

## Interactions Between Islamic Stock Indices And Business Cycles: Focusing On Asia Pacific

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**Abstract:** Scholars have long been interested in studying the trends in business cycles and stock market performance and have garnered several diverse conclusions. The instable nature of business cycles makes it necessary to study the relationships between stock performance and economic activity. Moreover, when stock markets react to changes in economic activity, the added dimension creates a more complex relationship, placing greater impact on investors, policymakers and other stakeholders in the economy. Novel to this multifaceted mix are Islamic equity markets who have witnessed tremendous growths over the last decade. The Islamic equity market is managing assets in the excess of US\$5 billion and has an estimated growth rate of 15% to 20%. With this growth and prominence, causal relationship between the performance of the stock market and business cycles is anticipated. In particular, for countries where the Islamic stock markets accounts for 60% market capitalization rate, such as Malaysia. Furthermore, we can witness a dearth in the present literature concerning Islamic stock indices and its relationship with business cycles. In the main, this study attempts to analyse the relationship between the volatility of Islamic stock indices and business cycles and assess how it fairs against conventional stock indices. Spanning over 12 years, employing Exponential-Generalized Autoregressive Conditional Heteroskedastic (E-GARCH) our results indicate that across the region of Asia Pacific, Islamic indices appeared to be more volatile during times of economic downturns and less volatile during the growth phase of a business cycle. The authors attributed this singularity to the small universe of stocks that make up the Asia Pacific index and the heavy reliance on western and global markets for trade. As the impact of the region's business cycle affected both indices in a similar pattern, it allows for common policy implementations.

**Key words:** Business Cycles, Islamic Stock Indices, Volatility, Asia Pacific JEL Classification Codes: O16, C87, E32

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### INTRODUCTION

The area of interaction between stock market performance and real sector business activity has been of much interest for several decades now. Considerable research has been undertaken to observe this relationship, to understand further, how stock markets react to fluctuations in real economic activity. There is room for much impact on investors, policymakers and other stockholders in the economy through the precarious relations of business cycles and stock markets.

In general financial markets theory, stocks markets are considered as the lead indicator of the health of the economy with the forecast embedded in it. The ability of financial markets to predict correctly economic behaviour has been deliberated extensively and while there is consensus on its indicating ability (see Siliverstovs and Duong, (2006)), there have been concerns and evidence of false alarms caused by the stock market. For instance, after the stock crash of October 1987 many had lost faith and called for a new index that did not include equity prices as shown by Siegel (1991).

However, the apparent beneficial relationship of stock market inclusion in predicting the economic cycle outweighs its shortcomings. Schewrt (1989) in his study confirms with empirical evidence that stock prices correlate with future economic activity on the basis that economic growth forms the source of corporate profits paid out to stockholders. Relating back to economic theory, when the economic growth is affected as will the demand and supply for equities be affected.

Candelon and Metiu (2011) explored the disengagement of financial markets from real fundamentals during periods of financial boom and found that the state of business cycle influences the stock markets as well. In addition to this, rapid liberalization, intensive international trade expansions and the overall interdependence of the global economy has greatly changed the fundamental dynamics of the macroeconomic fluctuations.

Relating to the core of our study, Islamic finance has shown a steady growth over the past decade and has started being noticed as a probable key player in the global economic landscape. Islamic funds globally are

valued to be at US\$ 1.3 trillion, while the Islamic capital market is estimated to be US\$ 400 billion in size with an estimated growth rate of 15% to 20%.

Owing to this new class of instruments being introduced within the ambit of Islamic finance, the study of financial markets and economic growth should no longer be limited to conventional stocks. Further research is called for on the causal link between Islamic stock markets and business cycles. Specifically, as during the global crisis of 2007-2009, several studies have focused on the merits of Islamic indices offering more permanence, thus tiding over the crises with relative stability as compared to its conventional equivalent (Girard and Hassan, 2008; Charles, Darne and Pop, 2010).

Under the Islamic financial framework, the capital markets play a dual role, firstly the role their conventional counterparts play in providing an avenue for lenders and savers to match their requirements, and secondly and more importantly, do that via a risk-sharing mechanism, the core pillar of this system. Islamic equity markets whereas serve the purpose of channelling surplus units fund to deficits at micro level, they have been proposed and tested to be used as a channel for fiscal deficit financing. According to Mirakhor (1993) stock markets within a non-interest equilibrium model, also serve as a monetary policy transmission channel for the central bank. The channelling of funds through the stock market become the primary source and dependent variable for the growth of economy in contrast to the banking system of money markets in conventional interest based system.

In the present study, we endeavour to analyse the volatility between Islamic stock indices and business cycles and empirically assess how it fairs against conventional stock indices. Employing Exponential-Generalized Autoregressive Conditional Heteroskedastic (E-GARCH), regional stock indices from Dow Jones family of Islamic and conventional indices, are studied.

This study primarily intends to contribute to lack of existing research on the effects of business cycles on Islamic indices. This paper is unique in evaluating the volatility of Islamic and conventional stock indices against regional business cycle movements. From the results obtained, we found that while both Islamic and conventional stock indices are affected in a similar manner during the business cycle, Islamic stock indices appeared to be more volatile with a slight lag to conventional indices during times of economic downturn.

The paper is divided into six sections. Following the introduction, a review of the literature is presented in section 2. The research objectives and motivations of the study are reflected in section 3. Section 4 describes the methodology, which precedes the empirical results. Lastly, in section 6 the conclusion is presented with a brief mention of the limitations and areas for further research.

The current literature shows a dearth of empirical studies in the area of Islamic stock indices and its relationship with business cycles. The few studies that have been undertaken on Islamic stock markets focus primarily on performance and volatility and are primarily restricted to developed countries.

Concerning business cycles, many schools of thoughts have emerged over the years. Classicalists are of the opinion that business cycles result from temporary instability of exogenous factors in the economy, which would eventually return to normal, requiring minimal interference. This view is in direct contrast to that held by Keynesians who argue that business cycles are indicative of market failure and government intervention is instrumental in stabilizing the economy. A failure to stabilize the economy in the short-term would lead to far greater implications in the long run.

Monetarists, on the other hand, conclude that business cycles are the result of wrong monetary policies that caused an over or under supply of money in the economy. They contend that stability in the monetary policies of an economy would translate to better stability in business cycles.

In one of the earlier studies on the linkage between volatility of stock markets and different economic regime Schwert (1989), the stock market volatility proved to be counter-cyclical; where it is greater in recessionary periods than in expansions. This was further reaffirmed by Backus and Kehoe (1992) who established that the correlation between stock market and industrial production cycles are significantly positive.

The literature is rich in evidence to the theory that stock markets can anticipate changes in the real sector. In reference to a causal link between stock market performance and real economic activity, Siliverstovs and Duong (2006), Fama (1990), Binswanger (2000) and Anotonios (2010) have provided empirical support for the interactions between financial and real markets.

Shyu and Hsia (2008) in their study show evidence of a causal relationship between stock return volatility and the business cycle in the case of Taiwan. In a related study by Enisan and Olufisayo (2009) they explored the long run and causal relationship between stock market performance and economic growth from seven sub-Saharan African countries. Their results point toward a significantly positive relationship between the two and asserts that stock markets can help promote the growth of African economies.

In the field of volatility study for capital markets, Wang (2010) investigated the link between the volatility of China's stock market and macroeconomic variables (real GDP, inflation and interest rate) using E-GARCH, and found that there was no causal relationship between stock market volatility and real GDP but showed a bilateral causal relationship between inflation and stock market volatility. Azarmi *et al* (2005) when exploring the relationship between stock market development and economic growth found parallel results for India.

Greenspan (2000) and Larrain (2004) deliberated the significance of an efficient financial system acting as a buffer against severe output retrenchments. Piyapas (2007) in his research, found a negative relationship between capital market development and output, investment and consumption volatiles. Similarly, Denizer et al. (2000) established that a more developed financial sector lead to smaller fluctuations in real per capita output, consumption and investment growth.

This developmental approach holds true when discussing regional inter-linkages, such as in Asia Pacific, where strong evidences of correlation was found for growth development, trade arrangements, monetary cooperation, regional institutionalisation and structural vulnerability by Weber (1991). Following this, with an increase in financial linkage, there is more room for diversified portfolios for countries allowing them to safeguard against idiosyncratic shocks to the market. Comparatively, Crosby (2002) measured business cycle correlations in the Asia-Pacific regions and found that GDP synchronisation links are not strongly associated amongst the countries and thus their link with stock markets would not be significant throughout the region.

In regards to Islamic equities, few studies have conducted empirical research on the relationship between Islamic stock indices and macroeconomic variables. A few studies have been undertaken on the impact of Islamic stocks on macroeconomic variables and vice versa. Ibrahim (2003) and Hussin et al. (2012) in their exploratory study regarding Malaysia, found that Islamic stock indices shared a positive affiliation with inflation rate, industrial production index, hence showing presences of a long-term relationship.

In recent studies, Rahman and Sidek (2011) and Siskawati (2010) they found evidence of volatility in major global markets as having influence on Islamic indices. However, Karim, Yusof and Majid (2007) and Kassim and Arip (2010), contradict this, as they failed to find any empirical existence of co-integration among the Islamic indices. Specifically, during economic crisis, Islamic funds had performed better than their conventional counterpart had Milly and Sultan (2009), Arshad and Rizvi (2013). However, Charles, Darne and Pop (2010) discovered that during the crisis, both indices were affected to same degree by variance change.

When investigating the difference in reaction towards macroeconomic variables between Islamic and non-Islamic compliant indices Yousof and Majid (2007) found that both indices reacted similarly to all the selected macroeconomic variables, with the exception of interest rate; the Islamic index showed no significant influence on the interest rate movement. Milly and Sultan (2009) and Arshad and Rizvi (2013) found that Islamic indices performed better during times calm economic times and moderately better during crisis times. Arshad and Rizvi (2013) further found that Islamic indices of Asia Pacific were partially immune to speculative shocks to global financial services, thus regaling Islamic indices as a better alternative.

However, Hassan (2002) found that Dow Jones Islamic Market Index (DJIMI) outperformed conventional indices from 1996 to 2000 and underperformed them in 2001 to 2005. Similarly, Hakim and Rashidian (2002) found that the three-month Treasury bill rates do not affect the DJIMI.

Lastly, it is to the best of the author's knowledge that no previous literature is available on the relationship of Islamic stock indices and business cycles. The present study hopes to fill this gap in literature.

This study aims to investigate the volatility of both Islamic and conventional stock indices against leads and lags in a regional business cycle. The authors have tried to provide an exploratory preliminary study to investigate the relation between Islamic stock market fluctuations and business cycles for regions in Asia Pacific.

The rationale for focusing on Asia Pacific is based out of the impressive economic growth of the region, and increasing economic importance in the global scenario. In theory, cross-border financial linkages are expected to reduce the links of cross-country outputs, which leads to an increase in the correlations between shocks related to nation specific monetary and fiscal policy. This would have a positive impact on business cycle synchronization. This paper aims to contribute to an improved understanding of whether Islamic indices offer more stability during the troughs of business cycle.

The motivation of this study arises from the growing interest in Islamic finance and the increasing innovation and introduction of Islamic financial assets in the global stock markets. Investors and policymakers would be interested in forecasting future business cycles concerning Islamic stock market performance.

When looking specifically at the Asia Pacific region, Islam is the largest religion of the region at 25%. Muslims here can be seen potential customers, and are instrumental in the growth of Islamic finance. Malaysia for instance, boasts of having a market capitalization rate of over 60% for their Islamic stock market. Similarly, Indonesia's Islamic finance has a net worth of \$23.2 billion and Islamic stocks boast a market capitalization rate of 53.7%

Thus, with massive growth and well-established prominence, the introduction of Islamic equities and stock markets is inclined to have several repercussions causing inflationary or deflationary pressures in the economy. Much has been written and debated upon regarding the decoupling of the real sector and financial sector in the context of the recent financial meltdown, and how the development of paper economy led to the sudden stop in the global growth.

Islamic finance is based on the concept of the underlying real asset theory and derives its core essence from the real sector. This inherent philosophy, requires a more thorough study of how it impacts the dynamics of capital markets and business cycles, and this research is an attempt to address that gap.

We attempt to contribute towards a dearth in the present literature concerning Islamic capital markets. We hope to empirically substantiate the claim that Islamic stocks are a relatively safer option for investors. Hence, with the above-mentioned motivation this research attempts to answer the following research questions:

1. *Are Islamic stock indices affected differently from conventional indices during a business cycle?*
2. *Do Islamic stock indices provide investors with more stability during periods of financial recession?*

## MATERIALS AND METHODS

Focusing specifically on Asia Pacific, this study uses daily stock prices for the Asia Pacific region provided by Dow Jones spanning 12 years from January 2000 to December 2011. Similarly, the data for our business cycle derivation comprises of quarterly regional real GDP taken from IIFS (2011).

To aid our research objective, a series of empirical investigation is performed, beginning with a simple descriptive examination of the data. Next, the business cycle graph is obtained using the Christiano-Fitzgerald band pass filter. After which, the volatility of our stocks are studied using Exponential Generalized Autoregressive Conditional Heteroscedastic (EGARCH) model. A detailed explanation of the methodology is given below.

### 2.1 Christiano-Fitzgerald:

Band pass filters are used to analyse GDPs for clear business cycles, which the naked eye can barely recognize. One such filter is the Christiano-Fitzgerald filter developed on the pitfalls of previous filters (such as the Hodrick-Prescott and Baxter-King). It formulates the detrending and smoothing problem in the frequency domains. Furthermore, it relaxes the constraints of stationarity and takes into account the timing relationship between series. Christiano and Fitzgerald (1999) based their work on the work on the random walk assumption allowing for the use of all data series for calculation. It can be calculated as:

$$c_t = B_0 y_{t+1} + \dots + B_{T-1-t} y_{T-1} + \widetilde{B_{T-t}} y_T + B_1 y_{t+1} + \dots + B_{t-2} y_2 + \widetilde{B_{T-1}} y_1 \quad (1)$$

$$\text{Where } B_j = \frac{\sin(jb) - \sin(ja)}{\pi j}, j \geq 1 \text{ and } B_0 = \frac{b-a}{\pi}, a = \frac{2\pi}{P_u}, b = \frac{2\pi}{P_l}$$

The parameters  $P_u$  and  $P_l$  are the cut-off cycle length in month. Cycles longer than  $P_l$  and shorter than  $P_u$  are preserved in the cyclical term  $c_t$ .

There are several benefits of using the Christiano-Fitzgerald filter over others, as it is considered more accurate for long-term business cycles and for time series where the beginning and ending are critical to evaluation as opposed to the Baxter-King filter, which shaves off the first and last 3 years in its calculation.

The beginning and end of our study period holds much importance as it includes two important economic crises, i.e. the dot.com bubble crisis of 2000 and the global financial crisis of 2008-2010. Hence, for this research we will be using the Christiano-Fitzgerald filter.

### 2.2. Wavelet:

The daily return for the Asia Pacific stock indices are first converted into index returns using:

$$r_{it} = \ln\left(\frac{P_{it}}{P_{it-1}}\right) \text{ for stock } i \text{ at day } t \quad (2)$$

Once the daily return has been calculated for both the Islamic and conventional index, they are then separated into fundamental multiresolution (multihorizon) components using wavelet analysis. Using Maximum Overlap discrete wavelet transformation (MODWT), the return series is transformed from time domain into scale (interval) domain to understand correctly the frequency at which the activity occurs. For this study, we have used three different scale crystals for our daily return series: d4 (16–32 days), d5 (32–64 days), and d5 (>64 days).

The wavelet family symmlet 8 is chosen to get the least asymmetry property which is more appropriate for financial series. The transformed return series  $r(t)$  is represented as a linear combination of wavelet functions as follows:

$$r(t) \approx \sum_k s_{j,k} \phi_{j,k}(t) + \sum_k d_{j,k} \psi_{j,k}(t) + \sum_k d_{j,k} \psi_{j,k}(t) + \dots + \sum_k d_{1,k} \psi_{1,k}(t) \quad (3)$$

Where:

j is the number of scale crystals (intervals or frequencies)

k is the number of coefficients in the specified component

This method carries much benefit to this research as it provides a multi-resolution analysis for correlation, allowing us to examine the correlation's dependence on a time scale. This is important as investors have different investment horizons and wavelet allows us to improve on decision making of risk management, portfolio allocation and asset pricing.

**Egarch:**

Looking at the ordinary GARCH model, we can see that the conditional variance is allowed to be dependent on its past, however this standard model possess some limitations as it cannot include the leveraging effects, nor can it allow for a direct response between conditional variance and conditional mean. Hence, in this study we concentrate on the asymmetric GARCH model developed by Nelson (1999), the EGARCH model which is better suited for volatilities.

$$\log\sigma_t^2 = \omega_t + \sum_{k=1}^{\infty} B_k g(Z_{t-k}) \tag{4}$$

The EGARCH model presides over other models with its ability to allow for a more stable optimization of routines, and no parameter constraints. Furthermore, Alexander (2009) concluded that EGARCH was beneficial in capturing asymmetric responses in the conditional variance at a more advanced level.

**RESULTS AND DISCUSSION**

The empirical analysis began with a simple descriptive analysis of our stock indices. Table 1 shows the mean and standard deviation for Asia Pacific. It can be observed that the mean volatility for Islamic indices was higher than that for conventional indices by a narrow margin. Consequently, the standard deviation was higher for Islamic indices over the shorter time scales and higher for conventional indices for timescale of more than 64 days. This gives us a preliminary understanding that in the long run, Islamic stocks indices offer investors more stability as compared to conventional indices.

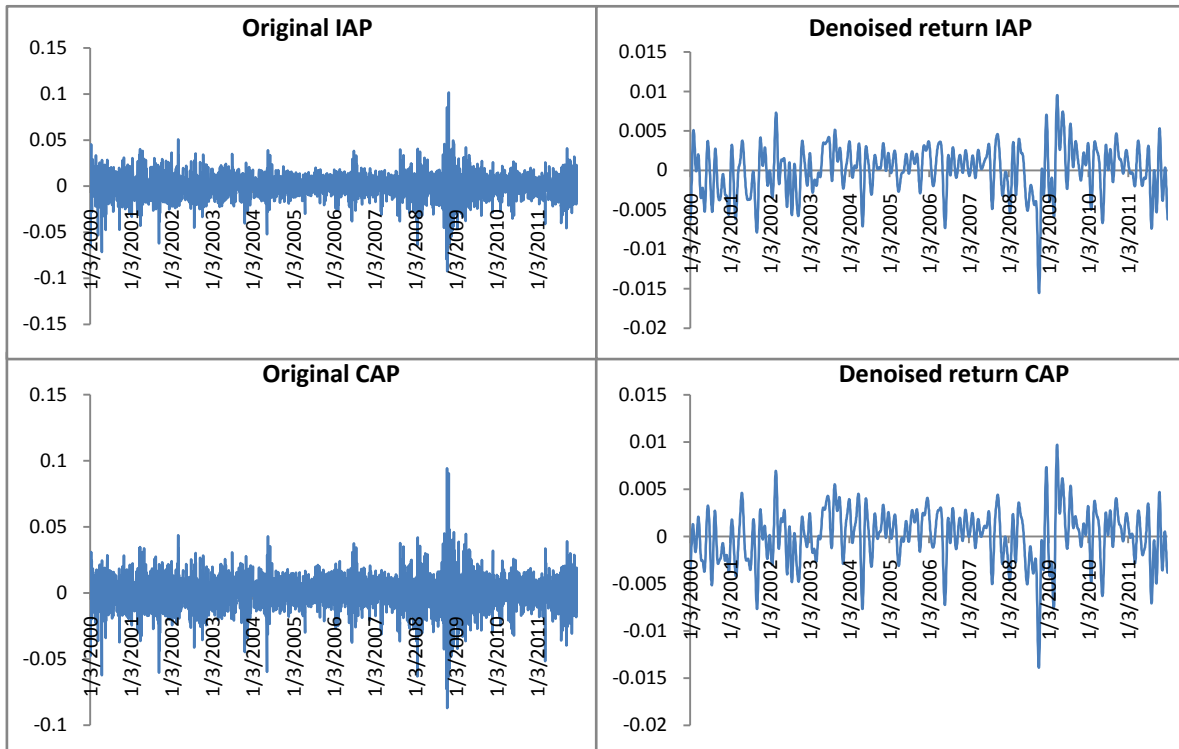
**Table 1:** Mean and Standard Deviation of Asia Pacific Indices

Mean of EGRACH for Asia Pacific				
	16-32	32-64	>64 days	>32 days
Islamic	0.000000619	0.000000066	0.000000010	0.000000102
Conventional	0.000000551	0.000000055	0.000000010	0.000000073
Standard Deviation of EGRACH for Asia Pacific				
	16-32	32-64	>64 days	>32 days
Islamic	0.000000903	0.000000086	0.000000015	0.000000164
Conventional	0.000000879	0.000000072	0.000000017	0.000000104

Coming to the core of our analysis, we categorized our index return into five time-scales of detail and one time-scale of approximation. Higher frequency components will make up the detail and the approximation focuses on the longer horizon. The six time-scales of detail from the lowest to the highest represents 2-4 days, 4-8 days, 8-16 days trading, 16-32 days and 32-64 day and an approximation scale representing over 64 days. The fifth scale and approximation scale is recomposed to become de-noised stock returns. Figure 1 below depicts the original and de-noised returns of our indices under study.

Following the de-noised returns, a clear shift in volatility is observed throughout the 12-year study period, where smoother flows are present as opposed to the sudden fluctuations. This is indicative of the presence of short-term noise owing mainly to speculative activity. Hence, for the remainder of the study, we will focus mainly on longer timescales, i.e. scale 4 and above, as it will allow us to differentiate temporary speculative shocks with those deriving from fundamental changes or business cycle turns.

Interestingly, it is perceived from Figure 1, that while the de-noised returns for Islamic stock indices follow a similar volatility pattern to that of its conventional counterpart, it has higher volatility peaks seen mainly in the periods of economic growth and downturn. Similarly, Table 2 highlights this phenomenon, which is attributable to the perception of the investors. Investors tend to withdraw from investments, specifically after an economic slowdown. From Table 2, we can see that Islamic indices showed higher volatility during periods of economic downturn. Looking at denoised returns as a reference point, for the periods of 2001, 2002-2004 and 2008, the Islamic denoised return was higher by a margin of  $1.8 \times 10^{-06}$ ,  $0.6 \times 10^{-06}$  and  $6.2 \times 10^{-06}$  respectively.

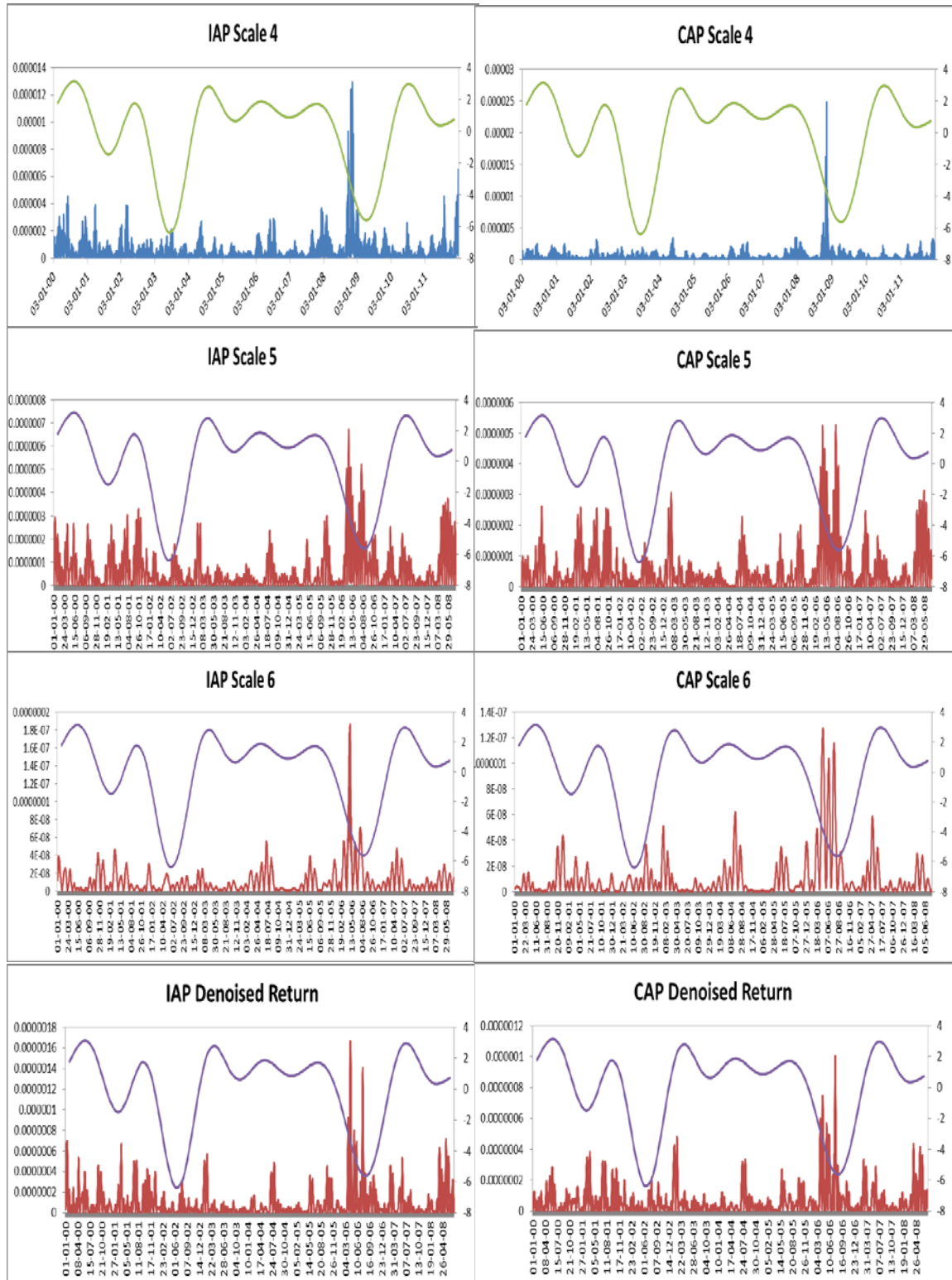


**Fig. 1:** Original and De-noised Returns for Islamic (IAP) and Conventional (CAP) Indices of Asia Pacific

**Table 2:** EGARCH Volatility in Different Cycles (Downturns in Grey Colour)

CAP				
	Scale 4	Scale 5	Scale 6	De-noised
Total	0.0000619%	0.0000066%	0.0000010%	0.0000101%
2000	0.0000552%	0.0000058%	0.0000002%	0.0000072%
2001	0.0000184%	0.0000074%	0.0000009%	0.0000092%
2002-2004	0.0000467%	0.0000029%	0.0000007%	0.0000042%
2004	0.0000281%	0.0000031%	0.0000004%	0.0000041%
2008-2009	0.0001007%	0.0000105%	0.0000027%	0.0000138%
2010	-0.0000390%	-0.0000037%	-0.0000006%	-0.0000045%
IAP				
Total	0.0000551%	0.0000055%	0.0000010%	0.0000073%
2000	0.0000697%	0.0000063%	0.0000003%	0.0000092%
2001	0.0000345%	0.0000068%	0.0000012%	0.0000110%
2002-2004	0.0000397%	0.0000036%	0.0000006%	0.0000048%
2004	0.0000316%	0.0000027%	0.0000004%	0.0000036%
2008-2009	0.0001126%	0.0000125%	0.0000022%	0.0000200%
2010	-0.0000442%	-0.0000047%	-0.0000007%	-0.0000063%

As noted above, Islamic indices quoted higher volatility in the business cycle downturn in the first quarter of 2009 (also see Figure 2). However, conventional indices volatility is relatively higher in the time leading to the crisis. This is attributable to the 2008 crisis springing from financial markets. As Islamic indices do not include financial companies due to their Shariah screening requirements, the distress caused are not reflected in the volatility of Islamic indices, which comprised mainly of real sector firms (see Hakim and Rashidan, 2002). The real sector felt an impact mainly through the effects of an economic slowdown, which translated into uncertain future cash flows and hence affected the prices.



**Fig. 2:** EGARCH Volatility with Business Cycles of Asia Pacific

Observing the approximation scale of 64 days and above, it was found that overall Islamic indices appeared to have a lower volatility throughout the 12-year period. Even for the period of 2009, the Islamic index was relatively less volatile as compared to conventional index. The authors attribute this to the lack of impact of speculative activities that was witnessed in shorter timescales. Similarly, shariah compliant stocks were able to boast lower levels of debt hence having a more stable cash flow stream even during the crisis period. The higher volatility of Islamic indices is witnessed mainly in the shorter scale 4, where perhaps due to information asymmetry regarding real sector companies played a consequential role.

The authors attribute much of the volatility of the Asia Pacific Islamic stock index during economic downturns to a relatively smaller and less mature state of financial intermediary and capital market development (see Dewandaru, et.al. 2013)

**Conclusion:**

The current literature has abundant research into theories and empirical studies on the relationship between stock markets and business cycles, however literature on Islamic stock markets and its interlinking dynamics with economic variables is scarce. This study has endeavored to empirically explore the relationship between business cycles and stock market volatilities within the Islamic finance ambit.

Our key focus is on Asia-Pacific region, which comprises of some of the fastest growing economies over the last decade, with plenty of further potential in growth owing to the massive workforce available. We tried to examine both Islamic and conventional stock indices for their volatilities in different business cycles in attempt to answer our research objectives. The analysis revealed that throughout the twelve-year period, Islamic indices seemed to follow a similar pattern to that of its conventional counterpart. Thus, indicating that the impact of business cycle movements affect the two indices in a similar manner. This allows policymakers the opportunity of clustering both stocks under the same umbrella when considering policies that may affect the financial markets.

Islamic equity index seems to be more volatile with a slight lag to conventional indices during times of economic downturns. This can be related to the seminal work by Charles, Darne and Pop (2010) and Girard and Hassan (2008) and yet is in contrast to other researchers who found that Islamic stock indices seemed to appear less volatile during times of financial instability (see Arshad and Rizvi, 2013; Al-Zoubi and Maghyereh, 2007). Not surprisingly, it was discovered further that during the growth phase of a business cycle, Islamic indices appeared less volatile and more stable. This is a reiteration of several works such as Hakim and Rashidan (2002), Al-Zoubi and Maghyereh, (2007).

A causal relationship between Islamic stock indices and business cycles can be indicative of a long-term predictability of Islamic index performance. This shows that the movement of Islamic stock indices, like its conventional counterpart is tied to its economic fundamentals. Hence, given that shocks in stock prices and affect future output levels, it may be used as a variable of economic stability by countries within the Asian region, such as Malaysia, as it is highly reliant on Islamic stock markets.

The authors would like to emphasize that more in-depth studies are required to comprehend further the dynamic relationship between real economic activity and the behaviour of Islamic stock indices. This preliminary study is faced with certain limitation, disallowing the results to be conclusive without further substantiation. Firstly, as only one region is studied, the results of which cannot be generalized to Islamic stock indices as it will not paint an accurate picture of Islamic indices globally. Secondly, with the lack of data available, the authors had to restrict their study for only twelve years, which some may argue, is not sufficient for a business cycle. Furthermore, only quarterly GDP was taken as a proxy for business cycles. Lastly, further research will benefit from including a multi-macroeconomic proxy for business cycles.

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