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Market Timing with GEYR in Emerging Stock Market: The Evidence from Stock Exchange of Thailand

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Abstract

This paper aims to examine whether the market timing strategy with Gilt-Equity Yield Ratio or GEYR can create abnormal returns in Thai Stock market. The trading rules using GEYR are established and switching strategies between bonds and equities are implemented. The out-of-sample profitability of these switching strategies compared with the simple buy-and-hold strategy. The result shows that switching strategies using GEYR can provide higher return but lower risk than buy-and-hold equity portfolio, even after the transactions costs are considered. Although these switching strategies cannot be fully utilized in some types of funds because there are some restrictions under investment policies, the result reveals that switching portfolios can still be more efficient than buy-and-hold portfolios.

JEL classification numbers: G11
Keywords: Trading Strategies, Marketing Timing, Equities, Gilt-Equity Yield

1 Introduction

Efficient market hypothesis proposes that all available information should be reflected in the stock price. Therefore, any investor cannot beat the market with public information. One of popular active trading strategies is market timing,

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which investors can beat the market by making the position in the market in the appropriate time. The common strategy to do so is to switch between stock market and bond market. Generally speaking, an investor would like to take position in the stock market when the performance is better relative to bond market and switch to take position in the bond market when the performance of stock market is worse. If it is successful, this switching strategy can outperform the passive buy-and-hold strategy.

In this paper, the switching strategies will be signaled by Gilt-Equity Yield Ratio. Three trading rules are implemented and out-of-sample portfolio performance will be compared with the simple buy-and-hold strategy. The result has revealed that the performance of switching portfolios is better than equity-only portfolios in mean-variance framework. In the other word, the switching portfolios are more efficient as they can provide higher returns whereas the variances are lower. The results in this paper support the usefulness of using Gilt-Equity Yield Ratio to time the equity market.

The outline of this paper is as followings; Section 2 discusses Gilt-Equity Yield Ratio in the literatures, Section 3 summarizes the empirical methodologies including data and how the trading rules are formed, Section 4 reports the model estimation and portfolio performance, Section 5 presents is the conclusion of this research.

2 The literature on GEYR

GEYR stands for Gilt-Equity Yield Ratio. It is the ratio between the yield on government securities (which is known as gilt in UK market) and the dividend yield on equity securities. As its fundamental, lower GEYR means bond yield is relatively lower compared to equity yield and it can signal the appropriate time to purchase stocks. Meanwhile, higher GEYR can be interpreted in the other hand and signal the timing to purchase bonds. Mill (1991) finds the co-integration among equity price, dividends, and government bond yield. This long-run equilibrium can imply the usefulness of GEYR to predict the future return between bond and equity markets.

Hoare Govett, well-known UK stock broker develops the trading rule for GEYR in UK stock market and suggests that GEYR less than 2 is the signal to buy equity. If GEYR is greater than 2.4, it is the signal to switch from equity to government bond (Hoare Govett, 1991). Clare, Thomas, Wickens (1994) use time-series forecasting of equity return by information about GEYR to create the trading rule. If the forecasted equity return is greater than bond yields, equity securities should be purchased. If the forecasted equity return is less, it is the signal to switch to government securities. Based on the above trading rule, they show that the switching strategy can outperform the buy-and-hold strategy. Levin and Wright (1998) adjust the trading rule by including the effect of other variables, which can help to capture time-varying factors of GEYR, to forecast excess equity return

over bond yields. The similar result about usefulness of GEYR is concluded. Brook and Persand (2001) proposed the forecasts of GEYR using regime-switching framework. They simplify the model into high and low regime and use Markov switching technique and self-exciting threshold autoregression to model regime switching. Although using GEYR in regime switching can yield the higher return than buy-and-hold portfolio, the profitability disappears after considering the transaction cost incurred by frequent trading of switching strategy.

3 Empirical Methodologies

3.1 Data

The data about equity return is collected from Stock Exchange of Thailand. SET50 index is used as the reference of equity market return because it is more possible to replicate the return from SET50 index e.g. investing in index fund or exchange traded fund (ETF). One-year government bond yields are from Thai Bond Market Association, which is the major bond dealer market in Thailand. The data is collected based on monthly basis starting from January 2001 to December 2011.

Gilt-Equity Yield Ratio or GEYR is computed from the ratio between bond yields and dividend yields. Thereafter, the information about GEYR is used to construct different trading rules representing switching portfolio in order to compare the performance with buy-and-hold equity portfolio and buy-and-hold bond portfolio. Equity return is computed based on SET50 Total Return because it has included returns from both capital gains and dividends. The log-difference of index is used to get continuous compound return. According to the switching strategies are based on monthly basis, the return from bond markets will be measured by yields on one-month treasury bills, which are also transformed to continuous compound return.

3.2 Trading Rules

The first trading rule has followed Clare, Thomas, and Wickens (1994). They mention that information about GEYR has incorporated forecastability of future equity return. They use special from of distributed lag of GEYR to forecast future equity return as follows.

$$r_t = \alpha_o + \beta\ GEYR_{t-1} + \sum_{i=1}^{k} \alpha_i \Delta GEYR_{t-i} + \varepsilon_t \qquad (1)$$

Where r_t is continuous compound equity returns and k is the number of lags of change in GEYR in the model. Akaike Information Criteria (AIC) is used to select the optimal number of lags. The first 60 observations are used to estimate this forecasting model. Thereafter, the estimated model will be used to forecast the

future equity returns out-of-sample for the remaining 72 observations. For example, the past information about GEYR and change in GEYR are used to predict the equity return in the 1st month during out-of-sample period. If the forecasted equity return is higher than the yield on one-month treasury bills that is known at the beginning of period, the trading rule will suggest to investment in equity. If the forecasted equity return is lower than, the treasury bills should be invested instead. This switching strategy is implemented throughout the out-of-sample 72 observations.

The second trading rule has adopted from Levin and Wright (1998). The excess returns on equity over yields on government bonds are estimated. Then, that excess return will be forecasted by lagged change in GEYR and other variables that can make GERY change but not due to mispricing. The model is as follows.

$$r_t^* = \alpha_o + \beta_1 \Delta GEYR_{t-1} + \beta_2 TP_{t-1} + \beta_3 DY_{t-1} + \beta_4 Z_{t-1} + \varepsilon_t \quad (2)$$

Where r_t* is the difference between continuous compound equity returns and yields on government bonds. *TP* is term premiums, which are the difference between ten-year government bond yields and one-month Treasury bill yields. *DY* is dividend premiums and *Z* is the interaction between equity returns and bond yields.

Equation 2 is estimated based on the first 60 observations. The estimated model is used to estimate excess return over out-of-sample period. The predicted positive excess returns trigger equity investment. Otherwise, the one-month treasury bills will be invested instead.

The third trading rule is based on regime-switching by Markov switching model. Markov switching model is developed by Hamilton (1990), which can overcome the basic assumption of time series data about means and variance stationary. In Markov switching, the whole time series data may not have constant mean and variance overtime because the data comes from different regimes. However, the transitions among different regimes are not deterministic but stochastic. In this case, the univariate Markov switching model for GEYR is as follows.

$$GEYR_t = \mu_{s_t} + \varepsilon_t \qquad where \quad s_t \in \{1,2\} \quad (3)$$

S_t determines states or regimes, which is assumed to be two regimes in this case and transitions between two regimes are stochastically determined by the transition matrix as follows.

$$P = \begin{bmatrix} p_{11} & p_{12} \\ p_{21} & p_{22} \end{bmatrix} \quad (4)$$

p_{11} is the probability that there is no switching from state 1. p_{21} is the transition probability of switching from state 1 to 2. p_{12} is the transition probability of switching from state 2 to state 1 and p_{22} is the probability of no switching from state 2. The Markov switching model of GEYR is estimated based on the procedure developed by Perlin (2010).

The trading rule of GEYR using Markov switching models is proposed by Brook and Persand (2001). Based on their paper, they forecast the probability of being in regime 1 in next period based on the formula by Engel and Hamilton (1990) as follows.

$$p_{1,t+1|t} = (1 - p_{22}) + (-1 + p_{11} + p_{22}) p_{1,t} \quad (5)$$

$p_{1,t+1|t}$ is forecasted probability of being in regime 1 in next period given information in this period. $p_{1,t}$ is the filtered probability of being in regime 1 in last period of the model. Using the first 60 observations, the probability in next period is forecasted. Suppose the regime 1 is high-GEYR regime and the forecasted probability is more than 0.5, the trading rule suggests that GEYR is still on high regime and Treasury bills should be invested. However, if the forecasted probability suggests that GEYR is in low-GEYR regime, it triggers switching to equity market. After adding one more observation, the model is re-estimated and the probability is forecasted until the last observation.

Thereafter, the portfolio return will be calculated based on switching strategy following the above three trading rules. The performances of switching portfolio are compared with buy-and-hold equity-only portfolio and buy-and-hold bond-only portfolio.

4 Analysis and results

Table 1 reports descriptive statistics of GEYR. The mean of GEYR is 0.8708 with the standard deviation of 0.4525. The distribution of GEYR is not normal but there are positively-skewed and leptokurtic. This is not surprising because the components of GEYR are bond yields and dividend yields, which can be only positive amount. The Jacque-Bera test also confirms non-normality characteristics of both GEYR and dividend yields. Equity returns are more symmetric with slightly negative skewness and lower excess kurtosis. However, the normality assumption of equity return is still rejected. The time series property has revealed that both GEYR and equity returns series are stationary based on the rejected of Augmented Dickey-Fuller test.

Table 1: Descriptive statistic of GEYR and equity return

	GEYR	**Dividend Yield**	**Equity Return**
Mean	0.8708	3.4827	1.1228
Median	0.8300	3.5150	1.6045
Standard Deviation	0.4525	1.0330	8.5012
Skewness	1.5643	1.0645	-0.2000
Excess Kurtosis	3.3501	3.2294	1.6247

JB	127.1145**	52.2683**	15.2817**
ADF	-3.5730**	-2.6701*	-12.0971**

*** Significant at 5%, * significant at 10%*

4.1 Model estimation

The first model is the modified distribute lag model in which past information of GEYR and change in GEYR are used to forecast equity returns. Table 2 reports the results of three estimated models, which are model with one lag of change in GEYR, model with two lags of change in GEYR and model with three lags of change in GEYR. F-tests reveal that all three models are significance as a whole. There is no problem about heteroskedasticity in these models based on White general test of heteroskedastics. Moreover, autocorrelation problem is not detected based on Breusch-Godfrey serial correlation LM test and Durbin-Watson statistics are around two. Based on one-lag model, adding the second lag can provide only little more explanation power as adjusted r-squared has only slightly increased. Furthermore, adding the third lag results in lower adjusted r-squared. Therefore, the one-lag model, which has lowest value of Akaike information criteria, is used for the first trading rule.

Table 2: The result of estimated model based on trading rule 1

	Lag 1	**Lag 2**	**Lag 3**
Constant	2.6699 (1.2603)	2.7531 (1.2490)	2.9579 (1.3076)
GEYR(-1)	-0.9864 (-0.5045)	-1.2913 (-0.6196)	-1.4422 (-0.6700)
ΔGEYR(-1)	17.2509 (2.4233)**	19.8784 (3.5957)**	21.5050 (3.0942)**
ΔGEYR(-2)		-6.8562 (-1.3113)	-7.3071 (-1.2967)
ΔGEYR(-3)			3.2259 (0.6075)
F-stat	6.241**	4.4514**	2.7286**
Adjusted R-squared	0.1553	0.1560	0.1117
AIC	6.9214	6.9411	6.9865
White	0.7066	1.4475	3.4186
DW	1.9687	2.2635	2.2336
BG (3)	4.6788	3.1557	3.7407

Note: The numbers in parenthesis are t-stat. White represents the LM-test statistic of White test of heteroskedasticity without cross-term. DW represents Durbin-Watson statistics. BG (3) represents

the test statistics of Breusch-Godfrey serial correlation LM test at three lags.
*** Significant at 5%, * significant at 10%*

The second model uses lag of GEYR and other variables to predict excess return on equity over T-bills. Table 3 reports the results of estimated models based on equation 2. Both model with only lag GEYR and model with GEYR and other variables are statistically significant. The multiple-variable model is suffered from heteroskedasticity and the t-stat is re-estimated based on robust standard error. The significance of other variables beside lag of change in GEYR suggests that the multiple-variable model is the better one. The higher adjusted r-squared also confirms the superior of multiple-variable model.

Table 3: The result of estimated model based on trading rule 2

	Single variables	**Multiple variables**
Constant	1.5408 (1.5508)	25.4729 (3.1896)**
ΔGEYR(-1)	17.4649 (3.5002)**	21.5229 (3.0944)**
DY(-1)		-4.0307 (-1.6013)*
Z(-1)		-0.3559 (-1.1221)
TP(-1)		-3.5491 (-3.8340)**
F-stat	12.2513**	7.0983**
Adjusted R-squared	0.1649	0.2997
AIC	6.8965	6.7688
White	0.6343	19.6384**
DW	2.2678	2.5245
BG (3)	3.2133	6.1353

Note: The numbers in parenthesis are t-stat. White represents the LM-test statistic of White test of heteroskedasticity without cross-term. DW represents Durbin-Watson statistics. BG (3) represents the test statistics of Breusch-Godfrey serial correlation LM test at three lags. The t-stats in the multiple-variable model are estimated based on robust standard errors.
*** Significant at 5%, * significant at 10%*

Table 4 reports the result of Markov switching model based on the whole sample of 132 observations. Based on Brook and Persand (2001), the mean difference between two regimes and the high probability of ρ_{11} and ρ_{22} suggest the stability of two regimes and regime-switching model is appropriate.

Table 4: The result of Markov switching model (whole sample) for trading rule 3

	Regime 1	Regime 2
Mean	0.9769 (0.0423)	0.4660 (0.0248)
Variance	0.0692 (0.0425)	0.0151 (0.0049)
ρ_{11}	0.97 (0.11)	
ρ_{22}	0.99 (0.17)	

Note: The numbers in the parenthesis are the standard error.

4.2 Portfolio performance

The performances of switching portfolio based on three trading rules are computed in order to compare with buy-and-hold equity portfolio and buy-and-hold T-bills. Table 5 reports five-year out-of-sample means and standard deviations of those five portfolios. For buy-and-hold strategies, T-bills provide the average annual return of 2.76% with standard deviation only 0.36% whereas equity market has provided much higher annual return of 11.44% with standard deviation of 29.45%. All switching portfolios are more efficient than equity-only portfolio as they provide more returns but lower risks. The higher Sharpe ratio and high positive Jensen's Alpha confirm the superiority of switching strategies. The third switching portfolio following regime-switching has clearly shown lower number of switching compared other two switching portfolios. The estimated roundtrip transaction cost of 0.83% based on commission fees and average bid-ask spreads from tick-size. The net returns after deducting transaction costs shows the similar result as before. All performance measurement has shown that switching strategies can make more profit with lower risk. Figure 1 shows the performance of five portfolios plotted on mean-variance framework. Based on the figure, it can be clearly seen that switching portfolios are superior to the current efficient frontier on the combination of equity and T-bill investments.

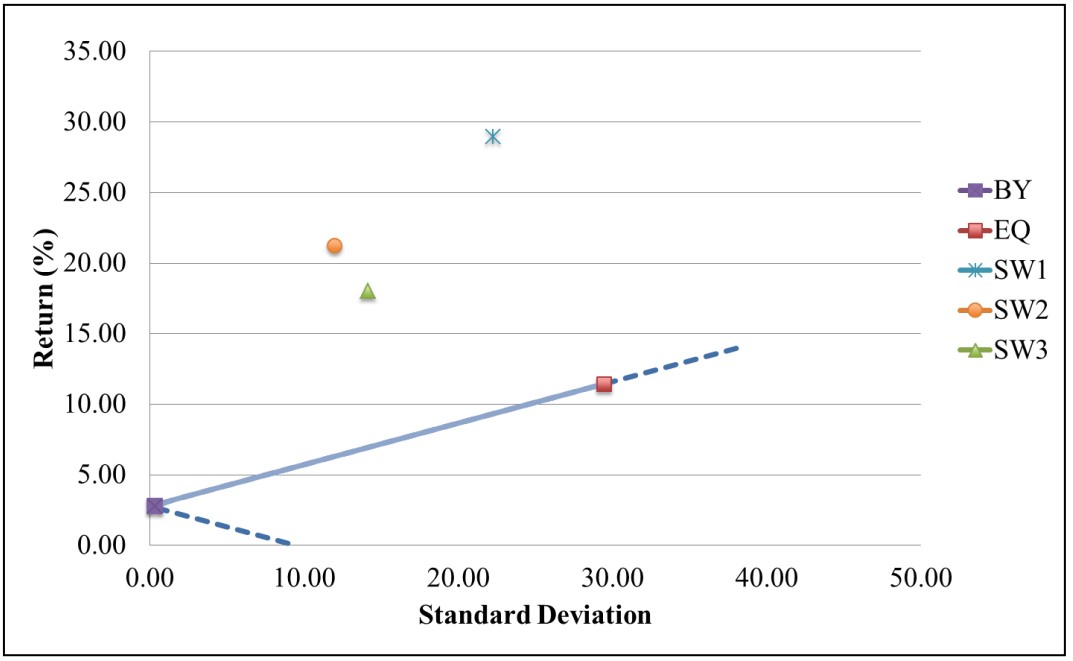

Figure 1: Mean-Variance Portfolios

Table 5: Out-of-sample portfolio performance (2006-2011)

	Mean Return (%)	**Standard Deviation (%)**	**Sharpe Ratio**	**Jensen's Alpha**	**Number of switching**
Buy-and-hold Equity	11.44	29.45	0.295		
Buy-and-hold T-bills	2.76	0.36	0.000		
Switching 1	30.00 (28.82)	22.30	1.222 (1.169)	21.844 (20.668)	15
Switching 2	22.27 (20.82)	11.97	1.630 (1.509)	17.912 (16.459)	15
Switching 3	18.57 (17.25)	14.15	1.118 (1.025)	13.687 (12.373)	8

Note: The numbers in the parenthesis are the returns net of transaction costs.

In order to compare the performance of five portfolios more clearly, the annual returns by year are shown in table 6. We can see that the performance of equity market is abnormally negative in 2008 at negative 76.69%, which is the side effect from subprime crisis in US. In 2009, equity market shows the abnormal return as the result of recovery from previous year. Although switching strategies can outperform the equity-only portfolio in many years, the major contribution to their

superior average returns is from the ability to avoid or reduce loss in 2008. Switching portfolios cannot consistently outperform equity portfolio in every year. Therefore, these switching strategies can be more useful in long-term investment horizon.

Table 6: Portfolio return classified by year

Year	Buy-and-hold T-bills	Buy-and-hold Equity	Switching 1	Switching 2	Switching 3
2006	4.54	16.33	27.82	30.58	4.54
2007	3.50	20.19	32.77	38.55	3.50
2008	3.18	-76.69	-17.39	4.11	3.18
2009	1.20	66.04	66.04	1.20	59.59
2010	1.36	38.65	38.65	33.75	24.74
2011	2.77	4.13	32.11	25.42	15.86
Average	***2.76***	***11.44***	***30.00***	***22.27***	***18.57***

4.3 Investment restriction of mutual funds in Thailand

Based on the investment restrictions of different types of mutual funds, the switching strategies mentioned above are unable to be fully utilized. Flexible funds are the portfolio that can freely invest in any proportion of equity and fixed-income securities. Therefore, flexible funds can fully utilize these switching strategies. Equity funds are the mutual funds that focus in investing in equity market. They are regulated to hold at least 65% of equity at anytime. It is possible to implement switching strategies under restriction by holding all equities during bull equity market and switching to hold only 65% and invest 35% in T-bills. Balanced funds can hold the combination between equity and bond markets but they are regulated to hold equity with the maximum proportion of 65% and minimum proportion of 35%. They can implement switching strategy by holding maximum of 65% in equity market and 35% in bonds or holding minimum of 35% in equity market and 65% in bonds.

Table 7 reports the returns on portfolio under the above restrictions for equity funds and balanced funds. In panel A of table 7, we can see that the returns of switching portfolios have reduced drastically for equity funds. This is not surprising as the switching strategies lose their advantages of loss-avoidance. However, the results still show that all switching strategies can provide returns higher than equity-only portfolios.

Panel B of table 7 shows the performance of switching portfolio assuming they are balanced funds. The returns have reduced even lower as switching strategies cannot fully be utilized. They cannot take advantages of loss avoidance totally during bear equity market as they still need to hold equities 35% whereas they cannot take full advantages during bull equity markets as they can hold equities up

to 65%. Two out of three switching portfolios have shown net returns slightly lower than equity-only portfolio. However, switching portfolio can still have advantages of lower risk. Figure 2 shows the performance of portfolio under the restriction of balanced funds in mean-variance framework. Even though some switching portfolio provided lower returns, the advantages of lower risk make all of them are more efficient than the combination of equity and bond investments.

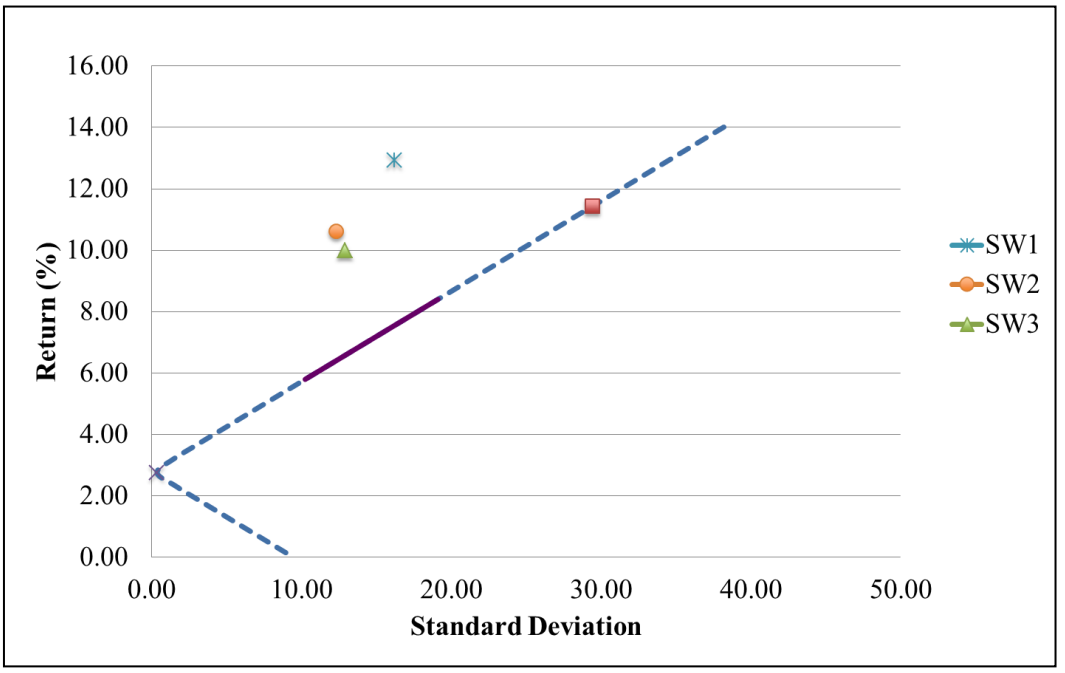

Figure 2: Mean-Variance portfolios with the restriction of balanced funds

Table 7: Annual portfolio performance based on investment restriction

Year	Buy-and-hold T-bills	Buy-and-hold Equity	Switching 1	Switching 2	Switching 3
	Panel A: With the restriction of investing in equities at least 65%				
2006	4.54	16.33	20.35	21.32	12.21
2007	3.50	20.19	24.60	26.62	14.35
2008	3.18	-76.69	-55.94	-48.41	-48.74
2009	1.20	66.04	66.04	43.34	63.78
2010	1.36	38.65	38.65	36.94	33.78
2011	2.77	4.13	13.92	11.58	8.23
Average	***2.76***	***11.44***	***17.94 (16.90)***	***15.23 (14.19)***	***13.94 (13.38)***
	Panel B: With the restriction of investing in equities at least 35% but not exceed 65%				

2006	4.54	16.33	15.65	16.48	8.67
2007	3.50	20.19	18.13	19.86	9.35
2008	3.18	-76.69	-30.95	-24.50	-24.78
2009	1.20	66.04	43.34	23.89	41.41
2010	1.36	38.65	25.60	24.13	21.43
2011	2.77	4.13	12.05	10.04	7.17
Average	***2.76***	***11.44***	***13.97 (12.93)***	***11.65 (10.61)***	***10.54 (9.99)***

Note: The numbers in the parenthesis are the returns net of transaction costs.

5 Conclusion

This paper has examined whether the information about GEYR is useful to generate abnormal profits using switching strategies. Three trading rules have bee estimated. The first trading rule uses only past information about GEYR to predict the future equity returns. The second trading rule uses not only GEYR but other variables including term premiums and dividend yields to predict the future excess return on equity over T-bills. The third trading rule employs Markov switching to predict whether the next period GEYR should be in high or low regime.

After model estimations, out-of-sample profitability of three trading rules is computed. The results have revealed that switching portfolios can outperform buy-and-hold equity-only portfolio, even after the transaction costs from switching strategies are included. However, the year-by-year results suggest that switching portfolios cannot consistently outperform equity-only portfolio. This can be concluded that these switching strategies are more useful for long-term investment horizons.

This paper has contributed to show the evidence of market timing using GEYR. The information contained in GEYR is useful to predict the future equity return and can be used to develop trading rules and create switching portfolios, which can outperform buy-and-hold equity-only portfolio. The abnormal profits from trading rules are not disappear even in long investment horizon like six-year in this paper. The possibility to do market timing has raised the question about equity market efficiency, especially in emerging market like Thailand.

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