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Constant & Time-Varying Hedge Ratio for FBMKLCI Stock Index Futures

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ABSTRACT

This paper examines hedging strategy in stock index futures for Kuala Lumpur Composite Index futures of Malaysia. We employed two different econometric methods such as-vector error correction model (VECM) and bivariate generalized autoregressive conditional heteroskedasticity (BGARCH) models to estimate optimal hedge ratio by using daily data of KLCI index and KLCI futures for the period from January 2012 to June 2016 amounting to a total of 1107 observations. We found that VECM model provides better results with respect to estimating hedge ratio for spot month futures and one-month futures, while BGACH shows better for distance futures. While VECM estimates time invariant hedge ratio, the BGARCH shows that hedge ratio changes over time. As such, hedger should rebalance his/her position in futures contract time to time in order to reduce risk exposure.

INTRODUCTION

Hedging is basically a risk management strategy intended to use to limit or offset potential losses or gains that may be incurred due to fluctuations in the prices of assets such as commodities, currencies or securities. Futures contracts are one of the most common used derivatives instrument to hedge or reduce the risk of adverse price movements in an asset. A futures contract is an agreement between two parties to buy or sell an asset at a certain time in the future for a certain price. The motivation underlying futures contract is its capability to protect the individual investor, companies or corporations from risk exposures and limit themselves from any adverse price fluctuations. Usually the aim of most hedgers is to eliminate or offset the risk exposure completely which is known as perfect hedge but in reality perfect hedge is rare and almost impossible. As such the investors attempt to neutralize the risk exposure by constructing the hedge in such a way so that it performs as close to perfect as possible. The most important and beneficial aspect of the use of a futures contract is that it removes the uncertainty of future price movements of the hedged item by locking in a price today. This also facilitates the companies or corporations to eliminate the ambiguity relating to their expenses and profits in the futures. Since perfect hedge is almost impossible, it is important that the investor choose a value for the hedge ratio to be employed. The *hedge ratio* is defined as the ratio of the size of the position taken in futures contract to the size of the total exposure. A widely used value for the hedge ratio is the one that minimizes the variance of the value of the hedged position (Johnson, 1960; Edarington, 1979). Once hedge is in place, its effectiveness can be evaluated. A hedge is considered to be effective if the changes in the price of the hedging derivative instrument and the changes in the price of the hedged item roughly offset each other. To estimate the hedge ratio and its hedging effectiveness, in this paper we have employed two models such as VECM and BGARCH models to estimate hedge ratio for FBMKLCI futures.

DATA AND METHODOLOGY

The data used in this study are based on daily observations obtained from Bursa Malaysia cover the period from January 3, 2012 to June 30, 2016. Data of underlying assets (stock indices) are adjusted to match the data of stock indices futures. The models employed to estimate the hedge ratio are specified as follows:

(1) VECM Model:

$$R_{st} = \alpha_s + \sum_{i=1}^{k} \beta_{si} R_{st-1} + \sum_{j=1}^{l} \delta_{fj} R_{ft-j} + \lambda_s Z_{t-1} + \varepsilon_{st}$$

$$R_{ft} = \alpha_f + \sum_{i=1}^{k} \beta_{fi} R_{ft-1} + \sum_{j=1}^{l} \delta_{sj} R_{st-j} + \lambda_f Z_{t-1} + \varepsilon_{ft}$$

where, $Z_{t-1} = S_{t-1} - \Theta F_{t-1}$ is the error correction term, λ_s, λ_f are the adjustment parameters and Θ is the cointegrating coefficient.

Minimum variance hedge ratio (H) is calculated as,

$H = \dfrac{\sigma_{sf}}{\sigma_f^{\ 2}}$ using the residual series generated from estimating the system of equations above.

Where, $Var(\varepsilon_{st}) = \sigma^2_s$, $Var(\varepsilon_{ft}) = \sigma_f^2$, and Covariance $(\varepsilon_{st}, \varepsilon_{ft}) = \sigma_{sf}$.

(2) Multivariate GARCH Model:

Most financial time series data of return has time varying ARCH effects. GARCH model is capable to capture this property. Among the several multivariate GARCH formulations proposed in the literatures, we used a bivariate *diagonal vech* GARCH where α and β matrix are considered restricted to only diagonal elements. The diagonal representation of the conditional variances (h_{ss} and h_{ff}) and the covariance (h_{sf}) element is expressed as-

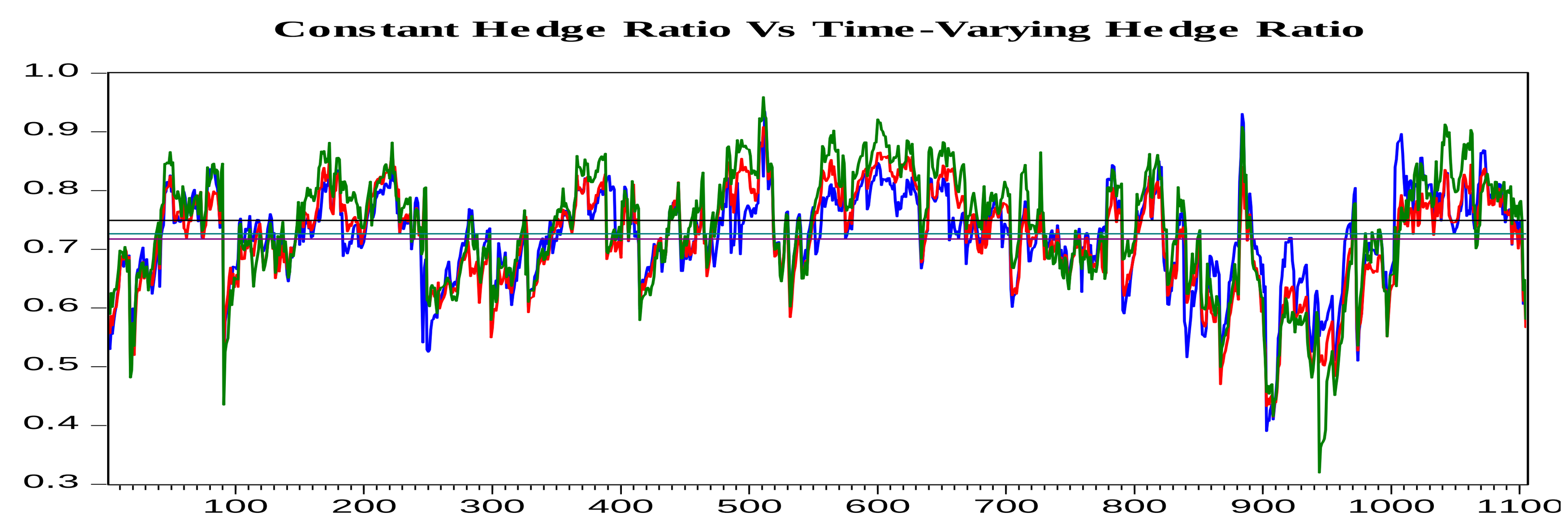
$$h_{ss,t} = C_{ss} + \alpha_{11}\varepsilon^2{}_{s,t-1} + \beta_{11} h_{ss,t-1}$$

$$h_{sf,t} = C_{sf} + \alpha_{22}\varepsilon_{st-1}\varepsilon_{f,t-1} + \beta_{22} h_{sf,t-1}$$

$$h_{ff,t} = C_{ff} + \alpha_{33}\varepsilon^2{}_{f,t-1} + \beta_{33} h_{ff,t-1}$$

Multivariate GARCH and univariate GARCH models are similar in spirit except that the former also specify equation for how the covariance moves over time. Time-varying hedge ratio is calculated as follows:

$$H_t = \frac{h_{sf,t}}{h_{ff,t}}$$



EMPIRICAL RESULTS

Table 1: Results of Minimum variance hedge ratio (MVHR)

Models	Future_1	Future_2	Future_3
VECM	0.7492	0.7266	0.7176
BGARCH (1,1)	0.7223	0.7178	0.7358

Table 2: Statistical properties of time-varying hedge ratio from BGARCH

	Min	Max	Mean	Std
Future_1	0.3902	0.9348	0.7223	0.0782
Future_2	0.4147	0.9085	0.7178	0.0845
Future_3	0.3196	0.9595	0.7358	0.0988

CONCLUSION

In this study, we have utilized two econometric models to calculate the minimum variance hedge ratio for FBMKLCI futures market in Malaysia. The key result of this study is that VECM model provides better estimate of hedge for nearer two futures contracts while BGARCH provides better hedge ratio for distant futures. However, BGARCH suggests that hedger needs to rebalance the hedging position over time in order to minimize risk exposure to their equity holding

REFERENCES

Bollerslev, T., (1986), 'A generalized autoregressive conditional heteroscedasticity', *Journal of Econometrics, 31, pp. 307-27.*

Butterworth, D. and Holmes, P. (2001), 'The hedging effectiveness of stock index futures: evidence for the FTSE-100 and FTSE-Mid 250 indexes traded in the UK', *Applied Financial Economics, 11, pp. 57-68.*

Ederington, L. (1979), 'The hedging performance of the new futures markets', *Journal of Finance, 34, pp. 157-70.*

Sah, Ash Narayan and Krishan K. Pandey, (2011), 'Hedging effectiveness of index futures contract: The case of S & P CNX Nifty', *Global Journal of Finance and Management, 3(1), pp. 77 – 89.*

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