



Munich Personal RePEc Archive

Islamic REIT response to macroeconomic factors: a markov regime switching auto regressive approach

Morad, Shahidah Nailul and Masih, Mansur

INCEIF, Malaysia, INCEIF, Malaysia

25 June 2015

Online at <https://mpra.ub.uni-muenchen.de/65237/>

MPRA Paper No. 65237, posted 24 Jun 2015 07:26 UTC

Islamic REIT response to macroeconomic factors: a markov regime switching auto regressive approach

Shahidah Binti Nailul Morad¹ and Mansur Masih²

Abstract

This paper intends to compare the returns of shariah-compliant (Islamic) REITs with non-shariah compliant REITs listed on the London Stock Exchange, Singapore Stock Exchange and Kuala Lumpur Stock Exchange (Malaysia) against the movement of US inflation and interest rates. A Markov-switching auto regressive model is applied to capture the unobserved component present in the market during the sample period. The results tend to provide empirical evidence that while there exist different regimes in all three markets, the regimes for shariah compliant REITs on LSE is not well defined. Meanwhile the returns of shariah-compliant REITs are lower compared to non-shariah compliant REITs with US interest rates being significant in all three markets but US inflation rates significantly affecting only the LSE and SGX REITs.

Keywords: Shariah (Islamic) REIT Index, diversification, Markov regime switching

¹ Shahidah Binti Nailul Morad, Graduate student in Islamic finance at INCEIF, Lorong Universiti A, 59100 Kuala Lumpur, Malaysia.

² **Corresponding author**, Professor of Finance and Econometrics, INCEIF, Lorong Universiti A, 59100 Kuala Lumpur, Malaysia. Phone: +60173841464 Email: mansurmasih@inцейf.org

Islamic REIT response to macroeconomic factors: a markov regime switching auto regressive approach

1. Introduction

Real estate investment trust ("REIT") was first introduced in 1960 following the passing of Real Estate Investment Trust Act of 1960 by the US Congress authorizing the creation of REITs. The appealing aspect of REITs is that at least 90% of their taxable income must be distributed to shareholders annually in the form of dividends Xie(2015). This law was to help investors gain access to large scale investment related to real estate. Although the Asian REITs market do not share a long history as the US REIT market, the Asian REIT markets is gaining momentum and is seen as a significant market for portfolio diversification.

One of the top REITs market which is of interest in this paper is the United Kingdom REITs market. The UK REITs market has developed extremely well with property firms in the UK, Europe, Hong Kong and Singapore listing on the London Stock Exchange ("LSE"). Thus providing investors a well-diversified portfolio of REIT in the UK, Europe, Hong Kong and also Singapore. The UK REITs market as at March 2015 has a market capitalisation of USD126,207,470,995. The Singapore REITs market on the other hand, has a market capitalisation of USD 19,334,375,303 with listings from Hong Kong and Malaysia on their Singapore Stock Exchange ("SGX"). Malaysia's REITs market has a market capitalisation of USD6, 205,729,403 on their Kuala Lumpur Stock Exchange ("KLSE").

The literature on REITs and its response to macroeconomic factors are immense. The impact that macroeconomic variables have on real estate markets and REITs plays a crucial role in the risk management strategies of financial market participants. In fact, a number of papers support the notion of a relationship among the returns of various asset markets and macroeconomic variables. REIT market is unique as it shares characteristics of the real estate market while possessing characteristics of the public stock market, Ewing (2005). It is in fact considered one of the main reasons that the REIT markets are considered a valuable addition for portfolio diversification. The nature of REITs which being a hybrid of real estate and equity allows it to have market characteristics such as liquidity issues, informational asymmetries and inefficiencies, Joyeaux (2015).

These literatures however are on non-shariah compliant REITs (herein after referred to "NSC REITs") while only a handful of it are attributed to shariah compliant REITs (herein after referred to "SC REITs"). The differences of SC REITs and NSC REITs have yet to be thoroughly studied. Unlike Islamic equities, where it has been said to be immune or at least well insulated to the movements of interest rates to a certain degree compared to its conventional counterpart. Islamic stock has been said to be resilient in times of crisis due to their nature of being detach from interest rates, Madjoub, (2014). Hence the need to increase study on Islamic REIT is imperative especially since it is still in the early stages. The introduction of the first listed Islamic REITs was in Malaysia in 2006. Since then, SC REITs emerged in several other countries such as Singapore, Bahrain, the UAE and China to name a few, Ibrahim(2006).

The main objective of this paper is to study the response of both NSC REITs and SC REITs listed on the LSE, SGX and KLSE to global macroeconomic factors being US inflation rate measured by US CPI and the US interest rates, throughout the time period sample. While many studies have been done on the effect of macroeconomic factors on REIT, this paper is believed to be among the first to study it in the context of SC REITs using Markov switching regime. This contribution is expected to facilitate investors, academicians and regulators alike in their analysis of the product and markets' response to the global macroeconomic factors.

In summary, the SC REITs of all three markets go through boom and bust regimes however for SC REITs listed on LSE, the regimes were not well identified which is presumed to be cause by the diversification of the REITs listed which included property firms in Europe and listed with Euro currency. Therefore the impact is not similar to property firms listed solely in the UK and with British Penny or Pound Sterling. In addition to that, SC REITs were found not to be severely affected to the macroeconomic factors compared to NSC REITs. These are evident in the constant returns of the SC REITs on KLSE and SGX as opposed to NSC REITs. However, under boom regimes, the NSC REITs' returns are better compared to during bust period. This is in support of the literature on Islamic equities performance/returns during the global financial crisis.

This paper is structured as follows. Section 2 provides the literature review. Section 3 provides the sources and reasons of the data selected. Section 4 provides the methodology used. Section 5 presents the findings and the discussions and section 6 is the conclusion.

2. Literature review

This literature review consists of two parts the first being the nature of REITs and its response to macroeconomic factors. The second is the difference between shariah compliant equities and conventional equities. The limited literature on SC REITs or even shariah compliant real asset/estate sector prevents a thorough literature review to contribute to this section.

As informed in the earlier section, REITs' nature consists of both equity and real estate. Apart from being listed on the stock market, REITs income stream is the rental income from their real estate portfolios. This sees REITs being listed, but having commercial real estate portfolios as the underlying assets to secure their income stream and deliver attractive yields Newell(2012). Lee and Stevenson(2007) found that while REITs share fundamental characteristics with value stock, REITs nevertheless still carry their own degree of distinctiveness which separates them from the value sector. This reason thus offers investors increased risk-adjusted performance for portfolio balancing and is not substitutable with value stocks. In their previous study, Lee and Stevenson (2005) shows a substantial allocation in REITs is justified across both short- and long-time horizons even for efficient portfolios which already contain value stocks.

Having presented the arguments on the hybrid nature of REITs, it is safe to assume that should there be any shocks to on a macroeconomic factor, both financial and real estate markets would be affected. Investors and even regulators are more likely to take precautions in their portfolio and policy so as to ensure that any shocks may be prevented or if not, limit any damages that it would cause. The usual set of macro variables are term structure, default risk, inflation, real economic

activity, as well as measures of monetary policy. However, the statistical significance of such variables varies greatly across studies on REIT returns Payne, 2006. In fact, any economic variable that systematically affects either the future cash flows and/or the discount factor will impact financial asset returns Chen et al. (1986).

Following the subprime crisis in 2007 which resulted in the collapse of the US mortgage market, the US financial markets were left in turmoil and subsequently the rest of the world's financial markets as well. A REIT, being of mortgage markets in nature is likely to be adversely affected during and after the crisis Tsai(2013). The magnitude of economic instability caused by the real estate sector demanded the need to study the relationship between REIT and the macroeconomic factors relevant to monetary policy so as to identify the origins of recessions. This issue is a major concern for central banks, especially owing to the role of housing as collateral. Since the 1990s, the central banks have succeeded in their objective of price stability by means of inflation targeting policy, but they failed to prevent asset price bubbles and negative real effects Fatnassi et al(2014). Interest rate is one of the many macroeconomic factors commonly used in studies to observe markets. Although Islamic finance products generally are not interest based, interest rates are considered as a blunt instrument of which it can affect discounted cash flows of any firm, even a firm with no financial leverage, Shamsuddin(2014).

In a study of three market portfolios, first being S&P Europe 350 Shariah Index, the second being S&P 350 Europe and the third a portfolio consisting all the equities of the two Indices less equities related to financial sector. The results were that the shariah compliant index performed better than the rest of the market in a period of economic slowdown. It exhibited less variability in return hence less risky while though slightly underperforming during economic boom Alam(2010). In contrast, a study based on a large international data set combining 35 developed and emerging markets and a contemporary evaluation framework based on bootstrap simulations and multifactor models, it was found that shariah compliance portfolios do not reduce financial performance in comparison to conventional index investments around the world Walkshäusl (2012). This brings in a new perspective on Islamic financial products which are known to perform lower than the conventional products.

This finding though quite singular, seems to be in support of Guyot 2011 where he examined the impact of the integration of Shariah values into the dynamics of Islamic indexes as well as their sensitivity to specific geopolitical events or crisis periods. It was discovered that shariah compliant investors do not suffer significant additional costs of inefficiency, though their portfolios are likely to be more sensitive to geopolitical events.

3. Data

The samples are weekly returns from January 2007 through February 2015, resulting in 426 observations. The sample periods were determined mainly based on availability of data especially data on SC REITs. The sampling frame is all the public real estate investment trusts listed on the stock exchange of three countries being United Kingdom, Singapore and Malaysia. All REITs (both NSC and SC) listed on the Singapore Stock Exchange ("SGX") and Bursa Malaysia of Malaysia's

stock exchange (“KLSE”) were taken, while only the firms of the five biggest and smallest market capitalisation listed on the London stock Exchange (LSE) were taken. The 10 LSE samples do not include SC REITs. There are a total of 62 REITs from the three stock exchanges with the breakdown as shown in Table 1.

COUNTRY	NSC	SC
UNITED KINGDOM	10	3
SINGAPORE	19	14
MALAYSIA	10	6
TOTAL	39	23

TABLE 1

OBSERVATIONS	TIME
0 – 100	3 Aug 2007 – 26 June 2009
101 – 200	3 July 2009 – 27 May 2011
201 – 300	3 June 2011 – 26 April 2013
301 - 400	3 May 2013 – 27 Feb 2015

TABLE 2

Data are from Thomson Reuters Eikon which screens the stocks to provide an updated list of shariah compliant stocks of listed real estate investment trust firms. The listed SC REITs on SGX and KLSE which are of shariah compliant status are recognised by their local regulators respectively while the listed SC REITs on LSE are the results of Thomson Reuters Eikon and Ideal Ratings Shariah screenings. The exact methodology, criteria and records of updates of such screening is unknown.

The reason these three countries were chosen to compare their SC REITs returns because first, Malaysia is recognised as being a pioneer for most Islamic finance products and continuously promote Islamic finance so as to become an Islamic finance hub for the world. Second, the positive reception of the international finance community towards Islamic finance has encouraged Singapore and United Kingdom to issue Islamic finance products as well. These two markets which are already established amongst the international finance community are more preferred to investors and are likely to be the preferred market instead of Malaysia. This brings us to the third reason i.e to study the returns of the Islamic finance product, in this case SC REITs among the three country’s stock market.

Table 2 provides the descriptive statistics of all data. All variables are of first difference natural log and are stationary according to the Augmented Dickey Fuller test which was truncated to 396 observations becoming observations from August 2007 until February 2015. The letter ‘D’ indicates ‘difference’ while LNSC and LSC are NSC REITs and SC REITs respectively listed on the LSE. SGNSC and SGSC are NSC REITs and SC REITs listed on the SGX while KLNSC and KLSC are NSC REITs and SC REITs respectively listed on KLSE. The macroeconomic variables chosen are supported by literature and dictated by the availability of data. The economic variables considered in this study are the inflation rate and the interest rate of the US. Inflation is represented by DUSCPI i.e the US Consumer Price Index while the interest rates are the weekly rates published by the Federal Fund Reserved and represented as USIR. The rationale behind interest rates and real estate stock prices is due to the theory that changes in interest rates affect the opportunity cost of holding cash and hence sustain a substitution effect between real estate stocks and interest bearing securities while changes in the inflation rates lead to corresponding changes in interest rates and asset prices ,Liw, 2009.

Additionally, this paper finds support in favour of modelling the influence of the US macroeconomic conditions by Narayan (2012) which have quoted the importance of taking into consideration the economic condition of the largest market. In this context, it is pertinent to examine the effects of the macroeconomic conditions in the US, as it is an important trading partner of both Malaysia and Singapore.

	DLNSC	DLSC	DSGNSC	DSGSC	DKLNSC	DKLSC	DUSCPI	USIR
min	-0.1801551	-0.1598559	-0.221672	-0.2290433	-0.096066	-0.3350498	-0.019348	0.27
max	0.1117259	0.1475	0.2231436	0.2328696	0.09961863	0.3116464	0.01005864	6.5
range	0.2918811	0.3073559	0.44481543	0.4619129	0.1956845	0.6466961	0.02940702	6.23
sum	-0.0936985	-0.0091946	0.68630752	0.08329251	0.5386887	0.4298748	0.119414	373.11
median	0.00226624	0.00129722	0.00258175	0.00291048	0.00107066	0.00160426	8.88178E-16	0.38
mean	-0.0002366	-0.00002322	0.0017331	0.00021034	0.00136033	0.00108554	0.00030155	0.942197
SE.mean	0.00167613	0.00196082	0.00183406	0.00169959	0.00082806	0.00148382	0.00010967	0.0693711
CI.mean	0.00329525	0.00385494	0.00360574	0.00334136	0.00162796	0.00291718	0.00021561	0.1363827
var	0.00111252	0.00152254	0.00133206	0.00114388	0.00027153	0.00087188	4.76268E-06	1.9056906
std.dev	0.03335451	0.03901975	0.03649733	0.03382132	0.01647819	0.02952767	0.00218236	1.3804675
coef.var	-140.9669	-1680.535	21.0589898	160.7977	12.11342	27.20085	7.237119	1.4651581

TABLE 3

Table 3 reports the weekly mean, median and standard deviation for all REITs included in each country sample. As the data indicate, the REITs listed on the KLSE have the lowest standard deviation compared to those listed on SGX and LSE. KLSE REITs as shown in Table 1 above have the least REITs to offer to investors and the fact that its' neighbouring country is Singapore diverts investors' attention away from KLSE REITs for want of a more attractive market. Thus the KLSE REITs are considered to be traded locally on the most part. SGX and LSE are considered primary equity markets which foster investments in innovation which gives incentives to cross list. Incentives are closely related with the country's rule of law and financial infrastructure Cetorelli, 2012.

4. Methodology

A Markov-switching model is known to be used in estimating the behaviour of a dependent variable known to have structural breaks when regressed with its independent variables throughout the time-series sample. The problem lies in the uncertainty of when the structural break may occur or if it does occur how long will it be in such form until it is presumed to return back to normal or jump to another state.

A basic discussion on regime-switching models is necessary before this paper proceeds. The regime switching models is divided into two categories, "threshold" models and "Markov-switching" models. The primary difference between these approaches is in how the evolution of the state

process is modelled. The main concern of this paper is the second one. Markov-switching models were introduced by Goldfeld and Quandt (1973), Cosslett and Lee (1985), and Hamilton (1989) with the assumption that the regime shifts evolve according to a Markov chain Piger, 2007.

A basic assumption behind such models consists of imposing fixed transition probabilities (FTP) governing the move between different states. Filardo, 1994 relaxes this assumption and allows for time varying transition probabilities (TVTP) in a Markov switching autoregressive model. Such probabilities are modelled as functions of certain conditioning variables (i.e., the state variables), which are found to be relevant in explaining the regime switches Agnello et al, 2013.

Due to the similarities of this paper's objectives with Fatnassi (2014), the equations and explanations presented below are humbly reproduced from his paper. The REIT returns being governed by an unobserved state variable or a latent variable S_t ($S_t = 1$ or $S_t = 2$) with an indicator regime, S_t is driven by the transition probabilities. In the case of two regimes (boom and bust), these transition probabilities can be expressed as follows:

$$p = \text{Prob}(S_t = 1 | S_{t-1} = 1) = 1 - (1 - \exp(\pi_{0,1}))^{-1}$$

$$q = \text{Prob}(S_t = 2 | S_{t-1} = 2) = 1 - (1 - \exp(\pi_{0,2}))^{-1}$$

If the parameters $\pi_{0,1}$ and $\pi_{0,2}$ both take zero values, p and q equal 0.5. In other words, the probability of remaining in the regime is equal to the probability of leaving the regime. Fitting the macroeconomic variables into the equation for the two regimes, the extension of the above equations is reflected as follows:

“

$$P(x_{i,t}) = \text{Prob}(S_t = 1 | S_{t-1} = 1, x_{i,t-1}) = 1 - (1 + \exp(\pi_{0,1} + \sum_{j=1}^m \pi_{j,1} x_{j,t-1}))^{-1}$$

$$q(x_{i,t}) = \text{Prob}(S_t = 2 | S_{t-1} = 2, x_{i,t-1}) = 1 - (1 + \exp(\pi_{0,2} + \sum_{j=1}^m \pi_{j,2} x_{j,t-1}))^{-1}$$

where $x_{j,t-1}$ represents the two selected macroeconomic variables that are sensitive to influence the boom and bust markets; $j = 1, 2$. The probability to switch from the boom to bust regime is given by $(1 - p)$, whereas the probability to switch from bust to boom regime is measured by $(1 - q)$.”

5. Empirical results and discussion

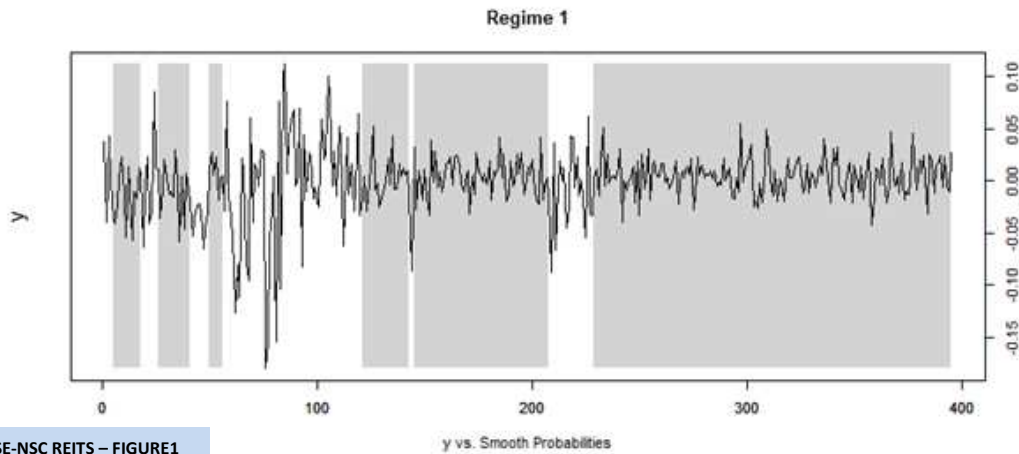
As informed in the introduction, this study is perhaps the first in the context of SC REITs, thus the initial estimate of this paper is based entirely on economic theory. However guidance is obtained from Alhenawi et al (2013) where *synthetic compliant REIT portfolios* was used to study the performance of SC REIT and compared against NSC REIT. Their studies shown that SC REIT outperformed NSC REITs, cumulative performance tests reveal evidence of outperformance during periods of recession and financial crises, but there were also results that indicate no difference between SC REIT and NSC REIT portfolios during every other time. Their synthetic shariah compliant portfolio was based on four shariah financial filters i.ea debt ratio of less than 33%, an interest expense ratio of less than 5%, an interest income ratio of less than 5%, and a cash and accounts receivable ratio of less than 45%, Lahasna and Hassan [2011].

The first examination for both NSC REITs and SC REITs is by using the OLS model. The results indicate that the OLS is not the best model hence a truthful account of the variables behaviour cannot be explained accurately. When the models are plotted, high auto-correlations are seen in addition to the residuals which cannot be fitted on the linear regression line. In the interest of saving space, these graphs are provided in the Appendix. The OLS results for the three stock exchanges and the REITs however are presented in Table 4 below.

	LONDON STOCK EXCHANGE		SINGAPORE STOCK EXCHANGE		KUALA LUMPUR STOCK EXCHANGE	
	NSC	SC	NSC	SC	NSC	SC
Intercept	1.504	0.821	2.297*	1.475	2.911**	1.669^
DUSCPI	0.514	0.287	1.252	2.441*	0.369	-2.154*
USIR	-2.988**	-1.536	-2.944**	-2.934**	-2.831**	-1.455
ResidStd Error	0.03306	0.039	0.03613	0.0332	0.01635	0.02934
Adjusted R-squared	0.01763	0.001043	0.01977	0.02959	0.01517	0.01252
Multiple R-squared	0.0226	0.006101	0.02473	0.0345	0.02015	0.01752
F-statistics	4.545	1.206	4.983	7.022	4.042	3.503
p-value	0.01119	0.3004	0.007294	0.001009	0.01831	0.03104
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '^' 0.1						
Table 4						

Having determined the non-linearity of the variables, the next step is to ensure that there exist two (at least) different regimes for the variables in order to justify the usage of MS-AR.

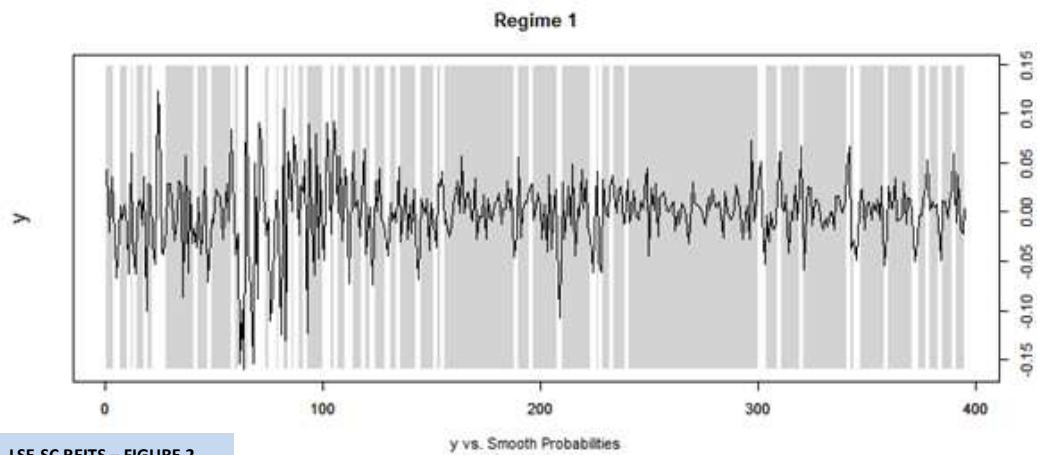
5.1 UK REITs



LSE-NSC REITS – FIGURE1

Figure 1 is the plot for regime 1 for NSC REITs listed on the LSE. The grey area is regime 2. According to the descriptive statistics for NSC REITs regimes in Table 6, it can be said that regime 1 is the best regime where the REIT sector's returns went through a dive period on the stock market. Regime 1 was significantly adversely affected by the US interest rate at a -3.5 which is significant at a 0 level. This coincides with the information in Table 2 where the 100th mark on the x-axis is on 26 June 2009, during the global financial crisis ("GFC"). The reason for this decline can be seen from the aspect of close cointegration of UK and the US real estate markets with the global world market Hatemi-J, 2013.

LONDON STOCK EXCHANGE	NSC			LONDON STOCK EXCHANGE	SC	
	REGIME 1	REGIME 2			REGIME 1	REGIME 2
Intercept	4.3571***	-0.6316		Intercept	1.5429	-0.4561
DUSCPI	-0.7478	0.6853		DUSCPI	-3.0912**	2.8804**
USIR	-3.5000***	-0.4571		USIR	-0.0278	-1.9744*
Y_1	-1.2307	1.2368		Y_1	-8.2739***	4.6038***
Multiple R-squared	0.07091	0.02278		Multiple R-squared	0.3427	0.3671
Residual StdError	0.018549	0.055265		Residual Std Error	0.0270085	0.037817
Transition probabilities				Transition probabilities		
Regime 1	0.97032914	0.07440047		Regime 1	0.6502657	0.7183066
Regime 2	0.02967086	0.92559953		Regime 2	0.3497343	0.2816934
AIC	BIC	LOGLIK		AIC	BIC	LOGLIK
-1729.20	-1649.54	872.60		-1520.85	-1441.19	768.43
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1						
Table 5						

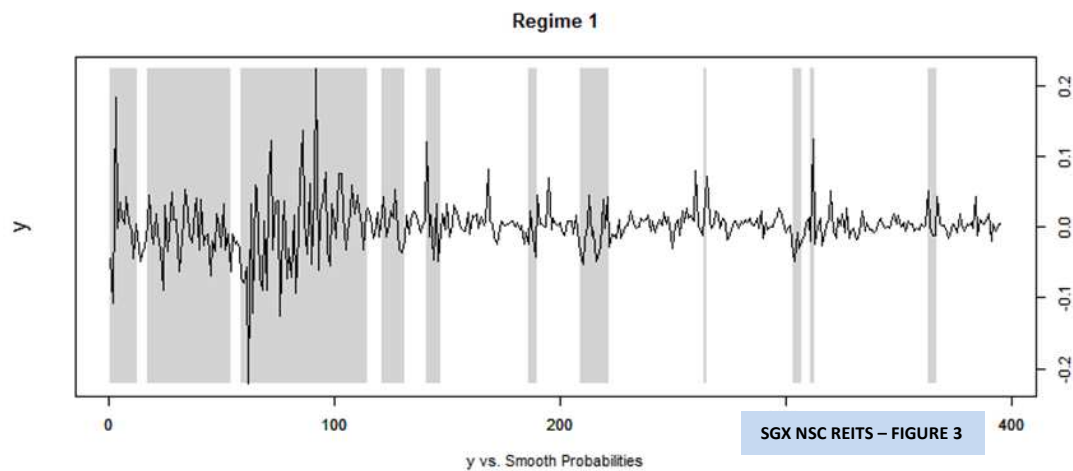


LSE-SC REITS – FIGURE 2

Figure 2 indicates that there are more structural breaks in SC REITs compared to NSC REITs. In fact, looking at the descriptive statistics, SC REITs are adversely affected by US CPI and also US interest rates. The frequency of regime 1 jumping into regime 2 and vice versa is quite often. This explains the figures on the transition probabilities where Regime 1 has only a 65% of staying in its current regime while at the same time has a 72% of jumping into regime 2. In fact, when it is currently in regime 2, it only has a 28% probability of staying in regime 2 and a 34% to jumping into regime 1. The transition probabilities for the regimes of SC REITs are quite weak when compared to the threshold of 0.5 by Hamilton (1998).

The behaviour of SC REITs perhaps could be attributed to the nature of the SC REITs in this sample. SC REITs in this sample includes European REITs (with portfolio of properties in Europe) listed in Euro currency, thus the impact of US CPI and interest rate would have to be in light of the property market and Euro currency. This would explain the significance of US CPI in regime 1 where the SC REITs recorded the lowest return sometime around the early 2009 being the GFC. In addition to GFC, the European debt crisis may have also played a role in the REIT markets as it was found that during this period the average returns equity and real estate markets indices are lower in the crisis period than in the pre-crisis period Hui, 2013.

5.2 SINGAPORE REITs



The graph depicted in Figure 3 coupled with the statistics description in Table 6 shows that regime 1 seems to be the boom regime where there are low volatilities and stable returns. The grey area, which is regime 2 indicates a bust regime where the statistics description shows that this regime was adversely affected by the US interest rate at a significant level of 0.000 which is highly significant. Although regime 1 was also adversely affected by the US interest rate, the level of significance is only at 0.10 level. Cross-reference Figure 3 and NSC REITs' statistics description with Table 4, it shows that from 0 – 100 is from 3 Aug 2007 – 26 June 2009 being the highlight of GFC.

SINGAPORE STOCK EXCHANGE	NSC			SINGAPORE STOCK EXCHANGE	SC		
	REGIME 1	REGIME 2			REGIME 1	REGIME 2	
Intercept	1.2075	5.0833***		Intercept	2.3333*	0.1122	
DUSCPI	1.0547	0.4645		DUSCPI	-0.8122	1.8046^	
USIR	-1.6957 ^	-4.7778***		USIR	-0.7368	-0.9250	
Y_1	0.83624	0.6433		Y_1	3.2658**	0.3055	
Multiple R-squared	0.02164	0.1843		Multiple R-squared	0.04851	0.0508	
Residual standard error	0.05235114	0.01118867		Residual standard error	0.01456048	0.06488013	
Transition probabilities				Transition probabilities			
Regime 1	0.8960818	0.08773125		Regime 1	0.98343299	0.04875601	
Regime 2	0.1039182	0.91226875		Regime 2	0.01656701	0.95124399	
	AIC	BIC	LOGLIK		AIC	BIC	LOGLIK
	-1734.48	-1654.82	875.2412		-1897.65	-1817.99	956.83
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '^' 0.1							
Table 6							

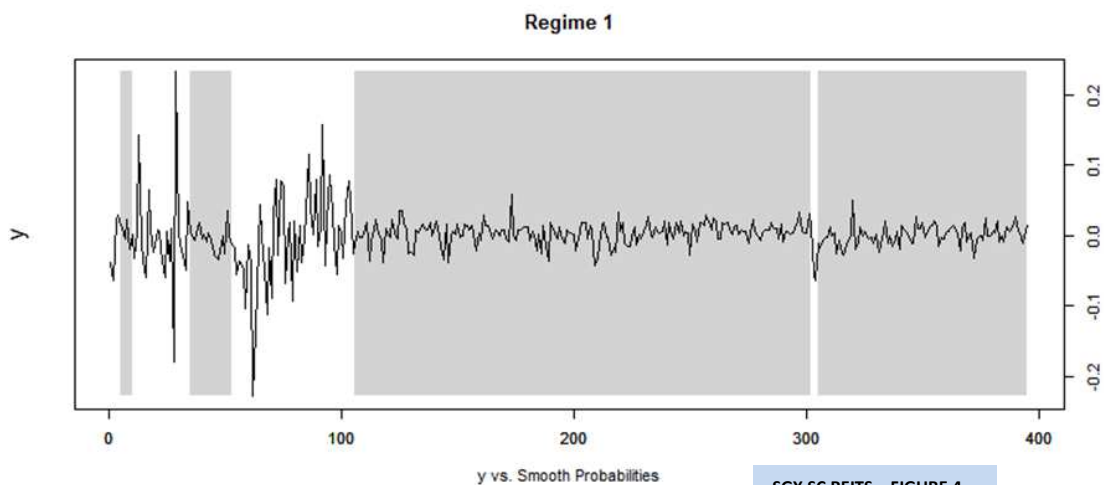


Table 6 indicates that the $y-1$ of regime 1 is significant at 0.01 level to regime 2 which means that factors in regime 1 would influence regime 2. Here it is presumed that the factor which influenced SC REITs returns in regime 2 is the US CPI as statistics description shows a positive relationship with the US CPI significant at 0.10 level. Although an SC REIT is presumed to be free from interests (the percentage allowed varies according to own Shariah Advisor / Regulators), which is a main contributor to inflation, the US inflation affected the SC REITs though not adversely. This is due to Singapore's close trade relation with US thus US interest rates have significant impact however, Singapore exchange rates are based managed float thus its Central Bank can intervene and continue to maintain its a low inflation rate policy.

Figure 4 interestingly matches Figure 3. The only difference is that regime 2 is more constant sometime after 26 June 2009 i.e the 100th mark A reason for the constant 2nd regime and positive relation with the US CPI may be attributed to the fact that in late 2010, Singapore listed the biggest SC REITs ("Sabana") in the financial markets. This drew attention from investors worldwide.

5.3 MALAYSIA REITs

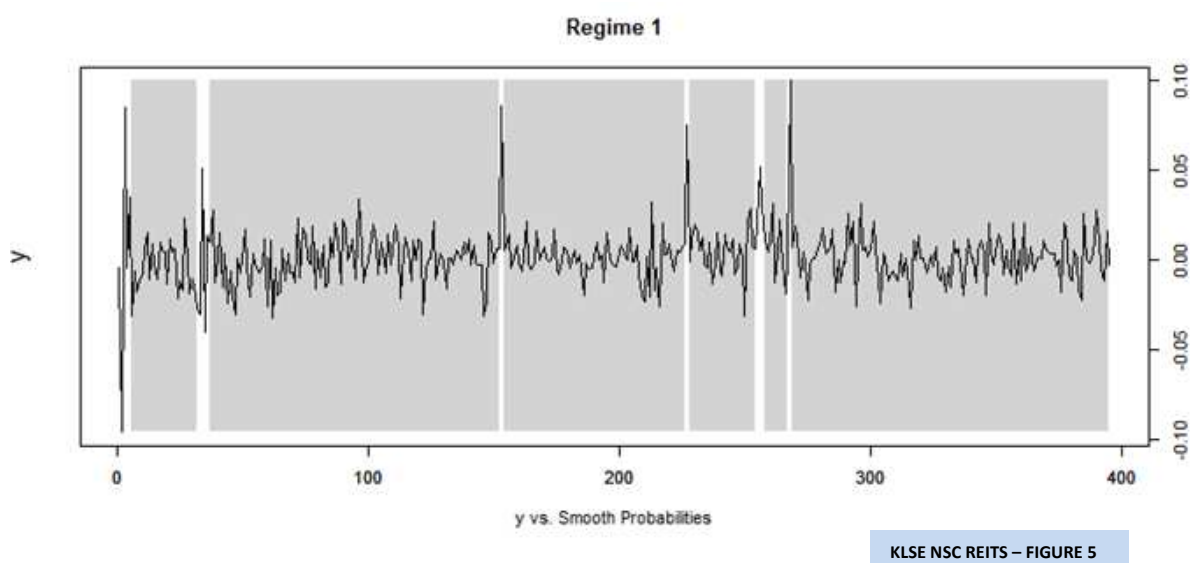
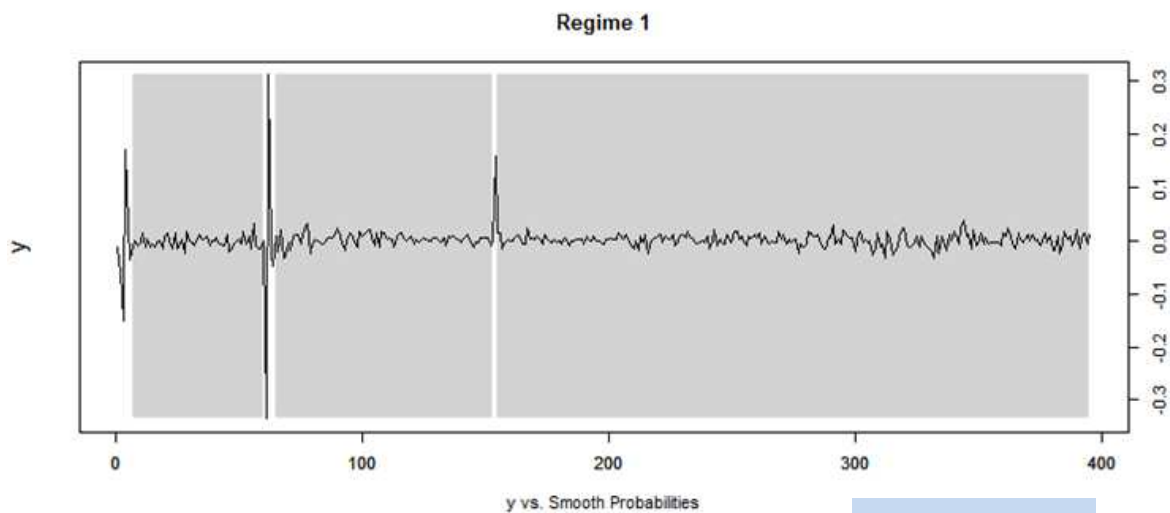


Figure 5 above shows that in the time sample of listed NSC REITs on KLSE, regime 2 dominates the REITs scene. This provides a positive outlook on the REIT industry as regime 1 has an adverse relation

with US interest rates which is significant at 0.05 level. Although regime 2 also has an adverse relation with US interest rates, it is significant at 0.10 only. Ironically, it is at regime 1 we can see several spikes on the returns making it the best returns for NSC REITs during the sample. In a test of contagion among REIT markets, it was shown that while there exist contagion throughout European and Asian markets during the GFC (author divided GFC into two time periods: January 2, 2006 to April 30, 2008 and January 2, 2006 to March 31, 2010) European REITs asset return distributions are more affected than those of the Asian countries'. In fact Malaysia's REITs asset returns distributions were significant at positive value in the 2nd crisis period Chang, 2014.

KUALA LUMPUR STOCK EXCHANGE	NSC			KUALA LUMPUR STOCK EXCHANGE	SC		
	REGIME 1	REGIME 2			REGIME 1	REGIME 2	
Intercept	2.3750*	2.0181*		Intercept	2.7143*	0.2726	
DUSCPI	0.7850	-0.4080		DUSCPI	0.7179	-1.1382	
USIR	-3.0000**	-1.7037^		USIR	-2.4000*	-0.5700	
Y_1	-0.2008	-1.7152^		Y_1	1.0991	-0.5078	
Multiple R-squared	0.03285	0.2686		Multiple R-squared	0.03285	0.3393	
Residual standard error	0.01202858	0.03980347		Residual standard error	0.01202858	0.1329397	
Transition probabilities				Transition probabilities			
Regime 1	0.97873424	0.3395328		Regime 1	0.99139223	0.2093859	
Regime 2	0.02126576	0.6604672		Regime 2	0.00860777	0.7906141	
	AIC	BIC	LOGLIK		AIC	BIC	LOGLIK
	-2253.55	-2173.89	1134.77		-2323.47	-2243.81	1169.73
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '^' 0.1							

Table 7



KLSE SC REITS – FIGURE 6

Figure 6 shows the response of SC REITs to the macroeconomic factors throughout the sample. It is obvious that unlike other SC REITs listed on SG X and LSE, the SC REITs listed in KLSE did not go

through constant shifts in regimes. The transition probabilities indicate strong regimes where both are above the 0.5 threshold. The returns are low yet stable throughout the whole sample period. The statistics description indicates that US interest rates was only significant at 0.10 level in regime 1 in an adverse manner and from Figure 6, it was for an extremely short period. The proportion of rentals from the operation of non-permissible activities to total turnover of the Islamic REIT in any current financial year must not exceed 20%³.

The SC REITs stable nature may be attributed to the limited interaction with US interest rates. Where a market has low correlation with interest rates, this would limit volatility as interest rate is the main conduit for spillover. Since SC REITs are presumed to have low leverage ratios and very small interest rate involvement, this linkage is broken Madjoub, 2014.

6. Conclusion

Shariah compliant REITs (“SC REITs”) by virtue of their nature of both equity and real estate responds to macroeconomic factors in the same manner as non-shariah compliant REITs (“NSC REITs”). The findings of this paper also indicate that SC REITs too undergo regime shifts although for LSE, it may not be apparent compared to NSC REITs. Listed SC REITs on LSE had better returns followed by SC REITs on SGX and the lowest returns are KLSE SC REITs.

Investors’ preference of Malaysia’s REITs during the crisis reflects their inclination to protect their capital though this flight to safety did not last long. It is suffice to say that Malaysia being a pioneer in SC REIT did not provide much of an advantage when taken into consideration other factors affecting choice of markets and products as KLSE REITs have the lowest returns compared to the others. In an industry survey among Malaysia’s top management of real estate, it was found that the key factors which influence development are tax issues, provision of professional REIT services, availability of quality properties and strategic property locations. The tax issues are significant as Singapore has provided many incentives on this matter therefore to remain competitive Malaysia must offer a more attractive package to investors Newell et al, 2010. In addition to this in a study on Islamic countries and their stock market development, Dewandaru et al (2014) found that to boost investors’ confidence in a particular stock market there must be a strong legal environment, transparency and independence from government, more efforts to control the corruption, shortening the bureaucratic process and ultimately ensuring the soundness of the economic policy. Nevertheless, SC REITs provides investors with valuable portfolio diversification avenues for their investments.

There are several noteworthy limitations to this study which necessitates further research is one, the lack of data as SC REITs have yet to mature and attract new issuance amongst well known property firms to boost the SC REIT markets. Two, the lack of information on shariah screenings methodology and records by Thomson Reuters and Ideal Ratings Shariah which could have facilitated further explanations on the SC REITs and also for a more precise inclusion of sample.

³Securities Commission Malaysia Guidelines on Islamic REITs 2005.

References

Agnello L., Dufrénot G. and Sousa M.G. (2013) Using time-varying transition probabilities in Markov switching processes to adjust US fiscal policy for asset prices. *Economic Modelling*, 34, 25–36.

Chang G.-D., Chen C.-S.(2014). Evidence of contagion in global REITs investment. *International Review of Economics and Finance*, 31, 148–158.

Chang K-L. (2009). Do macroeconomic variables have regime-dependent effects on stock return dynamics? Evidence from the Markov regime switching model. *Economic Modelling*, 26, 1283–1299.

Cetorelli N. and Peristiani S. (2013). Prestigious stock exchanges: A network analysis of international financial centers. *Journal of Banking & Finance*, 37, 1543–1551.

Chen, N., Roll, R. and Ross, S. (1986). Economic forces and the stock market. *Journal of Business*, 59, 383–403.

Dewandaru G., Rizvi S.A.R., Bacha O.I. and Masih M. (2014). What factors explain stock market retardation in Islamic countries. *Emerging Markets Review*, 19, 106–127.

Ewing B. and Payne E. J. (2005). The response of real estate investment trust returns to macroeconomic shocks. *Journal of Business Research* 58, 293– 300.

Fatnassi A., Slimc C., Ftiti Z. and Maatoug A. (2014). Effects of monetary policy on the REIT returns: Evidence from the United Kingdom. *Research in International Business and Finance* 32, 15–26.

Filardo, A.J. (1994). Business cycle phases and their transitional dynamics. *Journal of Business and Economic Statistics*, 12, 299–308.

Guyot A. (2011). Efficiency and Dynamics of Islamic Investment: Evidence of Geopolitical Effects on Dow Jones Islamic Market Indexes, *Emerging Markets Finance and Trade*, 47(6), 24-45.

Hamilton, J.D.(1989) A new approach to the economic analysis of non-stationary time series and the business cycle. *Econometrica* 57, 357–384.

Hatemi-J A., Roca E. and Al-Shayeb A.(2014).How integrated are real estate markets with the world market? Evidence from case-wise bootstrap analysis. *Economic Modelling* 37, 137–142.

Hui Eddie C. M. and Chan Kevin K.K, (2013). Contagion across real estate and equity markets during European sovereign debt crisis. *International Journal of Strategic Property Management*, 17:3, 305-316.

Lee S. and Stevenson S. (2007). The substitutability of REITs and value stocks, *Applied Financial Economics*, 17:7, 541-557.

Liow K.H. and Webb J.R. (2009) Common factors in international securitized real estate markets. *Review of Financial Economics*, 18, 80–89.

Majdoub J. and Mansour W. (2014). Islamic equity market integration and volatility spillover between emerging and US stock markets. *North American Journal of Economics and Finance* 29 (2), 452–470.

Narayan S. and Narayan P.K. (2012). Do US macroeconomic conditions affect Asian stock markets? *Journal of Asian Economics*. Volume 23, Issue 6, December, 669–679.

Newell G. and Osmadi A. (2010). Assessing the importance of factors influencing the future development of REITs in Malaysia. *Pacific Rim Property Research Journal*, Vol 16, No 3.

Payne E. J. (2006). The response of sub-sector REIT returns to shocks in fundamental state variables. *Applied Financial Economics Letters*, 2, 71–75.

Piger J. (2009). *Econometrics: Models of Regime Changes*. *Encyclopedia of Complexity and Systems Science*, 2744-2757.

Shamsuddin A. (2014). Are Dow Jones Islamic equity indices exposed to interest rate risk? *Economic Modelling*, 39, 273–281.

Tsai S-M and Chiang S-L. (2013). The asymmetric price adjustment between REIT and stock markets in Asia-Pacific markets. *Economic Modelling*, 32, 91–99.

Walkshäusl C. and Lobe S. (2012). Islamic investing. *Review of Financial Economics* 21, 53–62.

Xie Z. and Chen S-W. (2015). Are there periodically collapsing bubbles in the REIT markets? New evidence from the US. *Research in International Business and Finance* 33, 17–31.