AGRICULTURAL COMMODITY FUTURES AND STOCK MARKET: EVIDENCE FROM RSS3 FUTURES IN THAILAND

Yaowaluk Techarongrojwong
Thammasat University, Thailand
yaowalukt@gmail.com

Pathathai Sinliamthong
Assumption University, Thailand
pathathaisnl@au.edu

Rattana Waranyasathit
Assumption University, Thailand
rattanawrn@hotmail.com

Abstract

This study aims to examine the role of RSS3 Futures as the hedge for stock market in Thailand. The data is collected from May 28, 2004 until December 31, 2015, which includes totally 2,833 trading days. The results show that there is no relationship between RSS3 Futures and the stock market implying that RSS3 Futures can be the hedge for stock market in general. However, RSS3 Futures is not the candidate for safe haven of stock market because it shows no hedge property during the period of extremely negative stock returns. The result implies investors in Thailand, especially stock investors, should consider adding RSS3 Futures in their optimal portfolio because it clearly shows that RSS3 Futures can help in diversifying the risk, especially during the periods of stock market downturn.

Keywords: Diversification, Commodity Futures, Agricultural Product, Hedging

บทคัดย่อ

งานวิจัยฉบับนี้มีวัตถุประสงค์ในการทดสอบบทบาทของสัญญาฟิวเจอร์สยางแผ่นรมควันชั้น 3 เป็นเครื่องมือในการลดความเสี่ยงจากการลงทุนในตลาดหลักทรัพย์แห่งประเทศไทย ข้อมูลที่ใช้ในงานวิจัยนี้ถูกรวบรวมในช่วงเวลาตั้งแต่วันที่ 28 พฤษภาคม 2547 ถึงวันที่ 31 ธันวาคม 2558 รวมทั้งสิ้นมีข้อมูลการซื้อขายจำนวน 2,833 วัน ผลการวิจัยพบว่าไม่มีความสัมพันธ์ระหว่างผลตอบแทนที่ได้รับจากสัญญาฟิวเจอร์สยางแผ่นรมควันชั้น 3 และผลตอบแทนโดยเฉลี่ยของตลาดหลักทรัพย์แสดงว่าสัญญาฟิวเจอร์สยางแผ่นรมควันชั้น 3 สามารถใช้เป็นเครื่องมือในการช่วยลดความเสี่ยงจากการลงทุนในตลาดหลักทรัพย์ได้ อย่างไรก็ตามสัญญาฟิวเจอร์สยางแผ่นรมควันชั้น 3 ยังไม่ถือว่าเป็นสินทรัพย์ที่ปลอดภัย (Safe Haven) เนื่องจากการลงทุนในสัญญาฟิวเจอร์สยางแผ่นรมควันชั้น 3 ยังไม่สามารถช่วงลดความเสี่ยงในช่วงที่ผลตอบแทนของตลาดหลักทรัพย์มีการปรับตัวลดลงอย่างรุนแรง ทั้งนี้ผลที่ได้จากการวิจัยครั้งนี้แสดงว่านักลงทุนในประเทศไทยโดยเฉพาะอย่างยิ่งนักลงทุนในตลาดหลักทรัพย์ควรที่จะเพิ่มสัญญาฟิวเจอร์สยางแผ่นรมควันชั้น 3 ลงในพอร์ทการลงทุนเนื่องจากจะช่วยในการกระจายความเสี่ยงในช่วงขาลงของตลาดหลักทรัพย์

INTRODUCTION

The concept of diversification is general in the financial literature after it has been formally conceptualized by Markowitz (1952). Investors can enjoy the average return whereas the risk has been clearly diversified. Once investors include more assets into their portfolio, the level of risk diversification depends on the correlation of the additional assets and current portfolio. If the correlation is lower, the higher level of diversification can be achieved. However, investors who are fully-diversified in the stock market can mitigate the risks from some specific companies but cannot avoid the overall market downturn. Therefore, including other asset classes into the portfolio can help investors to achieve further diversification, especially the asset classes with lower correlation to the stock market.

Commodities become popular for investor due to its prominent characteristic of having lower correlation with other asset classes (Jensen, Johnson, and Mercer, 2000). There are many groups of commodities. In this study, it focuses on the agricultural commodity by using the commodity future market in Thailand. Among many products, Ribbed Smoked Rubber Sheet No.3 Futures or RSS3 Futures is the most popular one. The data is collected from the start of the commodity future market in Thailand, which is May 28, 2004, until December 31, 2015. The results show that RSS3 Futures can be the diversifier for stock investors in Thailand as its low correlation between RSS3 Futures and stock market. Moreover, RSS3 Futures can be the hedge for stock market. During the days with negative stock return, there is a weak negative relationship or no relationship between RSS3 Futures and the stock market. However, during the period of extremely-negative stock return, the result rejects the role RSS3 Futures as the hedge for stock market. In another word, RSS3 Futures is not the candidate for safe haven of stock market in Thailand.

The additional analysis between RSS3 Futures and stock market shows that the return on RSS3 Futures is mostly non-negative during the days with negative stock return. In average, investors who invest in RSS3 Futures will have the better performance than stock investors during the stock market decline. However, a few days later, the average stock return has been recovered but the return of RSS3 Futures becomes lower. Therefore, the positive performance of RSS3 Futures over stock market declines shortly after the days with negative stock return.

LITERATURE REVIEW

The role of commodity futures in the portfolio management has been well-documented in previous literature .Many literatures discussed the benefits of including commodities into traditional investment portfolio like bonds and stocks in order to achieve the benefit of diversification. However, the performance of investment solely in commodity futures is not sound compared to the normal equity investment .In general, the return from commodity futures does not surpass equity investment but the risk is slightly higher due to their unique risk .This underperformance of commodity future makes them unattractive to be invested solely by investor)Edwards and Park, 1996(

Nevertheless, Jensen, Johnson, and Mercer (2000) argued that the commodity futures are attractive for investors because they have relatively low correlation with other assets, especially for equity investment .Therefore, the commodity futures can provide the important role as the diversifiers, especially in the periods of tight monetary policy .

One of the explanation of low correlation between commodities and equites is from their unique characteristics making the difference return behavior during different phases of business cycle)Gorton and Rouwenhorst, 2006 .(During the different periods over business cycle, commodities and equities perform differently .During the recession, especially at the early period, the equity prices will drop significantly whereas the commodity prices will not change much .The prices may slightly increase or decrease but does not change significantly .However, once the equity prices have recovered at the end of recession, the commodity prices will decease during such period .

Oreg) 2011 (examined the commodity futures and Shanghai Stock Index in China and found that the correlation between stock index and some commodity futures like heating oil and soya bean, especially during the period of high volatility in the stock market .Therefore, these two commodities should be included to the equity portfolio. Chong and Miffre (2010) studied the conditional correlation between commodity futures and equity market and found that the correlation became lower over time, which implied that the commodity futures can be useful in asset allocation decisions, especially for equity investors. This benefit should be prominent for long-only portfolio managers who seeks for diversification during high volatility periods.

Creti, Joets, and Migon (2013) used the dynamic conditional correlation to study the link between commodities and stock market. They found that each commodities have different correlation behaviors with stock market. For example, the correlation between gold and stock is lower during the period of stock market downturn. This is consistent with other literatures showing the role of gold as safe haven for stock investors. Some agricultural commodities like cocoa and coffee has the unique characteristic that is similar to oil. The correlations with stock market are high during the stock market upturn and become lower during the downturn. Moreover, the correlation between stock market and electricity market is negative because the electricity market is determined by its fundamental factor rather than the economic condition like stock market.

Baur and Lucey (2010) studies the role of gold, which is considered as one of commodities, in the traditional investment portfolio like stocks and bonds. They discussed the difference between the role as the hedge and the safe haven. The hedge means the asset with negative correlation or no correlation with the portfolio. The hedge may reduce the risk of portfolio in average but the hedge may not be able to protect against the loss during the extreme stock market. However, the safe haven means the assets with negative correlation or no correlation with the portfolio during the period of extreme market downturn.

METHODOLOGY

The data used in this study in from the stock market and the commodity futures in Thailand . For the stock market, the Stock Exchange of Thailand has published the stock index named SET Index that is the value-weighted index of all stocks traded in the Stock Exchange of Thailand .This study employs SET Total Return Index as the representative of overall equity investment, which includes the capital gain return from the average change in stock prices and the dividend incomes .For the commodity futures, there are two main markets in Thailand .The Agricultural Futures Exchange of Thailand or AFET has provided agricultural commodity futures like rubber, rice, tropioca, and pineapple .The Thailand Future Exchange or TFEX has provided other futures beside the agricultural products including both commodity futures or financial futures .The commodity futures offered by TFEX include gold and oil .In this study,

only the Ribbed Smoked Rubber Sheet No.3 Futures or RSS3 Futures, which is the most popular agricultural commodity future in Thailand and traded in AFET, will be used .RSS3 was the first product traded in AFET and the first trading day was May 28, 2004 .
The daily price will be collected from May 28, 2004 to December 31, 2015 .The daily returns are computed using the log return .There are totally 2,833 daily returns used in this study .For RSS3 Futures, the spot-month continuous series are used to compute daily returns .The regression analysis used to analyze the hedging property of RSS3 Futures has been adapted from Baur and Lucy)2010 (as follows .

$$r_{rss3,t} = a + b_1 r_{stock,t} + b_2 r^*_{stock,t} + e_t, \qquad (1$$

where $r_{rss3,t}$ is the return on RSS3 Futures at day t and $r_{stock,t}$ is the return on stock at day t .$r^*_{stock,t}$ is the return on stock at day t only for the day the stock returns meet a specific condition .The condition is the downturn condition of stock market e.g .the returns on stock only for the day with negative returns and the returns on stock only for the day that the returns are lower than some specified quantile level including 25% quantile, 5% quantile, 2.5% quantile, and 1% quantile.
However, the asset return is characterized by time-vary volatility .In order to concern about asymmetric volatility, the exponential generalized autoregressive conditional heteroskedastic or E-GARCH developed by Nelson)1991 (should be employed .This study applies EGARCH)1,1 (as the variance equation augmented to the mean equation in)1 .(The specification of EGARCH)1,1 (is as follows .

$$log(h_t) = \omega + \alpha \left| \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right| + \gamma \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \beta log(h_{t-1}) \qquad (2$$

After the equation)1 (is estimated as the mean equation together with the variance equation in form of EGARCH in)2(, the role of RSS3 Futures as the hedge for the stock market can be interpreted .If b_1 is negative, it means that RSS3 Futures can be classified as the hedge in general .Moreover, if the summation of b_1 and b_2 is negative, it means that RSS3 Futures can be classified as the hedge under the specific stock market downturn circumstance .In case that RSS3 Futures is the hedge for stock market in the extreme downturn like 5% quantile, 2.5% quantile, or 1% quantile, RSS3 Futures can be classified as the safe haven for stock investors.

FINDINGS AND ANALYSIS

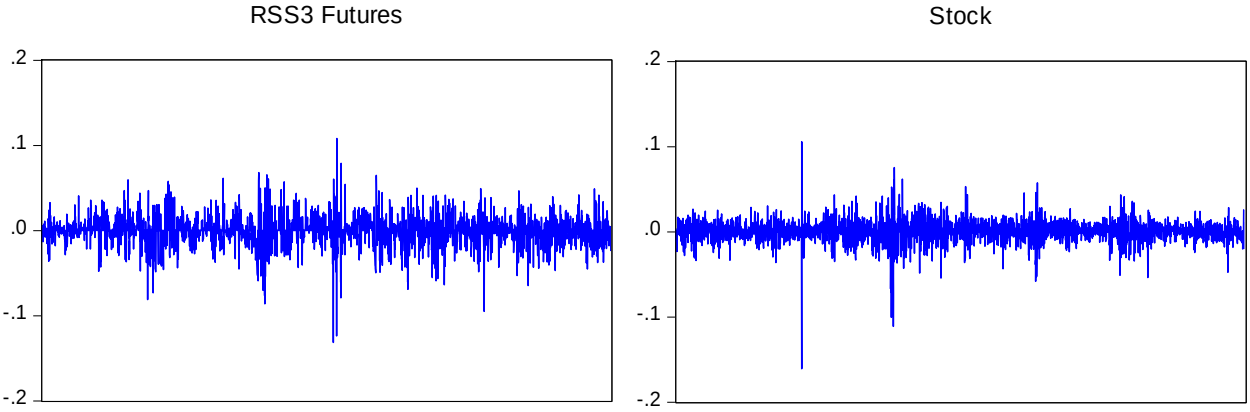
Before the regression analysis, the returns on stock market and RSS3 Futures are examined in form of their description .Table 1 displays the descriptive summary of the return on stock market and RSS3 Futures and Figure 1 displays the time-series plot of the returns on stock market and RSS3 Futures .

As discussed earlier in previous literature, the performance of RSS3 Futures is not attractive to be invested solely .The mean return of RSS3 Futures is clearly lower than stock but the risk as measured by standard deviation is higher .However, the return on stock displays the higher negative skewness and excess kurtosis implying that the stock return is more characterized by extreme negative shock and fat-tailed distribution .The time-series plot in figure 1 also supports the higher volatility of RSS3 Futures .Moreover, the plot also shows that the stock returns have been characterized by time-varying volatility .

Table 1. Descriptive Summary of the Return on Stock and RSS3 Futures

	Stock	RSS3 Futures
Mean	0.000409	-0.000095
Maximum	0.105800	0.108200
Minimum	-0.160600	-0.131200
Std. Dev.	0.013074	0.016929
Skewness	-1.000526	-0.524095
Kurtosis	17.891870	8.560154

Figure 1. The Time-series Plot of Returns on RSS3 Futures and Stock



Regression Analysis

Table 2 reports the regression analysis using the mean equation as in)1 and (the variance equation as in) 2 (in order to interpret the hedge property of RSS3 Futures on the stock return . However, the coefficients from the mean equation as in)1 (has been reported .The dependent variable is the return on RSS3 Futures. The explanatory variables are the return on stock and the return on stock only in the particular downturn period.

From table 2, the coefficient of the regression in the first row with only one explanatory variable is negative showing that RSS3 Futures can be the weak hedge for stock return. However, this coefficient is not statistically significant at any convention level. For the second row, the second explanatory equals to the stock return on the day with negative stock return or zero otherwise. The sum of coefficients representing the overall effect during the negative stock return is negative. This means RSS3 Futures can be used as the hedge for stock return during the negative stock return periods. In the third row, the second explanatory equals to the stock return on the day that stock returns lower than 25% quantile or zero otherwise. The sum of coefficients is still slightly negative showing that RSS3 Futures can weakly be used as the hedge for stock return during the period that the stock returns are lower than 25% quantile.

However, the results for 5%, 2.5%, and 1% quantile are different. The second explanatory variable in equals to the stock return on the day that stock returns lower than 5%, 2.5%, 1% quantile or zero otherwise. These circumstances represent the period of extremely negative stock returns. The sum of coefficients for these regressions are clearly non-negative. This

implies that RSS3 Futures cannot be used as the hedge during the period of extremely negative stock returns. In another word, RSS3 Futures is not the safe haven for the stock investors.

Table 2. Regression Results in Various Downturn Scenario

	a	***b1***	***b2***
General	0.000000 *(0.017)*	-0.000064 *(-0.014)*	
Negative Stock Return	0.000001 *(0.103)*	0.000379 *(0.566)*	-0.000463 *(-0.052)*
Stock Return < 25% quantile	0.000000 *(0.047)*	0.000012 *(0.086)*	-0.000013 *(-0.075)*
Stock Return < 5% quantile	-0.000000 *(-0.006)*	-0.000005 *(-0.017)*	0.092992 *(5.637)**
Stock Return < 2.5% quantile	-0.000000 *(-0.001)*	-0.000001 *(-0.043)*	0.021017 *(3.690)**
Stock Return < 1% quantile	0.000001 *(0.019)*	0.000013 *(0.010)*	0.261697 *(8.129)**

Note .The number in parenthesis is z-statistic and * indicates significant at 5 %

Additional Analysis

In order to show the role of RSS3 Futures as the hedge for stock investment, the further examination is done on the days with negative stock returns. Table 3 summarizes the distribution of return on stock and RSS3 Futures on the day of and after negative stock returns.

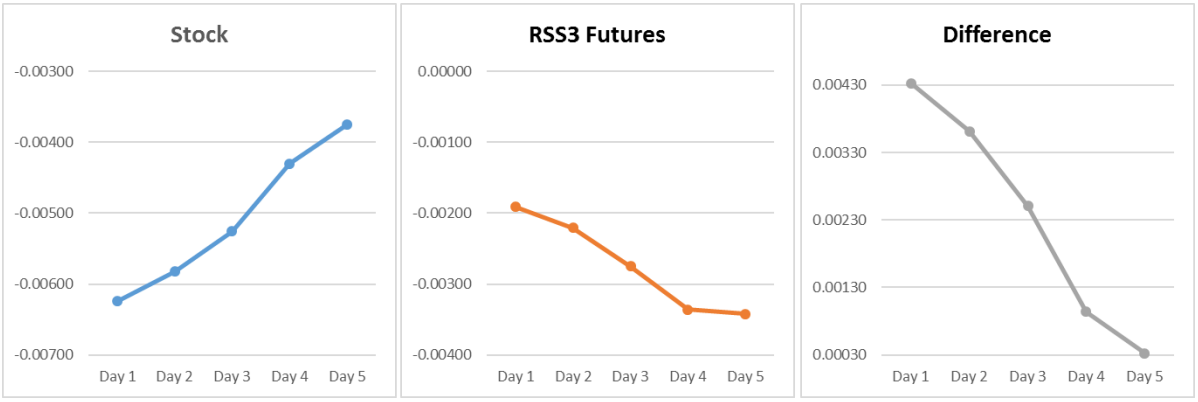
Table 3 Distribution of Return on the Days with Negative Stock Returns

One-day Returns	**Negative Return**	**Non-Negative Return**
Stock Market	1,315 (100.00%)	0 (0.00%)
RSS3 Futures	472 (35.89%)	843 (64.11%)
Three-day Returns	**Negative Return**	**Non-Negative Return**
Stock Market	858 (65.25%)	457 (34.75%)
RSS3 Futures	645 (49.05%)	670 (50.95%)
Five-day Returns	**Negative Return**	**Non-Negative Return**
Stock Market	787 (59.85%)	528 (40.15%)
RSS3 Futures	669 (50.87%)	646 (49.13%)

From 2,833 trading days used in this study, the stock return shows the negative figure for 1,315 times. The returns on RSS3 Futures are non-negative for 843 times or 64.11% of 1,315 times and become negative for only 472 times or 35.89%. This result supports that RSS3 Futures can be used as the hedge during the period of negative stock returns.

If the behavior of stock returns is further examined, it can be seen that the cumulative stock returns are still negative for 858 times or 65.25% of 1,315 times for three days after negative stock return and the cumulative stock returns are negative for only 787 times or 59.85% for five days after the negative stock return. However, the cumulative returns on RSS3 Futures are negative for 645 times or 49.05% for three days after negative stock return and the cumulative returns on RSS3 Futures are negative for 669 times or 50.87% for five days after the negative stock return.

Figure 2. Cumulative Return of Stock and RSS3 Futures



The above result shows that the cumulative stock returns start recovering whereas the cumulative returns on RSS3 Futures becomes more negative after the negative return days. The chance that RSS3 Futures can be used as the hedge for negative stock returns has disappeared shortly after the days of negative stock return. Figure 2 also confirm this issue. After the negative stock return days, the stock return has recovered whereas the return on RSS3 Futures becomes lower day by day for five days after. Therefore, the outperformance of RSS3 Futures over stock will decline over time after the days with negative stock return.

CONCLUSION

This study aims to examine the role of RSS3 Futures as the hedge for stock market in Thailand. The data is collected from May 28, 2004 that is the first trading day of the Agricultural Futures Exchange of Thailand until December 31, 2015, which includes totally 2,833 trading days. The test equation has been adapted from Baur and Lucy)2010(using EGARCH model to capture the asymmetric effect of conditional volatility in the market.

The results show that RSS3 Futures can be the diversifier for stock investors in Thailand as its low correlation between RSS3 Futures and stock market. During the days with negative stock return, there is no relationship (weakly negative) between RSS3 Futures and the stock market. This means that RSS3 Futures can be the hedge for stock market in general. However, RSS3 Futures is not the candidate for safe haven of stock market because it shows no hedge property during the period of extremely negative stock returns.

The result implies investors in Thailand, especially stock investors, should consider adding RSS3 Futures in their optimal portfolio. Although it cannot protect investors from extremely negative stock market, it clearly shows that RSS3 Futures can help in diversifying the risk, especially during the periods of stock market downturn.

References

Baur, D. G., & Lucey, B. M. (2010). Is gold as hedge or a safe haven? An analysis of stocks, bonds, and gold. *Financial Review, 45*(2), 217-229.

Chong, J., & Miffre, J. (2010). Conditional correlation and volatility in commodity futures and traditional assets markets. *Journal of Alternative Investments, 12*(3), 61-75.

Creti, A., Joets, M., & Mignon, V. (2013). On the links between stock and commodity markets' volatility. *Energy Economics, 37*, 16-28.

Edwards, F. R., & Park, J. M. (1996). Do managed futures make good investments? *Journal of Futures Markets, 16*(5), 475-517.

Gorton, G., & Rouwenhorst, K. (2006). Facts and fantasies about commodity futures. *Financial Analysts Journal, 62*(2), 47-68.

Jensen, G. R., Johnson, R. R., & Mercer, J. M. (2000). Efficient use of commodity futures in diversified portfolios. *Journal of Futures Market, 20*(5), 489-506.

Markowitz, H. M. (1952). Portfolio Selection. *Journal of Finance, 7*(1), 77-91.

Nelson, D. B. (1991). Conditional Heteroskedasticity in Asset Returns: A New Approach. *Econometrica, 59*(2), 347-370.

Oleg, M. (2011). Volatility interrelationship between commodity futures, Shanghai stock and 10 year bond indices in China. *International Journal of Economics and Finance, 3*(6), 265-274.