



UNIVERSITI
TEKNOLOGI
MARA

Cawangan Kedah
Kampus Sungai Petani

Voice of Academia

Academic Series of Universiti Teknologi MARA Kedah

VoA 2021
Volume 17 Issue 1

COMMITTEE PAGE

VOICE OF ACADEMIA

Academic Series of Universiti Teknologi MARA Kedah

Chief Editor

Dr. Junaida Ismail

*Faculty of Administrative Science and Policy Studies,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Editorial Team

Aishah Musa

*Academy of Language Studies,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Syahrini Shawalludin

*Faculty of Art and Design,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Etty Harniza Harun

*Faculty of Business Management,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Khairul Wanis Ahmad

*Facility Management & ICT Division,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Suhaida Abu Bakar

*Academy of Contemporary Islamic Studies Department,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Editorial Board

Professor Dr M. Nauman Farooqi

*Faculty of Business & Social Sciences,
Mount Allison University, New Brunswick, Canada*

Professor Dr Kiyomet Tunca Caliyurt

*Faculty of Accountancy,
Trakya University, Edirne, Turkey*

Professor Dr Diana Kopeva

*University of National and World Economy,
Sofia, Bulgaria*

Professor Dr Sivamurugan A/L Pandian

Universiti Sains Malaysia, Malaysia

Associate Professor Dr Wan Adibah Wan Ismail
*Faculty of Accountancy,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Dr Azlyn Ahmad Zawawi
*Faculty of Administrative Science and Policy Studies,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Dr Azyyati Anuar
*Faculty of Business Management,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Dr Neesa Amera Mohammed Salim
*Faculty of Art & Design,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Dr Muhamad Khairul Anuar Zulkepli
*Academy of Contemporary Islamic Studies Department,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Dr Mohd Nasir Ayub
*Academy of Contemporary Islamic Studies Department,
Universiti Teknologi MARA Cawangan Kedah, Malaysia*

Content Reviewer

Associate Professor Ts Dr Asmadi Mohammad Ghazali
Universiti Teknologi MARA

Associate Professor Dr Fadzilah Azni Ahmad
Universiti Sains Malaysia

Associate Professor Dr Nur Hisham Ibrahim
Universiti Teknologi MARA

Associate Professor Dr Mahadir Ladisma @ Awism
Universiti Teknologi MARA

Associate Professor Dr Noor Zahirah Mohd Sidek
Universiti Teknologi MARA

Associate Professor Dr Rizaimy Shahrudin
Universiti Teknologi MARA

Associate Professor Dr Yarina Ahmad
Universiti Teknologi MARA

Dr Azita Ahmad Zawawi, Senior Lecturer
Universiti Putra Malaysia

Dr Azyyati Anuar
Universiti Teknologi MARA

Dr Azlyn Ahmad Zawawi
Universiti Teknologi MARA

Dr. Anida Mahmood
Universiti Teknologi MARA

Dr Junaida Ismail
Universiti Teknologi MARA

Dr Mahadzir Ismail
Universiti Teknologi MARA

Dr Mohamed Samsudeen Sajahan
Universiti Teknologi MARA

Dr. Mohd Nasir Bin Ayub
Universiti Teknologi MARA

Dr Norhidayah Ali
Universiti Teknologi MARA

Dr. Nur Hafeeza Binti Ahmad Pazil
Universiti Sains Malaysia

Dr Nur Zafifa Kamarunzaman
Universiti Teknologi MARA

Dr Radzliyana Radzuwan
Universiti Teknologi MARA

Dr Siti Zuliha Razali
Universiti Sains Malaysia

Dr Zubir Azhar
Universiti Sains Malaysia

Language Reviewer

Dr Wan Irham Ishak
Universiti Teknologi MARA

Aishah Musa
Universiti Teknologi MARA

Bawani Selvaraj
Universiti Teknologi MARA

Nor Aslah Adzmi
Universiti Teknologi MARA

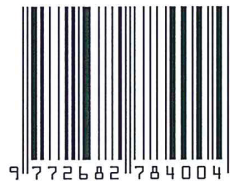
Norfaridatonasmah Abd Kadir
Universiti Teknologi MARA

Samsiah Bidin
Universiti Teknologi MARA

Shafina Md Salleh
Universiti Teknologi MARA

Sharina Saad
Universiti Teknologi MARA

e-ISSN: 2682-7840



Copyright © 2021 by the Universiti Teknologi MARA, Kedah

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or any means, electronic, mechanical, photocopying, recording or otherwise, without prior permission, in writing, from the publisher.

© Voice of Academia is jointly published by the Universiti Teknologi MARA Caawangan Kedah, Malaysia and Penerbit UiTM (UiTM Press), Universiti Teknologi MARA Malaysia, Shah Alam, Selangor.

The views, opinions and technical recommendations expressed by the contributors and authors are entirely their own and do not necessarily reflect the views of the editors, the Faculty or the University.

TABLE of CONTENTS

POTENSI MASJID SEBAGAI PRODUK PELANCONGAN DI MALAYSIA Azarudin Awang ¹ , Zainuddin Zakaria ² , Mohd Sabri Abdul Ghafar ³ , Noralisa Ismail ⁴ , Zuraini Jusoh ⁵	1 - 9
AN INVESTIGATION ON UNIVERSITY STUDENTS' PERCEPTIONS ABOUT ICEBREAKERS IN CLASSROOMS Che Nooryohana Zulkifli ¹ , Mohamad Putera Idris ²	10 - 19
A STUDY ON AIR POLLUTION INDEX IN SABAH AND SARAWAK USING PRINCIPAL COMPONENT ANALYSIS AND ARTIFICIAL NEURAL NETWORK Norwaziah Mahmud ¹ , Nur Elissa Syazrina Zulkifli ² , Nur Syuhada Muhammat Pazil ³	20 - 29
CHARACTERISTIC PERFORMANCE CUSTOMER RELATION MANAGEMENT: A CASE STUDY TECHNOLOGY EDUCATION INSTITUTION IN MALAYSIA Muhamad Fairos Mohamad Shah	30 - 36
ILLEGAL STREET HAWKERS ISSUE FACING THE LOCAL AUTHORITIES IN SARAWAK: A CASE STUDY OF URBAN STREETS IN KUCHING CITY Noni Harianti Junaidi ¹ , Anisa Safiqah Othman ²	37 - 54
EMOJI & EMOTICON-RELATED LEGAL ISSUES Nor Azlina Mohd Noor ¹ , Ahmad Shamsul Abd Aziz ²	55 - 62
GRADUATES' EMPLOYABILITY: ENHANCING STUDENTS' OVERALL PERFORMANCES Fatin Adilah Razali ¹ , Shafinaz Lyana Abu Talib ² , Naqiah Awang ³	63 - 72
PLAYING E-SPORT AMONG UNIVERSITY STUDENTS: BENEFITS AND DISADVANTAGES Nurul Nadiah Rasdi ¹ , Ahmad Najmie Rusli ²	73 - 80
FACTORS FOR FINANCIAL RESTATEMENTS: CASE OF PUBLIC LISTED COMPANIES IN MALAYSIA Shafinaz Lyana Abu Talib ¹ , Fatin Adilah Razali ² , Zaini Ahmad ³	81 - 96
PERCEIVED ORGANIZATIONAL SUPPORT AND JOB STRESS ON TURNOVER INTENTION: CONCEPTUAL PAPER Roshidah Safeei	97 - 104
IS EMERGING FOREIGN EXCHANGE MARKET EFFICIENT? Soofiyah Aiman Sanadi ¹ , Bee-Hoong Tay ²	105 - 115
THE IMPACT OF PERFORMANCE EXPECTANCY ON PURCHASING TRAVEL PRODUCTS VIA ONLINE TRAVEL AGENTS WEBSITES: GENDER AS MODERATOR Safwan Marwin Abdul Murad ¹ , Arunnaa a/p Sivapathy ² , Annuar Aswan Mohd Nor ³	116 - 128
LOGAN MULTI-FUNCTIONAL DIGITAL CLOCK Nik Nur Aneesa Zamzurri ¹ , Norarifah Ali ² , Izza Syahida Abdul Karim ³	129 - 152
HIBAH AL-UMRA DAN HIBAH AL-RUQBA DARI PERSPEKTIF MAZHAB AL-SYAFIE Nurfarhana Mohd Daud ¹ , Mohd Asyadi Redzuan ² , Dziauddin Sharif ³ , Siti Noor Ain Binti Aziz ⁴ , Mahasin Saja@Mearaj ⁵ , Aflah Isa ⁶	153 - 162
KAJIAN KONSEPTUAL TENTANG KESEDARAN BERWAKAF DALAM KALANGAN KAKITANGAN UITM CAWANGAN KEDAH Azyyati Anuar ¹ , Rohayati Hussin ² , Nurul Mazrah Manshor ³ , Noor Hidayah Kasim ⁴ , Daing Maruak Sadek ⁵	163 - 172
PREVENTION IS BETTER THAN CURE: A CASE OF PARENTS' DECISIONS OF CHILDREN VACCINATIONS Johan Mukhlis Jan Zakri ¹ , Mohd Nazir Rabun ² , Mohamad Syafiqir Rahman Mohamad Nazir ³	173 - 192
PUBLIC INTENTION TO REPORT CHILD ABUSE IN MALAYSIA: A CROSS SECTIONAL STUDY Nurul Hidayana Mohd Noor ¹ , Sharifah Hanis Syamimi Ghazali ² , Nurul Nabila Huda Abu Bakar ³	193 - 203
APLIKASI TEKNIK PEMOTONGAN LASER DALAM REKABENTUK PRODUK BATIK MERBOK Normaziana Hassan ¹ , Mas Ayu Zainal @ Ismail ² , Zaidi Yusoff ³ , Ahmad Fazlan Ahmad Zamri ⁴	204 - 218
MASALAH BERKAITAN FORMAT SURAT RASMI DALAM KALANGAN PENSYARAH BAHASA DI UiTM CPP Raja Rosila Raja Berahim ¹ , Noraziah Mohd Amin ² , Nur Afiqah Ab. Latif ³ , Noor Azli Affendy Lee ⁴ , Melati Desa ⁵ , Che Nooryohana Zulkifli ⁶ , Boon Yih Mah ⁷	219 - 231
CONFLUENCE OF COSTUME AND MAKE UP IN DEFINING COMMUNISIM VIA INDEPENDENT DOCUMENTARY Mohd Nor Shahizan Ali ¹ , Neesa Ameerah Mohamed Salim ² , Faryna Mohd Khalis ³	232 - 242

IS EMERGING FOREIGN EXCHANGE MARKET EFFICIENT?

Soofiyah Aiman Sanadi¹, Bee-Hoong Tay²

^{1,2}Faculty of Business and Management, Universiti Teknologi MARA Johor Branch

ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received July 2020</p> <p>Received in revised form Aug 2020</p> <p>Accepted Oct 2020</p> <p>Published Jan 2021</p>	<p><i>This study examines the weak form efficiency in the eight selected Asian foreign exchange markets from January 2010 to September 2020. The selected foreign exchange markets are Malaysia, India, Pakistan, China, Taiwan, Thailand, South Korea, and Indonesia. Augmented Dickey-Fuller (ADF) test, Phillips-Perron (PP) test and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test are adopted to investigate the weak form efficiency. The outcomes for all tests indicated that all the selected foreign exchange markets were weak form efficient except Taiwan when tested with the KPSS test. These findings have important implication to investors, fund managers and policy makers.</i></p>
<p>Keywords:</p> <p>Efficient market hypothesis, Weak form market efficiency, Foreign exchange market</p> <p>Corresponding Author:</p> <p>taybe869@uitm.edu.my</p>	

©2021 UiTM Kedah. All rights reserved.

1. INTRODUCTION

Market efficiency refers to the extent that the securities prices reflect all the available information. An efficient market requires market participants to have rational expectation and transaction cost would not deter them from trading the securities (Giannellis & Papadopoulos, 2009). The concept of market efficiency, or widely known as the efficient market hypothesis (EMH) has been the topic of intense debate and thought. EMH can be divided into three separate forms which are weak, semi strong, and strong forms (Fama, 1965, 1970). Weak form market efficiency proposes that past information about the securities have already incorporated into its prices, thus investors cannot use past news to predict current price movement. Semi strong form and strong form market efficiencies conjecture that securities prices have already contain the public and private information, thus, investor does not have the ability to outperform the market by using this information.

Since the seminal work of Fama (1970), the EMH has been extensively studied in the sphere of equity market over the past decades (see Groenewold, 1997; Chaudhuri & Wu, 2003; Tiwari & Kyophilavong, 2014; Bouoioyour, Selmi & Wohar, 2018). However, the study on efficiency of foreign exchange market is relatively less as compared to equity market, particularly in the emerging Asian markets (Meng & Huang, 2019; lyke, 2019). Moreover, the recent empirical studies on the EMH of the foreign exchange market have provided mixed evidence (see Firoj & Khanom, 2018; Putra, Lindawati & Sari, 2016; Kumar & Kamaiah, 2016; Kumar, 2011).

Financial market efficiency is one of the most significant topics in finance (Kharbanda & Singh, 2018). One of the most persistent questions in finance is about the efficiency of the financial markets (Katusiime, Shamsuddin, & Agbola, 2015). Out of all the financial markets, the foreign exchange market is known to be the largest financial market with an average transaction of \$5.3 trillion per day (Kitamura, 2017). Foreign exchange market plays a significant role in the economy and financial system (Yang, Shao, Shao, & Stanley, 2019). In the year of 1980, Asia's emerging country has contributed around 10% of the world gross domestic

product (GDP) which is deemed as a small contribution as Asia is known to be the world largest continent because it represents a total of 48 countries. However, in 2019, Asia's emerging countries have contributed around 36% of the world GDP. This shows an increase in the percentage of contribution of this region towards the world economy. With the increasing financial integration and globalization, emerging Asian country has been the talked of the 21st century related to investment matters. Moreover, the Asian foreign exchange markets have improved particularly in recent years (Tsuyuguchi & Wooldridge, 2008). The volume of transactions and market participants have increased enormously. The increasing growth and potential investment opportunities offered have made Asian foreign exchange markets attractive to many investors and fund managers. With that had been said, there is one common concern on whether these foreign exchange markets are efficient as investors are looking forward to increasing their profits.

The objective of this study is to investigate the weak form efficiency of the foreign exchange markets in the selected Asian countries. The eight selected Asian countries are Malaysia, India, Pakistan, China, Taiwan, Thailand, South Korea, and Indonesia¹. The analysis of the study is conducted by using data ranges from January 2010 to September 2020. Three tests are employed to examine the weak form efficiency, namely Augmented Dickey-Fuller (ADF) test, Phillips-Perron (PP) test and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test. The efficiency of the foreign exchange market is a significant consideration for the entire currency market participants (Aroskar, Sarkar, & Swanson, 2004). The acceptance and rejection of the efficient market hypothesis has significant implication to the investors, fund managers and policy makers. If a foreign exchange market is proven efficient, the securities price should reflect all the past information related to such security. This implies that investors and fund managers cannot use technical analysis to exploit excess return because such analysis involves the usage of past prices data to derive trends and patterns of a security. However, if the market is inefficient, the security's price does not fully incorporated all relevant information. Therefore, an inefficient market offers investors the opportunity to endeavour the trading rules to gain abnormal return. This study contributes to the existing literature on the topic of weak form market efficiency of foreign exchange market in the Asian countries.

The rest of the paper is organised as follows. Section 2 addresses the previous researches. Section 3 describes the data and methodology. Section 4 reports on the empirical findings and section 5 provides the concluding remarks.

2. LITERATURE REVIEW

Over the past decades, numerous researches regarding the EMH have concluded that prices in the financial market fully reflect all available information (Fawson, Glover, Fang, & Chang, 1996). Despite the increasing importance of Asian foreign exchange market to the world economy, the literature on the efficiency in this market is relatively scarce compared to the equity market. On the fact that the EMH has been used to evaluate the stock prices in the equity market, it can also be used to evaluate the efficiency of foreign exchange market (Ibrahim, Long, Ghani, & Izani, 2011). Among the three forms of market efficiencies, i.e. weak form, semi strong form and strong form, researchers mainly focused on the weak form market efficiency. In addition, as emerging markets are found to be not efficient towards semi strong form and strong form market efficiencies, therefore, it is more appropriate to conduct weak form efficiency test on these markets (Mobarek & Keasey, 2000). To recap, the weak form market efficiency test states that it is impossible to use past price information to predict future price of a security.

¹We include these countries in our samples because they are among the most important emerging markets and developing economies (Malaysia, India, Pakistan, China, Thailand, and Indonesia) and advanced economies (South Korea and Taiwan) in terms of GDP in Asia.

The literature on the weak form market efficiency is reported here. Putra et al., (2016) found that ASEAN-5 countries, namely Indonesia, Thailand, Malaysia, Singapore, and Philippines were efficient aftermath the global financial crisis of 2008. The study implies that investors in the ASEAN-5 markets cannot acquire abnormal returns by means of technical analysis on foreign exchange market. However, by applying the generalised autoregressive conditional heteroscedasticity-based unit root test, Iyke (2019) observed contradicted results in Indonesia. He found that Indonesian foreign exchange market was inefficient from January 1978 to July 2018 based on the bilateral exchange rates between Indonesia and its top 15 major trading partners. Thus, the study suggests that investors may have the opportunity to gain profit by engaging in a buy and hold strategy. Kumar and Kamaiah (2016) reported the weak form market efficiency in the foreign exchange markets of Brazil, Russia, India, China, and South Africa (BRICS) using various tests. The results of the study indicated that the weak form efficient market hypothesis was rejected for all the five series from April 1994 to September 2014.

On the other hand, Katusiime et al. (2015) tested the efficiency of Ugandan foreign exchange market from January 1994 to June 2012. Based on the variance ratio test, the study concluded that the Ugandan foreign exchange market contained the features of weak form efficiency, therefore, such market is efficient. In addition, by employing the unit root tests, Wickremasinghe and Kim (2008) found that the four selected currencies, namely Indian rupee, UK pound, US dollar and Japanese yen supported the legitimacy of the weak form EMH over the periods of January 1986 to December 2004. The results of the study have significant policy implications related to the foreign exchange market of Sri Lanka.

Noman and Ahmed (2009) examined the efficiency of the foreign exchange markets in South Asian countries for the periods of 21 years, i.e. from year 1985 to 2005. By adopting two different tests, namely the variance ratio test and Chow-Denning joint variance ratio test, the study focused on the seven South Asian countries which are also the members of the South Asian Association of Regional Cooperation (SAARC). The outcomes of the study concluded that all the selected countries, namely Bangladesh, Bhutan, India, Pakistan, Maldives, Nepal, and Sri Lanka followed random walk theory. Hence, they are weak form efficient. Next is the study conducted by Chiang, Mei, Lee, Su, Tzou, and Pin (2010). They used several variance ratio tests to examine the EMH on four foreign exchange markets, namely Japan, South Korea, Taiwan and Philippines. The results of their study revealed that the foreign exchange markets for Japan, South Korea and Philippines contained the characteristics of weak form efficiency. However, Taiwan foreign exchange market was found not to exhibit any characteristic of EMH.

Ibrahim et al. (2011) investigated the weak form market efficiency on the foreign exchange markets in 30 countries that are declared as the Organisation for Economic Cooperation and Development (OECD) based on the weekly data from 2000 to 2007. The methods used to examine the presence of unit roots or weak form efficiency are Augmented Dickey-Fuller test (ADF) test, Phillips-Perron (PP) test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. The outcomes of the study indicated that foreign exchange markets in OECD exhibited weak form efficiency. By utilising the same methods, Mabakeng and Sheefeni (2014) examined the weak form market efficiency for the foreign exchange market in Namibia. The study was conducted based on three different monthly bilateral exchange rates, namely nominal spot exchange rates of the European Currency Unit (EURO), the UK Pound (GBP) and the US dollar (USD) from the year 1993 to 2011. The results of the study suggested that Namibia's foreign exchange market was weak form efficient.

Moving on to another study by Kumar (2011) who tested the weak form market efficiency in Indian foreign exchange market. The study obtained monthly data of the Nominal Effective Exchange Rate (NEER) from April 1993 to June 2010. The author conducted the analysis based on three individual and joint variance ratio tests. It was established that the foreign exchange market of India did not demonstrate any characteristic of weak form market efficiency. By employing unit root test and cointegration test, Firoj and Khanom (2018) conducted a study with regards to the foreign exchange market of Bangladesh from January 2010 to November 2017. Seven different common exchange rates were used in the analysis, namely Australian dollar, Canadian dollar, European currencies, United Kingdom pound

sterling, Japanese yen, Swedish krona, and US dollar. The results showed that weak form efficiency was presented on all the currencies thus indicate that these markets were weak form efficient.

To sum up, the review of the literature revealed a mixed picture of empirical evidence of weak form market efficiency of the foreign exchange markets in emerging countries. Therefore, the purpose of this study is to re-examine the weak form market efficiency in the selected foreign exchange markets. The rationale of the present study is to provide a wider coverage of efficiency study in the emerging foreign exchange market.

3. ESTIMATION METHOD

Data

In this study, monthly data of exchange rate dated January 2010 to September 2020 were used in the analysis. The data were obtained from the Thomson Reuters DataStream. Eight important Asian foreign exchange markets were selected in this study, namely China, South Korea, Malaysia, India, Pakistan, Taiwan, Thailand, and Indonesia. The foreign exchange rates adopted in this study were Chinese Yuan, South Korea Won, Malaysian Ringgit, Indian Rupee, Pakistani Rupee, New Taiwan Dollar, Thailand Baht and Indonesian Rupiah, all vis-a-vis the US dollar.

Methodology

To examine the weak form efficiency of emerging markets, three tests were selected, namely the Augmented Dickey-Fuller (ADF) test, Phillips-Perron (PP) test and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test. The hypothesis statements corresponding to these tests are stated as follows:

ADF test:

$H_0 =$ There is unit root (weak form efficient)

$H_A =$ There is no unit root (not weak form efficient)

PP test:

$H_0 =$ There is unit root (weak form efficient)

$H_A =$ There is no unit root (not weak form efficient)

KPSS test:

$H_0 =$ The series is stationary (not weak form efficient)

$H_A =$ The series is not stationary (weak form efficient)

For ADF and PP tests, if the results of the study fail to reject the null hypothesis, i.e. there is a unit root in the exchange rate series, the study concluded that the exchange rates of the selected countries are weak form efficient. On the other hand, for KPSS, if the study rejected the null hypothesis, it indicates that the exchange rate series are not stationary. Thus, the foreign exchange market for that country is weak form efficient. Five percent (5%) statistical significance level was used to determine whether the emerging markets were weak form efficient. The details of the methods used in this study are reported as follows.

Augmented Dickey-Fuller (ADF) Test

ADF is one of the unit root tests that tested the null hypothesis of unit root in a series. It has been used by many researchers to examine market efficiency (see Ibrahim et al., 2011; Firoj & Khanom, 2018). Technically, the ADF test is carried out by inserting the values of the lagged of the dependent variables in the equation (Ibrahim et al., 2011). The test is being carried out in the form of the regression equation as below:

$$\Delta\rho = \alpha_0 + \alpha_1 t + \rho_0 \rho_{t-1} + \sum_{i=1}^q \rho_i \Delta\rho_{t-i} + \varepsilon_t \quad (1)$$

where ρ_t denotes the time series, $\Delta\rho$ denotes changes of series ρ , α_0 denotes the constant variance, t denotes the linear time trend and ε_t denotes the error term with the mean of zero (Cooray & Wickremasinghe, 2008). Based on the equation (1), the null hypothesis of a unit root is ρ_0 equal to zero which is tested against the alternative hypothesis which states that $\rho_0 < 0$.

There are some drawbacks when using the ADF test. First, the ADF test is known to suffer from a very low statistical strength in differentiating between the real unit root process which is ρ_0 equals to zero and near unit root process which is ρ_0 is close to zero. Next is the option for lags ρ . If the chosen ρ is too small, it will affect the test by autocorrelation and if the ρ is too big, the testing power will be lower (Schwert, 1989; Fedorová, 2016).

Phillips-Perron (PP) Test

PP test is a unit root test that is being used in time series analysis to test the null hypothesis whether it consolidates into one or not. The PP test corrects the t -statistic of the γ coefficient from the equation regarding to the serial correlation, expressed as below:

$$\gamma = \mu + \rho\gamma_{t-1} + \varepsilon_t \quad (2)$$

The correction made is non-parametric considering it uses an estimate of spectrum when the $\varepsilon = 0$ which is robust to the autocorrelation and heteroscedasticity of unknown form (Ibrahim et al., 2011).

The focal PP t -statistic distribution is similar to the t -statistic critical value of the ADF test. The difference between ADF and PP tests is essentially on how they manage with the serial correlation and heteroskedasticity in the errors (Herranz, 2017). PP test generally have some advantages against the ADF test. First, the PP test has more resistance against the common forms of heteroscedasticity in the error term, ε_t (Herranz, 2017). The next advantage is that there is no lag needed to be identified for the regression test. Nonetheless, one of the disadvantages of the PP test is that it is sensitive towards structural breaks.

Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) Test

There are some arguments between economists regarding the usage of the common unit root tests and suggested the needs of utilising another stronger test, i.e. a test that could assess the null hypothesis of stationary against the alternative hypothesis of non-stationary (Ibrahim et al., 2011). In addition, the ADF and PP tests were found more likely to not reject the null hypothesis of unit roots (Mabakeng & Sheefeni, 2014). Moreover, both the ADF and PP tests have limitations of lower power and successive or persistent unit roots. Therefore, this study includes the KPSS test as a confirmatory test. The KPSS test differs from both of the ADF and PP tests as it assumes that the data trend is stationary, i.e. not in weak form efficient under the null hypothesis (Worthington & Higgs, 2003). For instance, if the null hypothesis is rejected

(accepted), it reaffirmed that the series is non-stationary (stationary) (Ibrahim et al., 2011). The KPSS statistics can be represented by the following equation:

$$KPSS = T^{-2} \sum_{t=1}^T S_t^2 / \hat{\sigma}^2 \quad (3)$$

where S_t^2 is the partial sum of deviations of residuals from the model mean, $\hat{\sigma}^2$ is an estimator for the long run variance. The advantage of using the KPSS test falls on its capability to differentiate a unit root and a near root process (Tang, 2012).

This study examined both the p -value and t -statistics in ADF and PP tests to confirm the presence of the unit roots. The chosen level of significant for these three tests is 5%. If the t -statistics for ADF and PP tests are seen smaller than the critical values, then the study rejects the null hypothesis of unit roots or weak form efficient. Similar approach goes to the p -value. If the p -value is smaller than the 5% level of significance, the study rejects the null hypothesis of unit roots and concludes that there is nonexistence of weak form efficiency. For KPSS test, if the KPSS statistics is smaller than the critical value, the study fails to reject the null hypothesis of stationary. Therefore, the study concludes that the foreign exchange market is not weak form efficient.

4. RESULTS AND DISCUSSION

The results of the study are presented here.

Augmented Dickey-Fuller (ADF) Test

Table 1 reports on the results of the ADF test in the selected Asian foreign exchange markets. The results showed that the t -statistics of all the selected countries was greater than its critical value which led the failure to reject the null hypothesis. Thus, it is concluded that the selected Asian foreign exchange markets do have unit roots. The results confirmed that all the chosen countries were weak form efficient and their exchange rate were not predictable.

Table 1: Unit Root Tests: ADF

Foreign Exchange Market (Country)	Levels		
	t -statistics	Critical value	p -value (5%)
China	-0.6674	-3.4281	0.9736
South Korea	-2.4159	-3.4281	0.3704
Malaysia	-1.2673	-3.4281	0.8932
India	-1.5961	-3.4281	0.7921
Pakistan	0.5915	-3.4281	0.9995
Taiwan	-2.9654	-3.4281	0.1442
Thailand	-2.0155	-3.4281	0.5896
Indonesia	-2.2033	-3.4281	0.4852

Source: Author's estimation using Eviews.

Phillip Perron (PP) Test

Table 2 shows the outcomes of the PP test. Same as the ADF, PP test was conducted in trend and intercept at level. When comparing outcomes of the *t*-statistics value and the critical value, the study realised that the PP test had the same result as the ADF test. All the *t*-statistics were larger than their critical values thus, the study failed to reject the null hypothesis. Hence, it is proven again that unit roots were presented in the selected Asian foreign exchange markets. Therefore, the study concluded that these markets are weak form efficient and exchange rates of these countries were not predictable.

Table 2: Unit Root Tests: PP

Foreign Exchange Market (Country)	Levels		
	<i>t</i> -statistics	Critical value	<i>p</i> -value (5%)
China	-0.5450	-3.4281	0.9809
South Korea	-2.6155	-3.4281	0.2738
Malaysia	-1.4518	-3.4281	0.8832
India	-1.6057	-3.4281	0.7883
Pakistan	0.2230	-3.4281	0.9981
Taiwan	-3.244	-3.4281	0.0783
Thailand	-2.199	-3.4281	0.4876
Indonesia	-2.2764	-3.4281	0.4448

Source: Author's estimation using Eviews.

Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) Test

Table 3 documents the results of the KPSS test. The KPSS test is a different test compared to the ADF and PP tests. This test is used to determine whether the data is stationary or not stationary over time. If the KPSS statistics are lower than its critical value, the study fails to reject the null hypothesis and concludes that the data is not stationary. Thus, this correlates with the existence of unit roots (unpredictable systematic pattern). As can be seen in Table 3, the study reported that exchange rates of China, India, Malaysia, Pakistan, Thailand, South Korea and Indonesia were not stationary as the test statistics are larger than the critical value. On the other hand, the KPSS test statistics for New Taiwan Dollar was smaller than the critical value. Thus, the study failed to reject the stationary null hypothesis and revealed that the exchange rates of Taiwan were stationary. This leads the study to believe that the Taiwan exchange rate is predictable, and its foreign exchange market is indeed not weak form efficient.

Table 3: Unit Root Tests: KPSS test

Foreign Exchange Market (Country)	Levels	
	KPSS statistics	Critical value
China	0.3757	0.1460
South Korea	0.1479	0.1460
Malaysia	0.3947	0.1460

India	0.4189	0.1460
Pakistan	0.2577	0.1460
Taiwan	0.1256	0.1460
Thailand	0.3354	0.1460
Indonesia	0.3688	0.1460

Source: Author's estimation using Eviews.

Result Discussion

As indicated by the ADF and PP tests, our study demonstrated that all the foreign exchange markets of the selected countries were characterised by weak form efficiency. However, in the KPSS test, our study revealed that Taiwan market was stationary and thus was not weak form efficient. These results are in line with the study of Chiang et al. (2010) who revealed the weak form market efficiency in Japan and South Korea, however, such characteristics were not found in Taiwan. On the other hand, the results on Pakistan and India were consistent with the study conducted by Noman and Ahmed (2009), and Wickremasinghe and Kim (2008) where both countries were found to follow weak form market efficiency. However, the outcome of the study by Kumar (2011) contradicted our findings where he found that Indian foreign exchange market was not weak form efficient. In addition, the results of the Indonesian foreign exchange market contradicted with the study by Lyke (2019). Nonetheless, it is consistent with Putra et al. (2016) who documented efficient market in five ASEAN countries, namely Indonesia, Thailand, Malaysia, Singapore, and Philippines after the periods of global crisis.

The EMH suggests that if the prices in the market supports the random walk theory, i.e. weak form efficient, the uses of past price in predicting the future price is a waste of time as the past information is already reflected in the security price. In other words, it implies that one cannot obtain abnormal returns by taking advantage of searching for a security's historical values. However, the results of this study revealed that Taiwan was not weak form efficient. Findings of weak form inefficiency of the foreign exchange market lead to some important implications. Among others, an inefficient foreign exchange market may require the intervention of authority to identify the optima way to influence exchange rates, lower the volatility of the exchange rate and assess the effect of several economic policies (Mabakeng & Sheefeni, 2014). In addition, an inefficient foreign exchange market could potentially offer excess returns to their investors (Wickremasinghe, 2005).

5. CONCLUSION

This study empirically examined the weak form efficiency in eight selected Asian foreign exchange markets, namely China, South Korea, Malaysia, India, Pakistan, Taiwan, Thailand, and Indonesia. Augmented Dickey-Fuller (ADF) test, Phillips-Peron (PP) test and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test were used to investigate the weak form efficiency. The data used in this study was monthly data from January 2010 to September 2020. The results of ADF and PP tests show that all the selected countries were in fact weak form efficient. However, for KPSS test, all the selected foreign exchange markets were efficient in weak form except Taiwan. These findings have important implications to investors, fund managers and policy makers. However, this study is limited to eight selected Asian foreign exchange markets and employs the sample data from January 2010 to September 2020. Future researches may consider including more emerging countries and cover longer period of observations to generalise the results of the study. Finally, future research may include more advanced methodology such as the multifractal detrended fluctuation analysis that can

provide more precise explanation on the weak form market efficiency.

ACKNOWLEDGEMENT

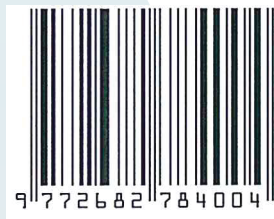
The authors would like to thank the reviewers for valuable comments and suggestions.

REFERENCES

- Aroskar, R., Sarkar, S. K., & Swanson, P. E. (2004). European foreign exchange market efficiency: Evidence based on crisis and noncrisis periods. *International Review of Financial Analysis*, 13(3), 333-347.
- Bouoiyour, J., Selmi, R., & Wohar, M. E. (2018). Are Islamic stock markets efficient? A multifractal detrended fluctuation analysis. *Finance Research Letters*, 26, 100-105.
- Chaudhuri, K., & Wu, Y. (2003). Random walk versus breaking trend in stock prices: Evidence from emerging markets. *Journal of Banking & Finance*, 27(4), 575-592.
- Chiang, S. M., Lee, Y. H., Su, H. M., & Tzou, Y. P. (2010). Efficiency tests of foreign exchange markets for four Asian countries. *Research in International Business and Finance*, 24(3), 284-294.
- Cooray, A., & Wickremasinghe, G. (2007). The efficiency of emerging stock markets: Empirical evidence from the South Asian region. *The Journal of Developing Areas*, 171-183.
- Fama, E. F. (1965). The Behavior of Stock Market Prices. *The Journal of Business*, 38 (1), 34-105.
- Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, 25, 383-417.
- Fawson, C., Glover, T. F., Fang, W., & Chang, T. (1996). The weak-form efficiency of the Taiwan share market. *Applied Economics Letters*, 3(10), 663-667.
- Fedorová, D. (2016). Selection of unit root test on the basis of length of the time series and value of ar (1) parameter. *Statistika*, 96(3), 3.
- Firoj, M., & Khanom, S. (2018). Efficient market hypothesis: Foreign exchange market of Bangladesh. *International Journal of Economics and Financial Issues*, 8(6), 99.
- Giannellis, Nikolaos, & Athanasios P. Papadopoulos. Testing for efficiency in selected developing foreign exchange markets: An equilibrium-based approach. *Economic Modelling*, 26.1 (2009): 155-166.
- Groenewold, N. (1997). "Share Market Efficiency: Tests Using Daily Data for Australia and New Zealand". *Applied Financial Economics*, 7, 645-657.
- Herranz, E. (2017). Unit root tests. *Wiley Interdisciplinary Reviews: Computational Statistics*, 9(3), e1396.
- Ibrahim, J., Long, Y., Ab Ghani, H., & Salleh, S. I. M. (2011). Weak-form efficiency of foreign exchange market in the organisation for economic cooperation and development countries: Unit root test. *International Journal of Business and Management*, 6(6), 55.
- lyke, B. N. (2019). A test of the efficiency of the foreign exchange market in Indonesia. *Buletin Ekonomi Moneter dan Perbankan*, 21, 439-464.

- Katusiime, L., Shamsuddin, A., & Agbola, F. W. (2015). Foreign exchange market efficiency and profitability of trading rules: Evidence from a developing country. *International Review of Economics & Finance*, 35, 315-332.
- Kharbanda, V., & Singh, A. (2018). Futures market efficiency and effectiveness of hedge in Indian currency market. *International Journal of Emerging Markets*.
- Kitamura, Y. (2017). Simple measures of market efficiency: A study in foreign exchange markets. *Japan and the World Economy*, 41, 1-16.
- Kumar, A. S. (2011). Testing for Weak Form of Market Efficiency in Indian Foreign Exchange Market. *IUP Journal of Monetary Economics*, 9(3).
- Kumar, A. S., & Kamaiah, B. (2016). Efficiency, non-linearity and chaos: evidences from BRICS foreign exchange markets. *Theoretical & Applied Economics*, 23(1).
- Mabakeng, M. E., & Sheefeni, J. P. S. (2014). Examining the weak form efficiency in foreign exchange market in Namibia. *International Review of Research in Emerging Markets and the Global Economy*, 1(4), 174-187.
- Meng, X., & Huang, C. H. (2019). The time-frequency co-movement of Asian effective exchange rates: A wavelet approach with daily data. *The North American Journal of Economics and Finance*, 48, 131-148.
- Mobarek, A., & Keasey, K. (2000, May). Weak-form market efficiency of an emerging Market: Evidence from Dhaka Stock Market of Bangladesh. In *ENBS Conference held on Oslo* (pp. 1-30).
- Noman, A. M., & Ahmed, M. U. (2009). Efficiency of the foreign exchange markets in South Asia. *Afro-Asian Journal of Finance and Accounting*, 1(4), 295-305.
- Putra, A. A., Lindawati, H., & Sari, S. F. (2016). Are The ASEAN-5 Foreign Exchange Markets Efficient? Evidence from Indonesia, Thailand, Malaysia, Singapore, and Philippines: Post-Global Economic Crisis 2008. *Indonesian Capital Market Review*, 8(2).
- Schwert, G. W. (1989). Why does stock market volatility change over time?. *The Journal of Finance*, 44(5), 1115-1153.
- Tang, C. F. (2008). A re-examination of the role of foreign direct investment and exports in Malaysia's economic growth: a time series analysis, 1970-2006. *International Journal of Management Studies (IJMS)*, 15, 47-67.
- Tiwari, A. K., & Kyophilavong, P. (2014). New evidence from the random walk hypothesis for BRICS stock indices: a wavelet unit root test approach. *Economic Modelling*, 43, 38-41.
- Tsuyuguchi, Y., & Wooldridge, P. D. (2008). The evolution of trading activity in Asian foreign exchange markets. *Emerging Markets Review*, 9(4), 231-246.
- Wickremasinghe, G. B. (2005). Efficiency of foreign exchange markets: a developing country perspective. *Asian Academy of Management Journal*, 10(1), 1-17.
- Wickremasinghe, G. B., & Kim, J. H. (2008). Weak-Form Efficiency of Foreign Exchange Markets of Developing Economies: Some Sri Lankan Evidence. *Journal of Emerging Market Finance*, 7(2), 169-196.

- Worthington, A. C., & Higgs, H. (2003). *Weak-form market efficiency in European emerging and developed stock markets* (Vol. 159). School of Economics and Finance, Queensland University of Technology.
- Yang, Y. H., Shao, Y. H., Shao, H. L., & Stanley, H. E. (2019). Revisiting the weak-form efficiency of the EUR/CHF exchange rate market: Evidence from episodes of different Swiss franc regimes. *Physica A: Statistical Mechanics and Its Applications*, 523, 734-746.



Cawangan Kedah
Kampus Sungai Petani

e-ISSN: 2682-7840

