, to pool resources from individual investors and invest in diversified portfolio of securities, with the purpose of adding value to their financial wealth in future period. The benefits of this investment tool are investors can better safeguard their investment through portfolio diversification and professional fund management. Recent statistics from Securities Commission has shown that the net asset value (NAV) of the mutual fund industry recorded RM121.8 billion as at 2006 year end with 14.4 percent of NAV to market capitalization, as compared to RM98.4 billion and 14.2 percent as at 2005 year end.[1]

Albeit the existence of portfolio diversification, historical record has shown that net asset value of funds fluctuated from economic upturn to downturn. As an example, in years preceding the crisis, with optimistic inflow of foreign funds to domestic capital market, market capitalization of Bursa Malaysia[2]

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[1] Refer Economic Report 2007/2008, Ministry of Finance, Malaysia, pp. 115–116.
[2] formerly known as Kuala Lumpur Stock Exchange (KLSE).

Table 1 Statistics On The Malaysian Mutual Fund Industry and Bursa Malaysia

	1995	1996	1997	1998	1999	2000	2001	2002
Industry								
Units in Circulation (billion units)	31.94	38.94	42.25	46.54	52.63	63.85	71.39	84.53
No. of Accounts ('000)	6,850	7,964	8,263	8,588	8,910	9,582	9,990	10,175
Net Asset Value (RM billion)	44.13	59.96	33.57	38.73	43.26	43.30	47.35	53.70
KLSE								
KLSE Composite Index	995.17	1237.96	594.44	586.13	812.33	679.64	696.09	646.32
Market Capitalization (RM billion)	565.63	806.77	375.8	374.52	552.69	444.35	464.99	481.62
NAV to Market Capitalization (%)	7.80	7.43	8.93	10.34	7.83	9.74	10.18	11.15

Source: PNB (2001) and Federation of Malaysia Unit Trust Managers.
Available from http://www.fmutm.com.my [cited 5 March 2004]

increased from RM566 billion to RM807 billion in 1996. Likewise, NAV of mutual funds increased from RM44 billion to RM60 billion in 1996. However, with the onset of crisis, market capitalization and NAV of funds decreased to RM376 billon and RM34 billion in 1997. Many investors suffered financial losses as their funds were sold at losses if they needed cash during economic downturn.

While the crisis was caused by some external and internal factors in the context of emerging financial markets,[3] it could be observed that mutual funds inherently possess risk as they were exposed to market movement of asset classes. Mutual fund investors do assume risk in order to receive higher returns. As stated by Jorion (2007), mutual fund investors expect to be compensated for taking risk in form of higher returns. The issue is to how to balance risk against expected return.

In this context, value at risk (VaR) can be used to measure, control and manage risk.[4] Risk management should be included as part of the four–step approach in designing an investment portfolio for investing clients.[5] Of which, the first step being deciding which asset classes to be represented in the portfolio, and second, determining the long–term 'target' percentage of the portfolio to allocate to each of these asset classes. The third step being specifying the range within the allocation can be altered, and the fourth step being selection of securities within each of these asset classes. Jorion (2007) states that the use of VaR can assist in setting better guidelines than traditional limits. The new risk management technique of risk budgeting is the process of allocating and managing risk using a top–down approach to different aspects of the investment process. It builds on VaR measures that can be applied to asset classes, fund managers and securities.

With the advent of the concept of a fund's 'effective asset mix' and 'attribution analysis' by Sharpe

[3] Refer Beim and Calormiris (2001), pp.292–305.
[4] Refer Jorion (2007), p.425.
[5] Refer Gibson (1996), pp. 9–12.

(1988, 1992), equity style management has been widely used advanced financial markets.[6] There have been a number of proponents for style analysis with each of them demonstrated the usefulness of this analysis with respect to equity style classification (Tierney and Winston, 1991; Bailey, 1992; Bailey and Tierney, 1993; Coggin, 1998). This analysis has also been used to link the investment returns and asset allocation policies in some of the recent research (Brinson et al., 1986, 1991; Ibbotson and Kaplan, 2000).

Fant and O'neal (1999) futher states style categories rather than mutual fund objectives groupings are better used to classify equity funds. It is said that mutual fund objective groupings such as growth funds or growth and income funds frequently include dissimilar funds. In addition, result with mutual fund objectives may also have limited application for institutional investors. Style analysis has been shown to yield a more parsimonious grouping of similar managers.

Based on the VaR measure of Jorion (2007), this paper intends to apply VaR on estimating equity style portfolio risk. In this respect, this paper has used the Malaysian Growth and Malaysian Value Indices developed by Morgan Stanley Capital International (MSCI). The contribution of this paper is threefold. First, this study is first of its kind to apply VaR measure on estimating equity style portfolio risk on Malaysian mutual funds. Second, this study compares portfolio risk of value and growth style funds, including and excluding international stock as an asset class in the portfolio. Third, this paper attempts to study the effect of diversification on portfolio risk.

The paper is organized as follows. The second section briefly reviews the literature on VaR, equity style classification and Malaysian mutual funds. The third, four and fifth sections are on data, methodology and results respectively. In final section, with respect to findings obtained from this study, this paper concludes on the application of VaR measure on equity style portfolio risk with respect to finance theory, economic and policy implication in the context of fund management industry in Malaysia.

2. Literature Review

Value at Risk

Gremillion (2001) states that asset managers of mutual funds have started to apply risk management techniques.[7] Jorion (2007) also states that VaR systems which have been successfully implemented in banking industry also apply to asset managers as VaR is a forward–looking measure of the risk profile of a fund based on current positions.[8] Numerous studies have been conducted by

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[6] Refer Coggin and Fabozzi (2003).
[7] Refer Gremillion (2001), pp. 98–100.
[8] Refer Jorion (2007), pp. 425.

different researchers on applying VaR measure to asset classes, asset managers and securities. Dowd (1999) suggests that incremental VaR can be used to guide risk managers when choosing between alternatives that offer different prospective returns but involve different risks.

In another study, Fong and Lin (1999) propose a new analytical approach to calculating VaR for derivatives and portfolios. Instead of using the traditional methods which require standard deviations, they investigate directly the VaR of the derivative and the underlying. Likewise, studies on exploring the usefulness of VaR continue to appear in various literatures. Gordon and Wai (2003) show that VaR can be used as a tool for measuring leverage risk in real estate portfolios. Alexander and Baptista, (2003) develop a VaR based measure of portfolio performance known reward–to–VaR ratio. Bali and Cakici (2004) state that VaR can be used as an alternative risk factor in explaining the cross–sectional variation in expected returns.

Equity Style Classification

It is inevitable for the problem of asymmetric information between fund manager and investors to exist as timely mutual fund holdings are not readily updated even in the developed market as discussed by Lucas and Reipe (1996). Furthermore, they identified style analysis to be a useful tool for investors to comprehend a trust fund's investment policy and objective.

In a number of subsequent studies, in the course of identifying a system of classification for equity trust funds, the researchers have also presented the evidence of mis–classifications if self–reported investment objectives were to be compared to the estimated styles (diBartolomeo and Witkowski, 1997; Brown and Goetzmann, 1997; Kim, Shukla and Tomas, 2000).

In one of the recent studies, Amenc Sfeir and Martellini (2002) have proposed an integrated framework for assessing the risk–adjusted performance of mutual fund managers. This methodology is designed to be consistent with modern portfolio theory and constraints imposed by practical implementation of investment management where a variety of styles have to be accounted for. In another study, TerHorst, Nijman and DeRoon (2004) states that while the estimated portfolio may indeed differs from actual portfolio holdings, but "…if the aim is to predict future fund returns, factors exposures seem to be more relevant than actual portfolio holdings, and return–style based style analysis performs better than holding–based style–analysis".

Mutual Funds in Malaysia

Chua (1985) with exclusive samples of 12 Malaysian mutual funds between 1974 to 1984, concluded that funds outperformed the market proxy and performance was fairly consistent over time. High performance funds tend to relate to those with low expense ratio, low asset size and low portfolio turnover.

In a subsequent study, Ewe (1994) with sample of 37 funds and a period between 1988–1992, with test of performance by Jensen's Alpha Measure and Sharpe Index Measure, reported that while risk adjusted returns overall were less than those of stock market implying that the managers had low forecasting ability. Shamsher and Annuar (1995) found a similar result with Ewe (1994), where the returns on investment in 54 funds for the period 1988–1992 were below risk–free and market returns. Besides the performance is inconsistent over time, the degree of diversification of the portfolios was below expectation.

In addition, the studies conducted with respect to the performance measurement of Malaysian unit trust funds have utilized market benchmarks such as Kuala Lumpur Composite Index (KLCI) and EMAS Index (Leong and Aw, 1997; Ch'ng and Kok, 1998). These researchers have advocated for more than one kind of market benchmarks for performance measurement. All the prior studies before 1997 have concentrated on using the broad market index i.e. KLCI as the single yardstick.

In another study by Shamsher and Annuar (2001), with a sample size of 41 non–government based mutual funds from 1995 to 1999, they reported that based on risk–adjusted returns basis, both active and passive funds performed equally well, but underperformed the market portfolio. They concluded that choice of active or passive funds was irrelevant given equal performance, but growth funds should be prioritized over income if investors preferred actively managed funds over passive funds and vice versa.

Recent studies have focused on the concept of equity style management in mutual funds. Using return based style analysis, Lau (2002) states that in addition to market benchmark comparison, the performance of funds can also be compared against their respective peer groups. In subsequent study, Lau (2005) finds that the risk–adjusted performance of growth style fund managers is more persistent than value style funds. The same effect was not found under mutual fund objective classification. In addition, Lau (2006) finds that under style classification based on MSCI style indices, investment style is found to communicate economic trends to investors. It is found that during the period of economic recovery, value style funds recover faster from distressed economic environment than growth style funds. On the other hand, during economic recovery, growth style funds exhibit recovery momentum better than value style funds.

In another study using an integrated framework of style analysis, Lau (2007) states that the inclusion of asset classes with negative correlation coefficient enhances the performance of funds and funds with relatively high degree of style (above 70 percent) that hold large–cap stocks together with high portion of liquid asset class (6 to 35 percent) tend to have higher alpha, translating into higher information ratio.

3. Data

The fund data comprises of 60 month–end net asset value (NAV) of the equity funds listed on daily newspapers. The sample period starts from May 1997 to May 2002. The sample period is chosen with the purpose to match the commencement of MSCI Malaysian Growth Style and Value Style Indices, which started in May 1997. A total of 41 funds from growth, income and balance categories are chosen for this study.[9]

The continuous compounding return for the fund is used as the dependent variable. It is calculated as

$R_{j,t} = \ln (P_{j,t} / P_{j,t-1})$

$R_{m,t} = \ln (l_{m,t} / I_{m,t-1})$

$R_{f,t} = \ln (1 + r_{f,t})$

Where:

$R_{j,t}$ = the continuous compounded return for j unit trust fund at time t

$R_{m,t}$ = the continuous compounded return for m benchmark portfolio for the month t

$R_{f,t}$ = the continuous compounding risk free rate of interest for month t

$P_{j,t}$ = the net asset value for j unit trust fund at time t

$l_{m,t}$ = the asset class index at the end of month t

$r_{f,t}$ = the discount rate of the 90–day T–Bill for month t as the proxy for the risk free rate of interest

Table 2. Asset class indices

Asset Class	Description
Growth Stocks	Represented by MSCI Malaysian Growth Index* quoted in local currency.
Value Stocks	Represented by MSCI Malaysian Value Index* quoted in local currency.
Cash	A proxy for short–term Ringgit money market instruments. Represented by Kuala Lumpur Inter–bank Offer Rate (KLIBOR). KLIBOR 1–month deposit rate is used.
Government Bonds	Represented by MGS–bond all tenure Index#, which account for MGS with value above RM 100 million on issues for maturity greater than one year.
Corporate Bonds	Represented by RAM Listed Bond Index#, which account for all bonds and loan stocks listed on KLSE a term to maturity of more than one year. A proxy for listed private debt securities.
International Stocks	Represented by MSCI World Index*. A proxy for all international stocks index.

Source of data : Rating Agency Malaysia (RAM)–Quantshop, 2004

* Available from http://www.msci.com [cited 5 May 2005]

[9] Mutual fund objectives self defined by the asset management companies or plan sponsors.

[10] As stated by Sharpe (1992) "…while not strictly necessary, it is desirable that such asset classes should be 1) mutually exclusive, 2) exhaustive and 3) have returns that 'differ', and the asset classes returns should either have low correlations with one another or, in cases in which correlations are high, different level of standard deviations".

Table 3 Descriptive Statistics of Returns of Asset Classes

Variable	Observation	Mean	Std. Dev.	Minimum	Maximum
MSCI Growth Index	60	–0.76	12.42	–29.23	35.81
MSCI Value Index	60	1.00	13.46	–23.23	41.81
KLIBOR	60	0.41	0.23	0.23	0.88
MGS Index	60	0.75	1.31	–2.68	6.55
LBI Index	60	2.07	13.83	–12.40	38.62
MSCI World Index	60	0.35	4.72	–14.49	8.11

Table 4 Correlation Matrix of Asset Class Returns

	MSCI Growth	MSCI Value	KLIBOR	MGS	LBI	MSCI World
MSCI Growth	1.00					
MSCI Value	0.89	1.00				
KLIBOR	–0.24	–0.20	1.00			
MGS	0.16	0.16	–0.07	1.00		
LBI	0.17	0.11	–0.14	–0.07	1.00	
MSCI World	0.43	0.43	0.13	–0.19	0.21	1.00

Independent variables are returns series of asset classes invested by fund managers. The asset classes that represent the investment universe are shown in table 2. Out of 41 funds in our sample, three funds also invest in foreign stocks.

Style analysis in equation (2) attempts to capture the investment universe in the model, careful consideration has been taken to ensure that asset classes chosen are not correlated to one another.[10] As shown in table 4, MSCI Value and MSCI Growth Indices are found to have high correlation of 0.89. However, the standard deviations of these indices are different at 12.42 and 13.46 percent for MSCI Growth and Value Index respectively.

4. Methodology

Style Analysis

As in Sharpe (1992), this study initially introduces the generic factor model in equation (1) before adapting it into style analysis in equation (2).

$$\tilde{R}_i = \left[b_{i1}\tilde{F}_1 + b_{i2}\tilde{F}_2 + b_{ik}\tilde{F}_k + ... + b_{in}\tilde{F}_n\right] + \tilde{e}_i \quad (1)$$

Where

$\tilde{R}_i$ = return of fund i

$\tilde{F}_k$ = return of factor k for fund i

b_{ik} = sensitivity of fund i to factor k

$\tilde{e}_i$ = non–factor return of asset i of mean zero with the assumption that the non–factor returns are uncorrelated $\sigma_{eiej} = 0$

Style Analysis is the use of constrained quadratic programming for solving the asset allocation problem. This approach incorporates two specific constraints: first, the coefficients must sum to 100 percent and second, coefficients must be positive. Negative coefficients can be interpreted as short positions in asset classes. This type of strategy is rarely used by the funds examined, and prohibiting these coefficients provides better, more usable results.[8]

The factor is rewritten as

$$\tilde{e}_i = \tilde{R}_i - \left[b_{i1}\tilde{F}_1 + b_{i2}\tilde{F}_2 + b_{ik}\tilde{F}_k + ... + b_{in}\tilde{F}_n\right] \quad (2)$$

Where

$\tilde{e}_i$ = selection

$\tilde{R}_i$ = return of fund i

$\tilde{F}_k$ = return of factor k for fund i

b_{ik} = sensitivity of fund i to factor k

To obtain the style, minimize variance of residual return $\tilde{e}_i$

Subject to Constraints

$\sum_{j=1}^{n} b_{ik} = 1$ for any fund i and asset class k

and $0 < b_{ik} < 1$

With the two specific constraints, the coefficients tabulated in equation (2) will resemble the weights within a portfolio and conveniently displayed as part of the portfolio. The asset class indices in table 2 which represent the factors in equation (1) and the sensitivity of each of the fund's return series to each of the asset class index factors is used to construct a passive benchmark portfolio return series for performance measurement. In other words, the return of funds will be measured against the style–based, passive benchmark contained as second, bracketed terms in the right hand side of equation (2).

Upon obtaining results from the quadratic programming in equation (2), the proportion of variance 'explained' by the selected asset classes, for fund i can be obtained as below:

$$R^2 = 1 - \frac{Var(\tilde{e})}{Var(\tilde{R})} \quad (3)$$

The second term of the right–hand side of the above equation represents the proportion of variance 'unexplained" or due to active management (selection). In other words, the return of unit trust fund is decomposed into return on a set of asset classes and residual return. The former is attributed to *style* and represented by the R–square while the latter is attributed to selection.

In order to take into account the added (or subtracted) value provided by a fund i.e. its benchmark and the added risk, the monthly mean selection returns is divided by the standard deviation of monthly selection returns. This calculation gives an information ratio as stated in equation (4).

$$\text{Information Ratio } \frac{E(\tilde{e}_i)}{\sigma_{\tilde{e}_i}} \tag{3}$$

The monthly mean selection returns can be measured for its statistical significance using a t–statistic. The null hypothesis is stated as selection return equals to zero.

$$t = \frac{(r_s - \mu)}{s/\sqrt{n}} \tag{5}$$

Where

r_s = the monthly mean selection returns

μ = zero, the null hypothesis

s = the standard deviation of monthly selection return

n = the number of observations

Value at Risk

Portfolio expected return and the variance are given by equation (9) and (10)

$$E(R_p) = \mu_p = \sum_{i=1}^{N} W_i \mu_i \tag{6}$$

$$V(R_p) = \sigma_p^2 = \sum_{i=1}^{N} W_i^2 \sigma_i^2 + \sum_{i=1}^{N} \sum_{j=1, j \neq i}^{N} W_i W_j \sigma_{ij} = \sum_{i=1}^{N} W_i^2 \sigma_i^2 + 2 \sum_{i=1}^{N} \sum_{j<1}^{N} W_i W_j \sigma_{ij} \tag{7}$$

The above equation accounts not only for the risk of the individual securities but also for all covariances, which add up to a total of N(N−1)/2 different terms.[11]

Defining Σ as the covariance matrix, the variance of the portfolio rate of return can be written as

$$\sigma_i^2 = w' \sum w \tag{8}$$

where w are weights which has no units.

For measuring portfolio VaR, delta–normal method as discussed in Jorion (2007) is used. This method which is also known as variance–covariance method uses parametric approximation such as normal distribution where VaR is derived from the standard deviation of the entire probability density function of profits and losses.[12] It provides a fast and efficient method for large portfolios where optionality is not a dominant factor.[13] Translating the portfolio variance into a VaR measure using delta–normal model where all individual security returns are assumed to be normally distributed. If the confidence level c into a standard normal deviate α such that the probability of observing a loss worse than −α is c. Hence, defining W as the initial portfolio value, the portfolio VaR is

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[11] As the number if assets increases, it becomes difficult to keep track of all covariance terms, hence matrix notation is used.

[12] Refer Jorion (2007) p. 247–271 for discussion of VaR Methods.

[13] Since Malaysian Mutual funds are not permitted to do short selling and trade in derivatives, delta–normal method is appropriate.

$$\text{Portfolio VaR} = VaR_p = \alpha\sigma_p W \tag{9}$$

VaR of a portfolio is defined as the worst loss over a target horizon such that there is a low, prescribed probability that the actual loss will be larger. The definition requires two quantitative factors, the horizon and confidence level. A general definition of VaR is that it is the smallest loss, in absolute value, such that

$$P(L > VaR) \leq 1 - c \tag{10}$$

where c as the confidence level and L as the loss, measured in positive number. In other words, VaR is the expected worst loss over a given horizon at a given confidence level.

It can be defined in percent mathematically,

$$\text{VaR (X\%)} = Z_{x\%}\sigma \tag{11}$$

where VaR(X%) is the X% probability value at risk, $Z_{x\%}$ is the critical z–value based on normal distribution and the selected X% probability and σ is the standard deviation of daily returns on a percentage basis. VaR can also be estimated on a dollar basis.[14] For measuring risk, risk horizon is period (days, weeks, months, quarters or years) can be used. Adjustments of volatility to different horizons can be based on a square root of time factor when positions are constant and returns are i.i.d.[15] The conversion method can be generalized

$$\text{VAR (X\%)}_{\text{J–days}} = \text{VaR (X\%)}_{\text{1–day}} \sqrt{J} \tag{12}$$

where VaR can be converted to from 1–day basis to longer basis by multiplying the daily VaR by the square root of the number of days (J) in the longer time period.

While individual risk of each component is

$$VaR_i = \alpha\sigma_i \mid w_i \mid \tag{13}$$

The absolute value of the weight indicates that the weight can be negative. Equation (13) shows that *Individual VaR or asset class VaR* is obtained by multiplying asset class weight with critical z–value based on normal distribution of 1.645 and asset class standard deviation.[16] Summing up *individual VaR or asset class VaR* will give the value of Undiversified VaR, which is defined as the portfolio VaR when there is no short position and all correlations are unity.

Conversely *diversified VaR* is defined as the portfolio VaR, taking into account diversification benefits between components. *Diversified VaR* is obtained by multiplying portfolio standard deviation

[14] VaR (X%) dollar basis = VaR (X%) decimal basis x asset value.

[15] Known as square root of time adjustment or square root rule.

[16] Asset class standard deviation is the volatility of returns of the respective asset class over the past 60 months. Refer Jorion (2007), pp. 162. Individual VaR is the VaR of one component taken in isolation.

(monthly percent) with critical z–value based on normal distribution of 1.645. The standard deviation of each portfolio is a matrix product of the asset class weighting matrix and its variance covariance matrix. The variance covariance matrix again is the product of its volatility matrix and correlation matrix.

Finally the benefit from diversification can be measured by the difference between the diversified VaR and undiversified VaR. The difference between two kinds of VaR represents portfolio diversification effect.

5.0 Result

The results of style analysis are shown in table 5. Across the different fund objectives, it can be observed as the name implied, growth funds have the most substantial holdings of growth stocks of 33.90 percent, while income funds have the most substantial holdings of value funds of 37.9 percent. On average, balanced funds also have 30.76 percent of growth stocks and 18.04 percent of value stocks, however each balance fund varies in its holdings of value and growth stocks.

The main purpose of finding the equity style of mutual funds is to address the issue of asymmetric information between fund managers and investors, and as a way to mitigate misclassification of fund objectives. Based on the result of style analysis, these funds are re–classified into growth style and value style funds.

As shown in table 6, after reclassifying the funds into style categories, there are 25 value style funds (VSF) and 13 growth style funds (GSF), inclusive of one fund with international stocks as asset class for the former and two funds with international stocks for the latter. Column 3 shows the respective asset class weights for both fund styles. On average VSF hold 45 percent of value stocks as an asset class, while GSF hold an average of 37 percent of growth stocks in their portfolio.

Individual VaR or Asset Class VaR is shown in column 4.[17] As observed VSF and GSF have an average of 10.54 percent and 7.96 percent of VaR in value stocks and growth stock respectively. The undiversified VaR for each fund in column 5 is obtained by summing up all individual VaR. It is observed that undiversified VaR for VSF is higher than GSF i.e. 17.17 percent and 12.81 percent respectively. Likewise, the undiversified VaR for VSF with international stocks is also higher than GSF with international stocks i.e. 20.03 percent and 19.58 percent respectively.

Comparing column 5 and 7, diversified VaR is found to be lower than undiversified VaR due to portfolio diversification. For VSF, the diversified VaR is 15.15 percent as compared to 17.17 percent of undiversified VaR. For GSF, the diversified VaR is 10.94 percent against 12.81 percent. The same can be observed for VSF and GSF with international stocks. Their respective diversified VaR is lower

Table 5 Results of the Estimation: The Degree of Styles and Selection, Asset Classes Holdings by Different Funds, Selection Return and Information Ratio

No	Fund	Fund Objective	Sub–Type	Style	Selection	MSCI Growth	MSCI Value	Cash	Govt Bonds	Corp Bonds	MSCI World	New Fund Objective	Monthly Mean Sel Return (%)	t–Statistic Sel Return)	Information Ratio
1	Affin Equity	Income	Equity	84.37	15.63	12.29	68.86	18.30	0.00	0.56		Value	0.13	0.21	0.03
2	AM Total Return	Income	Equity	50.98	49.03	32.09	35.65	0.00	28.23	4.03		Value	0.02	0.02	0.00
3	M Berjaya	Income	Equity	91.02	8.99	32.58	54.43	9.63	0.00	3.35		Value	0.46	0.91	0.12
4	M Investment	Income	Equity	92.21	7.79	40.65	43.82	14.25	0.00	1.29		Value	0.12	0.28	0.04
5	ASM 3	Income	Equity	58.73	41.27	13.22	45.79	10.51	25.58	4.89		Value	–0.84	–2.36**	–0.30
6	ASM 4	Income	Equity	47.94	52.06	0.00	64.05	23.98	5.04	6.92		Value	–0.82	–1.53	–0.20
7	ASM 5	Income	Equity	67.34	32.66	48.40	14.24	0.00	32.35	5.01		Growth	–0.73	–1.94*	–0.25
8	ASM 6	Income	Equity	45.92	54.08	28.03	22.21	18.68	25.19	5.90		Growth	–0.83	–2.09**	–0.27
9	ASM 7	Income	Equity	60.71	39.29	24.36	27.51	0.00	43.31	4.82		Value	–0.81	–2.55**	–0.33
10	ASM 8	Income	Equity	50.81	49.19	58.77	9.53	0.00	28.18	3.52		Growth	–0.88	–2.09**	–0.27
11	ASM 10	Income	Equity	87.28	12.72	17.88	72.90	0.00	3.71	5.50		Value	–0.69	–2.35**	–0.30
12	ASM 11	Income	Equity	69.04	30.96	19.25	63.85	0.00	11.48	5.42		Value	–0.29	–0.39	–0.05
13	ASM fpf	Income	Equity	81.99	18.01	31.35	55.43	0.00	7.92	5.30		Value	–0.57	–1.45	–0.19
14	ASM premier	Income	Equity	75.31	24.69	29.86	35.62	0.00	27.81	6.71		Value	–0.71	–2.34**	–0.30
15	ASM ptnb	Income	Equity	80.36	19.64	41.79	42.13	0.00	12.74	3.34		Value	–0.45	–1.06	–0.14
16	Mayban UT	Income	Equity	72.00	28.00	24.32	26.36	37.87	8.79	2.67		Value	–0.71	–2.77**	–0.36
17	Paciffic Premier	Income	Equity	72.35	27.65	16.11	43.92	19.68	16.27	4.03		Value	–0.36	–0.86	–0.11
18	BSN	Income	Equity	71.24	28.76	1.10	74.75	17.92	0.00	6.23		Value	–0.36	–0.54	–0.07
19	Public Savings	Income	Equity	47.78	52.22	19.82	15.01	60.91	0.00	4.26		Growth	–0.60	–1.77*	–0.23
20	Public Growth	Income	Equity	64.20	35.80	32.32	16.34	49.73	0.00	1.62		Growth	–0.67	–1.84*	–0.24
21	Public Industry	Income	Equity	49.82	50.18	6.72	36.60	50.55	1.74	4.39		Value	–0.67	–1.56	–0.20
22	Public Regular Savings	Income	Equity	43.88	56.12	32.24	2.28	64.48	0.68	0.32		Growth	–0.70	–1.92*	–0.25
23	RHB Dynamic	Income	Equity	87.83	12.17	27.71	31.29	35.78	1.99	3.24		Value	–0.22	–0.71	–0.09
24	TA Growth	Income	Equity	64.12	35.89	28.38	31.35	0.00	36.81	3.46		Value	–0.62	–1.48	–0.19
25	ASM 2	Income	Index	49.13	50.87	29.52	30.15	0.00	34.86	5.46		Value	–0.60	–1.62	–0.21
26	Public Index	Income	Index	76.93	23.07	25.58	23.49	30.08	16.61	4.24		Growth	–0.53	–1.74*	–0.23
27	ASN	Income	Federal	76.22	23.78	22.74	35.05	29.53	0.00	12.68		Value	–0.56	–1.45	–0.19
	Income Fund			67.39	32.61	25.82	37.87	18.22	13.68	4.41					
1	ASM dana Growth	Growth	Equity	59.71	40.29	28.87	24.30	41.36	0.00	5.47		Growth	–0.47	–0.99	–0.13
2	SBB Double Growth	Growth	Equity	75.72	24.28	33.39	28.59	21.46	5.60	0.96	10.00	Growth	–0.17	–0.33	–0.04
3	SSB High Growth	Growth	Equity	63.12	36.88	28.89	32.06	28.52	6.83	3.70		Value	–0.09	–0.11	–0.01
4	HLG Growth	Growth	Equity	70.92	29.08	44.87	14.60	27.03	13.24	0.26		Growth	–0.22	–0.44	–0.06
5	MBF Growth	Growth	Equity	79.85	20.15	39.89	46.36	0.00	6.76	6.99		Value	–0.26	–0.49	–0.06
6	Public Aggressive Growth	Growth	Equity	68.24	31.76	36.42	17.27	31.55	12.48	2.28		Growth	–0.52	–1.31	–0.17
7	RHB Capital	Growth	Equity	89.10	10.90	31.52	32.47	12.16	21.44	2.41		Value	–0.33	–1.08	–0.14
8	OSK–UOB Equity	Growth	Equity	79.61	20.39	47.20	16.96	0.00	35.84	0.00		Growth	–0.67	–1.35	–0.17
9	M Progress	Growth	Small Comp	78.83	21.17	25.16	37.07	34.60	0.00	3.17		Value	–0.01	–0.03	0.00
10	SBB ECO Growth	Growth	Small Comp	64.26	35.74	25.97	29.68	21.17	13.18	0.00	10.00	Value	–0.11	–0.16	–0.02
11	SBB Savings Fund	Growth	Balanced	74.27	25.73	30.68	15.72	7.39	33.88	2.33	10.00	Growth	–0.43	–1.09	–0.14
	Growth Fund			73.06	26.94	33.90	26.83	20.48	13.57	2.51	2.73				
1	Mayban Balanced	Balanced		46.12	53.88	25.39	0.00	72.99	0.00	1.62		Growth	–0.63	–2.26**	–0.29
2	MBF Balanced	Balanced		80.25	19.75	47.36	38.28	0.00	11.41	2.95		Growth	–0.34	–0.68	–0.09
3	Public Balanced	Balanced		61.10	38.90	19.53	15.84	61.15	0.00	3.47		Growth	–0.63	–2.20**	–0.28
	Balanced Fund			62.49	37.51	30.76	18.04	44.71	3.80	2.68					

Note: ***, ** and * denote level of significance at 1, 5 and 10 percent level respectively.

Table 6 Asset Class Weight, Asset Class VaR, Undiversified VaR, Diversified VaR and Measure of Difference in VaRs for Value Style and Growth Style Funds

No	Fund	MSCI Growth Asset Class Weight	MSCI Value	Cash	Govt Bonds	Corp Bonds	MSCI World	MSCI Growth VaR	MSCI Value VaR	Govt Bonds VaR	Corp Bonds VaR	MSCI World VaR	Undiversified VaR VaR (% basis) 1-month at 95% C. L.	Portfolio Stdev (% Monthly)	Diversified VaR (% basis) 1-month at 95% C. L.	Diversified VaR (% basis) 1-day at 95% C. L.	Difference UnDiv VaR-Div VaR	Measure of Difference in VaRs (%)
1	Affin Equity	12.29	68.86	18.30	0.00	0.56		2.67	16.32	0.00	0.14		19.13	11.39	18.74	4.19	0.39	2.09
2	AM Total Return	32.09	35.65	0.00	28.23	4.03		6.98	8.45	0.61	0.98		17.02	9.28	15.26	3.41	1.76	11.53
3	M Berjaya	32.58	54.43	9.63	0.00	3.35		7.09	12.90	0.00	0.82		20.80	11.91	19.59	4.38	1.21	6.18
4	M Investment	40.65	43.82	14.25	0.00	1.29		8.84	10.39	0.00	0.31		19.54	11.38	18.72	4.19	0.82	4.37
5	ASM 2	29.52	30.15	0.00	34.86	5.46		6.42	7.15	0.76	1.33		15.66	8.25	13.57	3.03	2.09	15.40
6	ASM 3	13.22	45.79	10.51	25.58	4.89		2.88	10.85	0.55	1.19		15.48	8.37	13.76	3.08	1.72	12.46
7	ASM 4	0.00	64.05	23.98	5.04	6.92		0.00	15.18	0.11	1.69		16.98	9.40	15.47	3.46	1.51	9.79
8	ASM 7	24.36	27.51	0.00	43.31	4.82		5.30	6.52	0.94	1.18		13.93	7.22	11.88	2.66	2.05	17.26
9	ASM 10	17.88	72.90	0.00	3.71	5.50		3.89	17.28	0.08	1.34		22.59	12.78	21.02	4.70	1.57	7.47
10	ASM 11	19.25	63.85	0.00	11.48	5.42		4.19	15.13	0.25	1.32		20.89	11.67	19.19	4.29	1.70	8.85
11	ASM fpf	31.35	55.43	0.00	7.92	5.30		6.82	13.14	0.17	1.29		21.42	11.96	19.68	4.40	1.74	8.85
12	ASM premier	29.86	35.62	0.00	27.81	6.71		6.49	8.44	0.60	1.64		17.18	8.51	14.00	3.13	3.17	22.64
13	ASM ptnb	41.79	42.13	0.00	12.74	3.34		9.09	9.99	0.28	0.82		20.16	10.66	17.54	3.92	2.63	14.97
14	Mayban UT	24.32	26.36	37.87	8.79	2.67		5.29	6.25	0.19	0.65		12.38	6.45	10.61	2.37	1.77	16.68
15	Paciffic Premier	16.11	43.92	19.68	16.27	4.03		3.50	10.41	0.35	0.98		15.25	7.86	12.93	2.89	2.31	17.88
16	BSN	1.10	74.75	17.92	0.00	6.23		0.24	17.72	0.00	1.52		19.47	10.31	16.95	3.79	2.52	14.88
17	Public Industry	6.72	36.60	50.55	1.74	4.39		1.46	8.67	0.04	1.07		11.24	5.77	9.48	2.12	1.76	18.56
18	RHB Dynamic	27.71	31.29	35.78	1.99	3.24		6.03	7.42	0.04	0.79		14.27	7.50	12.34	2.76	1.93	15.64
19	TA Growth	28.38	31.35	0.00	36.81	3.46		6.17	7.43	0.80	0.84		15.24	7.70	12.67	2.83	2.57	20.30
20	SSB High Growth	28.89	32.06	28.52	6.83	3.70		6.28	7.60	0.15	0.90		14.93	7.77	12.79	2.86	2.14	16.77
21	MBF Growth	39.89	46.36	0.00	6.76	6.99		8.67	10.99	0.15	1.71		21.51	11.08	18.22	4.07	3.29	18.06
22	RHB Capital	31.52	32.47	12.16	21.44	2.41		6.85	7.70	0.46	0.59		15.60	8.15	13.41	3.00	2.19	16.35
23	M Progress	25.16	37.07	34.60	0.00	3.17		5.47	8.79	0.00	0.77		15.03	7.95	13.09	2.93	1.95	14.87
24	ASN	22.74	35.05	29.53	0.00	12.68		4.95	8.31	0.00	3.09		16.35	7.76	12.77	2.86	3.57	27.99
	Value Style Funds	24.06	44.48	14.30	12.55	4.61		5.23	10.54	0.27	1.12		17.17	9.21	15.15	3.39	2.02	13.30
25	SBB ECO Growth	25.97	29.68	21.17	13.18	0.00	10.00	5.65	7.03	0.29	0.00	9.92	22.89	11.51	18.93	4.23	3.95	20.88
	Value Style Funds (Int'l)	24.13	43.91	14.57	12.58	4.43	10.00	5.25	10.40	0.27	1.07	9.92	20.03	10.36	17.04	3.81	2.98	17.09
1	Public Savings	19.82	15.01	60.91	0.00	4.26		4.31	3.56	0.00	1.04		8.91	4.45	7.32	1.64	1.58	21.64
2	Public Growth	32.32	16.34	49.73	0.00	1.62		7.03	3.87	0.00	0.40		11.30	6.07	9.98	2.23	1.32	13.18
3	Public Regular Savings	32.24	2.28	64.48	0.68	0.32		7.01	0.54	0.01	0.08		7.64	4.26	7.00	1.57	0.64	9.20
4	Public Index	25.58	23.49	30.08	16.61	4.24		5.56	5.57	0.36	1.03		12.52	6.29	10.35	2.32	2.17	20.95
5	ASM 5	48.40	14.24	0.00	32.35	5.01		10.52	3.38	0.70	1.22		15.82	7.98	13.13	2.94	2.69	20.51
6	ASM 6	28.03	22.21	18.68	25.19	5.90		6.09	5.26	0.55	1.44		13.34	6.51	10.71	2.39	2.64	24.63
7	ASM 8	58.77	9.53	0.00	28.18	3.52		12.78	2.26	0.61	0.86		16.51	8.62	14.18	3.17	2.33	16.43
8	ASM dana Growth	28.87	24.30	41.36	0.00	5.47		6.28	5.76	0.00	1.33		13.37	6.80	11.18	2.50	2.19	19.63
9	HLG Growth	44.87	14.60	27.03	13.24	0.26		9.76	3.46	0.29	0.06		13.57	7.40	12.17	2.72	1.40	11.50
10	Public Aggressive Growth	36.42	17.27	31.55	12.48	0.28		7.92	4.09	0.27	0.56		12.84	6.74	11.09	2.48	1.75	15.75
11	OSK–UOB Equity	47.20	16.96	0.00	35.84	0.00		10.26	4.02	0.78	0.00		15.06	8.05	13.25	2.96	1.81	13.70
	Growth Style Funds	36.59	16.02	29.44	14.96	2.99		7.96	3.80	0.32	0.73		12.81	6.65	10.94	2.45	1.87	17.06
12	SBB Double Growth	33.39	28.59	21.46	5.60	0.96	10.00	7.26	6.78	0.12	0.23	9.92	24.31	12.25	20.15	4.51	4.16	20.65
13	SBB Savings Fund	30.68	15.72	7.39	33.88	2.33	10.00	6.67	3.72	0.73	0.57	9.92	21.62	10.53	17.32	3.87	4.30	24.81
	Growth Style Funds (Int'l)	35.94	16.90	27.29	15.64	2.80	10.00	7.80	4.02	0.34	0.68	4.96	19.58	9.81	16.14	3.61	3.44	20.84

than undiversified VaR.

Within column 7, it can be observed that the diversified VaR of VSF is higher than diversified VaR for GSF, 15.15 percent against 10.94 percent for the latter. Adding international stocks to the portfolio increases the diversified VaR to 17.04 percent for VSF and 16.14 percent for GSF. **These facts concur with finance theory that VSF portfolio is more volatile than GSF portfolio, and adding international stocks to the portfolio increases the volatility, and hence higher VaR.**

As observed in column 8, on individual fund level, the least risky fund is Public Regular Savings followed by Public Savings fund and Public Growth fund with 1–day VaR of 1.57, 1.64 and 2.23 percent respectively. From risk manager's point of view, it can be said that there is a 5% chance in any given day, the portfolio of Public Regular Savings fund will experience a loss of 1.57 percent of its total portfolio value or more. Conversely, it can be said that there is 95 % chance that any given day the portfolio will experience a loss less than 1.57 percent of its portfolio or a gain. The low VaR for these portfolios can be explained by high asset allocation in cash or cash equivalent instruments of 64.48, 60.91 and 49.73 percent of their respective portfolios.

On the contrary, the most risky fund is ASM 10, followed by SBB Double Growth fund and ASM fpf fund with 1–day VaR of 4.70, 4.51 and 4.40 percent respectively. From risk manager's point of view, it can be said that there is a 5% chance in any given day, the portfolio of ASM 10 fund will experience a loss of 4.70 percent of its total portfolio value or more. Conversely, it can be said that there is 95 % chance that any given day the portfolio will experience a loss less than 4.70 percent of its portfolio or a gain. The high VaR for these portfolios can be explained by high asset allocation in riskier assets. For example, ASM 10 and ASM fpf have 72.90 and 55.43 percent in value stocks respectively. SBB Double Growth has 28.59 and 10 percent in value stocks and international stocks respectively.

The effect of portfolio diversification is further investigated by measuring of difference between undiversified VaR and diversified VaR. As observed in column 10, 7 out of 13 GSF versus 4 out of 25 VSF achieve around 20 percent reduction in diversified VaR. Hence, it can be concluded that GSF exhibit more portfolio diversification effect than VSF as measured by reduction in diversified VaR.

A closer examination reveals that, for GSF, with preconditions that substantial government bonds or cash (30 percent and above) and corporate bonds (4 to 7 percent) exist, the holdings of growth stocks must not be more than value stocks by 35 percent in order to achieve 20 percent reduction of diversified VaR. Examples are Public Index, Public Savings, ASM 5 and ASM 6 funds. Subsequently, adding international stocks to the above portfolio intensifies the diversification effect. Examples like

[17] Cash and cash–equivalent asset class is assumed to be risk free. Hence there is no VaR calculated for this asset class.

SBB Double Growth and SBB Savings funds. The reason being government bonds in the existing portfolio and international stocks are negatively correlated.[18]

Conversely, for VSF, with the same preconditions, the holdings of value stocks must not be more than growth stocks by 12 percent to observe the same quantum of VaR reduction. Examples are ASM premier, TA Growth and ASN funds. Again, adding international stocks to the above portfolio intensifies the diversification effect. Example is SBB Eco Growth fund. International stock is negatively correlated with government bonds in the existing portfolio.

As discussed by Jorion (2007) on the drawbacks of using delta–normal VaR approach, the first problem is the existence of fat tails in the distribution of returns on most financial assets. The second problem is that this method is inadequate for nonlinear instruments such as options and mortgages.[19] Based on the suggestion by Jorion (2007), the first problem can be overcome by using a normal distribution at the 95 confidence level. Hence, all results of this study are reported at 95 confidence level. With respect to this study, the second problem is not in existence as Malaysian Mutual funds are not permitted to do short selling and trade in derivatives.

6.0 Conclusion

Our results concur with finance theory on a few grounds. Firstly, VaR of value style funds is higher than VaR of growth style funds for both diversified and undiversified VaRs. This implies that the value stocks are riskier than growth stocks. Secondly, adding international stocks as an asset class increases the undiversified VaR for both value and growth style funds. International stocks are riskier as they are exposed to currency risk and interest rate risk. Thirdly, growth style funds exhibit more portfolio diversification effect than value style funds as measured by reduction in diversified VaR. Fourthly, adding international stocks to the portfolio intensifies the diversification effect by way of reduction in diversified VaR and finally, on individual fund level, asset allocation explains the riskiness of the portfolios. As expected, diversified VaR is lower than undiversified VaR across all portfolios in the samples.

With many uncertainties in global financial markets, investors are becoming more sensitive to financial events, especially so in the context of emerging financial market, where inflow and outflow of funds to domestic capital market are affected by happenings in other developed markets. The historical data has shown that financial crisis is contagious, and asset values of funds fluctuated during economic upturn and downturn. Hence, it is insufficient to look at the expected return without balancing the risk which can be absorbed by investors.

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[18] As shown in table 4.

[19] Refer Jorion (2007) p.262.

This study also highlights the benefits of style–based classification using MSCI style indices. The reclassification of funds to respective value and growth style has managed to mitigate one form of information asymmetries between fund managers and investors. Mutual fund objectives or self–defined fund objectives based classification is found to be inadequate with the existence of mis–classified funds based on earlier study on Malaysian mutual funds. Hence, the fund management industry should change to style–based classification in view of its benefits.

As stated by Jorion (2007), mutual fund investors expect to be compensated for taking risk in form of higher returns. The issue is to how to balance risk against expected return. Towards solving this issue, the first step is to quantify financial risk. The successful implementation of Basel II in banking and financial institutions highlights the importance of quantifying financial risk. Likewise, asset management companies should implement the good practice for the benefits of investors.

In view of the information asymmetries between fund managers and investors, there is greater responsibility of asset management companies to provide a full disclosure, if not, an up–to–date information of their asset allocation in annual reports and fund prospectuses. The spate of new funds being launched in the recent years by the Malaysian fund management industry, and the lessons from the Asian financial crisis, pose a greater need for Malaysian fund managers and the regulator –– Securities Commission (SC), likewise their counterparts in the developed markets, to place a greater focus on equity style management and risk management to benefit the unit trust investors. It certainly takes a concerted effort from all the market participants to enhance the mutual fund industry towards its long–term objectives of having 40 percent of market capitalization in Malaysian capital market by the year 2020.

(Lecturer, Faculty of Economics & Administration, University of Malaya)

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Appendix 1: List of Mutual Funds in the Sample

No.	Plan Sponsors	Fund	Launch Date	Fund Type	Units (Mil)
1	Affin Trust	Affin Equity	93.04.29	Income	300
2	ASNB	ASN	81.04.20	Federal	2500
3	Arab Malaysian	AM First	89.01.10	Income	500
4	Asia Unit Trust	M Progress	70.06.01	Small Companies	300
5	Asia Unit Trust	M Berjaya	76.05.05	Income	50
6	Asia Unit Trust	M Equity	82.02.20	Small Companies	50
7	Asia Unit Trust	M Investment	96.07.18	Income	300
8	Amanah Saham Mara	ASM 2 Index	69.02.19	Index	20
9	Amanah Saham Mara	ASM 3	69.11.01	Income	20
10	Amanah Saham Mara	ASM 4	70.02.02	Income	20
11	Amanah Saham Mara	ASM 5	71.09.03	Income	20
12	Amanah Saham Mara	ASM 6	72.05.05	Income	20
13	Amanah Saham Mara	ASM 7	72.12.28	Income	20
14	Amanah Saham Mara	ASM Growth	72.12.28	Growth	20
15	Amanah Saham Mara	ASM 8	75.07.17	Income	20
16	Amanah Saham Mara	ASM 11	79.10.28	Income	20
17	Amanah Saham Mara	ASM premier	95.06.12	Income	350
18	Amanah Saham Mara	ASM ptnb	95.08.28	Income	50
19	SBB	Double Growth	91.05.15	Growth	550
20	SBB	Emerging Companies	94.05.10	Small Companies	700
21	SBB	Savings Fund	95.08.05	Balanced	500
22	SBB	High Growth Fund	95.09.28	Growth	1000
23	HLG	HLG Growth	95.09.08	Growth	300
24	Mayban	Mayban Unit Trust	92.03.26	Income	500
25	Mayban	Mayban Balanced	94.09.19	Balanced	1000
26	MBF	MBF Balanced	91.05.01	Balanced	750
27	MBF	MBF Growth	95.06.01	Growth	300
28	Pacific Mutual	Pacific Premier	95.08.10	Income	500
29	BSN	BSN	95.01.12	Income	500
30	Public Mutual	Public Savings	81.03.29	Income	500
31	Public Mutual	Public Growth	84.12.11	Income	1000
32	Public Mutual	Public Index	92.03.02	Index	500
33	Public Mutual	Public Industry	93.11.18	Income	1000
34	Public Mutual	Public Aggressive Growth	94.04.25	Growth	500
35	Public Mutual	Public Regular Savings	94.04.25	Income	1500
36	Public Mutual	Public Balanced	92.09.15	Balanced	1000
37	RHB	RHB Dynamic	92.09.15	Income	750
38	RHB	RHB Capital	95.04.12	Growth	500
39	SBB	Premium Capital	95.08.01	Income	500
40	OSK–UOB	OSK–UOB Equity	96.08.08	Growth	750
41	TA Unit Trust	TA Growth	96.07.01	Income	350

Source: FMUTM. Available from http://www.fmutm.com.my [cited 5 March 2004]