Interaction between Romanian CDS and bond market – implications for macro-prudential policy

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Note: All views expressed are those of the author and do not necessarily represent the opinions of and should not be attributed to the National Bank of Romania.

Outlines

1. General framework – Hedging or other purposes?
2. How to investigate the relationship between CDS and bonds spread for Romanian case
3. Conclusions

1. General framework

- A sovereign credit default swap (CDS) represents a non-standardized contract which insure against the country's default.

- Sovereign CDS contracts were created to be used by financial institutions to mitigate (hedge) risks related to countries probability to default.

- A financial institution may take exposure on a given country by buying sovereign bonds.

- CDS contracts and bonds are therefore measured related to sovereign credit market.

1. General framework

- Even the primer purpose of sovereign CDS contracts should be the hedging activity, some financial institutions use these contracts for speculative purposes.

- The end-users of CDS contracts are banks (hedgers), pension funds (hedgers), asset managers (speculators), hedge funds (speculators) and dealers (at the interaction of these counterparties)

- CDS contracts and bonds are measured related to sovereign credit market.

- According to JP Morgan (2009), differences between sovereign bonds and CDS market can provide information on the potential existence and size of arbitrage opportunities.

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2. How to investigate the relationship between CDS and bonds spread for Romanian case

- In this study it was used a nonconventional approach to investigate the sovereign CDS – bonds spread link based on a continuous-time process.
- A general framework for modeling the evolution of an underlying time series can be described by the following stohastic differential equation:

$$dR_t = \alpha(\theta_R - R_t)dt + \sigma dW_t + [dJ_t - \lambda E[Y]\, dt]$$

- α is the rate at which R_t reverts to its long-run mean θ_R ;
- W_t represents the Wiener process along with the model's diffusion σ ;
- $dJ(t) = (Y_{N(t)} - 1)dN(t)$ is used to model jumps' dynamic, where $Y_{N(t)}$ denotes the jumps size $\left(Y_j \sim N(\mu_Y, \sigma_Y^2)\right)$, while $N(t)$ is a univariate homogeneous Poisson process;
- dR_t shows the evolution of interest variables (CDS and bonds spreads) during adjacent intervals of time denoted by dt .

2. How to investigate the relationship between CDS and bonds spread for Romanian case

- $\alpha(\theta_R - R_t)$ models the tendency of interest variables.

- σdW_t is used to account for normal risks (fluctuations) that affect the evolution of interest variable .

- $dJ_t - \lambda E[Y]$ was introduced to capture the extreme events (jumps) which reflects very high risks.

- The main idea followed here was intended to disangle the jumps (those significant movements in prices which denote a closeness to default) from the so-called normal fluctuations, by using discrete time data.

2. How to investigate the relationship between CDS and bonds spread for Romanian case

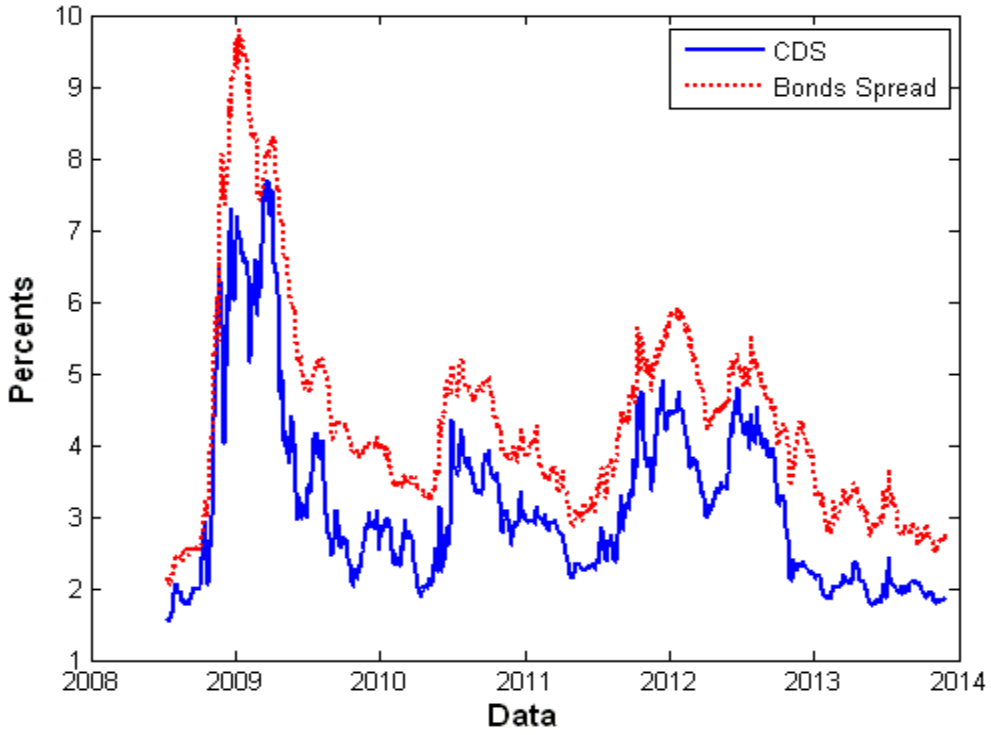
- For the purpose of analysis, were used data on the spread between yields offered by Romanian 5-year government bonds and German bunds and the 5-year sovereign CDS quotes.

- The time series with a daily frequency are provided by Bloomberg and span the period between June-2008 and October-2013.

- Dynamic of CDS quotes was determined as an arithmetic return (CDS(t) – CDS(t-1)) because this measure has a certain interpretation: it approximates the return obtained from buying an underlying bond of the country at *t -1* and then selling it at *t*.

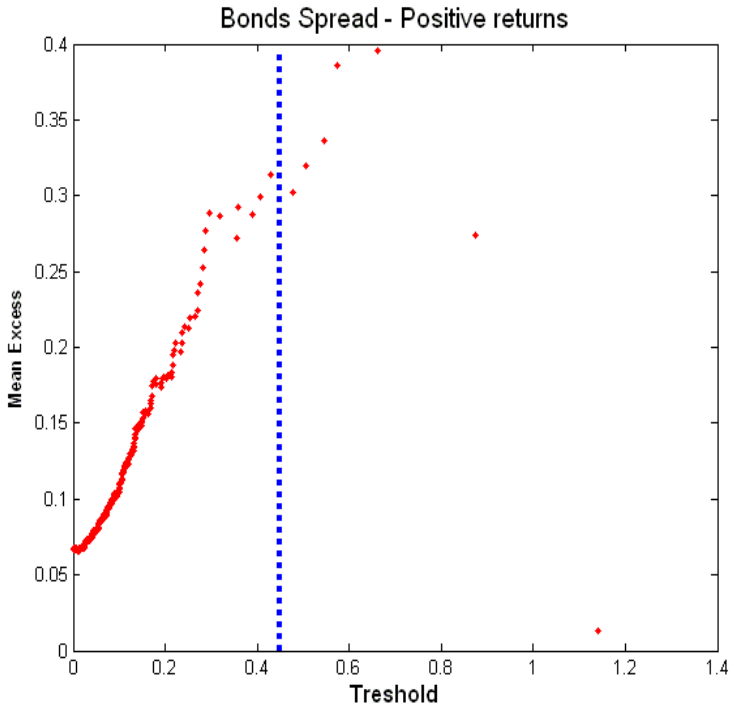
2. How to investigate the relationship between CDS and bonds spread for Romanian case

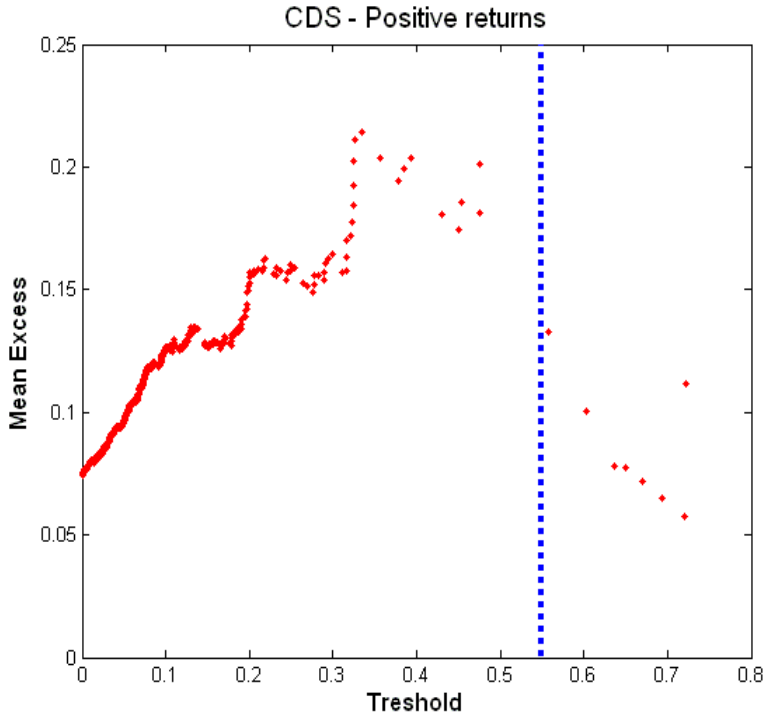
- From the inspection of bellow plot it can be seen a strong co-movement between CDS quotes and bonds spread – their correlation is around 94.6 %.



2. How to investigate the relationship between CDS and bonds spread for Romanian case

- The mean excess function (MEF) $\frac{\sum_{i=1}^{T}(C_i - p)I_{[C_i>p]}}{\sum_{i=1}^{T} I_{[C_i>p]}}$ it is called *i)* to provide prior information about jumps for calibration process and *ii)* to offer an indicative measure to approximate the jumps size and their dispersion.





2. How to investigate the relationship between CDS and bonds spread for Romanian case

- The Ornstein-Uhlenbeck model with positive Poisson jumps was estimated by using the following approximation for the real density function:

$$f_{C(t)|C(t-\Delta t)}(C) = \lambda \Delta t f_N\left(C; m_x\left(\Delta t, C(t-\Delta t)\right) + \mu_Y, v_x(\Delta t) + \sigma_Y^2\right) + \lambda\_\Delta t f_N\left(C; m_x\left(\Delta t, C(t-\Delta t)\right) - \mu_Z, v_x(\Delta t) + \sigma_Z^2 + (1 - (\lambda + \lambda\_)\Delta t) f_N\left(C; m_x\left(\Delta t, C(t-\Delta t)\right), v_x(\Delta t)\right)\right)$$

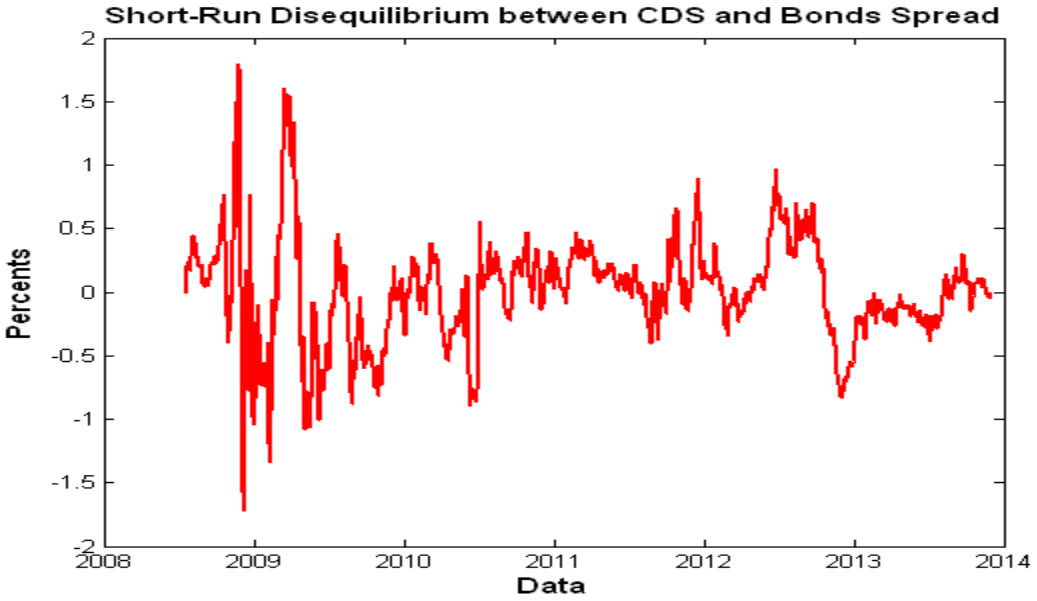
- Model's parameters were inferred with the *Random Walk Metropolis-Hastings* on the base of 50,000 simulations.

- The obtained results are reported bellow:

	θ	α	σ	μ_+	σ_+	λ_+	*Log-Likelihood*
Bond Spread	0.1459 (0.0244)	0.0330 (0.1863)	0.1493 (0.7688)	**0.549 (0.00)**	0.0797 (0.0012)	0.0658 (0.4818)	1,266.3
CDS	0.0669 (0.0234)	0.0327 (0.18)	0.1275 (0.1922)	**0.685 (0.00)**	0.0906 (0.00)	0.0192 (0.6377)	964.05

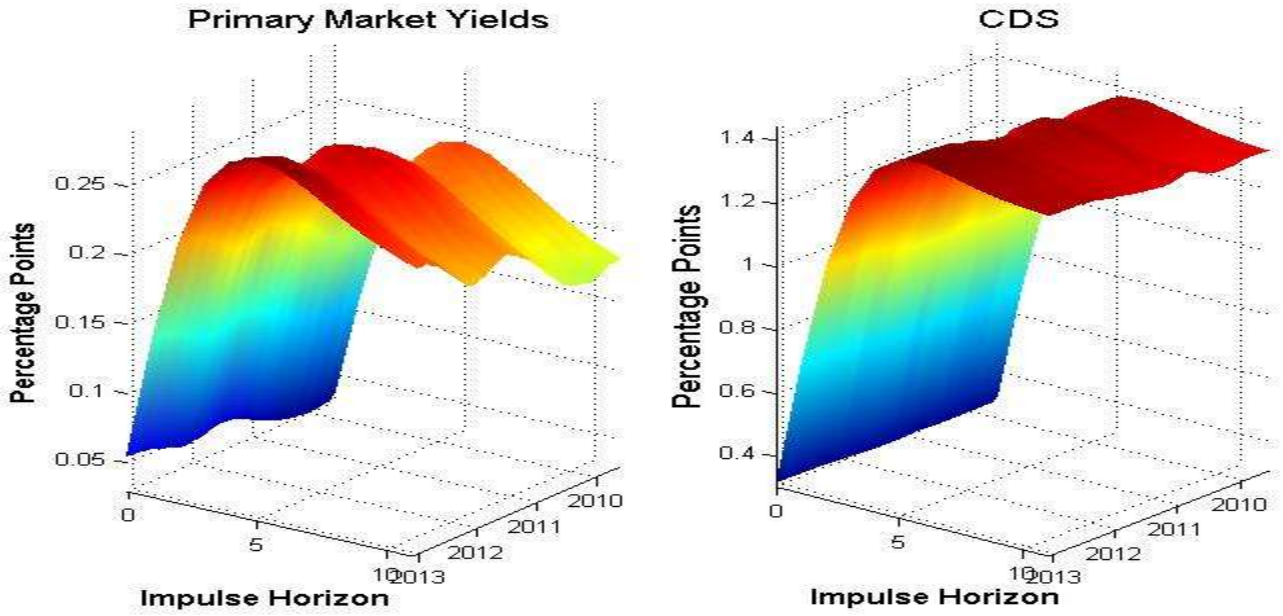
2. How to investigate the relationship between CDS and bonds spread for Romanian case

- Blanco *et al*. (2003) showed there could exist a long-run equilibrium between CDS quotes and bonds spread, characterized by a no-arbitrage relation - estimates of a VECM model for CDS quotes and bonds spread emphasized *i)* the existence of a long-run equilibrium (according to Johansesn test) and *ii)* the CDS quotes leads bonds spread.



2. How to investigate the relationship between CDS and bonds spread for Romanian case

- How expensive is the short-run disequilibrium (powered by non-fundamental facts as speculative purposes) for the costs at which the government is borrowing? – in that sense it was used a TVP-VAR model with stochastic volatility, assuming in the long-run only the fundamentals matters in pricing sovereign debt (Blanchard-Quah identification scheme).



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4. Conclusions

- Obtained results showed that mean of extreme movements recorded by 5-year bonds spread is about 0.55 percentage points.

- Instead, the positive jumps which affected the evolution of CDS quotes posted an average which approximate 0.685 percentage points.

- Therefore, the CDS transactions may contain a speculative component.

- Between CDS and bond markets exists a long-run equilibrium, which reveal a proper functioning of credit markets and low probability for negative spillovers to other financial markets in Romanian case.

Thank you!