THE LOCAL DETERMINANTS OF EMERGING MARKET SOVEREIGN CDS SPREADS IN THE CONTEXT OF THE DEBT CRISIS. AN EXPLANATORY STUDY

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Abstract

The aim of the paper is to explain the determinants of emerging market sovereign CDS spreads in the light of European debt crisis. There are two important types of factors that determined the evolution of sovereign CDS spreads: global, which equally affected all emerging markets and country-specific factors, which reflect the economic fundamentals of the countries.

We use data on five-year sovereign CDS spreads for selected Eastern European countries during the period 2008-2010. In order to examine the spillover effects of sovereign debt crisis on the emerging economies CDS spreads, we introduce in our analysis the evolution of Greece CDS spreads for the same period. We find that changes in the sovereign CDS spreads of CEE countries are (jointly) determined by the investors risk appetite, economic fundamentals, spillover effect, and rating downgrade.

Keywords: sovereign credit default swaps, emerging markets, risk measure, sovereign risk, sovereign debt crisis.
JEL classification: F30, G11, G14, G15.

1. INTRODUCTION

After the onset of global financial and economic crisis, many analysts have begun to consider CDS premium as a leading indicator of country risk, along with sovereign bonds. Activity in the CDS market for developing country sovereign debt increased significantly as investors adjusted their exposure to sovereign risk.

The behaviour of Credit Default Swaps spreads during the latest global financial crisis has attracted significant attention in three stages: (1) after the collapse of Lehman Brother in fall of 2008; (2) after the emergence of fiscal deficit problem in Greece in autumn 2009; (3) in May 2010, when the attention turned to default risk in Euro area sovereign debt.

This study employs regression analysis to explore the ability of macroeconomic variables to explain the variation in quarterly sovereign CDS spread changes across CEE countries. To the best of our knowledge, this is the only study in the literature that examines this link in above-mention region in the light of sovereign debt crisis.

The rest of the paper is organised as follows. In the next section a theoretical background of CDS is provided. The third section provides literature reviews on the factors affecting the sovereign CDS spreads. In section four, an explanation of the model and data is given. Section five discusses the empirical findings. The last section concludes the research with suggestions for future work.

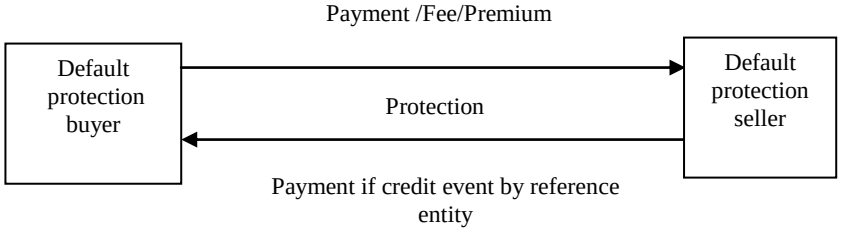
2. THEORETICAL BACKGROUND OF CREDIT DEFAULT SWAP SPREADS

Credit derivatives are contracts where the payoff depends on the creditworthiness of an agreed *reference entity* (a company or a country). Credit derivatives allow companies to trade risks in much the same way as they trade market risks, to diversify credit risks, and to transfer credit risks to a third party [Hull, 2009, 517]. Most segments of the credit risk transfer markets are global markets with the counterparties often domiciled in different countries.

The simplest and the most widely traded credit derivative is the Credit Default Swap (CDS), which represents a bilateral, off-balance sheet agreement between two counterparties. Under a credit default swap, one party (the *protection buyer*) agrees to pay an amount (the *fixed amount*), either initially or periodically, to the other party (the *protection seller or writer*) for protection or insurance against a credit event by a third party (reference entity), for a specified period of time. The protection seller agrees to pay an amount to, or buy a debt obligation from the protection buyer on the occurrence of specified credit-related contingencies (each a *credit event*). The contract under CDS depends upon the default event and the cash flow transaction is triggered only when the default event occurs and not otherwise. This not only helps market participants to seek protection, but also motivates them to buy and sell positions for reasons of speculation and arbitrage, without having the direct exposure to the underlying security.

Definition of the credit event is typically standardized by referring to the master agreements of the International Swaps and Derivatives Association (ISDA). A credit event can be the failure to make a required payment, the restructuring that makes any creditor worse off, the invocation of cross-default clause, and the bankruptcy [Stulz, 2003, 596].

Between a single name credit default swap and an insurance policy there are common features, but also important differences. In both cases, the protection buyer (who is covering against risk) pays to the protection seller a premium, which compensates the protection seller for assuming the risk of a default. If the credit event by reference entity occurs, the default protection seller has the obligation to pay he protection buyer the incurred loss. The main difference between the two ways to transfer credit risk is that a credit default swap is a financial instrument that can be traded on financial markets [Anton, 2009, 167-168].



Source: [Author's illustration]

Figure no. 1 Credit Default Swap Mechanism

The amount of the fee (or CDS premium) depends first of all on the underlying borrower's credit rating, the term of the contract, the risk taker's credit rating, the definition of the credit event and the probability of simultaneous default by the risk shedder, and the reference obligations. The CDS premium (or CDS spread) is computed to cover the expected loss of the reference entity [Weistroffer, 2009, 4]. The CDS premium is determined by two main parameters: probability of default (PD) and the recovery rate (RR):

$$\text{CDS premium} = PD * (1-RR) \quad (1)$$

Credit default swap market has three important economic functions:

a) hedging and trade of credit risk - CDS represent a very efficient way to manage peak exposure;
b) portfolio diversification - CDS can be used to reduce/avoid concentration among sectors or geographic regions*;*
c) market completion.

Credit Default Swaps are widely believed to facilitate risk-sharing across financial intermediaries and, hence, to have reduced the probability that difficulties at a single intermediary could affect the entire financial system. The *main advantage of credit derivatives* is the possibility that the credit risk is spread to investors/institutions outside the banking system.

The CDS market segment is one of the most innovative and fastest growing in the last 5 years, in particular between 2005 and 2007. Started as an inter-bank market to exchange credit risk without selling the underlying loans, the CDS market involves a wide range of financial institutions from insurance companies to hedge funds. In June 2007, gross notional amounts outstanding had reached a notable USD 58 trillion (BIS data) - which compares to the notional value of debt securities outstanding worldwide at that time of USD 80 trillion. After the onset of global financial crisis, CDS gross volumes outstanding fell to an estimated USD 30 trillion by mid-2009 [Weistroffer, 2009, 5].

The main market participants are banks, non-financial corporations, insurance companies, reinsurance companies, hedge funds or asset management companies. The concentration risk of CDS market has arisen some concerns in the last two years, especially after some major participants (Lehman Brothers, Merrill Lynch, AIG, and Bear Stearns) exit the market during the financial crisis. In the USA, the 25 largest banks account for more than 99% of the total notional amount of derivatives, while the largest 5 banks account for 96% of the total notional amount of derivatives. Moreover, the top derivatives dealers hold approximately 30% of the global derivatives market in terms of national values with just a few international institutions filling out most of the remaining market. The main concerns are that the failure of a leading dealer could result in counterparty credit losses for market participants and a leading dealer's exit may bring market illiquidity.

There are some important shortcomings of the sovereign CDS market practices and structure. Compared to the exchange-based derivatives market, the OTC market is not directly regulated with respect to disclosure of information between the parties. As a result, there is no pricing transparency, nor centralized transparency of derivatives positions, and therefore the inability to evaluate the size and scope of the market.

The explosive growth and rapid innovation in the markets for credit default swaps (CDS) have been accompanied by new risks to the investors. The most important risk is the counterparty risk (or default risk) – the risk that one party to the contract fails to meet its financial obligations. This risk is very hard to measure when the other party has other contracts with different counterparties and from the financial reports the financial obligation

are not clear, since the financial derivatives are off the balance sheet instruments. The current financial crisis has highlighted that market participants did not price counterparty credit risk correctly.

CDS and bond spreads measure the default risk of the reference entity. Although CDS and bond spreads are two measures of the same credit risk, they tend to reveal significant differences for various reasons.

The bond yields are influenced not only by credit risk, but also by interest rate risk, liquidity risk, choice of a risk-free benchmark yield, bond short-sale restrictions, differential tax treatment etc. The CDS premium is determined by "cheapest-to-deliver" option in the CDS, the relative liquidity in the CDS market, and the global market liquidity etc.

Due to their characteristics, CDS spreads are often perceived as a **superior measure of default risk**. Numerous empirical studies found that CDS spreads tend to lead the signals derived from bond markets. Blanco et al. (2005) analysed the relationship between investment grade bonds and credit default swaps and found that price discovery takes place primarily in the CDS market. Hull et al. (2004) found that CDSs tend to anticipate future rating changes. Recently, Forte et al (2009) found that CDS spreads lead bonds more frequently than the other way round. Varga (2009) found that the Hungarian CDS market rather than the sovereign currency bond market should be considered the most reliable measure of the Hungarian sovereign credit spread. Using a sample of 20 sovereign VDS spreads, along with their underlying bonds, Li and Huang (2011) studied the relationship between CDS quotes and yield spreads in countries of emerging markets. They found that "sovereign CDS market is playing more significant role in price information discovery than bonds markets" [Li, 2011, 199].

On the other hand, Ammer and Cai (2007) showed that bond market leads sovereign CDS premiums for emerging markets based on a sample of nine sovereigns from 2001 to 2005 and the interactions vary among different levels of liquidity. Similar, Li (2009), found that bond market leads CDS market in most of the eight sovereign names.

Chan-Lau and Kim (2005) found no solid evidence on the leadership of the pricing interaction among bond, CDS and equity markets by examining data of eight emerging markets between 2001 and 2003.

One important issue revealed by the current global financial crisis is the liquidity risk in bond market. After the onset of the crisis, CDS proved to be the most liquid credit instrument, as indicated by lower bid-ask spreads. Anecdotic evidence from periods of distress shows that when the corporate bond market registered a very low liquidity, CDSs remain the main instruments for credit risk management (Weistroffer, 2009) and (Hemetsberger, 2010).

3. LITERATURE REVIEW

The contemporary literature on credit derivatives that includes theoretical and empirical work focused mainly on the estimation of default probabilities and the factors influencing credit risk. During the crisis, in the last two years, the interest in factors determining the evolution of Sovereign CDS grew rapidly.

Analyzing three benchmark iTraxx indices, namely iTraxx Europe, iTraxx Europe Hivol and iTraxx Europe Crossover, with a 5-year and 10-year maturity euro denominated, Bhar, Colwell and Wang (2008) offered a complete overview of the European CDS market. Based on specific explanatory variables such as *short interest rate, the slope of yield curve, the stock market volatility and the bid-ask spread for each iTraxx index and each maturity*

and *credit rating premia*, their results show that the temporary component does behave differently from the persistent component and these theoretical explanatory variables do have different influences both in direction and degree on the temporary component and the persistent component. Also, the theoretical explanatory variables can explain more for the persis-persistent component.

Based on a multifactor affine framework, Ang and Longstaff (2011) studied the nature of systemic sovereign credit risk using CDS spread for the US Treasury, individual US states and major European countries and highlighted a substantial heterogeneity across US and European issues regarding the sensitivity to systemic risk, and a *strong relation to financial market variables*.

Using daily data on sovereign CDS spreads, stock market indices and sub-indices for banking and insurance for a group of selected European states Arezky, Candelon, and Sy (2010) found that sovereign rating downgrades have statistically and economically significant spillover effects both across countries and financial markets implying that rating agencies announcements could spur financial instability.

Regressing individual CDS premia on a common risk factor, the iTraxx index of non-financial CDS premia, Ejsing and Lemke (2009) indicated a strong comovement of weekly credit default swap premia in the first half of 2008, and based on regressions with breaks and time-varying parameters, concluded that credit risk transfer had a dynamic dimension.

Hassan, Ngow and Yu (2011) examined the determinants of CDS spread in the US, Europe and Asia-Pacific markets using linear regression with level and macroeconomic variables and confirmed the existence of a significant relationship between theoretical determinants of default risk and actual market pricing of CDS, highlighting the importance of the interaction between macroeconomic and firm-specific variables.

Considering the determinants of CDS spreads for a sample of 22 countries covering 2008-2009 period, Siklos (2011) identified some common factors such as *volatility*, proxied by the VIX indicator, *central bank transparency* and *the onset of the global financial crisis*, and some specific ones, such as the *exchange rate regime*, *monetary policy features* and the *openness of the economy*.

Several studies have demonstrated that a significant portion of sovereign CDS spreads is explained by common factors such as investors' risk appetite and global economic fundamentals (Remolona et al., 2008; Longstaff et al., 2008; Ciarlone et al., 2009; Fontana and Scheicher, 2010; Winckelmann and Sorensen, 2011).

Fontana and Scheicher (2010) found that the repricing of the cost of sovereign debt determined by common factors, such as the declining risk appetite. According to this study price discovery takes place both in the CDS and in the bond market.

Ismailescu and Kazemi (2010) examined the effect of sovereign credit rating change announcements on the CDS spreads of the event countries. They found that positive events have a greater impact on CDS markets in the two-day period surrounding the event (and are more likely to spill over to other emerging countries), while CDS spreads respond weakly to negative events. The information which led to the lowering of credit rating is already incorporated in credit spreads when announcing the new rating.

Bellas et al. (2010) found that in the short run volatility and financial stress ("financial fragility") are more important determinants of sovereign risk in emerging markets than fundamental indicators.

Dieckman and Plank (2011) documented that the state of the world financial system have strong explanatory power for the behavior of CDS spreads, and that the magnitude of

this impact depends on the relative importance of a country' s financial system pre-crisis and on the membership of the Economic and Monetary Union.

This paper contributes to the existent literature through the expansion of the research concerning the local determinants of CDS for an emerging economy in the light of European debt crisis. We include in our analysis both internal factor (gross domestic product, budgetary deficit, fiscal risk factors and so on) and the spillover effects of rating news during the period 1st January 2008 – 31st December 2010.

4. DATA AND METHODOLOGY

Our analysis uses quarterly data for ten Central and Eastern European countries: Czech Republic (CZ), Estonia (ES), Greece (GR), Hungary (HU), Lithuania (LI), Latvia (LA), Poland (PO), Romania (RO), Slovak Republic (SK), and Slovenia (SL). The country selection is due to the data availability. Datastream provided data on sovereign CDS spreads for October 2007 to December 2010. We use the 5-year CDS denominated in US$. Eurostat provide quarterly data on debt-to-GDP ratio, real GDP growth rate and general government deficit to GDP.

Most previous studies have employed a structural model. This approach was developed by Merton (1974) for corporate credit risk and extended to sovereign credit risk by Gapen et al. (2005). According to the latest model, key drivers of CDS spreads are the volatility of sovereign assets and a country's leverage.

There are many local economic factors that may determine the evolution of CDS spreads. We suppose that the CDS spreads have become more sensitive to the evolution of macroeconomic variables of a country. Based on the previous research and data availability we employ the following local variables: debt-to-GDP ratio (a measure of a country's indebtedness), real GDP growth rate (a measure of the state of local economy) and general government deficit to GDP.

Table no. 1 Expected sign of independent variables

Variable	Expected sign
Debt/GDP ratio	(+)
General government deficit to GDP	(+)
Real GDP growth rate	(-)

Table 1 provides an overview of the economic factors included in the analysis of the CDS spreads and the expected sign of the variable-coefficient.

We estimate the following regression model:

$$\Delta CDS_{i,t} = C_{1i} + C_{2i} * \Delta DEBT\_GDP_{i,t} + C_{3i} * \Delta PUBDEBT\_GDP_{i,t} + C_{4i} * \Delta REAL\_GDP_{i,t} \quad (2)$$

where the variables for country i are:

ΔCDS – CDS spreads;

Δ DEBT_GDP – debt-to-GDP ratio;

Δ PUBDEBT_GDP – general government deficit to GDP;

Δ REAL_GDP - real GDP growth rate.

5. THE DETERMINANTS OF SOVEREIGN CREDIT DEFAULT SWAPS SPREADS OF CEE COUNTRIES

Descriptive statistics are presented in table 2. As expected, the highest level of CDS spreads has been registered by Greece and Baltic countries (see table 2).

Table no. 2 Descriptive statistics of levels of CDS spreads

	CZ	**ES**	**GR**	**HU**	**LA**	**LI**	**PO**	**SL**	**SK**	**RO**
Mean	99.34	233.78	304.41	263.47	439.57	320.81	135.49	68.76	77.06	325.48
Median	85.58	134.00	188.33	237.63	356.33	263.00	133.07	68.33	75.58	295.40
Maximum	280.00	658.33	892.15	519.07	908.97	723.33	341.13	180.00	198.67	686.20
Minimum	33.00	91.33	21.90	55.00	138.00	130.75	40.00	8.00	13.00	168.50
Std. Dev.	69.21	190.21	323.02	146.42	277.03	183.83	88.16	46.58	56.94	166.44
Skewness	1.56	1.41	1.03	0.37	0.50	1.01	0.95	0.90	0.91	1.35
Kurtosis	4.73	3.49	2.40	2.14	1.95	2.94	3.38	3.66	3.09	3.58

Table no. 3 presents the results, containing the estimates of our model. It indicates that Poland is the only country from the region with the sign of all coefficients as expected. Even if Poland had higher level of debt-to-GDP ratio and general government deficit to GDP, the positive value of GDP growth rate in the last four years influenced positively the evolution of CDS spreads.

Table no. 3 The local drivers of CDS 5 year

	CZ	ES	GR	HU	LA	LI	PO	SL	SK	RO
DEBT_GDP	-4.31	-58.64	33.23	16.54	-9.77	-10.14	4.77	-2.10	-4.81	15.99
PUBDEBT_GDP	-11.68	-18.39	16.97	-13.94	-34.03	-65.07	0.65	-9.09	-7.06	-39.18
REAL_GDP	-2.52	-16.52	64.38	24.66	-21.58	5.04	-8.54	-0.87	-3.14	32.35

Source: [Own contribution using Eviews]

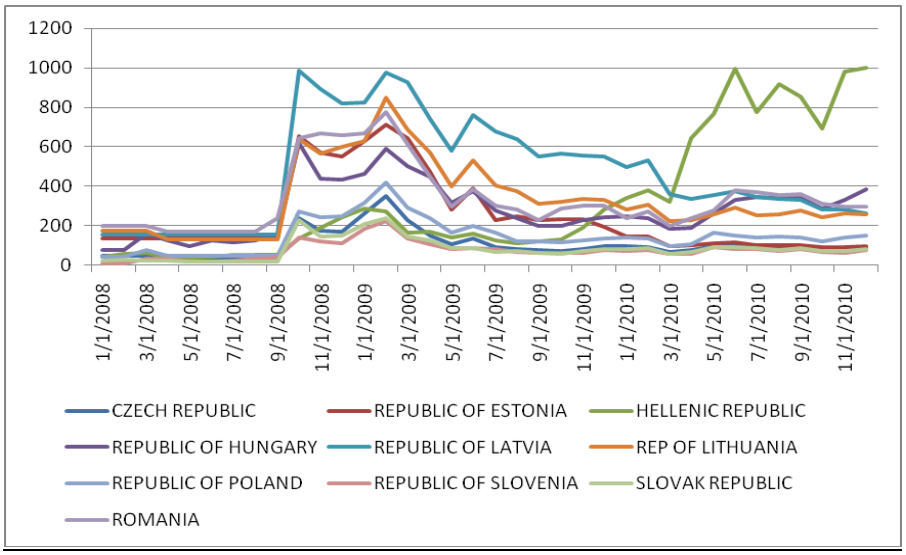
For the remaining countries we obtained coefficients which contradict the theoretical arguments. We consider that the CDS spreads have not reacted to the higher and higher level of public debt because the investors did not evaluate properly the burden of public debt. The results of the regression analysis show that the local economic variables have a low influence on the level of CDS spreads, while the global variables explain more than 80% of CDS spreads during the period of financial distress. The results are broadly in line with those obtained by Remolona et al. (2008), Longstaff et al. (2008) Ciarlone et al. (2009), Fontana & Scheicher (2010), and Winckelmann & Sorensen (2011).

We identified two important types of factors that affect the evolution of sovereign Credit Default Swaps Spreads for CEE countries:

a) global factors, which equally affected all emerging markets. Initially, sovereign credit risk premia increased substantially in the economies directly most hit by the cri-

sis and due to the investors risk aversion. More recently, spreads have increased more widely in some highly indebted advanced economies with underlying fiscal vulnerabilities. We observed the high degree of co-movements between the countries' 5Y CDS spreads and the sharp increase after Lehman Brothers default in September 2008 (see Figure 2).

b) country specific factors, which include debt-to-GDP ratio (a measure of a country's indebtedness), real GDP growth rate (a measure of the state of local economy) and general government deficit to GDP. Comparing with the global factors, the local drivers have a low influence during financial distress period.

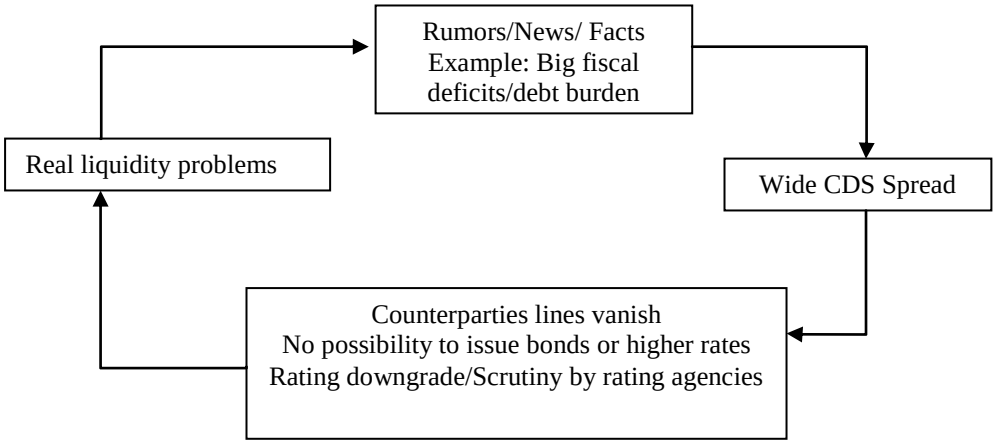


Source: [Author's illustration based on data offered by Datastream International]

Figure no. 2 Evolution of 5Y CDS Spreads for Selected Countries in Central and Eastern Europe (January 08- December 2010)

Wider CDS spreads can affect the country's ability to finance through financial markets. The vicious circle of wider CDS spreads evidenced by Hemetsberger (2009) can be extended from companies to countries. Greece is a good example in this regard. Once a wider CDS level is made public, counterparty lines are cut down and the country is exposed to the immediate danger of illiquidity. The figure 3 explains the vicious circle of wider CDS spreads for a country.

When Standard & Poor's downgraded Greece country rating of the Greeks to "junk" and some European officials have suggested that this country has to renounce to Eurozone membership, the cost of five-year credit default swap (CDS) Protection on Hellenic Republic debt hit a new high of 710 basis points, roughly twice the level seen in mid-April. Later, investor's uncertainty spread on emerging economies from Central and Eastern Europe who are facing unmanageable public debt. However, since 2010, the evolution of Romanian CDS, as well as other countries in the region, is no longer correlated with the Greece's CDS dynamics



Source: [Author's illustration]

Figure no. 3 The Vicious Circle of Wider CDS Spreads for a Country

As explanatory variables selection was influenced by lack of some data, we consider that our analysis could be extended with other local determinants of CDS spreads, such as exposure to the financial system, local financials and fiscal vulnerabilities as soon as the data will be available**.**

6. CONCLUSIONS

A credit default swap (CDS) represents an agreement between two parties to exchange the credit risk of a reference entity (either a corporate or a sovereign borrower). Fuelled by the eagerness of banks, insurance companies, and hedge funds to take on or shed credit risk exposures, the CDS market has been growing exponentially during the past decade, reaching almost $60 trillion in gross notional amount outstanding by the end of 2009.

The CDS spread is the premium that is paid to insure the loss of value of the underlying debt obligation against pre-specified credit events. During the current financial crisis, sovereign CDS proved to play an important role in price discovery. Due to their features, CDS spreads have gained widespread acceptance as an important measure of credit risk.

The behavior of Credit Default Swaps spreads during the global crisis has attracted significant attention. Along with sovereign bonds, CDS premia are interpreted as leading financial market indicator in macroeconomic analyses.

We find that changes in the emerging market sovereign CDS spreads are firstly determined by the investors risk appetite, spillover effect and rating downgrade. Economic fundamentals (debt-to-GDP ratio, real GDP growth rate and general government deficit to GDP) have a low influence on the evolution of sovereign CDS spreads of CEE countries.

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