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Credit default swaps: iTraxx Crossover index as an emerging markets' portfolio indicator

Abstract

In this paper, we first investigate the pricing dynamics among the credit default swap (CDS) markets and analyze the impact of the CDS index of high-yield corporate bonds, iTraxx Crossover (iTraxx XO), on sovereign CDSs of emerging markets such as Brazil, Turkey and South Africa. Moreover, we observe the volatility movements of iTraxx XO index and examine the effects of ups and downs on the volatility levels of these emerging markets' currencies in a vector autoregression framework. We find significant impact of iTraxx XO index on the pricing dynamics of sovereign CDS prices. Results also indicate the determining role of iTraxx XO volatility on some of the exchange rate volatilities.

Keywords: iTraxx XO, sovereign CDS spread, realized volatility.
JEL Classification: G19.

Introduction

Financial markets experienced extraordinary events in 2007 and 2008. Credit crunch erased approximately $50 trillion globally from both the developed and the emerging markets. Financial system was about to collapse and credit woes still continue. Credit crisis has led large dislocations and price fluctuations in the emerging markets. In the current financial environment, credit default swap (CDS) contracts are harshly criticized by some economists and academicians. A CDS is a contract that provides insurance against the risk of a default by the issuer, either a company or a country. It is not traded on an exchange with margin requirements. CDS contracts might have exacerbated the problems since they are not exchange traded and not regulated. But in terms of allowing credit risk transfer and enhancing investment and borrowing opportunities, they present economic benefits. On 18 May 2006 (at the Bond Market Association), Alan Greenspan spoke articulately about the usefulness of credit default swaps (CDS) on the international finance system:

"The CDS is probably the most important instrument in finance. ... What CDS did is lay-off all the risk of highly leveraged institutions – and that's what banks are, highly leveraged – on stable American and international institutions."

In the past decade, within credit derivatives market, the credit default swap (CDS) has become the most widely traded instrument for transferring credit risk. According to survey data coordinated by the International Swaps and Derivatives Association (ISDA), by the end of 2007, the total notional amount of outstanding CDS contracts grew to $62.2 trillion. CDS quotes are the annual premium payments as a percentage of the notional value of the reference obligation. This CDS premium should be almost equal to the credit spread (yield minus risk free rate) of the reference bond of the same maturity. Referencing the sovereign issuers, sovereign CDSs are considered the most liquid credit derivative instruments in emerging markets. Generally, emerging market sovereign CDSs are bond-oriented in terms of the credit event indication and the deliverable obligation. The corporate CDSs, on the other hand, correspond to almost 85% of total CDS market.

To be able to track CDS spreads, credit market participants have developed indices and first corporate CDS indices were launched in June 2004, namely iTraxx in Europe and Asia and CDX in North America. Both index compositions are updated twice a year, with the roll dates of each new index being either March 20 or September 20. Each reference entity is equally weighted. A sub-group of iTraxx Europe index, the iTraxx Crossover (iTraxx XO) index measures the cost of protecting 50 risky European companies' debt (corporate default risk). In other words, this index refers to CDS of high-yield bonds. The iTraxx XO is essentially traded like a CDS on a single firm. In case of a firm's default, the defaulted firm is removed from the index portfolio and the nominal value of the contract declines by 1/50, i.e. 2 %. The index has been widely used by financial institutions as a hedge for a huge variety of risky assets.

Considering the CDS market's rapid growth, a limited number of work has been done on CDSs, the majority has concentrated on corporate CDSs such as Blanco, Brennan and Marsh (2005). Regarding sovereign issuers, most of them focus mostly on pricing determinants and the equilibrium price relationships and price discovery in the CDS, bond and equity markets (see Chan-Lau and Kim, 2004; Weigel and Gemmill, 2006). In this paper, as departing from the previous studies, we raise the question: whether the credit risk indicators have a predictive power on the risk level of emerging markets.

By using the most widely followed credit risk indicator for non-investment grade bonds, iTraxx XO, we looked into the relationship between this indicator and the sovereign CDSs of three emerging markets from three different regions: Brazil, Turkey and South Africa. Our criteria for selection of these countries concentrate on certain similarities such as investment grade level or the balance of payments conditions for those countries. For instance, Brazil and South Africa; they are both investment grade countries (Brazil was upgraded from non-investment grade to investment grade status by S&P in April 2008), Turkey and South Africa; both countries are struggling with similar problems surrounding large current account deficits, Brazil and Turkey; due to high correlation between their currency and stock markets, these two countries are accepted as twin brothers by financial market participants. In sum, these countries represent the specific qualities of the emerging markets.

Previous studies mostly examined the corporate credit risk or sovereign bond spread links. In this paper, our empirical focus is on the relationship between the emerging market sovereign credit risk and the iTraxx XO index in Europe. Moreover, other than investigating the relationship between sovereign CDSs and iTraxx XO index, we looked into the relationship between emerging market currencies and iTraxx XO index. Sovereigns in financial distress generally do not enter bankruptcy proceedings or ever liquidate their assets, so the nature of default risk is somewhat different than the corporate counterparts. Our paper addresses the question whether the widely followed credit risk indicator iTraxx XO index could be also an indicator for another major line of credit derivatives market: sovereign CDSs. In this context, examining the relationship between the sovereign CDSs and their corporate counterparts (in terms of riskiness) will be our main contribution to the related literature. Beginning from the financial stress around emerging markets in May 2006 to the peak of credit crunch (September-October 2008) which began in August 2007, we found interesting results and somewhat different dynamic relationships between sovereign CDS prices and iTraxx XO index than the common knowledge accepted on this relationship by the investors, traders and financial institutions. We detected unidirectional causality from iTraxx XO market to Turkish, South African and Brazilian CDS markets. Furthermore, the examination of volatility interaction among the daily realized volatilities of iTraxx XO index, USD/TRY, USD/BRL, USD/ZAR exchange revealed interesting results. From the portfolio management perspective, we believe the context of our paper is very timely and will contribute a great deal to market professionals in the current financial environment. Since the emerging markets' assets are in risky category, during the time of market fluctuations, the risk appetite falls (risk aversion) and now financial investors need more sophisticated indicators such as iTraxx XO index, CDS spreads and the volatility index to manage their funds which cover emerging market assets. In that sense, the findings of this study would provide valuable information for fund managers and individual investors who are interested in emerging markets

1. Literature review

Previous studies mostly analyze the connection between stock prices and CDS spreads. Kwan (1996) studies the relationship between the corporate bond market and the stock market and finds a negative correlation between bond yield changes and also reveals that lagged stock returns have explanatory power for current bond yield changes, while current stock returns are unrelated to lagged bond yield changes.

Collin-Dufresne et al. (2001) suggest that monthly credit spread changes are principally driven by local supply/demand shocks that are independent of both credit-risk factors and standard proxies for liquidity. Campbell and Taksler (2002) find an empirical linkage between rising idiosyncratic equity risk and increasing yields on corporate bonds relative to Treasury bonds. They also document evidence that idiosyncratic equity volatility is directly related to the cost of borrowing for corporate issuers.

Longstaff et al. (2003) find that both changes in credit-default swap premium and stock returns often lead to changes in corporate bond yields. Their results are consistent with the view that the new information tends to appear in the credit-derivatives and equity markets before it arrives in the corporate bond market. Packer and Suthiphongchai (2003) provide information on the growth in the sovereign CDS market and make a comparison on average sovereign CDS premiums to corporate CDS premiums by credit rating. Norden and Weber (2004) investigate the European CDS market and find that the CDS market is significantly more sensitive to the stock market than the bond market and the stock returns lead CDS spread changes. On the other hand, Chan-Lau and Kim (2004), who look for lead-lag relationships among sovereign bond indices, sovereign CDS premiums, and national stock market indexes find unsatisfying results.

Blanco et al. (2005) analyze the behavior of credit default swaps for a small cross-section of US and European firms and find support for the theoretical equivalence of CDS prices and credit spreads. Yu

(2005) studies a trading strategy in which the arbitrageur takes advantage of the temporary divergence between CDS market spreads and predicted spreads from a structural credit risk model. This model connects a company's equity price with its CDS spread. According to Yu's results, the risk of the strategy arises when the arbitrageur shorts CDS and when the market spread is so high. Bystrom (2005) discusses a link between the iTraxx CDS index market and stock market. An interesting finding in this paper is the significant positive correlation found in all studied iTraxx indexes. Longstaff and Rajan (2008) find that a three-factor portfolio credit model explains the time-series and cross-sectional variation in CDX tranche premia. Bhansali et al. (2008) use a more simplified specification of the same model to study the credit crunch period. These papers find that the subprime turmoil has more than twice the systemic risk of the May 2005 downgrade of GM and Ford.

Coval et al. (2007) apply fundamental asset pricing theory to price CDX tranches. Feldhuetter (2007) employs intensity-based models, finding that pricing performance changes diagonally on CDX tranches. Pan and Singleton (2007) use data on CDS contracts of several different maturities, to identify default risk and recovery risk in line with the Duffie and Singleton's (2003) credit pricing framework.

2. Theoretical background

As discussed by Duffie (1999) and by Hull et al. (2004), an exact arbitrage pricing relation exists among a combination of three instruments, a risky floating rate bond trading at par, a risk-free par floater of the same maturity, and a CDS contract of the same maturity that specifically references the risky floating rate bond. In other words, in theory, CDS spreads ought to be closely related to bond yield spread. It should be emphasized that the floater without credit risk should consistently trade at par at all times between issue and maturity. If default event occurs, the CDS protection seller would compensate the protection buyer for the difference between the face value and market value of the reference bond upon default. Accordingly, an investor with a long position in the risky bond and a corresponding short position in the risk-free bond who bought CDS protection would receive a net payment of zero either upon a default event or upon the maturity of the three contracts (i.e., if there was no default). Thus the spread between the yields on the risky and risk-free bonds, (BS*p*), must be equal to the CDS premium, (CDSp), in order to preclude an arbitrage opportunity. In other words, the *CDS basis*, defined as ($CDSp - BSp$) must equal zero in this ideal case in Hull et al. (2004).

Since the most important determinant of the CDS price is the likelihood that a credit event involving the underlying reference entity occurs, and since theory (Merton, 1974) tells us that this probability should be linked to the stock market valuation as well as the stock return volatility of the reference entity. An increase in the instantaneous short rate should decrease the default probability. The theoretical argument supporting this is that the short rate influences the risk neutral drift in the firm value process: a higher short rate raises the risk neutral drift and lowers the probability of default. But although the short rate is often the only interest rate appearing in structural models, the future movement of the short rate is also influenced by the slope of the yield curve. The steeper the yield curve, the higher the expected future short rate and thus we expect a negative relationship between both the short rate and the slope of the yield curve and the CDS spread.

There are further arguments to support negative relationships between these interest rate variables and CDS spreads. Low interest rates are often observed during periods of recession and frequent corporate defaults. In addition, the steepness of the yield curve is an indicator of an increase in future economic activity. This is empirically supported by Fama (1984) and Estrella and Hardouvelis (1991).

De Santis and Gerard (1998), on the other hand, state that international investments are a combination of an investment in the foreign asset, i.e. market risk and an investment of the relative price of the two currencies involved, i.e. currency or exchange rate risk. From this point of view, investors can determine the risk level their international investments bear and, accordingly, their hedging strategies. They also provided empirical support for their hypothesis that the premium for the currency risk is an important pricing factor of the total premium of an investment for the equity markets of the USA, the UK, Germany and Japan and their corresponding Eurocurrency markets. As the sovereign CDS markets have been the standard markets for international investors who are interested in emerging markets, it sounds reasonable to look for a relation between the CDS and currency markets. Based on these theoretical backgrounds and empirical findings, in addition to searching for a relationship between a credit risk indicator (iTraxx XO) and the sovereign CDS spreads, we also study the possible volatility interaction between the CDS index and exchange rate markets.

3. Analysis

3.1. Data. For CDS spreads, we collect data on Turkish, Brazilian, and South African CDSs with five year maturity. ITraxx XO index used for the analysis is of 5-year maturity and all data is obtained from Bloomberg. The sample period spans from May 2006 to October 2008 since we wanted to observe the interaction among these indicators during the period which started with the emerging markets turmoil in May 2006 and goes through the peak of recent credit crisis until November 2008.

Table 1 reports the summary statistics on CDS spreads. Both the mean CDS spread and the volatility (as measured by standard deviation) is highest for iTraxx XO index which is followed by Turkish CDS spread. As it is fairly common in high frequency financial data, no series are normally distributed. Along with high kurtosis and positive skewness, the Jarque-Bera test provides evidence against the hypothesis of normality is all series (the null hypothesis of Skewness = 0 and Kurtosis = 3).

Table 1. Summary statistics on sovereign CDS spreads and iTraxx Crossover Index

	trcds	brcds	sacds	iTraxx XO
Mean	220.4063	124.0234	84.75436	279.3598
Std. Dev.	83.66562	60.73030	59.43340	88.11512
Skewness	3.409438	3.983474	0.950136	1.268185
Kurtosis	20.48923	25.72803	2.258320	4.526141
Jarque-Bera	9235.041	15201.76	109.0561	143.8474
Probability	0.000000	0.000000	0.000000	0.000000

Notes: trcds – Turkish CDS spread; brcds – Brazilian CDS spread; sacds – South African CDS spread; iTraxx XO – iTraxx XO index.

3.2. Computing realized volatility. Volatility cannot be directly observed. Realized (historic) volatility shows past variations in a share price or an option price. There are several methods to estimate realized volatility. The basic approach is to use the concept of standard deviation of return on exchange rate:

$$\sigma_{st} = \sqrt{\frac{1}{n-1}\sum_{t=1}^{n}(r_t - \bar{r})^2}\ , \tag{1}$$

where $r_t = ln(\frac{S_t}{S_{t-1}})$ is the yield of the exchange rate calculated as the natural log of the ratio of close prices for the current and previous days, S_t is the close price at a day t,

$r_t = ln(\frac{S_t}{S_{t-1}})$, $t = 1{:}n$; $\bar{r} = \frac{1}{n}\sum_{t=1}^{n} r_t$ is the average price of the iTraxx XO index per an n-day period. We used the same formula to calculate the realized volatilities of USD/TRY, USD/BRL, USD/ZAR cross rates. Thus, the realized volatility calculated as the standard deviation of return on exchange rate, characterizes the spread of possible returns of exchange rate about the mean value of return.

3.3. Investigating CDS market links. The aim of this section is to test whether there is any interaction between the credit riskiness of European high yield corporate bond market and the sovereign issuers. As we discussed earlier, we have three sovereign CDS markets under investigation; thus, we proceed with estimation of three models each containing two sovereign CDS spreads along with iTraxx XO index[1]. Our methodological approach involves a two-step process. We first explore the long-run equilibrium relationship among the CDS spreads (i.e. $trcds_t$, $brcds_t$ and $sacds_t$) and iTraxx XO index ($iTraxx_t$) and then conduct multivariate Granger-causality tests to examine the short-run effects that each variable has on the others. In our case, we are particularly interested in the effect of iTraxx XO index on sovereign CDS spreads.

Following Engle and Granger (1987), if all system variables are integrated of order one and the stochastic error term is stationary, then the variables are said to be cointegrated, and there must exist an error-correction representation that may take the following form:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{n} \Gamma_i \Delta y_{t-i} + + \varepsilon_t\ , \tag{2}$$

where y_t is a vector whose components are the iTraxx index and the set of sovereign CDS spreads considered; Π is the long-run impact matrix and $\beta' y_{t-1} = z_{t-1}$ (the error correction term, the estimated coefficient of which reflects the process by which the system parameters adjust in the short run to their long-run equilibrium paths or the speed of adjustment); the Γ_i s are matrices of parameters; ε_t is a vector of Gaussian white noise processes with covariance matrix $\Sigma, \varepsilon_t \sim NIID(0, \Sigma)$.

Estimation of an ECM model requires the data series to be cointegrated. First, we need to investigate the unit root behavior of the series. We use a modified version of the Dickey-Fuller and Phillips-Perron tests proposed by Ng and Perron (2001) together with Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. We use two different sets of unit root tests to confirm the information obtained from each one. The underlying reason for joint use of these tests is the opposite statements of their null hypotheses; the NP tests have the unit root process as the null hypothesis and

[1] Model I: Turkey- Brazil- iTraxx XO; Model II: South Africa- Turkey- iTraxx XO; Model III: South Africa- Brazil- iTraxx XO.

KPSS test has the stationarity of the process as the null. Table 2 shows the unit root test results. As shown in the table, for NP test, the null hypothesis of non-stationarity can not be rejected for neither of the series; however, the null is rejected for the first differences of all series. The KPSS test confirms the results provided by NP tests i.e., for all series, the null hypothesis of stationarity is rejected at 1% level, but for the differenced series, the KPSS test is not able to reject the null. In sum, unit root tests confirm that the all CDS series considered for the analysis are integrated of order one I(1).

Table 2. Unit root tests

Variables *X* and their first differences *ΔX*	$NP(MZ_a)$	$NP(MZ_t)$	KPSS
trcds	-3.6	-1.31	1.135*
Δtrcds	-335.6*	-12.94*	0.20
brcds	-2.98	-1.2	1.156*
Δbrcds	-1175.4*	-24.24*	0.23
sacds	1.24	0.825	1.917*
Δsacds	-335.3*	-12.94*	0.22
iTraxx	3.17	1.28	3.82*
ΔiTraxx	-87.2*	-6.6*	0.57

Notes: The null hypothesis of Ng-Perron (NP) tests is the non-stationarity of the series, whereas the null hypothesis of Kwiatkowsky-Phillips-Schmidt-Shin (KPSS) test is the stationarity of the series considered. * denotes the rejection of the null hypothesis at 1% level.

Cointegration of the CDS series is checked with the Johansen Maximum Likelihood (ML) Test procedure (Table 3). The null hypothesis of no cointegration is rejected at 1% level for all combinations. The test results point to one cointegrated relation in each case, which shows that the CDS markets considered in this study are linked in the long run. However, to infer causal linkages in such a setup where the two sovereign CDS markets and iTraxx XO index are considered, we need to look further into dynamic relations and the long-run relations.

Table 3. Johansen cointegration ML test

	Eigenvalue	Likelihood ratio	5% critical value	Hypothesized number of vectors
MODEL1	0.045240	44.08257	42.91525	None *
	0.017779	15.28714	25.87211	At most 1
MODEL2	0.047456	42.95839	29.79707	None *
	0.019623	12.57148	15.49471	At most 1
MODEL3	0.073006	60.78633	29.79707	None *
	0.021719	13.70940	15.49471	At most 1

Notes: Model I: Turkey- Brazil- iTraxx XO; Model II: South Africa- Turkey- iTraxx XO; Model III: South Africa- Brazil- iTraxx XO. * denotes rejection of the hypothesis at the 0.05 level.

We estimate and test the error correction model (ECM) as a system of three equations with the cointegrating vector obtained from the Johansen ML procedure[1]. Estimated coefficients of lagged returns and long-run equilibrium relations are reported in Table 4. In the first model, the speed of adjustment coefficient is significant for Turkish and Brazilian CDS spread returns confirming that these two sovereign CDS markets adjust to the long-run equilibrium. In other words, in response to a positive discrepancy in $\hat{e}_{t-1}$, sovereign CDS markets considered show a response to a deviation from the long-run equilibrium in the previous period. However, the lagged error term of iTraxx XO index returns has insignificant coefficient, which implies that the index reflecting the average credit risk level of non-investment grade European companies does not respond to a deviation from the long-run equilibrium in the previous period. The similar pattern is observed in the other two models estimated. While iTraxx XO does not show a response when the long-run equilibrium is disrupted, the other two sovereign CDS prices adjust to the log-run equilibrium path except Turkish CDS prices in the third model. As a second step, we conduct the block-exogeneity test which is a multivariate version of Granger-causality test. We should recall that the aim of the analysis is to test whether any information can be extracted from the iTraxx XO index to explain the sovereign CDS prices. Block-exogeneity test results reveal important information about the causal dynamics of these three CDS markets (Table 5). First of all, in the same direction to our expectations, we detect a strong causal impact of iTraxx XO index on Brazilian, Turkish and South African CDS markets at 1% and 5% significance levels, respectively.

Table 4. Long-run equilibrium parameters

MODEL	Coefficient	t-value
MODEL 1		
$e_{(TR)}$	-0.074426	-4.20

[1] The lag order selection is based on Log Likelihood, Final Prediction Error, Akaike, Schwarz and Hannan-Quinn information criteria and a lag structure that is selected by at least three out of the five criteria is chosen for each model. Based on this criterion, the optimum lag length is determined as seven for Models I and III and three for Model II.

Table 4 (cont.). Long-run equilibrium parameters

MODEL	Coefficient	t-value
$e_{(BR)}$	-0.038159	-2.49
$e_{(iTraxx)}$	-0.018368	-1.06
MODEL 2		
$e_{(SA)}$	-0.028136	-5.42
$e_{(TR)}$	-0.011864	-0.65
$e_{(iTraxx)}$	-0.021191	-1.35
MODEL 3		
$e_{(SA)}$	-0.0231180	-5.16
$e_{(BR)}$	-0.055697	-4.32
$e_{(iTraxx)}$	-0.012329	-0.91

Table 5. Wald tests – Granger causality for the Interaction among CDS prices

MODEL	Probability
MODEL 1	
$\Delta itraxx \rightarrow \Delta trcds$	0.0147
$\Delta itraxx \rightarrow \Delta brcds$	0.0004
MODEL 2	
$\Delta itraxx \rightarrow \Delta sacds$	0.1475
$\Delta itraxx \rightarrow \Delta trcds$	0.0123
MODEL 3	
$\Delta itraxx \rightarrow \Delta sacds$	0.2141
$\Delta itraxx \rightarrow \Delta brcds$	0.0000

Note: Wald tests report the marginal probabilities associated with the Granger-causality tests.

Between 2003 and 2008, Turkish economy has had the current account deficit and the trade deficit. These fundamental risks are priced by market players when the fluctuation begins in emerging markets. Then the risk premium on credit spreads rise and as we showed in our results, iTraxx XO and Turkish CDS prices move in tandem. On the other hand, even if they are in investment grade status, according to our results, Brazil and South African CDS prices seem to be affected by the iTraxx XO index. This may be attributed to the fact that the financial investors put all major emerging economies in the same investment basket. For example, during the recent financial turmoil, there was a huge capital outflow from Brazil as well along with Turkey and other emerging countries.

3.4. The interaction among the currency and the credit markets. The volatility interaction mechanism among the major CDS market index, iTraxx XO, and currencies of sovereign CDS issuers is investigated by using vector autoregression (VAR) model. The reliability of a VAR model depends on the stability of model parameters. As expected, all the volatility series to be used in VAR model are found to be stationary (Table 6).

Table 6. Unit root tests for realized volatility series

Variables *X*	NP(MZ_a)	NP(MZ_t)	KPSS
vol_TRY	-279.45*	-11.82*	0.521
vol_BRL	-87.65*	-6.20*	0.175
vol_ZAR	-587.33*	-17.137*	0.154
iTraxx	-62.10*	-5.50*	0.493

The analysis of VAR estimation results reveals that the realized volatility of iTraxx XO index has a direct effect on realized volatilities of USD/TRY and USD/BRL cross rates (Table 7). Strong causality relationship was found at 1% significance level. We think this is an important result since it shows a strong relationship between the credit markets and currency markets. In line with our expectations, the volatility of iTraxx XO index has an impact on the volatilities of USD/TRY and USD/BRL cross rates. This volatility effect could be explained by the approach of big financial institutions to these countries. In recent years, big investment banks have been treating Brazilian Real and Turkish Lira as a single currency. They offered hundreds of structured products which included these countries' government bonds, currencies. On the other hand, there was no interaction between the iTraxx XO volatility and the volatility of USD/ZAR cross rate. This result may suggest that the dynamics of credit markets are not a solid determinant of USD/ZAR rate volatility. Although the South African CDS price is directly affected by the iTraxx XO index, index volatility had no effect on USD/ZAR volatility. At this point it is important to remind that the South African CDS contracts are not traded as much as Brazilian and Turkish CDS contracts. Therefore, the trading volume for South Africa is relatively small as compared to these two countries' CDS contracts, which may explain the lack of relationship between the iTraxx XO volatility and USD/ZAR volatility. Moreover, ups and downs on the volatility of USD/BRL and USD/TRY are much sharper than the USD/ZAR exchange rate volatility, which may show the lack of correlation between USD/ZAR and iTraxx XO volatility.

Table 7. Wald tests – Granger causality for volatility interaction

TRY-REAL-iTRAXX	Probability
$\Delta itraxx \rightarrow \Delta USD/TRY$	0.0014
$\Delta itraxx \rightarrow \Delta USD/BRL$	0.0123
TRY-ZAR-iTRAXX	Probability
$\Delta itraxx \rightarrow \Delta USD/TRY$	0.0022
$\Delta itraxx \rightarrow \Delta USD/ZAR$	0.2663
ZAR-REAL-iTRAXX	Probability
$\Delta itraxx \rightarrow \Delta USD/ZAR$	0.1927
$\Delta itraxx \rightarrow \Delta USD/BRL$	0.9249

Note: Wald tests report the marginal probabilities associated with the Granger-causality tests.

Conclusion

In this paper, we explore the possible link between the corporate junk bond credit default swaps and the sovereign credit default swaps. According to our results, iTraxx XO index has an impact on sovereign CDSs of Brazil, Turkey and South Africa. Moreover, we detect a relationship between the volatility of corporate junk bond CDS index and volatility of emerging market currencies. We believe that our results could be a reference for emerging markets' portfolio managers and investors who consider investing in these emerging markets.

Credit default swaps are very attractive instruments of modern finance. Nevertheless, because of its off-balance sheet, over-the-counter and non-exchange-traded characteristics, it has been widely criticized since credit crisis began. We do not hold this skeptical view and think that if it could be highly regulated and traded on an exchange, CDS market would be the most impressive part of financial engineering once again. While CDS market did not trigger the current financial crisis, it might have increased the intensity of the problems and complicated the process of dealing with the issues. But still, according to our results, for an ex-ante evaluation, they are very good indicators for funds and for both institutional and individual investors who invest in emerging markets like Brazil, Turkey and South Africa.

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