International Journal of Engineering and Information Systems (IJEAIS)
ISSN: 2643-640X
Vol. 4 Issue 11, November - 2020, Pages: 129-136

An Analysis of MENA Countries Spread CDS and their Relationship with Government Bonds Using VAR Model

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Abstract— *This article looks at the analysis of the Middle East and North American Countries (MENA Countries) Credit Default Swaps CDS Spread and the relationship they have with Government Bonds. The sample of data for this study comprises the monthly CDS spread and Government Bonds of Ten (10) MENA Countries from the period January 2005 to December 2015. The Ten main selected countries from MENA are (Bahrain, Turkey, Egypt, Saudi Arabia, Syria, Jordan, Morocco, Oman, United Arab Emirates, and Tunisia). Some of these Countries found themselves problematic with their public sector, in the early hours of the recent financial crisis/distress. The above countries were selected for this study due to the data availability under the study period. The researchers first compared the CDS spreads determinants and the government bonds and then test how the financial crisis has affected their market pricing. Secondly, we try to analyze the 'Basis' between the CDS Spreads and the Government bond to see if there exist a relationship or any serious effects between the Markets. The Vector Autoregression (VAR) model was used in the analysis. The Unit Root Test and the Granger Causality was also used to come out with a clear decision and conclusion about the relationships. We found out that CDS Prices Granger-Cause of the spreads affects the Government bonds. A feedback causality is also detected during the financial crisis and the economic turmoil period, therefore, signifying a high-risk aversion tends to baffle/perplex the mechanism of transmission between the CDS Spread and the Government bonds.*

Keywords— *Credit Default Swaps, Government Bonds, VAR Model, Unit Root Test, MENA Countries*

Used Abbreviation
AMF- *Arab Monetary Fund*
CDS *- Credit Default Swaps*
EMDB- *Emerging Markets Database*
FEAS- *Federation of Euro-Asian Stock Exchanges*
IFS- *International Financial Statistics*
MENA- *Middle East and North African Countries*
VAR- *Vector Auto-Regression*
WDI-*World Development Indicators*

1. INTRODUCTION

The recent financial crisis has taken a heavy toll on the global economy and has had a devastating effect on public finances. One of the issues that attracted the attention of policymakers and market participants is whether changes in sovereign bond yield differentials cause changes in the associated credit defaults swaps (CDS) or vice versa. Credit derivatives are an exciting innovation in financial markets. They have the potential to allow companies to trade and manage credit risks and market risks. The most popular credit derivative is a credit default swap (CDS). Our study is primarily motivated by recent developments in the market for government securities. These securities were until recently considered to be virtually risk-free assets; clearly, this is not the case anymore. Those countries that were already running a high public deficit and/or debt are severe to borrow money at low-interest rates in the bond markets and to finance their debt without altering its structure. The selected countries Bahrain, Turkey, Egypt, Saudi Arabia, Syria, Jordan, Morocco, Oman, United Arab Emirates, and Tunisia not an exception to this. The difficulties faced by these countries led some (primarily policymakers but also academics) to blame hedge funds for speculative attacks on CDS. Empirical analyses of the effects of CDS spread have to a large extent been addressed in terms of vector autoregressive (VAR) models, initiated by Sims (1980). Yet, studies that use VAR models to identify the interdependence have found only small effects of interaction between CDS and bond. In this study, we analyze the relationship between government Bond and CDS spread in the MENA countries using a VAR model that takes full account of the potential simultaneity of interdependence. Using a sample of ten MENA countries, this study tries to understand whether there is an interaction between bond markets and CDS spread. Relatively little empirical evidence is available that estimates these relationships in the MENA regions and this is the first study that addresses this relationship for some MENA countries. In sum, the response of stock markets in the MENA region is far from being homogenous across countries. In some countries, stock market returns depict an upward tendency while in other countries it declines or does not react at all. Another important finding that should be emphasized is that

the Saudi Arabian monetary authority reacts strongly to a rise in stock market returns. This could be taken as a preemptive reaction to avoid large assets misalignments and booms. Again, in Saudi Arabia, a monetary tightening appears to be effective in mastering inflation. Most countries' monetary authorities, except Saudi Arabia and Turkey, do not react to stock market dynamics. This could be an indication that the stock market dynamics do not have a significant impact on key macroeconomic variables such as inflation. The other sections include; Review of related literature, the institutional framework of MENA stock markets, a brief review of sovereign CDS, the concept of the 'basis' between CDS and bonds, a brief description of the empirical models, the identification scheme used for the VAR study in identifying the relationship between the CDS spread and the government bond market, discussion of the empirical results finally, conclusion and recommendations were offered.

2. REVIEW OF RELATED LITERATURE

In this paper, we point out that in theory the N-year CDS spread should be close to the excess of the yield on an N-year bond issued by the reference entity over the risk-free rate. This is because a portfolio consisting of a CDS and a par yield bond issued by the reference entity is very similar to a par yield risk-free bond. We examine how well the theoretical relationship between CDS spreads and bond yield spreads hold. Several other researchers have independently carried out related research. Long staff et al. (2003), using the Treasury rate as the benchmark risk-free rate, they find significant differences between credit default swap spreads and bond yield spreads. Blanco et al. (2003) use the swap rate as the risk-free rate and find credit default swap spreads to be quite close to bond yield spreads. They also find that the credit default swap market leads the bond market so that most price discovery occurs in the credit default swap market.

Houweling and Vorst (2002) confirm that the credit default swap market appears to use the swap rate rather than the Treasury rate as the risk-free rate. They adjust CDS spreads to allow for the fact that the payoff does not reimburse the buyer of protection for accrued interest on bonds. We estimate that the market is using a risk-free rate about 10 basis points less than the swap rate.

The empirical literature that investigates the CDS-bond nexus has mainly concentrated on the relationship between corporate bonds and their underlying CDS (see Long staff et al., 2003; Blanco et al., 2005; Forte and Pena, 2009). These studies uniformly agree that corporate CDS prices lead bond prices in the price discovering process. The explanation is that when e.g. risk perceptions concerning corporate bonds rise, investors already holding these bonds want to insure against this adjustment and so the demand for CDS increases. Subsequently, this translates into higher interest rates on bond prices for new purchases or new investors on the bonds. Yet, in times of heightened economic and financial uncertainty, short-term inefficiencies of the kind described in the theoretical papers above may prevail, thereby altering the direction of causality (i.e. from bonds to CDS). Thus, it would be interesting to examine whether this is the case at specific periods of severe stress in the markets. Similar to existing empirical studies, in this note, we examine the CDS-bond spreads linkages. Therefore, the observed statistics at every stage provide a more thorough reflection of the sequence of events and allow detecting changes in the direction of causality over time.

2.1 A Brief Review of Sovereign CDS

A credit default swap (CDS) serves to transfer the risk that a certain individual entity or credit defaults from the "protection buyer" to the "protection seller" in exchange for the payment of a regular fee. In case of default, the buyer is fully compensated by receiving e.g. the difference between the notional amount of the loan and its recovery value from the protection seller. Hence, the protection buyer's exposure is identical to that of short-selling the underlying bond and hedging out the interest-rate risk. Commonly, CDS transactions on sovereign entities have a contractual maturity of one to ten years. The CDS spread is the insurance premium (in basis points per annum as a fraction of the underlying notional) for protection against default. As in a standard interest rate swap the premium is set such that the CDS has a value of zero at the time of origination. If a credit event occurs the protection seller compensates the protection buyer for the incurred loss by either paying the face value of the bond in exchange for the defaulted bond (physical settlement) or by paying the difference between the post-default market value of the bond and the par value (cash settlement) where the post-default value of the bond is fixed by an auction procedure. In the context of sovereign risk, the first such auction procedure was held for Ecuador in January 2009.

In a standard CDS contract on public or corporate debt, two parties enter into an agreement terminating either at the stated maturity or earlier when a previously specified "credit event" occurs and the protection component is triggered. Three important credit events defined (along with other terms of the contract) by the International Swaps and Derivatives Association (Barclays, 2010a) are:

- Failure to pay principal or coupon when they are due: Hence, already the failure to pay a coupon might represent a credit event, albeit most likely one with high recovery (i.e. 'technical default').
- Restructuring: The range of admissible events depends on the currency and the precise terms which materialize.
- Repudiation/Moratorium.

For corporate as well as sovereign CDS, the premium can be interpreted as a credit spread on a bond issued by the underlying reference entity. Using a no-arbitrage argument, Duffie (1999) shows that the CDS spread should equal the spread over LIBOR on a par floating-rate bond. According to this pricing analysis, the risk-reward profile of a protection seller (who is 'long' credit risk)

therefore is very similar to a trading strategy which combines a bond by the same entity with a short position in a default risk- free instrument.

Like most CDS contracts, sovereign CDS typically serve as trading instruments rather than pure insurance instruments. Investors commonly use sovereign CDS mainly for the following purposes:

- Taking an outright position on spreads depending on traders' expectations over a short horizon
- Hedging macro, i.e. country risk (e.g. a bank's exposure to a quasi-governmental body)
- Relative-value trading (e.g. short position in country X and a long position in country Y)
- Arbitrage trading (e.g. government bonds vs. CDS).

1. **MENA Stock / Bond Markets**

The development of stock markets in the MENA region followed the same path as that of the banking sector. Due to the governments' (belated) recognition of the importance of the capital market for economic development, the reform agenda of the 1990s included plans to revitalize stock markets in some countries and to establish stock markets in others. Many of MENA countries issued new capital market laws, aimed at encouraging private investment, increasing investors' protection and enhancing the banks' roles in stimulating capital markets through the establishment of mutual funds. Specifically, their core provisions included establishing a new legal framework to govern specialized capital market companies, strengthening financial disclosure, giving foreign investors full access to the market and increasing investor's rights through provisions which prohibit unfair market practices.

The security markets in the region are generally underdeveloped with a limited number of companies, low free-float of shares and thin trading. However, security markets also in corporate bond markets. The advantage of creating a bond market is that the Ministry of Finance relies upon bonds to finance the country's medium- and long-term needs and reduce the cost of public debt. In addition to being policy tools, government bonds serve other general market purposes such as being indicators for the risk-free rate in the country and serve as benchmarks in pricing corporate debt. MENA countries, however, has fallen behind in developing these markets. With the financial liberalization policies, it was expected that bond markets in the region would gain more momentum. However, for several reasons, such as the difficulty of having longer-term maturities, the relative scarcity of large private corporations, the underdevelopment of pension funds and other forms of contractual savings and high transaction costs, bond markets did not experience any noticeable progress until now.

We see then that the equity markets in the MENA region developed at a much faster rate than the lagging bond markets, the development of which needs to be speeded up. One crucial impetus to developing bond markets is having viable non-banks and contractual savings financial institutions. In the MENA region, these underdeveloped institutions have been hampered by highly conservative regulations (investments in mostly government bonds, for example). The gradual development of bond markets hinges on reforming these institutions.

Overall, the issuance of stocks and bonds is still a fairly minor method of raising funds in the MENA region. However, after September 11, 2001, the regional stock markets seem to have benefited from intra-regional financial flows. With a temporary pullback from US financial markets, MENA investors have increasingly sought returns in markets closer to home which has supported a sharp rise in regional real estate and equity prices.

3.1 Credit Default Swaps and Bond Price

Credit default swap spreads are an interesting alternative to bond prices in empirical research for two reasons. The first is that the CDS spread data provided by a broker consists of the firm bid and offer quotes from dealers. Once a quote has been made, the dealer is committed to trading a minimum principal (usually $10 million) at the quoted price. By contrast, the bond yield data available to researchers usually consist of indications from dealers. There is no commitment from the dealer to trade at the specified price. The second attraction of CDS spreads is that no adjustment is required: they are already credit spreads. Bond yields require an assumption about the appropriate benchmark risk-free rate before they can be converted into credit spreads.

3.2 The Concept of the 'Basis' between CDS and Bonds

In general, both sovereign CDS and government bonds offer investors exposure to the risk and return of sovereign debt. The basis is defined as the CDS spread minus the credit spread on a fixed-rate bond of similar maturity. In a basis trade, investors set up a default-risk free position by combining a bond position with a CDS trade to directly profit from potential price differences. With unimpeded access to sufficient funding (e.g. lending from prime brokers) arbitrage should over time reduce any differentials between the two market segments. Hence, differences between the market prices of bonds and CDS can provide information on the potential existence and size of arbitrage opportunities which should typically be very small if credit markets are functioning normally.

To exploit a negative basis an arbitrage trader has to finance the purchase of the underlying bond and buy protection in the CDS market. In this case, default risk arising from the underlying entity is fully removed from the resulting position. For a positive basis, a trader short-sells the underlying bond and sells CDS protection. Hence, if the bond is cheaper than the CDS, the investor should buy the bond and buy CDS protection to "lock-in" a risk-free profit and vice versa. These two cases are summarized in the following table:

	CDS > Bond Spread ('positive Basis')	CDS < Bond Spread ('negative Basis')
Strategy	Sell CDS protection and bond	Buy CDS protection and bond

Sample Details

We use monthly CDS spreads and benchmark bond yields collected from Bloomberg. Our sample period is from January 2005to December 2015. The series is for 10-year CDS denominated in US$ for Turkey, Egypt, Saudi Arabia, Syria, Iraq, Iran, Israel, United Arab Emirates, Qatar and Tunisia. This country selection is due to data availability. We focus on the ten -year horizon as this is the common horizon for the government bond. Hence, our yield data cover benchmark bonds with a 10 -year maturity.

3. METHODOLOGY

For the empirical analysis, we use monthly data of a 10- year government yield spreads for 10 MENA area countries, namely Turkey, Egypt, Saudi Arabia, Syria, Iraq, Iran, Israel, United Arab Emirates, Qatar and Tunisia. These spreads are matched with the corresponding 10-year MENA CDS mid-bid-ask prices. Data are collected from a secondary source close to the MENA markets. The sample period for the countries from January 2005 to December 2015 and excludes holidays.

The sample covers the selected countries, and thus it is free from any exchange rate risk, as all issues are in MENA countries. However, bond spreads are still affected by domestic risk factors (i.e. credit risk and differences in market liquidity) and the concomitant changes in investors' preferences. Decomposing empirically credit and liquidity risk is cumbersome since only the sum of these two components can be observed. Several studies (Geyer et al., 2004; Pagano and von Thadden, 2004) indicate that liquidity differences have at best a minor role in the time-series behaviour of the sovereign yield spreads in the MENA area countries. On the contrary, yield differentials are mainly driven by the credit default component. Therefore, the use of information in the underlying CDS can be viewed as a high-frequency measure of the credit default component of the government yield spreads. This allows us to restrict our analysis in the bivariate case (spreads CDS and bond) and look for their dynamic interrelationship over time.

Other Sources of Data Include:

- *Arab Monetary Fund (AMF)*
- *Emerging Markets Database (EMDB),*
- *Federation of Euro-Asian Stock Exchanges (FEAS),*
- *International Financial Statistics (IFS)*
- *World Development Indicators (WDI).*

4. EMPIRICAL ANALYSIS

Granger-causality tests necessitate that all data series involved are stationary; otherwise, the inference from the F-statistic might be spurious due to non-standard distributions. To test for stationarity, we first perform conventional ADF unit root tests. Since these tests assume no structural break in the series, we also apply the Zivot and Andrews (1992) sequential test procedure for unit roots in which the breakpoint is estimated endogenously. As identified by the Zivot–Andrews test, are statistically significant and vary across countries and estimated models. Since all variables are (1), we also test for bilateral co-integration between government bond yield spreads and their corresponding CDS prices. Table 1 reports the results of the cointegration tests using the Johansen (1988, 1991) procedure. The test results indicate the presence of a long-run strong relationship in the case of Egypt and Turkey spreads and their associated CDS prices. In all other instances, the maximum value and trace test statistics are well below their 5% critical value. However, these tests do not account for endogenously determined structural changes. Therefore, we also use the Gregory and Hansen (1996) test for cointegration with one shift in the cointegrating vector at some unknown date. These are residual-based tests for the null of no cointegration against three models of a regime shift, depending on whether the shift affects the intercept or the slope and whether a trend is included in the co-integrating regression.

5. RESULTS AND DISCUSSION

In this study are used monthly data from January 2005 to December 2015. The various dates are shown at the table below:

Annex A1: Sample Description

Countries	Time/Period
Turkey	2005: 01- 2015:12
Egypt	2005: 03- 2015:12
Bahrain	2005:01- 2015;11
Jordan	2005: 12 -2015:04
Morocco	2005: 02 -2015:12
Saudi Arabia	2005:01- 2015:12
Oman	2005:04- 2015:04

Syria	2005: 01-2014; 03
Tunisia	2005:06-2013:04
Dubai	2005: 04- 2015:12

The table above discussed the samples of the study from the various countries and the period that each data starts within the study period (10 years).

Table 1: **- Equity Markets in Selected MENA Countries (Selected Indicators: Since 2005)**

Country	Number of listed companies	Market Capitalization ($ billions)	Market Capitalization (% GDP)	Value Traded (% GDP)	Turnover Ratio (%)
Turkey	311	65.65	35	86.9	204.2
Egypt	1076	28.74	26.1	11.9	36.7
Syria					
Oman	129	3.46	17.4	28	14.2
Saudi	74	646.1	205.6	336.2	221.2
Bahrain	47	17.36	131.6	5.5	4.6
Jordan	200	37.63	290.7	175.1	95
Morocco	57	27.21	54.6	8	13.9
Tunisia	43	2.87	12	1.7	17.5
Dubai	39	2.38	12.8	6.9	20.6

Sources: Arab Monetary Fund (AMF), Federation of Euro-Asian Stock Exchanges (FEAS)

The following is a descriptive statistics of the data (time series data for the study period)

Table 2: The Descriptive Statistics

Countries	Mean	Median	Maximum	Minimum	Std. Dev.
Turkey	5.228712	6.31	412.7	-421.8	59.99812
Egypt	2.341271	19.20	1231.33	-2641.15	347.1342
Saudi	4.228791	2.360	417.61	-630.73	38.67231
Syria	3.72315	4.40	621.11	-387	68.23421
Bahrain	1.774288	14.018	861.2	-369.52	73.23410
Jordan	3.170305	8.811	291.321	-508.332	81.67321
Morocco	-1.22781	-0.336	111.51	-23.70	1.345085
Oman	2.005431	0.42	29.67	-19.47	3.774521
Tunisia	0.458723	0.924	73.42	-49.41	8.435122
DUBAI	0.479842	3.90	521.44	-296.65	47.982

Source: *International Financial Statistics (IFS)*

Table 3: Correlation

	TURKEY	EGYPT	BAHRAIN	OMAN	JORDAN	SAUDI ARABIA	SYRIA	MOROCCO	TUNISIA	DUBAI
Turkey	1.000	0.332	0.461	0.231	0.014	0.210	0.241	-0.662	0.471	0.710
Egypt		1.000	0.611	0.219	0.281	0.339	0.121	-0.541	0.372	0.532
Bahra			1.001	0.342	-0.052	0.378	0.901	-0.469	0.351	0.510
Oman				1.000	-0.220	0.394	0.076	-0.431	0.380	0.462

Jordan	1.000	-0.026	0.047	-0.065	0.215	0.020
Saudi		1.000	0.207	-0.413	0.321	0.621
Syria			1.001	-0.077	0.105	0.301
Morocco				1.000	-0.410	-0.353
Tunisia					1.000	0.389
Dubai					0.566	1.000

Source: *International Financial Statistics (IFS)*

Table 4: Stationary at level

	Unit root test-Stationary at level			
Tests	**Augmented Dickey-Fuller**		**Philips Perron**	
Country	T-statistic	Probability	T-statistic	Probability
Turkey	-31.33811	(0.000)	-31.23812	(0.000)
Egypt	-24.77002	(0.000)	-24.67004	(0.000)
Saudi	-36.40180	(0.000)	-36.30183	(0.000)
Syria	-11.97321	(0.000)	-11.87323	(0.000)
Bahrain	-21.17422	(0.000)	-21.07424	(0.000)
Morocco	-26.8944	(0.000)	-26.99430	(0.000)
Jordan	-21.1345	(0.000)	-21.0345	(0.000)
Oman	-34.7714	(0.000)	-34.6714	(0.000)
Tunisia	-19.454878	(0.000)	-19.44879	(0.000)
Dubai	-28.21675	(0.000)	-27.21673	(0.000)

After the calculations on F- statistics, both the Dickey-Fuller and the Philips Perron test the same results were revealed for all the countries under investigation/study.

Table 5 below is the number of lags for each country which help in the analysis and it is repeated in Table 6 below for further analysis.

Table 5: Number of Lags

Country of Market	Turkey	Egypt	Bahrain	Jordan	Morocco	Saudi	Syria	Oman	Tunisia	Dubai
Lags	5	3	3	3	2	3	2	4	9	5

Table 6: - VAR Lag Selection, Serial Correlation and Granger Non-Causality Tests

Country	**Model**	**Optimal lag Length**	**LB Statistics p-value**	**Causality p-value**
Turkey	Model 1	5	0.03	0.01
Egypt	Model 1	3	0.05	0.57
Bahrain	Model 1	3	0.04	0.13
Jordan	Model 1	3	0.02	0.96
Morocco	Model 1	2	0.04	0.93

Saudi Arabia	Model 1	3	0.00	0.00
Syria	Model 1	2	0.02	0.92
Oman	Model 1	4	0.13	0.12
Tunisia	Model 1	9	0.00	0.72
Dubai	Model 1	5	0.05	0.43

The first column is the ten selected countries. Followed by VAR specification for each of the countries. The third column indicates, for each specification the optimal lag length according to AIC criterion information. The fourth column reports the p-value relative to the LB test of the null hypothesis of the absence of serial correlation. The null is rejected at α-percent risk level if the corresponding p-value is lower than α. In the last column, the results of the causality test are given.

6. CONCLUSION AND RECOMMENDATION

The study analysis's the relationship between CDS Spread and Government Bonds of MENA countries. This issue for the region, namely the MENA region, using a sample of ten MENA countries which are; in Bahrain, Turkey, Egypt, Saudi Arabia, Syria, Jordan, Morocco, Oman, United Arab Emirates, and Tunisia. This study aims to investigate whether there is a relationship between CDS Spread and Government Bond or not. From a comparative perspective, promising results reflect a significant effect of an appropriate CDS spread on government bond markets development especially in Turkey, Egypt, Bahrain and Tunisia. On the other hand, the responsiveness of bond markets differs across these MENA countries.

VAR method was used in the analysis between the relationship of CDS spread and government bond. Also, another test such as unit root test, granger causality etc. was used to come out with a vivid conclude of the relationship. The researchers find that CDS prices Granger-cause of spreads affect the government bond. Feedback causality is detected during periods of financial and economic turmoil, thereby indicating that high-risk aversion tends to perplex the transmission mechanism between CDS spread and the government bonds.

In some countries, bond market returns depict an upward tendency while in other countries they decline or do not react at all. In a nutshell, what we could propose for the lagging countries in matters of the relationship between their CDS spread and Government bond market returns is to peg their currencies and to further develop their stock markets. It would be also of interest to develop Treasury fund futures because they could be considered of benefit not only to investors such as banks, which want to protect themselves against changes in the cost of reserves but also to policymakers. After all, futures allow the observer to infer, from the prices of futures contracts, the values of the discount rate that market participants anticipate at various future dates.

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