

Tax-Motivated Trading Strategies of Mutual Funds

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ABSTRACT

The 1997 Taxpayer Relief Act repealed IRC (Internal Revenue Code) Section 851 (b)(3), commonly known as the “short-short rule (SSR).” It had been considered a burden for fund managers in managing their portfolios. The objective of this study is to investigate the effects of repealing the short-short rule on the performance, risk characteristics, and trading patterns of mutual funds. This paper finds that risk measures including beta, idiosyncratic risk, and market adjusted risk clearly show an increase after the SSR repeal. Risk-adjusted performance has also been observed to improve while risk management skills of funds have become varied. In addition, it is found that the SSR repeal relieves fund managers from such liquidity concerns as expense or cash holding position of fund managers. Notably, the test results demonstrate a somewhat different picture depending on fund objectives.

1. Introduction

Investment returns of mutual funds are granted “pass through status” under the U.S. tax code, which means that taxes are paid only by the investors,, not by the fund itself.¹ This implies that mutual funds are exempted from paying corporate tax against their ordinary income and net capital gains as long as mutual funds retain the pass through status. One of the most notable conditions required to keep the status was contained in the Internal Revenue Code Section 851 (b)(3), commonly known as the “short-short rule” or the “30 percent gross income test” (henceforth SSR). Appearing first in the tax code in 1936, the SSR required that mutual funds must receive less than 30 percent of their gross income from the sale of securities held for less than three months. If funds violate the requirement, as high as 35 percent of the corporate tax rate for the penalty was to be applied to all income of the funds, and higher short-term capital gain rate was claimed as the dividend paid to shareholders. This also means that if mutual funds did not abide by the rule, investment income and capital gains would be doubly taxed with corporate tax and shareholder’s tax. The rule has been basically designed to penalize funds with big gains on short-term investments and to prevent mutual fund managers from excessively buying, selling, or churning.

Under the short-short rule, however, trade by mutual fund managers was inefficiently restrained. To adhere to the rule, portfolio managers were forced to constantly consider tax-motivated investments by expending their resources to monitor and record transactions. Further, they were discouraged from using various advanced financial vehicles such as options, futures, or short-selling. The rule, therefore, resulted in limiting fund managers’ flexibility to trade, creating tax compliance costs, and constraining the use of derivatives in the mutual fund industry.

1) Bodie, Kane, and Marcus (2004), *Essentials of Investments 5th*, pg. 111.

Understandably, the validity of the rule was critically questioned in the 1990s.. People who advocated the abolition of the rule claimed that fund managers did not trade stocks held by portfolios just to earn their commissions but to maximize the performance. In addition, they argued that a number of safeguards had been added to the securities law since 1936, making the short-short rule no longer meaningful. After having argued against the rule, the U.S. Congress eventually eliminated the restriction under the Taxpayer Relief Act of 1997 that mutual funds should not make gains more than 30 percent of their income from the short-term sale of assets. Hence, mutual funds could take advantage of the change from the tax year beginning September 1, 1997.²

Several changes in portfolio management and trading activity in the mutual fund industry have been anticipated since the SSR repeal. Funds are likely to be managed under a lower administrative burden and enjoy greater flexibility in the selection of hedging, trading, and investment strategies as well as market liquidity. The SSR repeal also allows fund managers to engage in new trading strategies involving short-term trades. Yet, the most significant change was that fund managers could use various advanced financial instruments including options and futures. The SSR basically has hindered mutual fund managers from using derivatives, because most futures and options contracts have maturities within three months and realize capital gains in less than three months. Prior researches have indirectly found evidences for such changes. Koski and Pontiff (1999) find only 21 percent of domestic equity mutual funds used derivatives in surveys conducted in December 1993 and December 1994; while Deli and Varma (2002) show 79.8 percent of equity funds permit investment in at least one type of derivatives in their investigation from the first quarter of 1997 through the second quarter of 1998. Almazan et al. (2004) illustrate that the number of funds that are permitted to engage in options, futures, and

2) Although the rule went into effect for tax years beginning September 1, 1997, it could be applied to most mutual funds from 1998 because funds normally use the calendar year as the fiscal year. For example, if the fiscal year of a fund begins with January 1, then the Act is effective for a fund from the 1998 fiscal year.

short-sells has been increasing since 1998. Consequently, many changes have been expected in trading strategies in mutual funds as a result of the various advanced financial vehicles that were allowed since the SSR repeal.

Clearly, increased use of various advanced financial instruments and active short-term trades can affect risk and performance of funds. For example, if mutual funds use financial vehicles to hedge the market risk, systematic risk can be reduced; while if mutual funds employ them to speculate, the risk can increase. If the financial tools are used to manage for fund-specific risk, then idiosyncratic risk may decrease. Transaction cost benefits diminishing trading cost and liquidity-motivated cost as well as opportunity cost benefits reducing cash holding cost may result in improving risk-adjusted performance. Upgraded timing skills that can follow market movement in a timely manner by using short-term trades may also influence performance in a positive direction.

The SSR repeal would also affect the risk management style of funds that adjusts the risk exposure against prior performance. Earlier studies provide empirical evidences that risk exposure increases after a poor performance and decreases after a good performance. The use of derivatives can be expected to advance the risk management skills of fund managers because they can alter the extent of risk to the desirable level for maintaining purposes resulting in decreased risk. This implies that the extent of risk change against prior performance should decrease after the SSR repeal.

In addition to risk-return characteristics, it is likely that trading patterns of funds change. Without concerns about short-term trading such as day trading to maximize returns, fund managers can accomplish active portfolio management. This vigorous trading may also affect the turnover ratio, expense ratio, and the volatility of net asset value.

The objective of this paper is to investigate the effects of repealing the SSR on portfolio management, investment strategy, and trading activity. This study suggests risk-return characteristics and trading patterns of mutual funds as proxies to detect changes in trading strategies after the SSR repeal. For risk-return characteristics, three kinds of measurements are utilized and examined: risk (standard deviation, beta, and idiosyncratic risk), risk-adjusted returns (Jensen's alpha, Sharpe and Treynor measurement), and risk management (the extent of changes in risk conditional on prior performance). Of particular interest is whether the extent of risk changes conditional on past performance after the SSR repeal will weaken as a measurement on risk management skill. Differences in trading patterns such as the turnover ratio, the expense ratio, and the percent of cash holding position before and after the SSR repeal are also investigated.

As the results of empirical tests on risk return characteristics, fund risks estimated as systematic, unsystematic, and market-adjusted are observed to increase regardless of the fund objective after the SSR repeal. The risks of pre-SSR repeal are clearly different from those of post-SSR repeal in mean difference tests. It is also found that the SSR repeal improves the abnormal return of funds. In terms of risk management, it is observed that fund managers have cut down the amount of risk change on prior performance after the SSR repeal. This implies that fund managers may have changed their risk management style through various financial vehicles that have been allowed since the SSR repeal.

With respect to trading patterns, the expense ratio clearly decreases after the SSR repeal. This may mean that the decrease in administrative costs and the improvement in economy of scale outweigh expense increases occurring from the active management that resulted from the deregulation. The portion of cash holding position also declines because fund managers can apply various advanced financial instruments after the SSR repeal to manage their cash position.

This research offers major contributions to the study of mutual funds in two ways. First, this is the first empirical study of the impact of the SSR abolition upon the mutual fund industry. No research has attempted to address changes in the risk or return characteristics, trading patterns, and risk management of mutual funds despite the fact that more than seven years have passed since the rule was eliminated.

Second, this study could answer why the use of derivatives has recently increased in the mutual fund industry. Although several recent studies³ have found an increase in derivatives use in the mutual fund industry, none of them proposes the likelihood of the SSR as the reason. In particular, although Cao et al. (2002) recognize that the majority of funds have the legal authority to use derivatives but few elect to do so, they do not suggest any reason for this trend.

The structure of this paper is as follows. In Section 2, hypotheses are developed based on previous pertinent literatures for risk, risk-adjusted performance, risk management, and trading patterns. Section 3 discusses data and testing methodology. Section 4 and 5 report the empirical results and robust test. Section 6 summarizes and concludes.

2. Related Literature and Development of Hypotheses

2.1 Risk

The impact of the SSR repeal on the fund risk can be examined in two aspects: active trading and use of derivatives. Active trading increases the fund risk because enlarged trading volume intensifies the volatility of net asset value. On the contrary, the increment of advanced financial vehicles is likely to decrease the fund risk. Existing literature provides mixed empirical evidences

3) Koski and Pontiff (1999), Deli and Varma (2002), Cao et al. (2002), and Almazan et al. (2004).

for the effect of derivatives on the risk for financial firms depending on hedge or speculative purposes. Whaley (1985), Merton (1995), and Levich, Hayt and Ripston (1999) suggest that fund managers normally use derivatives to hedge portfolio risk; while McGrough (1995) and Johnson and Yu (2004) advocate that derivatives are used for higher risk investments in order to speculate. Meanwhile, Koski and Pontiff (1999) analyze the use of derivatives by equity mutual funds and find that there are no systematic differences between funds that use derivatives and those that do not.

Therefore, if we consider both the active trading effect and the derivatives use effect, the increased risk by active trading can not be sufficiently offset by the decreased or unchanged risk by derivatives use. This implies that the risk is more likely to increase after the SSR repeal.

Deregulation and new financial vehicles usage may allow fund managers to access more powerful tools to control systematic risk as well as unsystematic risk. Simultaneously, the increase of overall risk through the SSR repeal may also influence systematic risk and idiosyncratic risk. McAnally (1996) examines whether footnote disclosure of off-balance-sheet financial instruments and derivatives is associated with banks' systematic risk and concludes that there is a positive relationship between traditional credit-enhancing derivatives activities and equity beta. Hirtle (1997) and Carter and Sinkey (1998) investigate the use of interest rate derivatives by commercial banks and find that the use of interest rate derivatives is positively related to exposure to interest rate risk, which is idiosyncratic risk. This implies that the use of derivatives is more likely to increase systematic risk as well as idiosyncratic risk.

The level of the fund risk may be different depending on fund objectives. Normally, aggressive growth funds are riskier than income funds. Therefore, the impact of the SSR repeal on the risk is also different depending on the objectives and risk types. In summary, not only systematic risk but also unsystematic risk will increase and be changed depending on fund objectives.

Hypothesis No. 1: Systematic risk as well as idiosyncratic risk increase after the SSR repeal, and the level of fund risk is different depending on fund objectives.

2.2 Risk-Adjusted Performance

The use of various advanced financial instruments and unrestricted short term trades may improve risk-adjusted performance by allowing trading at a lower cost or by taking advantage of better information⁴. Funds that permit investments in derivatives tend to have transaction-cost benefits that diminish trading cost, liquidity-motivated cost, and cash holding opportunity cost (Deli and Varma (2002)). Funds can lower transaction costs by applying assorted financial vehicles instead of trading underlying securities when funds want to attain a desired risk level. Employing futures or options may also cut down the opportunity cost of holding cash. If holding cash is not fully diversified due to high trading costs, futures or options may offer diversification without changing the proportion of underlying assets.

On the other hand, such financial vehicles may also increase the potential agency costs thus resulting in the deterioration of the risk-adjusted performance. If there is a conflict between fund managers and investors with respect to risk exposure, managers can easily achieve their desired risk level by using the financial vehicles.

4) Koski and Pontiff (1999) indicate that transaction costs are related to risk in the environment of derivatives use and provide the evidence that managers who use derivatives may improve “net” portfolio performance due to lower transaction costs. It implies that transaction cost benefits can be considered as the factor to affect risk adjusted performance.

The amount of increment of agency cost and decrement of transaction cost may also be different depending on fund objectives. The more active in trading the fund objective is, the larger the amount of increment or decrement gets.

Between agency costs and transaction cost benefits, previous literature has documented that funds tend to permit investments in derivatives mainly for transaction cost benefits. Koski and Pontiff (1999) suggest that fund managers use derivatives to achieve a desired risk exposure at a lower transaction cost. Deli and Varma (2002) find that funds tend to permit investments only in derivatives offering transaction cost benefits, and demonstrate that transaction cost benefits dominate agency costs. Cao et al. (2002) indicate that risk-adjusted returns may improve depending on the amount of derivatives use of the funds; they also find that the returns of heavy users differ significantly from the returns of light users. Meanwhile, Bae and Yi (2005) indicate that the market timing ability has been improved since the SSR repeal, supporting the better risk-adjusted performance.

Therefore, the following hypothesis about risk-adjusted returns has been generated:

Hypothesis No. 2: Risk-adjusted performance improves after the SSR repeal.

2.3 Risk Management

Mutual funds are categorized as an actively managed and transparent group among financial institutions.⁵ Although managers can actively perform risk management, these institutions are

5) In terms of risk management, financial institutions can be categorized into nine groups based on characteristics of information provided to investors (transparent, translucent, and opaque) and the level of managing investments (actively, medially and passively managed). Open-end mutual funds fall under the category of an actively managed and transparent group with hedge funds (Oldfield and Santomero (1997)).

subject to limitation in effectively eliminating systematic or unsystematic risks because investors can easily access information, including investment portfolios.

In academics, a few researchers have only recently begun to examine the risk management practices of financial institutions and other corporations. One suggested method to measure risk management skills in mutual funds is to examine the relationship between the extent of changes in the risk and prior performances. It has been known that any changes in the risk is inversely related to prior performances. This inverse relationship is explained by the incentive gaming hypothesis that fund managers alter their risk exposure in response to the performance due to the incentive compensation (Brown et al. (1996); Chevalier and Ellison (1997)). In other words, fund managers who did not achieve a good performance at mid-year tend to increase their risk exposure in the latter part of the year in order to enhance the performance.

After the SSR repeal, this incentive gaming hypothesis can be still applied to explain the relationship between prior performances and risk changes? Koski and Pontiff (1999) paper, which has investigated the risk management skills of mutual funds using derivatives, suggests another hypothesis. It is the cash flow hypothesis which explains that any changes in the risk are not directly related to the prior performance; rather, they are associated with cash flows into or out of the funds based on the result of the previous performance. In other words, managers who are unable to instantly invest new cash can cause the cash position to increase after a good performance, which results in a decrease of the fund risk. The logic of cash flow hypothesis is consistent with the role of cash flow used to measure fund performances in Ippolito (1992), Edelen (1995), Sirri and Tufano (1998), and Berkowitz and Kotowitz (2000) studies.

Both incentive gaming hypothesis and cash flow hypothesis predict an inverse relationship between the changes in risk and the prior performance. However, two hypotheses play an exact opposite role when derivatives are used. Under the incentive gaming hypothesis, fund managers

can deepen the negative relationship between the risk change and the prior performance, because managers can increase the risk more easily through the derivatives if the prior performance was poor. On the other hand, the negative relationship between the risk change and prior performance can be reduced under the cash flow hypothesis. A cash inflow or outflow owing to the prior performance happens regardless of the manager's will, thus, these flows become the exogenous variable. In this situation, fund managers generally adjust the risk to a desired or original level by using derivatives, so as to minimize the extent of risk change conditioned on the prior performance.

The SSR restrained fund managers from using financial devices to time the market and attain target risk levels. Fund managers who use financial vehicles should keep an eye on the attained capital gains from using financial devices to avoid tax penalties. Therefore, fund managers may use restrictive financial devices for risk management to reach the desired risk level. In addition, using derivatives is known to increase the chance for managers to get a manager tenure. It suggests that established managers are more likely to use derivatives, implying less use of incentive games. Koski and Pontiff (1999) provide the evidence that changes in fund risk in response to previous performances are substantially less severe for funds that use derivatives. In this sense, the cash flow hypothesis seems to have a more persuasive power than the incentive gaming hypothesis does after the SSR repeal, assuming that the SSR repeal leads to an increase of the derivatives use.

From the above discussion, the following hypothesis is formulated:

Hypothesis No. 3: The inverse relationship between risk changes and prior performance is lessened after the SSR repeal.

2.4 Trading Patterns

The SSR repeal would alter the various trade patterns of fund managers such as turnover ratio, expense ratio, and the portion of cash position. Fundamentally, it is anticipated that the turnover ratio augments due to active trading as a result of relaxed trade restrictions.

Transaction costs are expected to decrease due to the lessening of trading, liquidity-motivated, and cash holding opportunity cost. Furthermore, the removal of the rule also allows fund managers to reduce administrative costs. A fund manager in the American Heritage Fund indicates that administrative costs of monitoring due to the SSR amounted to between five percent and ten percent of the total cost per year.⁶ Fund expenses are classified into three categories; management fees, operating expenses, and 12b-1 fees. The largest is usually the management fees that pay for the marketing and expertise needed to run the fund. The monitoring costs for the SSR accounted for a considerable part of management fees. Also, transaction costs hold the substantial portion of operating expenses. Therefore, the expense ratio is expected to lower resulting from the decrease of management fees and operating expenses.

The cash holding position in funds may also dampen because funds managers can quickly invest in stocks, bonds, or derivatives, using the cash inflow resulting from the good performance that follows the timing of the market movement. Therefore, managers do not need to hold too much cash at a time, which does not create a positive return.

It is also important to note that the increasing or decreasing rate of a turnover depends heavily on the objectives of each fund. For example, the turnover ratio of growth-oriented funds that use various investment techniques to seek maximum capital growth is very likely to increase. On the other hand, the turnover ratio of income-oriented funds is not expected to be affected as much.

6) "Hoping for end to obscure law – 'short-short' rule strips away tax advantage; Options could benefit," *The Wall Street Journal*, May 9, 1997.

Therefore, it is interesting to investigate whether expense ratio, turnover ratio, and the portion of cash holdings actually increase following the SSR repeal.

Hypothesis No 4. (A): Mutual funds trade more actively after the SSR repeal.

4. (B): Expense ratios of funds are decreased after the SSR repeal.

4. (C): Mutual funds cut down their cash holding positions after the SSR repeal.

3. Research Design

3.1 Data

Data used in this study are retrieved from Morningstar mutual fund quarterly-based data (32 quarters: from the first quarter of 1994 to the fourth quarter of 2001) and CRSP.⁷ This study uses monthly data from January 1994 to December 2001, consisting of 96 observations.

To be included in the sample, a mutual fund should: (i) be made up of domestic equity funds; (ii) have an inception date of June 1993 or earlier; (iii) belong to one of the following objectives as domestic equity funds--aggressive growth, growth, growth and income, equity income, small company (balanced, asset allocation, specialty, and hybrid are excluded); (iv) have more than \$10 million of net assets; and (v) have all data needed to test from other resources. There are 611 equity mutual funds that meet the above criteria.

The monthly return data of funds come from Morningstar Principia Pro Plus for Mutual Funds as of April 2002. Monthly returns on the S&P 500 index including dividend distributions are used

7) Professor Ravi Shukla at Syracuse University provides Morningstar mutual fund data.

as the market return, and secondary market rates of three-month Treasury bills are used for the risk-free rates.

Descriptive statistics are reported in Table 1. Funds are classified into different groups according to their prospective objectives.⁸ The number of funds in each group, the average of excess return, standard deviation, skewness and kurtosis of funds, and CAPM beta are reported. Growth funds occupy the largest portion of the samples (45.3 percent) whereas aggressive growth funds are the smallest group (5.4 percent). The small company group shows the highest excess monthly returns and the aggressive growth group is the most volatile in fund returns. In terms of CAPM beta, the equity income group exhibits the lowest beta, while the aggressive growth group shows the highest, which is as expected. As it is typical that stock returns have a non-normality property, most of the funds' returns show a non-normality distribution with a negative skewness of -0.51 and a kurtosis of 1.89 .

3.2 Methodology

3.2.1 Risk

Standard deviation, beta, and idiosyncratic risk are used as the proxy for the risk. In terms of the total risk, the standard deviation of a fund is cross-sectionally calculated using monthly returns. The beta is estimated using a market model regression. The idiosyncratic risk is computed by the standard deviation of residuals from a market model regression. In order to control the bias caused by time variance, a market adjusted standard deviation is determined by the absolute value from a fund standard deviation minus the market return standard deviation. Four risk variables are estimated by the cross-sectional mean value for all sample firms during both the pre-period (January 1994 to December 1997) and the post-period (January 1998 to

8) Funds are also classified according to Morningstar category. Morningstar categorizes the funds into nine groups based on size and value, and whether they are growth-oriented.

December 2001). The mean value for each fund objective is calculated by the mean average of funds in the same objective. The mean difference in the risk variables between the pre- and the post-periods is tested using the t-test and the Wilcoxon signed test. The test is also performed according to the fund objective.

3.2.2 Risk-Adjusted Performance

With respect to the risk-adjusted performance, assorted measurements have been introduced. The basic assumption about the risk-adjusted performance is that investors are risk averse and need to be compensated for being exposed to risks. Recent studies show various risk-adjusted performance measurements--(i) Berkowitz and Kotowitz (1993): Jensen's alpha, Sharpe, and Treynor; (ii) Gruber (1996): four-index alphas; (iii) Sirri and Tufano (1998): market excess return and alpha; (iv) Berkowitz and Kotowitz (2000): Jensen's alpha, Sharp, and Treynor ; and (v) Cao et al. (2002): mean-adjusted returns.

In this study, three kinds of commonly used measurements--Jensen's alpha, Sharpe, and Treynor measurements--are employed to investigate the effect of the SSR repeal on risk-adjusted performance. Jensen's alpha is calculated using three kinds of regression models--the market, CAPM, and the interest risk adjusted model--that control the assorted types of risk exposure. An interest risk-adjusted model can adjust the interest rate risk beyond the market, size, and book-to-market ratio risks controlled from the Fama-French three-factor model. Jensen's alpha is computed as the estimate of α in the following regressions:

$$\text{Market model} \quad r_{it} = \alpha_i + D_t \Delta \alpha_i + \beta_i r_{mt} + \varepsilon_{it}, \quad (1)$$

$$\text{CAPM} \quad r_{it} - r_{ft} = \alpha_i + D_t \Delta \alpha_i + \beta_i (r_{it} - r_{mt}) + \varepsilon_{it}, \quad (2)$$

Interest risk-adjusted model

$$r_{it} - r_{ft} = \alpha_i + D_t \Delta \alpha_i + \beta_i (r_{it} - r_{mt}) + s_i SMB_t + h_i HML_t + I_i INT_{t-1} + \varepsilon_{it} \quad (3)$$

where r_{it} and r_{ft} are the return of a mutual fund i in excess of the risk-free rate in a month, and $r_{m,t}$ is the market return in excess of the risk-free rate. SMB_t and HML_t are the return difference in month t based on the size and the book-to-market ratio as mentioned by Fama and French (1993). As the variable for controlling the interest risk, INT_{t-1} is computed by the difference between the average 10-year AAA yield and the three-month T-bill rate. A binary dummy variable D_t equals one if period t is in the post-SSR repeal period, and zero otherwise. Jensen's alpha represents the risk-adjusted return or abnormal return so that $\Delta \alpha_i$ measures the change in risk-adjusted returns between pre- and post-SSR repeal of fund i .

The Sharpe differential and the Treynor differential⁹ can be calculated by the Sharpe (Treynor) ratio of the fund minus that of the market. The differentials are more likely to reduce the bias caused by the raw return difference between two periods. The simple Sharpe (Treynor) ratio is not appropriate for the comparison of the two periods because the market condition may be inconsistent with each period. For example, although the Sharpe ratio of a fund for period 1 is higher than that of the fund for period 2, this does not necessarily mean that the abnormal return of the fund is decreased. This is because if the Sharpe ratio of the market is higher than that of the fund for period 1, whereas the Sharpe ratio of the market is lower than that of the fund for period 2, the abnormal return of the fund will definitely be improved. Therefore, the Sharpe

9) Sharpe differential:
$$S_i = \frac{T^{-1} \sum_{t=1}^T (r_{it} - r_{ft})}{\sqrt{(1/(T-1)) \sum_{t=1}^T (r_{it} - \bar{r}_i)^2}} - \frac{T^{-1} \sum_{t=1}^T (r_{mt} - r_{ft})}{\sqrt{(1/(T-1)) \sum_{t=1}^T (r_{mt} - \bar{r}_m)^2}}$$

Treynor differential:
$$T_i = \frac{T^{-1} \sum_{t=1}^T (r_{it} - r_{ft})}{\beta_i} - T^{-1} \sum_{t=1}^T (r_{mt} - r_{ft})$$

(Treynor) differential considering the market condition is compared for the pre-period with the post-period. In addition, the percentage of funds whose Sharpe or Treynor ratio is higher than the market's are examined for clearer evidence of the impact of the SSR repeal on abnormal returns.

3.2.3 Risk Management

To test whether the risk management pattern of fund managers changed after the SSR repeal, the risk management model of Koski and Pontiff (1999) is employed. Koski and Pontiff examine the difference in the changes in risk conditional on prior performance between funds that use derivatives and those that do not. The following pooled cross-sectional regression model is revised from Koski and Pontiff:

$$\sigma_{i,t2} - \sigma_{i,t1} = \alpha + \lambda D_t + \gamma(r_{i,t1} - gr_{ig,t1}) + \delta D_t * (r_{i,t1} - gr_{ig,t1}) + \phi \sigma_{i,t1} + \sum_j \beta_j Dummy_j \quad (4)$$

where $\sigma_{i,t1}$ and $\sigma_{i,t2}$ are beta, idiosyncratic risk, or the standard deviation of fund i during the first six months and the second six months of the year t ; D is a dummy variable that equals one if the period is the post-SSR repeal and zero otherwise; $r_{i,t1}$ is the mean excess return on fund i during the first half of the year t ; $gr_{ig,t1}$ is the mean excess return for funds with the same investment objective as fund i during the first half of the year t ; and $Dummy_j$ is a set of dummy variables that are year, fund objectives, and interactions between year and fund objectives to control the variation over time or fund objectives.

In equation (4), γ shows the impact of prior performance ($r_{i,t1} - gr_{ig,t1}$) on the risk change ($\sigma_{i,t2} - \sigma_{i,t1}$); and δ displays the incremental impact caused by the SSR repeal. If δ is positive,

the negative relationship between prior performance and the change in risk exposure weakens, which means that mutual fund managers change their risk management style in the direction of decreasing the extent of risk change after the SSR repeal.

Funds tested are restricted to three kinds of objectives--growth, aggressive growth, and small company--because they are more likely to carry out active risk management.¹⁰ Beta and idiosyncratic risks are measured through the GMM estimator using a market model that utilizes the CRSP value weighted index as the market index¹¹. The pooled cross-sectional regression is conducted not only by the OLS, but also by the weighted least squares (WLS) estimator to avoid potential heteroskedasticity within funds. The weights for WLS are calculated by the inverse of the per fund standard deviation of the residual terms computed from the first OLS estimator.

3.2.4 Trading Activit

To compare trading activities before and after the SSR repeal, mean differences of turnover ratio, expense ratio, and the percentage of cash holding are tested using the t-test and Wilcoxon signed test. The turnover ratio is calculated by the lesser of purchases and sales divided by average monthly net assets. The expense ratio is computed by the percentage of fund assets paid for operating expenses and management fees, including 12b-1 fees, and administrative fees. The portion of cash holding position is the percentage of both actual cash and cash equivalents of the portfolio. The observations having missing values and outliers are deleted resulting from 538 sample funds.

10) Brown, Harlow, and Starks (1996) use only growth-oriented mutual funds, and Chevalier and Ellison (1997) have growth and growth and income funds as samples to test prior performance and risk change. Sirri and Tufano (1998) sample consists of aggressive growth, growth and income, and growth funds to figure out the relationship between the flow and prior performance.

11) Instrument variables for GMM are independent variables and the first difference of market excess return.

4. Results

4.1 Risk

Table 2 reports the cross-sectional mean values of each risk measurement, standard deviation, beta, idiosyncratic risk, and market-adjusted risk before and after the SSR repeal. Notably, risk measurements--including market-adjusted risk increased after the SSR repeal. The difference between the two groups is obviously statistically significant at the one percent level according to the t-test and the Wilcoxon signed test¹².

With respect to fund objectives, cross-sectional risk measurements of the pre-SSR repeal are also lower than those of the post-SSR repeal in most cases. Income-oriented funds such as the equity and the growth income show lower risks in all risk measurements than do growth funds, which was expected. The beta of income-oriented funds decreases after the deregulation unlike other risk measurements. It is more likely that this phenomenon is related to the high volatility of the market condition during the period after the SSR repeal. Also, it can be interpreted that income-oriented funds dampen market risk exposures in order to achieve the fund prospectus that pursues more current income, including dividend payments, as opposed to considering the future value of stocks held by the portfolio. The result of the Wilcoxon signed test is not much different from the t-test.

4.2 Risk-Adjusted Performance

4.2.1 Jensen's Alpha

12) Test result of the Wilcoxon signed test is not shown in Table 2 because the test is so(not???) statistically significant.

The average coefficients of fund-specific time series regressions using equations (1), (2), and (3) are summarized in Table 3. The overall regression results show that the risk-adjusted performance is strongly improved after the SSR repeal. Jensen's $\Delta\alpha$ coefficients clearly display a positive sign and are statistically significant at the one percent level in all three panels (0.14 percent a month for the market model; 0.13 percent for CAPM; and 0.13 percent for the interest risk-adjusted model). Funds are observed to achieve an abnormal return of 1.53 percent a year after the SSR repeal when market, size, book-to-market ratio, and interest difference are used as indices to control risks in the interest risk-adjusted model. On the other hand, abnormal returns for pre-SSR repeal, α , show a negative sign in most models.

In terms of the results of analyses by objectives, growth-oriented funds enhance the abnormal return while income-oriented funds worsened after the SSR repeal. Growth, aggressive growth, and small company funds show positive $\Delta\alpha$ coefficients, while equity and growth income funds display negative $\Delta\alpha$ coefficients with statistically significant in two models. These results suggest that income-oriented funds have different investment strategies from growth funds, which is consistent with the result of the beta change in Table 2. By objectives, funds that show improved abnormal returns after the SSR repeal exhibit negative abnormal returns before the SSR repeal, and vice versa. This implies that there is an inverse relationship between pre- and post-SSR repeal with respect to abnormal returns. Meanwhile, aggressive growth funds accomplish the most improved abnormal returns among the five objectives.

4.2.2 Sharpe and Treynor Differentials

Table 4 contains the results of other risk-adjusted measurements, the Sharpe and the Treynor differential, for the two periods, before and after SSR repeal. Overall, both the Sharpe and

Treynor differentials obviously show increases in the post-SSR repeal period. Two differentials for post-SSR repeal display a positive sign changing from the negative sign of the pre-SSR repeal period. Consistent with the results of Jensen's alpha by objectives, the Sharpe and Treynor differentials of growth oriented funds are increased whereas those of income oriented funds are rather decreased. In particular, aggressive growth funds reveal the biggest improvement of abnormal returns after the SSR repeal.

Panel B of Table 4 also displays significant enhancement from the abnormal performance after the SSR repeal. In terms of the Sharpe ratio, the percentage of funds outperforming the market for the post-period reaches 59%, which is much higher than the 27% of the pre-period. Significantly, seventy percent of aggressive growth funds better performed than the market did during the post-period, while no aggressive growth fund outperforms the market before the SSR repeal. The statistics of the Treynor ratio displays a similar pattern. However, income-oriented funds display a somewhat different picture. The Sharpe ratio of equity income funds and the Treynor ratio of equity income/growth income funds are decreased after the SSR repeal.

4.3 Risk Management

Table 5 presents regression estimates of OLS and WLS on beta, idiosyncratic risk, and standard deviation conditional on prior performance. The coefficients of γ evaluating the relationship between prior performance and risk changes show a negative sign for all risk measures in the WLS estimator and for beta in OLS, which is consistent with the findings of previous studies¹³. Among them, though, the coefficient of γ in the standard deviation in WLS is

13) Grinblatt and Titman (1989); Ippolito (1992); Edelen (1995); Brown et al. (1996); Chevalier and Ellison (1997); and Koski and Pontiff (1999).

shown to be only significant. The coefficients of γ for the idiosyncratic risk and standard deviation in the OLS estimator display a positive sign with insignificance.¹⁴

Based on the weak results in some coefficients, prior performances might not affect risk changes. This can be attributed to the time-varying effect and the fund-specific heteroskedasticity. If the sample period from 1992 to 1994 of Koski and Pontiff (1999) is applied, all three coefficients of γ present a negative sign with significance in the OLS and WLS estimators. During the sample period used in Koski and Pontiff, the number of bull market months in the second half is more than in the first half. The markets in the first half, however, show better performances than the second half during the sample periods of this study. This weak result may explain why managers were reluctant to increase risk exposures in spite of their poor performances, since the market went down in the second half and short sale or the use of derivatives was restricted under the short-short rule.

On the other hand, the effect of the SSR repeal on the risk management has been clearly observed. The parameter δ measuring the incremental effect of risk change on prior performances after the SSR repeal presents a positive sign that is statistically significant in all coefficients except for the idiosyncratic risk in OLS. The δ coefficients of beta are 4.36 and 3.93 in the OLS and WLS estimators, respectively, and those of standard deviation are 0.09 and 0.13, which are statistically significant at the one percent level. The implication of the δ coefficient in WLS, for example, is that if a fund performs one percent more returns than the average return of funds with the same objective, then the fund beta additionally increases as much as 0.039 after the SSR repeal. This suggests that the negative impact of prior performance on the risk changes decreases after the SSR repeal. Therefore, the cash flow hypothesis in which cash inflow caused

14) Beta and idiosyncratic risks can be calculated by using the various measurement methods. They are computed from the market timing model with consecutive twelve months or eighteen months, or the first or the second half for two years respectively. They are also estimated by pooled cross-sectional regression with two sub-groups of the pre- and post-SSR repeal. The results using other measurement methods do not improve the insignificant property.

by a good performance brings down the risk level of the funds is more convincing than the incentive gaming hypothesis in which fund managers increase the risk after a poor performance for incentive purposes. This implies that fund managers employ the advanced financial vehicles to maintain a given and desired risk level rather than manipulate risks which can be harmful to fund investors.

Meanwhile, the idiosyncratic risk change is less likely to be affected by the SSR repeal than it is by beta or standard deviation especially for OLS. This result can be interpreted to mean that OLS is less logical and less relevant than WLS is because funds have their own strong heteroskedasticity that often happens in a pooled cross-sectional regression. In summary, the results of risk management present a clear evidence that the negative relationship between prior performance and risk change is weakened after the SSR repeal, which strongly supports the alternative hypothesis (3).

4.4 Trading patterns

The changes in trading activity patterns after the SSR repeal are given in Table 6. The most noteworthy result is that funds have a marginally increased turnover ratio after the SSR repeal. Even if the overall turnover ratio of funds increases slightly by 2.48 percent, it is statistically significant at the ten percent level in only the Wilcoxon signed test. According to fund objectives, only small company funds show a significant difference of the turnover ratio between before and after the SSR repeal. More growth funds are statistically observed to increase the turnover ratio since the SSR repeal by the Wilcoxon signed test. The reason for this somewhat unexpected result can be attributed more to the fact that market conditions affect trading activities. The market return of the post-SSR repeal period is 0.17 percent per month, which is much lower than the 1.06

percent of the pre-SSR repeal period. This implies that funds may confine active trading depending on the market conditions.

The expense ratio and the percentage of cash holding position undoubtedly diminish. Regardless of fund objectives, the expense ratio representing the percentage of fund assets paying for operating expenses and management fees, including 12b-1 fees, and administrative fees drops. The statistics clearly displays changes in two tests and in all objectives. The results suggest that the decrease in administration costs and the transaction cost benefit dictates the likelihood of expense increases occurring as a result of the active management after the deregulation. Decreasing expense ratio supports the findings of previous literature in that funds may be able to lower their costs using various financial vehicles after the SSR repeal because funds tend to permit investments in derivatives mainly for the transaction-cost benefit.

Funds are also observed to reduce the cash holding position after the SSR repeal. The portion of both actual cash and cash equivalents of the portfolio in overall funds is decreased to 4.96 percent from 7.24 percent. This finding is expected because the funds had various financial vehicles to manage cash and cash equivalents after the SSR repeal. This implies that funds actively manage portfolios and quickly respond against cash inflows by using various financial vehicles. This result sustains findings in this study that beta increases after the SSR repeal. With respect to fund objectives, all growth funds show a decrease of cash holding position at a significant level. A fund's portfolio with a large percentage of its assets in cash indicates that it is a defensive fund.

5. Robustness Tests

In this section, this paper examines whether the use of derivatives really increase after the SSR repeal, which is an important fact because all the hypotheses are developed from this assumption. This paper investigates the number of funds that are authorized to use derivatives contracts in their investment management and that actually use derivatives contracts. The data are from the N-SARA (the first six months) or N-SARB (full year) form of the SEC's EDGAR. Item 70 of the N-SAR form requires that the filing investment companies report whether the fund's investment policies allow the use of derivatives investments. Item 70 of the N-SAR is classified depending on the type of derivatives used as follows: options on equities (70-B), options on stock indices (70-D), interest rate futures (70-E), stock index futures (70-F), options on futures (70-G), and stock index futures (70-H). A total of 174 funds out of our 611 sample funds report item 70 on their N-SARs form.

Table 7 shows the trend in the use of derivatives for our sample funds. The number of funds that are authorized to use derivatives and the number of funds that actually use them show a clear increase in all types of derivatives. Since the SSR repeal, the number of funds that use at least one type of derivatives has increased by 38.1 percent. In particular, the use of options on equities is dramatically increased by 50 percent after the SSR repeal. It implies that the use of derivatives has been playing a substantial role in changing risk-return characteristics and trading pattern after the SSR repeal.

The second robustness test is performed through six overlapping periods with respect to risk, risk-adjusted return, and trading patterns in order to control the confounding effects other than the SSR repeal. An overlapping period is composed of a three year unit and provides the micro trend during the sample period instead of a simple comparison of pre- vs. post-SSR repeal.

Table 8 displays risk measurements, risk-adjusted performances, and the trading patterns during the overlapping periods. It also shows the significant differences in all test variables since 1998. The standard deviation is dramatically increased in the overlapping period of 96-98 when the SSR repeal period is first included, and the idiosyncratic risk reached the four percent level in 98-00 when the entire overlapping period is composed of the years after the SSR repeal. The Sharpe differentials also exhibit a tremendous rise in the overlapping period of 96-98. Trading patterns show a similar picture. Therefore, robust tests using the overlapping period are more likely to provide evidences that significant changes related to risk, risk-adjusted performance, and trading patterns since 1998 are caused by the SSR repeal more than by any other events.

6. Conclusions

This paper investigates the impact of the short-short rule repeal on portfolio management, investment strategies, and the trading activities of mutual funds. More specifically, this paper analyzes the changes of risk-return characteristics and trading patterns after the SSR repeal.

Through the results of various tests, all null hypotheses are rejected. In terms of risk-return characteristics, risk measurements including beta, unsystematic risk, and market risk-adjusted risk for post-SSR repeal clearly show an increase. The abnormal returns of funds are observed to have been improved. In regression tests for calculating Jensen's alpha using the market, CAPM, the interest rate-adjusted model and the two-group test through Sharp and Treynor differentials, the abnormal performance of funds increases after the SSR repeal. The risk management pattern is also found to alter through the use of derivatives, which means that the inverse relationship between risk changes and prior performances lessens. In addition, it is shown that trading patterns have significantly changed before and after the SSR repeal. The expense ratio and the portion of

cash holding position obviously drop after the SSR repeal. Contrary to our expectations, however, the turnover ratio marginally increases after the SSR repeal.

Notably, the test results demonstrate a somewhat different picture depending on fund objectives. For instance, income-oriented funds reveal that their beta values decrease and that risk-adjusted performance deteriorates in Jensen's alpha and in the Sharpe and Treynor differentials. Their turnover ratio also decreases unlike growth-oriented funds. The reason may be attributed to the unique characteristics of income-oriented funds whose managers manage their portfolios more conservatively under market conditions with huge volatility. In the robustness test, the number of funds authorized to use derivatives as well as the number of funds that actually use them are observed to significantly increase after the SSR repeal.

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Table 1. Descriptive Statistics of Mutual Funds

The statistics are summarized for monthly excess returns of 611 sample funds, the market index, and the risk free rate from January 1994 to December 2001, a period of 96 trading months. N is the number of funds in the group. Mean is the average return of sample funds. MIN and MAX are minimum and maximum of the mean return. Std, S, and K are the average of standard deviation, skewness and kurtosis of funds. Numbers are in percent.

Obj [*]	N	Mean	Std	MIN	MAX	S	K	CAPM beta
AG	33	0.7077	6.8274	-0.5292	1.2551	-0.2991	1.6422	1.1641
EI	43	0.5741	3.4233	0.2674	0.7977	-0.5033	1.8677	0.7107
GI	166	0.6350	3.8783	0.0850	1.1556	-0.5986	1.7936	0.8540
GR	277	0.6601	4.9897	-0.1630	1.3581	-0.5212	1.9010	1.0091
SM	92	0.7687	5.7560	0.1177	1.2343	-0.3971	2.1520	0.9181
Overall	611	0.6662	4.7921	-0.5292	1.3581	-0.5102	1.8932	0.9406
S&P500		0.7246	4.0386	-14.8650	9.2962	-0.6720	1.1283	
Rf		0.3738	0.0849	0.1408	0.5142	-0.6150	-0.4960	

* AG: Aggressive Growth, EI: Equity Income, GI: Growth-Income, GR: Growth, SM: Small Company

Table 2. Risk Measurements of the Pre- versus the Post-SSR Repeal

Listed are mean estimates of risk variables: standard deviation, beta, idiosyncratic risk, and market adjusted risk for the pre- and the post-short-short rule repeal. *t*-test is the mean difference test where mean estimates of risk variables are equal for the pre- and the post-deregulation period. Beta and idiosyncratic risk are computed by market model. Monthly returns are in percent. The Wilcoxon signed test is performed and the result is statistically significant in all tests except beta of growth income funds.

Risk Measurements		AG	EI	GI	GR	SM	Overall
Standard Deviation	Pre	4.66	2.48	2.78	3.38	3.95	3.31
	Post	9.17	4.45	5.08	6.70	7.71	6.39
	<i>t</i> -test	17.59	23.39	47.45	36.13	19.90	50.77
Beta	Pre	0.95	0.76	0.87	0.92	0.85	0.89
	Post	1.28	0.68	0.85	1.06	1.00	0.98
	<i>t</i> -test	7.70	-4.26	-2.17 [†]	11.40	12.40	12.40
Idiosyncratic Risk	Pre	3.71	1.06	1.02	1.97	3.30	1.92
	Post	6.16	2.52	2.08	3.50	5.59	3.51
	<i>t</i> -test	10.66	16.05	15.56	16.92	14.26	28.07
Market-adjusted Risk	Pre	1.73	0.46	0.24	0.58	1.11	0.62
	Post	3.89	0.96	0.56	1.69	2.62	1.59
	<i>t</i> -test	8.43	8.52	8.85	13.14	8.43	17.98

[†]P value for *t*-test is 0.0314. P value for Wilcoxon signed test is 0.3933.

Table 3. Abnormal Performance Tests by Regressions

The statistics are the average coefficient estimates of fund time series regressions using the following equations.

Market model $r_{it} = \alpha_i + D_t \Delta \alpha_i + \beta_i r_{mt} + \varepsilon_{it}$

CAPM $r_{it} - r_{ft} = \alpha_i + D_t \Delta \alpha_i + \beta_i (r_{it} - r_{mt}) + \varepsilon_{it}$

Interest risk-adjusted model

$$r_{it} - r_{ft} = \alpha_i + D_t \Delta \alpha_i + \beta_i (r_{it} - r_{mt}) + s_i SMB_t + h_i HML_t + I_i INT_{t-1} + \varepsilon_{it}$$

$r_{i,t}$ is the excess return of a fund i , and $r_{m,t}$ is the market return in excess of the risk-free rate. SMB_t and HML_t are the return difference in month t based on the size and the book-to-market ratio. INT_{t-1} is computed by the differences between average 10-year AAA yield and the three-month T-bill rate. Binary dummy variable D_t equals one if period t is in the post SSR repealing period and zero otherwise. Monthly returns are in percent.

Model		AG	EI	GI	GR	SM	Overall
Market Model	α	-0.5759	0.3900	0.2209	-0.1409	-0.0879	-0.0207
	$t(\alpha)$	-8.25**	11.75**	10.35**	-5.23**	-1.38	-1.07
	$\Delta \alpha$	0.6674	-0.2918	-0.1288	0.2342	0.3239	0.1355
	$t(\Delta \alpha)$	5.68**	-5.94**	-5.15**	7.26**	4.37**	5.90**
CAPM	α	-0.4587	0.2609	0.1488	-0.1297	-0.0711	-0.0355
	$t(\alpha)$	-7.43**	9.12**	8.35**	-5.84**	-1.38	-2.26*
	$\Delta \alpha$	0.6762	-0.3009	-0.1341	0.2350	0.3261	0.1345
	$t(\Delta \alpha)$	5.74**	-6.11**	-5.34**	7.24**	4.36**	5.81**
Interest risk-adjusted Model	α	-0.2846	-0.0429	0.0246	-0.0738	-0.1321	-0.0651
	$t(\alpha)$	-1.86	-1.28	0.88	-2.45*	-2.52*	-3.31**
	$\Delta \alpha$	0.4268	-0.0672	-0.0218	0.1788	0.2256	0.1274
	$t(\Delta \alpha)$	3.92**	-1.53	-0.92	6.54**	3.60**	6.79**

**Significant at the one percent level.

*Significant at the five percent level.

Table 4. Risk-adjusted Performance Tests

The statistics are the average of funds' Sharpe and Treynor differential for the pre- and the post-SSR repeal. A fund Sharpe differential and the Treynor differential can be calculated by Sharpe (Treynor) ratio of fund minus that of market. Panel B shows the percentage of funds that outperform the market return before or after the SSR repeal.

Panel A. Sharpe and Treynor Differential

obj	Sharpe Differential		Treynor Differential	
	Pre	Post	Pre	Post
AG	-0.1616	0.0196	-0.0025	0.0015
EI	0.0116	-0.0155	0.0015	-0.0003
GI	-0.0102	-0.0005	0.0006	0.0005
GR	-0.0769	0.0131	-0.0008	0.0014
SM	-0.0874	0.0271	0.0007	0.0026
Overall	-0.0649	0.0088	-0.0001	0.0011

Panel B. The Percentage of Outperformed Funds

obj	Sharpe Ratio		Treynor Ratio	
	Pre	Post	Pre	Post
AG	0.00	0.70	0.12	0.73
EI	0.70	0.42	0.81	0.47
GI	0.42	0.48	0.63	0.52
GR	0.19	0.62	0.36	0.65
SM	0.17	0.71	0.54	0.74
Overall	0.27	0.59	0.48	0.62

Table 5. Risk Management Tests Using OLS and WLS

The statistics present the regression estimates by OLS and WLS about beta, idiosyncratic risk, and standard deviation change on prior performance in a year. The following is a pooled cross-sectional regression model.

$$\sigma_{i,t2} - \sigma_{i,t1} = \alpha + \lambda D_t + \gamma(r_{i,t1} - gr_{ig,t1}) + \delta D_t * (r_{i,t1} - gr_{ig,t1}) + \phi \sigma_{i,t1} + \sum_j \beta_j Dummy_j$$

where $\sigma_{i,t1}$ and $\sigma_{i,t2}$ is beta, idiosyncratic risk, or standard deviation of fund i during the first six months and the second six months of the year t ; D is a dummy variable that equals one if the period is the post-SSR repeal and zero otherwise; $r_{i,t1}$ is the mean excess return on fund i during the first half of the year t ; $gr_{ig,t1}$ is the mean excess return for funds with the same investment objective with fund i during the first half of the year t ; and $Dummy_j$ is dummy variables that include year, fund objectives, and interactions between year and fund objectives to control variations over time or fund objectives. The weights for WLS are calculated by the inverse of the per fund standard deviation of the residual terms computed from the first OLS estimator.

Changes of Risk		α	λ	γ	δ	ϕ
<i>OLS</i>						
Beta	Coefficient	0.4832	0.4840	-0.6889	4.3629	-0.6945
	t value	9.11**	6.64**	-0.96	4.8**	-79.16**
Idiosyncratic risk	Coefficient	0.4660	0.1250	0.0042	0.0044	-0.9051
	t value	8.4**	1.6	0.54	0.45	-205.54**
Standard Deviation	Coefficient	2.3040	0.9330	0.0015	0.0900	-0.6335
	t value	11.14**	3.25**	0.06	2.61**	-72.53**
<i>WLS</i>						
Beta	Coefficient	0.4537	0.4833	-0.4874	3.9381	-0.6819
	t value	9.72**	7.59**	-0.76	4.83**	-85.03**
Idiosyncratic risk	Coefficient	0.4290	0.0351	-0.0008	0.0126	-0.9078
	t value	11.52**	0.65	-0.15	1.86*	-299.59**
Standard Deviation	Coefficient	1.4140	2.2500	-0.0571	0.1295	-0.4203
	t value	6.33**	7.45**	-1.92*	3.45**	-42.76**

**Significant at the one percent level.

*Significant at the five percent level.

Table 6. Trading patterns of the Pre- versus Post-SSR Repeal

The statistics are the average of turnover ratio, expense ratio, and the portion of cash holding position for the pre- and post-SSR repeal. Turnover ratio is calculated by the lesser of purchases or sales dividing by average monthly net assets. Expense ratio is the percentage of fund assets paying for operating expenses and management fees, including 12b-1 fees, and administrative fees. The percent of cash holding position is the portion of both actual cash and cash equivalents of the portfolio. The mean difference test examines the mean estimates of turnover ratio, expense ratio, and the percent of cash holding position are equal for the pre- and the post-deregulation period. The W-test is the Wilcoxon signed test.

Trading activity	obj	N	Mean		Difference Tests	
			Pre	Post	t-test	W-test
% of Cash holding	AG	27	7.4169	4.8601	-2.34**	-91**
	EI	36	6.1660	4.8398	-1.98*	-105*
	GI	152	6.9385	4.6563	-5.43***	-3506***
	GR	242	7.1027	5.0277	-6.08***	-8675***
	SM	81	8.6508	5.3929	-6.24***	-1232***
	Overall	538	7.2425	4.9568	-10.33***	-43216***
Expense ratio (%)	AG	27	1.4032	1.3438	-2.02*	-84**
	EI	36	1.0497	1.0299	-1.43	-95*
	GI	152	0.9941	0.9508	-3.95***	-2215***
	GR	242	1.1627	1.0845	-8.15***	-8395***
	SM	81	1.2876	1.2299	-3.73***	-945***
	Overall	538	1.1384	1.0780	-9.93***	-35818***
Turnover ratio (%)	AG	27	88.5977	95.4597	0.76	28
	EI	36	54.1854	51.9666	-0.67	-72
	GI	152	59.4759	57.8039	-0.77	-147
	GR	242	82.3470	86.6983	1.31	1720*
	SM	81	70.1857	75.5238	1.75*	394**
	Overall	538	72.4836	74.9681	1.42	6081*

***Significant at the one percent level.

**Significant at the five percent level.

*Significant at the ten percent level.

†AG: Aggressive Growth, EI: Equity Income, GI: Growth-Income, GR: Growth, SM: Small Company

Table 7. Use of Derivatives

This table presents the number of funds that are authorized to use derivatives contracts in their investment management (1) and the number of funds that actually use derivatives contracts (2). The data are from the N-SARA (the first six months) or N-SARB (full year) form of the SEC's EDGAR. Item 70 of the N-SAR form requires that the filing investment companies report whether the fund's investment policies allow the use of derivatives investments. The table reports the number of funds that allow the use of derivatives such as options on equities (70-B), options on stock indices (70-D), interest rate futures (70-E), stock index futures (70-F), options on futures (70-G), and stock index futures (70-H) from 1995 to 2001. Actual use of derivatives contracts (2) of 70-D, 70-E, 70-G, and 70-H are omitted because only a few funds are observed to use these items. A total of 174 funds out of our 611 sample funds report item 70 on their N-SARs form. Numbers in parentheses represent the percentage of funds.

	Derivatives		Options on Equities		Stock Index Futures		Options on Stock Indices	Interest Rate Futures	Options on Futures	Options on Stock Index Futures
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(1)	(1)	(1)
1995	127	36	91	19	118	19	89	43	63	82
1996	127	32	93	23	116	14	91	49	70	84
1997	124	33	96	23	117	11	90	53	66	85
1998	135	45	105	28	121	21	96	62	79	91
1999	128	41	101	32	117	13	95	61	77	90
2000	138	50	108	35	125	18	101	74	89	96
2001	132	50	108	35	124	19	103	70	88	95
1995-1997										
(A)	126	34	93	22	117	15	90	48	66	84
1998-2001										
(B)	133	47	106	33	122	18	99	67	83	93
		38.1	13.0	50.0		21.0				
B/A -1	5.8%	%	%	%	4.1%	%	9.7%	38.1%	25.5%	11.2%

Table 8. Risk Measurements, Risk-adjusted Performance, and Trading Patterns during overlapping periods

The statistics are the average of standard deviation, beta, idiosyncratic risk, Sharpe differential, Treynor differential, percentage of cash holding, expense ratio, and turnover ratio of all samples for each overlapping period.

Panel A. Risk Measurements

	94-96	95-97	96-98	97-99	98-00	99-01
Standard Deviation	3.15	3.55	5.16	5.55	6.35	6.16
Beta	0.91	0.85	0.97	0.98	0.96	0.96
Idiosyncratic Risk	1.97	2.31	2.52	2.99	4.31	4.32

Panel B. Sharpe and Treynor Differentials

	94-96	95-97	96-98	97-99	98-00	99-01
Sharpe Difference	-0.1160	-0.1232	-0.0152	-0.0407	0.0090	0.0116
Treynor Difference	-0.0015	-0.0001	-0.0005	-0.0004	0.0001	0.0044

Panel C. Trading Patterns

	94-96	95-97	96-98	97-99	98-00	99-01
% of Cash holding	7.6218	6.7977	6.2240	5.4655	4.7807	4.5589
Expense ratio (%)	1.1320	1.1222	1.1046	1.0857	1.0726	1.0722
Turnover ratio (%)	72.2785	72.5817	73.4584	73.7304	73.8123	75.4635