

*Are sukuk markets weak form efficient?
Evidence from major active Islamic stock markets*

هل أسواق الصكوك المالية كفؤة في المستوى الضعيف؟ "دراسة حالة أهم الأسواق المالية الإسلامية النشطة"

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Abstract:

The main objective of this study is to explore sukuk markets weak form efficiency level based on random walk hypothesis, to this end we have used the most accurate tests for random walks namely the Augmented Dickey-Fuller unit root test and the Runs test, by studying 34 sakk from eight regions (United States, United Kingdom, Luxembourg, Turkey, Emirates, Saudi Arabia, Kuala Lumpur, Jakarta) using large samples. The findings provided convincing evidence of the weak-form inefficiency of sukuk markets. Thus, we concluded that sukuk markets offer the opportunity to profit from technical analysis.

Keywords: Sukuk market, random walks, efficiency, ADF test, runs test.

Jel Classification Codes:G11, G14, G17

ملخص:

تهدف هذه الدراسة بالدرجة الاولى الي تحليل كفاءة أسواق الصكوك المالية ضمن المستوى الضعيف بناء على فرضية السير العشوائي، ومن اجل هذا فقد قمنا باستخدام أدق نموذجين لاختبار السير العشوائي لسلاسل الزمنية والمتمثلين في اختبار (ADF) المعزز لجذر الوحدة وكذا اختبار (Runs)، وشملت عينة الدراسة 34 صك مالي من ثمان دول (الولايات المتحدة، المملكة المتحدة، لوكسمبورغ، تركيا، الإمارات، المملكة العربية السعودية، كوالالمبور، جاكرتا)، وذلك مع عينات كبيرة الحجم.

ومن خلال نتائج الدراسة نستنتج ان أسواق الصكوك المالية ليست كفؤة ضمن المستوى الضعيف وبالتالي فإنه يمكن الاستفادة من التحليل الفني للتنبؤ بحركة أسعار الصكوك المالية.

الكلمات المفتاحية: أسواق الصكوك، السير العشوائي، الكفاءة، اختبار ADF، اختبار Runs.

تصنيفات الجيل: G11, G14, G17

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□. Introduction:

Sukuk, the plural form of the arabic word sakk, emerged at the beginning of this century in stock markets. However, they have now gained a dominant place in the islamic finance industry. According to the International Islamic Finance Market (IIFM Sukuk Report 2022), the total international sukuk issuances stood at USD 49.427 billion in 2021, which translates into an increase of USD 7.02 billion or a positive 16.55% from the 2020 level of USD 42.408 billion. The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) defined sukuk as Certificates of equal value representing undivided shares in ownership of tangible assets, usufructs, and services, or in the ownership of the assets of projects or special investment activities (AAOIFI 2008). There are different types of sukuk based on different structures of Islamic contracts (Murabaha, Ijara, Istisna, Musharaka, Istithmar, etc.). Sukuk is now firmly established as a viable source of financing for corporate and financial institutions' general purposes (capital adequacy, project financing, budgetary and fiscal requirements of the sovereign, liquidity management purposes, etc.). In Algeria, the Supreme Islamic Council is studying the possibility of launching financial sukuks, which will be offered by investment funds that adopt sharia compliant bond like instruments for the first time in Algeria. Besides, according to the CEO of AOM Invest, sukuk will be offered for sale to customers during 2023 as a maximum (Imane Kimouche 2022). Despite this, we still find limited literature that influences the real development of the sukuk market, neither locally nor globally, especially in terms of market efficiency or volatility forecasting, despite the significantly different market behaviour of sukuk indices and conventional indices. Indeed, the literature review shows that all the studies focused on a single sukuk market, which may not reflect the real picture of sukuk markets around the world. To overcome this shortage, our article contributes to the current literature by studying 34 Sakk from eight regions (the United States, the United Kingdom, Luxembourg, Turkey, Emirates, Saudi Arabia, Kuala Lumpur, and Jakarta) with large samples of up to 4350 observations. Using the most accurate tests for random walks (the Augmented Dickey-Fuller unit root test and the Runs test), Our paper is structured as follows: in Section 2, we present a brief literature review related to the most relevant empirical studies, in Section 3, we introduce the adopted data and the methodology. The empirical results are discussed in Section 4. Finally, Section 5 provides the concluding remarks.

□. Literature review:

A huge body of literature has studied market behaviour to allow the best predictions. In fact, the efficient market hypothesis (EMH) is One of the most used theories to explain market behaviour. According to this theory, an efficient market implies that current prices fully reflect all available information, meaning that security prices adjust rapidly to new information. (Fama, 1970). Besides, the random walk theory states that stock price movements are unpredictable and follow random behavior. Kendall (1953) and Fama (1965) are considered the earlier scholars who concluded that stock prices move randomly and that past movements are useless in predicting future movements. (Al-Jafari & Abdulkadhim, 2012). Consequently, Fama (1970) categorized the overall efficient market hypothesis (EMH) into three forms: the weak-form EMH, the semi-strong-form EMH, and the strong-form EMH. (ThonseHawaladar et al., 2017). The weak form of efficiency implies that historical data is the best predictor of today's price, meaning that all past publicly available information is factored into the current price. In addition to the weak form of price efficiency, the prices instantly reflect new public information. The strong form of the EMH hypothesis, in addition to the semi-strong form, considers the insider or hidden information in the market price. (Rizvi et al. 2014), in terms of islamic stock market efficiency, numerous studies have

been debated, for instance Guyot (2011); Jawadi, Jawadi, & Cheffou (2015); Alam, Arshad, & Rizvi (2016); Khan, & Rahman (2021). However, little scholarly attention has been paid to testing the EMH for sukuk markets due to the newest trading of the sukuk instrument on the stock markets, as an illustration, Rusgianto & Ahmad (2013) examined the Volatility behavior of the Dow Jones Citigroup Sukuk Index for the period 2007–2011 applying the EGARCH (1,1) model. The main finding indicated that the volatility during the pre-crisis and contemporaneous periods was more sensitive to market events compared to the post-crisis period (Mnif et al. 2019). as well as tested the Dow Jones sukuk indices efficiency focusing on the presence of investor herding behavior (HB) from 1 January 2010 to 30 December 2016 using a rolling sample of the Hurst exponent and a time-varying parameter method based on the Hurst of delayed returns. The results show that sukuk markets have different efficiency degrees, so the most efficient structure corresponds to Murabaha, followed by Ijara, then Mudaraba, and finally Wakala. In the same context, nor et al. (2020) also tested the efficiency of three Malaysian sukuk indices from 2010 to 2015 by employing GARCH-in-mean estimation. The findings indicate that two indices display weakly efficient market behavior, while one falls under the inefficient category. Ultimately, Rahim et al. (2021) investigated the efficiency of Dow Jones sukuk indices. Based on different tenures from 2005 up to 2015, using GARCH-in-mean, the results conclude that the sukuk index with a long-term tenure has the best market performance. Overall, the sukuk market is recorded as an inefficient market.

□. Data and methodology:

□.1 Data:

□.1.1. Data sample:

In order to test the random walk and market efficiency of sukuk markets, daily closing prices of 34 sakk are considered. from eight regions (united states, United Kingdom, Luxembourg, Turkey, Emirates, Saudi Arabia, Kuala Lumpur, Jakarta) starting from their available date to June 22, 2022. Most of the sukuk data are derived from Luxembourg (20sakk) which has become a center for islamic finance. The sample data involves five instruments type (index, bonds, funds, ETF, short maturity ETF). The sample includes all sukuk data available on investing website. Table1 presents all sukuk included in this study.

□.1.2 Statistical description:

From **table2** it is observed that sample lengths are different ranging from 378 to 4350 observations, besides as can be seen the means and the standard deviations vary widely across the 34 sakk.

The table also indicates that the medians of the samples are greater than their respective means. Resulting in negative skewness in most cases which implies that the sukuk prices are flatter to the left compared to the normal distribution. The kurtosis reported in **table3** also indicates that the sukuk prices distributions have Fat tails or skinner tails compared to a normal distribution since the Kurtosis coefficients are different from 3. Indeed, the Jarque-Bera statistic rejects the hypothesis of a normal distribution of sukuk prices.

□.2. Methodology:

This study employs the augmented Dickey–Fuller test (ADF) unit root test and Runs test on the daily closing price of 34 sakk to examine the random walk within sukuk market, in order to check the efficiency level of sukuk market.

□.2.1 Augmented Dickey–Fuller Test (ADF):

ADF test is the most common unit root test. Unit root tests are commonly used to test the stationary property of a time series data. Dickey and Fuller consider three differential-form autoregressive equations to detect the presence of a unit root:

model I no constant, no trend:

$$\Delta y_t = \delta_{t-1} + \beta \sum_{i=1}^p \Delta y_{t-i} + u_t \quad (1)$$

model II Constant, no trend:

$$\Delta y_t = c_0 + \delta_{t-1} + \beta \sum_{i=1}^p \Delta y_{t-i} + u_t \quad (2)$$

model III Constant and trend:

$$\Delta y_t = c_0 + c_1 t + \delta_{t-1} + \beta \sum_{i=1}^p \Delta y_{t-i} + u_t \quad (3)$$

where:

Δ : first difference operator

c_0 : the intercept constant or drift.

$c_1 t$: the coefficient β on a time trend.

δ_t : the coefficient presenting the process' root.

β : the vector of coefficients of lagged derivatives

u_t : error term

The hypotheses in the Augmented Dickey-Fuller (ADF) test are stated as follows:

H 0: there is a unit root in the series then the Series is not stationary

H 1: there is no unit root in the series then the series is stationary

- To reject the null hypothesis, the p-value obtained should be less than the significant value 0.05.

□.2.2 The Runs Test:

A Runs test of randomness is a statistical test that is used to know the randomness in data. Runs test of randomness is sometimes called the Geary test, and it is a nonparametric test. Runs test of randomness is an alternative test to autocorrelation tests.

To proceed the test, we consider n_a and n_b observations above and below the sample mean (or median), and r stands for the observed number of runs.

Where $n = n_a + n_b$.

And
$$Z(r) = \frac{r - E(r)}{\sigma(r)} \quad \dots (4)$$

Therefore, the expected number of runs can be calculating by the following formula:

$$E(r) = \frac{n - 2n_a n_b}{n} \quad \dots (5)$$

And the standard error is represented by:

$$\sigma E(r) = \left[\frac{2n_a n_b (2n_a n_b - n)}{n^2 (n - 1)} \right]^{1/2} \quad \dots (6)$$

The runs hypotheses test is stated as follows:

H0: the series' pattern is random.

H1: the series' pattern is not random.

- In order to reject the null hypothesis, the p-value obtained should be less than the significant value 0.05.

□. **Results and Discussion:**

□.1 **Augmented Dickey-Fuller (ADF) test results:**

Table 4 shows the results of unit root tests using the Augmented Dickey-Fuller test at level. The null hypothesis of non-stationarity is tested at the 1%, 5%, and 10% significance levels. The results of the ADF test illustrate that all the sukuk time series are nonstationary at level, since all the P values are greater than >5% and all the ADF statistics are greater than critical values, except for IDSUKNS97B7 sakk.

Table 4. ADF unit root test at level (sukuk prices)

Sakk Quote TEST	ADF statistic	Critical Values			Prob
		1%	5%	10%	
0P00008MCX	-1.942290	-3.431885	-2.862103	-2.567113	0.3130
0P00008MJA	-1.9909	-3.43167	-2.86201	-2.56706	0.2911
0P0000SGIM	-1.72786	-3.43255	-2.8624	-2.56727	0.417
0P0000WZN9	-1.89026	-3.43584	-2.86385	-2.56805	0.3371
0P0000YEQK	-2.32363	-3.4373	-2.8645	-2.5684	0.1647
0P0000YEQM	-2.37258	-3.4373	-2.8645	-2.5684	0.1499
0P0000YEQN	-0.62592	-3.43731	-2.8645	-2.5684	0.8622
0P0000YWBG	-2.298468	-3.438139	-2.864868	-2.568596	0.1727
0P0000YWCI	0.413421	-3.442120	-2.866624	-2.569538	0.9834
0P0000YWCJ	-2.413947	-3.437267	-2.864483	-2.568390	0.1381
0P0000ZMJ8	-1.355911	-3.437575	-2.864618	-2.568463	0.6049
0P0000ZMPJ	-1.349135	-3.437575	-2.864618	-2.568463	0.6082
0P0000ZOXD	-2.217736	-3.437575	-2.864618	-2.568463	0.2002
0P0000ZOXF	-2.213501	-3.437575	-2.864618	-2.568463	0.2017
0P00010MK7	-0.239265	-3.437617	-2.864637	-2.568473	0.9308
0P00011R8U	-1.226822	-3.437298	-2.864496	-2.568397	0.6646
0P00011VED	-1.232324	-3.435696	-2.863789	-2.568018	0.6623
0P00012K86	-1.796949	-3.435806	-2.863837	-2.568044	0.3823
0P00015JM1	-1.141807	-3.437298	-2.864496	-2.568397	0.7009

Sakk Quote TEST	ADF statistic	Critical Values			Prob
		1%	5%	10%	
0P00015JZJ	-1.993981	-3.438360	-2.864965	-2.568649	0.2896
0P00015JZK	0.022482	-3.437792	-2.864715	-2.568514	0.9593
0P00015JZL	0.707819	-3.437792	-2.864715	-2.568514	0.9923
0P00015TDS	-1.278743	-3.435654	-2.863770	-2.568008	0.6414
0P00018B3P	0.024014	-2.568397	-2.864496	-3.437298	0.9595
0P0001993J	-1.555886	-3.435801	-2.863835	-2.568043	0.5049
IDSUKNS97B7	-7.300067	-3.446044	-2.868353	-2.570464	0.0000*
LP65135728	-2.175990	-3.432228	-2.862255	-2.567195	0.2153
LP68234063	-0.322524	-3.435436	-2.863674	-2.567956	0.9191
LP68257960	-1.985662	-3.435436	-2.863674	-2.567956	0.2933
NUM9403	1.798036	-3.441613	-2.866401	-2.569418	0.9998
NUM9404	-0.013934	-3.447580	-2.869029	-2.570827	0.9558
SPSK	1.164615	-3.440451	-2.865888	-2.569144	0.9980
TR160211628	-0.382520	-3.441736	-2.866455	-2.569447	0.9094
TSIB	-0.279371	-3.433579	-2.862853	-2.567515	0.9255

Note: * denote the rejection of null hypothesis at 1% significance level /Source: Elaborated by the Authors

Table 5 illustrates the result of the ADF test on the first difference, the outcomes strongly support that all sukuk time series are stationary after the first difference, because all the P values are <5% and all the ADF statistics are less than critical values. Hence, we determine that all series have the same order of integration, and they are integrated series of order I (1). Hence, sukuk markets don't behave as random walks. As a result, sukuk markets are weak-form inefficient, in other words historical sukuk data can be used to predict future sukuk prices. Therefore, participants in the sukuk markets can gain abnormal profit by using statistical techniques. These findings ultimately correspond with those reported by Rahim et al. (2021) and Nor et al. (2020), illustrating the weak form inefficiency in the sukuk market.

Table 5. ADF unit root test at first difference (sukuk Return)

Sakk Quote TEST	ADF statistic	Critical Values			Prob
		1%	5%	10%	
0P00008MCX	-65.25790	-3.431687	-2.862016	-2.567066	0.0001*
0P00008MJA	-64.77293	-3.431670	-2.862008	-2.567062	0.0001*
0P0000SGIM	-32.39438	-3.432549	-2.862397	-2.567271	0.0000*
0P0000WZN9	-12.90531	-3.435836	-2.863850	-2.568051	0.0000*
0P0000YEQK	-11.00969	-3.437298	-2.864496	-2.568397	0.0000*
0P0000YEQM	-10.83049	-3.437298	-2.864496	-2.568397	0.0000*
0P0000YEQN	-12.17134	-3.437306	-2.864500	-2.568399	0.0000*
0P0000YWBG	-31.77035	-3.437275	-2.864486	-2.568392	0.0000*

Sakk Quote TEST	ADF statistic	Critical Values			Prob
		1%	5%	10%	
0P0000YWC I	-25.41144	-3.442142	-2.866634	-2.569543	0.0000*
0P0000YWC J	-31.80361	-3.437275	-2.864486	-2.568392	0.0000*
0P0000ZMJ 8	-28.97107	-3.437583	-2.864622	-2.568465	0.0000*
0P0000ZMP J	-28.98029	-3.437583	-2.864622	-2.568465	0.0000*
0P0000ZOX D	-28.59196	-3.437583	-2.864622	-2.568465	0.0000*
0P0000ZOX F	-28.54031	-3.437583	-2.864622	-2.568465	0.0000*
0P00010MK 7	-9.560852	-3.437617	-2.864637	-2.568473	0.0000*
0P00011R 8U	-13.44624	-3.437298	-2.864496	-2.568397	0.0000*
0P00011VE D	-7.424739	-3.435696	-2.863789	-2.568018	0.0000*
0P00012K 86	-36.01536	-3.435811	-2.863840	-2.568045	0.0000*
0P00015JM 1	-13.00352	-3.437298	-2.864496	-2.568397	0.0000*
0P00015JZ J	-15.81898	-3.438360	-2.864965	-2.568649	0.0000*
0P00015JZ K	-12.72898	-3.437792	-2.864715	-2.568514	0.0000*
0P00015JZ L	-12.71134	-3.437792	-2.864715	-2.568514	0.0000*
0P00015TD S	-7.291963	-3.435654	-2.863770	-2.568008	0.0000*
0P00018B 3P	-13.03627	-3.437298	-2.864496	-2.568397	0.0000*
0P0001993 J	-10.57519	-3.435801	-2.863835	-2.568043	0.0000*
IDSUKNS97 B	-7.351708	-3.446083	-2.868370	-2.570474	0.0000*
LP6513572 8	-22.95080	-3.432228	-2.862255	-2.567195	0.0000*
LP6823406 3	-33.52714	-3.435440	-2.863676	-2.567957	0.0000*
LP6825796 0	-8.487153	-3.435436	-2.863674	-2.567956	0.0000*
NUM9403	-17.42634	-3.441613	-2.866401	-2.569418	0.0000*
NUM9404	-16.97981	-3.447580	-2.869029	-2.570827	0.0000*
SPSK	-31.39608	-3.440451	-2.865888	-2.569144	0.0000*
TR1602116 28	-24.21677	-3.441757	-2.866464	-2.569452	0.0000*
TSIB	-30.24472	-3.433579	-2.862853	-2.567515	0.0000*

Note: * denote the rejection of null hypothesis at 1% significance level /Source: Elaborated by the Authors.

□.2 Runs Test Results:

The results of the Runs test conducted for the sukuk sample is appearing in **table 6**, from the results it is observed that all z-values are negative which implies there are too few runs. Indeed, all p-values are less than 0.01, meaning that the actual number of runs falls short compared to the expected number of runs, which signifies the existence of a positive serial correlation.

Thus, we reject the null hypothesis at a 1% significance level, subsequently, past price changes could impact the future price prediction and price changes do not follow the random walk model. consequently, sukuk markets are clearly weak-form inefficient. Eventually the results of the runs test are consistent with those of the initial difference ADF test, indicating that the sukuk

markets exhibit weak form inefficiency.

Table 6. Runs test.

Sakk quote Test	Test Value ^a	Cases < Test Value	Cases >= Test Value	Total Cases	Number of Runs	Z	P value
0p00008mcx	1.035	2147	2155	4302	63	-63.706	0*
0p00008mja	1.28	2167	2183	4350	23	-65.295	0*
0p0000sgim	13.096	1369	1369	2738	8	-52.068	0*
0p0000wzn9	1.383	551	601	1152	23	-32.657	0*
0p0000yeqk	12.62	457	459	916	7	-29.885	0*
0p0000yeqm	13.09	458	458	916	9	-29.753	0*
0p0000yeqn	9.4	452	463	915	7	-29.869	0*
0p0000ywbg	12.4	450	467	917	36	-27.985	0*
0p0000ywci	9.86	264	282	546	32	-20.729	0*
0p0000ywcj	13.38	457	460	917	32	-28.25	0*
0p0000zmj8	4.813	438	441	879	30	-27.707	0*
0p0000zmpj	4.811	438	441	879	30	-27.707	0*
0p0000zoxd	6.41	437	442	879	22	-28.247	0*
0p0000zoxf	6.41	437	442	879	22	-28.247	0*
0p00010mk7	4.92	437	442	879	19	-28.45	0*
0p00011r8u	9.86	443	473	916	17	-29.223	0*
_0p00011ved	8.221	588	595	1183	18	-33.42	0*
0p00012k86	1.09	515	639	1154	11	-33.39	0*
0p00015jm1	9.58	456	460	916	9	-29.753	0*
0p00015jzj	12.162	397	400	797	17	-27.115	0*
0p00015jzk	9.559	428	429	857	21	-27.925	0*
0p00015jzl	8.89	427	430	857	11	-28.608	0*
0p00015tds	130.507	596	597	1193	18	-33.57	0*
0p00018b3p	8.96	453	463	916	17	-29.224	0*
0p0001993j	137.154	579	580	1159	4	-33.882	0*
idsukns97b7	101.05	209	220	429	25	-18.415	0*
lp65135728	14.046	1583	1584	3167	16	-55.752	0*
lp68234063	7.247	617	618	1235	24	-33.847	0*
num9403	10.06	285	288	573	24	-22.035	0*
num9404	102.6	185	193	378	7	-18.85	0*
spsk	20.01	311	324	635	62	-20.372	0*
tr160211628	97.356	282	282	564	15	-22.59	0*
tsib	991.44	821	1090	1911	9	-43.353	0*

Note: * denote the rejection of null hypothesis at 1% significance level /Source: Elaborated by the Authors.

□. CONCLUSION

Islamic finance attempts to provide financial products and instruments that are consistent with certain principles such as (ethical value, social responsibility). Given the prevalent interest in such products we have investigated the random walk behaviour and efficiency of a large sukuk markets sample using the ADF unit root tests and Runs test, The empirical results show that both tests produce identical outcomes, rejecting the random walk hypothesis implying that sukuk markets are weak-form inefficient, since that the future returns can be predicted using the historical prices. subsequently, investors can make extra earnings by using technical analysis.

The stability of sukuk markets can be attributed to their foundation on a commodity-based economy that seeks to generate added value. Indeed, Islamic stock markets don't engage in Gambling and speculative activities, in contrast to conventional stock markets, due to the ethical principles upheld by Muslims. Furthermore, Islamic markets are recognized for their transparency, ensuring that all market participants have access to information.

Our results support the findings of Rahim et al. (2021) and Nor et al. (2020), which show that the sukuk market is weak form inefficient.

Through the examination of literature review we have observed that numerous studies explore the efficiency of Islamic stock markets by combining various instruments, which leads to a lack of clarity in the overall picture, yet there are only a few studies specifically focusing on the efficiency of the sukuk market, due to the lack of literature reviews on the efficiency of the sukuk market, we suggest conducting additional research using different econometric techniques in order to compare their outcomes and to get a clear idea of the sukuk market's efficiency level.

□. **Appendices:**

Table 1. Sukuk Market Sample

Quote	Sakk name	Instrument type	Country
SPSK	SP Funds Dow Jones Global Sukuk	ETF	USA(NYSE)
TR160211628	Aktif Bank Sukuk VarlikKiralama AS CALIKK 7 10-May-2024	Bond	Turkey (Istanbul stock exchange)
9403	Albilad Saudi Sovereign Sukuk	ETF	Saudi Arabia
9404	Alinma Saudi Government Sukuk ETF Fund	Short Maturity ETF	Saudi Arabia
TSBI	Sukuk & Bonds	Index	Saudi Arabia
0P0000YWCJ	Franklin Global Sukuk Fund A(acc)eur	Fund	Luxembourg
0P00015JZJ	Emirates NbdSicav Emirates Global Sukuk Fund aEurAcc	Fund	Luxembourg
0P0000ZMPJ	Az Fund 1 - Az Islamic - Global Sukuk B-az Fund Eur Inc	Fund	Luxembourg
0P0000ZMJ8	Az Fund 1 - Az Islamic - Global Sukuk A-az Fund Eur Inc	Fund	Luxembourg
0P0000ZOXF	Az Fund 1 - Az Islamic - Global Sukuk B-az Fund EurAcc	Fund	Luxembourg
0P0000ZOXD	Az Fund 1 - Az Islamic - Global Sukuk A-az Fund EurAcc	Fund	Luxembourg
0P00018B3P	Franklin Global Sukuk Fund W(qdis)eur-h1	Fund	Luxembourg
0P00011R8U	Franklin Global Sukuk Fund X(qdis)usd	Fund	Luxembourg
0P0000YEQN	Franklin Global Sukuk Fund A(mdis)usd	Fund	Luxembourg
0P00015JM1	Franklin Global Sukuk Fund W(qdis)usd	Fund	Luxembourg
0P0000YWBG	Franklin Global Sukuk Fund N(acc)eur	Fund	Luxembourg
0P00015JZL	Emirates NbdSicav - Emirates Global Sukuk Fund C Usd Inc	Fund	Luxembourg
0P0000YEQM	Franklin Global Sukuk Fund I(acc)usd	Fund	Luxembourg
0P0000YEQK	Franklin Global Sukuk Fund A(acc)usd	Fund	Luxembourg
0P00015JZK	Emirates NbdSicav - Emirates Global Sukuk Fund a Usd Inc	Fund	Luxembourg
0P00012K86	Pb Aiman Sukuk Fund	Fund	Kuala Lumpur
0P0001993J	Kaf Sukuk Fund	Fund	Kuala Lumpur
0P0000WZN9	Amdynamic Sukuk - Class A	Fund	Kuala Lumpur
0P0000SGIM	Emirates Global Sukuk Fund Usd B Share Class Accumulation	Fund	United Kingdom (London)
0P00015TDS	Rasmala Investment Funds - Rasmala Global Sukuk Fund RasmalaUsdAcc	Fund	Luxembourg
0P00011VED	Az Multi Asset - Az Islamic - Mamg Global Sukuk Master Euro	Fund	Luxembourg
Quote	Suk name	Instrument type	Country
LP68257960	Rasmala Investment Funds - Rasmala Global Sukuk Fund RasmalaUsd Inc	Fund	Emirate (Abu Dhabi)
LP65135728	Emirates Global Sukuk Fund Usd Institutional Share Class Accumulation	Fund	Emirate (Abu Dhabi)
LP68234063	Az Multi Asset - Az Islamic - Mamg Global Sukuk Master Euro Inc	Fund	Luxembourg
0P00010MK7	Az Multi Asset - Az Islamic - Mamg Global Sukuk a Usd Inc	Fund	Luxembourg
0P0000YWCI	Franklin Global Sukuk Fund A(mdis)sgd	Fund	Luxembourg
0P00008MCX	Principal Islamic Lifetime Enhanced Sukuk Fund	Fund	Kuala Lumpur
0P00008MJA	Principal Islamic Lifetime Sukuk Fund	Fund	Kuala Lumpur
IDSUKNS97B7	TimahTbk PT TINS 8.75 28-Sep-2022 Sukuk	Bond	Jakarta

Source: Elaborated by the Authors.

Table 2. Descriptive Statistics A

Sakk quote / Test	N	Mean	Median	Std. Deviation	Minimum	Maximum
0p00008mcx	4302	1.02722	1.035	0.03771	0.904	1.102
0p00008mja	4350	1.21735	1.28	0.12158	0.98	1.375
0p0000sgim	2738	12.7230	13.096	1.54898	9.936	15.313
0p0000wzn9	1152	1.36415	1.383	0.06821	1.234	1.478
0p0000yeqk	916	12.5182	12.62	0.62044	11.05	13.26
0p0000yeqm	916	13.0055	13.085	0.70998	11.35	13.84
0p0000yeqn	915	9.2811	9.4	0.28547	8.38	9.66
0p0000ywbg	917	12.3586	12.4	0.4524	11.1	13.24
0p0000ywcj	546	9.7798	9.86	0.26288	8.99	10.15
0p0000ywcj	917	13.3109	13.38	0.5773	11.75	14.42
0p0000zmj8	879	4.89805	4.813	0.20092	4.582	5.364
0p0000zmpj	879	4.89694	4.811	0.20188	4.58	5.364
0p0000zoxd	879	6.43194	6.41	0.18584	6.038	6.896
0p0000zoxf	879	6.43197	6.41	0.18589	6.038	6.896
0p00010mk7	879	4.87166	4.92	0.14727	4.423	5.065
0p00011r8u	916	9.7306	9.86	0.29602	8.91	10.14
0p00011ved	1183	8.20617	8.221	0.55086	7.462	8.988
0p00012k86	1154	1.0949	1.09	0.03604	1.03	1.17
0p00015jm1	916	9.4636	9.58	0.2936	8.64	9.9
0p00015jzj	797	11.9654	12.162	0.53804	10.624	12.636
0p00015jzk	857	9.47962	9.559	0.31710	8.455	9.892
0p00015jzl	857	8.85168	8.89	0.34299	7.719	9.336
0p00015tds	1193	129.414	130.507	7.79638	118.281	141.349

Sakk quote / Test	N	Mean	Median	Std. Deviation	Minimum	Maximum
0p00018b3p	916	8.8804	8.96	0.27696	7.91	9.24
0p0001993j	1159	135.479	137.154	8.40883	120.239	145.87
idsukns97b7	429	100.818	101.05	1.15411	91.53	102.35
lp65135728	3167	13.9849	14.046	1.90387	10.006	17.363
lp68234063	1235	7.10603	7.247	0.56504	6.019	8.237
lp68257960	1242	102.901	103.294	2.75094	95.194	107.168
num9403	573	9.8636	10.06	0.42056	8.56	10.42
num9404	378	102.53	102.6	1.067	99.2	104
spsk	635	19.7974	20.01	0.60419	17.88	20.5
tr160211628	564	97.5877	97.356	1.72358	94.175	102.071
tsib	1911	997.233	991.44	13.9243	949.61	1033.6

Source: Elaborated by the Authors.

Table 3. Descriptive Statistics B

Sakk quote Test	Skewness	Kurtosis	Jarque- bera	P
0p00008mcx	-0.767	3.2394	432	0
0p00008mja	-0.653	1.8943	530	0
0p0000sgim	-0.041	1.7999	165	0
0p0000wzn9	-0.473	2.0388	87	0
0p0000yeqk	-0.691	2.4163	85	0
0p0000yeqm	-0.675	2.3571	85	0
0p0000yeqn	-0.978	3.0837	145	0
0p0000ywbg	-0.857	3.5353	122	0
0p0000ywci	-1.19	3.4102	132	0
0p0000ywcj	-0.826	3.4570	111	0
0p0000zmj8	0.563	1.9925	83	0
0p0000zmpj	0.559	1.9849	83	0
0p0000zoxd	0.17	2.2301	25	0.0002%
0p0000zoxf	0.171	2.2310	25	0.0002%
0p00010mk7	-1.274	4.0729	279	0
0p00011r8u	-0.889	2.6569	124	0
0p00011ved	0.001	1.4479	118	0
0p00012k86	0.269	2.1014	52	0
0p00015jm1	-0.818	2.5451	109	0
0p00015jzj	-0.866	2.6847	102	0
0p00015jzk	-1.073	3.7914	186	0
0p00015jzl	-1.247	4.4082	292	0
0p00015tds	0.032	1.4920	113	0
0p00018b3p	-1.38	4.4416	368	0
0p0001993j	-0.449	1.6637	125	0
idsukns97b7	-5.102	33.744	187	0
lp65135728	-0.036	2.1179	103	0
lp68234063	-0.184	1.9537	63	0
lp68257960	-0.3	2.0567	64	0
num9403	-1.233	3.6059	153	0
num9404	-1.153	4.3269	110	0
spsk	-1.452	4.3247	268	0
tr160211628	-0.074	2.0203	23	0.001%
tsib	0.307	3.7249	71	0

Source: Elaborated by the Authors.

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