The Indonesian Capital Market Review

Volume 2
Number 2 *July*

Article 5

7-30-2010

# Style Analysis: Asset Allocation & Performance Evaluation of Indonesian Equity Funds, April 2004 – March 2009

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INDONESIAN
CAPITAL MARKET REVIEW

# Style Analysis: Asset Allocation & Performance Evaluation of Indonesian Equity Funds, April 2004 – March 2009

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*This paper explores investment styles and risk exposures of mutual funds in Indonesia using Sharpe's return-based style analysis, a quadratic optimization of an asset class factor model, proposed by William F. Sharpe in 1992. The research observes nine sectoral asset class indexes and fifteen survivor Indonesian equity funds within April 2004 - March 2009. The results suggest that the infrastructure sector has the biggest exposure on average. This study also measures the relative performance of the funds with respect to their style benchmarks. The results indicate that the nine funds have been able to beat their style benchmarks on average. From all funds, Fortis Ekuitas is the best fund based on its average monthly selection return.*

***Keywords:*** *style analysis, mutual funds, index, portfolio management, performance evaluation*

## Introduction

This study centers on another alternative investment vehicle: using a professional money manager. The efficient market studies indicate that few individual investors outperform the aggregate market average. This makes professionally managed investments a potentially appealing alternative for several reasons, including the additional services they provide, the cost-effective way to choose among a wide variety of diversified portfolios in various risk-return characters, and its liquidity of the instrument. While investors can purchase any of the instruments such as stocks, bonds, or derivatives, they can instead choose to invest indirectly by purchasing the shares of investment companies in for of mutual funds. Mutual fund products hold a portfolio of security, usually in line with a stated policy and objective, from only a small set of securities to broad classes of securities (Gruber, 2007).

Mutual funds come in two flavors: open-end funds and closed-end funds. Open-end funds are purchased/sold directly from/to mutual fund. They are purchased/sold at the value of net assets standing behind each share, where the net asset value

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is determined once a day, at a stated time. While closed-end investments trade on the regular secondary market, and the market price of its shares is determined by supply and demand. No new investments available for the investment company unless it makes another public sale of securities. Similarly, no funds can be withdrawn unless the investment company decides to repurchase its stocks. The approriate way to value a client's investment, especially for open-end funds, is to multiply the number of shares in the fund a investor owns by the per-share value of the entire security fund (Reilly, 2006). This is known as the Net-Asset Value (NAV) of the investment fund. It equals the total market value of all firm's assets divided by the total number of fund shares outstanding, or

$$\textit{Fund NAV} = \frac{\textit{(Total Market Value of Fund Portfolio)} - \textit{(Fund Expenses)}}{\textit{(Total Fund Shares Outstanding)}} \quad (1.1)$$

Analogous to the share price of a corporation's common stock, the NAV of the fund shares will increase/decrease when the value of its underlying assets increases/decreases.

Mutual funds industry is growing sharply in emerging countries. In Indonesia, mutual funds are expanding as popular investment alternative with high growth from year to year. The first product was introduced in 1977 in the form of closed-end fund. The industry started to grow when four open-end funds were launched in 1996 with total managed funds of IDR 2,78 trilion. A year later in 1997, Indonesia has 76 mutual funds and total managed funds of IDR 8,3 trilion. Mutual funds keep increasing to 246 products and 299.063 investors compared to 2441 investor back in 1996. The industry achieved its peak in the beginning of 2005 when NAV reached IDR 110 trilions. However, it dropped to IDR 27 trilions in the end of 2005 due to higher rate of inflation, interest rate and foreign exchange in the national market at that time. For the next two years, domestic mutual funds recovered with the help of relatively stable economic condition, the increasing number of funds agents, and innovation in electronic banking. *Badan Pengawas Pasar Modal* (Bapepam), The Indonesia Capital Market Regulatory, reported that total managed funds had increased to IDR 92,19 in the end of 2007. The market once again became bearish when financial crisis hit most countries in 2008. The negative sentiments in Indonesia, resulted from global crisis, affected the amount of managed investments to decrease to IDR 73,35 trilions in December 2008. The industry of mutual funds is expected to recover in 2009.

In Indonesia, mutual funds are classified into four categories: 1) Money Market funds; 2) Fixed Income Funds; 3) Equity Funds; 4) Discretionary Funds, and; 5) Capital Protected Funds. Money market funds invest mostly in the money market, while fixed income funds invest primarily in selected fixed income instruments. Equity funds allocate investments at least 80% in the equity market. Discretionary funds, also known as balanced funds, focus on both equity and fixed income instruments with balanced proportion on its portfolio. Capital protective fund is relatively new in Indonesia. It protects the beginning value of investment to be equal with its maturity date value. The time of profit sharing establishment is based on agreement between client and fund manager. Among all type of funds, money market fund has the lowest risk and return characteristics. Equity funds tends to provide the highest return with the highest risk level. In 2008, Bapepam reported that there were 213 mutual fund products that consist of 83 conventional funds and 130 protected funds. The total number of investment

management companies had increased from 30 companies in 1996 to 94 companies in 2008.

It is important for such prospects and investors to understand the performance of equity mutual funds managers in terms of return and risk. Measuring stock mutual funds ability in outperforming the market often uses several common methods which are Sharpe ratio, Treynor ratio, and Jensen's alpha. Furthermore, another approach, named style analysis, has been widely agreed as a valuable exercise in measuring the funds performance. Introduced by William F. Sharpe in 1992, style analysis recognizes the superior portfolios from its asset allocation and investment style. Furthermore, style analysis provides a method to identify and describe the characteristics of an investment portfolio. Style analysis has now become popular in investment industry. Many portfolio managers utilize websites that help investors identify their style and stock selection performance. Style analysis might reveal that one portfolio invests in large-cap stocks, while another invests in small-cap stocks. Individual investors use style to understand what types of investments they are buying and how they fit into existing portfolios. In other words, style analysis is a valuable tool to match the portfolio's risk-return characteristics with their tastes and risk preferences. Financial advisors, invesment managers, academics among others use style analysis to purchase, classify, or construct managed funds to monitor them for style drift (Kaplan, 2003). Style analysis also constructs the most effective asset mix, which fits the investor's needs, as a benchmark in evaluating performance of a mutual fund.

The purpose of this paper is to implement style analysis using equity funds in Indonesia through three steps: determining fund exposures, examining style consistency over time using the *rolling window* technique, and evaluating funds performance from style perspective. The study is organized as follows. Section 1 provides a brief overview of Indonesian mutual funds and style analysis. Section 2 reviews the underlying theory behind return-based style analysis. Section 3 contains past literatures relate to style analysis. Section 4 describes the data used in this paper. Section 6 examines the empirical results from style regressing to performance measurements. Section 7 concludes.

# Literature Review

Style analysis is an attempt to explain the variability in the observed returns to a security portfolio in terms of the movements in the returns to a series of benchmark portfolios designed to capture the essence of a particularly security characteristic such as size, value, and growth (Reilly, 2006). It has two types, holding-based and return-based. Holding-based style tools classify portfolios based on the characteristics of the underlying securities. Some of the common characteristics used in such comparisons include: market cap, book-to-market ratio, historical earnings growth rate, dividend yield, duration, rating, etc. In contrast, return-based style analysis compares the portfolio's total returns (usually three to five years of monthly returns) to the total returns style-based indexes and makes inferences about style based on how closely the portfolio returns resemble those of different indexes. Return-based style analysis has been widely used among financial professionals, because the input data (monthly returns) is readily available. While holding-based style analysis has been well received in concept but difficult to apply, because fewer people have access to data on portfolio holdings.

Return-based style analysis provides a way of identifying the asset mix style of the fund manager and comparing it with

the asset mix style of the performance benchmark. It is widely agreed that asset allocation accounts for a large part of the variability in the return on a typical investor's portfolio. This is especially true if the overall portfolio is invested in multiple funds, each including a number of securities. Asset allocation is generally as the allocation of an investor's portfolio among a number of major class assets (Sharpe, 1992). Until now, the finance study has dealt with performance attribution and style analysis for traditional buy-and-hold strategies, associating *style* with *asset class mixes* and *skill* with *security selection*. Jensen (1968) implemented the style or skill decomposition by regressing a stock mutual fund's returns ($R_t$) on the market return ($R_{mt}$) and a risk-free return ($R_{ft}$):

$$R_t = \alpha + \beta R_{mt} + (1-\beta) R_{ft} + e_t \qquad (2.1)$$

The β coefficients provide the proportions of risky and risk-free assets to replicate the fund's returns. The constant term (α) measures the manager's ability to generate returns beyond this static mix of assets. In this decomposition, $[\beta R_{mt} + (1-\beta) R_{ft}]$ is *style* $[\alpha + e_t]$ is *skill*. Sharpe (1992) extended this single factor framework to a multiple factor model, with industry factors or economy wide-pervasive factors as independent variables such as class asset returns, and showed that only a limited number of major class asset classes required to successfully replicate the performance of an extensive universe of U.S mutual funds. Fung and Hsieh (1998) found that the success of Sharpe's approach is due to the fact that most mutual fund managers are typically constrained to buying and holding assets in a well-defined number of asset classes and are frequently limited to little or no leverage. As developed by Sharpe (1992), the model is written as follow.

$$\widetilde{R}_{i,t} = [b_{it}F_1 + b_{i2}\widetilde{F}_2 + \ldots + b_{in}\widetilde{F}_n]\widetilde{e}_i \quad n=1,2,3, \ldots, N \qquad (2.2)$$

Where $R_{i,t}$ is the return (usually monthly) on security $i$ in period $t$; $\widetilde{F}_1$ represents the value of factor 1; $\widetilde{F}_2$ the value of factor 2; $\widetilde{F}_n$ the value of the $n$th factor/index (also monthly) and $\widetilde{e}_i$ is the nonfactor component of the return. The coefficients $b_{i1}$, $b_{12}$, ...$b_{in}$ represent the exposure of the security $i$ to the different set of industry and economy-wide pervasive factors in the relevant period, referred to as style asset class exposures. The sum of the terms in the square brackets is that part of the managed portfolio return that can be explained by its exposure to the different style benchmarks and is termed the *style* of the manager. The residual component of the portfolio return, $\widetilde{e}_i$, called the fund's "tracking error", reflects the manager decision to deviate from the benchmark composition within each style benchmark asset class. Under the assumption that the residual $\widetilde{e}_i$ terms are uncorrelated. Dor and Jagannathan (2003) wrote that Sharpe's return-based style analysis can be a considered a special case of the generic factor model or least square estimation. In return-based style analysis, the performance of a managed portfolio over a specified time period is replicated as best as possible by the return on a passively managed portfolio of style benchmark index portfolio. The two important differences when compared to factor models are: (i) Every factor is a return on a particular style benchmark index portfolio, and (ii) the weights assigned to the factors sum to unity. The primary function of return-based style analysis is to determine fund exposures. According to Sharpe (1988), the exposures of a fund to the various asset classes are, in turn, a function of: 1) the amounts that the fund has invested in various securities, and 2) the exposures of the securities to the class assets.

The style model has three requirements to be applied in practice. The asset classes must be: 1) *mutually exclusive*, no security should be included in more than one asset

class; 2) *exhaustive*, each should represent a market-capitalization weighted portfolio of securities, and; 3) *have returns that "differ"*, the asset class returns either have low correlations with one another, or, in which correlations are high, different standard deviations. However, in order to get coefficients' estimates that closely reflects the fund's actual investment policy, it is important to incorporate restrictions on the style benchmark weights. The following two restrictions are:

$$0 \geq b_{ij} \geq 0 \text{ for each i} \quad (2.3)$$
$$b_{i1} + b_{i2} + .... + b_{in} = 1 \quad (2.4)$$

The first restriction corresponds to the constraint that the fund manager is not allowed to take short positions in securities. The no-short-sale restriction is standard for pension funds and mutual funds. The second restriction imposes the requirement to approximate the managed fund return as closely as possible by the return on a portfolio of passive style benchmark indexes. The presence of this constraint is required to measure weight or exposure reflected by its slope coefficients of each asset class. For this analysis, the condition of inequality contraints in **(2.3)** required the use of a quadratic programming algorithm. Based on the conditions, De Roon, Nijman, and ter Horst (2004) classified style analysis into three types. The constrains are imposed on factor loadings will be referred to as *weak* style analysis. The case where only the portfolio constraint is imposed will be referred to as *semi-strong* style analysis and the case where both portfolio and the positivity constraints are imposed, will be referred to as *strong* style analysis, or style analysis as proposed by Sharpe.

The decomposition of a managed portfolio return into two components, *style* and *selection*, provides a natural distinction between "active" and "passive" managers (Dor and Jagannathan, 2002). "Passively managed" funds do not buy and sell securities based on research and analysis; rather, the fund's assets are simply deployed among different asset classes. As a result, the $\tilde{e}_i$ value will be closer to zero for passively managed funds compared to actively managed funds. The goal of passive strategy is to minimize this $\tilde{e}_i$ value, the difference between the fund return and a passive portfolio with the same style (replication). In contrast, an "active' manager is looking for ways to improve performance by investing in asset classes as well as individual securities within each asset classes that he/she considers undervalued. The manager will therefore deviate from the style of the performance index and select individual secuirities within each style benchmark asset class that she considers as being good buys. Hence he/she will typically have different exposure to the style benchmark asset classes when compared to his/her performance benchmark. The holding portfolio of securities will also be different within each style benchmark asset class that fall outside the range of asset classes spanned by the style benchmarks. As a result, the benchmark will have a lower explanatory power and the residual terms $\tilde{e}_i$ will be larger in absolute value for the managed funds when compared to their respective performance benchmarks. Thus, a passive fund manager provides an investor with an investment *style*, while an active manager provides both *style* and *selection*.

An useful measure for identifying "active" managers from "passive" managers is $R^2$, a proportion of the variance "explained" by the selected style benchmark asset. $R^2$ is defined as:

$$R^2 = 1 - \frac{Var(\tilde{e}_i)}{Var(\tilde{R}_i)} \quad (2.5)$$

The right side of (2.5) equals 1 minus the proportion of variance "unexplained". The resulting $R^2$ value thus indicates the

proportion of the variance of the variance of the $\widetilde{R}_i$ "explained" by the *n* asset classes. A higher $R^2$ implies that the management tends to use passive strategy. It also suggests that the technique is better to explain the long-term return behavior of the fund. On the opposite, a low value of $R^2$ is an indicator of "active" management. Style consistency could also be examined from $R^2$. Recall that the style identified solely from a regression is, in a sense, an average of potentially changing styles over the period covered, a fund's style might change substantially over time. For that purpose, a technique known as *rolling window* is conducted to show the changes in a mutual fund's style by graphing the output from a series of rolling period regressions. We define rolling window methodology as a series of style analyses, using a fixed number of months for each analysis, rolling the time period used for the analysis through time. A relatively unstable style graph could indicate inadequate benchmarks or market timing/sector rotation. In the latter case, the fund manager may be switching in and out of asset classes or sectors, with the result that the customized benchmark that best explains the fund's return changers from time to time. Rolling window could examine whether a low $R^2$ coupled with large variation in style is due to active management or ill-specified benchmarks. The method compares the average $R^2$ for the period covered, with the series of $R^2$ that result from the rolling window technique. If the series of $R^2$ are low as well, it indicates that active management is likely to be the case, on the other hand, the individual $R^2$ is higher than the over-all period $R^2$, then some benchmarks are probably ill-specified. The low $R^2$ is always not a result of a highly "active management" strategy, but merely a manifestation of inadequate benchmarks.

Another purpose of style analysis is to evaluate funds performance. The estimated style model of the fund could then be used as a benchmark to evaluate the actual fund performance. The return obtained by a fund each month can be compared with the return on a mix of asset classes with the same estimated style, where the style is estimated prior to month in question. Rearranging equation (2.2)

$$\widetilde{e}_i = R_i - R_b \tag{2.6}$$

$$\widetilde{e}_i = R_i - [b_{i1}\widetilde{F}_1 + b_{i2}\widetilde{F}_2 + \ldots + b_{in}\widetilde{F}_n] \tag{2.7}$$

$R_i$ is the actual fund return, while $R_b$ is the benchmark return. The term on the left on (2.7), named *selection return*, can be intepreted as the difference between the retun on the fund (the first term on the right) and the return of a passive mix with the same style (shown by sum of the terms in the brackets). As stated by Sharpe (1992), a benchmark portfolio should be: 1) a viable alternative, 2) not easily beaten, 3) low in cost, and 4) identifiable before the fact. The style benchmark is relative, not absolute, so that every fund has its own benchmark. The fund performance is superior when it could beat its style benchmark indicated by its positive selection return value. Note that the $\widetilde{e}_i$ value as selection return differs from the use of $\widetilde{e}_i$ values obtained as byproducts of a style analysis, since the latter are in-sample, not out-of-sample values.

For multiple-manager portfolios, one advantage of style analysis is that the manager could interpret every exposure coefficient of the asset class as the optimal weight for every asset class to create a combination that will provide the best return of the fund. The mix constructed from style model called *the effective asset mix.* Sharpe defines the "effective asset mix" as the style of the investor's overall portfolio or pension fund overall assets. The effective asset mix represents the style of the investors overall portfolio. Once the style of the individual mutual funds have been estimated, it is quite straightforward to determine the corresponding effective asset

https://scholarhub.ui.ac.id/icmr/vol2/iss2/5
DOI: 10.21002/icmr.v2i2.3664

mix. Letting $\omega_i$ represent the proportion of the investor's portfolio invested in fund *i*, overall portfolio return $R_p$ will be:

$$\tilde{R}_{p,t}=[\omega_{1,p}x_{1,t}+\omega_{2,p}x_{2,t}+ ... +\omega_{n,p}x_{n,t}]+\tilde{e}_{t,p} \quad (2.8)$$

$$t = 1, 2, 3, ..., T$$

where $\omega_{1,p}$, $\omega_{2,p}$, ..., $\omega_{n,p}$ can be defined as the fund or investor's portfolio overall exposure to each style benchmark asset class. By comparing (2.8) and (2.2), $b_{i1}$ is simply a value-weighted average of the exposures of the component funds to the asset class in question, with the relative amounts invested in the funds used as weights. Diversification accross funds will greatly reduce the variance of the non-factor component and thus increase the portion of variance attributable to asset allocation. Though style analysis become popular because its ease to be applied, the common drawback lies in the selection of appropriate style benchmark asset classes to use. Benchmarks that are not mutually exclusive might cause the factor weightings to oscillate between the correalted asset classes. If the set of benchmarks is incomplete or not exhaustive or ineadequate, the optimization algorithm will have trouble pinning down a benchmark that consistenly explains the fund's behavior from period to period. The number of asset classes used in the model represents a trade-off. The use of a larger number of benchmarks has the potential of introducing more "noise" into the analysis. This problem is especially acute, since there's no easily available statistical procedure for assesing the significance of the exposure coefficients. Another drawback arises in interpreting $R^2$ that the low $R^2$ is not always a result of an active management strategy, but might be result of improper or inadequate benchmarks.

Sharpe first introduced style analysis in 1992. He developed the return-based style analysis model and estimated the investment style of *Trusstee's Commingfield-U.S. Portfolio*, *Fidelity Magellan Fund,* 4 *utility funds,* 161 *growth equity funds,* 118 *growth and income equity funds*, 34 *small stock funds,* 19 *balanced funds*, 54 *bond high-quality funds*, and 5 *convertible bond funds* by using twelve asset classes model. By using monthly return inputs, he examined that most of funds in America invests primarily in large cap stocks, both in growth stock type and value stock type during January 1985-December 1989.

Fung and Hsieh (1998) analyzed investment styles both in mutual funds and hedge funds. The results supported Sharpe's research that the funds invest primarily in large cap stock. Critics about style analyis method came from Runkle, Buetow and R Johnson (2000) about the inconsistency of return-based style analysis. They argued that return-based style analysis may lead to an extreme multicollinearity due to its dependence on the choice of class asset framework. To avoid volatility, they recommended that the selected indexes must be specific to use in every style analysis.

Stanley Atkinson and Choi (2001) investigated Sharpe's investment style model of managed portfolio in terms of asset allocation (style) and style drift, using The Microsoft Excel™ Solver™ function with 3 year observations from January 1994-December 1996. Ibbotson and Patel (2002) suggested that the phenomenon of persictence in mutual fund performance does exist in domestic equity funds, even after adjusment for the style of the fund. Style-adjusted alpha were evaluated on both an absolute and relative basis. The highest persistence was exhibited by funds whose alpha were greater than 10% and also by funds whose alpha ranked in the top 5% of the sample used.

De Roon, Nijman and Horst (2004) evaluated the application or return-based style analysis. They concluded that, first,

style analysis might be used to estimate the relevant factor exposures of a fund. They used a simple simulation experiment to show that imposing portfolio and positivity constraints in style analysis leads to significant efficiency gains if the factor loadings are indeed positively weighted portfolios, in particular when the factors have low cross-correlations. Second, style analysis might be used in performance measurement. If the actual factor exposures are a positively weighted portfolio and if the risk-free rate is one of the benchmarks, then the intercept coincides with the Jensen measure. Third, style estimates might be compared with actual portfolio holdings. They showed that the actual portfolio holdings will in general not reveal the actual investment style ofa fund because of cross exposures between the asset classes and because fund managers might hold securities that on average do not have a beta of one relative to their own asset class. Although return-based style analysis is less suitable to predict future portfolio holdings, their empirical analysis suggests that it performs better than holding-based style analysis in predicting future fund returns.

Kaplan (2003) compared holding-based and return-based style analysis. He revealed that return-based style analysis can be used to validate the completeness and accuracy of reported portfolio holdings. If the return-based analysis is considerably different than the holdings-based analysis, it may indicate that the portfolio manager is not disclosing all of his/her holdings. Moreover, return-based style analysis is dependent on the choice of benchmark indexes. Holding-based style analysis is dependent on the choice of style framework. The study concluded that holding-based style analysis generally produces more accurate results than return-based style analysis. However, in certain circumstances, return-based style analysis can be used to estimate investment style. He argued that ideally, practitioners should use both approaches. Return-based models can often be more widely applied while holding-based models allow for deeper style analysis.

Style analysis study has been applied in many countries. Liodakis and Levis (1999) applied Sharpe's style analysis in England. They found that the funds circulated in England have the biggest exposure in large cap stocks. Ferruz and Vincente (2005) analyzed the fund styles in Spanish and explained that the best style analysis in Spanish does not include exhaustive benchmarks, as Sharpe (1992) proposed, but rather it is the model that identifies the fund's investment vocation that is much more significant in statistic terms to avoid as far as possible the presence of significant linearity between the representative benchmarks for those assets. The most effective style model itself includes only investment in Spanish stocks and money market assets. The application of their models added a prior analysis of multicollinearity in the benchmarks, consists of calculation of Pearson's correlation coefficients for the benchmarks considered, and calculation of Variance Inflation Factors (VIF), which reflect the degree to which the benchmarks considered contributes to the multicollinearity of the model, and calculation of the statistical term proposed by Farrar and Glauber (1967) to identify the possible existence of multicollinearity between the variables proposed in a general linear model. In Indonesia, Surachmat (2002) analysed investment patterns for Indonesian equity funds from sector perspective. He recognized that most equity funds in Indonesia primarily invest in consumer goods sector during period September 1998 - February 2001. Years later, Saputra (2006) measured the fund's styles from different perspective by using LQ45 index as active large stock class and constructing several self-made indexes under certain

assumptions, named non-LQ45s, referred to medium cap and small cap. He determined the funds has large exposure to large stocks represented by LQ45 index from January 2000-May 2005.

# Methodology

### Data Description

The sample used in the study comprises the monthly NAV returns of Indonesian mutual funds holding domestic equities as the prime component of portfolios during April 2004 to March 2009. There are total of 15 survivor equity funds and 60 monthly returns data for each one. Table 1 provides the profile of the funds. As domestic equity funds are not allowed to invest in any instruments outside equities, we use only equity indexes (bond indexes and foreign indexes are not required). The monthly return of asset classes in this study is not represented by a market capitalization weighted index of the returns. Unlike U.S, Indonesia has only two indexes based on market capitalization, the blue chips value index and the growth stocks value index, which are insufficient to implement. Instead, we obtain a set of sectoral indexes built by JASICA (*Jakarta Industrial Classification*) Indonesia Stock Exchange. The composite index is divided into nine industrial indexes, which are: 1) Agriculture; 2) Mining; 3) Basic Industry and Che micals; 4) Miscellaneous Industry; 5) Consumer Goods; 6) Property and Real Estate; 7) Infrastructure, Utilities, and Transportation; 8) Finance; and 9) Trade, Services, and Investment. Table 2 describes the asset classes. The model includes Bills (Cash equivalent with less than a year to maturity), in Indonesia known as 1-month SBI rate (*Sertifikat Bank Indonesia*), since Indonesian common equity funds also has a minor investment in money market.

### Return-based Style Analysis Model

First, we measure fund exposures and determine asset allocations. We implement the ten asset class model consists of nine sectoral indexes and SBI rate/Bills. The purpose is to identify the sector to which the average equity funds primarily allocate and also the sector in which the average funds ignore. We also estimate the style of each fund. The factors represent independent variables of the model. The benchmarks are mutually exclusive and exhaustive. Next, we use the constrained regression and quadratic programming by using Excel Solver for asset allocation/ fund style, and then compare the results. The sectoral model is written as follow:

$$\widetilde{R}_i = [b_{i1}\widetilde{F}_1 + b_{i2}\widetilde{F}_2 + b_{i3}\widetilde{F}_3 + b_{i4}\widetilde{F}_4 + b_{i5}\widetilde{F}_5 + b_{i6}\widetilde{F}_6 + b_{i7}\widetilde{F}_7 + b_{i8}\widetilde{F}_8 + b_{i9}\widetilde{F}_9 + b_{i10}\widetilde{F}_{10}] + \widetilde{e}_i \qquad (2.9)$$

where $\widetilde{R}_i$ is the return on the fund $i$, $\widetilde{F}_i$ is agriculture index, $b_{i1}$ is the exposure to agriculture index, $\widetilde{F}_i$ is the mining index, $b_{i2}$ is the exposure to mining, and so on, with constraints that all the factor sensitivities are non-negative and lie between zero and one ($0 \leq b_{ij} \leq 1$) and add up to one ($\Sigma b_{ij}=1$). The definition of the independent variables is shown in Table 2. The style analysis results provide coefficients to a constrained regression that can be interpreted as style weights. The portfolio of indices, weighted by their style weights, represent a reasonable passive alternative to the fund's active management that provides the same exposure to the chosen asset classes (Ibbotson, 2002).

Second, we analyse style drifts recall that style identified in the model is an overall style that potentially changes during 60 months. As a fund's style may change over time, rolling 30-month periods are used to determine the customized benchmark for each period. We measure

30 style regressions from October 2006 to March 2009. The fund style in October 2006 is obtained from April 2004-September 2006 regression (30 months prior), style in November 2006 is obtained from May 2004-October 2006 observation, and so on. The $R^2$ obtained from both average style and rolling window can identify whether the low $R^2$ management following an active strategy or a result of improper benchmark measure.

Finally, we implement performance evaluation of equity by this return-based style analysis approach. The style model represents the fund's investment pattern so that it is defined as benchmark portfolio with passive mix. The fund performance is evaluated by comparing the actual fund return with the return obtained from benchmark portfolio. The result of this difference named *selection return*. Assumed that the active manager declares the fund style at the beginning of each period and is engaged only in picking undervalued securities within each style benchmark asset class; and that the style benchmark is a more approriate benchmark for measuring performance than the commonly used composite index. The following steps for each month *t* are:

1. The fund's style is estimated, using NAV returns from month *t-30* through *t-1* (same with rolling window). The length of the estimation period tries to balance between opposing issues. A longer estimation period reduces "noise" and provide a more accuracy of the fund's style exposure. However, for active manager who dynamically rotate among several class assets, a longer estimation periode will not produces accurate estimates.
2. The return on the resulting style (using the coefficients estimated in step 1) is calculated for the month *t*.
3. The difference between actual NAV return in month *t* and that of the style benchmark determined in the previous steps is computed based on equation (2.7). This difference is defined as the fund's selection return for t. The greater average monthly selection return value, the better the fund in outperforming its style.
4. Signifficancy test. The *t* value computed from $t = \frac{\tilde{e}}{\sigma_e / \sqrt{n}}$ (2.10), $\sigma_e$ represent residual for standard deviation and *n* represents the total observations, is compared to *t* value from distribution table with confidence level of 95%.

## Results and Discussion

Table 3 and Table 4 portray the statistic desriptive of the sectoral class assets and the fund sample returns. Table 5 describes the estimated factor loadings from the quadratic programming of the constrained regression analysis by the Solver function for the fifteen mutual funds. These factor loadings represent the exposures of a fund to the asset classes, which are a function of the amounts that the fund has invested in various sectors and the exposures of the sectors to the class assets. Every fund has different exposures caused by such diffrences such as manager's market perception difference, industry characteristics, risk tolerance level, manager's stock picking ability, and manager's ability to adapt and anticipate market changes.

From Figure 1, we can conclude that infrastructure sector has the biggest exposure on average funds with proportion about 22% during observations. Eight funds, which are Fortis, Master, Mawar, TRIM, Phinisi, Rencana Cerdas, Schroder, and Si Dana Saham concentrate their holding primarily in this sector during April 2004-March 2009. This sector also the second largest exposure to three funds, which are Bahana, BNI, and Manulife. Many funds tend to invest in infrastructure

stocks due to its low sensitivity to foreign exposures. The sector's resistance from crisis relates to its importance as basic domestic needs in emerging countries, including Indonesia. It means, in any market conditions, the demands of infrastructure are relatively stable in addition to government's support. Basic industry takes the second most influential sector with 13.71% proportion on average. Similar to infrastructure, basic industry companies in Indonesia are relatively resistent within bearish maket condition. They typically manage their raw materials, productions, and customer networks in domestic basis so they have less foreign exchange exposures.

Consumer goods, as well as property and agriculture, provide the lowest exposures on average funds. Six funds, which are Dana Sentosa, TRIM, Nikko, Rencana Cerdas, dan Platinum, have no exposures on consumer goods, while three other funds have less than 1% exposures. This sector doesn't attract many funds probably due to its low monthly return as computed on descriptive statictics Table 3. Other sectors such as Agriculture, Property, and Trade & Service are relatively vulnerable to foreign exhange risk due to their dependence on import and other foreign transactions so that they suffer major decline in growth when global financial crisis hit in 2008. Also from Table 3, we can see that SBI rate has average exposure 4.9%, to which six funds have no exposures during obeservations. The presence of this Bills/SBI rate exposure probably results from the actual cash holdings that such funds maintain to meet liquidity needs. Note the choice to expose some of the portfolio to these asset classes should be attributed to the investor. Results (good or bad) associated with such the choice of a style should be attributed to the investor, not to the manager of a fund following that style (Sharpe,1992). For example, an investor choosing BNI Berkembang could and should have known that its style flavored trade and service stocks.

Figure 2 shows overall $R^2$ value for each fund. During the period, almost 90% of the monthly variation in return of average equity funds can be attributed to its style. There are eight funds whose style accounts for approximately more than 90% of the monthly variation in returns. Higher $R^2$ from the funds are more diversified (and/or engaged in less rotation). Four funds have lower R-Squared between 85% - 80%. And there are three funds whose R-squared value is slightly lower (below 85%) than for the other diversified funds, perhaps reflecting fund managers moderately follow active strategy. Month-to-month deviations of the fund's return from that of style itself can arise from selection of specific securities within one or more asset classes, rotation among asset classes, or both security selections and asset class rotations.

Figure 3 portrays the style evolution of the fifteen funds, using a 30-month rolling window between April 2004 - March 2009. The point far left of each diagram represents the fund style when the thirty months ending in September 2006 are analyzed. The ability of return-based style analysis to capture changes in investment style over different time horizons in one of its key advantages. From rolling window, we identify in general there are two major style drift throughout period analyzed. The first occured in October - November 2007 when invesments on property stocks have a major loss. And the second occured in July - August 2008 when emphasis on finance stocks decrease sharply on all funds. The drifts cause all funds style does not remain constant during 60 months. Figure 3 also suggests that most of the funds progressively increased or kept its emphasis on the sectors which has low sensitivity to global financial crisis such as infrastructure stocks and basic industry stocks. In crisis period, they tend to decrease their exposures to finance stocks,

property stocks, consumer goods stocks and trade and service stocks due to their high sensitivity toward crisis. Agriculture, mining, and miscellanous industry stocks tend to do minor changes. **Table 6** provide $R^2$ series obtained from rolling window. In general, the funds' $R^2$ series display stable movements, except BNI Berkembang and TRIM Kapital. Their $R^2$ keep increasing over time. Those two funds appeared to follow a moderately active strategy during bullish period until global financial crisis period began in mid 2008. The relatively low $R^2$ obtained using style benchmarks for Nikko Saham Nusantara might indicate that the fund may be pursuing a relatively more active stock selection strategy within each style asset class. Such violations can be detected through rolling window. Dana Sentosa and Nikko Saham Nusantara appeared to invest more than 20% in 1-month SBI which violate one of domestic fund rules.

Table 7 presents the average monthly selection fund return gained from return difference between the actual fund and a portfolio with the same estimated style. In addition to Table 7, Figure 4 exhibits the cumulative sum of the monthly selection return from October 2006 through March 2009 for every funds. In such a graph, increases result from positive selection returns and decreases from the negative ones. From the table summary, there are nine funds outperformed its style benchmarks. The nine funds are Fortis Ekuitas, Manulife Dana Saham, Master Dinamis, Mawar Danareksa, TRIM Kapital, Panin Dana Maksima, Phinisi Dana Saham, Rencana Saham, and Schroder Dana Prestasi Plus, reflecting most fund managers able to anticipate market changes. The best fund outperformed its style benchmark is Fortis Ekuitas by monthly selection return 0.793% per month, with cumulative amount over 23.79% and a standard deviation 0.059% respectively. The t-statistic associated with the mean difference, was, however, small in absolute value for all superior funds, suggesting that the average difference was not statistically different from zero. Though the difference is statistically insignificant, the value is *economically* significant. The six funds are Bahana Dana Prima, BNI Berkembang, Dana Sentosa, Nikko Saham Nusantara, Si Dana Saham, and Platinum Saham. The most underperformed fund is Dana Sentosa by monthly return -1.324%, with cumulative return -39.72% and a standard deviation 0.218% respectively. From the six funds, only BNI Berkembang showing its return difference was statistically different from zero. The nine superior funds are able to beat their style benchmarks due to their tendency to increase their allocations on infrastructure and basic industry stocks when market went bearish. While the six underperformed typically keep their holdings in high sensitive sectors (i.e. property, trade and service stocks) when global financial crisis occured.

# Conclusion

This paper explores investment styles and performance evaluation of mutual funds in Indonesia using Sharpe's return-based style analysis. The result suggests infrastructure sector has the biggest exposure on average funds with proportion about 22%. Eight funds concentrate their holdings primarily in infrastructure. From rolling window, we identify generally there are two major style drift throughout observed period. The first occured in October - November 2007. At that time, invesments on property stocks decreased sharply. And the second drift occured in July-August 2008, when all funds reduced their emphasis on finance stocks. From performance measurements, nine funds are able outperforming its style benchmarks. The best outperforming fund is Fortis

Ekuitas by monthly selection return 0.793% per month. The t-statistic associated with the mean difference, was, however, small in absolute value for the fund, indicates that the average difference was not statistically different from zero.

## References

Amenc, N., Sfeir, D. And Martellini, L. (2002), *An Integrated Framework for Style Analysis and Performance Measurement* , EDHEC Risk and Asset Management Research Centre, France.

Atkinson, S.M and Choi, Y. K. (2001), Investment Style of Portfolio Management: Excel Applications. *Journal of Applied Finance,* 2001, pp 61-69.

Ben Dor, A. and Jagannathan, R. (2003), *Style Analysis: Asset Allocation and Performance Measurement*, New York: John-Wiley & Sons. Inc.

Bodie, Z., A. Kane, and Marcus, A.J. (2008), *Investments*, 7th ed. McGraw-Hill.

Bogle, J. C. (1998), The Implications of Style Analysis for Mutual Fund Performance Evaluation, *Journal of Portfolio Management,* 4(4), 33-42.

Brooks, C. (2006), *Introductory Econometrics for Finance*. Cambridge: Cambridge University Press.

Budiman, Rahman Untung (2007)., *Apakah Kinerja Masa Lalu Mencerminkan Kinerja Masa Depan? Evaluasi Return Reksa Dana Saham Tahun 2005-2006.* Usahawan,. XXXVI(01), 03-06.

Budiman, Rahman Untung. (2007), *Berburu Manajer Investasi yang Menghasilkan Alfa Positif: Evaluasi Monthly Return Reksa Dana Saham Tahun 2004-2006.* Usahawan, Vol. XXXVI(04), 18-21.

*Buku Panduan Indeks Harga Saham Bursa Efek Indonesia.* (2008). Jakarta: IDX

Cassarin, R. M. Lazzarin, and Sartore, D. (2002), Performance, Style, and Persistence of Italian Equity Funds, Greta Associates. www.greta.it/wp/02.03.PDF

Cavaglia S., J. Sefton, A. Scowcroft and Smith, B. (2006), Global Style Investing, *The Journal of Portfolio Management,* 32(04).

Coggin, T.D. and Fabozzi, F.J. (2003), *The Handbook of Equity Style Management*. 3rd ed. New York: John Wiley & Sons, Inc.

De Roon, F., T.E. Nijman, and Horst, J.R.(2004), Evaluating Style Analysis, *Journal of Empirical Finance,* 1(1), 29-53.

Effendy, R. N. P, and Siswandi, E. (2007), *Application of Sharpe, Treynor, Jensen, Information Ratio, and DEA Super Efficiency Methods to Measuring Performance of Equity Mutual Funds in Indonesia for Periods 2004-2005*. Usahawan, XXXVI(09), 03-10.

Ferruz, L. and Vicente, L. (2005), Sharpe's Style Analysis Applied to Spanish Domestic Equity Funds (1996-2002), *European Review of Economics and Finance*, 4(1), 21-34.

Gruber, M. et al. (2007). *Modern Portfolio Theory and Investment Analysis*, 7th ed. USA: Wiley.

Ibbotson, R. G. and Patel, A. K. (2002), *Do Winners Repeat with Style?*, Social Science Research Paper Collections (February 2002).

Jackson, M. and Staunton, M. D. (1999), Quadratic Programming Applications in Finance Using Excel, *The Journal of the Operational Research Society*, 50(12), 1256-1266.

Kaplan, Paul D. (2003), Holdings-Based and Returns-Based Style Models, Morningstar Research paper available at http://datalab.morningstar.com

Kemp M., M. Richardson, and Wilson, C. (2000), Invetsment Manager Style Analysis, Faculty and Institute of Actuaries Investment Conference, Hatfield Heath, 25-27 June 2000.

Koh, F., W. Koh, and Teo, M. (2003), Asian Hedge Funds: Return Persistence, Style, and Fund Characteristics, working paper, SSRN, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=41696

Levis M., and Tessaromatis, N. (2004), Style Rotation Strategies, *The Journal of Portfolio Management,* 30(04), 160-169.

Liodakis, M. and Levis, M. (1999), The Profitability of Style Rotation Strategies in the United Kingdom, *The Journal of Portfolio Management*, 26(01), 73-86.

Lobosco, Angelo. (1999), Style/Risk-Adjusted Performance, *The Journal of Portfolio Management,* 23(03), 65-68.

Madura, Jeff. (2007). *International Corporate Finance*, 7th edition. Thomson South-Western

Manurung, A. H., P. Sihombing, and Sitanggang, T. (2006), *Analisis Kinerja Reksa Dana dengan Menggunakan Risk Adjusted Return, Rasio Risiko & Snail Trail.* Usahawan, XXXV(09), 21-24.

Reilly, Frank K. and Brown, K.C. (2006), I*nvestment Analysis & Portfolio Management.* 8th ed., Thomson South-Western

Ross, S. A., R.W. Westerfield, and Jaffe, J. (2005), *Corporate Finance*. 7th ed, New York : The McGraw-Hill Companies, Inc.

Runkle, D. E., Jr. Buetow, and Johnson., R. R. (2000), The Inconsistency of Return-Based Style Analysis, *Journal of Portfolio Management,* 26(03), 61-77.

Saputra, Ilham Fajar. (2006), *Style Analysis dan Pengukuran Kinerja Reksa Dana Saham di Indonesia periode 2000-2005*, Tesis Pasca Sarjana Universitas Indonesa. Unpublished.

Sharpe, William F. (1992), Asset Allocation: Management Style and Performance Measurement, *Journal of Portfolio Management*, 18(2), 7-19.

Sharpe, William F. (1992), Determining a Fund's Effective Asset Mix, *Investment Management Review,* December 1988,59-69.

Siamat, Dahlan. (2005) , *Manajemen Lembaga Keuangan.* 5th ed, Jakarta: FEUI.

Surachmat, Adi G. (2002), *Penentuan Eksposur dan Pengukuran Kinerja Reksa Dana berdasarkan Style Analysis,* Tesis Pasca Sarjana Univesitas Indonesia. Unpublished.

Tim Studi Bapepam. (2003), *Studi Pemeringkatan Reksa Dana.* Departemen Keuangan Republik Indonesia: Badan Pengawas Pasar Modal dan Lembaga Keuangan.

Tim Studi Bapepam. (2007), *Studi Tipologi Investor Reksa Dana Pasar Modal di Indonesia,* Departemen Keuangan Republik Indonesia: Bapepam-LK.

*Undang-Undang Republik Indonesia Nomor 8 tahun 1995 tentang Pasar Modal.*

# Appendix

Table 1. Description of equity fund samples exist within April 2004-March 2009

| NO | EQUITY FUNDS | INVESTMENT MANAGEMENT | EFFECTIVE DATE |
|---|---|---|---|
| 1 | Bahana Dana Prima | PT. Bahana TWC Investment Management | August 1, 1996 |
| 2 | BNI Berkembang | PT. BNI Securities | September 30, 1996 |
| 3 | Fortis Ekuitas | PT. Fortis Investment | January 16, 2001 |
| 4 | Dana Sentosa | PT. Equity Development Securities | October 13, 2003 |
| 5 | Manulife Dana Saham | PT. Manulife Asset Management Indonesia | July 16, 2003 |
| 6 | Maestro Dinamis | PT. AXA Asset Management | July 29, 1997 |
| 7 | Mawar Danareksa | PT. Danareksa Investment Management | July 5, 1996 |
| 8 | TRIM Kapital | PT. Trimegah Sekuritas | March 19, 1997 |
| 9 | Nikko Saham Nusantara | PT. Nikko Securities Indonesia | June 26, 1997 |
| 10 | Panin Dana Maksima | PT. Panin Sekuritas | March 27, 1997 |
| 11 | Phinisi Dana Saham | PT. Manulife Asset Management Indonesia | August 7, 1998 |
| 12 | Rencana Cerdas | PT. Ciptadana Aset Manajemen | July 8, 1999 |
| 13 | Schroder Dana Prestasi Plus | PT. Schroder Investment Management Indonesia | September 12, 2000 |
| 14 | Si Dana Saham | PT. Batavia Prosperindo Asset Management | December 9, 1996 |
| 15 | Platinum Saham | PT. Platinum Asset Management | February 12, 2004 |

Table 2. Description of asset classes for constructing Sharpe's style benchmark in the sectoral model based on Jakarta Industrial Classification (JASICA) with addition to Bill

| Variables | FACTORS | DESCRIPTION |
|---|---|---|
| $\tilde{F}_1$ | *Agriculture Index* | The index represents the monthly return obtained by investing in the stock markets engaged in agriculture business (plantation, fishing, etc) |
| $\tilde{F}_2$ | *Mining Index* | The index represents the monthly return obtained by investing in the stock markets engaged in mining sector (coal, oil, and petroleum) |
| $\tilde{F}_3$ | *Basic Industri and Chemical Index* | The index represents the monthly return obtained by investing in the stock markets engaged in basic industry (ceramics, porcelain, and glass, metal, plastics and packaging, woof, commodity chemicals, forestry, and paper) |
| $\tilde{F}_4$ | *Miscellanous Index* | The index represents the monthly return obtained by investing in the stock markets engaged in automobile and parts,clothing and textile, shoes, cable, and electrionic equipment |
| $\tilde{F}_5$ | *Consumer Goods Index* | The index represents the monthly return obtained by investing in the stock markets engaged in food and beverage, tobacco, pharmacy, cosmetics, household goods, household equipment |
| $\tilde{F}_6$ | *Property & Real Estate* | The index represents the monthly return obtained by investing in the stock markets engaged in property and real estate, and building construction |
| $\tilde{F}_7$ | *Infratructure, Utility & Transportation* | The index represents the monthly return obtained by investing in the stock markets engaged in telecommunications, transportation, and non-building construction |
| $\tilde{F}_8$ | *Finance Index* | The index represents the monthly return obtained by investing in the stock markets engaged in finance area such as banks, financial institutions, securities, and insurance. |
| $\tilde{F}_9$ | *Trade and Service* | The index represents the monthly return obtained by investing in the stock markets engaged in production goods grocery, retail, restaurants, hotels, and tourism, advertising, and media, computer, invesment companies |
| $\tilde{F}_{10}$ | SBI *Index* – 1 Month | The index represents the monthly return obtained by investing in Bills or cash equivalent with maturity less than 1 year |

Table 3. Descriptive Statistics for Sectoral Class Assets, 60 month observations

| No | Equity Fund | Mean | Median | Maximum | Minimum | Standard Deviation | Skewness | Kurtosis | Jarque-Bera | Probability | Observations |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Bahana Dana Prima | 1,57% | 3,15% | 17,29% | -35,57% | 8,56% | -1,401308 | 7,543481 | 71,24470 | 0,000000 | 60 |
| 2 | BNI Berkembang | -0,02% | 1,30% | 23,33% | -38,60% | 8,75% | -1,448902 | 8,445019 | 95,11374 | 0,000000 | 60 |
| 3 | Fortis Ekuitas | 2,10% | 3,68% | 15,73% | -35,87% | 8,52% | -1,719184 | 8,300890 | 99,80454 | 0,000000 | 60 |
| 4 | Dana Sentosa | -0,16% | 0,01% | 13,44% | -28,10% | 7,08% | -1,104469 | 5,781173 | 31,53582 | 0,000000 | 60 |
| 5 | Manulife Dana Saham | 1,87% | 2,95% | 14,96% | -30,67% | 7,59% | -1,392023 | 7,305386 | 65,71814 | 0,000000 | 60 |
| 6 | Master Dinamis | 1,28% | 2,93% | 16,17% | -31,18% | 7,71% | -1,529890 | 7,192701 | 67,35250 | 0,000000 | 60 |
| 7 | Mawar Danareksa | 1,45% | 2,77% | 17,47% | -31,28% | 7,61% | -1,516331 | 7,853435 | 81,88216 | 0,000000 | 60 |
| 8 | TRIM Kapital | 2,07% | 3,83% | 16,44% | -35,32% | 8,66% | -1,561237 | 7,504364 | 75,09784 | 0,000000 | 60 |
| 9 | Nikko Saham Nusantara | 0,72% | 0,62% | 21,78% | -28,69% | 7,21% | -0,872458 | 7,328617 | 54,44982 | 0,000000 | 60 |
| 10 | Panin Dana Maksima | 1,91% | 1,91% | 14,76% | -29,55% | 7,03% | -1,661718 | 8,265193 | 96,91871 | 0,000000 | 60 |
| 11 | Phinisi Dana Saham | 1,95% | 1,95% | 17,31% | -37,28% | 8,24% | -1,832462 | 10,029840 | 157,12570 | 0,000000 | 60 |
| 12 | Rencana Cerdas | 1,86% | 3,94% | 13,74% | -30,36% | 7,71% | -1,591278 | 6,980550 | 64,93360 | 0,000000 | 60 |
| 13 | Schroder Dana Prestasi Plus | 1,92% | 3,34% | 14,34% | -28,48% | 7,15% | -1,385033 | 7,032566 | 59,83715 | 0,000000 | 60 |
| 14 | Si Dana Saham | 1,87% | 2,98% | 14,46% | -27,88% | 7,67% | -1,079765 | 5,292431 | 24,79703 | 0,000000 | 60 |
| 15 | Platinum Saham | 1,84% | 2,96% | 20,93% | -37,43% | 9,08% | -1,578425 | 7,694278 | 80,00487 | 0,000000 | 60 |

Table 4. Descriptive Statistics for Equity Fund Returns, 60 month observations

| No | Equity Fund | Mean | Median | Maximum | Minimum | Standard Deviation | Skewness | Kurtosis | Jarque-Bera | Probability | Observations |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture Index | 3,72% | 5,18% | 36,00% | -50,44% | 13,23% | -1,045941 | 6,730641 | 45,73412 | 0,000000 | 60 |
| 2 | Mining Index | 2,53% | 4,08% | 33,55% | -40,22% | 12,32% | -0,775740 | 4,857129 | 14,64004 | 0,000662 | 60 |
| 3 | Basic Industry Index | 1,67% | 3,05% | 22,98% | -31,15% | 9,54% | -0,712972 | 4,405345 | 10,02078 | 0,006668 | 60 |
| 4 | Miscellaneous Industry Index | 1,75% | 2,50% | 21,22% | -38,69% | 10,01% | -1,170607 | 6,101885 | 37,75745 | 0,000000 | 60 |
| 5 | Consumer Goods Index | 1,11% | 1,63% | 29,03% | -19,11% | 6,77% | 0,495540 | 7,765544 | 59,23163 | 0,000000 | 60 |
| 6 | Property Index | 1,91% | 1,85% | 22,53% | -28,84% | 10,02% | -0,375832 | 3,545102 | 2,15534 | 0,340389 | 60 |
| 7 | Infrastructure Index | 1,66% | 1,72% | 16,49% | -28,69% | 7,82% | -0,865964 | 5,252254 | 20,18056 | 0,000041 | 60 |
| 8 | Finance Index | 1,36% | 1,36% | 18,34% | -25,36% | 8,26% | -0,348798 | 3,502168 | 1,84703 | 0,397121 | 60 |
| 9 | Trade & Service | 0,51% | 2,19% | 12,02% | -39,25% | 8,17% | -2,123280 | 10,573410 | 188,47440 | 0,000000 | 60 |

Table 5. The Regression and Quadratic Programming Results

| No | Equity Fund | Agriculture | Mining | Basic Industry | Miscellanous Industry | Consumer Goods | Property | Infrastructure | Finance | Trade & Service | SBI 1 Month |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Bahana Dana Prima | % | % | % | % | % | % | % | % | % | % |
| 2 | BNI Berkembang | % | % | % | % | % | % | % | % | % | % |
| 3 | Fortis Ekuitas | % | % | % | % | % | % | % | % | % | % |
| 4 | Dana Sentosa | % | % | % | % | % | % | % | % | % | % |
| 5 | Manulife Dana Saham | % | % | % | % | % | % | % | % | % | % |
| 6 | Master Dinamis | % | % | % | % | % | % | % | % | % | % |
| 7 | Mawar Danareksa | % | % | % | % | % | % | % | % | % | % |
| 8 | TRIM Kapital | % | % | % | % | % | % | % | % | % | % |
| 9 | Nikko Saham Nusantara | % | % | % | % | % | % | % | % | % | % |
| 10 | Panin Dana Maksima | % | % | % | % | % | % | % | % | % | % |
| 11 | Phinisi Dana Saham | % | % | % | % | % | % | % | % | % | % |
| 12 | Rencana Cerdas | % | % | % | % | % | % | % | % | % | % |
| 13 | Schroder Dana Prestasi Plus | % | % | % | % | % | % | % | % | % | % |
| 14 | Si Dana Saham | % | % | % | % | % | % | % | % | % | % |
| 15 | Platinum Saham | % | % | % | % | % | % | % | % | % | % |

Note : The exhibit presents the average style exposure measurements of the fifteen equity funds obtained from the sectoral model $Ri = b_{i1}\widetilde{F}_1+b_{i2}\widetilde{F}_2+b_{i3}\widetilde{F}_3+b_{i4}\widetilde{F}_4+b_{i5}\widetilde{F}_5+b_{i6}\widetilde{F}_6+b_{i7}\widetilde{F}_7+b_{i8}\widetilde{F}_8+b_{i9}\widetilde{F}_9+b_{i10}\widetilde{F}_{10}$ during 60-month observations from April 2004-March 2009. The estimations of style use mutual fund returns as dependent variable and nine sectoral index and SBI rate (cash equivalent) returns as independent variables. The coeffients of the style model determines fund exposures to each sector (in %).


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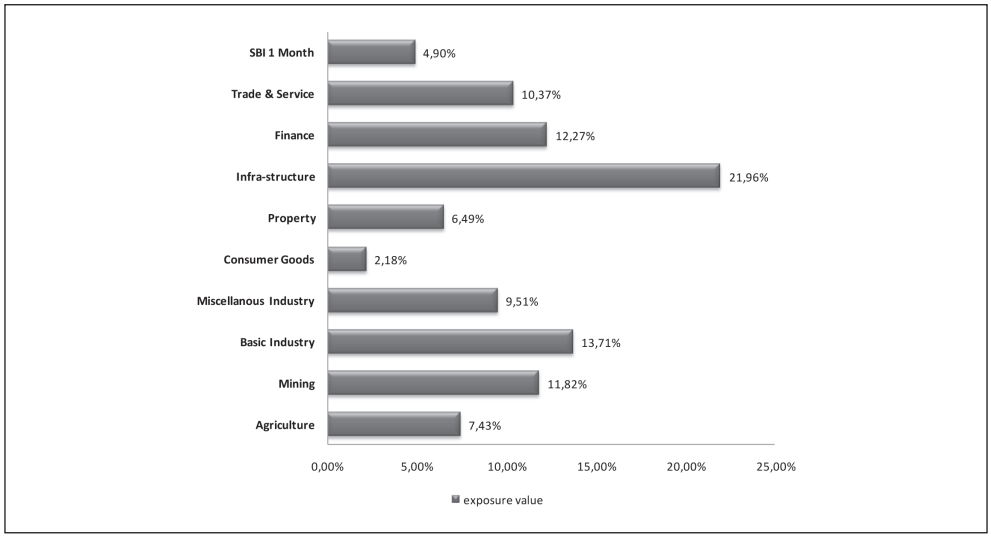
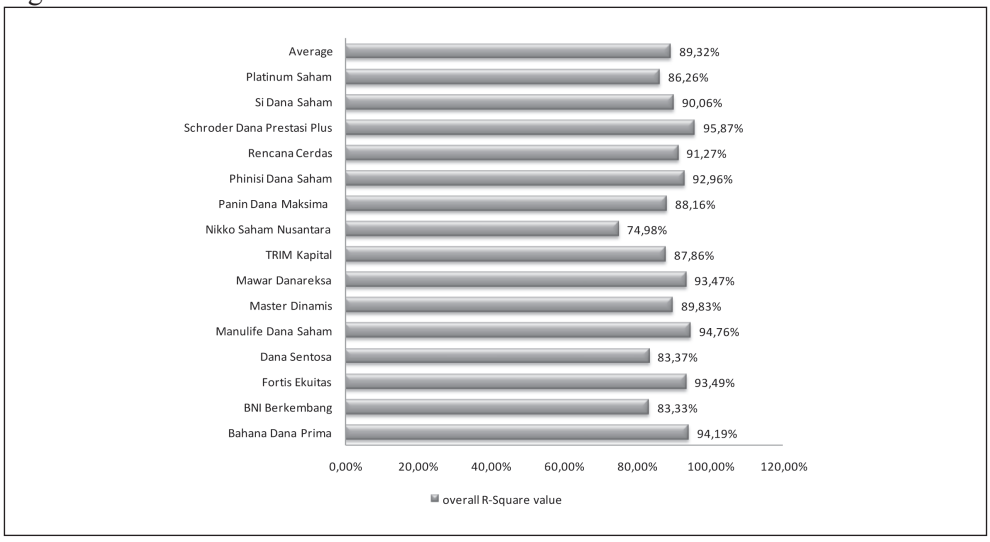
DOI: 10.21002/icmr.v2i2.3664

Figure 1. The average style of all observed equity funds



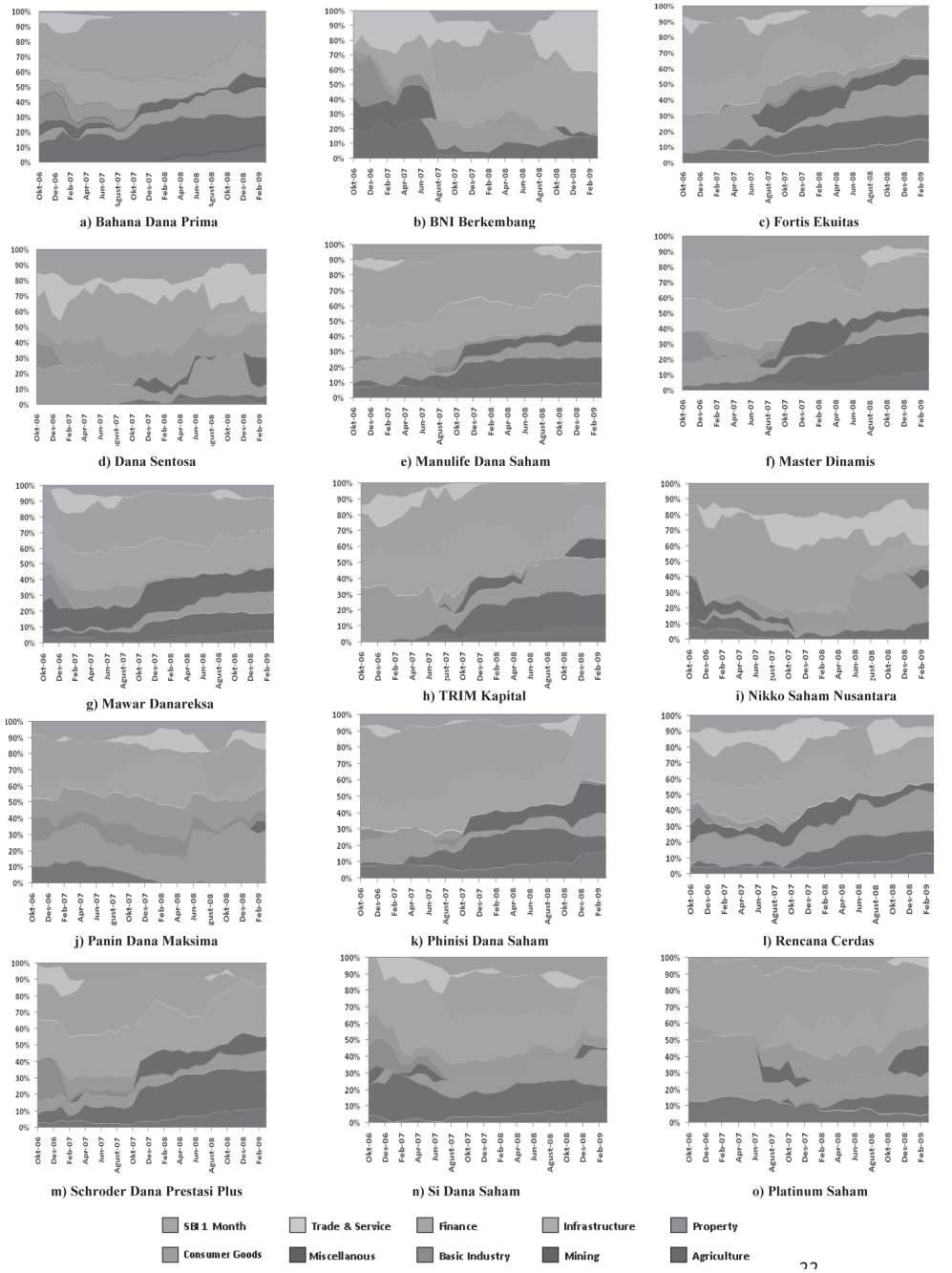

Note : The figure shows the result of average style analysis of all funds from 60 month observations from April 2004-March 2009. The bar chart indicates the estimated style of the fund. The exposure of each coefficent is obtained from averaging all funds exposure to each sector shown on Table 5.

Figure 2. Overall $R^2$ value for each fund




Note : The bar chart exhibits the R2 value calculated from $R^2 = 1 - \frac{\mathrm{Var}(\tilde{e}_i)}{\mathrm{Var}(\tilde{R}_i)}$ using 60-month observations from April 2004 to March 2009. The results indicate the strategy applied by fund management.

Figure 3. 30-Month Rolling Window. Computed Monthly, April 2004 – March 2009, to identify style drift



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DOI: 10.21002/icmr.v2i2.3664

Table 6. R2 Series Obtained from 30-month Rolling Window

| Periode | Bahana Dana Prima | BNI Berkembang | Fortis Ekuitas | Dana Sentosa | Manulife D. Saham | Maestro Dinamis | Mawar | TRIM Kapital | Nikko Saham | Panin Dana Maksima | Phinisi D. Saham | Rencana Cerdas | Schroder D. P. Plus | Si Dana Saham | Platinum Saham |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Okt-06 | 0,9399 | 0,7012 | 0,9116 | 0,8415 | 0,8941 | 0,8853 | 0,9324 | 0,7270 | 0,8699 | 0,8799 | 0,9040 | 0,9840 | 0,9661 | 0,8876 | 0,8286 |
| Nop-06 | 0,9405 | 0,6984 | 0,9248 | 0,8426 | 0,8922 | 0,8808 | 0,9329 | 0,7282 | 0,8726 | 0,8771 | 0,9024 | 0,8695 | 0,9661 | 0,8822 | 0,8193 |
| Des-06 | 0,9278 | 0,6518 | 0,9152 | 0,8147 | 0,8803 | 0,8754 | 0,9271 | 0,7263 | 0,8081 | 0,8576 | 0,8917 | 0,8745 | 0,9697 | 0,8477 | 0,7906 |
| Jan-07 | 0,9364 | 0,6468 | 0,9163 | 0,8138 | 0,8814 | 0,8736 | 0,9061 | 0,7207 | 0,7718 | 0,8582 | 0,8960 | 0,8667 | 0,9629 | 0,8707 | 0,7919 |
| Feb-07 | 0,9019 | 0,6107 | 0,9199 | 0,8187 | 0,8894 | 0,8762 | 0,8873 | 0,7197 | 0,7680 | 0,8573 | 0,9008 | 0,8648 | 0,9548 | 0,8421 | 0,7838 |
| Mar-07 | 0,8989 | 0,6076 | 0,9057 | 0,8140 | 0,8948 | 0,8912 | 0,8910 | 0,7284 | 0,7647 | 0,8650 | 0,9085 | 0,8639 | 0,9551 | 0,8310 | 0,7918 |
| Apr-07 | 0,9107 | 0,6345 | 0,8937 | 0,8197 | 0,8954 | 0,8820 | 0,9027 | 0,7598 | 0,7580 | 0,8734 | 0,9119 | 0,8637 | 0,9581 | 0,8145 | 0,7950 |
| Mei-07 | 0,9127 | 0,6406 | 0,8991 | 0,8162 | 0,8976 | 0,8925 | 0,9027 | 0,7651 | 0,7449 | 0,8592 | 0,9158 | 0,8704 | 0,9533 | 0,8149 | 0,8064 |
| Jun-07 | 0,8997 | 0,6131 | 0,8684 | 0,8138 | 0,8770 | 0,8738 | 0,8825 | 0,7867 | 0,6976 | 0,8266 | 0,8917 | 0,8507 | 0,9464 | 0,7868 | 0,7766 |
| Jul-07 | 0,8994 | 0,6200 | 0,8856 | 0,8115 | 0,9142 | 0,9231 | 0,8849 | 0,8817 | 0,7027 | 0,8490 | 0,9309 | 0,8547 | 0,9436 | 0,7852 | 0,8063 |
| Agust-07 | 0,8981 | 0,8740 | 0,9131 | 0,8227 | 0,9190 | 0,9389 | 0,8957 | 0,8999 | 0,6904 | 0,8815 | 0,9463 | 0,8557 | 0,9469 | 0,8610 | 0,8184 |
| Sep-07 | 0,9057 | 0,8889 | 0,9226 | 0,8588 | 0,9298 | 0,9416 | 0,9087 | 0,9055 | 0,7227 | 0,8990 | 0,9586 | 0,8797 | 0,9498 | 0,8745 | 0,8593 |
| Okt-07 | 0,9148 | 0,8859 | 0,9244 | 0,8572 | 0,9314 | 0,9529 | 0,9116 | 0,9013 | 0,7268 | 0,9008 | 0,9658 | 0,8777 | 0,9592 | 0,8763 | 0,8553 |
| Nop-07 | 0,9137 | 0,8746 | 0,9268 | 0,8494 | 0,9283 | 0,9447 | 0,9063 | 0,9037 | 0,7237 | 0,8958 | 0,9522 | 0,9239 | 0,9565 | 0,8866 | 0,8440 |
| Des-07 | 0,9123 | 0,8745 | 0,9281 | 0,8543 | 0,9290 | 0,9436 | 0,8995 | 0,8907 | 0,7031 | 0,8929 | 0,9521 | 0,9279 | 0,9558 | 0,8843 | 0,8389 |
| Jan-08 | 0,9126 | 0,8737 | 0,9246 | 0,8501 | 0,9293 | 0,9504 | 0,9083 | 0,8914 | 0,7047 | 0,8977 | 0,9527 | 0,9292 | 0,9562 | 0,8797 | 0,8384 |
| Feb-08 | 0,9099 | 0,8720 | 0,9341 | 0,8511 | 0,9358 | 0,9544 | 0,9108 | 0,9001 | 0,7278 | 0,9076 | 0,9542 | 0,9361 | 0,9550 | 0,8901 | 0,8390 |
| Mar-08 | 0,8932 | 0,8399 | 0,9198 | 0,8148 | 0,9256 | 0,9469 | 0,8971 | 0,8825 | 0,6834 | 0,8768 | 0,9463 | 0,9174 | 0,9446 | 0,8710 | 0,8030 |
| Apr-08 | 0,9211 | 0,8609 | 0,9374 | 0,8515 | 0,9409 | 0,9372 | 0,9250 | 0,8865 | 0,7209 | 0,8892 | 0,9619 | 0,9234 | 0,9580 | 0,8959 | 0,8247 |
| Mei-08 | 0,9228 | 0,8639 | 0,9455 | 0,8631 | 0,9445 | 0,9200 | 0,9283 | 0,8964 | 0,7074 | 0,8874 | 0,9638 | 0,9216 | 0,9596 | 0,9020 | 0,8253 |
| Jun-08 | 0,9200 | 0,8688 | 0,9465 | 0,8303 | 0,9453 | 0,9094 | 0,9277 | 0,9007 | 0,6323 | 0,8491 | 0,9622 | 0,9260 | 0,9595 | 0,9012 | 0,8185 |
| Jul-08 | 0,9226 | 0,8716 | 0,9480 | 0,8401 | 0,9477 | 0,9099 | 0,9293 | 0,9039 | 0,6295 | 0,8405 | 0,9636 | 0,9247 | 0,9631 | 0,9008 | 0,8308 |
| Agust-08 | 0,9175 | 0,8670 | 0,9370 | 0,8374 | 0,9418 | 0,8746 | 0,9228 | 0,9013 | 0,6224 | 0,8405 | 0,9592 | 0,9061 | 0,9532 | 0,9018 | 0,8303 |
| Sep-08 | 0,9200 | 0,8763 | 0,9427 | 0,8279 | 0,9416 | 0,8868 | 0,9308 | 0,9065 | 0,6349 | 0,8451 | 0,9588 | 0,9089 | 0,9548 | 0,9139 | 0,8673 |
| Okt-08 | 0,9345 | 0,8960 | 0,9545 | 0,8500 | 0,9569 | 0,9137 | 0,9486 | 0,9233 | 0,6889 | 0,8601 | 0,9674 | 0,9282 | 0,9591 | 0,9264 | 0,8912 |
| Nop-08 | 0,9640 | 0,9405 | 0,9742 | 0,8976 | 0,9743 | 0,9419 | 0,9730 | 0,9559 | 0,7915 | 0,9055 | 0,9810 | 0,9494 | 0,9748 | 0,9560 | 0,9282 |
| Des-08 | 0,9605 | 0,9361 | 0,9730 | 0,8959 | 0,9766 | 0,9378 | 0,9717 | 0,9586 | 0,7873 | 0,9097 | 0,9566 | 0,9430 | 0,9726 | 0,9302 | 0,9319 |
| Jan-09 | 0,9623 | 0,9420 | 0,9735 | 0,8706 | 0,9770 | 0,9400 | 0,9720 | 0,9601 | 0,7579 | 0,9036 | 0,9574 | 0,9450 | 0,9745 | 0,9309 | 0,9326 |
| Feb-09 | 0,9630 | 0,9463 | 0,9737 | 0,8737 | 0,9772 | 0,9404 | 0,9718 | 0,9602 | 0,7454 | 0,8980 | 0,9562 | 0,9436 | 0,9742 | 0,9313 | 0,9288 |
| Mar-09 | 0,9629 | 0,9385 | 0,9735 | 0,8619 | 0,9772 | 0,9412 | 0,9720 | 0,9613 | 0,7487 | 0,8968 | 0,9559 | 0,9424 | 0,9744 | 0,9314 | 0,9138 |

Table 7. Monthly Average Selection Return of Equity Funds: Fund versus Sectoral Style2009, to identify style drift

| No | Equity Mutual Fund | Average Monthly Selection Return | Monthly Standard Deviation | t-value | Significant on α=5%? |
|---|---|---|---|---|---|
| 1 | Bahana Dana Prima | -0,141% | 0,088% | -0,259% | no |
| 2 | BNI Berkembang | -2,894% | 0,159% | -3,979% | significant |
| 3 | Fortis Ekuitas | 0,793% | 0,059% | 1,785% | no |
| 4 | Dana Sentosa | -1,324% | 0,218% | -1,555% | no |
| 5 | Manulife Dana Saham | 0,514% | 0,036% | 1,493% | no |
| 6 | Master Dinamis | 0,241% | 0,120% | 0,38% | no |
| 7 | Mawar Danareksa | 0,216% | 0,086% | 0,404% | no |
| 8 | TRIM Kapital | 0,118% | 0,085% | 0,221% | no |
| 9 | Nikko Saham Nusantara | -0,641% | 0,300% | -0,641% | no |
| 10 | Panin Dana Maksima | 0,143% | 0,144% | 0,206% | no |
| 11 | Phinisi Dana Saham | 0,460% | 0,090% | 0,839% | no |
| 12 | Rencana Cerdas | 0,642% | 0,096% | 1,133% | no |
| 13 | Schroder Dana Prestasi Plus | 0,527% | 0,043% | 1,387% | no |
| 14 | Si Dana Saham | -0,374% | 0,122% | -0,586% | no |
| 15 | Platinum Saham | -0,949% | 0,137% | -1,406% | no |
| | **Average** | **-0,178%** | **0,199%** | | |

Note : The figure shows the result of average style analysis of all funds from 60 month observations from April 2004-March 2009. The bar chart indicates the estimated style of the fund. The exposure of each coefficent is obtained from averaging all funds exposure to each sector shown on Table 5.

Figure 3. 30-Month Rolling Window. Computed Monthly, April 2004 – March 2009, to identify style drift