Journal of Islamic Finance Vol. 11 No. 2 (2022) 20-33
IIUM Institute of Islamic Banking and Finance
ISSN 2289-2117 (O) / 2289-2109 (P)

Statistical Behaviours and Forecast of Cash Waqf Collection

Azniza Hartini Azrai Azaimi Ambrose[a*], Fadhilah Abdullah Asuhaimi[b]

[a,b] *Kulliyyah of Economics and Management Sciences, International Islamic University Malaysia*

**Corresponding author: azniza_azrai@iium.edu.my*

Abstract

The main purpose of this research is to elucidate the efficacy of statistical measurements on cash waqf collection. To demonstrate this, the sub-objectives of this study are (1) to examine the statistical behaviours of cash waqf and (2) to ascertain future cash waqf collection trend. Numerical measures were used to describe statistical behaviours of cash waqf while Box-Jenkins methodology was employed for forecasting. Cash waqf data of State Islamic Religious Council (SIRC) of Pulau Pinang and Perbadanan Wakaf Selangor (PWS) had been collected to address these sub-objectives. During the period of study, it was found that cash waqf collected by SIRC of Pulau Pinang was more predictable than PWS even though PWS collected higher value on average. As such, the statistical measurements had identified different cash waqf management strengths. This is hoped to encourage cross-sharing exercises between SIRCs so cash waqf management can continuously be improved. Furthermore, the tentative sum of cash waqf collection forecasted using time series forecasting shows that cash waqf managers can make informed decision for the beneficiaries' best interest. The usefulness of statistical measurements elucidated above is hoped to convince cash waqf managers to make cash waqf data readily accessible. This paper fills the gap in the literature of cash waqf collection statistics which is extremely limited. This paper is expected to be an impetus for future studies on advanced cash waqf statistics that could add relevance of waqf to the modern economy.

Keywords: *Cash waqf, Waqf, Time series econometrics, Numerical measures, Univariate analysis*

1. Introduction

At present, the endowment of cash waqf is well-established in Malaysia. All the State Islamic Religious Council (SIRC) or Majlis Agama Islam Negeri (MAIN) in Peninsular Malaysia accept cash as waqf, while in West Malaysia, only the SIRC of Sarawak recognizes it. Since the first inception of cash waqf endowment by the SIRC of Johor in the 1980s, the accumulated cash waqf collection for most Malaysian states, if not all, have reached a substantial sum. As such, a rise in the waqf literature is observed as there is a boost in the development and aid provided by cash waqf. Concurrently, the Shariah rulings concerning all facets of cash waqf had been debated and its sustainability mechanism was suggested.

Yet, minimal studies have examined the statistical behaviour of cash waqf collection. The limited research on this subject is attributed to the unavailability of consolidated cash waqf data from all states. Each SIRC can be approached for the data, but very few SIRCs enabled the data to be easily accessible to the public. In turn, there are lack of studies in the statistical mechanism of cash waqf although meaningful information may be discovered. Examining the cash waqf collection pattern may aid the mutawalli (cash waqf manager) to understand the performance, forecast future collection, and make effective risk management decision regarding cash waqf. The mutawalli may be able to plan a specific waqf development project, provide certain cash waqf collection projection, and then target suitable beneficiaries. Thus, findings from statistical analysis encourage efficient and effective utilization of the cash waqf.

To expound the usefulness of statistical analysis on cash waqf, this paper has formulated two research objectives (RO); (1) to analyse the statistical behaviours of cash waqf collection and, (2) to forecast on future cash waqf collection trend. To this end, cash waqf collected by the SIRC of Pulau Pinang and Perbadanan

Article history
Received: 1 October 2022
Accepted: 30 December 2022

Wakaf Selangor (PWS) were chosen. This paper is organized into five different sections. Section 1 is the introduction section. Section 2 until Section 4 review the literature of cash waqf. The literature review sections not only identify literature gaps but also provide the theoretical background on the study of cash waqf. Section 5 elaborates on the methodology applied in this paper while Section 6 provides the result and analysis. Lastly, Section 7 concludes this study.

2. The Background of Cash Waqf

Cash waqf can be literally defined as waqf existed using cash money (Mannan, 2005; Abdel Mohsin, 2009). The return received is used for noble purposes with the intention of seeking Allah's pleasure. Basically, the value of cash waqf should remain intact and cash waqf should be invested to generate return and grow the capital (Razali, 2015). This definition is also in line with the opinions of Algunduz (2009) and Nazir and Hasanuddin (2004) where cash waqf, similarly known as waqf money and *waqf an-nuqud*, requires the capital to remain intact with the intention of seeking Allah's blessing. Meanwhile, Çizakça (1995) defined cash waqf by focusing on the aim of the fund which is for giving services to human in the name of Allah. In another article, Çizakça (2000) emphasized that cash waqf is a specific waqf which is different from other real waqf in that the actual value is in the form of cash (*asl al-mal* or corpus). Considering all these definitions, cash waqf is a specific waqf in the form of cash that needs to be invested so that the principal may remain intact, and return can be obtained. The return is then used for the service of humanity to gain Allah's pleasure.

The first implemented cash waqf in history was traced in 1423 in Erdine, Turkey, during the Uthmaniyyah Empire (Mandaville, 1979). However, between 1545 and 1547, a debate on the validity of cash waqf (also in the form or gold, silver, dinar, and dirham) had occurred. Traditionally, waqf assets were in the form of fixed assets and immovable assets (*al-'iqar*). Plus, numerous scholars agreed that the main rule of waqf asset is that it must physically remain intact (Abu-Zahrah, 2007). In contrast, cash waqf is a movable asset and does not physically remain intact. This further led to another issue where cash waqf could not give continuous benefits since money would destroy and vanish over time. This is best explained by the concept of Time Value of Money (TVM) where a dollar today is worth more than a dollar tomorrow, thus diminishing the capital of cash waqf as time passes by. Yet by 1560, the debate was deemed settled, at least during the Uthmaniyyah Empire, as cash waqf became a common practice and was the main form of endowment (Mandaville, 1979).

Yet, one prominent issue of the Uthmaniyyah cash waqf serves as a warning to the present implementation of cash waqf, namely, *istiglal* (economic interest) (Çizakça, 1995). Razali (2015) had explained this mechanism clearly. The borrower of cash waqf is required to put up his or her house as collateral to the lender. In turn, the lender will rent the house back to the borrower at a price above the amount of cash waqf borrowed. As such, *istiglal* is accused to be a back door to *riba* (usury). The reason for the adoption of *istiglal* is simple; the preservation of cash waqf capital and as a mean to gain guaranteed return. This inadvertently shows that the implementation of *istiglal* ranks the preservation and usufruct of cash waqf capital to be above of other severe Shariah issues like *riba*.

3. The Shariah Rulings of Cash Waqf

In general, the issue of cash waqf validity has been addressed in Malaysia. The National Fatwa Council Islamic Affairs of Malaysia had come up with a *fatwa* that permits the practice of cash waqf in 2007 (Ambrose, 2018). Yet, to guarantee that the principal of cash waqf remains intact and be able to provide usufruct, not to mention avoidance of Shariah issues like *riba*, other scholars and religious authorities have also come up with *fatwas* (Islamic rulings) on cash waqf. In fact, one of the *fatwas* exceeded expectation by incorporating sustainable solutions from both conventional and Islamic finance.

For instance, the *pondok* (traditional Islamic school) scholars in Acheh deem that the operationalization of cash waqf is only allowed through the mechanism of *istibdal* (the exchange of cash waqf with immovable asset(s)) (Mauluddin and Rahman, 2018). The scholars justify the fatwa based on the practice of Prophet Muhammad (ﷺ) that did not endow fiat money as waqf, vulnerability of cash waqf to exchange rates, the inability of cash waqf to retain its original form after being spent, and the attributes of cash itself where it is a mere store of value not an asset. Razali (2015) echoed most of these points by arguing that fiat money endowed as waqf will threaten the *Maqasid* (Objective) of waqf. Meanwhile, Ambrose and Asuhaimi (2021) had even attempted to address the issue of cash waqf perpetuity vis a vis the risk of capital depletion.

The International Council of Fiqh Academy in its Resolution No. 140 (15/6) made compulsory for waqf assets,

whether movable or immovable, to be invested (Mohsin, 2014). The return from waqf investment is not constituted as the corpus of waqf. The Resolution put the conditions for investment as follows (Mohsin, 2014):

- Must be Shariah-compliant.
- Risk should be minimized where an investment strategy like diversification should be considered. In addition, other risk mitigation measures such as feasibility studies and obtaining surety should be undertaken.
- High-risk investments should be avoided.
- Investment chosen must be suitable to the corpus of waqf and protects the waqf and beneficiary rights.
- The investment activities must be transparent.

Note that cash waqf is categorized under movable assets and thus applicable to this Resolution. As such, with this multi-faceted view put forward by the International Council of Fiqh Academy, it is natural to gauge and forecast the performance of cash waqf collection. Hopefully, these endeavours can assist in selecting a proper future investment method and benefit a wider pool of beneficiaries. Furthermore, gauging the performance of cash waqf collection will garner more confidence and professionality in the management of cash waqf.

In the matter involving figures, statistics are often employed. Yet, minimal studies have extensively researched on cash waqf statistics. Based on our limited knowledge, only two studies in the literature have studied cash waqf statistics which are Ambrose et al. (2019) and Marzuki (2012). However, these studies are mostly futuristic in nature and based on assumptions i.e., real cash waqf data were not employed. To be specific, Marzuki (2012) had simulated the implication towards government savings on the assumption that one Malaysian Ringgit (RM) is given out as waqf. Meanwhile, Ambrose et al. (2019) had used unit trust return as proxy of return on cash waqf investment. Thus, this study enriches the literature by employing real cash waqf data that will not only assess the performance of cash waqf, but also perform projections of cash waqf using statistical measures.

4. The Implementation of Cash Waqf

Despite the differences in opinion regarding the operationalization of cash waqf, numerous cash waqf initiatives have been presently introduced globally. In Bangladesh, Social Investment Bank Limited (SIBL) was the first financial institution in the world that had introduced a cash waqf product on 22nd November 1995 (Hishamuddin, 2006). Overall, the product generates 10.7 percent profit every year which is used to fund three main activities of social development. The three activities are family reinforcement, health, and social services (Hasan, 2007). In Indonesia, Dompet Dhuafa Republika introduced cash waqf investment through the development of Tabung Wakaf Indonesia (Indonesia Waqf Fund) to raise fund for several programs such as funding poverty elimination, healthcare service, education service, and entrepreneur development program (Razali, 2015).

In Malaysia, there is a trend of cash waqf being used to finance and develop waqf properties. According to Razali (2001), waqf in Malaysia is seen as an institution that does not have potential in developing socioeconomics. Razali (2001) revealed that from 11, 196 acres of waqf land, 79.6 percent or 8196 acres are dedicated for graveyards, mosques, and Islamic schools. In 1992, revenue received from those lands was RM 5 556 467.20 while administration cost was RM 5 903 648.91 which is much higher by RM 347 181.71. As recorded in Ghazali et al. (2021), 11,000 hectares of waqf land in the country has potential for development but only eight projects were managed to be completed recently. For institutions that have the financial capacity like banks, capital agencies, and private companies, interest in financing waqf development project are none as there are restrictions from legal and religious perspectives.

As such, cash waqf is viewed as an effective solution to address this problem. The first cash waqf scheme that was termed as waqf shares was introduced by Majlis Agama Islam Johor (MAIJ) in 1983 (Abdul Hamid and Mohammad, 2014). Waqf shares refer to a type of cash waqf since it comprises of cash or money (Razali, 2015). Waqf shares were introduced to raise funds to finance waqf development projects and it was an idea of the then Mufti of the State of Johor, Dato' Ahmad bin Awang (Abdul Hamid and Mohammad, 2014). The waqf shares contributors consist of individuals and corporate bodies. From the waqf shares collection, development of new properties for commercial and educational purposes was conducted such as two waqf buildings, one in Pontian and another one in Tampoi (Abdul Hamid and Mohammad, 2014). In 2006, MAIJ bought a property

in Egypt which is a six-storey apartment building converted into a hostel for Malaysian students using waqf shares collection (Abdul Hamid and Mohammad, 2014). Not only MAIJ, other MAIN have also introduced cash waqf scheme including Majlis Agama Islam Selangor (MAIS), Majlis Agama Islam Melaka (MAIM), Majlis Agama Islam Pulau Pinang (MAINPP), Majlis Agama Islam Pahang (MAIP), Majlis Agama Islam Negeri Sembilan (MAINS), Majlis Agama Islam Kedah (MAIK), Majlis Agama Islam Terengganu (MAIDAM), Majlis Agama Islam Pahang (MUIP), Majlis Agama Islam Perlis (MAIPs), and Majlis Agama Islam Kelantan (MAIKN) (Razali, 2015; Farhana and Asmak, 2017).

In Selangor, MAIS had introduced cash waqf in 2001 (Fadhilah, 2017). Subsequently, MAIS developed a corporate body to focus on waqf, namely PWS. Up until now, it has received positive responses from public and corporate bodies. In 2011, the collection was RM 1,438,910.43 and a sharp rise of 90% recorded in 2018 with a total collection of RM 9 million. About RM 1 million of the cash waqf collected was used and distributed to a total of 43 mosques and schools around Selangor (PWS, 2020). On the other hand, MAINPP had introduced cash waqf since 2014 and collected about RM 1,094,462.91; and in 2018, the amount had doubled to RM 2,010,761.00 (MAINPP, 2020). Presently, MAINPP used cash waqf collection to buy properties such as building and land for MAINPP which intends to convert cash waqf into a permanent asset.

The significant cash waqf collection, its wide implementation, and welfare provision elucidate that cash waqf has strongly assisted the field of socioeconomics. It further lends support to the fact that cash waqf is not an anachronistic instrument and should be managed professionally. This way, the conduct of cash waqf will not only be ethical but can further coalesce with the present economy that is transparent and forward-looking. Specific to the topic of this paper, professional management should include periodic analysis of cash waqf collection amount and its future projection. This paper delivers a basic statistical analysis of how cash waqf managers can do just that.

5. Methodology

The research employed a quantitative method where secondary data were collected and analyzed using numerical measurements and time series econometrics; specifically, Box-Jenkins (BJ) methodology. These analyses are loosely based on the Probability Theory namely the mathematical study of random phenomena (Siegmund, n.d.). This theory fits with this study of cash waqf collection for its collection amount is random. Numerical measures of analysis were used to answer the first RO while time series econometrics were used to answer the second RO. The proceeding subsections explain the methodology in detail.

5.1 Data collection

The cash *waqf* data were collected from PWS and MAINPP using purposive sampling. These Malaysian states are amongst the very few where a selected set of cash waqf data is made accessible upon request. The data collections were from January 2015 until December 2018 with a total of 48 observations and both are thus, in time-series form and embody stochastic process. The data were augmented using the logarithm function of base 10 to work with smaller values.

5.2 Data analysis techniques

Two data analysis techniques were applied which were numerical measurements and BJ methodology or autoregressive integrated moving average (ARIMA) modelling. The numerical measurements technique was performed using the Analysis Toolpak add-in in Microsoft Excel while the ARIMA modelling was done using EViews.

5.2.1 Numerical measurements

Numerical measurements refer to a list of descriptive statistics to describe data (Groebner et al., 2011). Although rudimentary, numerical measurements can help point out unique and useful cash waqf statistical behaviour. The measures include minimum value, maximum value, sum, count, measures of centre and location (mean, median), and measures of variation (standard deviation, standard error, range). The following formulas explain the less obvious meanings of measures of centre and location as well as measures of variation:

$$\bar{C} = \frac{\sum_{i=1}^{n} C_i}{n} \qquad (1.0)$$

where $\bar{C}$ is the mean of cash *waqf*, C_i is the cash *waqf* value at point *i*, and n is the cash *waqf* sample size.

$$z = \frac{1}{2}n \quad (1.2)$$

where z is the point in the cash *waqf* data set corresponding to the median value.

$$Standard\ deviation, \sigma = \sqrt{\frac{\sum_{i=1}^{n}(C_i - \bar{C})^2}{n-1}} \quad (1.3)$$

$$Standard\ error, SE = \frac{\sigma}{\sqrt{n}} \quad (1.4)$$

$$Range, R = Maximum\ Value - Minimum\ Value \quad (1.5)$$

5.2.2 BJ methodology

The collected time series data were also tested for stationarity using the Augmented Dickey-Fuller (ADF) test, a type of unit root test, before forecasting was performed using BJ methodology. Test for stationarity is important to prepare the cash waqf data for forecasting. Basically, a series that does not have a unit root is stationary. A stationary stochastic process occurs when "its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed" (Gujarati and Porter, 2009: p.740). Thus, the data can be used to predict future cash waqf collection only when a time series data is stationary.

Figure 1 displays that the cash waqf data of PWS is weakly stationary or nonstationary. The trend line suggests that the mean and variance have slight deviations. On the other hand, the trend line in Figure 2 seems to indicate that the cash waqf data of MAINPP is stationary. Yet, the ADF test must be performed to obtain accurate results.

Figure 1: Cash waqf collection trend of PWS

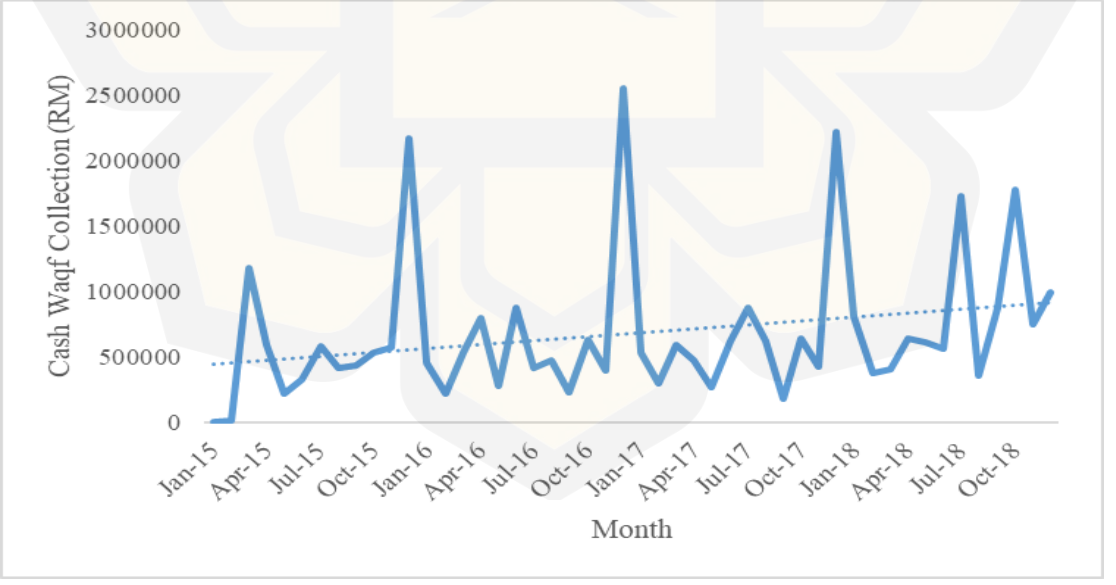
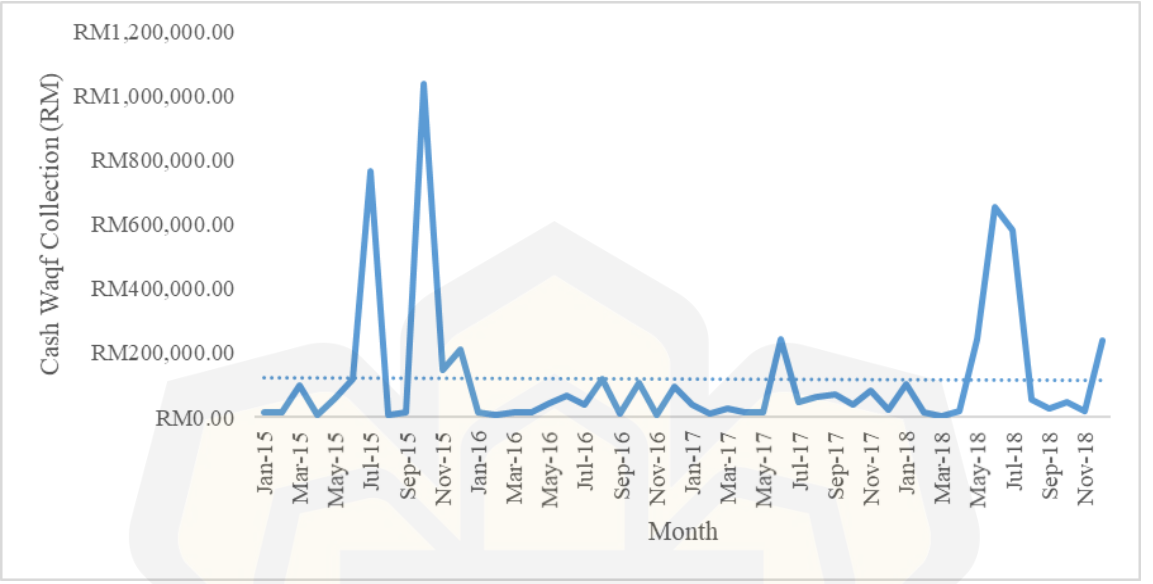


Figure 2: Cash waqf collection trend of MAINPP



The ADF tests involve the estimation of:

$$\Delta C_t = \beta_1 + \beta_2 t + \delta C_{t-1} + \sum_{i=1}^{n} \alpha_i \Delta C_{t-i} + \varepsilon_t \qquad (1.6)$$

where $\Delta C_{t-1} = C_{t-1} - C_{t-2}$, $\Delta C_{t-2} = C_{t-2} - C_{t-3}$, and ε_t is a pure white noise error term. The connotation C_t simply refers to the amount of cash *waqf* collected at time *t*. Meanwhile, β_1, β_2 and δ are simply coefficients or parameters of the model. The corresponding hypotheses are:

H_0: If $\delta = 0$, the cash *waqf* time series data are nonstationary

H_1: If $\delta < 0$, the cash *waqf* time series data are stationary

If the cash *waqf* time series data are nonstationary, the data will be transformed to be stationary using difference-stationary processes. Basically, the difference-stationary process requires taking the first difference of the cash *waqf* time series i.e., $\Delta C_t = C_t - C_{t-1}$.

After testing for stationarity, the BJ methodology was performed on the cash *waqf* data. This was done to forecast the collection of cash *waqf* for PWS and MAINPP. As elucidated in Gujarati and Porter (2009), ARIMA modelling involves the following steps:

1. Model identification using correlogram. To make it simple and useful for the forecast, the model should be parsimonious since a parsimonious model contains the least number of variables.
2. Parameter estimation of the determined model.
3. Diagnostic checking i.e., estimation of residuals. If the residual is white noise, then the ARIMA may be accepted, and forecasting is established. If the residual is not white noise, the steps should be repeated from the beginning.

6. Analysis and Findings

This section is further divided into two to ensure an organized discussion of the findings. The first section presents the findings of the numerical measurements while the second section presents the findings of the BJ methodology.

6.1 Numerical measurements result

Table 1 compares the values of numerical measurements between PWS and MAINPP. It demonstrates that PWS collects a higher cash waqf amount of RM32,583,550.21, almost six times more than MAINPP in the period studied. Further insight can be observed in Table 1.

Table 1: Numerical Measurements of Cash *Waqf* Collection by PWS and MAINPP

Descriptive Statistics	Value of PWS	Value of MAINPP
Mean	678823.96	119336.78
Standard Error	79005.77	30549.77
Median	549440.46	42851.96
Standard Deviation	547368.053	211654.99
Sample Variance	2.99612E+11	44797833195
Kurtosis	3.849179034	9.131917026
Skewness	1.99	2.997987248
Range	2537331.03	1036458.71
Minimum	11000	3267
Maximum	2548331.03	1039725.71
Sum	32,583,550.21	5,728,165.38

Between 2015 and 2018, the *mutawalli* (trustee) may surmise that PWS has collected an average of RM549,440.46. The value of skewness explains why the median value is used as a proxy for the average value in place of the mean. The skewness value of +1.99 which is positive and more than +1 suggests that the data set is heavily skewed to the right. As opposed to mean, the median measure is less affected by extreme values and thus it is a better proxy for the average value of cash waqf collection. Concurrently, the average value collected by MAINPP is also best represented by the median, which is RM42,851.96. As such, MAINPP can benefit from this information by determining the strategies adopted by PWS to acquire high cash waqf collection amount. The identification would enable MAINPP to adopt the same strategies and deliver more aid to the beneficiaries in Pulau Pinang.

Table 1 also shows that the standard error, standard deviation, sample variance, and the range of PWS are higher than MAINPP. However, the measures of variation give a different meaning. The higher values show that the cash waqf data set is very spread out from one point of time to another. This means that the cash waqf collection of PWS is more erratic and uncertain than MAINPP. In other words, although PWS collects higher cash waqf on average than MAINPP, its collection amount is also less predictable. Thus, it will be harder for PWS to estimate future cash waqf collection amount and ascertain appropriate future waqf projects for the beneficiaries' benefit. In this case, PWS can analyse MAINPP's management strategies to identify the key factor behind consistent cash waqf collection amount.

Table 1 shows the minimum and maximum amount collected by both institutions. The data ranks reveal that the maximum amount collected by PWS is on December 2016 and October 2015 for MAINPP while the minimum amount collected by PWS is on January 2015 and March 2018 for MAINPP. It is useful to determine the reasons why the maximum and minimum collection amount occurred in this period. A good understanding of the reason and adjusting to it for each period would enable the *mutawallis* to have a higher chance in increasing future cash waqf collection amount.

Determining the exact reason behind these numerical measurements result is outside the scope of this paper. It is worth stressing that this paper aims to expound the benefits of conducting statistical analysis on cash waqf and is not a case study of a particular MAIN. Hence, identifying the statistical behaviours of cash waqf collection is sufficient for this paper.

6.2 BJ methodology result

To explicate further on the matter of cash waqf estimation, Table 2 presents the unit root test result of the cash waqf data from PWS and MAINPP. The estimated tau statistic (τ-statistic) for PWS and MAINPP are 6.437854 and 5.824356 in absolute terms. Since the estimated τ-statistic is larger than all the critical values in absolute terms, H_0 can be rejected. Both cash waqf time series data are stationary and thus, may be extended for forecasting using the BJ Methodology.

Table 2: Summary of unit root test via ADF Test

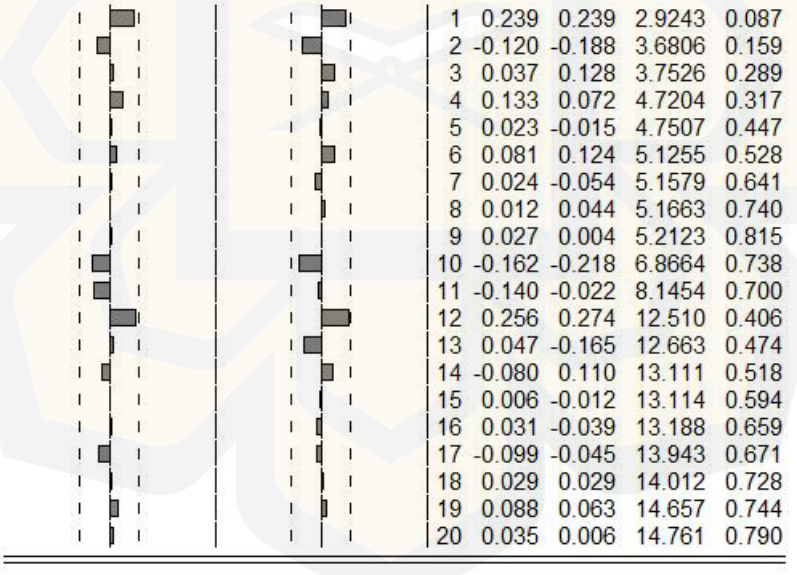
Cash *waqf* data	t-statistic
PWS	-6.437854***
MAINPP	-5.824356***

Notes: ***indicates significance at the 1% level

The first step in BJ methodology is model identification. This can be conducted using a correlogram i.e., by plotting the autocorrelation function and partial autocorrelation function of PWS and MAINPP against the lag length. For this research, the lag length was 20; i.e., the optimal lag length chosen automatically by the Schwarz criterion. Figure 3 and Figure 4 demonstrate the correlogram of PWS and MAINPP, respectively. Both figures show that the ACF and PCF have similar patterns. In conjunction with Gujarati and Porter (2009), these similar patterns suggest that the cash waqf collection of PWS and MAINPP is an ARMA model. The lags in both figures are within the 95 percent confidence bounds, thus, none of the lags are statistically significant. This concludes that both time series are modelled as zero-order autoregressive moving average or ARMA (0,0). Both cash waqf series are demonstrated as white noise which required no further improvements to be made on the data (Zhang, 2018). White noise is purely random time series where its data are uncorrelated with zero mean and constant variance (Gujarati and Porter, 2009). Hence, using a simple least square regression method is sufficient to complete the second step of parameter estimation.

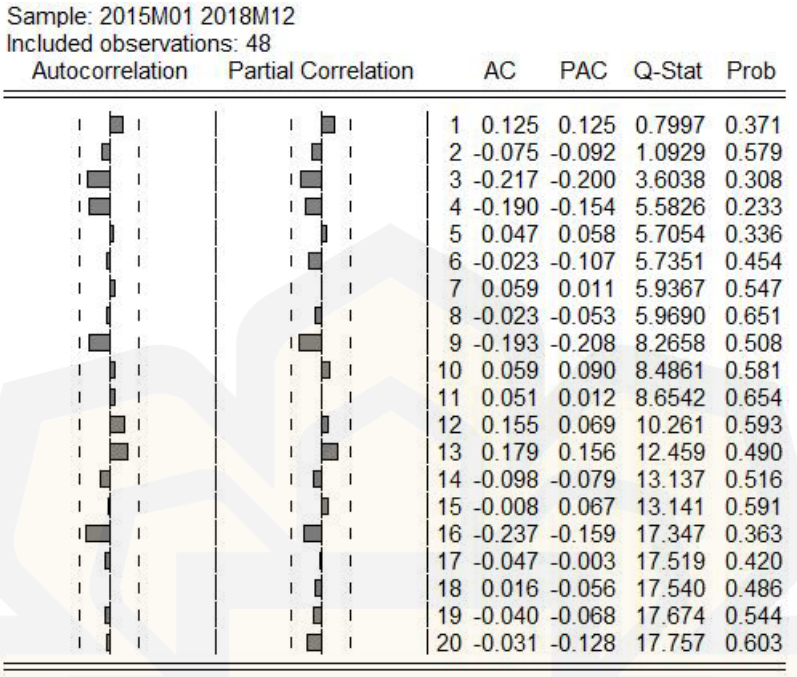
Figure 3: Correlogram of PWS

Sample: 2015M01 2018M12
Included observations: 48



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.239	0.239	2.9243	0.087
		2	-0.120	-0.188	3.6806	0.159
		3	0.037	0.128	3.7526	0.289
		4	0.133	0.072	4.7204	0.317
		5	0.023	-0.015	4.7507	0.447
		6	0.081	0.124	5.1255	0.528
		7	0.024	-0.054	5.1579	0.641
		8	0.012	0.044	5.1663	0.740
		9	0.027	0.004	5.2123	0.815
		10	-0.162	-0.218	6.8664	0.738
		11	-0.140	-0.022	8.1454	0.700
		12	0.256	0.274	12.510	0.406
		13	0.047	-0.165	12.663	0.474
		14	-0.080	0.110	13.111	0.518
		15	0.006	-0.012	13.114	0.594
		16	0.031	-0.039	13.188	0.659
		17	-0.099	-0.045	13.943	0.671
		18	0.029	0.029	14.012	0.728
		19	0.088	0.063	14.657	0.744
		20	0.035	0.006	14.761	0.790

Figure 4: Correlogram of MAINPP



	AC	PAC	Q-Stat	Prob
1	0.125	0.125	0.7997	0.371
2	-0.075	-0.092	1.0929	0.579
3	-0.217	-0.200	3.6038	0.308
4	-0.190	-0.154	5.5826	0.233
5	0.047	0.058	5.7054	0.336
6	-0.023	-0.107	5.7351	0.454
7	0.059	0.011	5.9367	0.547
8	-0.023	-0.053	5.9690	0.651
9	-0.193	-0.208	8.2658	0.508
10	0.059	0.090	8.4861	0.581
11	0.051	0.012	8.6542	0.654
12	0.155	0.069	10.261	0.593
13	0.179	0.156	12.459	0.490
14	-0.098	-0.079	13.137	0.516
15	-0.008	0.067	13.141	0.591
16	-0.237	-0.159	17.347	0.363
17	-0.047	-0.003	17.519	0.420
18	0.016	-0.056	17.540	0.486
19	-0.040	-0.068	17.674	0.544
20	-0.031	-0.128	17.757	0.603

Table 3 and Figure 5 show the results of the least squares regression for cash waqf data of PWS and estimation of its residuals, respectively. The coefficients of the model were statistically significant (refer Table 4) and the adjusted R-squared was positive. Finally, the estimation of residuals shows that the model was white noise. Thus, the forecast for PWS cash waqf was established using this equation:

$$\log S_t = 0.24 \log S_{t-1} + 4.34 \quad (1.7)$$

where $\log S_t$ is the natural logarithm of PWS cash waqf collection at period t. Hence, the *mutawalli* of PWS can estimate for instance, the cash waqf data collection for May 2021 by inserting the cash waqf collection of April 2021 in Equation (1.7).

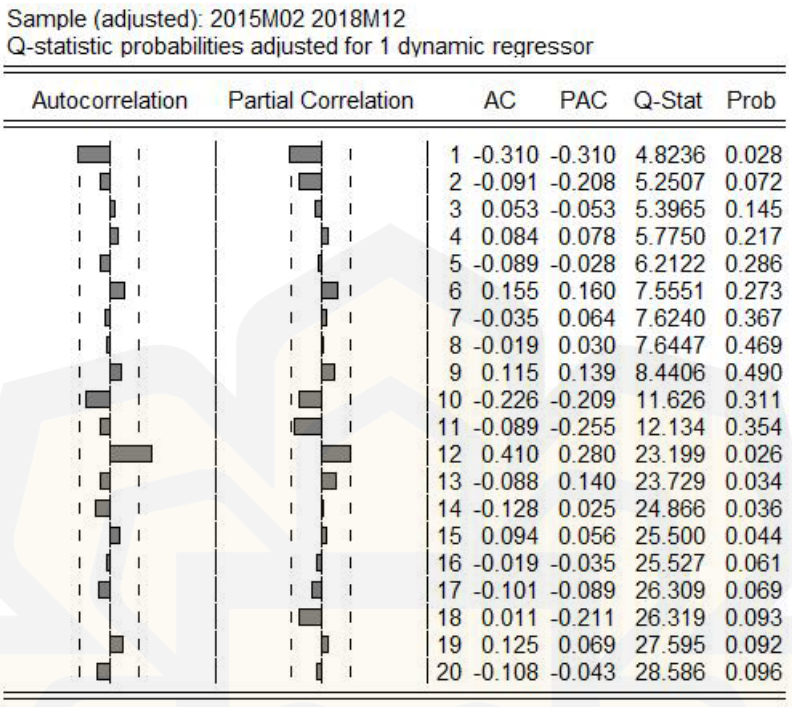
Table 3: PWS cash waqf model summary

R^2	Adjusted R^2	Standard error of regression
0.086909	0.066618	0.341086

Table 4: PWS cash waqf model parameter estimation summary

Parameter	Coefficient estimate	t-statistic	Probability
Constant, C	4.343772	6.482154	0.0000
log P_{t-1}	0.243267	2.069581	0.0443

Figure 5: Estimation of residuals for PWS cash waqf model

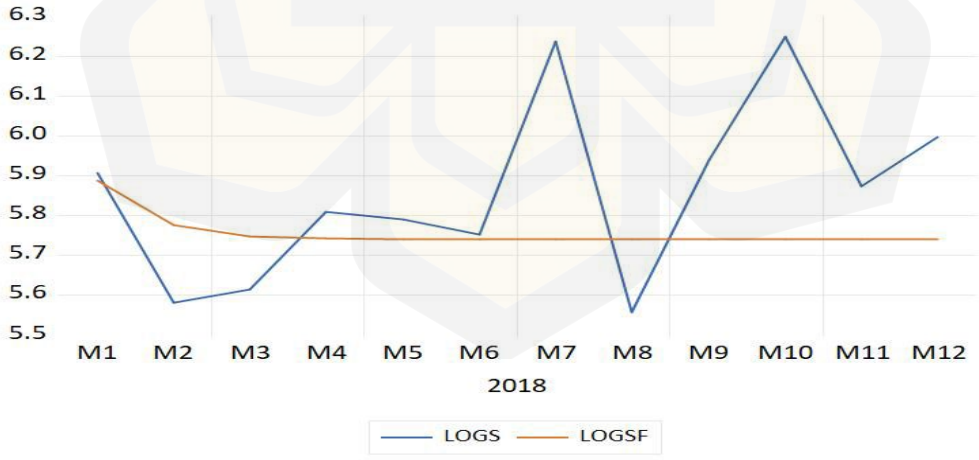


Sample (adjusted): 2015M02 2018M12
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.310	-0.310	4.8236	0.028
		2	-0.091	-0.208	5.2507	0.072
		3	0.053	-0.053	5.3965	0.145
		4	0.084	0.078	5.7750	0.217
		5	-0.089	-0.028	6.2122	0.286
		6	0.155	0.160	7.5551	0.273
		7	-0.035	0.064	7.6240	0.367
		8	-0.019	0.030	7.6447	0.469
		9	0.115	0.139	8.4406	0.490
		10	-0.226	-0.209	11.626	0.311
		11	-0.089	-0.255	12.134	0.354
		12	0.410	0.280	23.199	0.026
		13	-0.088	0.140	23.729	0.034
		14	-0.128	0.025	24.866	0.036
		15	0.094	0.056	25.500	0.044
		16	-0.019	-0.035	25.527	0.061
		17	-0.101	-0.089	26.309	0.069
		18	0.011	-0.211	26.319	0.093
		19	0.125	0.069	27.595	0.092
		20	-0.108	-0.043	28.586	0.096

The points of the PWS cash waqf model (LOGSF) were plotted against the raw data (LOGS) for January 2018 until December 2018 to demonstrate the forecasting power of Equation (1.7). Figure 6 demonstrates that a total of four points had intersected while another point almost intersected. This indicates that Equation (1.7) has successfully predicted cash waqf collection amount of PWS in certain periods.

Figure 6: The forecasted PWS cash waqf model vs raw data



Regarding cash waqf collection by MAINPP, the summary results of its least squares regression are depicted in Table 5. In Model I, the adjusted R-squared was negative suggesting that the dependent variable was not explained by the independent variables, $\log P_{t-1}$ and C. The parameters need to be further estimated while the parsimonious model fitting must hold simultaneously. Thus, Model II was estimated by including the

least number of independent variables to obtain positive adjusted R-squared. Yet, the Akaike info criterion (AIC) and the Schwarz criterion (SC) were larger than the earlier model. AIC and SC were used as criteria to select between two competing models (Gujarati and Porter, 2009). Interestingly, Model II (refer Table 6) shows that $\log P_{t-3}$ was the most significant variable as its probability was the lowest after C.

Table 2: MAINPP cash waqf models summary

Model	R^2	Adjusted R^2	Standard error of regression	AIC	SC
I	0.016498	-0.05358	0.598657	1.853366	1.932095
II	0.108239	0.016777	0.595167	1.906697	2.109445
III	0.050666	0.028588	0.594400	1.840898	1.921194

Table 6: MAINPP cash waqf models parameter estimation summary

	Parameter	Coefficient estimate	t-statistic	Probability
Model I	Constant, C	4.059320	5.814358	0.0000
	$\log P_{t-1}$	0.129808	0.868829	0.3896
Model II	Constant, C	6.271557	4.452788	0.0001
	$\log P_{t-1}$	0.112039	0.714845	0.4790
	$\log P_{t-2}$	-0.096808	-0.624222	0.5361
	$\log P_{t-3}$	-0.204793	-1.333125	0.1902
	$\log P_{t-4}$	-0.152033	-0.981811	0.3322
Model III	Constant, C	5.712361	8.199342	0.0000
	$\log P_{t-3}$	-0.225490	-1.514895	0.1371

By regressing the dependent variable to $\log P_{t-3}$, Model III shows that the AIC and SC became lower than MAINPP Cash Waqf Model I and MAINPP Cash Waqf Model II (refer Table 5). The adjusted R-squared had a larger positive number and the model was parsimonious. In addition, the diagnostic checks depicted in Figure 7 prove that MAINPP Cash Waqf Model III was white noise and Figure 8 shows the forecast performance. As such, the forecast for MAINPP cash waqf was established using this equation:

$$\log P_t = -0.23 \log P_{t-3} + 5.71 \quad (1.8)$$

where $\log P_t$ is the natural logarithm of MAINPP cash waqf collection at period t. Hence, the *mutawalli* of MAINPP can estimate, for instance, the cash waqf data collection for May 2021 by inserting the cash waqf collection of February 2021 in Equation (1.8).

Figure 7: Estimation of residuals for MAINPP cash waqf Model III

Sample (adjusted): 2015M04 2018M12
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.093	0.093	0.4146	0.520
		2	-0.058	-0.067	0.5810	0.748
		3	-0.052	-0.041	0.7180	0.869
		4	-0.175	-0.172	2.2991	0.681
		5	0.099	0.131	2.8138	0.729
		6	-0.116	-0.174	3.5446	0.738
		7	-0.037	0.000	3.6224	0.822
		8	0.031	-0.012	3.6784	0.885
		9	-0.146	-0.130	4.9322	0.840
		10	0.154	0.138	6.3717	0.783
		11	0.052	0.016	6.5396	0.835
		12	0.120	0.132	7.4572	0.826
		13	0.149	0.085	8.9312	0.778
		14	-0.142	-0.072	10.298	0.740
		15	0.015	0.023	10.313	0.800
		16	-0.240	-0.229	14.505	0.561
		17	-0.095	-0.002	15.187	0.582
		18	0.030	-0.069	15.257	0.644
		19	-0.138	-0.077	16.804	0.603
		20	-0.008	-0.107	16.810	0.665

Figure 8: The Forecasted MAINPP Cash Waqf Model III vs Raw Data

5. Conclusion

In the period under study, cash waqf collected by MAINPP was more consistent than PWS although PWS collected higher value on average. Mathematical models that can forecast cash waqf collection were also illustrated. These results that were obtained from statistical measurement have important implications not only to MAINPP and PWS, but other SIRCs too.

Firstly, it is hoped that these results will ignite cash waqf management sharing exercises between SIRCs; in particular, on the strategy to obtain consistent and higher cash waqf collection. This cross-learning exercise may increase the effectiveness of cash waqf management of all SIRCs which will eventually profit a wider pool of beneficiaries. Secondly, the *mutawallis* of all SIRCs can individually employ time series forecasting

on the complete cash waqf dataset to estimate the sum of future cash waqf collection. Coincidentally, *mutawallis* can adapt and strategize on future cash waqf projects and cash waqf investment. Thirdly, the authors hope that the usefulness of time series analysis that this study demonstrated may nudge *mutawallis* to make available cash waqf collection data to researchers. This can help proliferate future studies on advanced cash waqf statistics. In this regard, the SIRCs can charge a fee to researchers which can be channelled to the cash waqf fund.

This research is not without limitations. Firstly, only two SIRCs were considered in this study out of the fourteen SIRCs (including Federal Territories) in Malaysia. Secondly, the cash waqf data obtained were not recent and robust. Despite these, the main objectives of this research which were to expound the virtues of cash waqf statistical analysis were attained. Thirdly, the statistical techniques employed in this study were quite basic and modest. Regardless, these techniques i.e., numerical measurements and BJ methodology, may serve as the building blocks for further intricate statistical techniques in future studies. As such, future studies should attempt to incorporate more SIRCs and apply advanced statistical measures in examining the statistical behaviour of cash waqf collection. Future research can also extend the statistical model to include relevant financial and economic variables.

References

Abdel Mohsin, M. I. (2009). *Cash waqf: a new financial product*. Pearson: Petaling Jaya.

Abdul Hamid, M. I., & Mohammad, M. T. S. H. (2014). *Waqf property: concept, management, development and financing*. Universiti Teknologi Malaysia: Johor Bahru.

Abu-Zahrah, M. (2007). *Waqf according to religion and laws (wakaf menurut agama dan undang-undang)*. Jasmin Enterprise: Puchong.

Algunduz, A. (2009). *Studies in Islamic economics: Islamic banking and development*. IUR Press: Rotterdam, Holland.

Ambrose, A. H. A. A., & Asuhaimi, F. A. (2021). Cash waqf risk management and perpetuity restriction conundrum. *ISRA International Journal of Islamic Finance*, *13*(2), 162-176.

Ambrose, A. H. A. A., Aslam, M., & Hanafi, H. (2019). Waqf financing expenditure and its impact on government debt. *European Journal of Islamic Finance*, *13*(August), 1–15.

Ambrose, A. H. A. A. (2018). *Impact of waqf financing on federal government expenditure and debt in Malaysia*. University of Malaya: Kuala Lumpur.

Çizakça, M. (1995). Cash waqf of busra, 1555-1832. *Journal of Economic and Social History of the Orient*, *38*(3), 314–354.

Çizakça, M. (2000). *The history of philanthropic foundations: the Islamic world from the seventh century to the present*. Bogazici University Press: Istanbul.

Fadhilah, A. A. (2017). *Mawquf development*. Universiti Sains Islam Malaysia: Nilai.

Farhana, M. S., & Asmak, A. R. (2017). *Wakaf tunai dalam pembangunan ekonomi masyarakat Islam*. Dewan Bahasa dan Pustaka: Kuala Lumpur.

Ghazali, N. A., Sipan, I., Mohammad, M., & Aziz, M. (2021). New framework for the management of waqf land registration system in Malaysia. *International Journal of Islamic and Middle Eastern Finance and Management*, *14*(3), 625-640.

Groebner, D. F., Shannon, P. W., Fry, P. C., & Smith, K. D. (2011). *Business statistics: A decision-making approach*. Pearson: New Jersey.

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics*. McGraw Hill: New York.

Hasan, S. (2007). *Philanthropy and social justice in Islam: principles, prospects and practices*. Percetakan Zafar Sdn Bhd: Kuala Lumpur.

Hishamuddin M. A. (2006). *Pelaburan wakaf: strategi dan rangka kerja perundangan Islam*. In: Prosiding Seminar Konvensyen Wakaf Kebangsaan Jabatan Wakaf Zakat dan Haji, Jabatan Perdana Menteri, Kuala Lumpur.

Majlis Agama Islam Pulau Pinang (MAIPP). (2020). Produk Dana Wakaf, available at https://www.mainpp.gov.my/# (accessed 8 September 2020)

Mandaville, J. E. (1979). Usurious piety: the cash waqf controversy in the Ottoman empire. *International Journal of Middle East Studies 1*, 289–308.

Mannan, M. A. (2005). *Beyond the Malaysian twin towers: mobilization efforts of cash-waqf fund at local, national and international level for development of social infrastructure of the Islamic ummah and establishment of world social bank*. In: International Seminar on Awqaf 2008 - Awqaf: The Social and Economic Empowerment of Ummah, Johor Bahru.

Marzuki, M. U. M., Shahimi, S., Ismail, A. G., & Embong, Z. (2012). *Tackling poverty: a look at cash waqf*. Paper presented at the Seventh Malaysian National Economic Conference (PERKEM VII), 4- 6 June 2012, Ipoh, Perak, available at: http://www.ukm.my/fep/perkem/pdf/perkemVII/PKEM2012_5E5.pdf (accessed 29 September 2020).

Mauluddin, M. I., & Rahman, A. A., (2018). Cash waqf from the perspective of Majelis Ulama Indonesia (MUI) and the scholars of Acheh. In: Rahman, A. A. (Ed.). *New developments in Islamic economics* (pp. 49-66). Emerald Publishing Limited: Bingley.

Mohsin, M. I. A. (2014). *Corporate waqf from principle to practice: A new innovation for Islamic finance*. Pearson Malaysia Sdn Bhd: Kuala Lumpur.

Nazir, H., & Hasanuddin, M. (2004). *Ensiklopedi ekonomi dan perbankan Syariah*. Bandung: Kaki Langit, Indonesia.

Perbadanan Wakaf Selangor (PWS). (2020). Agihan Manfaat Wakaf, available at http://www.wakafselangor.gov.my/index.php/hartanah-wakaf/agihan-manfaat-wakaf (accessed 8 September 2020)

Razali, O. (2001). *Konsep, prinsip dan perlaksanaan pengurusan institusi wakaf: kajian kes di Negeri Selangor*. Universiti Kebangsaan Malaysia.

Razali, O. (2015). *Wakaf tunai: sejarah, amalan dan cabaran masa kini*. Dewan Bahasa dan Pustaka: Kuala Lumpur.

Siegmund, D. O. (n.d.). Probability theory, available at: https://www.britannica.com/science/probability-theory (accessed 30 September 2020)

Zhang, M. (2018). Time series: Autoregressive models AR, MA, ARMA, ARIMA, available at: http://people.cs.pitt.edu/~milos/courses/cs3750/lectures/class16.pdf (accessed 10 May 2020)