

The Effect of Goods and Services Tax (GST) Imposition on Stock Market Overreaction and Trading Volume in Malaysia and Australia

(Kesan Pengenaan Cukai Barang dan Perkhidmatan (CBP) ke atas Reaksi Berlebihan Pasaran Saham dan Jumlah Dagangan Saham di Malaysia dan Australia)

Lee Yok Yong
(Putra Business School, Universiti Putra Malaysia)
Mohamed Hisham Yahya
A.N. Bany-Arifin
Aslam Izah Selamat
(Faculty of Economics and Management, Universiti Putra Malaysia)

ABSTRACT

This paper investigates the GST imposition effect on stock overreaction and trading volume in Bursa Malaysia and Australian Securities Exchange (ASX). To evaluate the stock overreaction, t-test, Wilcoxon Signed-Rank Test and Mann-Whitney U-Test are employed to analyse the market-adjusted abnormal returns. The homogeneity of stock trading volume is assessed by block resampling bootstrapping, t-test and regression. Consistent with the Overreaction Hypothesis, this research reveals that all arbitrage portfolios over one-month interval in Bursa Malaysia are able to generate significant abnormal profits. This infers the profitability of implementing short-term contrarian strategy in the Malaysian stock market. However, the analysis for ASX shows the opposite. Additionally, GST imposition reduces the trading volume in Bursa Malaysia but not in ASX. This empirical result will be of interest to the policymakers who are considering imposing tax on fee-based financial services, as well as the investors and fund managers who are concern about profits maximisation.

Keywords: Efficient market hypothesis; financial transaction tax; prospect theory; adaptive market hypothesis; overreaction hypothesis

ABSTRAK

Kajian ini bertujuan untuk menyiasat kesan pengenaan CBP ke atas reaksi pasaran saham dan jumlah dagangan saham di Bursa Malaysia dan Bursa Sekuriti Australia (ASX). Reaksi pasaran saham berlebihan dinilai dengan kaedah pulangan abnormal terlaras pasaran. Ianya disusuli kemudian dengan analisis ujian t, ujian pangkat bertanda Wilcoxon dan ujian Mann-Whitney. Kehomogenan jumlah dagangan saham dikaji dengan menggunakan persampelan semula blok bootstrapping, ujian t dan regresi. Selaras dengan hipotesis reaksi berlebihan, kajian ini menyimpulkan bahawa semua portfolio arbitraj berupaya menjana keuntungan luar biasa yang signifikan dalam tempoh sebulan. Keuntungan luar biasa tersebut dipengaruhi oleh jumlah dagangan saham di Bursa Malaysia. Justeru, penggunaan strategi kontrarian untuk jangka masa pendek boleh mendatangkan keuntungan abnormal di Bursa Malaysia. Walau bagaimanapun, ASX tidak menunjukkan sebarang keputusan empirikal yang signifikan untuk ini. Di samping itu, pengenaan CBP mengurangkan jumlah dagangan di Bursa Malaysia, tetapi tidak mempunyai perhubungan yang signifikan dengan jumlah dagangan di ASX. Keputusan empirikal ini boleh menarik minat para penggubal dasar di negara yang mempertimbangkan pengenaan CBP ke atas perkhidmatan kewangan berasaskan fi serta para pelabur dan pengurus dana yang ingin mengoptimumkan keuntungan.

Kata kunci: Hipotesis pasaran cekap; cukai transaksi kewangan; teori prospek; hipotesis pasaran mudah suai, hipotesis reaksi berlebihan

INTRODUCTION

The recent spate of financial crises has contributed towards renewed interests in tax on financial transactions (Burman et al. 2016). There are two ways to impose tax on the financial transactions: (1) Goods and Services Tax (GST) or Financial Transaction Taxes (FTT). As of 2015, a total of 169 countries have implemented GST (Sanusi, Omar & Sanusi 2015). Due to (1) the difficulty in quantifying the “value-added” component of financial services, and (2) the financial services being the ancillary to the acquisition and

trading of goods and services (KPMG 2013), the majority of these countries have exempted financial transactions from GST, except for Malaysia and Australia. Such exemption compromises on tax neutrality and diverts tax-revenue. As such, this research focuses on examines the effect of GST imposition on the developing market, Bursa Malaysia and the developed market, Australian Securities Exchange (ASX). It has been found that FTT imposition on financial transactions reduces trading volume (Coelho 2014). It is worthwhile to consider the effect of extending GST on financial transactions, specifically, stock market

transactions. This paper attempts to investigate the effect of GST imposition on trading volume in Bursa Malaysia and ASX.

Malaysia and Australia impose GST on fee-based financial services with GST rate at 6% and 10%, respectively (KPMG 2013). Prior to this, fee-based financial services were not taxed under the Sales and Services Tax (SST). The GST imposition on fee-based financial services would lead to additional transaction costs to the investors (which is also a form of market friction). Evidence on the presence of stock market overreaction, post GST imposition (on fee-based financial services), is noteworthy for investors to plan their strategies. The second objective of this paper is to examine the presence of stock market overreaction after GST imposition on fee-based financial services in Bursa Malaysia and ASX. The third objective of this paper is to evaluate the relationship between stock market overreaction and trading volume in Bursa Malaysia and ASX with respect to GST imposition on financial services.

This paper is different from previous literatures in two ways. Firstly, this paper investigates the effect of GST imposition on trading volume, which is scarce in literatures. Secondly, it examines the effect of a regulatory policy towards market behaviour. The next section reviews the literature and formulates the hypotheses. This is followed by the description of the data and research methods, discussion on the empirical findings and managerial implication. The last section concludes the paper, highlights the limitations and provides suggestions for future research.

LITERATURE REVIEW

GOODS AND SERVICES TAX (GST)

GST is a broad-based consumption tax imposed on (1) taxable supplies of domestic goods and services and, (2) imported goods and services. It is a multi-stage consumption tax that is imposed on goods and services at every stage of the supply chain. The output tax is defined as the GST imposed and collected by GST registered business from the customers (Choong & Lai 2006). The input tax is the GST imposed on GST registered business, when purchasing from another GST registered business or during importation. The GST paid on the business inputs are claimable by offsetting against GST collected as business outputs. Therefore, only the incremental value is taxed on taxable supply, which implies that GST is payable on consumption rather than production. Consequently, GST prevents the problem of double taxation and tax cascading.

GST can be categorised into three fundamental classifications, namely; (1) GDP-type GST, (2) consumption-type GST, and (3) income-type GST (Palil et al. 2013). Each type differs according to its treatment on investment (capital) expenditures. For instance, in GDP-type GST, the

computations of tax base do not allow for deductions of capital investment and capital depreciation. Therefore, this type of GST is analogous to the sales tax. For the consumption-type GST, capital investment that was not included in the initial stage of taxation is deducted from value added during the purchase year. This means that the GST is equivalent to the sales tax. Finally, for the income-type GST, the tax base excludes the capital depreciation, i.e. the GST imposed is on the net domestic product, which is close to the national income.

PREVIOUS LITERATURES

According to Efficient Market Hypothesis, during the trading of stocks, transaction cost is a sufficient condition, which means that after GST imposition on fee-based financial services, stock market prices should still reflect all available information. Meanwhile, the Prospect Theory (Kahneman & Tversky 1979) advocates that the cognitive bias of decision makers depends on the way a problem is presented and their mental accounting. GST that is imposed on fee-based financial services is not claimable and could be interpreted by investors as a certain loss. The sentiment is generally reflected in the stock price (Charles & Dahlquist 2015). Similarly, De Bondt and Thaler (1985) proposed in the Overreaction Hypothesis that investors are prone to overreact to unexpected and intense information in past earning and stock prices. Furthermore, Adaptive Market Hypothesis (AMH) suggested that evolutionary model of individuals enable adaptation to uncertain environments through simple heuristics (Lo 2004). In other words, GST imposition on fee-based financial services behaves as a market friction that changes the ecology of the market conditions. Nevertheless, previous literature revealed a significant negative relationship between market friction and stock market overreaction (Farg 2015). In addition, existing literature failed to resolve the contradiction between modern finance theory and behavioural finance theory. The first hypothesis conjectures that GST imposition significantly reduces the stock market overreaction in Bursa Malaysia and ASX.

Previous studies on the relationship between stock market overreaction and trading volume provided mixed results. Chordia, Roll and Subrahmanyam (2001) pinpointed that transaction costs and trading volume are highly correlated. Besides, Su and Zheng (2010) asserted that trading volume contains information on investor's reaction on trading frequency, expectations and equity market demand. Hameed and Ting (2000) and McInish et al. (2008) proved that stock market overreaction is positively related to the trading volume of stocks. However, Ali, Ahmad and Anusakumar (2011) found an inverse relationship between stock market overreaction and trading volume. Thus, second hypothesis proposes that stock market overreaction has a positive relationship with trading volume after GST imposition.

In line with the AMH and Prospect Theory, it is found that increase in transaction costs will reduce trading volume in the stock market through the trading behaviour

of market participants (Lo, Mamasky & Wangn 2004). FTT imposition on the excessively well-functioning market discouraged the higher-frequency investments and limit the floating rates volatility. In addition, Hayashida and Ono (2011), Baltagi et al. (2006), Pomeranets and Weaver (2011) and Coelho (2014) confirmed the negative relationship between transaction costs and trading volume. Investors might reduce their tax liability by changing their trading behaviours (Campbell & Froot 1995). This can be done by (1) migrating their trading location into offshore markets or abroad, (2) substituting those with untaxed local stocks that are generating similar payoffs or (3) choosing not to trade. Moreover, studies on the effect of transaction costs have been mainly limited to FTT. The generalisation of findings from FTT could be problematic as both FTT and GST differ in terms of design, magnitude, and structure. Therefore, third hypothesis posits that GST imposition has a significant negative relationship with trading volume in Bursa Malaysia and ASX.

DATA AND METHODOLOGY

DATA

The data sets used in this paper are: (1) the daily official closing price, (2) year-end turnover by volume, (3) year-end stocks outstanding and (4) daily trading volume, of the companies (census) listed in Bursa Malaysia and ASX that gathered from DataStream. Nevertheless, companies with incomplete set of data have been excluded (Ali et al. 2011; Soomro, Ahmed & Hussain 2016).

The daily stock returns are computed as the first difference in the natural logarithm of the daily closing price over one day using the following formula (Farang 2015):

$$R_{it} = \ln(P_{it}/P_{it-1}) * 100 \quad (1)$$

where, R_{it} = the stock return on stock i at time t ,
 P_{it} = the stock price of stock i at time t , and
 P_{it-1} = the stock price of stock i at time $t-1$.

The justification for using natural logarithm stock returns are: (1) natural logarithm stocks returns are often used in empirical research of stock overreactions; (2) natural logarithm stock returns are more manageable by simply summing up sub-period stock returns to get longer intervals stock returns; and (3) natural logarithm returns are more likely to be normally distributed and conform to the assumptions of parametric tests (Strong 1992).

Similarly, the market return of Bursa Malaysia KLCI Index and ASX All Ordinaries are computed using Equation (1). To avoid sample length arbitrariness, the intervals for this study include one-month, three-month, six-month and one-year intervals. These four intervals, pre and post GST imposition on fee-based financial services, will be used in this study (Baltagi et al. 2006; Su & Zheng 2010). The GST imposition dates for both Malaysia and Australia are

1st April 2015 and 1st July 2000, respectively. Hence, the research period in Bursa Malaysia and ASX is from 1st April 2014 to 31st March 2016 and 1st July 1999 to 30th June 2001, correspondingly. Weekends and holidays are excluded from the research intervals. Since the longest window period is one-year, sample selection will not lead to substantial survivorship bias related to delisting, bankruptcy, and the long-term autocorrelations in stock returns (Brown, Goetzmann & Ross 1995). Having a large sample size is essential for a reasonably accurate approximation under badly skewed or discrete non-normal distribution. The general rule of thumbs of 30 samples is adequate (Hogg, Tanis & Zimmerman 2014). Nevertheless, according to Krejcie and Morgan (1970) from a given population of 933 in Bursa Malaysia and 2079 in ASX, the sample size should be between 269-274 and 322-327, respectively. Hence, 614 samples from Bursa Malaysia and 326 samples from ASX are sufficient.

METHODOLOGY

CUMULATIVE ABNORMAL RETURNS

As suggested by the basic framework of De Bondt and Thaler (1985) for overreaction hypothesis, the loser and winner portfolios are constructed based on the stocks that have experienced extreme capital losses or gains within the intervals of one-month, three-month, six-month, and one-year, respectively.

Firstly, returns of the stocks that are listed in Bursa Malaysia and ASX are computed using the daily official closing price. Subsequently, the weekly stock returns are computed using Wednesday-to-Wednesday data. According to Baumöhl and Lyócsa (2012), there are three types of weekly stock returns: (1) Wednesday-to-Wednesday, (2) Friday-to-Friday, and (3) average daily stock returns within the corresponding week. Wednesday-to-Wednesday return is used in this paper to minimize the effect of non-synchronous trading (Hameed & Ting 2000). Moreover, McInish et al. (2006) clarified that the Wednesday-to-Wednesday returns could avoid the weekend effect.

Secondly, the weekly market adjusted abnormal return (AR) for stock i is carried out as follows (Farang 2015):

$$AR_{it} = R_{it} - R_{Mt} \quad (2)$$

where, R_{it} = the stock return for stock i at time t ,
 R_{Mt} = the market return at time t .

DeBondt and Thaler (1985) defined an abnormal return as the excess return of the stock over the return of the chosen market index on the event day. They found that the empirical results of stock overreaction are not sensitive to abnormal returns as quantified by Market Adjusted Returns Model (MARM) or Capital Assets Pricing Model (CAPM). This is consistent with Brown and Warner (1980), who found that sophisticated CAPM do not perform better

than simple model like MARM. CAPM is introduced before the MARM, which linked the expected returns of a risky asset with the risk of the asset in an equilibrium market condition. Thirdly, the cumulative abnormal returns (CAR) of portfolio formation period for every stock is computed over the period of one-month, three-month, six-month, and one-year window for Bursa Malaysia and ASX.

$$CAR_i = \sum_{t=1}^T AR_{it} \quad (3)$$

Then, these stocks have been ranked based on their CAR over the period of one-month, three-month, six-month, and one-year window. The bottom one-third of the stocks are grouped into the loser portfolio, while the top one third of the stocks into the winner portfolio. The arbitrage portfolio is constructed by selling the winner portfolio and buying the loser portfolio, to generate abnormal profits equivalent to the $ACAR_{LTP}$ minus the $ACAR_{WTP}$.

Fourthly, the portfolios are held for different intervals (*i.e.* one-month, three-month, six-month and one-year) in the subsequent test periods. The CAR of portfolio test periods for Bursa Malaysia and ASX are computed using Equation (3). The average cumulative abnormal return (ACAR) is computed for each stock as follows:

$$ACAR_i = \left(\frac{1}{T}\right) \sum_{t=1}^T CAR_{it} \quad (4)$$

where, $ACAR_i$ denotes the ACAR for stock i ,
 T is the number of test periods,
 CAR represents the cumulative abnormal return for stock i .

The $ACAR$ for loser portfolio and winner portfolio is measured twice, *i.e.* before and after GST imposition, resulting two pairs of observations. Hence, for all test periods, the paired samples t-test is employed to determine the mean difference of $ACAR$ during the formation period, followed by the reversal in the test period for loser and winner portfolio, respectively.

Nonetheless, Mun, Vasconcellos and Kish (2000) mentioned that when computing the market adjusted returns, the non-parametric test is more powerful than the parametric test. This is owing to non-parametric tests do not rely on known distributions and more appropriate than parametric tests for testing the Overreaction Hypothesis. The non-parametric test of Wilcoxon Signed-Rank Test for matched pairs is employed in this paper.

For loser portfolio, the null hypothesis and alternative hypotheses are as follows:

$$\begin{aligned} H_0 & ACAR_{LFP} = ACAR_{LTP} \\ H_1 & ACAR_{LFP} < ACAR_{LTP} \end{aligned}$$

For winner portfolio, the null hypothesis and alternative hypotheses are as follows:

$$\begin{aligned} H_0 & ACAR_{WFP} = ACAR_{WTP} \\ H_1 & ACAR_{WFP} > ACAR_{WTP} \end{aligned}$$

The t-test for two independent samples is used to ascertain the mean difference in ACAR for the loser and winner portfolios. Significant t-statistics suggests that the mean returns of the loser and winner portfolios are different. A significant t-statistics for arbitrage portfolio suggests the usefulness of a contrarian-based arbitrage trading strategy to generate abnormal returns. In that case, there is an exploitation potential of contrarian profits through arbitrage by purchasing the loser portfolio and selling the winner portfolio. For the purpose of robustness, non-parametric test of Mann-Whitney U Test is conducted to compare with the results of independent t-test (Ahmad & Hussain 2001).

The null hypothesis and alternative hypotheses are as follows:

$$\begin{aligned} H_0 & ACAR_{LTP} = ACAR_{WTP} \\ H_1 & ACAR_{LTP} > ACAR_{WTP} \end{aligned}$$

To examine the relationship between stock market overreaction and trading volume, another group of the loser and winner portfolios is constructed by grouping according to the previous year end turnover ratio. According to Ali et al. (2011), trading volume is intertwined with firm size. Therefore, turnover ratio is used to isolate the firm size from the trading volume. The previous year-end turnover ratio is computed as the previous year end trading volume divided by the previous year end stocks outstanding, resulting to the high, medium and low turnover ratio stocks. Next, the stocks (within each turnover ratio) are grouped again based on the stock returns over the intervals of one-month, three-month, six-month, and one-year to construct both loser and winner portfolios. In other words, stock market overreaction is tested within each of the high, medium and low-trading-volume portfolios to examine the relationship between stock overreaction and trading volume.

PAIRED SAMPLE T-TEST

To evaluate the effect of GST imposition on trading volume in Bursa Malaysia and ASX, the homogeneity of trading volume before and after the GST imposition has been empirically measured.

Firstly, the daily trading volumes are denoted as $x = (x_1, x_2, \dots, x_k)$ for k trading days before the GST imposition and $y = (y_1, y_2, \dots, y_k)$ for k trading days after the GST imposition. Each company in the sample is measured for k trading days before and after GST imposition.

Secondly, the average trading volumes for each company are calculated for before and after the GST imposition. Lastly, the paired-samples t-test has been adopted to compare the average trading volumes for each company in the same sample before and after the GST imposition.

BLOCK RESAMPLING BOOTSTRAPPING

According to Baltagi et al. (2006), the block resampling bootstrap method may be adopted to get rid of possible non-normality prior to analysing the null hypothesis of equal trading volume. Through sampling with the replacement from the original sample, bootstrapping estimates the sampling distribution of an estimator to derive robust estimates of standard errors and confidence intervals of a population parameter (Mu 2006).

Efron and Tibshirani (1993) elaborated upon the bootstrap test statistic for homogeneity of average as follows: (1) Transform $\tilde{x}_i = xi - \bar{x} + \bar{z}$ and $\tilde{y}_i = yi - \bar{y} + \bar{z}$ where \bar{x} and \bar{y} are the subgroup averages, while \bar{z} is the average of the combined sample. (2) Form n bootstrap sample (x^*, y^*) , where x^* and y^* is sampled with replacement from $\tilde{x}_i = (\tilde{x}_1, \tilde{x}_2, \dots, \tilde{x}_k)$ and $\tilde{y}_i = (\tilde{y}_1, \tilde{y}_2, \dots, \tilde{y}_k)$, respectively. (3) Evaluate $T(\cdot)$ defined by Step (2) on each bootstrap sample,

$$T^*(z^{*b}) = \frac{(\bar{x}^* - \bar{y}^*)}{\sqrt{\frac{\sigma_x^{2*}}{n} + \frac{\sigma_y^{2*}}{n}}}, b = 1, 2, \dots, B. \quad (4)$$

Approximate the bootstrap estimate of the achieved significance level, $ASL_{boot} = \#\{T^*(z^*) \geq T(z_{obs})\} / B$.

Generally, the block resampling bootstrapping is used to improve the accuracy of bootstrap for times series data. The original time series dependency structure is maintained within a pseudo-sample. Thus, in this paper, the block length (l) is chosen by the criterion $l = N^{1/3}$, where N is the sample size. Efron and Tibshirani (1993) showed that the percentile confidence intervals have less satisfactory coverage properties. The improved version of confidence interval is known as bias-corrected and accelerated (BCa), but it requires at least 1000 bootstrap samples to sufficiently reduce the Monte Carlo sampling error. Hence, 2000 bootstrap samples are used in this paper.

REGRESSION CORRECTED WITH NEWEY-WEST VARIANCES

The homogeneity of trading volume is analysed over k trading days before and after the GST imposition, where k = one-month, three-month, six-month and one-year intervals to avoid sample length arbitrariness. Autocorrelation can be taken care by conduct regression corrected with Newey-West variances of trading volume against a constant and a time dummy variable indicating the GST imposition (Baltagi et al. 2006; Su & Zheng 2010). The time dummy variable for before GST imposition is denoted as '0', whilst the dummy variable for on and after GST imposition is denoted as '1'.

FINDINGS

According to Table 1, during the formation period, the loser portfolio has predominantly negative ACAR and the

reversals prolonged for all intervals, with the exception of the six-month interval. The mean ACAR (demonstrated by the t-statistic) and median ACAR (represented by the Wilcoxon Signed Rank test) for all intervals in loser portfolio are statistically significant at the critical value of 0.1%. The loser portfolio of the one-month interval has the lowest ACAR of -1.867% in the formation period, which subsequently reverses to the highest ACAR of 0.734% in the test period. These empirical results imply that the GST imposition on the fee-based financial services does not prohibit the loser portfolio from overreacts over all intervals, excluding the six-month interval. Consistent with the Prospect Theory, the mental accounting of the investors in relation to the GST imposition on fee-based financial services do not impede the investors from overreacting. The GST imposition on the fee-based financial services is negligible and is not deciphered as a perceived loss. This supports the AMH and Overreaction Hypothesis but violates the weak form of the EMH. The stock returns have a certain degree of predictability. Particularly, the investors may earn the highest abnormal profits by acquiring the loser portfolio a week before the GST imposition on the fee-based financial services and then sell it a week later.

A prominent positive ACAR is uncovered in the winner portfolio during the formation period for all intervals. The winner portfolio of the one-month interval has the highest ACAR of 2.702% in the formation period, which subsequently underperformed at ACAR of -0.27% in the test period. Notwithstanding, the ACAR of winner portfolio over the period of three-month and six-month intervals have declined but still remain positive during the test period. The one-year interval winner portfolio has ACAR of 0.81% in the formation period and subsequently reversed to -0.242% in the test period. This empirical result shows that the loser portfolio exhibit remarkably greater reversals than the winner portfolio. Consistent with the Prospect Theory and AMH, investors tend to emphasise on the unforeseen negative news rather than the positive news (Ali et al. 2011).

The arbitrage portfolio provides the ACAR difference between the loser portfolio and winner portfolio over different intervals. The mean ACAR (indicated by the t-statistic) and median ACAR (denoted by the Mann-Whitney U test) for all intervals are statistically significant, except the three-month (insignificant). Advocating the AMH and Overreaction Hypothesis, the ACAR of arbitrage portfolio over the one-month and one-year intervals outperformed in the test period at 1.004% and 0.631%, respectively. These empirical results suggest that greater abnormal profits can be generated from the arbitrage portfolio by adopting contrarian strategy over a one-month interval rather than the one-year interval. Nonetheless, the empirical results are in agreement with Ahmad and Tjan (2004) by showing that, the ACAR of arbitrage portfolio remained negative for most intervals in the test period.

TABLE 1. ACAR (%) for loser, winner and arbitrage portfolios in Bursa Malaysia after GST imposition

Portfolios	Intervals							
	One-Month		Three-Month		Six-Month		One-Year	
Loser	-1.867	0.734	-1.145	0.283	-1.276	-0.184	-0.636	0.389
t-statistics	-17.194***	-18.496***	-16.301***	-5.332***				
Wilcoxon Signed Rank Test	13.455***	13.207***	12.931***	5.234***				
Winner	2.702	-0.270	1.803	0.339	0.693	0.236	0.810	-0.242
t-statistics	11.147***	9.739***	5.618***	5.216***				
Wilcoxon Signed Rank Test	-11.015***	-9.859***	-4.822***	-4.845***				
Arbitrage	-4.569	1.004	-2.947	-0.056	-1.969	-0.420	-1.446	0.631
t-statistics	4.460***	-0.425	-5.007***	2.297*				
Mann-Whitney U-Test	-5.26***	-0.197	6.188***	-2.026*				

Note: * $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$.

Overall, the empirical results are not in line with the EMH, but it is in accordance with the AMH, Prospect Theory and Overreaction Hypothesis. The empirical results clearly indicate that the market friction attributable to the GST imposition on fee-based financial services is relatively weak to inhibit stock market overreaction in Bursa Malaysia. Besides, the adoption of contrarian strategy by acquiring loser portfolio and selling winner portfolio can generate abnormal profits for one-month and one-year intervals in Bursa Malaysia. Thus, the market overreaction in Bursa Malaysia is not sensitive to the length of the formation period (Farag 2015).

Referring to Table 2, in the high-trading-volume loser portfolio, the ACAR is consistently negative throughout all intervals during the formation period. The high-trading-volume-loser portfolio has significantly outperformed in the test period for all intervals, except for the six-month interval. Both the mean and median ACAR are statistically significant at the critical value of 0.1% for all intervals. Amidst all intervals, the high-trading-volume loser portfolio of one-year interval reverses from ACAR of -0.81% to the highest ACAR at 1.163%. On the other hand, the negative ACAR of high-trading-volume loser portfolio for the six-month interval with ACAR of -1.503% in the formation period persists after the GST imposition on the fee-based financial services with ACAR of -0.197%.

With regards to the high-trading-volume winner portfolio, out of all intervals with positive ACAR during the formation period, only two intervals have significantly underperformed, specifically the one-month interval from ACAR of 2.439% to -0.326% and six-month interval from 0.853% to -0.060%. The mean and median ACAR for one-month, three-month and six-month intervals are significant at the critical value of 0.1%. However, both of the mean and median ACAR for the one-year interval is insignificant.

As for the high-trading-volume arbitrage portfolio, only the one-month interval generated significant abnormal profits, by having ACAR of -4.475% in the formation period and overshoot to 1.064% in the test period at the critical value of 0.1%. The other intervals

of the high-trading-volume arbitrage portfolio exhibit insignificant ACAR. Nevertheless, the abnormal profits generated by the high-trading-volume loser portfolio at one-year interval yielding to higher abnormal profits than the high-trading-volume arbitrage portfolio at the one-month interval.

Similar to high-trading volume loser portfolio, the medium-trading-volume loser portfolio for all intervals significantly overshoot in the test period, excluding the six-month interval. The greatest ACAR of 0.74% is generated at the one-month interval in the test period. The mean and median ACAR for one-month, three-month, and six-month intervals are significant at the critical value of 0.1%, whilst the one-year interval is significant at the critical value of 5%.

In the medium-trading-volume, winner portfolio of the one-month and one-year intervals experience reversals from 2.439% to -0.326% and from 0.805% to -0.731%, respectively. Both of the mean and median ACAR over the one-month and one-year intervals are statistically significant at the critical value of 0.1%. The otherwise intervals in the medium-trading-volume winner portfolio did not experience reversals.

On the other hand, the one-month interval of medium-trading-volume arbitrage portfolio generates significant abnormal profits at 1.066%, whilst the one-year interval generates significant abnormal profits at 0.936%. The mean and median ACAR of the one-month interval is statistically significant at the critical value of 5%. However, the mean ACAR of the one-year interval in medium-trading volume arbitrage portfolio is statistically significant at the critical value of 5%, but its median is not. Thus, the investors could generate abnormal profits of 1.066% by using the contrarian strategy over the one-month interval. Interestingly, the abnormal profits in medium-trading-volume arbitrage portfolio are as high as the high-trading-volume arbitrage portfolio's.

In the low-trading-volume loser portfolio of one-month, three-month and six-month intervals significantly outperformed from ACAR of -1.763% to 0.735%, -1.118% to 0.410%, as well as -1.073% to 0.154%, correspondingly.

TABLE 2. ACAR (%) for high, medium and low volume stocks in Bursa Malaysia after GST imposition

Portfolios		Intervals							
		One-Month		Three-Month		Six-Month		One-Year	
High Turnover Ratio	Loser	-2.036	0.738	-1.133	0.196	-1.503	-0.197	-0.810	1.163
	t-statistics	-9.837***	-8.351***	-11.372***	-5.841***				
	Wilcoxon Signed Rank Test	7.520***	7.048***	7.634***	5.132***				
	Winner	2.439	-0.326	2.361	0.093	0.853	-0.060	0.852	0.521
	t-statistics	5.704***	7.062***	5.467***	.931				
	Wilcoxon Signed Rank Test	-7.044***	-6.703***	-5.048***	-0.661				
	Arbitrage	-4.475	1.064	-3.494	0.103	-2.357	-0.137	-1.662	0.643
	t-statistics	3.591***	0.413	-0.850	1.338				
Medium Turnover Ratio	Mann-Whitney U Test	-4.084***	-0.895	1.083	-1.228				
	Loser	-1.810	0.740	-1.184	0.200	-1.204	-0.349	-0.601	0.205
	t-statistics	-9.931***	-11.474***	-9.444***	-2.538*				
	Wilcoxon Signed Rank Test	8.087***	7.711***	7.236***	2.286*				
	Winner	2.439	-0.326	1.487	0.294	0.638	0.271	0.805	-0.731
	t-statistics	5.704***	5.423***	3.158**	4.44***				
	Wilcoxon Signed Rank Test	-6.224***	-5.493***	-2.504*	-3.956***				
	Arbitrage	-4.249	1.066	-2.670	-0.094	-1.842	-0.620	-1.406	0.936
Low Turnover Ratio	t-statistics	2.320*	-0.396	-5.250***	2.019*				
	Mann-Whitney U Test	-2.568*	-0.026	5.194***	-1.502				
	Loser	-1.763	0.735	-1.118	0.410	-1.073	0.154	-0.484	-0.796
	t-statistics	-10.006***	-11.971***	-9.886***	0.963				
	Wilcoxon Signed Rank Test	7.7***	7.749***	8.163***	-0.722				
	Winner	2.149	-0.063	1.457	0.700	0.581	0.387	0.778	-0.252
	t-statistics	5.858***	3.539**	1.645	3.375**				
	Wilcoxon Signed Rank Test	-5.956***	-3.895***	-1.826	-3.538***				
Arbitrage	-3.911	0.798	-2.575	-0.290	-1.654	-0.233	-1.262	-0.544	
	t-statistics	2.451 *	-1.525	-1.646	-1.243				
	Mann-Whitney U Test	-2.619**	1.351	2.507*	0.963				

Note: *p < 0.05, **p < 0.01 and ***p < 0.001.

All intervals in the low-trading-volume loser portfolios are significant at 0.1%, except the one-year interval, which is insignificant. Meanwhile, the low-trading-volume winner portfolio for one-month and one-year intervals significantly underperformed from 2.149% to -0.063% and from 0.778% to -0.252%, respectively. Both mean and median ACAR for the one-month and one-year interval is significant at the critical value of 0.1%, with the exception of the mean ACAR for a one-year interval that is statistically significant at the critical value of 1%. Otherwise portfolios are either not underperforming or insignificant. Analogous to the high and medium-trading-volume arbitrage portfolio, the low-trading-volume arbitrage portfolio generates statistically significant abnormal profits of 0.798% over the one-month interval. The mean and median ACAR is statistically significant.

These empirical findings support Hameed and Ting (2000) and McInish et al. (2008) in which, the ACAR of arbitrage portfolio in high-trading-volume portfolio documented greater return. Consistent with AMH and Overreaction Hypothesis, but contrary to the EMH, investors could earn greater abnormal profits by using contrarian strategy on high and medium-trading-volume portfolios over the period of one-month interval. The stock market is not perfectly efficient by virtue of the investors' overreaction is irrational and predictable. GST imposition

on fee-based financial services indicates a change in the ecologies of the stock market condition. At the same time, GST imposition on fee-based financial services is also a form of market friction. The dynamic of the investors' overreaction is driven by such change in the ecologies. In conclusion, stock market overreaction has a significant positive relationship with trading volume.

From Table 3, it can be seen that the loser portfolio has significant negative ACAR in the formation period for all intervals. The mean ACAR and median ACAR for all intervals are statistically significant at the critical value of 0.1%, excluding the one-year interval, which is statistically significant at the critical value of 1%. However, only the loser portfolio over one-month interval outperformed from ACAR -4.462% to ACAR 1.766%. The ACAR for otherwise intervals of loser portfolio have improved but still negative. This suggests that investors may earn abnormal profits by purchasing the loser portfolio one month before the GST imposition on the fee-based financial services and subsequently sell the loser portfolio one month after GST imposition. Unlike Bursa Malaysia, the mental accounting of the investors towards the GST imposition on fee-based financial services encumber the investors from overreacting over the period of three-month, six-month and one-year intervals in ASX. Similar to Bursa Malaysia, the investors may earn the highest abnormal

TABLE 3. ACAR (%) for loser, winner and arbitrage portfolios in ASX after GST imposition

Portfolios	Intervals							
	One-Month		Three-Month		Six-Month		One-Year	
Loser	-4.462	1.766	-4.376	-1.037	-1.780	-0.687	-0.993	-0.541
t-statistics	-6.575***	-7.646***	-5.057***	-3.229**				
Wilcoxon Signed Rank Test	7.176***	6.532***	4.763***	3.248**				
Winner	4.136	0.746	0.981	-0.097	0.938	-0.086	1.107	-0.774
t-statistics	4.480***	3.510**	3.413**	7.076***				
Wilcoxon Signed Rank Test	-4.510***	-4.166***	-3.116**	-6.083***				
Arbitrage	-8.597	1.020	-5.357	-0.941	-2.718	-0.602	-2.100	0.233
t-statistics	1.497	-2.648**	-2.065*	0.950				
Mann-Whitney U Test	-2.248*	2.317*	2.481*	0.053				

Note: *p < 0.05, **p < 0.01 and ***p < 0.001.

profits by acquiring the loser portfolio a week before the GST imposition on the fee-based financial services and then sell it after a week. These empirical findings favour the AMH and Overreaction Hypothesis but contravene to the weak form of the EMH.

The winner portfolio is strongly positive for all intervals before the GST imposition on the fee-based financial services. Nevertheless, the winner portfolio of the one-year interval with the ACAR of 1.107% reverses to the lowest ACAR of -0.774%. This is followed by the winner portfolio of the three-month interval with the ACAR of 0.981% that overshoot to -0.097%. The ACAR of winner portfolio for the six-month interval is 0.938% and subsequently underperformed at -0.086%. The mean ACAR and the median ACAR for all intervals are statistically significant.

The arbitrage portfolio presents the ACAR difference between the loser portfolio and winner portfolio for different intervals. The mean ACAR for the one-month and one-year intervals are statistically insignificant, while the three-month and six-month intervals are statistically significant at the critical value of 1% and 5%, respectively. The median ACAR for all intervals are statistically significant at the critical value of 5%, except for the one-year interval. The ACAR for all intervals are either statistically insignificant (*i.e.* one-month and one-year intervals) or generate losses (*i.e.* three-month and six-month intervals). These empirical results are in agreement with Ahmad and Tjan (2004) who showed that there is a strong negative ACAR for all intervals in the arbitrage portfolio but did not turn positive after the GST imposition. Overall, the empirical findings are consistent with the EMH but contradict the Prospect Theory, Overreaction Hypothesis and AMH.

In conclusion, the empirical results support the EMH but contradict to the AMH, Prospect Theory and Overreaction Hypothesis. According to Glynn (2000), market overreaction present in ASX regardless of employing the approach of MARM or CAPM. Thus, opposed to Bursa Malaysia, the empirical results reveal that the GST imposition on fee-based financial services hinders

stock market overreaction in ASX. The contrarian strategy cannot be employed to generate abnormal profits for all intervals in ASX.

Table 4 illustrates that in the high-trading-volume loser portfolio, only the ACAR of one-month interval overshoots from -1.620% to 0.314%. The mean and median of ACAR for one-month and three-month intervals are statistically significant, with other intervals being insignificant. Meanwhile, only the high-trading-volume winner portfolio over the one-year interval underperformed (from ACAR of 0.956% to -0.899%). Nonetheless, the high-trading-volume winner portfolio for one-month, three-month and six-month intervals did not exhibit overreactions. In addition, none of the high-trading-volume arbitrage portfolios shows significant positive abnormal returns. Unlike the emerging market with the thinness of trading like Bursa Malaysia, contrarian strategy cannot be adopted to generate abnormal profits in ASX.

As for the medium-trading-volume loser portfolio, only the ACAR of one-month experienced significant reversals from -3.669% to 1.947%. Both the mean and the median ACAR are statistically significant at the critical value of 0.1%. The otherwise intervals of medium-trading-volume loser portfolio did not outperform. On the other hand, the medium-trading-volume winner portfolio underperformed from ACAR 1.155% to -0.304% for six-month interval while the one-year interval underperformed from 1.552% to -0.841. The mean and the median of ACAR for six-month and one-year intervals are statistically significant at the critical value of 5% and 0.1%, correspondingly. Nevertheless, similar to the high-trading-volume arbitrage portfolio, none of the medium-trading-volume arbitrage portfolios is significant. The noise investors cannot earn abnormal profits by buying loser portfolio and selling winner portfolio.

With regards to the low-trading-volume loser portfolio, only the ACAR of one-month interval significantly outperformed from -7.622% to 2.153%. The low-trading-volume loser portfolio for three-month, six-month and one-year intervals are significant. Nevertheless, none of them has shown any reversals. The ACAR of low-trading-volume winner portfolio over the one-year interval

TABLE 4. ACAR (%) for high, medium and low volume stocks in ASX after GST imposition

Portfolios		Intervals							
		One-Month		Three-Month		Six-Month		One-Year	
High Turnover Ratio	Loser	-1.620	0.314	-3.555	-1.890	-1.503	-1.662	-0.970	-0.693
	t-statistics	-6.672***	-3.213**	0.328	-1.004				
	Wilcoxon Signed Rank Test	4.078***	3.027**	0.202	1.009				
	Winner	5.765	0.790	1.578	0.022	1.042	0.224	0.956	-0.899
	t-statistics	4.780***	4.429***	2.024	3.982**				
	Wilcoxon Signed Rank Test	-3.888***	-3.807***	-2.247*	-3.377**				
	Arbitrage	-7.385	-0.476	-5.133	-1.912	-2.546	-1.886	-1.926	0.206
	t-statistics	-0.610	-3.707**	-3.314**	0.438				
Medium Turnover Ratio	Mann-Whitney U Test	-0.126	3.279**	2.823**	0.223				
	Loser	-3.669	1.947	-4.560	-1.053	-1.501	-0.478	-0.695	-0.223
	t-statistics	-5.904***	-4.157***	-4.535***	-1.613***				
	Wilcoxon Signed Rank Test	4.023***	3.511***	3.404**	1.628				
	Winner	4.664	1.002	1.097	0.313	1.155	-0.304	1.552	-0.841
	t-statistics	2.124*	.938	2.297*	4.642***				
	Wilcoxon Signed Rank Test	-2.058*	-1.493	-2.301*	-3.942***				
	Arbitrage	-8.333	0.944	-5.656	-1.365	-2.656	-0.173	-2.246	0.619
Low Turnover Ratio	t-statistics	0.732	-1.817	-0.317	1.341				
	Mann-Whitney U Test	-1.232	1.057	0.786	-0.999				
	Loser	-7.622	2.153	-4.864	-0.660	-2.272	-0.286	-1.241	-0.678
	t-statistics	-3.936**	-4.677***	-4.663***	-3.213**				
	Wilcoxon Signed Rank Test	4.319***	3.942***	3.861***	3.054**				
	Winner	1.379	1.637	-0.016	-0.029	0.475	-0.235	0.714	-0.614
	t-statistics	-.245	.057	1.393	3.373**				
	Wilcoxon Signed Rank Test	0.928	0.390	0.175	-2.731**				
Arbitrage	Arbitrage	-9.001	0.516	-4.849	-0.631	-2.747	-0.052	-1.955	-0.064
	t-statistics	0.395	-1.165	-0.116	-0.185				
	Mann-Whitney U Test	-0.593	1.155	0.582	1.087				

Note: *p < 0.05, **p < 0.01 and ***p < 0.001.

underperformed from 0.714% to -0.614%. Its mean and median are significant at 1%. The ACAR of low-trading-volume winner portfolio in otherwise intervals did not underperform. Moreover, none of the mean and median ACAR of low-trading-volume arbitrage portfolio is significant. The empirical findings are consistent with the EMH but opposed to AMH and Overreaction Hypothesis. The stock return in ASX is unpredictable. Besides, the investors did not exhibit overreaction behaviour. Thus, contrarian strategy is not suitable to be adopted to earn abnormal profits. This paper confirmed that stock market overreaction has an insignificant relationship with trading volume in ASX.

Based on Table 5, in Bursa Malaysia, the mean trading volume for all intervals declined after the GST imposition on the fee-based financial services. The mean trading volume of one-month interval decline by 1.717%, whilst the mean trading volume of three-month interval fell by 10.57% after the GST imposition on the fee-based financial services. Accordingly, the trading volume over the period of six-month and one-year intervals declined by 15.35% and 20.30%, separately. This conjectures that the effect of GST imposition as market friction on the trading volume is getting greater over the periods. Likewise, the trading volume ratio for all intervals are less than 1 and gradually decline from one-month to one-year intervals. However,

the reductions in the mean trading volume for one-month and three-month intervals are insignificant. Nonetheless, the decline of mean trading volume over the six-month interval is statistically significant at the critical value of 5% whilst the one-year interval is statistically significant at the critical value of 1%.

The coefficient of dummy variable that represents the GST imposition on the fee-based financial services is -233.531 and -1233.503 for one-month interval and three-months interval, correspondingly. This implies that after the GST imposition, the trading volume over one-month interval decline by 233.531 units. The trading volume over the three-months interval fell by 1233.503 units after the GST imposition. However, analogous to the empirical results of the paired sample t-test, the coefficients of dummy variables for one-month and three-month intervals are insignificant. The empirical results match with the adjusted R-squared results. The adjusted R-squared of -0.136 for one-month interval shows that this model contains the independent variable that does not explain the dependent variable. Therefore, the GST imposition on fee-based financial services does not explain the trading volume in Bursa Malaysia. For a three-month interval, the adjusted R-squared of 0.014 denotes that the GST imposition on fee-based financial services can only explain 1.4% of the trading volume in Bursa Malaysia.

TABLE 5. Effect of GST imposition on trading volume in Bursa Malaysia

Intervals	One-Month	Three-Month	Six-Month	One-Year
Mean Before	13602.868	11669.243	11471.243	12152.190
Mean After	13369.337	10435.740	9710.536	9685.427
Ratio (After / Before)	0.983	0.894	0.847	0.797
t-statistic	0.204	1.405	2.286*	2.962**
Coefficient of Dummy	-233.531	-1233.503	-1760.708*	-2466.763**
Adjusted R-Squared	-0.136	0.014	0.112	0.127

Note: *p < 0.05, **p < 0.01 and ***p < 0.001

The coefficient of dummy variable that reflects the GST imposition on the fee-based financial services are -1760.708 and -2466.763 for six-month and one-year intervals, respectively. In other words, the trading volume over six-month interval decline by 1760.708 units after the GST imposition on fee-based financial services. The trading volume over the one-year interval fell by 2466.763 units after the GST imposition. Additionally, the dummy variable of GST imposition for six-months interval is significant at 5%, whilst for one-year interval is significant at 1%. The coefficients of dummy variables for six-month and one-year intervals are significant and match to the empirical results of the paired sample t-test. The null hypothesis for t-statistic of paired samples t-test is “the average trading volume before and after the GST imposition are equal.” The average trading volume for all intervals are insignificantly different, with the exception of the six-month interval that is significantly unequal at 5% and one-year interval that significantly unequal at 1%. The adjusted R-squared for the six-months interval is 11.2%, whilst for the one-year interval is 12.7%. Therefore, the dummy variable of GST imposition can be used to explain 11.2% variation of trading volume for the six-month interval, *ceteris paribus*. As for the one-year interval, the dummy variable of GST imposition could explain 12.7% variation of the trading volume, *ceteris paribus*. Collectively, the evidence clearly establishes that the GST imposition has a significantly negative relationship with trading volume over time in an emerging market, *i.e.* Bursa Malaysia.

Consistent to Coelho (2014), the coefficients of GST imposition dummy variable for six-month (-1760.708) and one-year (-2466.763) intervals are negative. This infers that average trading volume significantly declined over time after the GST imposition on the fee-based financial services. Since the average trading volume is elastic

in relation to the transaction costs in Bursa Malaysia, the destabilizing speculation can be mitigated via GST imposition on fee-based financial services. These empirical findings provide insights for the policymakers from the emerging markets that are moving towards taxing fee-based financial services under GST system. They should take into consideration of the adverse effects on trading volume when devising and implementing such policy.

Table 6 shows that the mean trading volume for all intervals declined after the GST imposition on the fee-based financial services in ASX, excluding the one-year interval. After the GST imposition on fee-based financial services in ASX, the mean trading volume of one-month interval dropped by 12.71%. This is followed with another fell in trading volume by 1.26% and 12.33% at the three-month and six-month intervals, respectively. At the one-year interval, the trading volume bounces back and increase by 10.51%. This suggests that the effect of GST imposition as market friction on the trading volume is getting weaker over the periods. The sudden increase in trading volume is associated with an insignificant paired samples t-statistic and an insignificant dummy variable. Thus, the sudden increase in trading volume is not attributable to GST imposition on fee-based financial services.

Unlike Bursa Malaysia, the trading volume ratios for all intervals in ASX fluctuate across one-month to one-year intervals. The trading volume ratio of one-month interval increases from 0.873 to 0.987, which is then reduced to 0.877. Eventually, it upsurged to 1.105. According to paired samples t-statistic, the decline in the mean trading volume over three-month and one-year intervals are insignificant. Nevertheless, the decline of mean trading volume over the one-month interval is statistically significant at the critical value of 5% whilst the six-month interval is statistically significant at the critical value of 1%.

TABLE 6. Effect of GST imposition on trading volume in ASX

Intervals	One-Month	Three-Month	Six-Month	One-Year
Mean Before	3520.180	2907.680	3236.420	2935.843
Mean After	3072.767	2871.180	2837.238	3244.287
Ratio (After / Before)	0.873	0.987	0.877	1.105
t-statistic	2.308*	0.357	2.882**	-1.397
Coefficient of Dummy	-447.413	-36.500	-399.182	308.444
Adjusted R-Squared	-0.041	-0.041	0.063	0.030

Note: *p < 0.05, **p < 0.01 and ***p < 0.001.

Most of the previous literatures, particularly, Hayashida and Ono (2011), Pomeranets and Weaver (2011) and Coelho (2014) found a significant negative relationship between transaction costs and trading volume. This does not appear to be the case in ASX. The coefficient of dummy variable that epitomises the GST imposition on the fee-based financial services are -447.413, -36.5, -399.182 and 308.444 for one-month, three-month, six-month, one-year intervals, correspondingly. However, none of the dummy variables of GST imposition on fee-based financial services is significant. Likewise, the adjusted R-squared ranges between -0.041 to 0.063. This implies that the average trading volume is inelastic in relation to the GST imposition on fee-based financial services in ASX.

MANAGERIAL IMPLICATIONS

The empirical findings of this paper can be used as guide for investors and fund managers in understanding and evaluating the effects of GST imposition on stock overreaction, as well as, the relationship between stock overreaction and trading volume. Particularly, investors and fund managers in emerging markets could employ the contrarian strategy, by buying underperformed high trading volume portfolio and selling outperformed high trading volume portfolio, to maximize their abnormal profits during GST imposition on financial services. Since GST will be no longer applicable in Malaysia effective 1st September 2018 onwards, reduced transaction costs will increase the net benefits earned by the investors and fund managers. Also, adoption of the contrarian strategy will be more profitable.

CONCLUSIONS

This paper explores the effect of GST imposition on stock market overreaction and trading volume in Malaysia and Australia over the intervals of one-month, three-month, six-month, and one-year window before and after GST imposition. This paper revealed that an increase of transaction costs through GST imposition has a significant relationship with stock market overreaction in Bursa Malaysia, but an insignificant relationship in ASX. In addition, the empirical results show that the relationship between stock market overreaction and trading volume is significant for Bursa Malaysia, but insignificant for ASX. Hence, this paper proposes the possibility that, knowing past trading volume enables investors to generate abnormal profits during GST imposition in an emerging market (Bursa Malaysia). The empirical results of this paper enable the policymakers of the emerging market to devise policy with lesser adverse effect when their countries move towards taxing fee-based financial services under GST.

Furthermore, GST imposition has a significant negative relationship with trading volume in Bursa Malaysia, but an insignificant relationship in ASX. This paper has important implications, especially for countries which are moving towards imposing GST on fee-based financial services. The empirical results suggest that GST imposition could be used as an effective tool to generate substantial revenues without having implications for stock market overreaction and reduction of trading volume in a developed market.

Future research should investigate the effect of GST 0%, abolishment and u-turn to SST on the stock market. It should also include the countries that imposed GST on fee-based financial services in recent years, *i.e.* China and India for the purpose of external validity of the findings. In addition, a comparative study of FTT and GST can be investigated from the lens of transactional efficiency.

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- Lee Yok Yong (corresponding author)
Putra Business School
Universiti Putra Malaysia
43400 UPM Serdang, Selangor, MALAYSIA.
E-Mail: leeyokyong@gmail.com
- Mohamed Hisham Yahya
Faculty of Economics and Management
Universiti Putra Malaysia
43400 UPM Serdang, Selangor, MALAYSIA.
E-Mail: mohdhisham@upm.edu.my
- A.N. Bany-Ariffin
Faculty of Economics and Management
Universiti Putra Malaysia
43400 UPM Serdang, Selangor, MALAYSIA.
E-Mail: bany@upm.edu.my
- Aslam Izah Selamat
Faculty of Economics and Management
Universiti Putra Malaysia
43400 UPM Serdang, Selangor, MALAYSIA.
E-Mail: aslamizah@upm.edu.my