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SUKUK IN ISLAMIC FINANCE: A COMPARATIVE STUDY BETWEEN S&P MENA SUKUK AND S&P MENA BOND INDEX

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Abstract:
The Sharia-compliant financial market is relatively new, many studies have focused on the difference between Islamic and classic financial products, the aim of our paper is to study the difference between Sukuks and conventional bonds. To do so, we will proceed to modeling closing prices of booth Sukuks and conventional bonds, the obtained results show that Sukuk has volatility less than the conventional bonds. Also, the asymmetric model used shows that the Sukuk index has more asymmetry impact than the bond index.

JEL: C58, O16, D53

Keywords: aggressive financing strategy, conservative financing strategy, financing decision, matching principle, working capital requirements

1. Introduction

The notion of financing often brings to mind the existence of payment deadlines, as well as the transfer of financial resources directly between two parties, or through a third party. The Islamic finance industry is still young of only about thirty years old. However, it has evolved in recent years despite a turbulent global context: the global financial crises, the Arab revolutions, the events of 11th September, all of this caused the stigmatization of Islamic finance and the development of Islamic financial products. The term Islamic finance covers all Sharia-compliant financial transactions and products, which presume the prohibition of interest, uncertainty, speculation, the prohibition of investment in the illicit sectors (alcohol, tobacco, gambling, etc.), as well as respect for the principle of sharing losses and profits.

It can be defined as a new financial system whose conceptualization is built around a subtle combination of economics, ethics and sharia business concept. Its aims

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lie in the desire to ensure that financial products are compatible with the legal-ethical principles of Islam.

The basic principle behind Sukuk is that the holder has an undivided interest in a particular asset, he is entitled to the return generated by that asset. The structure of the classical Sukuks involves the acquisition of real estate by a special purpose company established in a neutral tax jurisdiction. The company finances itself by issuing Sukuks. Sukuk holders receive a return based on asset rental income, taking the risk of hiring. In general, the Sukuk market is subdivided into four types of market: the international Sukuk market, the domestic Sukuk market, the short-term Sukuk market and the Sukuk secondary market. This type of financing is based on a broad base of products that in turn conform to Islamic Sharia.

The literature on Sukuk and bonds is very rich. A Bond is a pure debt of the issuer, while the Sukuk represent a share in an underlying asset. Some studies prove the existence of a difference between bond and Sukuk, but others indicate that the two products are totally similar.

In this paper, we proceed to modeling both Sukuk and bond indices, the objective is to find the principal similarities and differences between the two indices. After an introduction, we will proceed to represent the literature review on the subject. The third section contains the data and methodology followed through our study. Finally, the last section will contain the obtained numerical results.

2. Literature Review

The Sukuk debate is mainly about their similarities and differences with conventional bonds. The main difference between the Sukuk and bonds is the prohibition of a fixed interest income, the exclusion of transactions involving extreme uncertainty or a deliberate lack of transparency (Gharar), the exclusion of gambling (Maysir), short selling, arbitrage and excessive speculation. Alouiet et al. (2015a, b); Bouslama and Lahrichi (2016). So, in Islamic finance, Sukuk's performance should depend on the performance of the underlying investments, which must conform to Islamic sharia rules. These constraints may reduce the need for cross-asset hedging and, as a result, one may expect lower returns and volatility between Sukuk and conventional bonds see also Hamza et al (2017).

As a result, interest rate changes should not influence Sukuk in the same way as traditional bonds. Unlike bonds which considered a nominal debt that the issuer must repay at maturity, Sukuk represents a portion of the project and its value at maturity must reflect the current market value of the underlying investment.

Recent years have been marked by the growth and evolution of the Sukuk market. In terms of global volume, the market grew from less than $ 14.8 billion in 2001 to more than $ 472.68 billion at the end of 2013. This year alone, Sukuk sales exceeded 118.8 billion dollars. In addition, the market has begun to attract non-Muslim issuers in Europe, Asia

and Africa Hamza and Akhrif (2017). For example, the UK government structured and sold £ 200M of Sukuk on 2014.

After all, the acceptance of Islamic products by the international financial markets is not proof of its legitimacy, since, as Al-Amine (2008); Shaikh Sharif and Arif (2016) emphasize that the Islamic capital market should not focus just on how to raise funds and be acceptable to the international financial institutions, but must above all conform to Sharia law. El-Gamal (2003) finds it paradoxical that "*Islamic finance has quickly imitated conventional finance (interest-based) when its real purpose is to replace the conventional one*." Rethel (2011) argues that Islamic finance is too focused on its epistemic legitimacy, but the real financial activity tends to replicate the existing global financial order. Afshar (2013) states that there are fundamental differences in risk / return between bond and Sukuk, but practically there is no financial difference.

Other issues relate to the cost of issuing Sukuk over bonds, Hayat, Den Butter and Kock (2013); Saad and Hanif (2014); Hanefah, Noguchi and Muda (2013); while El-Gamal (2009) raises a more fundamental question of equity with respect to effectiveness. Since it is difficult to theoretically solve such problems, empirical studies can shed light on the economic substance of Islamic equity's as to the extent to which they retain elements of interest.

Many studies claim that Sukuk are not innovative financial products, but that they are just another version of bonds in terms of non-ownership, fixed-rate and principal repayment transmitter Miller et al. (2007)and Wilson (2008).several paper have examined the interdependencies between the bonds and the Sukuks. Cakir and Raei (2007) deviate from the preposition above and support the opposite position by proposing that the Sukuk be different from the conventional bonds in terms of benefits and in terms of risk reduction.

3. Material and Methods

3.1. S&P MENA (Sukuk and Bond) Index dataset

The study is based on the data that were collected from S&P Dow jones index. we used both S&P MENA Sukuk Index and S&P MENA bond index. Our set of data cover the period from 7/31/2013 to 2/15/2019, implying a total of 1434 observations.

3.2. Statistical Tests and Numerical Experiments

In this paper, the aim is to compare the stylized fact of both bonds and Sukuks. Also, we're aiming to explain the volatility behavior according to shocks. Various statistical tests and GARCH family models were applied and analyzed using E-views10. Volatility has been estimated using returns (r_t), and hence before going for all these tests. First the daily returns of both bond indexes and the Sukuk index are defined as follow:

$$r_t = log \frac{p_t}{p_{t-1}}$$

Where $r_t$is the logarithmic daily return on index at t, andp_t is the closing price at time t,and $p_{t-1}$is the corresponding price in the period at time t-1.

3.1.1 Various Statistics Testes

First of all, we will proceed by testing the stationarity of our two series, to do so, we will apply the Augmented Dickey-Fuller Test (ADF)Dickey &Fuller (1979), PP Philips & Perron (1988) and KPSS Kwiatkowski et al. (1992).

In the second step, in order to apply the GARCH family model, we have to examine the existence of heteroscedasticity. To test the presence of heteroscedasticity in residual, we used Lagrange Multiplier (LM) test for Autoregressive conditional heteroscedasticity (ARCH). It is sensible to compute the Engle (1982) test for ARCH effect to ensure that there is no ARCH effect.

3.1.2 Measurement Technique

GARCH models represent the main methodologies applied in modelling the stock market volatility. The present study employed GARCH (1,1) for modelling conditional volatility and for modelling asymmetric volatility EGARCH (1, 1) was applied. The following GARCH techniques are applied to capture the volatility of the return series.

GARCH Model:

$$\sigma_t^2 = \omega_i + \sum_{i=1}^{p} \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2.$$

Where ω is unconditional volatility,α_i is a parameter that governs the impact of past shock: the more important it is, the more volatility will increase after a shock. β_j is a parameter interpreted as the speed of getting back to minimum volatilityω.

This equation refers to the conditional variance. The conditional variance σ_t^2depends on lagged squared errors and lagged conditional variances. in order to be well defined GARCH model necessitates that coefficient of the lagged squared errors and lagged conditional variances to be non-negative and their sum must be less than unity $\omega > 0$, $\alpha > 0$ and $\beta > 0$.

3.1.3 The Exponential GARCH Model

This model is based on the logarithmic expression of the conditional variability. The presence of the leverage effect can be tested and this model enables to find out the best model, which capture the symmetries of both series Nelson (1991).

EGARCH Model:

$$\ln(\sigma_t^2) = \omega + \sum_i^p \alpha_i \left[\left| \frac{\varepsilon_{t-i}}{\sigma_{t-i}} \right| - \sqrt{\frac{\pi}{2}} \right] + \sum_j^q \beta_j \ln(\sigma_{t-j}^2) + \sum_i^p \gamma_i \frac{\varepsilon_{t-i}}{\sigma_{t-i}}$$

The conditional variance σ_t^2 shows a sign effect, corresponding to the parameters $\omega, \beta_i, \alpha_i$, are not limited to being negative.

The process is stationary if the constraint $\beta_j < 1$ is satisfied. In addition, β_j represents the autoregressive term, α the effect of a shock on the return and γ_i the asymmetry effect corresponds to the complementary impact.

4. Numerical Results

The following figures show the evolution of returns for of both bond and Sukuk index for the same period going from 7/31/2013 to 2/15/2019.

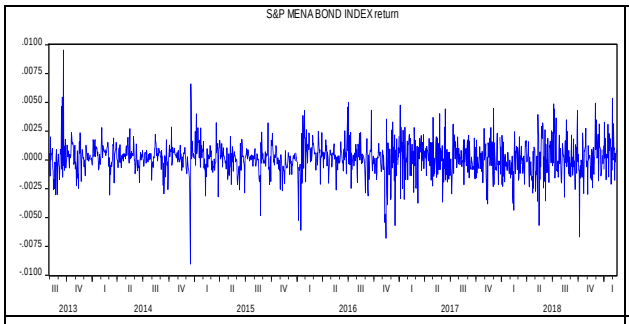

Figure 1: Volatility Clustering of Gov Bond

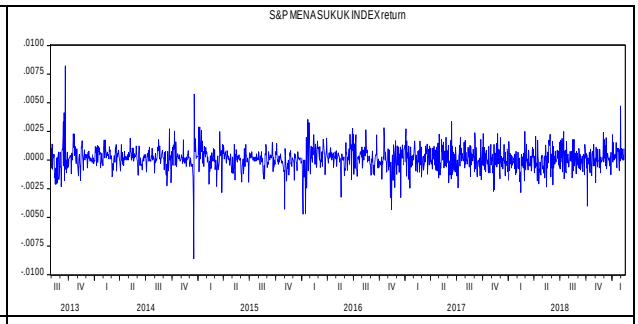

Figure 2: Volatility Clustering of Gov Sukuk

The following table presents descriptive statistics of both the S&P MENA Bond INDEX and S&P MENA SUKUK daily return indexes.

Table 1: Descriptive statistics for both returns of S&P MENA BOND and SUKUK INDEXS

	S&P MENA BOND INDEX RETURN	S&P MENA SUKUK INDEX RETURN
Mean	0.000155	0.000126
Median	0.000196	0.000173
Maximum	0.009530	0.008226
Minimum	-0.009032	-0.008601
Std. Dev.	0.001455	0.001012
Skewness	-0.268371	-0.236674
Kurtosis	7.711301	12.01201
Jarque-Bera	1343.446	4866.062
Probability	0.000000	0.000000
Sum	0.222356	0.181149
Sum Sq. Dev.	0.003035	0.001469
Observations	1434	1434

Descriptive statistics on return of S&P MENA Bond and S&P MENA Sukuk indices are summarized in table above. We can see that the mean daily returns are positive for both

indexes and given respectively by 0.0155% and 0.0126%. In the other hand, the Sukuk index is less volatile (Std dev = 0.001012%) than the Bond indices (Std dev = 0.001455%). bond indexes exhibit higher volatility than the Sukuk index.

Furthermore, the both are skewed to the left. All returns changes exhibit high values of Kurtosis is greater than>3, but for the Sukuk index we can see that his value is bigger than 12.01201, suggesting that the behavior presents some extreme values for Sukuks. The following figures 3 and 4 show the distribution of returns for both indexes.

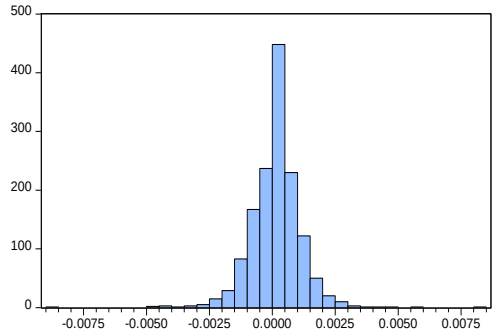

Figure 3: Distribution of returns, S&P MENA SUKUK

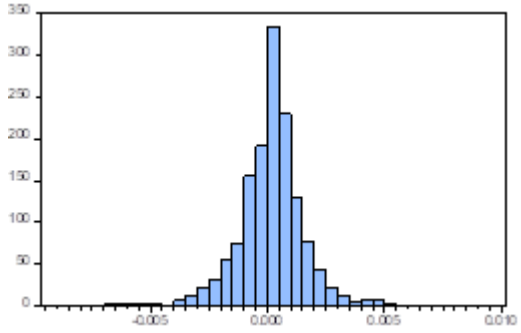

Figure 4: Distribution of returns, S&P MENA BOND

Indeed, as the results in Table (1) show, the *Jarque-Bera* test rejects the null hypothesis of normality for both series.

Table 2: Stationarity test for S&P MENA bond and Sukuks indexes

	Variables	
	S&P MENA BOND INDEX RETURN	**S&P MENA SUKUK INDEX RETURN**
ADF statistic	-17.80389	-18.04103
critical values 1%	-3.434711	-3.434711
critical values 5%	-2.863353	-2.863353
critical values 10%	-2.567784	-2.567784
Prob.*	0.0000	0.0000
PP statistic	-33.42606	-36.10691
critical values 1%	-3.434705	-3.434705
critical values 5%	-2.863351	-2.863351
critical values 10%	-2.567783	-2.567783
Prob.*	0.0000	0.0000
KPSS statistic	0.135386	0.155345
critical values 1%	0.739000	0.739000
critical values 5%	0.463000	0.463000
critical values 10%	0.347000	0.347000

To test the stationarity of our series, we applied ADF, PP and KPSS testes. The result show that both returns of Sukuk and bonds indexes are stationary at level, the probability value is less than 5%, so we accept the hypothesis H_0. Also, all of ADF, PP and KPSS statistics values shows that both series are stationary.

Table 3: Test of heteroscedasticity ARCH-LM test for S&P MENA BOND and SUKUK returns

	F.stat	prob	nR^2	prob
S&P MENA BOND INDEX RETURN	121.4491	0.0000	112.1045	0.0000
S&P MENA SUKUK INDEX RETURN	88.15054	0.0000	83.15155	0.0000

The ARCH-LM test is applied to find out the presence of ARCH effect in the residual of the return series. From the table 3, it is inferred that the ARCH-LM test statistics is highly significant. Since probability of R squared is less than 5%. So, we therefore reject the hypothesis of homoscedasticity, and we consider that the series of returns follow a process of the ARCH type. Given the limitations of the ARCH model, including the large number of parameters p to estimate, we will model conditional volatility using GARCH model (1.1) and EGARCH (1.1).

Now, we are going to estimate conditional volatility parameters of S&P MENA SUKUK and S&P MENA Bond indexes.

Table 4: GARCH (1.1) model parameters
for S&P MENA SUKUK and S&P MENA Bond indexes

	S&P MENA BOND INDEX RETURN			S&P MENA SUKUK INDEX RETURN		
	Gaussian	**Student's**	**GED**	**Gaussian**	**Student's**	**GED**
ω	1.64E-07	1.67E-07	1.53E-07	1.49E-07	1.63E-07	1.49E-07
	[0.0000]	[0.0001]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
α_1	0.235565	0.327415	0.266191	0.254186	0.302480	0.279813
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
β_1	0.711600	0.677295	0.695856	0.620992	0.594537	0.600680
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
υ		3.835594	1.122416		4.118068	1.136755
		[0.0000]	[0.0000]		[0.0000]	[0.0000]
σ^2	3.104E-06	-3.54565E-05	4.0313E-06	1.1937E-06	1.58279E-06	1.24679E-06
LnL*	7466.258	7537.347	7539.817	7969.196	8040.494	8040.650
AIC*	-10.40761	-10.50537	-10.50881	-11.10906	-11.20710	-11.20732

According to σ^2 LnL and AIC, the best model to estimate volatility is giving by GARCH - Normal distribution for both S&P MENA BOND INDEX RETURN and S&P MENA SUKUK INDEX RETURN
With:

$$\sigma^2 = \frac{\omega}{(1 - \alpha_1 - \beta_1)}$$

LnL: represents the log-likelihood of the parameters associated with the data.
AIC: (Akaike Information Criterion, 1973): this is a criterion used to select the best model. And unconditional volatility is the limit of volatility σ^2 when t tends to $+\infty$ for a GARCH (1.1). The first term α_0 of the conditional volatility equation represents a minimum variance threshold below which the conditional variance cannot fall. It is negligible and very close to 0 for both indexes. The second term α_1 is a sum of squared residuals that

reflects the impact of shocks on volatility. When a crash occurs, the returns' value is very different from its average, and so the residue is very large.

In our case, for S&P MENA BOND INDEX RETURNα_1=0.235565 and for S&P MENA SUKUK INDEX RETURN with a normal distribution, α_1= 0.254186. It should be noted that the magnitude of the impact of the shock is greater for the Sukuks index than for the bond index, regardless of the nature of the innovation distribution.

The third term β_1 represents the sum of past variances, which has the effect of quantifying the persistence of volatility. Indeed, if the volatility at time t is low, its contribution in the conditional variance at time $(t+1)$ will also be low, which increases the probability of a low variance.

This persistence seems very significantly high for the bond index $\beta_1 = 0.7116$, in the other hand the Sukuk index shows less value than the bond index $\beta_1 = 0.620992$. It reveals that the volatility is less persistent for the Sukuk index to its conventional counterpart in the conditional variance equation, Finally, unconditional volatility of Sukuk index is slightly lower than the Bond index. Here, we note that the volatility of Sukuk index remains significant in the long run these results is illustrated in the following figure 5:

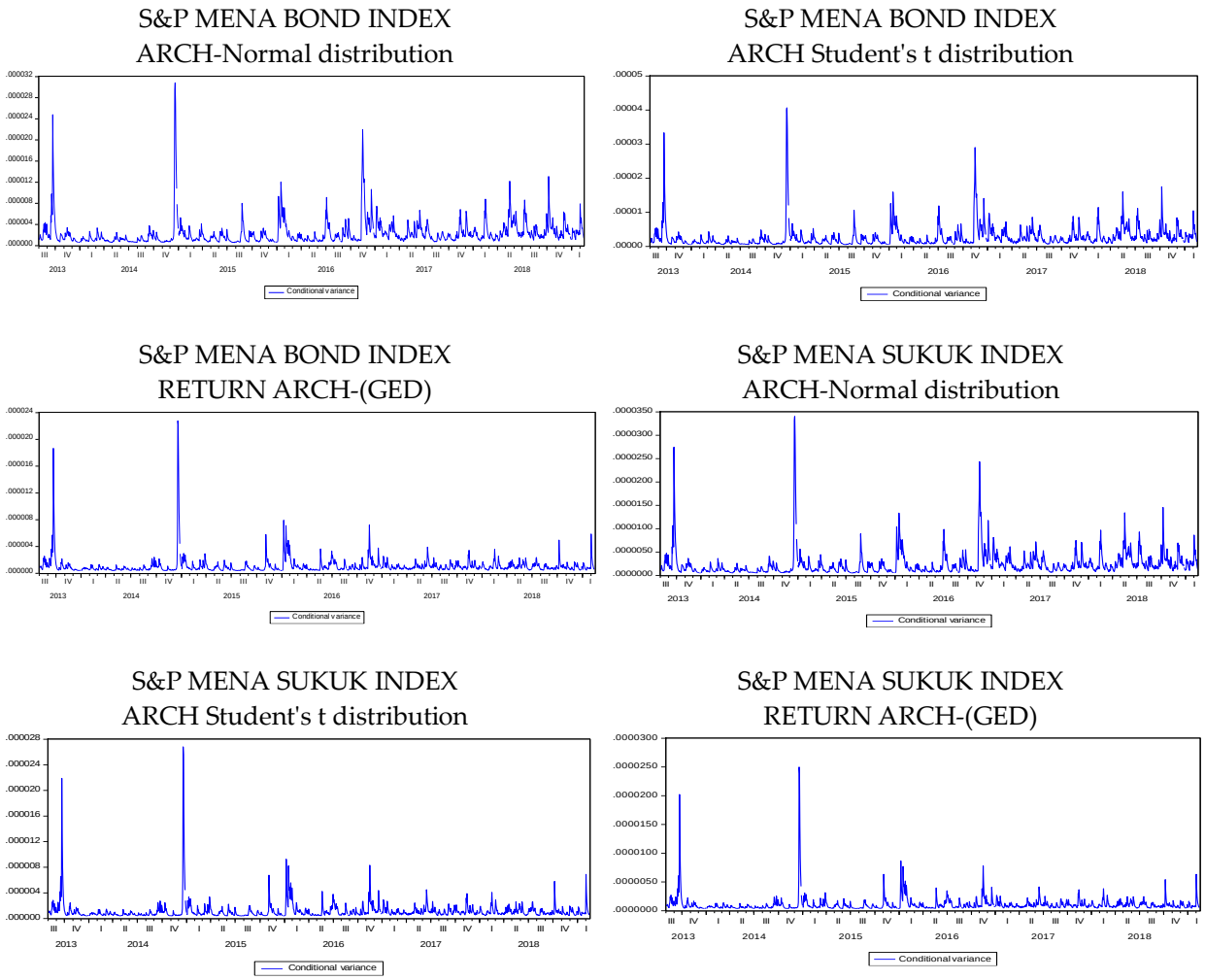

Figure 5: Conditional volatility for S&P MENA bond and Sukuk index for GARCH model

Table 5: EGARCH model parameters for S&P MENA SUKUK and S&P MENA Bond indexes

	S&P MENA BOND INDEX RETURN			**S&P MENA SUKUK INDEX RETURN**		
	Gaussian	**Student's**	**GED**	**Gaussian**	**Student's**	**GED**
ω	-1.787189	-1.586333	-1.780150	-2.210256	-2.442053	-2.363249
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
α_1	0.406710	1.738011	1.747414	0.381071	0.434650	0.407793
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
γ_1	-0.091650	-0.044282	-0.216354	-0.110855	-0.081522	-0.086712
	[0.0000]	[0.7666]	[0.0000]	[0.0000]	[0.0115]	[0.0000]
β_1	0.886886	0.948181	0.811948	0.861842	0.847060	0.852655
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
υ		340.6714	79.67985		4.267964	1.160725
		[0.9524]	[0.0157]		[0.0000]	[0.0000]
LnL*	7465.931	-3853.350	-3535.761	7985.300	8052.089	8050.876
AIC*	-10.40716	5.378884	4.936252	-11.13013	-11.22188	-11.22019

According to LnL and AIC, the best model to estimate volatility is giving by EGARCH - Normal distribution for both S&P MENA BOND INDEX RETURN and S&P MENA SUKUK INDEX RETURN. In order to capture the asymmetries in the return series, the asymmetrical EGARCH (1, 1) model is used to estimate the returns of the S&P MENA Sukuk and Bond indices and the result is presented in table 5.

The table reveals that ARCH (α) and GARCH (β) are less than one, indicating that conditional variance isn't explosive; the estimated coefficients are statistically significant at 1%level. γ, the leverage coefficient, is negative and is statistically significant at 1% level, exhibiting the leverage effect in return during the study period. The analysis shows that there is a negative correlation between past return and future return (leverage effect); hence, EGARCH (1, 1) model supports for the presence of leverage effect on the Sukuk and Bond return indices.

The asymmetric effect captured by the parameter (γ) in EGARCH model is negative and statistically significant at 1% level providing the presence of leverage effect for both Sukuk and Bond indices, which shows that positive shocks have less effect on the conditional variance when compared to the negative shocks, the following figure 6 shows the evolution of conditional volatility for both indexes.

The main advantage of the EGARCH model lies in the fact that the parameters are not restricted of being positive, which is not valid in the case of GARCH model, so the EGARCH model shows the impact of negative and positive shocks witch give us more advantage in terms of analysis.

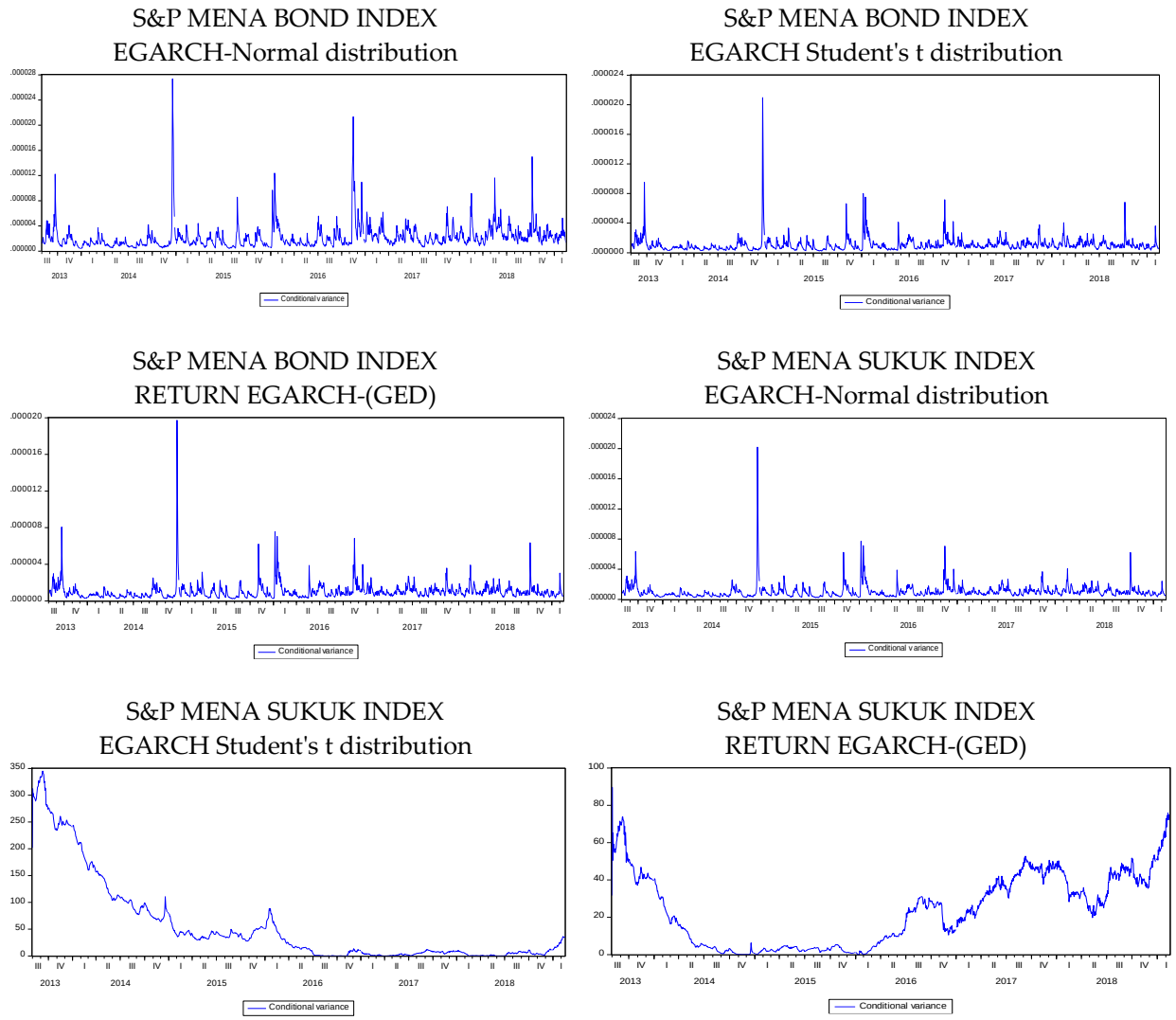

Figure 6: Conditional volatility for S&P MENA bond and Sukuk index for GARCH model

5. Financial Discussion

In general, the Sukuk differ from bonds in several ways, first of all, Sukuk are asset backed which is not the case for bonds, in this case, we can say that Sukuk are more stable economically, because bonds are just a debt, so they don't rely on a real asset that can be recovered or sold, in this scenario, the bond issuer could note refund the investors in extreme cases of bankruptcy.

The second difference is that the return of Sukuk is based on the usufruct of the underlying asset, which different for bonds where the yield is provided by the issuer (company), so this yield is not connected to the real economy.

The third difference is that, for Sukuk the investor bay to holds until maturity, whereas for the bonds they can be the object of speculation, which can harm the well-being of the economy. This can also appear in the evolution of financial series of both bond and Sukuk, in our study we have seen that the Sukuk have less volatility than bonds. Also, in terms of heteroscedasticity, the Sukuk are more stable and have less shock which is notes the case for bonds where shocks can cause more turbulence in the series.

The lest difference is related to the interest rate, for the bond, if the interest rate offered by banks is a good deal and have more yield than the bonds, investors will switch and make deposits in the bank instead of baying bonds, this mechanism tends to lower the value of the bond in the market, but for Sukuk it's not the case there is no direct effect of interest rate. Since investors are already knowing that the interest rate is prohibited by sharia lows.

6. Conclusion

in the broad sense, financial shocks and crises can affect any asset in the market regardless, but in a normal state, classic assets tend to have more volatility than the sharia-based assets. For this study, we have compared Sukuk to bond in terms of volatility (risk). Also, we have estimated both, a Sukuk and a Bond index (S&P MENA BOND Index and S&P MENA Sukuk index) using GARCH and EGARCH model. The results of our estimation confirm that the Sukuk react less to shocks. Also, the conditional volatility for Bonds tend to have more turbulence and risk, but for Sukuk we can observe that the conditional volatility is less important and has less impact on the evolution of the Sukuk index. These results show that the Sukuk are more stable and have less risk, in addition to all the advantages that we have mentioned in the financial discussion part.

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