THE IMPACT OF MAJOR OIL, FINANCIAL AND UNCERTAINTY FACTORS ON SOVEREIGN CDS SPREADS: EVIDENCE FROM GCC, OTHER OIL-EXPORTING COUNTRIES AND REGIONAL MARKETS

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Abstract

The aim of this paper is to investigate the impact of oil price volatility and major financial and uncertainty factors on sovereign credit default swap (CDS) spreads in the case of the oil-rich Gulf Cooperation Council (GCC) countries, other oil-exporting countries and regional markets namely the G7, BRICS, Council of Europe (CE), Asia, North America (NA) and the N11 nations. We first employ the standard quantile regression analysis that allows one to investigate the dependence dynamics of the sovereign CDS spreads under different market circumstances. Consequently, we use the causality-in-quantiles, which allows for identifying the quantile range for which causality is relevant. Empirical results show that the sovereign CDSs of the non GCC oil-exporting countries (i.e., Venezuela, Mexico and Russia) are the most affected by oil prices, which is more than those of major global regions/blocs. However, the results show no or little dependence for Saudi Arabia, UAE and Norway which have the largest sovereign wealth funds. The results also show that the sovereign CDS spreads are more sensitive to global bond market uncertainty factors than to global equity market uncertainty factors. Finally, we find causality-in-quantiles between sovereign CDS and global financial risk and uncertainty factors and this causality relationship is different across countries and regions/blocs, particularly in the lower quantiles (i.e., bearish markets).

JEL Classification: C1; G1; G2

Keywords: Sovereign CDS spreads; Oil volatility; Financial uncertainty; Causality-in-quantiles approach.

ملخص

الهدف من هذه الورقة هو دراسة تأثير تقلبات أسعار النفط والعوامل المالية وعدم اليقين الرئيسية على مبادلة عجز الائتمان السيادية في حالة دول مجلس التعاون الخليجي الغنية بالنفط والدول الأخرى المصدرة للنفط والأسواق الإقليمية، وهي مجموعة السبعة، ومجموعة بريكس، ومجلس أوروبا، وآسيا، وأمريكا الشمالية. نستخدم أولا تحليل الانحدار الكمي القياسي الذي يسمح للمرء بالتحقيق في ديناميات التبعية لفروق عجز الائتمان السيادية في ظل ظروف السوق المختلفة. ونتيجة لذلك، نستخدم السببية - في الكميات، والذي يسمح لتحديد النطاق الكمي والسببية ذات الصلة. وتبين النتائج التجريبية أن البلدان النامية المصدرة للنفط في دول مجلس التعاون الخليجي (أي فنزويلا والمكسيك وروسيا) هي الأكثر تضررا من أسعار النفط، وهي أكثر من أسعار المناطق / التكتلات العالمية الرئيسية. ومع ذلك، فإن النتائج لا تظهر أو تعتمد قليلا على المملكة العربية السعودية والإمارات العربية المتحدة والنرويج التي لديها أكبر صناديق الثروة السيادية. وتظهر النتائج أيضا أن فروق أسعار الفائدة السيادية أكثر حساسية لعوامل عدم اليقين في سوق السندات العالمية مقارنة بعوامل عدم اليقين في سوق الأسهم العالمية. وأخيرا نجد العلاقة السببية بين عجز الائتمان السيادية والمخاطر المالية العالمية وعوامل عدم اليقين، وهذه العلاقة السببية تختلف عبر البلدان والمناطق / الكتل، وخاصة في المقادير الدنيا.

1. Introduction

The CDS is the most common type of credit derivatives that offers protection against default and other major credit events. The market price of a CDS (called CDS premium or spread) reflects the risk of the underlying credit as it widens in the face of financial difficulties and rising dangers in the national economy. Sovereign CDSs are bilateral contracts between a buyer and a seller where the seller is offering protection against credit events that may affect a sovereign borrower. Since sovereign CDS contracts are generally used to hedge adverse credit events by a sovereign borrower, it will be interesting to examine how the sovereign CDS spreads are interconnected with oil prices, expected risks, and uncertainty factors of financial markets under different oil and financial market conditions (normal, bullish and bearish markets).

Our research has become relevant and timely for the oil-exporting countries in the wake of the recent collapse of oil prices which dropped from $100 in June 2014 to $26 in February 2016. This grave instability of oil prices has jolted the sovereign CDS markets, particularly those of the oil-exporting countries like Russia and Venezuela. A widening of a CDS spread in response to a credit event or recently to a certain oil price shock indicates an increase in the level of the credit risk of the affected countries, while a narrowing in the spread reveals a decrease in the credit risk of those countries. On the other hand, financial risk and uncertainty factors should in theory affect the economy by increasing the risk that investors perceive they will face when making economic decisions (ex. Bloom, (2009); Arellano et al., (2012); Bloom, (2014); Christiano et al., (2014); Caldara et al., (2016); among others). The financial uncertainty is closely related to unexpected credit changes that may affect investment decisions. Indices such as VIX and MOVE gauge market risks in the form of expected volatility in the equity, bond and foreign exchange markets.

There are numerous recent empirical studies on sovereign CDS markets. The important studies include Longstaff et al. (2011) and Pan and Singleton (2008) but these studies do not fully investigate the impact of the changes in financial risk and uncertainties factors particularly on major oil-producing countries which have not been researched. These studies find a strong relationship between the U.S. CDS spreads and the VIX index. Baum and Wan (2010) show that sovereign CDS spreads rise under economic policy uncertainty. They also argue that interest rate risks and macroeconomic uncertainty factors are significant determinants of CDS spreads. Ang and Longstaff (2013) find that the systemic risk component of the sovereign CDS spreads is influenced by global financial factors. Alter and Schüler (2012) show evidence of joint dynamics from banks to sovereign CDS before the public rescue programs for the financial sector. Dieckmann and Plank (2012) test whether Western European sovereign CDS spreads capture a transfer of risk from the private sector to the public sector from January 2007 through April 2010. They indicate that sovereign CDS spreads rose in the European region after the recent global financial crisis.

Few recent studies examine the impact of oil prices on sovereign credit risk. Sharma and Thuraisamy (2013) for example investigate the impact of oil price uncertainty on sovereign CDS spreads using the data of eight Asian countries. They find that oil price uncertainty predicts out-of-sample CDS spread returns for six out of the countries under study, namely Malaysia, Indonesia, Japan, the Philippines, Vietnam and South Korea. Bouri et al. (2016) investigate the volatility transmission from commodities to sovereign CDS spreads using daily data for seventeen emerging and six frontier countries. Overall, they find a significant volatility spillover from commodity markets to sovereign CDS spreads of emerging and frontier markets.

The recent oil collapse, the 2008-2009 global financial crisis, the 2010-2012 European sovereign debt crisis and the elevation in economic uncertainty have motivated us to investigate the dynamic co-movement between sovereign CDS spreads and major oil, financial and uncertainty factors for the GCC, other major oil-exporting countries and different regions/blocs which is relevant and timely but has not been done before. The main objective of this study is to investigate how major oil prices, global uncertainty in bond markets and global financial factors shape the CDS spreads' distributions in the GCC (namely Bahrain, Qatar, Saudi Arabia and United Arab Emirates (UAE)), other major oil-exporting countries (namely Mexico, Nigeria, Norway, Russia and Venezuela) and regional markets as well as those of the G7, BRICS, Council of Europe, Asia and N11 nations. These countries and regions/blocs are different in terms of their relative dependency on oil revenues, amounts of foreign reserves, levels of sovereign wealth funds and sensitivity to uncertainty. The uncertainty indexes include the global bond market uncertainty as represented by the Merrill Lynch option volatility estimate (Move) index, the stock market uncertainty as captured by the CBOE volatility index (VIX), and the global market bond price risk captured by the US 10-year Treasury bond interest rate (US bond). We also use the Brent crude oil, since it benchmarks two thirds of the oil market, to account for the oil prices dynamics and the CBOE crude oil volatility index (OVX) to account for the oil price uncertainty.

First, we first utilize the quantile regression analysis (QRA hereafter) which allows one to investigate the dependence dynamics of the sovereign CDS spreads under different market circumstances i.e., downturns or bearish credit markets (lower quantiles), upturns or bullish credit markets (upper quantiles) and normal states (intermediate quantiles)[1]. After that, we use the causality in quantiles approach which allows one to identify the quantile range for which causality is relevant. We examine the causality effect of global risk and uncertainty factors on the sovereign credit risk spread dynamics using a novel methodology to detect nonlinear causalities during alternative market states that can be characterized by normal, upward and downturn markets.

This study adds to the related literature on sovereign CDS markets in several ways. First, it investigates whether there is a co-movement and a causality relationship between sovereign CDS spreads and global financial risk and uncertainty factors, with a particular emphasis on oil-exporting countries, which has become timely and relevant after the recent collapses in oil prices. Second, if such a relationship exits, it addresses the question: under which market conditions is this relationship stronger or weaker, given the fact that sovereign CDS spreads go through boom, normal and bust periods? Third, it deepens and enriches the investigation of the casual relationship, by investigating which variable is the initiator or the leader of the causal relationship. Fourth, the recent available sample period (2009-2016) and the diversity of the markets under consideration allow us to make a comparison between countries and regions/blocs during different periods that include the collapses of oil prices in 2008 and 2014.

Using weekly data from January, 2009 to June, 2016 since there is no change in sovereign CDS spreads over days, our empirical results show the following findings. (i) There is a dependence and a co-movement between the oil price and the CDS spreads for Venezuela, Mexico and Russia for all quantiles, but an independence in the case of Bahrain, Qatar, Norway and G7 countries. Bahrain is a very minor oil producer and a center for of offshore banking in the region and also depends on Saudi Arabia for foreign aid since it is a minor oil producer. Qatar is a major natural

[1] We used also the quantile-on-quantile approach (QQA), advanced by Sim and Zhou (2015), which allows for relationships between the variables to be specific of the location of the dependent variable. However, we find similar results as in the case of the QRA.

gas producer and has a relatively large sovereign fund which it uses as a buffer against fluctuations in the oil and financial markets. The G7 countries are well developed economies and are not major oil exporters. (ii) There is a dependence and a co-movement between the oil price and sovereign CDS mainly during upturns or bullish markets. (iii) There is also a co-movement between the VIX index and the Mexico CDS market but independence in the case of Bahrain and Saudi Arabia which depends on its huge foreign reserves to stabilize the economy. (IV) There is a different dependence structure between the financial risk and global bond market uncertainty and the sovereign CDS. (V) There is Causality-in-Quantiles between the sovereign CDS and the global financial risk and uncertainty factors and this causality relationship is different across the diverse countries and regions/blocs. (VI) There is little evidence of reverse Granger causality from sovereign CDS to VIX and no evidence of Granger causality from sovereign CDS to MOVE, implying the presence of a unidirectional relationship flowing from the global equity and bond market uncertainty to the sovereign CDS markets. Furthermore; we show evidence supporting the instability of the relationship over time and across quantiles of the sovereign CDS spread dynamics. This suggests that market conditions might influence the lagged relationship between the sovereign CDS spreads and the global financial risk and uncertainty factors in this study.

This research should be useful to investors and policy makers particularly in the oil-exporting countries since it investigates the impact of oil, global financial and uncertainty factors on the credit risks of those countries under different oil and financial market conditions. It should provide them with the knowledge of the extent of the response of their CDS spreads to major changes in their oil and global financial markets which are considerably relevant to them.

The reminder of this study is organized as follows. Section 2 describes the data and provides preliminary analyses. Section 3 introduces the research methodology. Section 4 presents the empirical results, and Section 5 concludes the study.

2. Data Description and Preliminary Analyses

We use weekly time series for the 5-year sovereign CDS spread indices (the most frequently traded indices) of the GCC countries (Bahrain, Qatar, Saudi Arabia, UAE,) for which data are available.[2] We also use the sovereign CDS spreads for other major oil-exporting countries (Mexico, Brazil, Norway, Russia and Venezuela) as well as for regional markets namely the G7, BRICS, Council of Europe, Asia[3], North America and N11(the next 11) regions/nations over the period January, 2009 to June, 2016, totaling 391 weekly observations, for comparison purposes. The explanatory variables include the global bond market uncertainty (MOVE) index, the global stock market uncertainty (VIX) index, the US 10-year Treasury bond interest rate, the Brent crude oil price and the oil volatility index (OVX). The beginning of the sample period is restricted by the starting year of the data on the sovereign CDS spread indices at the country and region levels to make all series homogenous in length but still this period captures well the recent collapses in oil prices. Figure 1 plots the time-variation of the weekly sovereign CDS spreads.

[2] We use weekly data instead of daily because there is not much change in sovereign CDS spreads over days. The CDS spreads of almost all countries do not change on daily basis and since there are very small daily variations and most of the time we get zero values for the changes in the CDS spreads when we use the daily data, hence the results were not reliable. Further, the Quantile based methods are usually applied to weekly or monthly data.

[3] Asia refers to ASEAN (Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam), East Asia, Advanced Asia (Australia, Hong Kong SAR, Japan, Korea, New Zealand, Singapore, and Taiwan Province of China), South Asia and other Asian economies.

Figure 1 shows that the level of sovereign CDS spreads for all countries and region started to decrease since the beginning of 2009, in correspondence with the beginning of the end of the global financial crisis. It is evident also how the level of sovereign CDS spreads started to rise dramatically since 2011 for Norway, Europe, CE, and G7 in correspondence with the outbreak of the European sovereign debt crisis.

To account for the effects of global financial market risks on the sovereign CDS spreads, we use the VIX index - the Chicago Board Options Exchange (CBOE) Volatility Index for the stock market - also known as the fear index which measures the implied volatility of a wide range of options based on the S&P 500 index. To account for the market bond price dynamics, we use the US 10-year Treasury bond interest rate (US bond), and to capture the effect of financial uncertainty on global bond markets, we use the VIX for the bond market (the MOVE index). The MOVE index measures the implied volatility of the U.S. Treasury markets and is considered by international investors as a useful indicator to assess the psyche of the world's credit markets. To account for the effect of the global commodity market, we use the price of the Brent crude oil to represent oil prices. Finally, we use the OVX index - the CBOE crude oil volatility index—which measures the market expectations of volatility of crude oil prices by applying the VIX methodology to options on the United States Oil Fund. All data of our study are sourced from DataStream. Figure 2 plots the time-variation of risk and uncertainty indices from January, 2009 to June, 2016.

Figure 2 shows that uncertainty in oil prices (OVX index) rises since 2014 in correspondence with the outbreak of the recent collapse of oil prices.The descriptive statistics of the data series are shown in Table 1. This table shows the properties of changes in CDS spreads (also for other variables) but not the CDS spreads themselves to ensure stationarity for the regression estimates. The Jarque-Bera test rejects the null hypothesis of normality at the 1% level of significance, confirming the non-normality of the series under consideration, which is also supported by the measures of skewness and kurtosis. Panel A of Table 1 shows that the standard deviation of the changes in the CDS spreads of Saudi Arabia which is the world's largest oil exporter is the highest, compared to those of the other GCC countries. Bahrain, which has the most open GCC financial markets and receives a steady stream of foreign aid from Saudi Araba, has the lowest standard deviation of the CDS spreads among the GCC countries. For the other five oil-exporting countries, Venezuela in Panel B has the highest standard deviation of the CDS spreads of all the oil-exporting countries considered in this study including Russia. On the other hand, Norway which has the greatest sovereign wealth fund in the world and is a relatively more diversified economy has the lowest CDS volatility in this group. Interestingly, the CDS spread volatility for the non GCC oil-exporting countries and regions is higher than the volatility of the GCC CDS spreads. The reason for this anecdotal finding is probably due to the GCC markets being relatively closed to global investors, compared to the markets of the other countries and regions (blocs) considered in this study which have to deal with the full impact of global financial crises.

The volatility of the oil, financial and risk variables given in Panel D is generally much lower than that of the CDS spread for the non-GCC exporting-countries and the major regions under consideration. A comparison of the volatility underscores the high volatility of the CDS spreads, which justifies all the attention those financial derivatives have been getting.

By referring to the skewness, kurtosis ~~coefficients~~ and J-B statistics, one can confirm that the normality hypothesis of all the datasets is rejected. Additionally, the ARCH-LM(12) test of Engle (1982) is applied to all data to check the presence of ARCH effects. The results show a rejection of the null hypotheses of conditional homoscedasticity for all the datasets at the 1% significance level. Also, the results of the Ljung-Box test statistics of the residuals and squared residuals (Q(12) and $Q^2(5)$) reject the null hypothesis of a white noise process (i.e., an *i.i.d* process), underlying the presence of temporal dependence for all the series. To initially establish that we are dealing with stationary time series, a requirement of the quantile regression and the causality-in-quantiles test, we implement the augmented Dickey and Fuller (ADF; 1979) unit root and the Kwiatkowski, Phillips, Schmidt, and Shin (KPSS; 1992) stationarity test. The results of the unit root and the stationarity tests strongly suggest that all the series are stationary processes at the conventional levels. The non-normality, serial correlations and conditional heteroskedasticity in the distribution of all datasets provide the motivation for performing a quantile-based analysis.

Table 2 reports the correlation coefficients between the sovereign CDSs and the risk and uncertainty factors for all countries and regions over the total sample period. The correlation matrices between these CDSs and risk and uncertainty factors show that the correlations for the GCC markets are weak, compared with the corresponding correlations for the other oil-exporting countries which are higher. This finding reinforces the low volatility of the GCC CDS spreads, compared to that of the other countries and regions under consideration. Over the total period of study, the minimum value of the correlation coefficient is -0.0068 which is between the Qatar CDS spreads and the US 10-year Treasury bond rate, while the maximum value of the correlation coefficient is 0.95 which is between the Mexico CDS spreads and the VIX index. It is also interesting to acknowledge the significant correlation between the CDS spread for the UAE and Saudi Arabia and each of MOVE and VIX but the highest correlations between those two variables are for Mexico and Brazil which is also an oil-exporting country, followed by Venezuela.

3. Research Methodology

To motivate the use of the quantile regression and quantile-in-causality approach, we statistically examine the possibility of nonlinearity in the relationship between the sovereign CDS spreads and various global risk factors. We apply the Brock, Dechert, Scheinkman, and LeBaron (1996, BDS) test on the residuals of the sovereign CDS spreads (table 3). The empirical findings provide evidence of nonlinearity in the relationship between sovereign CDS spreads and global financial risk and uncertainties factors. Next, we turn to the Bai and Perron (2003) test of multiple structural breaks. The results are reported in Table 4.

Table 4 reports that there is one break at least in all the datasets (except for Europe and G7 regions). These break dates are mainly during the recent collapse of oil prices (2014) and the end of global financial crisis (2010). Therefore, as under the BDS test and the existence of structural breaks in the relationship, a linear regression approach or linear Granger causality framework is likely to suffer from misspecification.

We first apply the standard quantile regression analysis (QRA) that allows one to investigate the dependence dynamics of the CDS spreads for the oil-rich GCC countries, other major oil exporters and major global regions under different market circumstances (normal, bearish and bullish).

3.1 Quantile regression analysis

In this research, the quantile regression analysis (QRA) enables us to quantify the impact of oil prices, financial risk and uncertainty factors on changes in the CDS spreads for the GCC, other major oil-exporting countries and major regions across quantiles and under different market circumstances including the states of normal, downturn (lower quantile) and upturn (upper quantile) markets. The basic quantile regression is introduced by Koenker and Bassett (1978) and involves the consideration of a set of regression curves that differ across different quantiles of the conditional distribution of the dependent variable. To account for the dynamics between the CDS spreads and the different explanatory variables, we rely on the quantile regression model for the τ^{th} quantile of the CDS distribution (y_t), $Q_\tau(y_t)$, that is specified as:

$$Q_\tau(y_t) = \delta_{0,\tau} + \delta'_{1,\tau} Z_t \tag{1}$$

where Z_t may include lags of both the target variables and lags of the control covariates. The coefficients included in δ_1 allow one to detect the presence of the impacts from the covariates (either the CDS spreads, oil prices, and financial and uncertainty factors) at the quantile of order τ.

The quantile regression does not require any distribution assumptions regarding the population and can estimate the parameters non-parametrically. The quantiles may be characterized as the solution to a simple optimization problem (e.g., Koenker and Bassett, 1978; Koenker and Hallock, 2003; Koenker, 2005). More formally, taking a random sample $y_1, y_2, y_3, \ldots y_n$ with the empirical distribution function $\hat{F}_y(\alpha) = \frac{1}{n} \neq \{y_i \leq \alpha\}$, the empirical unconditional quantile function is defined as

$$\hat{Q}_y(\tau) = \hat{F}_y^{-1}(\tau) = inf\{\alpha / \hat{F}_y(\alpha) \geq \tau\} \tag{2}$$

According to Koenker and Bassett (1978), the quantiles may be expressed as the solution to a minimization problem:

$$\hat{Q}_y(\tau) = argmin_\alpha \left\{ \sum_{i:y_i \geq \alpha} \tau |y_i - \alpha| + \sum_{i:y_i < \alpha} (1-\tau) |y_i - \alpha| \right\}$$

$$= argmin_\alpha \sum_i \rho_\tau (y_i - \alpha) \tag{3}$$

Using the check function

$$\rho_\tau(z) = \begin{cases} \tau z: & z \geq 0 \\ (\tau - 1) z: & z < 0 \end{cases}$$

In the case of linear dependence on a vector of exogenous variables (X), the linear conditional quantile function can be written as follows:

$$Q_y(\tau / X) = inf\{(\alpha / F_y(\alpha / X) \geq \tau\} = \sum_k \beta_k(\tau) X_k = \mathrm{X}'\beta(\tau) \tag{4}$$

3.2 Causality-in-quantiles analysis

To illustrate the causality-in-quantile, we follow Jeong et al. (2012) where the quantile-based causality is defined as follows[4]: x_t does not cause y_t in the θ quantile with respect to the lag-vector of $\{y_{t-1}, \ldots, y_{t-p}, x_{t-1}, \ldots, x_{t-p}\}$ if:

$$Q_\theta\left(y_t, y_{t-1}, \ldots, y_{t-p}, x_{t-1}, \ldots, x_{t-p}\right) = Q_\theta\left(y_t, y_{t-1}, \ldots, y_{t-p}\right). \tag{5}$$

x_t is a prima facie cause of y_t in the θ-th quantile with respect to $\{y_{t-1}, \ldots, y_{t-p}, x_{t-1}, \ldots, x_{t-p}\}$ if:

$$Q_\theta\left(y_t, y_{t-1}, \ldots, y_{t-p}, x_{t-1}, \ldots, x_{t-p}\right) \neq Q_\theta\left(y_t, y_{t-1}, \ldots, y_{t-p}\right) \tag{6}$$

where $Q_\theta\ (y_t)$ is the θ-th quantile of y_t depending on t and $0 < \theta < 1$.

[4] The exposition in this section closely follows Jeong et al. (2012) and Balcilar et al. (2017).

Let $y_{t-1} \equiv (y_{t-1}, \ldots, y_{t-p})$, $x_{t-1} \equiv (x_{t-1}, \ldots, x_{t-p})$, $Z_t = (X_t, Y_t)$ and $F_{y_t/z_{t-1}}(y_t/Z_{t-1})$ and $F_{y_t/Y_{t-1}}(y_t/Y_{t-1})$ denote the conditional distribution functions of y_t given Z_{t-1} and Y_{t-1}, respectively. The conditional distribution $F_{y_t/z_{t-1}}(y_t/Z_{t-1})$ is assumed to be absolutely continuous in y_t for almost all Z_{t-1}.

If we denote $Q_\theta(Z_{t-1}) \equiv Q_\theta(y_t/Z_{t-1})$ and $Q_\theta(Y_{t-1}) \equiv Q_\theta(y_t/Y_{t-1})$, we have $F_{y_t/z_{t-1}}(Q_\theta(Z_{t-1})/Z_{t-1}) = \theta$ with probability one. Therefore, the following hypothesis:

H0: $P\{Fy\,|Z\,\{Q_\theta\,(Yt-1)\mid Z_{t-1}\} = \theta\} = 1$ (7)

H1: $P\{Fy\,|Z\,\{Q_\theta\,(Yt-1)\mid Z_{t-1}\} = \theta\} < 1.$ (8)

Jeong et al. (2012) employ the distance measure $J = \{\varepsilon_t E\,(\varepsilon_t|Z_{t-1}) f_Z(Z_{t-1})\}$ where ε_t is the regression error term and $f_Z(Z_{t-1})$ is the marginal density function of Z_{t-1}. The regression error ε_t emerges based on the null in Eq. (7), which can only be true if and only if $E[\mathbf{1}\{y_t \leq Q_\theta\,(Y_{t-1})Z_{t-1}\}] = \theta$ or $\{y_t \leq Q_\theta\,(Y_{t-1})\} = \theta + \varepsilon_t$, where $\mathbf{1}\{\quad\}$ is an indicator function. Jeong et al. (2012) specify the distance measure as follows:

$$J = E\left[\left\{F_{\frac{y_t}{z_{t-1}}}\{Q_\theta\,(Y_{t-1})|Z_{t-1}\} - \theta \quad\right\}^2 f_Z(Z_{t-1})\right] \tag{9}$$

In Eq. (7), it is important to note that J ≥ 0, i.e., the equality holds if and only if H0 in Eq. (7) is true, while $J > 0$ holds under the alternative H1 in Eq. (8). Jeong et al. (2012) show that the feasible kernel-based sample analog of J has the following form:

$$\widehat{J_T} = \frac{1}{T(T-1)h^{2p}} \sum_{t=p+1}^{T} \sum_{s=p+1}^{T} K\left(\frac{Z_{t-1} - Z_{s-1}}{h}\right) \widehat{\varepsilon_t}\,\widehat{\varepsilon_s} \tag{10}$$

where $K(\cdot)$ is the kernel function with bandwidth h, T is the sample size, p is the lag-order, and $\widehat{\varepsilon_t}$ is the estimate of the unknown regression error.

The causality-in-quantile analysis has three advantages compared to the standard causality tests. First, it is robust to misspecification errors since it detects the underlying dependence structure between time series. Second, it can be used to test for not only causality-in-mean (first moment), but also the causality that may exist in the extreme upper and lower tails of the joint distribution of the variables. Third, we can investigate the causality-in-variance, which is the effect on volatility, because it is possible to have higher order interdependencies even if the causality-in - conditional mean is not present.

4. Empirical Results and Discussion

In this section, we report the results of the quantile regression analysis to investigate the dependence dynamics of the sovereign CDS spreads under different market circumstances including the states of downturns, upturns and normalcy. Secondly, we employ the causality-in-quantiles test analysis and examine causality effects of different global financial risk and uncertainty factors during alternative market states.

4.1 Quantile regression results and discussion

Conventionally, we estimate the QR of the sovereign CDS spreads for the following seven quantiles: 0.05, 0.1, 0.25, 0.5, 0.75, 0.9 and 0.95. Tables 5, 6, 7, 8, 9 and 10 report the quantile estimates. Specifically, Table 5 shows a co-movement between the sovereign CDS spreads and the oil prices across all quantiles in the case of Venezuela, Mexico and Russia. We also note that all coefficients of oil prices are negative, and thus a decrease in oil prices leads to an increase in risk premium, and in turn an increase in the sovereign CDS spreads for those oil-sensitive countries. This finding can be explained by the fact that those countries which are major oil exporters have huge oil reserves, and Venezuela tops the list of countries in terms of having the largest proven oil reserves accounting for more than 24% of OPEC's total oil reserves. In addition, the economies of those countries depend heavily on oil prices, and then any drops and shocks in oil prices affect the economy, geopolitics and alliances' structure of those countries[5]. Comparable results are found for Brazil (except for one quantile) and this finding confirms that the sovereign credit risks of major oil producing countries are affected by the drop and the shock of oil prices (the recent 2014-2015 oil price collapse).

However, there is independence between oil prices and sovereign CDS in the case of Norway, Qatar and Bahrain meaning that the oil prices changes have no impact on the sovereign CDS spreads. This finding can be explained by the fact those countries have an important sovereign wealth fund[6] and their sovereign credit risk is not affected by oil prices changes. Bahrain is a minor oil producer and depends on a steady stream of foreign aid from Saudi Arabia. Qatar, in particular, is one of the world's largest LNG exporters, in addition to exporting oil, which may have weakened the link between its CDS spread and oil prices. For the global regions or blocks, we notice that the sovereign CDS spreads of BRICS and the Asia region are more sensitive to oil prices. This finding supports our previous results since these regions/blocs include the top oil-producing and exporting countries in the world, namely Saudi Arabia, Russia and China.

Concerning the oil price implied volatility (OVX index), Table 6 shows independence between this volatility index and the sovereign credit risk for Norway, Venezuela, Saudi Arabia, UAE, N11, Europe and North America. However, the results show a co-movement between the oil price uncertainty and the sovereign credit risk spreads only for the extreme upper quantiles (very bullish markets) in the case of Russia, Bahrain and the G7 region/bloc, indicating that the sovereign CDS spreads for those countries become sensitive to the global oil price uncertainty when the markets are very bullish. Moreover, the oil price uncertainty co-moves with the sovereign credit risk spreads only in the bearish markets (in the case of Mexico, Asia and the CE region/ bloc), that is when these sovereign CDS spreads are weak and down.

The empirical results however show a different picture for the impact of the global stock market uncertainty (proxied by the equity VIX index) on these sovereign CDS spreads. Table 7 shows a co-movement between this VIX index and the sovereign credit risk for all quantiles only for Mexico but independence in the case of Saudi Arabia and Bahrain. In the case of Russia and Venezuela, the coefficients of the VIX index are significant for the lower and intermediate quantiles, with a positive relationship whereas for the upper quantiles we observe no significant effect. This empirical finding implies that sovereign CDS spreads of these countries are affected positively by global financial uncertainty only in the bearish and normal market conditions. This implies that the structure of dependence is asymmetric, having a lower tail dependence and an upper tail independence. However, for the extreme upper quantiles, there is no significant impact for the VIX index on all sovereign CDS spreads.

[5] Narayan et al. (2014) show that the nominal oil price predicts economic growth for 37 countries (16 developing and 21 developed countries) for the period 1983Q2 to 2010Q4.

[6] Norway has the greatest sovereign wealth fund in the world and is a relatively more diversified economy, thus is less affected by oil prices changes, than the GCC countries.

The empirical results from Table 9 show that the global bond market rate (proxied by the US 10-year Treasury bond yield) co-moves with all sovereign CDS spreads for all countries and regions but with different dependence structures. For Qatar, the global bond rate has a positive impact on sovereign credit risk spreads but this is limited to the upper quantile during the bull CDS market. That is, the global bond rate affects the Qatar sovereign CDS spread in bullish markets, while they are not significant when its CDS market during bearish markets since the country is buffeted by its sovereign wealth fund. On the other hand, we notice a negative relationship in the case of UAE and Russia, which is only significant for the intermediate and upper quantiles whereas we observe no significant effect for the lower quantiles. Then this structure of dependence of the sovereign CDS spreads with respect to this risk variable is asymmetric, having upper tail dependence and lower tail independence. Moreover, we notice a negative and significant relationship between the global bond rate and the sovereign CDS spreads for all regions/blocs (except for North America) in the intermediate quantiles or normal markets.

Concerning the global bond market uncertainty (MOVE index), we observe from Table 10 that the coefficients of the global conventional bond market uncertainty (represented by MOVE) are significant for all quantiles of the distribution of the sovereign CDS spreads in the case of Mexico and Brazil, whereas we notice no significant effect in the case of Bahrain. This finding implies that the extreme (positive or negative) global bond market uncertainty has no impact on the sovereign credit risk spreads. Moreover, we detect a positive relationship in the case of Qatar, which is only significant for the extreme lower quantile or very bearish markets, whereas we observe no significant effect for the intermediate and upper quantiles. Then this structure of dependence of the Qatar CDS spreads with respect to this bond uncertainty variable is asymmetric, having a lower tail dependence but an upper tail independence.

In order to formally test for the heterogeneity of the estimated quantile regression coefficients across the entire range of quantiles and to examine the suitability of QR against OLS regressions, the Khmaladze test as adapted to the quantile regression methodology by Koenker and Xiao (2002) is applied. This test is based on the idea that the covariates exert a pure location shift effect on the distribution of the dependent variable, and hence renders the OLS estimates unreliable. The Khmaladze test results reported in Table 11 reject the null hypothesis of equal coefficient estimates at the usual significance levels for almost all cases. This significant heterogeneity across the quantiles means that the quantile regression approach provides an appropriate framework to investigate the impact of different uncertainty factors on the CDS spreads, and therefore the OLS estimates may not provide the complete picture of the relationships.

4.2 Causality-in-quantile results and discussion

Figures 3 to 7 present the causality-in-quantiles tests between the global risk and uncertainties factors and the sovereign CDS spreads. Figure 3 shows significant episodes of Granger-causality from the oil prices to the sovereign CDS spreads mainly for the oil-exporting countries. Overall, the oil price Granger-causes the sovereign the CDS spreads in the lower and/or middle quantiles for most of the countries and regions/blocs, mainly UAE, Qatar, Saudi Arabia, Bahrain, Russia, Venezuela, Norway, CE and N11. This finding implies that lower oil prices in down oil market conditions causes increases in the credit risk of these countries. This finding is probably due to the fact that the oil sector accounts for a significant portion of the GDP in this country. However, for Brazil we find no evidence of causal flows. Brazil extracts most of its oil from sugarcane, is not a major oil exporter and has relatively a more diversified basket of exports.

Figure 4 shows also significant episodes of Granger-causality emanating from the oil price volatility to those sovereign CDS spreads for Qatar, Saudi Arabia, and Norway for all quantiles with higher significance in the lower quantile, as we see a downward moving curve from the lowest to the highest quantiles. This underscores the importance of oil prices for the economics of these countries that depend heavily on oil proceeds, particularly during low oil prices. For Bahrain, Russia, Venezuela, the N11 and the Europe region, the OVX Granger-causes their sovereign CDS spreads–mostly during the intermediate quantile. The policy implication of the increase in the sovereign credit risk as a result of a higher oil volatility is that these oil-exporting countries may face higher borrowing costs and mounting pressures on their currencies which are pegged to a major anchor such as the US dollar.

The empirical results from Figure 5 show significant episodes of a Granger-causality from the equity VIX index to the CDS spreads for Qatar, UAE, Saudi Arabia, Norway, CE, G7, N11 and NA for almost all quantile, with higher significance in the lower quantile, as we see a downward moving curve from the lowest to the highest quantiles. For Bahrain, Russia and Venezuela, the VIX index Granger-causes the sovereign CDS spreads mostly in the intermediate quantiles. These findings imply that VIX index provides useful information for predicting sovereign CDS spreads. Then, the Granger causality from VIX to the sovereign CDS market provides evidence of how information transmitted between the markets. On the other hand, we find little evidence of a reverse Granger causality from sovereign CDS to VIX. This finding shows that the nature of the Granger causality is unidirectional (except for the case of Russia, Mexico and the BRICS region), flowing from the S&P index option market to the sovereign CDS markets.

Figure 6 shows that the global bond rate causes the sovereign CDS spreads of Qatar, UAE, Saudi Arabia, Norway across all quantiles, and also causes Russia, Mexico, Venezuela, CE, G7, N11 and North America mostly in the lower and intermediate quantiles. We also find no evidence of a reverse Granger causality from the sovereign CDS to the global bond rate market (as proxied by the US 10-year Treasury yield) for all countries and regions/blocks. This finding shows that the nature of the Granger causality is unidirectional, flowing from the U.S. bond market to the sovereign CDS markets. Finally, Figure 7 shows also similar results like Figure 6 and we also notice significant episodes of Granger-causality emanating from the bond market volatility to the sovereign CDS spreads. On the other hand, no evidence of reverse Granger causality is founded from the sovereign CDSs to the global bond market volatility, implying that the unidirectional relationship flows from the global bond market volatility to the sovereign CDS markets. Overall, the findings from the causality-in-quantile analysis confirms our results from the quantile regression analysis concerning the impact of the global bond markets on the sovereign credit spreads that follow different market conditions. Interestingly, the exposure of a country's CDS spread to different uncertainty factors has a certain pattern i.e., most of the factors Granger-cause the Bahrain CDS spread only in the middle quantiles.

5. Conclusions

The sovereign credit risk is an important topic of consideration for international investors seeking portfolio investments in emerging markets and diversification in different countries and regions/blocks. The sovereign CDS market has also been used as a market-based reference for the sovereign credit risk. This study is motivated by three facts: The first fact relates to the alarming widening of the sovereign CDS spreads in credit markets in the wake of the drastic drops in oil prices and increases in unceratinty. The recent 2014-2015 oil price collapse period has renewed the debate about the impact of oil price volatility and global financial uncertainty on the sovereign

CDS market, particularly for oil- exporting countries. The second fact acknowledges that there are no in-depth empirical studies that address the impact of global financial risk and uncertainty factors on sovereign credit risk premiums in comparison to the impact of the oil price collapses reckoned under different market conditions. The third has to do with the lack of empirical research to detect causal flows from the global oil market and global financial risk and uncertainty factors to the sovereign CDS spreads of the oil-rich GCC countries, other major oil-exporting countries and major global regions/blocs selected based on data availability and for comparative purposes. The comparison is relevant to the GCC countries since they have entered an important era in which they increasingly want to open up to foreign investors and borrow large amounts of money from international financial centers to lengthen the lifespan of their foreign asset endowments.

Firstly, we use the quantile regression analysis that allows one to investigate the dependence dynamics of the sovereign CDS spreads of those countries, regions and blocs under different market circumstances including the states of downturns, upturns and normalcy. The empirical results show a different dependence structure between sovereign credit risk premiums and the global financial risk and uncertainty factors across quantiles as well as countries, regions and blocs. We find that the non GCC major exporters Venezuela, Mexico and Russia are the most countries affected by oil prices across all quantiles. However, no dependence (or just weak dependence that is limited in a few quantiles) is observed between oil market returns and volatility and sovereign credit risk spreads in the case of Saudi Arabia, UAE and Norway, although these countries are considered as major players in global oil market. This finding can be explained by the fact that these countries have huge sovereign wealth funds which cushion them from global shocks, and therefore their sovereign CDS spreads are less affected by the volatility of oil prices. This result for the GCC countries must be conditioned on the possession of large foreign assets. A dwindling in the size of those assets should have different implications for the magnitude of their CDSs, as we have seen in the case of Venezuela, Mexico and Russia and the oil-less regions considered in this study.

Secondly, we employ the causality-in-quantiles test analysis and examine the causal relationship between the sovereign CDS spreads and the oil market and different global financial risk and uncertainty factors during different market states. The empirical results show that the oil price returns and volatility Granger-cause sovereign the CDS spreads mostly in the lower and/or middle quantiles for most of the oil-exporting countries, with higher significance in the lower quantiles. This finding implies that oil prices have more influence in the case of bearish markets. We also find significant episodes of Granger-causality from the equity VIX and the bond MOVE indexes to the sovereign CDS spreads of the major oil-exporting countries and the regional/blocks, implying that the global bond and stock uncertainty provide useful information for predicting sovereign CDS spreads. We also find little evidence of reverse Granger causality from sovereign CDS to VIX and no evidence of Granger causality from sovereign CDS to MOVE, underlying the presence of a unidirectional relationship. This suggests that the CDSs get their clues from the stock and bond markets but not the other way around.

The increase in the credit risk premiums as a result of a higher oil price volatility or financial uncertainty has implications in terms of the capital-borrowing costs, the values of currencies that are pegged to an anchor and the levels of financial spreads which are important for investments. The rise of sovereign credit risk premiums affects banks and funding conditions, and also impacts the level and volatility of sovereign bond yields, mainly in the term of maturity, and thereby influences the sovereign liquidity risk. Policy makers and sovereign debt managers in oil-exporting countries should be cognizant of our empirical results and should seek to minimize the medium- to long-term expected costs of funding government activities, particularly when oil volatility and financial uncertainty follow a rising trend. Our findings also help gauge which countries under consideration are more sensitive to oil price volatility and global financial uncertainties and how this sensitivity translates into increased sovereign credit risk.

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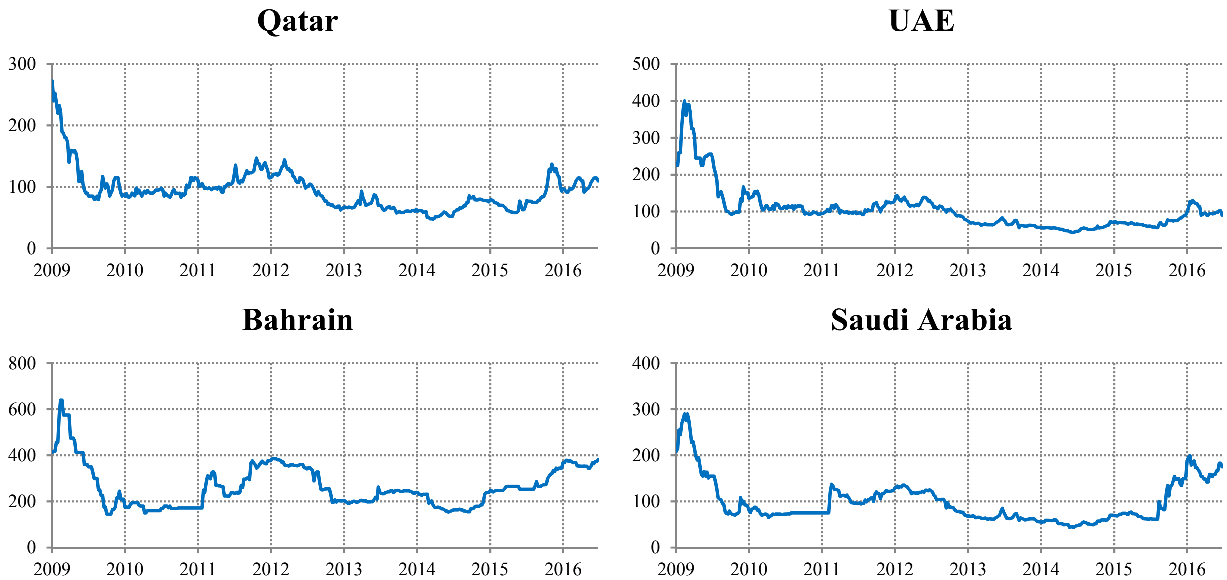
Figure 1: Trend of CDS Spread (basis points – 5-year maturity)

Panel A: GCC



Panel B: Other oil exporting countries

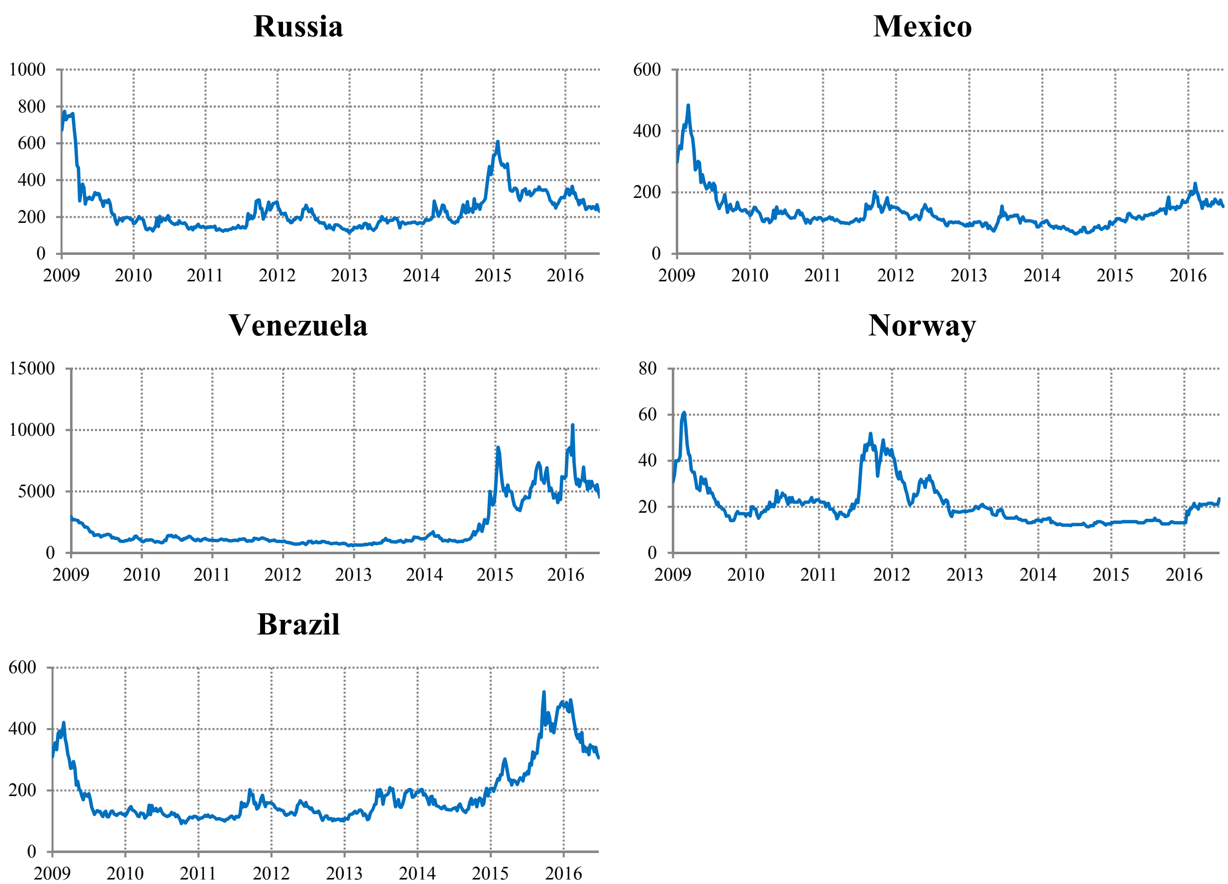


Figure 1: Continued

Panel C: Regional CDS indices

Europe

Asia

BRICS

CE

G7

N11

NA

Figure 2: Trend of Explanatory Variables (Financial Risk and Uncertainty Factors)

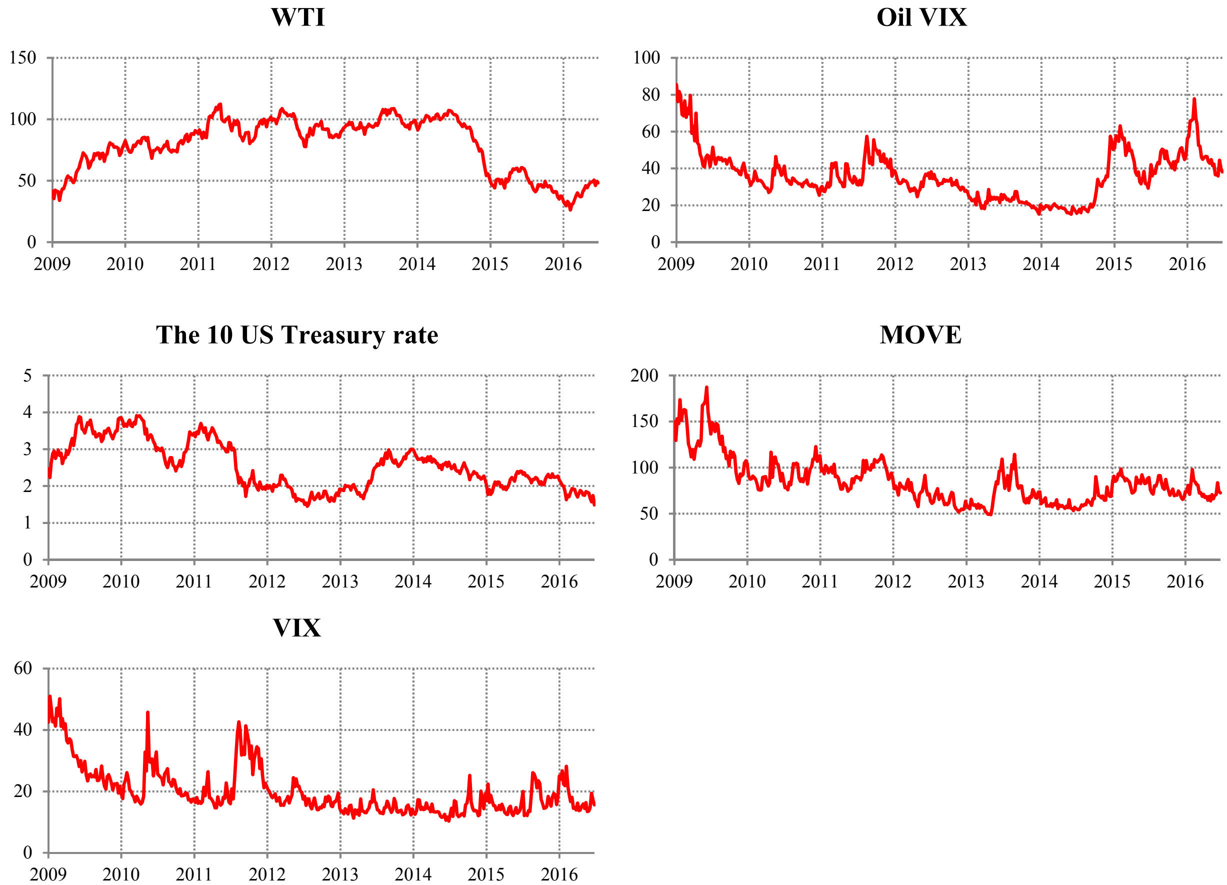


Figure 3: Causality-in-Quantiles test for CDS and Oil Causality

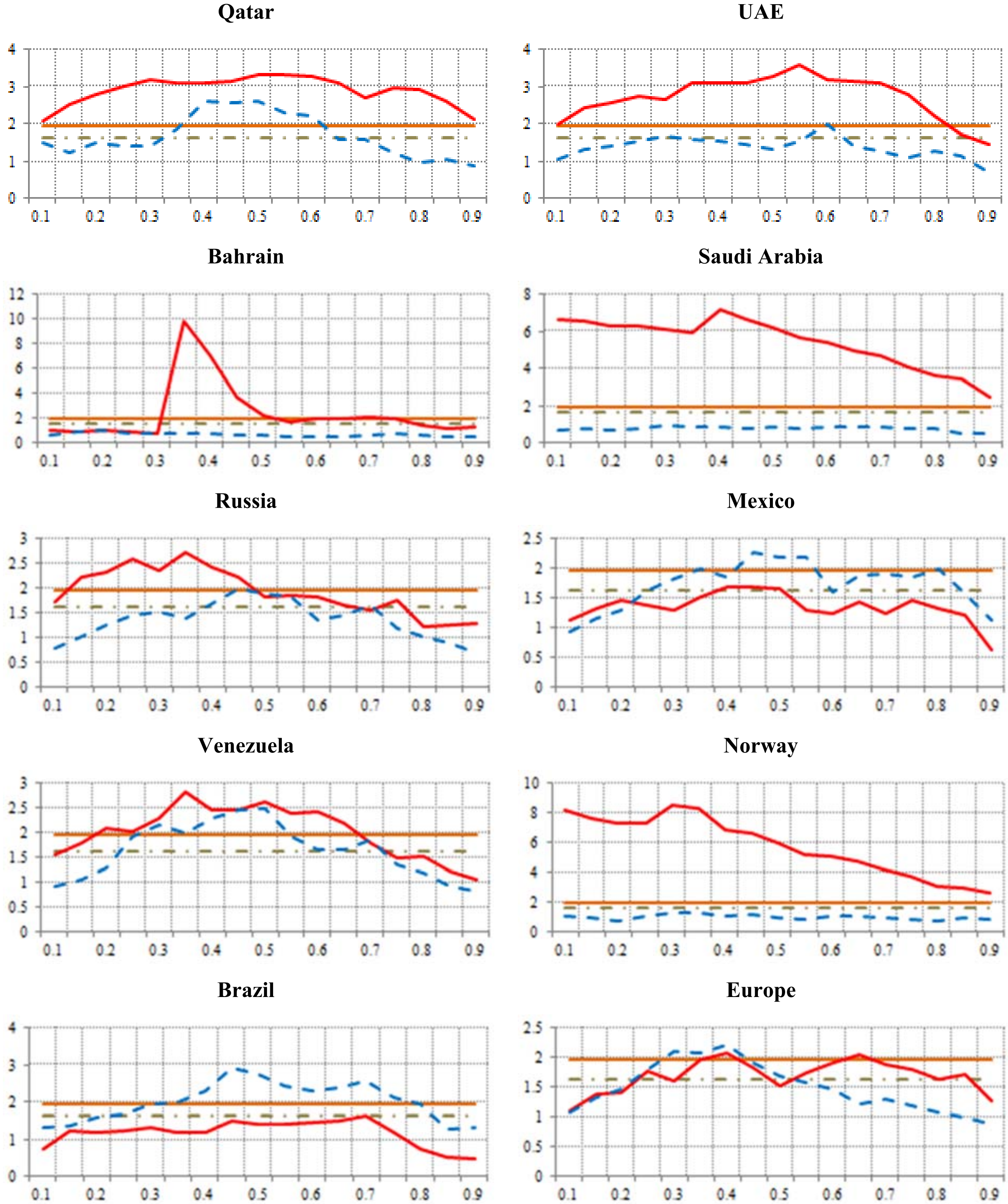
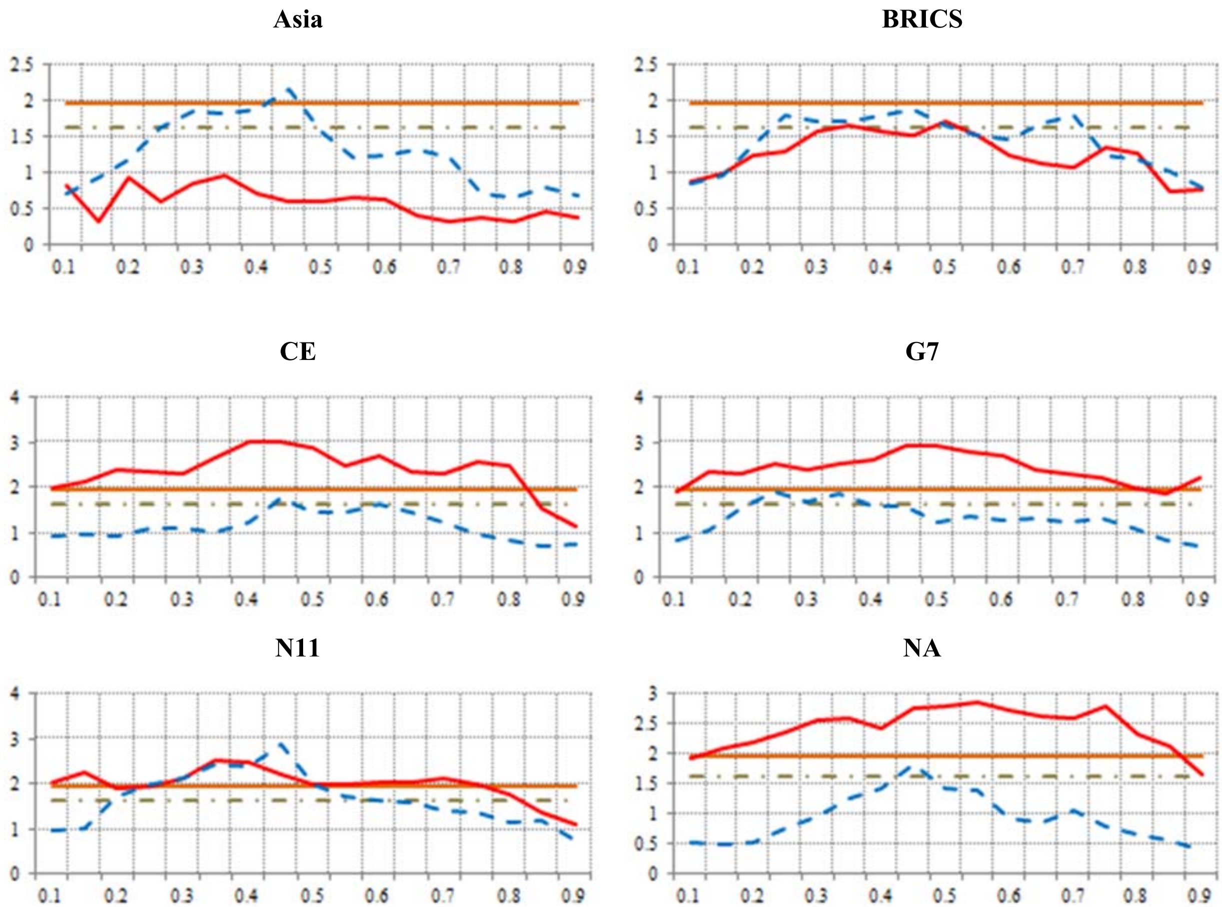


Figure 3: Continued



Note: These figures plot the test statistics (vertical axis) for the causality-in-quantiles. The quantiles are on the horizontal axis. The red line (dashed blue line) indicates the test statistic for causality from oil to CDS (CDS to oil). The horizontal thin solid and the thin two-dashed lines represent the 5% and 10% critical values (CV), respectively.

Figure 4: Causality-in-Quantiles Test for CDS and OVX Causality

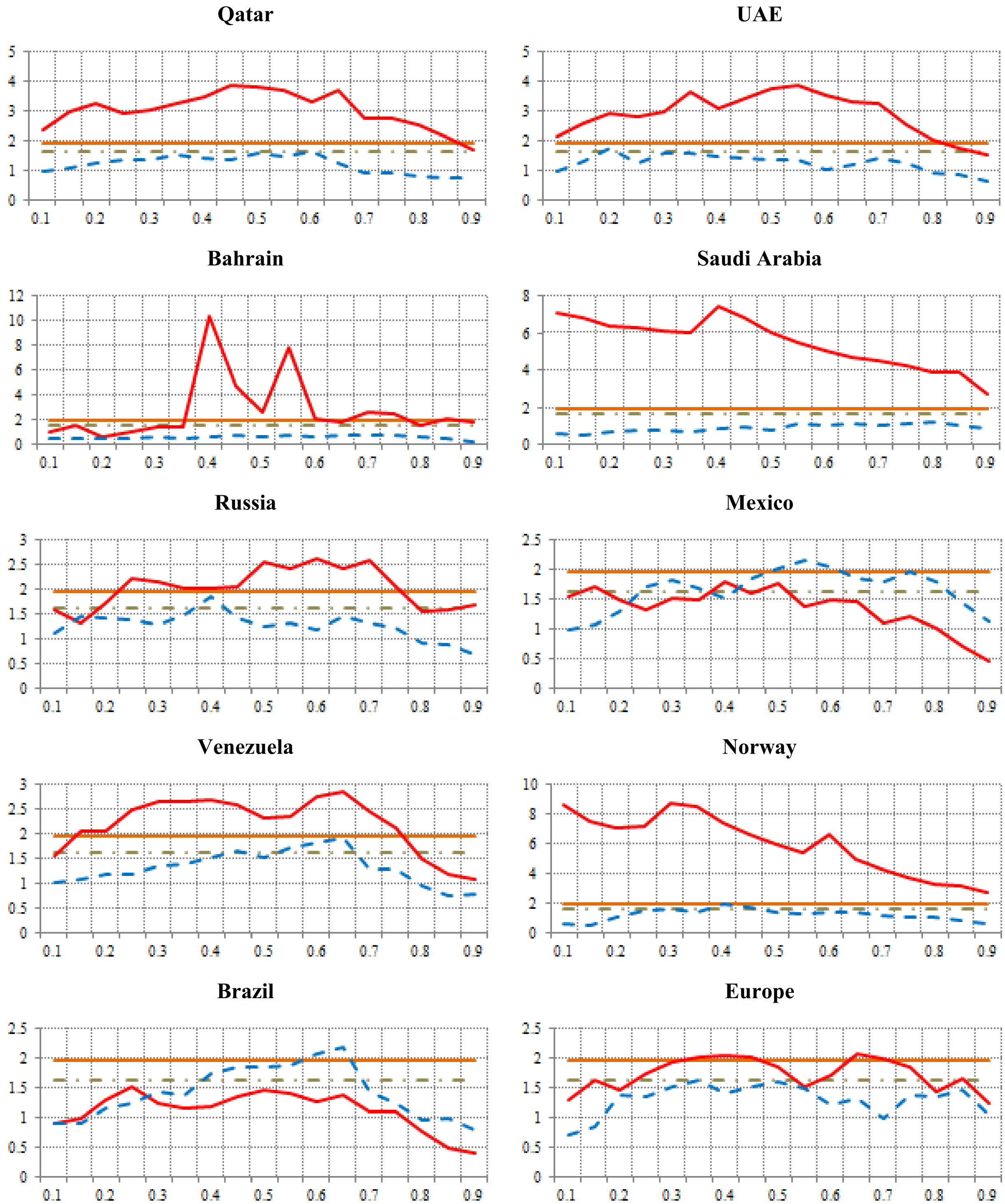
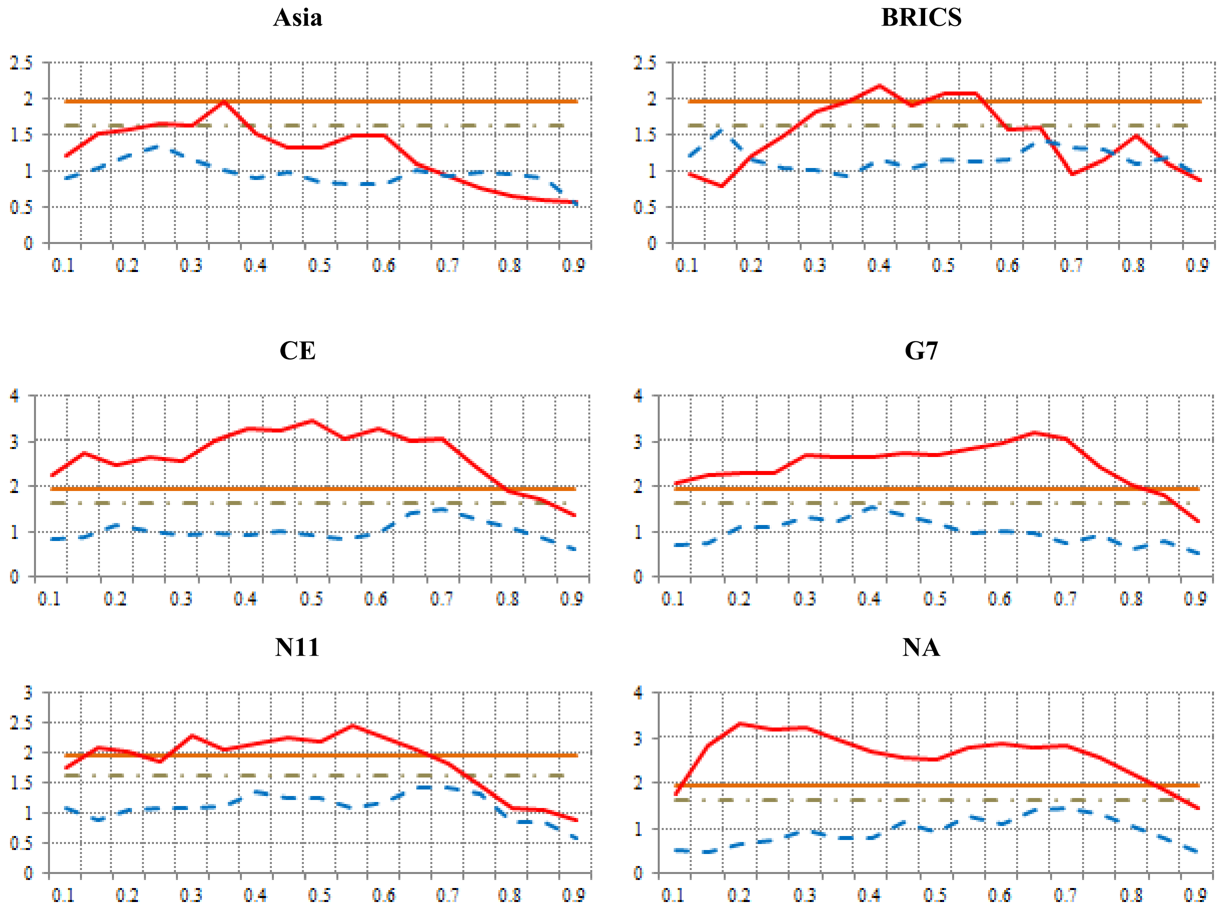


Figure 4: Continued



Note: These figures plot the test statistics (vertical axis) for causality-in-quantiles. The quantiles are on the horizontal axis. The red line (dashed blue line) indicates the test statistic for causality from OVX to CDS (CDS to OVX). Horizontal thin solid and thin two-dashed lines represent the 5% and 10% critical values (CV), respectively.

Figure 5: Causality-in-Quantiles test for CDS and Stock VIX Causality

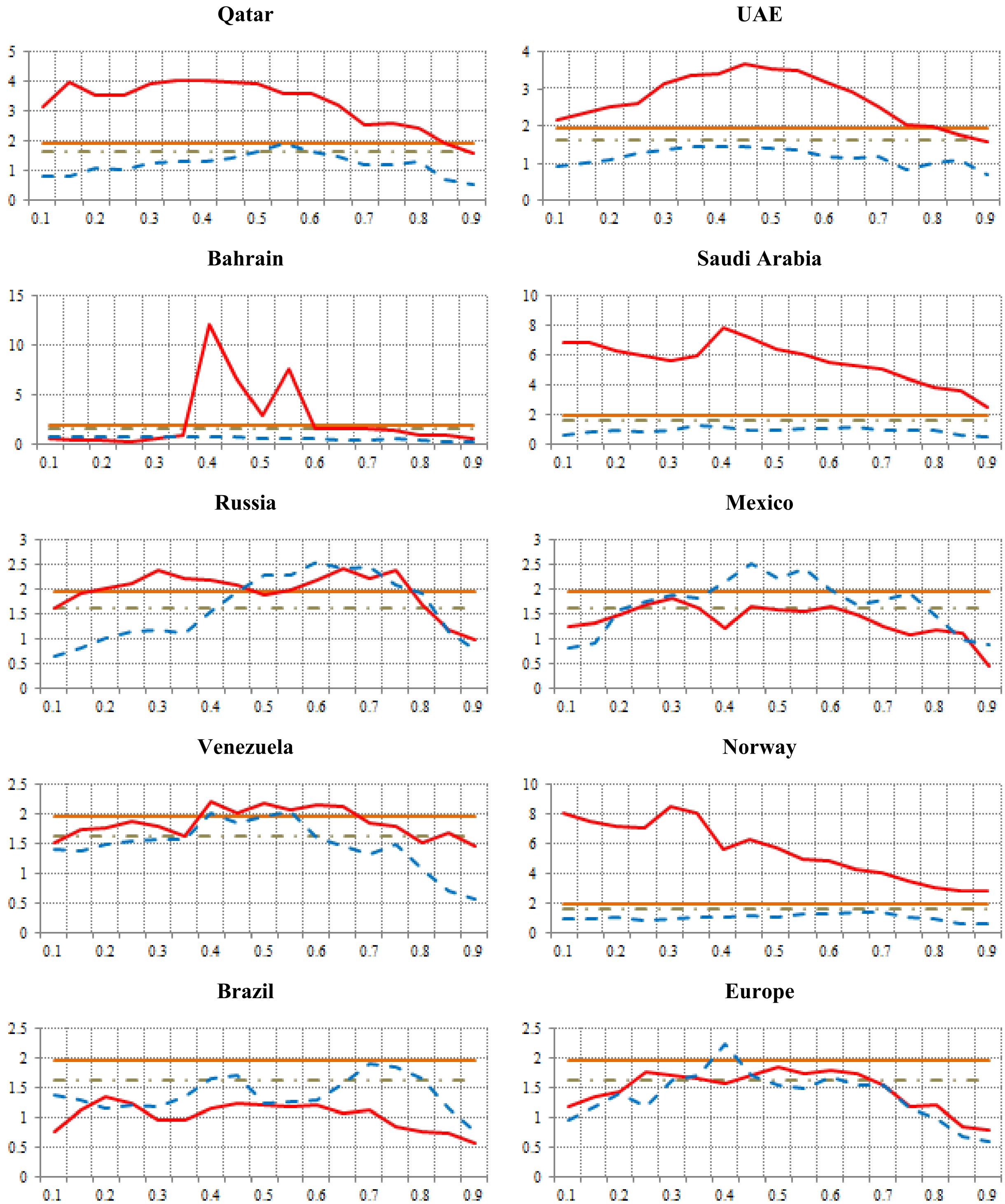
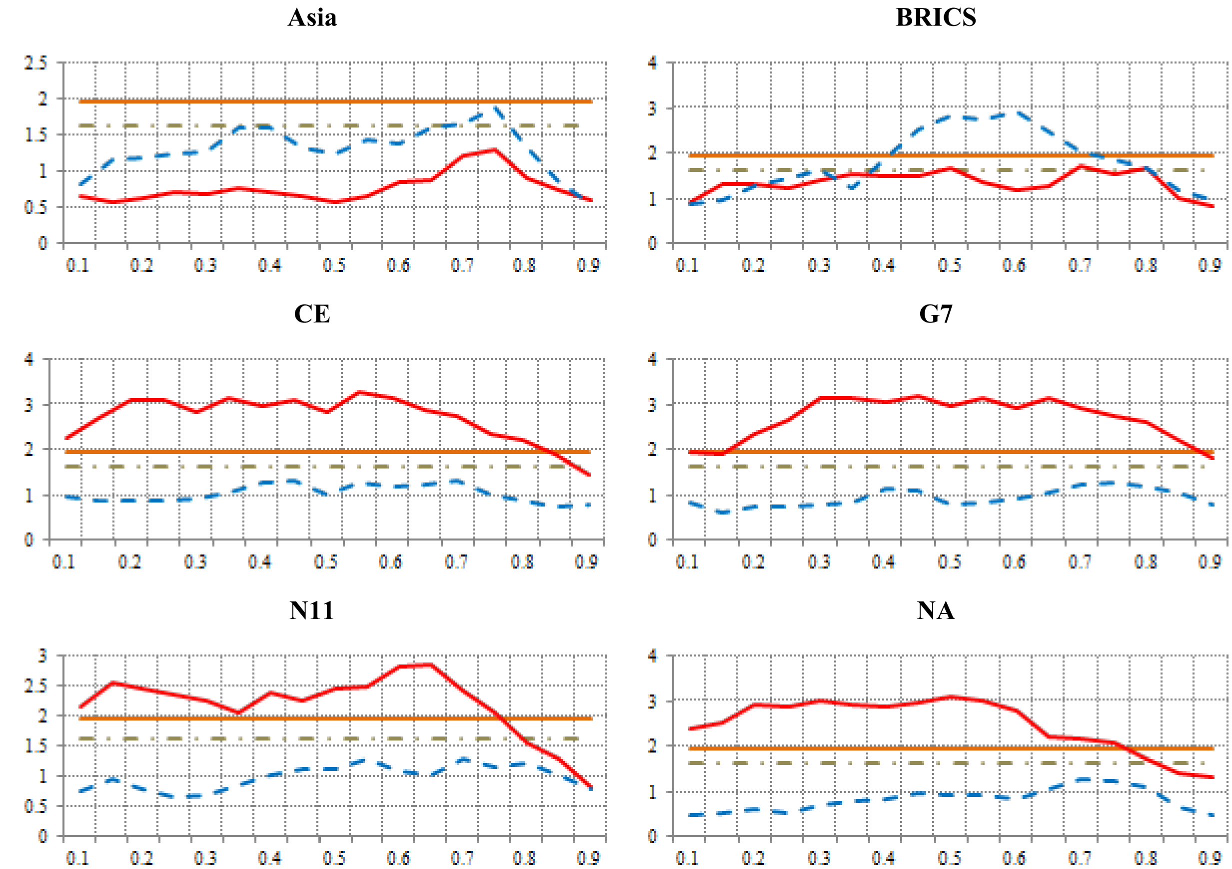


Figure 5: Continued



Note: These figures plot the test statistics (vertical axis) for causality-in-quantiles. The quantiles are on the horizontal axis. The red line (dashed blue line) indicates the test statistic for causality from VIX to CDS (CDS to VIX). The horizontal thin solid and the thin two-dashed lines represent the 5% and 10% critical values (CV), respectively.

Figure 6: Causality-in-Quantiles Test for CDS and US 10 years Treasury Rate Causality

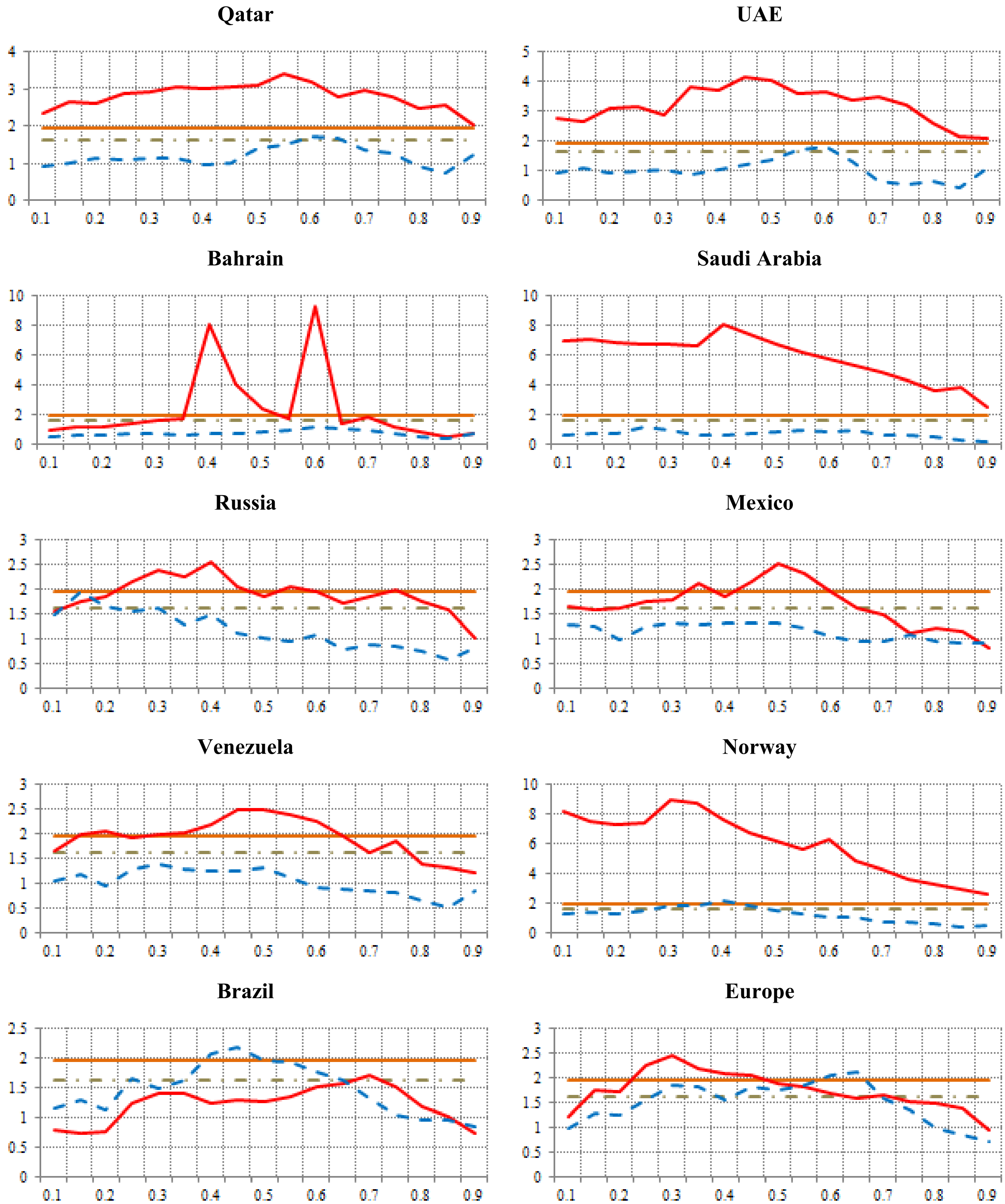
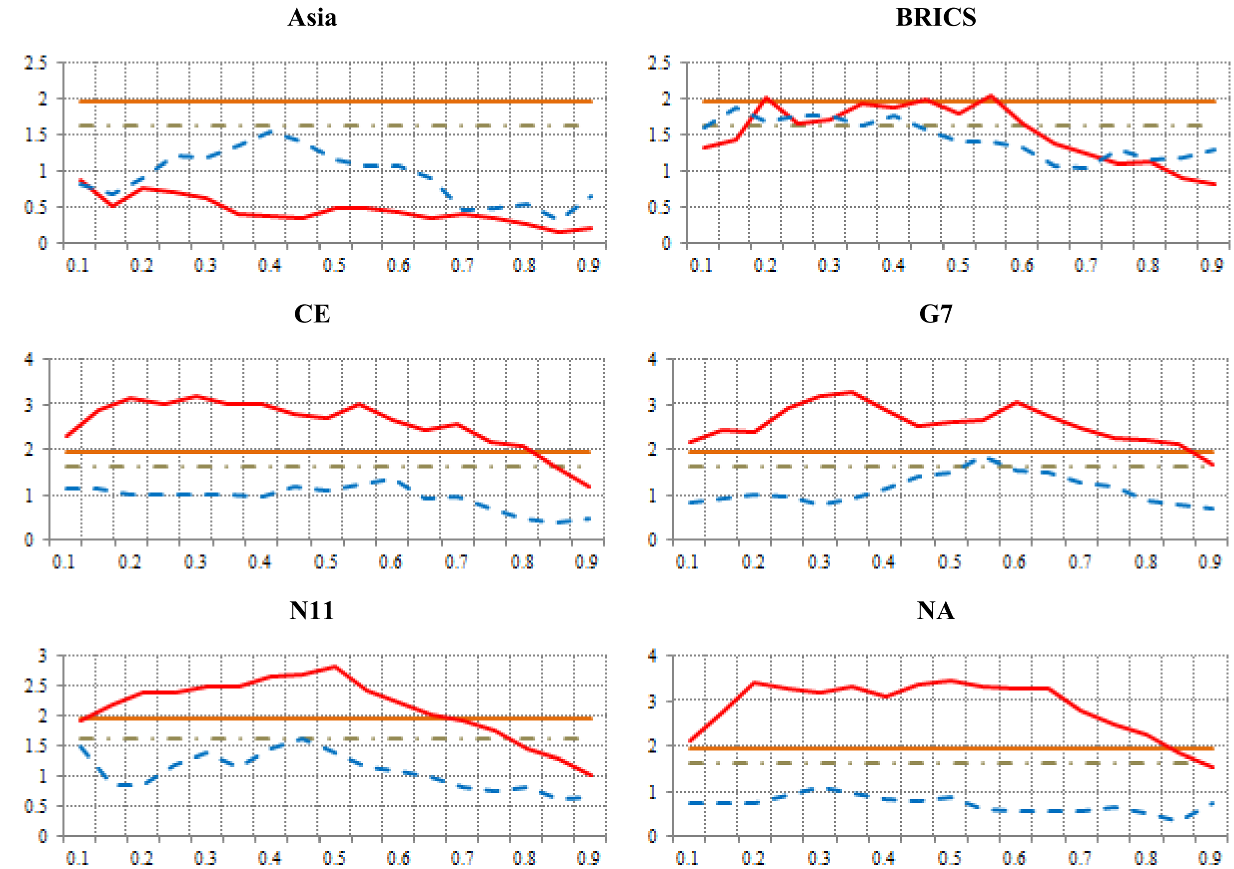


Figure 6: Continued



Note: These figures plot the test statistics (vertical axis) for causality-in-quantiles. The quantiles are on the horizontal axis. The red line (dashed blue line) indicates the test statistic for causality from US 10 years Treasury Rate to CDS (CDS to the US 10 years Treasury Rate). The horizontal thin solid and the thin two-dashed lines represent the 5% and 10% critical values (CV), respectively.

Figure 7: Causality-in-Quantiles Test for CDS and MOVE Causality

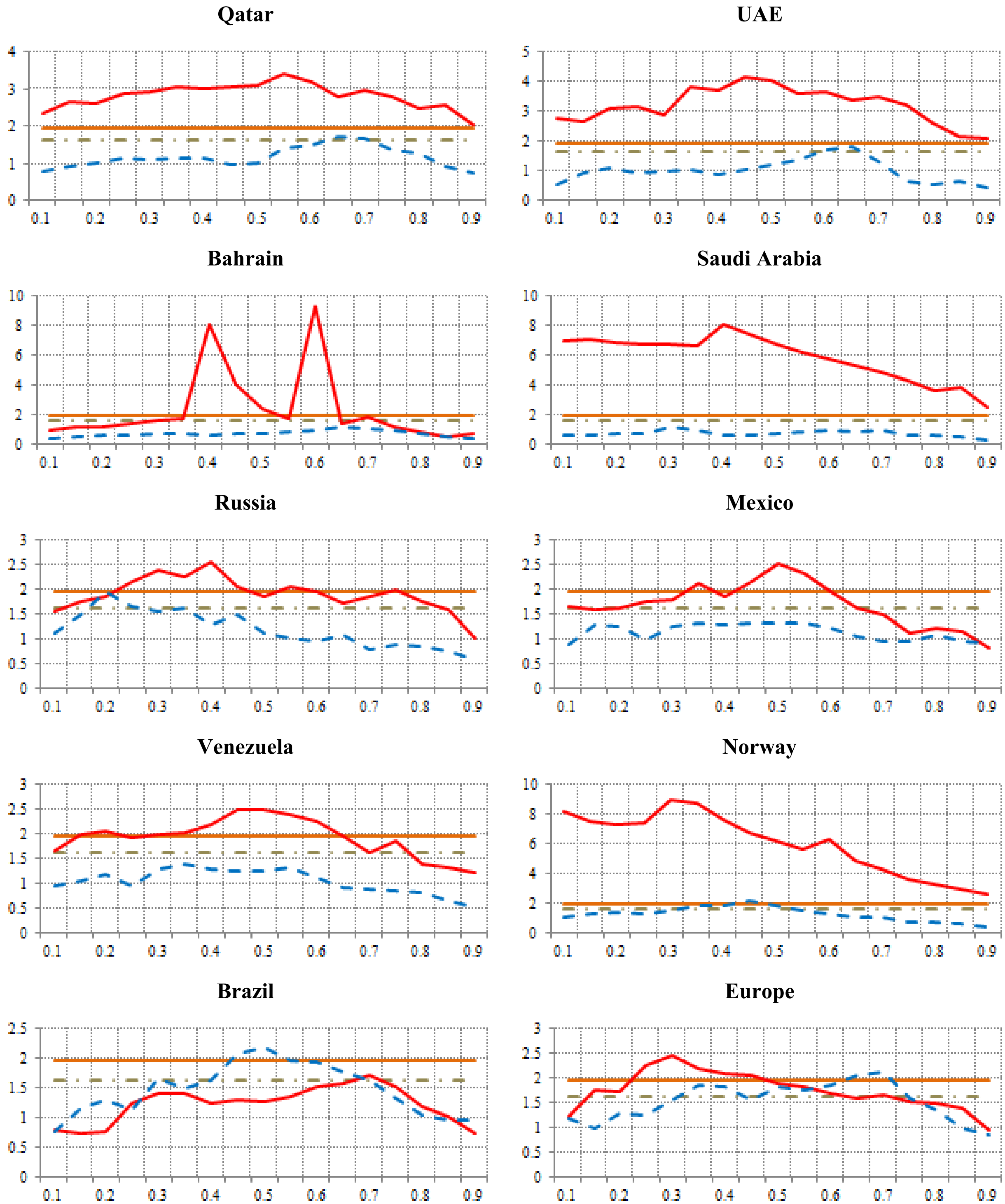
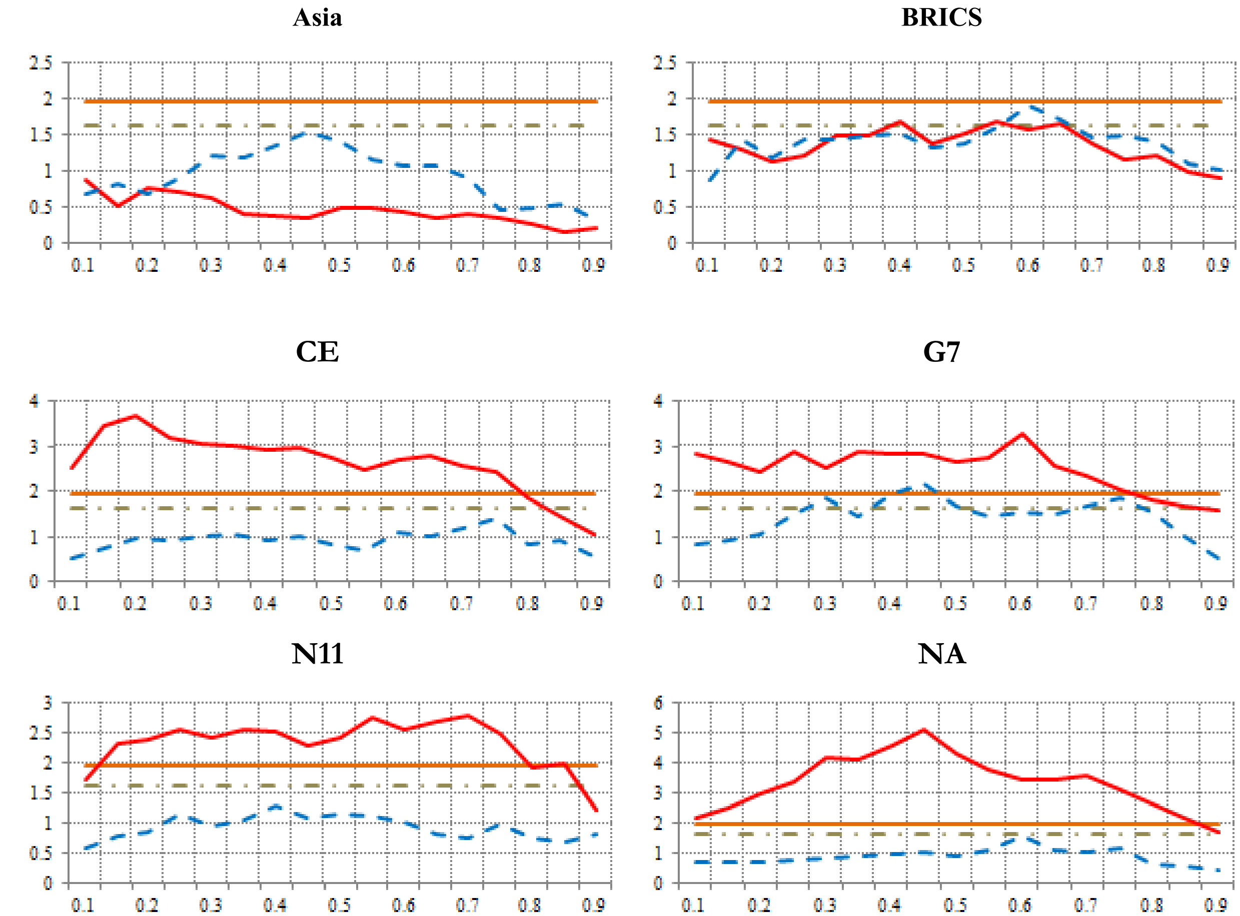


Figure 7: Continued



Note: These figures plot the test statistics (vertical axis) for causality-in-quantiles. The quantiles are on the horizontal axis. The red line (dashed blue line) indicates the test statistic for causality from MOVE to CDS (CDS to MOVE). The horizontal thin solid and the thin two-dashed lines represent the 5% and 10% critical values (CV), respectively.

Table 1: Stochastic Properties of the Data

	Mean	Min.	Max.	Std. Dev.	Skew.	Kurtosis	J-B	Q(12)	$Q^2(12)$	ARCH(12)	ADF	KPSS
						Panel A: GCC CDS indices						
Qatar	-0.0023	-0.2645	0.2652	0.0607	0.0367	6.0564	151.892***	15.584	24.992**	39.090***	-17.31***	0.2082
UAE	-0.0023	-0.2733	0.3027	0.0597	0.3514	8.1520	439.353***	16.955	26.257***	81.676***	-15.45***	0.0499
Bahrain	-0.0002	-0.2513	0.3700	0.0550	0.4685	13.4972	1804.86***	17.626	32.066***	98.270***	-9.982***	0.0983
Saudi Arabia	-0.0004	-0.1927	0.4871	0.0656	2.5849	20.1027	5187.47***	10.102	30.597***	51.053***	-15.58***	0.1176
						Panel B: Other oil-exporting countries' CDS indices						
Russia	-0.0028	-0.4850	0.3507	0.0917	-0.0894	6.2391	171.011***	17.956*	20.821*	73.408***	-18.82***	0.2360
Mexico	-0.0017	-0.2425	0.2907	0.0790	0.1429	4.4040	33.362***	9.999	32.692***	79.795***	-18.59***	0.0943
Venezuela	0.0011	-0.3407	0.4970	0.0937	0.8141	6.1266	201.938***	7.222	40.862***	35.329***	-16.59***	0.2432
Norway	-0.0007	-0.2602	0.3234	0.0691	0.7646	6.5903	247.473***	12.068	36.548***	40.473***	-16.20***	0.0646
Brazil	0.0000	-0.2347	0.2714	0.0759	0.0743	3.9530	15.118***	9.845	30.772***	81.968***	-18.54***	0.1999
						Panel C: Regional CDS indices						
Europe	-0.0034	-0.5328	0.2446	0.0868	-0.8911	7.7844	423.575***	21.187**	8.293	96.319***	-19.83***	0.2107
Asia	-0.0023	-0.9774	1.1285	0.0965	1.4854	76.1270	87041.3***	2.949	23.358**	64.832***	-17.17***	0.1197
BRICS	-0.0020	-0.2781	0.3024	0.0784	0.1513	4.5611	41.090***	11.125	21.581**	74.886***	-18.08***	0.2054
CE	-0.0018	-0.3270	0.4561	0.0649	0.8279	13.8834	1969.35***	20.650**	30.635***	74.086***	-19.27***	0.1366
G7	-0.0016	-0.7945	0.7349	0.1055	-0.8829	20.7820	5188.88***	22.152**	36.097***	59.747***	-19.67***	0.1741
N11	-0.0015	-0.2902	0.3479	0.0583	0.6284	11.2622	1134.95***	19.876*	21.176**	85.117***	-20.18***	0.1705
NA	-0.0019	-1.0316	0.9963	0.2186	0.0824	8.4250	478.691***	35.491***	47.202***	62.244***	-13.32***	0.1290
						Panel D: Risk and uncertainty factors						
WTI	0.0004	-0.1900	0.1785	0.0489	-0.0069	4.9386	61.071***	8.8523	95.800***	27.214***	-18.16***	0.2611
Oil VIX	-0.0021	-0.2980	0.3416	0.0957	0.6976	4.3309	60.414***	38.598***	15.544***	86.588***	-21.98***	0.1423
VIX	-0.0026	-0.5002	0.5759	0.1391	0.3944	4.7444	59.561***	35.263***	50.509***	92.163***	-22.11***	0.0660
US10TR	-0.0013	-0.1948	0.1612	0.0501	-0.1880	3.9300	16.354***	10.632	61.523***	93.834***	-18.94***	0.1124
MOVE	-0.0019	-0.2654	0.3372	0.0877	0.3155	3.6196	12.707***	21.765**	18.253*	71.922***	-20.14***	0.0424

Notes: Min., Max., St. Dev., Skew., Kurt., and J-B stand for minimum, maximum, standard deviations, skewness, kurtosis and Jarque-Bera test of normality, respectively. Q(12) and $Q^2(12)$ refer to the empirical statistics of the Ljung-Box test for autocorrelation of returns and squared returns series, respectively. ADF and KPSS are the empirical statistics of the Augmented Dickey-Fuller (1979) unit root tests, and the Kwiatkowski et al. (1992) stationarity test, respectively. The ARCH-LM(12) test of Engle (1982) is used to check the presence of ARCH effects. ***, ** and * denote the rejection of the null hypotheses of normality, no autocorrelation, unit root, non-stationarity, and conditional homoscedasticity at the 1%, 5% and 10% significance levels, respectively. NA stands for North America.

Table 2: Correlations between the Sovereign CDSs and Risk and Oil and Uncertainty Factors

	WTI	Oil VIX	VIX	US10TR	MOVE
Panel A: GCC CDS indices					
Qatar	-0.0350	0.1018**	0.0599	-0.0068	0.0549
	(-0.6907)	(2.0152)	(1.1829)	(-0.1342)	(1.0839)
UAE	-0.1992***	0.2323***	0.2799***	-0.1215**	0.2820***
	(-4.0032)	(4.7055)	(5.7434)	(-2.4107)	(5.7889)
Bahrain	-0.0805	0.1011**	0.0863*	-0.0160	0.0910*
	(-1.5906)	(2.0021)	(1.7064)	(-0.3158)	(1.8008)
Saudi Arabia	-0.1594***	0.1474***	0.2315***	-0.0933*	0.1787***
	(-3.1800)	(2.9352)	(4.6881)	(-1.8465)	(3.5774)
Panel B: Other oil-exporting countries' CDS indices					
Russia	-0.3820***	0.3763***	0.4879***	-0.3235***	0.2581***
	(-8.1430)	(7.9992	(11.010)	(-6.7332)	(5.2616)
Mexico	-0.4125***	0.3699***	0.5692***	-0.2778***	0.3738***
	(-8.9205)	(7.8414	(13.638)	(-5.6953)	(7.9376)
Venezuela	-0.4091***	0.2886***	0.4168***	-0.2062***	0.2988***
	(-8.8323)	(5.9378	(9.0319)	(-4.1512)	(6.1685)
Norway	-0.1373***	0.2002***	0.2476***	-0.2161***	0.1339***
	(-2.7305)	(4.0244	(5.0344)	(-4.3602)	(2.6616)
Brazil	-0.3641***	0.3320***	0.4844***	-0.2272***	0.3489***
	(-7.6999)	(6.9335	(10.907)	(-4.5959)	(7.3340)
Panel C: Regional CDS indices					
Europe	-0.2163***	0.2228***	0.3157***	-0.2878***	0.1322***
	(-4.3643)	(4.5010	(6.5541)	(-5.9196)	(2.6261)
Asia	-0.1920***	0.1904***	0.2085***	-0.1487***	0.2413***
	(-3.8534)	(3.8202	(4.1999)	(-2.9617)	(4.8979)
BRICS	-0.3922***	0.3651***	0.5048***	-0.3298***	0.2939***
	(-8.3988)	(7.7252	(11.520)	(-6.8814)	(6.0573)
CE	-0.1854***	0.1894***	0.2645***	-0.1762***	0.2100***
	(-3.7158)	(3.7988	(5.4019)	(-3.5259)	(4.2310)
G7	-0.2058***	0.2081***	0.2433***	-0.2741***	0.1328***
	(-4.1426)	(4.1898	(4.9407)	(-5.6143)	(2.6398)
N11	-0.2293***	0.1924***	0.3501***	-0.1301**	0.2839***
	(-4.6403)	(3.8621	(7.3626)	(-2.5837)	(5.8324)
NA	-0.0491	0.1527***	0.2062***	-0.0828***	0.1827***
	(-0.9674)	(3.0429	(4.1505)	(-1.6362)	(3.6594)

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. The t-statistics are in parenthesis.

Table 3: Brock et al., (1996, BDS) Test

Panel A: BDS test with WTI oil price					
	***m*=2**	***m*=3**	***m*=4**	***m*=5**	***m*=6**
Qatar	6.079***	6.784***	7.603***	7.972***	8.488***
UAE	6.882***	8.544***	9.783***	10.934***	11.872***
Bahrain	2.032*	2.686*	3.517*	4.191*	4.511**
Saudi Arabia	9.248***	11.235***	12.160***	13.742***	15.257***
Russia	9.412***	10.722***	11.731***	12.963***	14.157***
Mexico	9.074***	11.633***	12.935***	14.113***	15.300***
Venezuela	13.952***	16.382***	18.522***	21.288***	24.515***
Norway	7.788***	10.286***	12.391***	14.573***	16.852***
Brazil	7.487***	10.530***	12.355***	14.449***	16.613***
Europe	9.266***	11.069***	12.712***	14.531***	16.538***
Asia	7.521***	9.214***	10.335***	11.189***	12.398***
BRIC	9.315***	10.358***	11.337***	12.382***	13.415***
CE	8.099***	10.117***	11.990***	13.732***	15.409***
G7	9.273***	11.178***	13.058***	15.157***	17.042***
N11	6.843***	7.693***	8.019***	8.409***	9.142***
NA	9.990***	11.541***	12.335***	13.147***	14.077***
Panel B: BDS test with OVX					
	***m*=2**	***m*=3**	***m*=4**	***m*=5**	***m*=6**
Qatar	5.991***	6.694***	7.533***	7.888***	8.390***
UAE	6.780***	8.779***	10.158***	11.474***	12.557***
Bahrain	2.016	2.998	3.857*	4.662*	4.963**
Saudi Arabia	9.768***	11.800***	12.657***	14.206***	15.617***
Russia	9.368***	10.630***	11.593***	12.818***	14.031***
Mexico	8.960***	11.469***	12.580***	13.708***	14.918***
Venezuela	14.461***	16.714***	18.898***	21.623***	24.875***
Norway	7.747***	10.138***	12.169***	14.299***	16.557***
Brazil	7.450***	10.392***	12.116***	14.071***	16.191***
Europe	9.215***	10.965***	12.626***	14.458***	16.490***
Asia	7.413***	9.079***	10.154***	11.017***	12.179***
BRIC	9.174***	10.202***	11.135***	12.238***	13.339***
CE	8.200***	10.218***	12.092***	13.857***	15.557***
G7	9.304***	11.206***	13.102***	15.221***	17.130***
N11	6.719***	7.693***	8.149***	8.634***	9.428***
NA	10.554***	12.110***	12.991***	13.962***	14.974***
Panel C: BDS test with VIX					
	***m*=2**	***m*=3**	***m*=4**	***m*=5**	***m*=6**
Qatar	5.853***	6.440***	7.313***	7.692***	8.212***
UAE	7.001***	9.152***	10.479***	11.806***	12.927***
Bahrain	2.277	3.437	4.392*	5.207**	5.511**
Saudi Arabia	10.034***	11.927***	12.656***	14.062***	15.430***
Russia	9.425***	10.930***	12.043***	13.326***	14.586***
Mexico	8.487***	10.820***	11.857***	12.950***	14.059***
Venezuela	14.380***	16.686***	18.897***	21.604***	24.832***
Norway	7.371***	10.006***	11.993***	14.069***	16.157***
Brazil	7.766***	10.584***	12.278***	14.152***	16.266***
Europe	9.205***	10.960***	12.605***	14.439***	16.475***
Asia	7.176***	8.862***	10.066***	11.013***	12.216***
BRIC	9.268***	10.402***	11.419***	12.500***	13.585***
CE	8.297***	10.186***	12.080***	13.890***	15.647***
G7	8.864***	10.861***	12.890***	15.080***	17.046***
N11	6.667***	7.690***	8.150***	8.632***	9.415***
NA	9.192***	10.700***	11.264***	11.933***	12.584***

Panel D: BDS test with US 10 year Treasury yield					
	***m*=2**	***m*=3**	***m*=4**	***m*=5**	***m*=6**
Qatar	6.010***	6.764***	7.637***	8.034***	8.544***
UAE	6.435***	8.214***	9.389***	10.420***	11.208***
Bahrain	1.776	2.747	3.613	4.241*	4.558*
Saudi Arabia	9.771***	11.797***	12.461***	13.849***	15.203***
Russia	9.336***	10.622***	11.597***	12.799***	13.984***
Mexico	8.621***	10.976***	12.079***	13.180***	14.267***
Venezuela	14.237***	16.609***	18.768***	21.534***	24.787***
Norway	7.890***	10.353***	12.391***	14.426***	16.644***
Brazil	7.453***	10.371***	12.095***	14.026***	16.140***
Europe	9.055***	10.928***	12.594***	14.343***	16.145***
Asia	7.564***	9.171***	10.217***	10.994***	12.213***
BRIC	9.106***	10.118***	11.042***	12.106***	13.197***
CE	8.199***	10.196***	12.069***	13.840***	15.538***
G7	8.769***	10.521***	12.345***	14.633***	16.635***
N11	6.861***	7.653***	8.091***	8.557***	9.270***
NA	8.113***	9.236***	9.591***	10.042***	10.554***
Panel E: BDS test with MOVE					
	***m*=2**	***m*=3**	***m*=4**	***m*=5**	***m*=6**
Qatar	6.123***	6.835***	7.665***	8.036***	8.565***
UAE	6.668***	8.191***	9.201***	10.084***	10.717***
Bahrain	1.936	2.983*	3.933**	4.703**	5.079**
Saudi Arabia	9.390***	11.307***	11.994***	13.349***	14.609***
Russia	9.344***	10.664***	11.617***	12.748***	13.902***
Mexico	8.633***	10.996***	12.002***	13.163***	14.342***
Venezuela	14.346***	16.651***	18.804***	21.541***	24.788***
Norway	7.191***	9.655***	11.575***	13.648***	15.882***
Brazil	7.347***	10.367***	12.181***	14.151***	16.293***
Europe	9.121***	10.899***	12.532***	14.352***	16.367***
Asia	7.444***	9.090***	10.181***	10.992***	12.237***
BRIC	9.246***	10.307***	11.257***	12.311***	13.392***
CE	8.203***	10.151***	11.992***	13.756***	15.472***
G7	8.794***	10.730***	12.693***	14.903***	16.871***
N11	6.896***	7.718***	8.183***	8.644***	9.394***
NA	9.128***	10.358***	10.934***	11.685***	12.488***

Note: m stands for the number of (embedded) dimension which embed the time series into m-dimensional vectors, by taking each m successive points in the series. Value in cell represents BDS z-statistic; ***, ** & * indicate rejection of ***i.i.d.*** residuals at 1%, 5% and 10% level of significance, respectively.

Table 4: Bai and Perron (2003) Test of Multiple Structural Breaks

	WTI	OVX	VIX	10 TBR	MOVE
Qatar	5/31/2012	--	5/31/2012	--	--
UAE	--	--	--	--	5/6/2010
Bahrain	10/2/2014	--	10/2/2014	10/2/2014	--
Saudi Arabia	4/8/2010	--	--	--	4/8/2010
Russia	--	--	9/4/2014	--	9/4/2014
Mexico	--	3/25/2010	--	--	--
Venezuela	3/25/2010	4/29/2010	3/25/2010	4/29/2010	3/25/2010
Norway	10/23/2014	10/23/2014	10/23/2014	10/23/2014	--
Brazil	--	3/25/2010	--	1/10/2013	--
Europe	--	--	--	--	--
Asia	--	--	4/22/2010	--	4/22/2010
BRIC	3/25/2010	3/25/2010	--	--	--
CE	--	--	4/10/2014	11/28/2013	11/28/2013
G7	--	--	--	--	--
N11	5/20/2010	--	5/20/2010	--	--
NA	--	10/7/2010	10/7/2010	10/7/2010	--

Table 5: Quantile Regression Parameter Estimates for The Impact of Oil Returns on CDS Spread Change

Quantiles	Qatar	UAE	Bahrain	Saudi Arabia	Russia	Mexico	Venezuela	Norway
q05	0.0107	-0.2470	-0.2555	-0.5231**	-0.2794*	-0.5741*	-0.4694**	-0.2616
	(0.2517)	(0.1846)	(0.3274)	(0.2213)	(0.1730)	(0.3112)	(0.2018)	(0.2109
q10	-0.0343	-0.2309**	-0.1797	-0.3042*	-0.2683*	-0.4159***	-0.5289***	-0.1468
	(0.1516)	(0.1029)	(0.1544)	(0.1869)	(0.1484)	(0.1414)	(0.1981)	(0.2299
q25	0.0235	-0.1230*	-0.0509	-0.1641*	-0.2986***	-0.3031**	-0.5403***	-0.0530
	(0.1014)	(0.0760)	(0.0440)	(0.0917)	(0.0842)	(0.1493)	(0.1200)	(0.1207
q50	-0.0006	-0.0481	-0.0509	-0.0111	-0.3562***	-0.4081***	-0.4867**	0.0063
	(0.0503)	(0.0803)	(0.0440)	(0.0571)	(0.0824)	(0.1160)	(0.2082)	(0.0337
q75	0.0350	0.0227	-0.0397	-0.0624	-0.3467**	-0.3568***	-0.6042***	-0.0566
	(0.1182)	(0.0798)	(0.0420)	(0.0764)	(0.1347)	(0.1045)	(0.1785)	(0.1110
q90	-0.0774	-0.0279	-0.0217	-0.0787	-0.6312***	-0.4153***	-0.5865***	0.1718
	(0.1286)	(0.1472)	(0.1688)	(0.1190)	(0.2203)	(0.0839)	(0.2247)	(0.2544
q95	-0.0725	-0.1557	-0.1682	-0.0625	-0.6039***	-0.4908***	-0.9237***	0.3304
	(0.3990)	(0.1966)	(0.1875)	(0.1721)	(0.1476)	(0.0984)	(0.3149)	(0.3282
OLS	-0.0233	-0.1334**	-0.0699	-0.1339*	-0.3495***	-0.3888***	-0.6250***	0.0080
	(0.0723)	(0.0661)	(0.0655)	(0.0759)	(0.0898)	(0.0725)	(0.0961)	(0.0779
Quantiles	**Brazil**	**Europe**	**Asia**	**BRICS**	**CE**	**G7**	**N11**	**NA**
q05	-0.5484***	-0.3699	-0.4581***	-0.1911	-0.0425	-0.1969	-0.1113	1.9535***
	(0.1927)	(0.3052)	(0.1503)	(0.1602)	(0.2832)	(0.3626)	(0.2906)	(0.5880)
q10	-0.2691	-0.4075*	-0.2648***	-0.2570*	-0.0374	-0.1943	-0.2206**	0.2511
	(0.1812)	(0.2294)	(0.0829)	(0.1520)	(0.2106)	(0.2072)	(0.1050)	(0.7386)
q25	-0.3104***	-0.0808	-0.2582***	-0.3020**	-0.0865*	-0.0969	-0.1771***	-0.1685
	(0.1120)	(0.1099)	(0.0845)	(0.1198)	(0.0510)	(0.1036)	(0.0552)	(0.1398)
q50	-0.3983***	-0.0491	-0.1106*	-0.3095***	-0.0870*	-0.0436	-0.0842*	-0.2328*
	(0.1266)	(0.0760)	(0.0578)	(0.0629)	(0.0497)	(0.1226)	(0.0439)	(0.1228)
q75	-0.3561**	-0.1016	-0.1406*	-0.3813***	-0.1456	-0.1332	-0.0923**	-0.2363
	(0.1413)	(0.1238)	(0.0824)	(0.0971)	(0.1006)	(0.1069)	(0.0361)	(0.1433)
q90	-0.3225**	-0.1170	-0.1360	-0.3221***	-0.1202	0.0874	-0.1158	-0.1679
	(0.1316)	(0.2483)	(0.0957)	(0.1015)	(0.1362)	(0.1721)	(0.0818)	(0.2651)
q95	-0.3921**	0.1154	-0.0329	-0.3161*	-0.1714	-0.0847	-0.1649	0.5125
	(0.1737)	(0.1686)	(0.1437)	(0.1852)	(0.2127)	(0.1915)	(0.1333)	(1.5756)
OLS	-0.3365***	-0.1197	-0.2253**	-0.3244***	-0.0950	-0.1503	-0.1573**	0.1919
	(0.0744)	(0.0962)	(0.1094)	(0.0755)	(0.0726)	(0.1178)	(0.0634)	(0.2545)

Note: standard errors are in parenthesis. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 6: Quantile Regression Parameter Estimates for The Impact of OVX on CDS Spread Change

Quantiles	Qatar	UAE	Bahrain	Saudi Arabia	Russia	Mexico	Venezuela	Norway
q05	0.0024	0.0004	0.0038	-0.0009	0.0024	-0.0041*	0.0012	-0.0021
	(0.0025)	(0.0019)	(0.0041)	(0.0018)	(0.0023)	(0.0024)	(0.0021)	(0.0026)
q10	0.0027*	0.0013	-0.0011	-0.0002	0.0014	-0.0043***	-0.0010	-0.0006
	(0.0017)	(0.0017)	(0.0012)	(0.0016)	(0.0017)	(0.0013)	(0.0019)	(0.0016)
q25	0.0023**	0.0008	-0.0004	0.0005	-0.0012	-0.0014	0.0000	-0.0009
	(0.0010)	(0.0009)	(0.0004)	(0.0017)	(0.0019)	(0.0009)	(0.0025)	(0.0008)
q50	0.0001	0.0005	-0.0004	0.0002	-0.0005	-0.0015	-0.0008	-0.0001
	(0.0009)	(0.0010)	(0.0004)	(0.0009)	(0.0017)	(0.0011)	(0.0026)	(0.0006)
q75	0.0010	0.0014	0.0003	0.0000	0.0010	0.0003	0.0008	-0.0013
	(0.0016)	(0.0015)	(0.0003)	(0.0013)	(0.0021)	(0.0011)	(0.0028)	(0.0016)
q90	0.0018	0.0038	0.0018	0.0015	0.0018	-0.0008	0.0006	0.0007
	(0.0023)	(0.0028)	(0.0012)	(0.0026)	(0.0018)	(0.0020)	(0.0035)	(0.0029)
q95	0.0043*	0.0043	0.0047***	0.0036	0.0038***	-0.0004	0.0034	0.0021
	(0.0022)	(0.0033)	(0.0015)	(0.0045)	(0.0014)	(0.0021)	(0.0054)	(0.0041)
OLS	0.0018*	0.0007	0.0011	0.0001	0.0015	-0.0008	0.0005	0.0006
	(0.0010)	(0.0009)	(0.0009)	(0.0010)	(0.0012)	(0.0010)	(0.0013)	(0.0010)
Quantiles	**Brazil**	**Europe**	**Asia**	**BRICS**	**CE**	**G7**	**N11**	**NA**
q05	-0.0043**	0.0023	-0.0020*	-0.0003	0.0038	0.0005	-0.0039**	-0.0037
	(0.0020)	(0.0044)	(0.0012)	(0.0016)	(0.0037)	(0.0034)	(0.0017)	(0.0125)
q10	-0.0032	-0.0003	-0.0016	0.0002	-0.0002	-0.0010	-0.0023	-0.0042
	(0.0021)	(0.0032)	(0.0013)	(0.0011)	(0.0029)	(0.0023)	(0.0009)	(0.0047)
q25	-0.0030*	-0.0006	-0.0013	-0.0025*	-0.0021**	0.0006	-0.0012	-0.0021
	(0.0018)	(0.0014)	(0.0009)	(0.0014)	(0.0010)	(0.0018)	(0.0009)	(0.0016)
q50	-0.0003	-0.0009	-0.0003	-0.0007	-0.0012	0.0010	-0.0009	-0.0015
	(0.0012)	(0.0011)	(0.0012)	(0.0010)	(0.0012)	(0.0016)	(0.0008)	(0.0009)
q75	-0.0001	-0.0002	-0.0014	-0.0005	-0.0008	0.0007	-0.0007	0.0004
	(0.0011)	(0.0017)	(0.0018)	(0.0015)	(0.0016)	(0.0017)	(0.0010)	(0.0013)
q90	0.0015	0.0018	0.0004	0.0022**	-0.0007	0.0037	0.0003	0.0012
	(0.0013)	(0.0020)	(0.0017)	(0.0009)	(0.0027)	(0.0033)	(0.0015)	(0.0052)
q95	0.0032*	0.0044	-0.0007	0.0029**	-0.0001	0.0068***	0.0009	0.0219
	(0.0022)	(0.0034)	(0.0022)	(0.0014)	(0.0021)	(0.0023)	(0.0022)	(0.0159)
OLS	-0.0002	0.0002	0.0002	0.0003	-0.0005	0.0011	-0.0014	0.0006
	(0.0010)	(0.0013)	(0.0015)	(0.0010)	(0.0010)	(0.0016)	(0.0008)	(0.0034)

Note: standard errors are in parenthesis. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 7: Quantile Regression Parameter Estimates for the Impact of VIX on CDS Spread Change

Quantiles	Qatar	UAE	Bahrain	Saudi Arabia	Russia	Mexico	Venezuela	Norway
q05	-0.0022	0.0081***	-0.0026	-0.0020	0.0115***	0.0135***	0.0095**	0.0055
	(0.0038)	(0.0035)	(0.0057)	(0.0038)	(0.0033)	(0.0035)	(0.0043)	(0.0045)
q10	-0.0029*	0.0026	-0.0005	0.0003	0.0144***	0.0125***	0.0092**	0.0043
	(0.0017)	(0.0026)	(0.0023)	(0.0029)	(0.0039)	(0.0027)	(0.0037)	(0.0029)
q25	-0.0013	0.0027	-0.0004	-0.0003	0.0128***	0.0088***	0.0052*	0.0029*
	(0.0022)	(0.0023)	(0.0006)	(0.0021)	(0.0037)	(0.0024)	(0.0032)	(0.0018)
q50	-0.0001	0.0020*	-0.0004	0.0005	0.0075***	0.0084***	0.0048**	0.0017
	(0.0010)	(0.0012)	(0.0006)	(0.0007)	(0.0023)	(0.0018)	(0.0023)	(0.0013)
q75	-0.0030*	0.0017	-0.0003	0.0006	0.0064**	0.0085***	0.0033	0.0017
	(0.0017)	(0.0017)	(0.0008)	(0.0009)	(0.0027)	(0.0017)	(0.0037)	(0.0035)
q90	-0.0011	-0.0008	0.0011	0.0015	0.0044*	0.0109***	0.0034	0.0032
	(0.0021)	(0.0023)	(0.0019)	(0.0025)	(0.0028)	(0.0028)	(0.0054)	(0.0055)
q95	-0.0023	-0.0040	-0.0001	0.0013	0.0008	0.0090***	0.0007	0.0063
	(0.0042)	(0.0029)	(0.0038)	(0.0042)	(0.0032)	(0.0029)	(0.0046)	(0.0060)
OLS	-0.0015	0.0018	-0.0003	0.0013	0.0082***	0.0097***	0.0048**	0.0035**
	(0.0014)	(0.0013)	(0.0013)	(0.0015)	(0.0018)	(0.0014)	(0.0019)	(0.0015)
Quantiles	**Brazil**	**Europe**	**Asia**	**BRICS**	**CE**	**G7**	**N11**	**NA**
q05	0.0085**	0.0040	0.0062***	0.0129***	0.0041	-0.0022	0.0029	0.0210
	(0.0037)	(0.0059)	(0.0020)	(0.0041)	(0.0054)	(0.0049)	(0.0039)	(0.0154)
q10	0.0078**	0.0030	0.0065***	0.0130***	0.0035	-0.0011	0.0048**	0.0119
	(0.0035)	(0.0044)	(0.0025)	(0.0031)	(0.0025)	(0.0041)	(0.0019)	(0.0079)
q25	0.0089***	0.0045**	0.0057***	0.0106***	0.0053***	0.0032**	0.0038**	0.0092***
	(0.0016)	(0.0021)	(0.0018)	(0.0025)	(0.0012)	(0.0016)	(0.0018)	(0.0032)
q50	0.0070***	0.0068***	0.0043***	0.0073***	0.0039***	0.0019	0.0033**	0.0094***
	(0.0017)	(0.0020)	(0.0009)	(0.0016)	(0.0011)	(0.0022)	(0.0013)	(0.0019)
q75	0.0076***	0.0045	0.0033*	0.0054***	0.0025	0.0041	0.0043***	0.0075**
	(0.0020)	(0.0035)	(0.0017)	(0.0019)	(0.0020)	(0.0046)	(0.0015)	(0.0030)
q90	0.0045	-0.0005	0.0015	0.0029	0.0023	0.0014	0.0047***	0.0061
	(0.0032)	(0.0022)	(0.0018)	(0.0020)	(0.0026)	(0.0054)	(0.0015)	(0.0060)
q95	0.0052	0.0014	0.0017	0.0031	0.0017	-0.0025	0.0033	-0.0087
	(0.0036)	(0.0027)	(0.0032)	(0.0024)	(0.0033)	(0.0036)	(0.0030)	(0.0230)
OLS	0.0075	0.0031	0.0014	0.0070	0.0035	0.0011	0.0049	0.0085
	(0.0015)	(0.0019)	(0.0021)	(0.0015)	(0.0014)	(0.0023)	(0.0012)	(0.0050)

Note: standard errors are in parenthesis. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 8: Quantile Regression Parameter Estimates for the Impact of the US 10-Year Treasury Yield on CDS Spread Change

Quantiles	Qatar	UAE	Bahrain	Saudi Arabia	Russia	Mexico	Venezuela	Norway
q05	-0.1436	0.0907	0.0288	-0.0437	-0.0751	-0.0678	0.0924	0.0015
	(0.1273)	(0.0691)	(0.1304)	(0.0824)	(0.1315)	(0.0792)	(0.1038)	(0.0944)
q10	-0.0368	0.0033	-0.0459	-0.0425	-0.0159	-0.1279**	0.0383	-0.0308
	(0.0568)	(0.0845)	(0.0510)	(0.0514)	(0.0830)	(0.0536)	(0.0726)	(0.0882)
q25	-0.0042	0.0095	-0.0187	0.0079	-0.0681	-0.0859*	-0.0124	-0.1011*
	(0.0522)	(0.0490)	(0.0180)	(0.0277)	(0.0489)	(0.0530)	(0.0595)	(0.0581)
q50	-0.0001	-0.0371*	-0.0187	-0.0114	-0.0936**	-0.0451	-0.0517	-0.0233
	(0.0275)	(0.0245)	(0.0180)	(0.0124)	(0.0465)	(0.0425)	(0.0499)	(0.0349)
q75	-0.0484	-0.0960**	-0.0305**	-0.0535**	-0.1384**	-0.0597	-0.0774*	-0.1804***
	(0.0372)	(0.0453)	(0.0142)	(0.0246)	(0.0669)	(0.0438)	(0.0478)	(0.0361)
q90	0.0642*	-0.1086***	0.0269	-0.0789	-0.1043	-0.0065	-0.1443*	-0.1897**
	(0.0374)	(0.0366)	(0.0701)	(0.0688)	(0.0888)	(0.0732)	(0.0957)	(0.0908)
q95	0.0100	-0.1456**	0.1721**	-0.1100	-0.1827**	-0.0170	-0.0171	-0.2212**
	(0.1703)	(0.0733)	(0.0870)	(0.1088)	(0.0824)	(0.0910)	(0.1565)	(0.1310)
OLS	-0.0080	-0.0427	0.0032	-0.0428	-0.1150***	-0.0528	-0.0224	-0.0938**
	(0.0344)	(0.0314)	(0.0311)	(0.0361)	(0.0427)	(0.0345)	(0.0457)	(0.0370)
Quantiles	**Brazil**	**Europe**	**Asia**	**BRICS**	**CE**	**G7**	**N11**	**NA**
q05	-0.1125	-0.1296	-0.0658	-0.0807	-0.0052	-0.3193***	-0.1550	-0.5081
	(0.0859)	(0.1766)	(0.0825)	(0.1066)	(0.1254)	(0.0972)	(0.1311)	(0.5648)
q10	-0.1711*	-0.1584	-0.0743	-0.0047	-0.0370	-0.3484***	-0.0739	-0.2591
	(0.0737)	(0.1152)	(0.0602)	(0.0753)	(0.0785)	(0.0643)	(0.0720)	(0.2106)
q25	-0.0681*	-0.1752***	-0.0779**	-0.1063**	-0.0160	-0.2051***	-0.0268	-0.1077**
	(0.0401)	(0.0491)	(0.0354)	(0.0456)	(0.0359)	(0.0659)	(0.0354)	(0.0509)
q50	-0.0297	-0.1372***	-0.1266***	-0.1201***	-0.0512*	-0.1880***	-0.0564*	-0.0489
	(0.0381)	(0.0483)	(0.0308)	(0.0330)	(0.0321)	(0.0489)	(0.0337)	(0.0380)
q75	-0.0821**	-0.1465***	-0.1063***	-0.1313*	-0.1144***	-0.2046***	-0.0422*	-0.1096
	(0.0398)	(0.0443)	(0.0288)	(0.0701)	(0.0405)	(0.0470)	(0.0222)	(0.0854)
q90	-0.0083	-0.1717***	-0.1010**	-0.1257**	-0.1610***	-0.2206***	-0.0121	-0.0271
	(0.0701)	(0.0645)	(0.0429)	(0.0559)	(0.0444)	(0.0792)	(0.0509)	(0.3020)
q95	0.0266	-0.2628***	-0.1235	-0.0952	-0.0746	-0.2984**	-0.0086	-0.3368
	(0.0626)	(0.0777)	(0.0968)	(0.0725)	(0.0988)	(0.1208)	(0.0980)	(0.7314)
OLS	-0.0433	-0.1762***	-0.1116**	-0.1176***	-0.0738**	-0.2284***	-0.0299	-0.1745
	(0.0354)	(0.0457)	(0.0520)	(0.0359)	(0.0345)	(0.0560)	(0.0302)	(0.1210)

Note: standard errors are in parenthesis. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 9: Quantile Regression Parameter Estimates for The Impact of MOVE on CDS Spread Change

Quantiles	Qatar	UAE	Bahrain	Saudi Arabia	Russia	Mexico	Venezuela	Norway
q05	0.0008	0.0007	0.0021	0.0009	0.0030**	0.0026**	0.0041***	0.0005
	(0.0015)	(0.0010)	(0.0015)	(0.0009)	(0.0012)	(0.0011)	(0.0015)	(0.0010)
q10	0.0011*	0.0018*	0.0006	0.0009	0.0023**	0.0024***	0.0014	0.0011
	(0.0007)	(0.0010)	(0.0008)	(0.0008)	(0.0011)	(0.0006)	(0.0011)	(0.0008)
q25	0.0002	0.0013**	0.0002	0.0016***	0.0015**	0.0029***	0.0019***	0.0012**
	(0.0009)	(0.0005)	(0.0003)	(0.0006)	(0.0007)	(0.0008)	(0.0007)	(0.0005)
q50	0.0000	0.0014***	0.0002	0.0003	0.0022***	0.0019***	0.0022***	0.0003
	(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.0005)	(0.0006)	(0.0007)	(0.0007)
q75	0.0005	0.0022***	0.0003	0.0013***	0.0021***	0.0022**	0.0027***	0.0012
	(0.0004)	(0.0007)	(0.0002)	(0.0005)	(0.0007)	(0.0009)	(0.0009)	(0.0011)
q90	-0.0002	0.0020**	0.0007	0.0015*	0.0021	0.0024***	0.0035***	0.0010
	(0.0006)	(0.0008)	(0.0010)	(0.0010)	(0.0018)	(0.0009)	(0.0013)	(0.0018)
q95	0.0024	0.0028**	0.0001	0.0024	0.0035**	0.0030**	0.0030	0.0032**
	(0.0022)	(0.0013)	(0.0018)	(0.0017)	(0.0015)	(0.0015)	(0.0020)	(0.0015)
OLS	0.0004	0.0020***	0.0004	0.0014***	0.0020***	0.0024***	0.0026***	0.0013***
	(0.0005)	(0.0004)	(0.0004)	(0.0005)	(0.0006)	(0.0005)	(0.0006)	(0.0005)
Quantiles	**Brazil**	**Europe**	**Asia**	**BRICS**	**CE**	**G7**	**N11**	**NA**
q05	0.0037***	0.0032*	0.0019***	0.0024**	0.0026	0.0043***	0.0031**	0.0034
	(0.0008)	(0.0021)	(0.0006)	(0.0010)	(0.0020)	(0.0015)	(0.0015)	(0.0066)
q10	0.0034***	0.0018	0.0024***	0.0021***	0.0023	0.0037***	0.0020**	0.0043***
	(0.0006)	(0.0013)	(0.0005)	(0.0008)	(0.0016)	(0.0013)	(0.0008)	(0.0016)
q25	0.0017**	0.0014*	0.0020***	0.0021***	0.0008	0.0019**	0.0014***	0.0035***
	(0.0008)	(0.0008)	(0.0003)	(0.0005)	(0.0005)	(0.0010)	(0.0005)	(0.0006)
q50	0.0020***	0.0011	0.0016***	0.0018***	0.0015***	0.0018***	0.0011**	0.0018***
	(0.0007)	(0.0007)	(0.0005)	(0.0003)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
q75	0.0022***	0.0013*	0.0021***	0.0023***	0.0018***	0.0013	0.0013***	0.0028***
	(0.0008)	(0.0008)	(0.0006)	(0.0007)	(0.0006)	(0.0014)	(0.0004)	(0.0008)
q90	0.0029***	0.0018**	0.0020***	0.0028***	0.0020***	0.0019	0.0017***	0.0029
	(0.0006)	(0.0008)	(0.0007)	(0.0007)	(0.0008)	(0.0013)	(0.0006)	(0.0020)
q95	0.0024***	0.0012	0.0012	0.0025**	0.0020*	0.0044***	0.0012	-0.0007
	(0.0008)	(0.0008)	(0.0012)	(0.0010)	(0.0012)	(0.0011)	(0.0011)	(0.0091)
OLS	0.0023***	0.0018***	0.0028***	0.0022***	0.0016***	0.0026***	0.0015***	0.0038***
	(0.0005)	(0.0006)	(0.0007)	(0.0005)	(0.0005)	(0.0008)	(0.0004)	(0.0016)

Note: standard errors are in parenthesis. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 10: Explaining (Pseudo R Squared for Quantile Regression and Adjusted R-Squared for OLS) Power of Regression Models

	q5	q10	q25	q50	q75	q90	q95	OLS
Qatar	0.0383	0.0311	0.0076	0.0001	0.0052	0.0101	0.0342	0.0008
UAE	0.1037	0.1000	0.0697	0.0664	0.0971	0.1690	0.1721	0.1364
Bahrain	0.0416	0.0152	0.0071	0.0000	0.0169	0.0257	0.0665	0.0025
Saudi Arabia	0.0816	0.0787	0.0553	0.0086	0.0522	0.0681	0.0775	0.0572
Russia	0.1905	0.1986	0.2101	0.1737	0.1737	0.2047	0.2569	0.3240
Mexico	0.2673	0.2624	0.2214	0.2203	0.2338	0.2485	0.2821	0.4066
Venezuela	0.1152	0.1106	0.1324	0.1124	0.1281	0.2147	0.2321	0.2590
Norway	0.0616	0.0581	0.0633	0.0048	0.0648	0.0745	0.0996	0.1038
Brazil	0.2261	0.1821	0.1656	0.1736	0.1722	0.2115	0.2646	0.3219
Europe	0.1144	0.0913	0.0971	0.0821	0.0752	0.0887	0.1179	0.1350
Asia	0.1402	0.1566	0.1293	0.1259	0.1149	0.0960	0.0924	0.0940
BRICS	0.1985	0.2081	0.2195	0.2016	0.1826	0.2183	0.2451	0.3470
CE	0.0523	0.0540	0.0887	0.0900	0.0973	0.1278	0.1115	0.1179
G7	0.0940	0.1128	0.1084	0.0806	0.0902	0.1361	0.1548	0.1213
N11	0.0988	0.1141	0.1034	0.1087	0.1193	0.1212	0.1310	0.1662
NA	0.0774	0.0597	0.0915	0.0943	0.0762	0.0493	0.0190	0.0443

Table 11: The Khmaladze Test of Equality of Coefficient Estimates Across the Entire Range of Quantiles

	Oil	OVX	VIX	10YTR	MOVE
Qatar	1.408	2.203***	1.540	1.372	1.633
UAE	1.734	2.529***	1.866*	1.698	1.959**
Bahrain	1.984**	3.401***	3.117***	1.964**	2.522***
Saudi Arabia	2.511***	6.044***	2.018***	3.791***	3.902***
Russia	1.943**	2.478***	2.284***	1.892*	1.858*
U- MX States	1.817*	2.157***	2.546***	2.274***	2.201***
Venez-uela	1.964**	2.406***	1.732	1.394	2.300***
Norway	1.751	2.049***	2.730***	3.786***	3.544***
Brazil	1.576	2.197***	2.578***	1.592	1.889*
Europe	2.370***	2.717***	1.900*	2.142***	1.567
Asia	2.030***	2.151***	1.951**	2.430***	2.477***
BRICS	1.962**	1.514	1.361	1.770	0.934
CE	2.778***	3.921***	2.440***	2.513***	2.200***
G7	2.076***	2.281***	2.005***	1.731	1.905**
N11	2.144***	1.810*	3.033***	2.127***	2.485***
NA	1.510	2.124***	2.177***	1.963**	2.494***

Notes: This table contains the statistics of the Khmaladze test, introduced by Koenker and Xiao (2002) that are applied on the quantile regression coefficient estimates. The Khmaladze test is a joint test checking that all covariates' effects satisfy the null hypothesis of equality of the slope coefficients across the quantiles. A rejection of this null favors the quantile regression model. As usual, *, ** and ***denote statistical significance at the 10%, 5% and 1% levels, respectively.