Transmission of shocks between Islamic and conventional banks in Emirates Arab Union

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Abstract- The objective of this paper is to test the existence of the contagion effect between Islamic and conventional banks in Emirates Arab Union. For this purpose, we use the DCC- GARCH model to estimate the conditional dynamic correlation which used to assess the financial contagion. We employ a sample composed of three Islamic bank and four conventional banks during the period of study from March 31, 2004 to March 18, 2014. The empirical results show that the correlation between the returns of the two types of banks in Emirates Arab Union increased between the period of calm and crisis. This finding implies the existence of a contagion effect between Islamic and conventional banks in Emirates Arab Union. In addition, thus result implies that financial contagion represent a major source for the spread of the crisis between the Islamic and conventional banks in Emirates Arab Union.

Keywords: Contagion;Islamic;conventional;banks; DCC-GARCH

JEL Classification: Q9, Q91.

KAUJIE Classification: E3, H2, I2.

I-Introduction

The global financial crisis in 2007 was one of the most turbulent economic events in world. In this respect, Islamic banks have emerged as an alternative to conventional banking.

Many researchers show that Islamic banks have been affected by the crisis because it is exposed to the same risks. The spread of the crisis is due to two factors, the first isthe direct exposure of financial institutions around the world to the US crisis. But the second factor is due tocontagion.

There are many studies of the existence of contagious consequences of different crises in mechanisms. specific transmission. The first empirical study on financial contagion consisted of a simple comparative study of Pearson's correlation coefficients between markets in times of calm and crisis.

Contagion has defined for many ways. contagion is the spread of financial disturbancesfromonecountrytoothers.KaminskyandReinhart(2000)definedcontagion as the spread of financial market disturbances from one country to financial markets of other countries. Other authors like Pericoli and sbracia (2001) contagion is defined as a significant increase in co-movement of prices and quantities across markets following a crisis in a marketoragroupofmarkets.ForbesandRigobon(2002) specifiedthatcontagion is find as a transmission mechanism during financial turbulence. Consequently, this change can be expressed as a significant increase in correlation across markets.

The source of banking contagion is the presence of the interbank market. The mission of an interbank market is to transfer liquidity between banks. Contagion risk is said to be triggered by liquidity shocks to the market, enabling the transmission of crises.

According to Forbes and Rigobon (2001), contagion causes an increase in correlation between financial assets.Accordingtothem,this mechanism is find only during crisis periods. On another side, Van Rijckeghen and Weder (2000) examined the notion of liquidity in the banking system. Indeed, banks react to a crisis in a country by a generalized reduction in credit granting depending on the borrowing countries. Therefore, investors will rebalance their portfolios, causing the spread ofcrises.

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Contagion exists with the existence of significant correlations in times of crisis. King and Wadhwani (1990) and Lee and Kim (1993) use the correlation coefficient between equity returns to test the contagion of stock market crash on equity markets in many countries.

Gulf countries have recently become more integrated into the world economy and have also been seriously affected. indeed, it is important to examine the financial contagion in each country, especially in the context of Islamic and conventional banks.

In this context, we will focus empirically on the financial contagion between Islamic banks and the conventional banks Emirates Arab Union. Then, we used the DCC-GARCH model to estimate the conditional dynamic correlation which quantifies the financial contagion. We employ a sample composed by three Islamic bank and four conventional banks during the period of study from March 31, 2004 to March 18, 2014. The empirical results find that the correlation among the returns of the two types of banks in Emirates Arab Union increased between the period of calm and crisis. This finding implies the existence of a contagion effect between Islamic and conventional banks. Also, thus result implies that financial contagion represent a major source for the spread of the crisis between the Islamic and conventional banks in Emirates ArabUnion.

The rest of our paper is organized as follow: in section 2, presents the literature review. Section 3 summarizes the econometric methodology and data used to test the existence of the financial contagion. Section 4 presents the empirical results. Finally, Section 5 presents the conclusions.

II- **Literature review**

There are various methods of calculating financial contagion. Hamao et al .(1990) performed their research on the New York , London and Tokyo stock exchanges using the ARCH model. They examine the volatility of stock prices in each market and the potential transition from one market to another.The findings show that there are volatility effects transfer from New York to Tokyo and rates from London to Tokyo, but not from Tokyo to New York or London.

In addition, Tai (2004) uses the M-GARCH method to estimate conditional average stock returns and volatility throughout the crisis time. In addition, Tai (2004) applies the BEKK model developed by Baba et al .(1991) to assess the presence of contagion. Their findings indicate that the contagion effects appear to be multi-directional on average. The output shocks on each separate part of the three markets (banks, capital markets and the money market) seem to examine all markets, but the contagion effects on volatility were mainly due to negative shocks in the banking sector. These empiric findings indicate that the effect on volatility and returns can be contagious, indicating that banks can be an significant source of contagion throughout the crisis.

Hwang et al .(2010) investigate the contagion impact of the subprime crisis on the international stock market. The DCC-GARCH model is used in 38 countries. The result demonstrate that financial contagion not only occurred in developing markets, but also in developed markets during the crisis. Bouaziz et al .(2012) examine the contagion effects on the capital markets of developing countries during the subprime financial crisis (2007–2008). They're using a DCC-GARCH model.The findings indicate that market correlations have risen dramatically during the crisis era and suggest that the crisis has spread through various markets, suggesting the presence of contagion. Bekaert and Harvey (1997) research the contagion of the stock market in twenty developing countries. They employ the GARCH(Generalized Autoregressive Conditional Heteroskedasticity) multivariate model. They use macro-economic variables to calculate the degree of integration of each country (the share of foreign trade in GDP). According to their findings, the more integrated country is subjected to a heavy external shock from the transmission channels.

Nevertheless, few studies have focused on crisis transmission between conventional and Islamic banks. Cihak and Hesse (2008) found that small Islamic banks tend to be financially stronger than smaller commercial banks; that large commercial banks are financially stronger than large Islamic banks; and that small Islamic banks are stronger than large Islamic banks.Boumediane and Caby (2009) are studying the stability of Islamic banks during the subprime crisis. The results show that the volatility of Islamic banks' yields increased during the 2007 crisis.

They found two major conclusions: primary, Islamic banks were affected by the crisis, and subsequently, they were faced with the same risks as traditional banks. Empirical findings show that there are signs of a risk transfer between the Islamic stock market and the three key conventional markets, resulting in contagion across global equity markets. The volatility structure of these markets is driven by short-term volatility in the first cycle and high long-term volatility in the second period.

The challenges raised by Islamic banking therefore raised the question of whether there is

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any chance that the Islamic banking industry will hardly be insulated from infectious shocks from crisis-oriented countries during the recent financial crisis of 2008.

In order to investigate the contagion effects of banking industries across countries, Dungey and Gajurel (2015) use the CAMP-based factor loading model and EGARCH to analyze the structural, idiosyncratic and unpredictable contagion impacts. The empiric investigation of Dungey and Gajurel(2015) specifically indicated that factors such as stronger regulatory capital, retail banking practices and increased market concentration appear to minimize the risk of a banking crisis even in the presence of contagion effects.

Ben Ltaifa M et al .(2018) explore the contagion between Islamic and traditional banks in Malaysia and notice the contagion effect between Islamic and conventional banks in Malaysia.

III-Data andmethodology

The main objective of this paper is to verify the presence of the financial contagion effect between Islamic and conventional banks in Emirates Arab Union. To do, we employ the DCC-GARCH model to assess the conditional dynamic correlation which used to capture the financial contagion. We utilize a sample composed by 3 Islamic banks and 4 conventional banks during the period of study from March 31, 2004 to March 18, 2014. We choose these banks because they represent 90% of the total market capitalization of banks listed in the stock exchange of Emirates Arab Union.

We employ the DCC-GARCH model to perform the estimation of financial contagion between conventional and Islamic banks in Emirates Arab Union. we base our study on the use of econometric model DCC-GARCH developed by Engle (2002). We note that the vector comprises the performance of both titles.
We denote by :

$$A(L)r_t = \mu + e_t \qquad \textbf{(1)}$$

Where, μ indicates the vector of expected returns e_t is the vector of error terms.

The model of the Dynamic Conditional Correlation (DCC) is based on the assumption that the conditional returns are normally distributed with zero mean and the matrix of the conditional covariance is $H_t = E\left[r_t r_t^{'} \middle| I_{t-1}\right]$. The covariance matrix is measured by the equation:

$$H_t = D_t R_t D_t \qquad \textbf{(2)}$$

With, $D_t = diag\left[\sqrt{h_{1t}}, \sqrt{h_{2t}}\right]$ is the diagonal matrix of volatilities temporal standard types deviations from the univariate estimate of GARCH (1,1). The DCC specification (1,1) can be obtained based on some steps:

First, one identifies the specification GARCH (1,1):
$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} \ \textbf{(3)}$$
Where, α_0 , α_1 et β_1 are parameters to be estimated.

The Conditional correlation matrix R_t standardized distributions ε_t is given by:

$$R_t = \begin{bmatrix} 1 & q_{12t} \\ q_{21t} & 1 \end{bmatrix} \qquad \textbf{(4)}$$

With, $\varepsilon_t = D_t^{-1} r_t$

The matrix R_t is expressed as follows:

$$R_t = Q_t^{*-1} Q_t Q_t^{*-1} \qquad \textbf{(5)}$$

Where, Q_t is the temporal conditional volatility matrix ε_t and Q_t^{*-1} is the inverse of the Diagonal matrix Q_t. Note that Q_t^{*-1} is:

$$Q_t^{*-1} = \begin{bmatrix} 1/\sqrt{q_{11t}} & 0 \\ 0 & 1/\sqrt{q_{22t}} \end{bmatrix} \qquad \textbf{(6)}$$

Thus, the DCC (1,1) is given by equation:

$$Q_t = \omega + \alpha \varepsilon_{t-1} \varepsilon_{t-1}^{'} + \beta Q_{t-1} \qquad \textbf{(7)}$$

Where, $\omega = (1-\alpha-\beta)\overline{Q}$, with $\overline{Q}$ is the covariance matrix unconditional standardized distributions ε_t. ω , α et β are parameters to be estimated.

Finally, the dynamic conditional correlation (DCC) is given by:

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$$\rho_{12t} = \frac{q_{12t}}{\sqrt{q_{11t} q_{22t}}} \quad \textbf{(8)}$$

According to Engle (2002), the maximum likelihood estimator of the DCC is

$$L = -\frac{1}{2}\sum_{t=1}^{T}\left(k\log\left(2\pi\right)+2\log\left(\left|D_t\right|\right)+\log\left(\left|R_t\right|\right)+\varepsilon_t^{'}R_t^{-1}\varepsilon_t\right) \quad \textbf{(9)}$$

IV-Empirical results

The main objective of this paper is to investigate empirically the presence of the financial contagion effect between Islamic and conventional banks in UAE. So, we utilize the DCC GARCH model to assess the conditional dynamic correlation which used to determinate the financial contagion. We employ a sample composed by 3 Islamic banks and 4 conventional banks during the period of study from March 31, 2004 to March 18, 2014.

In Table 2, we present the different descriptive statistics of dynamic conditional correlations between the different Islamic and conventional banks. We remark that in average the dynamic conditional correlation between Islamic and conventional banks is low. However, we can observe that DCC have an important level risk in negative or in positivesign.Thelevelriskbetweenislamicandconventionalbanksvariedbetween30% and4%.

According to the two coefficients of asymmetry (skewness) and leptokurtic (kurtosis), the various variables used in this paper are characterized by non-normal distributions.Asfortheskewness,thisreflectsthattheDCCbetweenIslamicconventional banks is skewed to the right and that it is far from being symmetric for allvariables.

Additionally, the kurtosis statistic shows the leptokurtic feature of the series and shows the existence of a high peak or fat tail in the volatilities of all variables. Similarly, the positive estimate of the Jarque-Bera statistic signifies that we reject the null hypothesis of normal distribution of the variables used in our study. In addition, the high value of the Jarque-Bera statistic reflects that the series is not normallydistributed.

According to Figures 1, 2 and 3, we found that dynamic conditional correlations betweenbanksisveryvolatilefortheentirestudyperiodforsomebanksandpeaksmainly during the 2007 crisisperiod.

In Table 3, we estimate the DCC-GARCH (1,1) between conventional andIslamic banks in UAE. Then, we find that the dynamic conditional correlation estimated between conventional and Islamic banks is low for some and strong for others with a negative or positivesign.

We note that the level of DCC can explain the phenomenon of contagion between Islamic and conventional banks in UAE. Thereafter, we can confirm the existence of a contagion on the UAE banking market for the study period used in our research.

Additionally,theresultsoftheDCC-GARCHmodeldemonstratethatthecrisishas also affected GCC financial markets other than stock markets. The financial crisis of2008 has to a certain extent disrupted the syndicated loanmarkets.

1. V-Conclusion

The purpose of this paper is to examine empirically the existence of the financial contagion effect between Islamic and conventional banks in UAE. So, we use the DCC- GARCH model to assess the conditional dynamic correlation which employed to assess the financial contagion. We utilize a sample composed by 3 Islamic bank and 4 conventional banks over a daily period of study through March 31, 2004 to March 18, 2014.Our results verify the existence of a phenomenon of contagion between Islamic and conventional banks. These results are verified by testing the existence of contagion. To conclude, the Islamic finance does not evolve in a separate financial environment, but itis facing an environment of interdependence with the international financial market who knows more and more repetitive and unpredictable shocks, and requires measures to mitigate the effects of shocks on the real sector of the economy. Depending found conclusion, operators of Islamic finance should try to adopt prudent risk management practices, and adopt hedging mechanisms to defend the stability of the Islamic financial markets in times of economic and financial crisis. Several approaches havebeendeveloped inthisdirection,suchasthemacro-prudentialpolicywhichaimstolimitsystemicrisksandto avoid exposure to the real sector of the economy to

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the risks of devastating disruption of financial systems.

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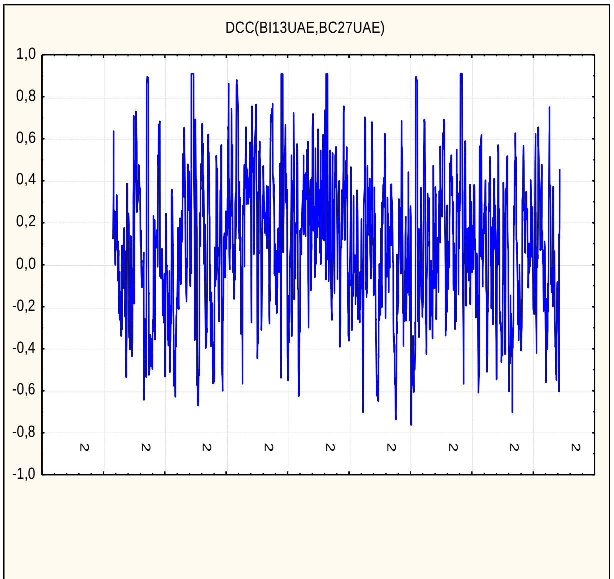
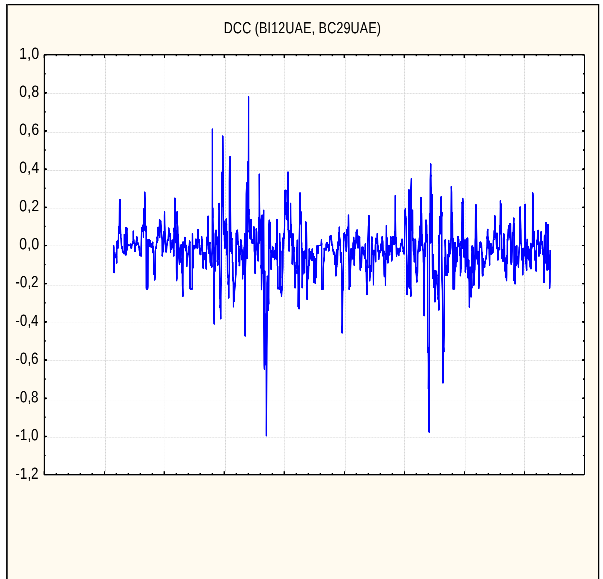
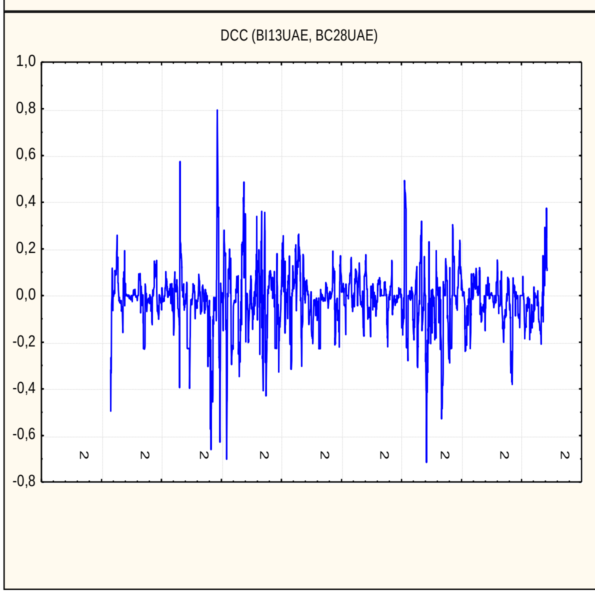
Appendix

Figure 1: dynamic conditional correlations between BI1 and conventional banks of UAE







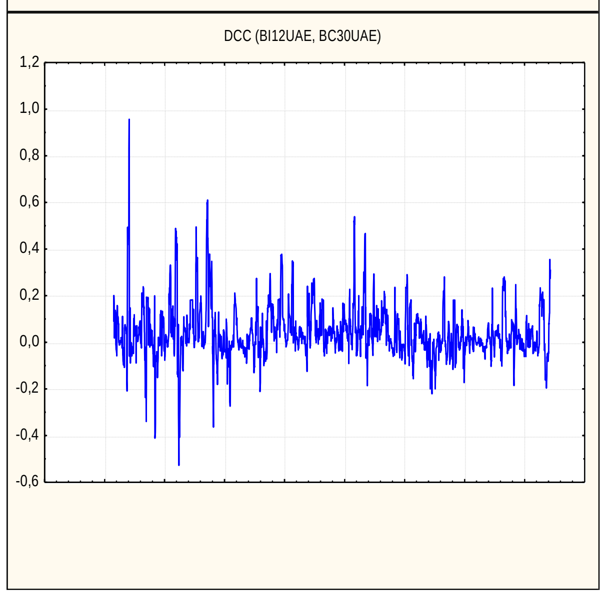


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figure 2: Dynamic conditional correlations between BI2 and conventional banks of UAE

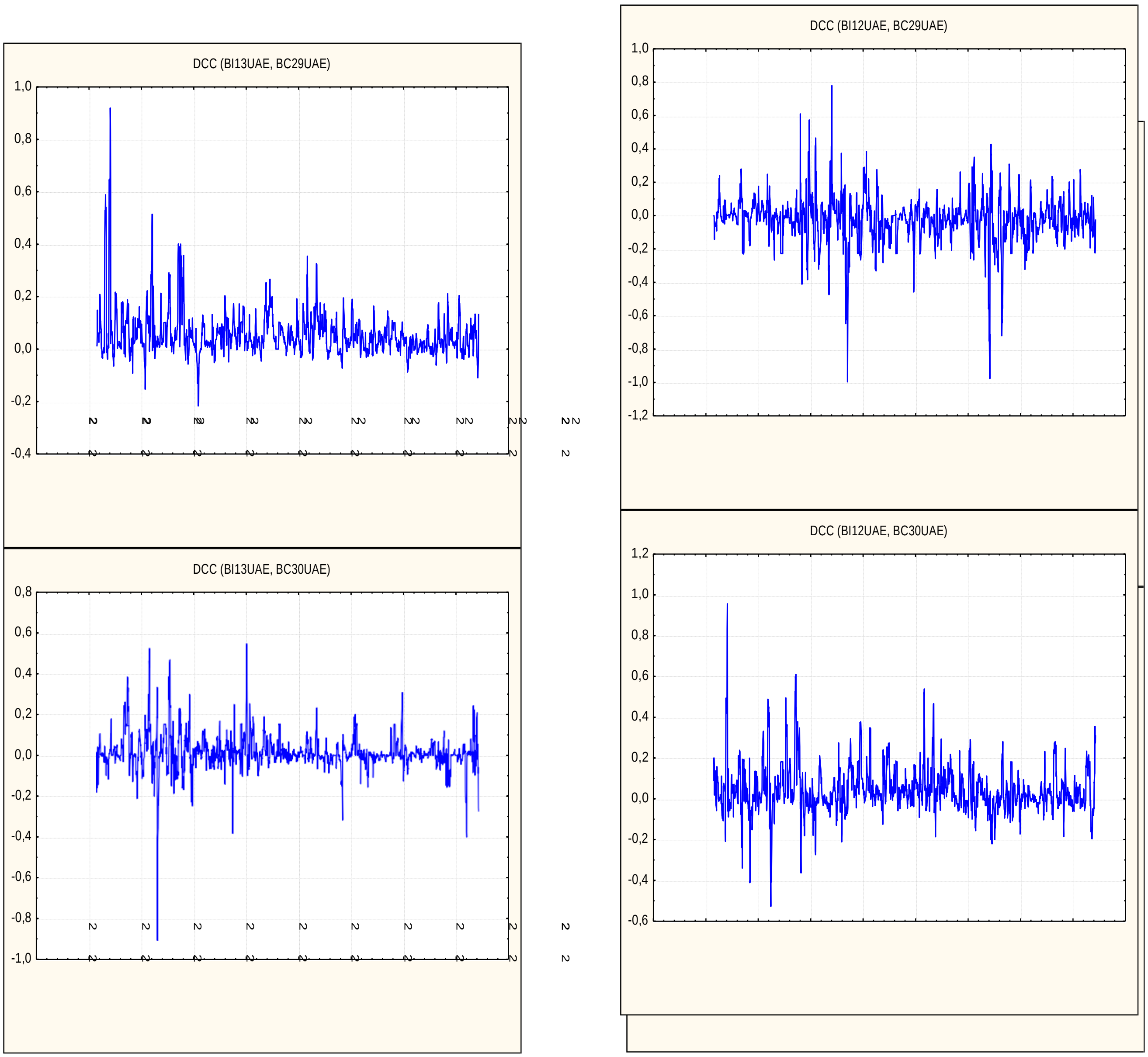

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Figure 3: dynamic conditional correlations between BI3 and conventional banks of UAE

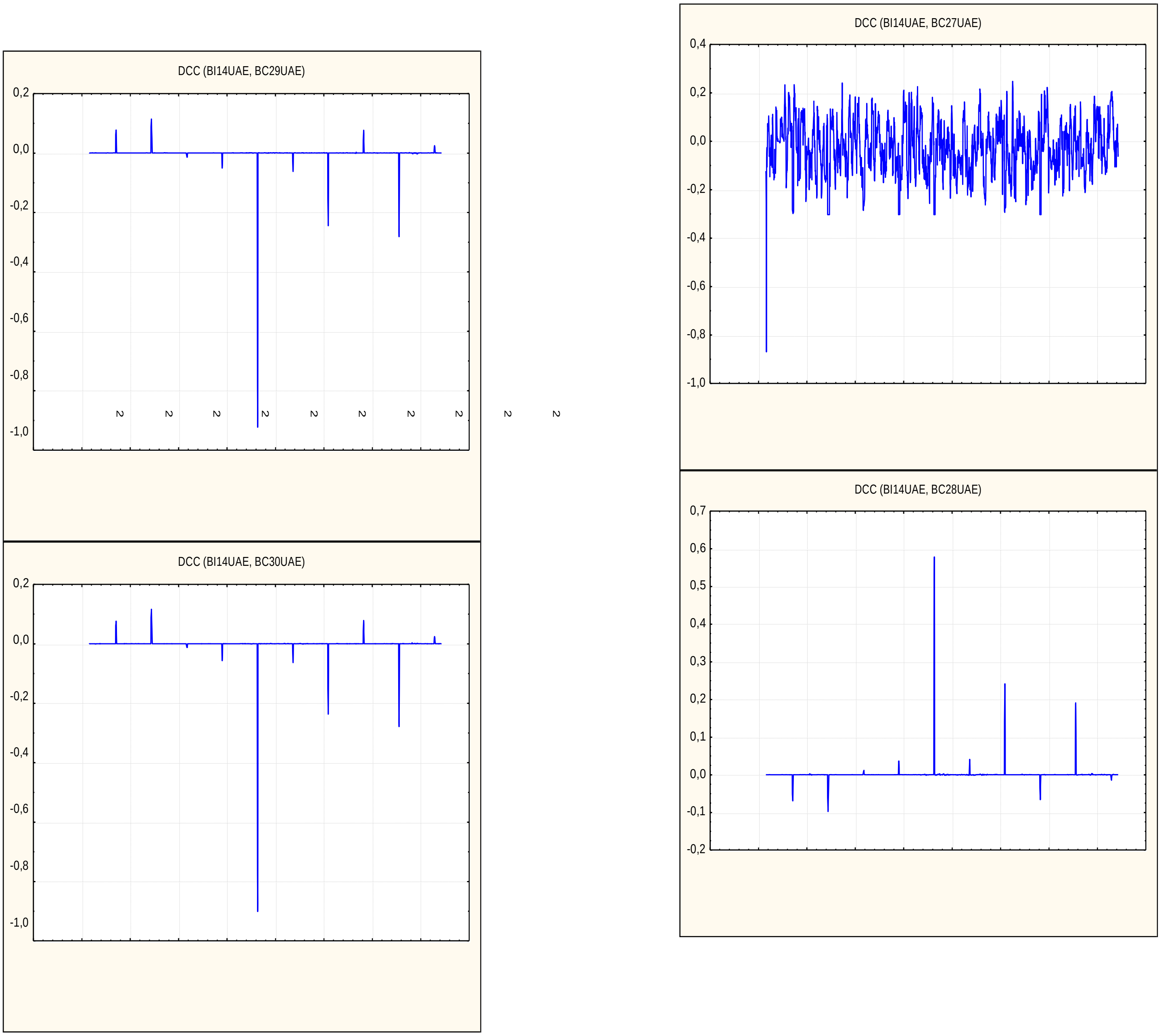

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Table 1. List of banks

UAE	Dubai islamic bank	BI1
UAE	Abu dhabi islamic bank	BI2
UAE	Sharjah islamic bank	BI3
UAE	abu dhabi commercial bank	BC1
UAE	commercial bank of Dubai	BC2
UAE	national bank of abu dhabi	BC3
UAE	banque of Sharjah	BC4

Table 2. Descriptive statistics of the DCC between the Islamic banks and conventional banks of UAE

	(BI1, BC1)	**(BI1, BC2)**	**(BI1, BC3)**	**(BI1, BC4)**
Mean	-97095	0.040363	-026750	0.043786
Median	-7290	0.011043	-014496	0.022702
Maximum	0.763347	0.909087	0.780018	0.956814
Minimum	-9079	-0.908940	-996851	-527696
Std. Dev.	0.332474	0.310577	0.133365	0.114511
Skewness	-3156	0.294114	-973664	1.182108
Kurtosis	2.728722	3.489222	10.56093	8.674222
Jarque-Bera	9.577765	62.60817	6520.159	4041.562
Probability	0.008322	0.000000	0.000000	0.000000
Observations	2567	2567	2567	2567
	(BI2, BC1)	**(BI2, BC2)**	**(BI2, BC3)**	**(BI2, BC4)**
Mean	0.097095	-0.018050	0.057328	0.014697
Median	0.107290	-0.004428	0.038647	0.002032
Maximum	0.909079	0.795241	0.920060	0.545644
Minimum	-0.763347	-0.715561	-0.217458	-907392
Std. Dev.	0.332474	0.129522	0.085417	0.086064
Skewness	0.063156	-0.256767	3.129823	-253037
Kurtosis	2.728722	8.001977	20.71845	17.76903
Jarque-Bera	9.577765	2704.280	37769.84	23357.60
Probability	0.008322	0.000000	0.000000	0.000000
Observations	2567	2567	2567	2567
	(BI3, BC1)	**(BI3, BC2)**	**(BI3, BC3)**	**(BI3, BC4)**
Mean	-0.028475	0.001497	-0.002160	-0.002110
Median	-0.028293	0.000000	-1.51E-31	-2.47E-31
Maximum	0.247435	0.578261	0.114027	0.116308
Minimum	-0.869830	-0.097851	-0.923479	-901097
Std. Dev.	0.109979	0.025526	0.037295	0.036849
Skewness	-0.358256	15.67071	-18.15309	-18.07446
Kurtosis	4.207882	298.2213	387.3103	384.2985
Jarque-Bera	210.9613	9427086.	15938132	15690283
Probability	0.000000	0.000000	0.000000	0.00000
Observations	2567	2567	2567	2567

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Tableau 3: Estimation du DCC et effet de contagion

	DCC	**t-statistic (DCC)**
(BI1, BC1)	-0.9999286	(-1.6e+05)*
(BI1, BC2)	0.8758746	(59.55)*
(BI1, BC3)	-0.9999186	(-7.8e+04)*
(BI1, BC4)	-0.9999411	(-4.6e+05)*
(BI2, BC1)	0.9999121	(96143.47)*
(BI2, BC2)	0.9998858	(32697.62)*
(BI2, BC3)	0.9999279	(1.2e+05)*
(BI2, BC4)	0.9999422	(2.0e+05)*
(BI3, BC1)	-0.9998043	(-2.2e+04)*
(BI3, BC2)	-0.9998626	(-5.3e+04)*
(BI3, BC3)	-0.9998564	(-4.0e+04)*
(BI3, BC4)	-0.9649263	(-3.0e+04)*
(*), (**) et (***) sont des valeurs significatives à un seuil de 1%, 5% et 10%.		

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