

# “Mutual fund managers’ behavior in derivatives: evidence from Taiwan”

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## Mutual fund managers' behavior in derivatives: evidence from Taiwan

### Abstract

Taiwan open-end equity funds hold securities rarely less than 70% of their net asset value because that have to cut management fees in half by the law. Thus, it is more important that fund managers use derivatives to hedge against periods of stress in financial markets. This paper examines whether the use of futures and options by fund managers can increase performance. The empirical results show that futures and options users over perform nonusers by nearly two percent per year. Furthermore, high rank users outperform low rank users, which means heavy user of futures and options outperform light user.

**Keywords:** mutual funds, futures, options.

**JEL Classification:** G11, G12.

### Introduction

General investors would choose mutual funds for investment as they trust the investment experiences of the fund managers. They tend to believe that the professional research team can grasp the international economic ripples, and thus gain better excess returns. However, under the fund-related laws and norms in Taiwan, fund managers' operations are often subject to many limitations. For example, the model agreement for open-ended stock funds stipulates that if the total amount of investment in stocks of listed companies does not reach 70% of the NAV of the fund, the management fee to the fund family should be halved. Based on this, even when fund managers expect that the economic cycle will enter the recession, the fund shareholding percentage is rarely lower than 70% to avoid the decrease in management fee. Hence, when the stock market suffers a system risk, if the investors cannot redeem the fund timely, they will face shrinking asset even the funds are operated by a professional team.

By observing the investment in the open-ended stock funds in Taiwan from 2002 and 2008, when financial crisis occurred, then the average return rates of stock funds were -21.02% and -45.67%, respectively, while weighted stock price index return rates decreased by -19.79% and -46.67%, respectively. Preliminary data suggest that Taiwan's stock funds did not seem to avoid market risk; hence, how fund managers can use derivatives such as futures and options to hedge when the market is in decline has become an important issue of the operations of fund managers.

Regarding the discussions in the statutory respect, to meet the investor demand for redemption, fund managers have to maintain a certain level of

liquidity of assets<sup>1</sup> by holding a certain percentage of cash. This opportunity cost will be reflected in the change in the fund flow in manager's fund configuration. Edelen (1999) argued that fund flow will affect fund performance, while the change in the fund flow caused by the purchase or redemption of investors will affect the operations of the fund manager<sup>2</sup>. Since the trading of futures commodities is based on margin trading, in addition to increasing the utility efficiency by using futures, fund managers can also reduce the impact caused by the adjustment of shareholding due to the change in fund flow. On the other hand, whether fund managers use futures and options in operational strategic planning tends to associate with their investment training. If fund managers are not well-versed in operating derivatives, they may also avoid operations of relevant commodities.

In addition to the above-mentioned laws and norms that will affect fund managers' operations, fund managers should have professional considerations regarding the changes in portfolios. However, relevant studies have suggested that information asymmetry may also affect the behaviors of fund managers. If the level of information asymmetry is greater, it may make managers more likely to engage in self-serving risk adjustment behaviors (Lakonishok, Shleifer, Thaler and Vishny, 1991). According to Gervais and Odean (2001), as the investors' overconfidence level may vary with changes in market state, operations of fund managers will be interfered. Lin (2004) suggested that in Taiwan's mutual fund market, funder managers of good (poor) performance will raise (lower) risk exposure and increase (reduce) trading

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<sup>1</sup> According to the provision of Article 18 of "Securities Investment Fund Management Measures", investment trust companies can deposit cash in the bank, buy short-term bonds or other FSC-approved approaches to keep the liquidity of the fund assets. The fund asset ratio should not be lower than 5% of the net asset value of the fund.

<sup>2</sup> See Sirri and Tufano (1998), Fant and O'Neal (2000), Jain and Wu (2000), Froot, O'Connell, and Seasholes (2001), O'Neal (2004).

only in the bullish market. By contrast, there is no evidence of self-serving behaviors of fund managers in a bearish market. Hence, market conditions not only affect investor behaviors, but also the operations of fund managers. In view of this, the relationship between changes in market conditions and the use of futures and options operations by funds, the hedging effect of using futures and options trading by Taiwan's fund managers is another key point of discussion.

Therefore, this paper focuses on TAIEX options trading used by fund managers, and distinguishes the short and long sides to discuss the relationship between fund returns and risk. For hedging needs and increase in investment efficiency of funds, this paper reviews the effectiveness of using futures and options by funds. Moreover, for futures and options operations, in addition to a higher level of liquidity, the transaction costs are relatively lower. Therefore, for funds of large scale, managers have much higher level of flexibility by using futures and options as compared to using individual stocks. Accordingly, this paper also discusses the correlation between fund characteristic factors, including standard deviation, net asset value, turnover rate and net money growth rate and the use of futures, and options by fund managers.

Our results show futures and options users over perform nonusers by nearly two percent per year, but there is no significant with the types of funds and use of derivatives. Furthermore, high rank users outperform low rank users, which is consistent with greater futures and option usage being associated with better performance. This paper is organized as follows: Introduction presents the research motives and purposes; Section 1 is the literature review; Section 2 discusses data analysis, including sample data processing, variable definition descriptions and research method; Section 3 describes the empirical analysis; the final section offers conclusions of this study.

## 1. Literature review

Using hedge funds of higher level of operational flexibility as an example, according to Deuskar et al. (2011), managers with better performance will not choose to leave the original companies for higher pay due to the rise of hedge funds. Whether this result is related to the familiarity of commodity operations of the fund managers is not known. In addition, hedge funds' strategies are more flexible as compared with traditional funds with more diversified investment tools. With hedged mutual funds<sup>1</sup>, hedge funds and traditional mutual funds as

research samples, Agarwal, Boyson, and Naik (2009) compared the operating performance of the three funds, and found that hedged mutual fund performance is lower than that of the hedge funds but higher than that of the mutual fund, which has the poorest performance. Similarly, with funds in the emerging market as samples, Eling and Faust (2010) found that the performance of hedge funds in the emerging market<sup>2</sup> is better than that of the traditional funds. It can be concluded that traditional funds' performance is generally lower than that of the hedge funds because the traditional funds are not like hedge funds in pursuit of the absolute returns. If traditional funds can effectively hedge by using futures and options, they will be preferred by investors due to corresponding rewards and risks.

Following from this relative perspective, Samouilhan (2014) examines the behavior of active managers during periods of changing market opportunities which defined in terms of a market's cross-correlation and cross-sectional volatility structure. The results show that the behavior of managers in top and bottom quartiles is affected by the opportunity set. As the opportunities expand, top quartile managers take greater relative risk turn into greater outperformance and bottom quartile managers turn into greater underperformance. Compared to hedge funds, when traditional funds engage in futures and options trading, the hedging demand should be greater than the increase in investment portfolio efficiency. Koski and Pontiff (1999) discussed the equity funds of the Morningstar Mutual Funds on Disc, and found that there is no significant difference in higher moments of the risk and return rate distribution for whether using the derivative commodities. This conclusion suggests that the use of financial derivatives by funds does not increase the risk exposure of funds. Moreover, fund performance and the trading of financial derivatives have no significant relationship, and the use of financial derivatives can only change system, while cannot change the system risk. This result means that the risk of investment portfolio will not be increased by the operations of using financial derivatives by fund managers due to previous performance.

However, Garcia-Appendini and Rangel (2009) reached different conclusion in the study of using Italian stock funds as samples. They suggested that the use of financial derivatives can improve fund performance, reduce idiosyncratic risk and total risk,

<sup>1</sup> Hedging mutual funds' investment strategies are like those of the hedge funds. However, it retains the characteristics of the mutual funds such as low investment threshold, better liquidity and lower cost. For

example, Baron Partners Fund, Hussman Strategic Growth Fund, CGM Focus Fund are funds of this category.

<sup>2</sup> Regarding the study on the hedge funds in emerging markets, see Fung and Hsieh (2001), Capocci and Hubner (2004) and Abugri and Dutta (2009).

while skewness will be reduced and the kurtosis will be increased. Marin and Rangel (2006) empirically studied the mutual funds in Spain, and found that the use of derivatives did not improve fund performance, while the fund performance of most funds using derivatives was lower than those not using the derivatives. Furthermore, fund managers engaging in derivative trading did not have better timing and stock pick capabilities. Second, there was no evidence suggesting that the use of derivatives by the fund was for hedging purposes. However, the use of derivatives to increase investment efficiency was significant. Finally, the data suggest that using derivative commodities by funds can make the management of fund flow more efficient.

Chou and Tu (2002) discussed the performance of using futures by using the cross-sectional data in the analysis whether the returns and risks would differ between funds using or not using futures. According to the results, using the futures or not is irrelevant to the same period returns, and the use of the futures have no correlation with the reduction of total risk of the fund. Based on the above, in different countries' financial environments, the results of the fund managers' operations of derivatives may vary accordingly.

Regarding the correlation between change in fund investment portfolios and the operating strategies of fund managers, Cici and Palacios (2013) explored the performance of using options by stock fund managers based on the CRSP database for the period from 2003 to 2007, and found that the performance of funds of more frequent options transactions and funds using the directional strategies was relatively poor, suggesting that fund managers had no special talents or more private information. Moreover, hedging is the main factor for fund managers to engage in options trading. McCord and Martin (1993) pointed out that using derivatives can increase inflow of capital because fund managers are able to adjust the proportion of distribution of expected returns of the funds through the operations of derivatives. Moreover, funds can create higher level of returns by using derivatives due to lower costs and higher efficiency of asset allocation.

Regarding previous performance and risk adjustment behavior, relevant studies have all confirmed that fund managers would take investment behaviors of higher risk level due to poor previous performance (Busse, 2001; Almazan, Brown, Carlson and Chapman, 2004; Kempf and Ruenzi, 2008; Li, Chen and Lin, 2011). Regarding the relationship between risk adjustment behavior and derivatives, Chevalier and Ellison (1995) empirically found that fund managers would use derivatives to manage the investment portfolio risk.

The previous period performance and risk of the fund are negatively correlated, suggesting that poor performance will encourage fund managers to take high risk derivative operations. According to Brown, Harlow, and Starks (1996), managers of funds with poorer performance at the beginning of the period would be likely to engage in options trading at the end of the period, in order to increase the fund investment returns, thus, enhancing the risk of the investment portfolio<sup>1</sup>.

The above studies generally accept the use and operations of financial derivatives by funds; however, no consistent view has been reached regarding the investment effectiveness of the fund performance. In recent years, the topic of financial derivatives has received more attention. Although the above studies have reported different viewpoints on the impact of using futures and options by funds, there still lacks a complete interpretation. This paper attempts to propose a new empirical analysis to provide a more comprehensive conclusion.

## 2. Empirical methodology

**2.1. Data source.** Schultz (1994) pointed out that, most stock fund managers would choose the relatively common financial derivatives of futures and options. According to Taiwan's statistical data, this paper explores the topic by using futures and options as examples to learn the investment effectiveness of funds engaging in futures and options trading. The research samples are Taiwan's open-ended stock funds. Data relating to funds are sourced from the database of the Securities Investment Trust and Consulting Association, including information about NAV, per unit NAV, cash dividends, buy-in turnover rate, sell-out turnover rate, and fund fee<sup>2</sup>. Data from TEJ include the prices of the listed and OTC stocks, the concentrated market issuance weighted stock price index, and fund position details. The data of fund short term investment return rates are sourced from the Financial Statistics Monthly based on the 30-day interest rate of commercial promissory paper in the secondary market; data regarding the trading of futures and options by funds are from Taiwan Futures Exchange.

**2.2. Measurement of fund performance.** The disclosure of fund position details information can be a major reference in the measurement of the fund

<sup>1</sup> Regarding studies on the operations of funds using options, see Koski and Pontiff (1999), Deli and Varma (2002) and Almazan, Brown, Carlson, and Chapman (2004).

<sup>2</sup> Fund fees can be categorized into direct trading cost and the accounting listed expenses. The direct trading cost includes handling charge, transaction tax while the accounting listed expenses include the management fee, carrying fee and other expenses. The fund fee in this study refers to the accounting listed expenses.

performance. Past studies, such as Grinblatt and Titman (1989), Wermers (2000), Kaminsky, Lyons and Schmukler (2004), have developed the manager performance measurement models by the disclosed information of position details. However, all the above models have not considered whether the stock changing behaviors of the fund managers during the information disclosure period can create higher returns of fund performance. Therefore, when using the disclosed information about position details to measure the performance can inevitably result in bias due to the limitation of the information disclosure period. Compared with previous studies, this paper proposes a new viewpoint to measure the fund performance before discussing the relationship with the use of futures and options trading.

Regarding the measurement of fund performance, Kacperczyk, Sialm and Zheng (2006) developed the fund performance model with the position details disclosed by the fund. In their study, the unobserved behaviors of the fund managers included transaction costs and manager commission, as well as other hidden costs. Moreover, the unobserved behaviors of the manager had a long term impact on fund performance; hence, the behaviors of fund managers may generate hidden costs. Such type of agency costs can be directly reflected in the stock changing behaviors of the managers. Therefore, the benefits of the actual operations of the manager cannot be accurately understood using the traditional measurement approach.

The performance measurement approach proposed by Kacperczyk, Sialm and Zheng (2006) is to establish the hypothetical portfolio based on the quarterly published information of the position details of the fund, and assumes that the manager will take the buy and hold strategy. The model calculates the return rate of holding the stocks until the next period of information disclosure by the cross-sectional approach. If the gap between the calculation result and the actual net value return rate is greater, it means that the return rate of the stock changing operation of the fund manager is higher. Hence, the fund performance can be more accurately measured. The measurement model is as illustrated below.

NAV (net asset value) is obtained from subtracting the total liabilities from the total assets of the fund. The returns obtained in this way do not have the concept of risk, and it is calculated by:

$$R_{i,t} = \frac{NAV_{i,t} + DIV_{i,t} - NAV_{i,t-1}}{NAV_{i,t-1}}, \quad (1)$$

where  $R_{i,t}$  is the return rate of fund  $i$  in period  $t$ ,  $NAV_{i,t}$  is the end of term value of fund  $i$  in period  $t$ ,  $NAV_{i,t-1}$  is the end of term net value of fund  $i$  in

period  $t-1$ ,  $DIV_{i,t}$  is the stock dividend of fund  $i$  in period  $t$ . If establishing the hypothetical portfolio based on the recently disclosed information about the position details, and assuming the fund manager will take the buy and hold strategy, the return rate of the next period will be:

$$RH_{i,t} = \sum_{j=1}^N \tilde{w}_{i,j,t-1} R_{j,t}, \quad (2)$$

where  $RH_{i,t}$  is the return rate in period  $t$  when using the buy and hold strategy in period  $t-1$ ,  $R_{j,t}$  is the return rate of stock  $j$  in period  $t$ ,  $\tilde{w}_{i,j,t-1}$  is the shareholding percentage of fund  $i$  holding stock  $j$  in period  $t-1$  and it is calculated by the following equation:

$$\tilde{w}_{i,j,t-1} = \frac{N_{i,j,t-1} P_{j,t-1}}{\sum_j N_{i,j,t-1} P_{j,t-1}}. \quad (3)$$

The return gap can be defined as the gap between the net value return rate and the return rate of taking the buy and hold strategy according to the disclosed position details information:

$$RG_{i,t} = R_{i,t} - (RH_{i,t} - EXP_{i,t}), \quad (4)$$

where  $EXP$  refers to the accounting listed expenses including management fee, carrying fee, guarantee fee and other costs. Further distinguishing the return gap values finds that when the return gap is positive, it can be regarded that the stock changing operations of the manager during the disclosed period is more efficient, namely, the fund manager can create greater value of fund returns. On the contrary, it means that the operations of the fund manager during the information disclosure period have an adverse impact on fund performance. After quantifying the performance indicators of the fund manager behaviors, funds engaging in the trading of futures (options) before testing are distinguished according to market conditions, financial crisis period and fund characteristic factors, in order to explore the relationship between the above factors and the use of futures (options) trading by funds.

**2.3. Regression analysis model.** This study uses regressions of quarterly return gap measures on several independent variables. To explore whether fund managers using futures and options can bring significant benefits, the regression model established in this study is as shown below:

$$RG_{i,t} = \beta_0 + \beta_1 User_{i,t} + \beta_2 High\_Rank_{i,t} + \beta_3 Low\_Rank_{i,t} + \beta_4 STD_{i,t-1} + \beta_5 NMG_{i,t-1} + \beta_6 TURNOVER_{i,t-1} + \beta_7 LOGTNA_{i,t-1} + \varepsilon_{i,t}, \quad (5)$$

where the fund performance  $RG$  is the dependent variable,  $User$  is a dummy variable that equals to one if fund uses futures or options, and zero otherwise. Besides, we rank and sort all futures and options users into two groups based on the average portfolio fraction invested in futures and options.

Futures and options users with an average portfolio fraction above the cross-sectional median are classified as high rank user and the rest, as low rank user.  $High\_Rank$  denotes the dummy variable of the high users of futures and options during the sample period. Namely, when the variable is higher than median during period  $t$ , dummy variable  $High\_Rank$  equals to one, otherwise it is zero. Similarly,  $Low\_Rank$  denotes, when the various variables are lower than median during period  $t$ . The dummy variable equals to one, otherwise it is zero. To control other possible factors relating to performance, this paper adds the control variables such as previous period fund performance and fund characteristic factors to control the net value fluctuation level ( $STD$ ), net money growth rate ( $NMG$ )<sup>1</sup>, turnover rate ( $TURNOVER$ ) and total net asset ( $LOGTNA$ ), in order to avoid affecting the relationship with fund performance.

### 3. Empirical results and analysis

**3.1. Descriptive statistics.** Since the approval of investment trusts to engage in derivatives in May

1999, Taiwan’s financial market has become gradually mature, and the relevant statutory constraints have loosened<sup>2</sup>. Nevertheless, the competent authorities still keep restrictions on the percentage of holding derivatives by funds for the consideration that percentage of retail investors in Taiwan’s fund market. When the managers of foreign funds and Taiwan’s investment trust funds attempt to increase investment efficiency, the restriction on the risk exposure of the non-write-off derivatives has been loosened from the previous 15% to 40%, making the operations of fund managers of financial derivatives more flexible. However, according to the structure of average futures and options commodity traders in the past 10 years, as shown in Figures 1 and 2, securities investment trusts, whether in the trading proportions of futures or options, are the institutional investors of lowest percentage, suggesting that investment trusts have no significant impact in the futures and options market despite the trend of ever increasing proportion of institutional investors’ participation in futures market trading against the total trading volume. Hence, investment trusts should be more flexible in operations as compared to other institutional investors. Moreover, due to the loosening of the relevant regulations, fund managers will have fewer market size limitations when engaged in operations of futures and options.

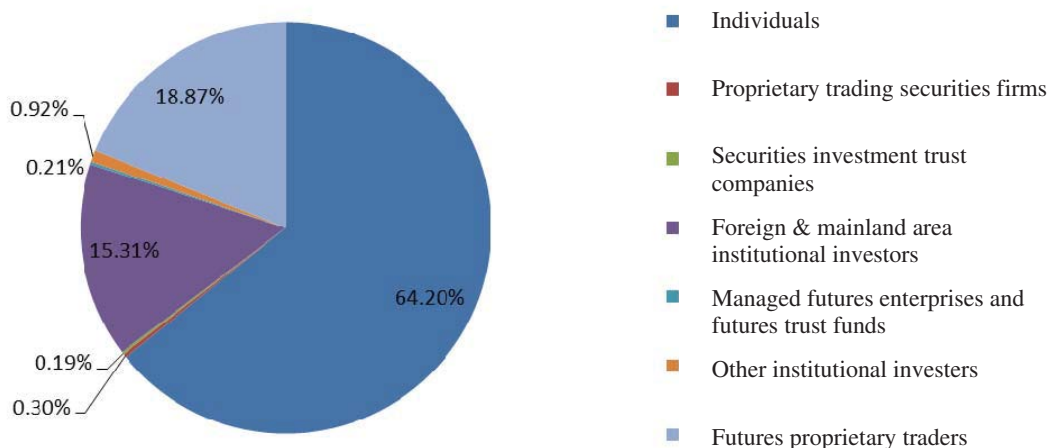


Fig. 1. The structure of futures traders

<sup>1</sup> Relevant studies have suggested that, fund flow and performance returns have a significant relationship (Ippolito, 1992; Sirri and Tufano, 1998; Fant and O’Neal, 2000; Jain, and Wu, 2000), therefore, this paper lists the change in the net cash flow as a control variable and used the net money growth rate model measurement method proposed by Zheng (1999):  $NMG_{i,t} = [TNA_{i,t} - TNA_{i,t-1}(1 + R_{i,t})] / TNA_{i,t-1}$ .

<sup>2</sup> Article 9 of the “Securities Investment Fund Management Measures” was amended on November 27, 2008 by adding the provision of “Securities investment trust enterprises approved by this Commission to concurrently engage in futures investment trust business can apply to this Commission, when using funds in trading of securities related commodities, for a ratio that is not subject to the restriction of the previous section. The risk exposure should not be more than 100% of the net asset value of the fund”. “Notes to Securities Investment Enterprises Using Securities Investment Funds in Securities Related Commodities” was released on November 18, 2004 and was thereafter amended in May 2005, January 2007, February 2008, and June 2011 in the direction of deregulation.

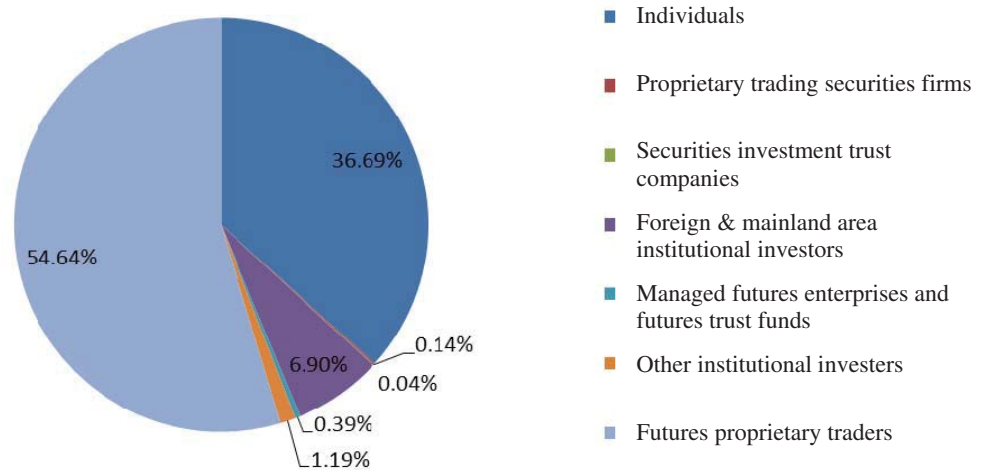


Fig. 2. The structure option traders

In theory, after deregulation, fund managers' operations should be more active than before. However, according to the statistics of the trading volume of investment trusts in the futures market, there is no obvious rise (Table 1). Therefore, after competent authorities loosening the relevant restrictions regarding the participation of securities investment trusts in the futures market, the impact on the fund managers' trading in the futures and options would be further explored in this study, in order to help competent authorities in future adjustment of norms for domestic and foreign funds in trading derivatives.

Table 1. Futures trading volume of securities investment trust

Year	Buy	Sell	Year	Buy	Sell
2002	16,285	18,152	2008	632,099	641,041
2003	52,578	71,142	2009	447,288	391,761
2004	316,959	351,566	2010	208,376	195,039
2005	497,956	485,573	2011	168,017	141,375

2006	279,184	274,768	2012	74,271	73,778
2007	223,725	220,881	2013	47,990	48,433

Although Taiwan Futures Exchange launched more derivatives, funds still use TAIEX futures as the main trading target and TAIEX options in options trading (Tables 2 and 3). Nevertheless, according to the data of the tables, a number of interesting findings can be observed. First, regarding the futures trading by investment funds, the TAIEX futures trading in 2011 accounted for only 75%, and the financial index futures trading ratio rose to 9.82%, which has gone beyond the electronics index futures for the first time and setting a nearly five years high. It is possibly due to the European Debt Crisis. As a result, funds increased the hedging proportions of financial stocks, and the trading percentage of the stock futures commodity<sup>1</sup> increased rapidly to 5.77%. Whether stock futures trading can create better returns is a topic worthy of follow-up studies.

Table 2. Proportion of positions by futures type

Futures type	2007	2008	2009	2010	2011	2012	2013
TAIEX futures	87.72%	82.50%	90.15%	89.99%	75.00%	88.44%	84.81%
Mini-TAIEX futures	0.01%	0.59%	0.20%	0.09%	1.35%	3.29%	4.70%
GreTai securities market stock index futures	0.15%	0.16%	0.00%	0.06%	1.11%	1.36%	1.34%
Electronic sector index futures	10.17%	11.15%	6.14%	6.08%	6.68%	3.72%	4.61%
Finance sector index futures	1.80%	5.47%	3.41%	3.47%	9.82%	2.98%	3.91%
Non-finance non-electronics sub-index futures	0.16%	0.14%	0.10%	0.30%	0.27%	0.22%	0.33%
Single stock futures	0.00%	0.00%	0.00%	0.00%	5.77%	0.00%	0.30%

Second, regarding the trading of options, funds used more put options than call options. The buy put trading volume was greater than the sell put trading volume, indicating that funds may tend to take the hedging operations in favor of short side. Regarding the use of options, compared with futures trading, fund managers used less options trading of electronic index and financial index, but concentrated on TAIEX options trading.

Table 3. Number of positions by option type

Options types	Buy position	Sell position
Call option		
TAIEX options	221,721	224,741
Electronic sector index options	19	394

<sup>1</sup> Stock futures were marketed on January 25, 2010 with 34 initial stock futures targets. By the end of November, 2011, the total number of marketed targets has been more than 200.

Table 3 (cont.). Number of positions by option type

Options types	Buy position	Sell position
Finance sector index options	100	297
Put option		
TAIEX options	445,334	345,323
Electronic sector index futures options	0	10
Finance sector index futures options	2	2

**3.2. Regression results.** We regress the return gap of each mutual fund in each quarter on the use of futures and options proxy variable and on other fund characteristics. We lag all control variables by one quarter. Using the lagged explanatory variables mitigates potential endogeneity problems. Table 4

presents the results of the regression on return gap ( $RG$ ) against  $User$  variables.

The first column of Table 4 shows the coefficients from the panel regression using the return gap as the dependent variable.  $User$  has a statistically significant positive effect on the return gap of the mutual fund. The result shows that futures and option users perform better than nonusers. In the second column the fund characteristics are included as the control variable. The result shows that controlling for fund characteristics changes the outperformance results very little. Results are presented that mutual fund managers could employ futures and options to help protect the value of their portfolios.

Table 4. Return gap regressions

	Dependent variable: return gap in each quarter $t$ for fund $i$							
	(1)		(2)		(3)		(4)	
	Coefficient	Standard errors	Coefficient	Standard errors	Coefficient	Standard errors	Coefficient	Standard errors
<i>Constant</i>	12.810***	0.255	13.835***	0.327	12.789***	0.311	14.054***	0.397
<i>User</i>	0.503***	0.023	0.496***	0.019				
<i>High_Rank</i>					2.811***	0.839	2.899***	0.838
<i>Low_Rank</i>					1.987	1.961	1.982	1.969
<i>STD<sub>it-1</sub></i>			1.223	1.921			1.685	3.301
<i>NMG<sub>it-1</sub></i>			0.299	0.225			1.203	0.808
<i>TURNOVER<sub>it-1</sub></i>			-0.011***	0.002			-0.012***	0.001
<i>LOGTNA<sub>it-1</sub></i>			-2.786***	0.310			-2.899***	0.332

Note: \*\*\* indicates significance at the 1% level.

Furthermore, we rank and sort all futures and options users into two groups based on the average portfolio fraction invested in futures and options. We use two dummy variables,  $Hank\_Rank$  and  $Low\_Rank$ , which indicate whether futures and option user belongs to the high or low user groups. The results in third column indicate the  $Hank\_Rank$  is significant positive related to  $RG$  which means high rank users generated return gap that outperformed otherwise similar nonusers. However, low rank users were not statistically different from the return gap of nonusers. The coefficient also shows the same results in the fourth column. The coefficient on the  $Hank\_Rank$  remains similar and is statistically significant at the 1% level. Therefore, high rank users outperform low rank users, which is consistent with greater futures and option usage being associated with better performance<sup>1</sup>.

## Conclusions

The past studies generally accept the use and operations of financial derivatives by funds; however,

no consistent view has been reached regarding the investment effectiveness of the fund performance. In recent years, the topic of financial derivatives has received more attention. Although the previous studies have reported different viewpoints on the impact of using futures and options by funds, there still lacks a complete interpretation. This paper attempts to propose a new empirical analysis to provide a more comprehensive conclusion that examines whether fund managers using futures and options can bring significant performance.

The results show that fund managers using futures and options do perform better than nonusers. Controlling for a number of fund characteristic variables, we find further evidence that fund managers using futures and options perform significantly better. Furthermore, we also show that heavy user of futures and options outperform light user. In other words, mutual fund managers could employ futures and options to help protect the value of their portfolios.

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