The Dynamics of Sovereign Credit Default Swap and Bond Markets: Empirical Evidence from the 2001-2007 Period*

Erdem Aktug
Doctoral Candidate
College of Business & Economics
Lehigh University
rea204@lehigh.edu
(610) 758-5930

Geraldo Vasconcellos
Professor of Finance
College of Business & Economics
Lehigh University
gmv0@lehigh.edu
(610) 758-3440

Youngsoo Bae
Assistant Professor of Economics
College of Business & Economics
Lehigh University
yob206@lehigh.edu
(610) 758-5342

Abstract

This paper evaluates the dynamic relationship between sovereign credit default swap (CDS) and bond markets for the 2001-2007 period. We compare monthly five year CDS premiums with Emerging Market Bond Index Global (EMBIG) stripped spreads for thirty sovereign bonds, providing a thorough analysis of sovereign credit markets with an extensive and high quality data set. Our first finding is that the relationship between sovereign CDS and bond markets has strengthened over time. Second, we show bond markets' leading role in the price discovery mechanism. This result is in sharp contrast with studies on corporate credit markets and it reveals the inefficiencies surrounding sovereign credit markets. Third, we provide an econometric methodology which is more meaningful in the sovereign context. Consequently, we propose a new measure to check for the appropriate error correction mechanism in the Vector Error Correction Model (VECM) framework. The results of our study possess valuable information for issuers, regulators, investors, and traders of sovereign securities.

This draft: October 20th, 2008.
Comments welcomed.
Please do not quote without permission of the authors.

* This paper is an outgrowth of the doctoral dissertation work of the first author at Lehigh University. We are grateful to the other members of the dissertation committee, Nandu (Nandkumar) Nayar, Vladimir Dobric, and Parveen Gupta for providing their input. Special thanks to JPMorgan and Markit Group for providing the data.

1 - Introduction

Credit Default Swap (CDS) markets give bond holders the opportunity to hedge their risks. An investor who owns a sovereign bond can eliminate his risk by buying the corresponding CDS. A hedge fund manager can make arbitrage profits if buying the bond and the CDS of the same sovereign gives a higher rate of return compared to her cost of borrowing. Similarly, a speculator who predicts that a sovereign will be in distress in the near future can bet on the increase on CDS prices. Or, more commonly, an issuing entity such as a bank can take advantage of the asymmetric information in the sovereign markets and make mark-up profits from the insurance business (Andritzky, 2005). Recently, it has also become a common practice for rating agencies to adopt various new marked-to-market risk indicators, such as CDS Implied Ratings, revealing the significance of CDS markets.

Sovereign bonds are the securities issued by sovereign governments. Sovereign CDSs, however, are insurance policies provided by a third financial party, such as a bank or a hedge fund, against the risk of default by a sovereign. The protection seller has to deliver the reference bond at its par value when a credit event occurs. In return, the protection buyer makes periodic payments to the seller until the maturity date of the CDS contract or until a credit event occurs. The periodic payment, which is usually expressed as a percentage (in basis points) of the principal, is called the CDS premium (Zhu, 2006). The CDS markets also serve as a financial tool for investors and traders to short the sovereign bonds without any liquidity problem (Blanco et al., 2005). The major players (buyers and sellers) in the CDS markets are, in order of importance, banks, insurance companies, security houses, and hedge funds (Chan-Lau and Kim, 2004).

A sovereign bond spread is a premium paid by the issuing government to compensate for the additional risk. This premium is generally calculated as the difference between the yield of the risky sovereign bond and the yield of a risk-free bond, such as a US or German government bond, or a risk-free market rate such as a LIBOR or Swap Rate. Unlike the bond spreads, the CDS premiums (or spreads) do not incorporate any risk-free benchmarks into their calculations. However, this premium is determined by the issuing entity with a careful eye on the sovereign bond markets, therefore there is a very close relationship between the sovereign bond spreads and the sovereign CDS premiums. In efficient markets (such as the US corporate bond markets), arbitrage forces CDS spreads to be approximately equal to the underlying bond spreads in the absence of market friction, therefore driving the *basis*, the difference between the CDS and the corresponding bond spread, to zero in the long-run (Hull-White, 2000 and Zhu, 2006).

Starting in the mid 1990s, the international bond markets gained more importance. During this time period, international financial crises and subsequent restructurings led to better functioning markets for sovereign debt. In terms of sovereign CDS markets, however, it is hard to come to any conclusions since these markets are in their infancy. Therefore, the interaction between sovereign CDS and bond markets stands as a promising research area. Uncovering the recent development or irregularities in the sovereign credit markets will help governments, investors, and various regulators improve the transparency of these markets.

In modern finance literature, there are numerous studies focusing on the relationship between bond and CDS spreads. One group of the studies emphasizes the relationship between bond spreads, CDS spreads, stock prices or stock market indices, and the ratings assigned by major agencies such as S&P, Moody's, and Fitch. Most of these studies focus on the corporate bond markets as opposed to sovereigns, since the data availability for the latter is very limited. Another group of authors focus on the local (macroeconomic) and global factors affecting the spreads. Specifically, this group tries to explain the sovereign CDS and bond spreads with more frequent data such as daily equity indices, daily volatility measures, exchange rates, and interest rates.

A third line of research deals with the pricing issues in sovereign CDS markets. This line of investigation studies terms such as recovery value, loss rate, and credit event intensities. For instance, Andritzky (2005) reveals that the recovery values are higher than traditional assumptions (25%) in general CDS pricing models. Thus we observe over-pricing in Sovereign CDS Markets in recent distress periods. In addition, Pan and Singleton (2005) assert that the term structure of sovereign bonds and CDSs convey important signals about the implied default probabilities and recovery rates. A more detailed summary about the literature on sovereign CDS and bond markets can be found in Appendix 1.

In this paper, we evaluate the dynamics of sovereign credit default swap (CDS) and bond markets for the 2001-2007 period. The main contribution of our study is to provide a thorough analysis of the sovereign credit markets with an extensive and high quality data set. Our results can be summarized as follows. First, we find that sovereign CDS and bond markets have become more integrated over time. However, these markets are still less efficient than the corporate bond markets. This is mainly the result of the sovereign bond markets' leading role in price discovery mechanism. Next, we provide an econometric methodology which is more meaningful in the sovereign context. Additionally, we provide a new measure to check for the appropriate error correction mechanism in the Vector Error Correction Model (VECM) framework.

The results of our study possess valuable information for regulators, investors, and traders of sovereign securities. For instance, our results might help to alert international authorities about the impending problems in sovereign markets. Accordingly, this might bring additional assistance to those sovereigns in aligning the bond markets with the CDS markets. Additionally, as Andritzky (2005) points out, banks and arbitrageurs might face more restrictions in the mark-up pricing for insurance or trading activities which might bring instability to these economies. Since the CDS spreads are marked-to-market signals for country risk, any speculation in these markets might cause significant harm to the emerging economies as a whole. Lastly, our study also points to some arbitrage opportunities for traders and hedge-funds which have an interest in sovereign securities.

Our paper proceeds as follows. First, we provide a brief literature review on the relationship between the sovereign CDS and bond markets. Next, we state our hypotheses and explain how we contribute to existing literature. Third, we describe our data set in detail and go over some definitions. Fourth, we lay out the econometric methodology and perform empirical time series analysis. In this step we also provide comprehensive tables to summarize the majority of our findings. In the final step, we wrap up the whole discussion, and relate the findings to the modern economic and finance theory. We also point out some of the shortcomings of our study and address some potential directions for further research in our conclusion.

2 - Literature Review

A - The Relationship between CDS & Bond Markets

First, the paper by Zhu (2006) covers daily rates from 1999 to 2002 for twenty-four (19 US, 2 Europe, 2 Asia) corporate entities. Zhu demonstrates (via cointegration test) that the long-run equilibrium relationship holds between CDS and Bond markets. In general, a long-run equilibrium is a stable and arbitrage free state in which CDS and Bond spreads converge to each other, thus the basis converges to zero. Zhu adds that short-run deviations occur due to the high responsiveness of CDS markets to changing credit conditions. Specifically, the author argues that the changes in credit and liquidity conditions are the most important factors affecting the basis. In terms of market efficiency, Zhu shows that CDS markets lead bond markets in price discovery.

In a similar paper, Blanco, Brennan, and Marsh (2005) perform an empirical study for a sample of thirty-three (16 US, 17 European) investment grade firms with a time series data which covers January 2, 2001 through June 20, 2002. They find two key factors accounting for the deviation from the parity. In the long run, the imperfections in the contract specifications and measurement errors cause markets to drift away from the equilibrium. Specifically, the authors suggest cheapest-to-deliver (CTD) options, unavailability or cost of short selling (non-zero repo costs) in bond markets, and the liquidity premium as potential imperfections. In the short-run, the deviation from the parity is mainly a result of the leading role of CDS spreads in the price discovery process. Overall, the authors confirm that the cointegration relation holds in the majority of the entities, and CDS prices lead bond prices. They also note that US markets are much more efficient compared to European Markets.

Third, Norden and Weber (2004) analyze a sample of fifty-eight (35 Europe, 20 US, 3 Asia) firms over the 2000-2002 period. They conclude that the change in stock prices lead the changes in CDS and bond spreads in their three dimensional vector autoregressive (VAR) model. The cointegration relation is shown to hold in the majority of the entities (US 15/20, Europe 20/35). In addition, the study confirms that the CDS markets lead bond markets in price discovery for the US firms, whereas bond markets contribute to price discovery for European firms. In other words, their analysis shows that the markets are more efficient for US compared to non-US entities, which is in line with the first two papers above. However, the authors also use Granger Causality test to make predictions on the CDS and bond markets. This approach casts a considerable doubt since the econometric literature asserts that the Granger Causality is not an appropriate test for cointegrated systems (Enders, 2004).

Fourth, we can refer to the European Bond Market Study Annex B (ECB, 2004) as a comparable study. Data includes fifteen companies with liquid euro-dominated bonds from October 2001 to June 2004 on a daily basis. The analysis shows that for 68% of the analyzed companies, the cointegration relation is confirmed. In addition, this study also uses the Gonzalo-Granger (1995) measure for the price discovery, and concludes that for 67% of the entities, the CDS markets are leading the bond markets. The last paper we can mention related to corporate markets is by Hull, Predescu, and White (2004). Their study concludes that the CDS prices rise

sharply and predict all types of negative rating actions (actual downgrade, negative outlook, negative review) for a large sample of corporate bonds.

Our work extends the literature concerning corporate studies towards sovereign CDS and bond markets. The only two papers which focus on the sovereign case are the IMF working paper by Chan-Lau and Kim (2004), and the Federal Reserve System Discussion Paper by Ammer and Cai (FRB, 2007). In the former paper, the authors use daily CDS spreads, daily JPMorgan's EMBI+ spreads, and daily MSCI equity indices for eight emerging markets covering the March 2001 - May 2003 period. Specifically, they perform cointegration and causality tests, and price discovery analysis for three markets: the stock market, the bond market, and the CDS market. They conclude that there is no equilibrium relationship between Bond and CDS markets in Mexico, the Philippines, and Turkey; whereas the cointegration relation is significant for Brazil, Bulgaria, Colombia, Russia, and Venezuela. In addition, they find mixed results in terms of price discovery and causality. For instance, in Russia and Colombia, the CDS market is claimed to be the source of price discovery. For Brazil and Bulgaria, the study reveals that the bond and CDS markets are equally important in price discovery. The study also demonstrates the negligible effect of the equity markets in price discovery (except Russia).

In the latter paper, Ammer and Cai (FRB, 2007) emphasize the effect of Cheapest-to-Deliver (CTD) option in sovereign CDS contracts. In addition to the 5-year CDS spreads, the authors obtain the corresponding bond spreads from Bloomberg's fair market curve analysis. The authors also criticize the use of EMBI+ spreads for several reasons, such as the variation in maturity structure over time and across sovereign entities, and inclusion of Brady Bonds with collateral enhancements. This paper covers nine emerging markets and daily spreads from 2001 to 2005. However, the price discovery tests are only performed for seven countries and 58% of the time CDS spreads are found to lead bond spreads, which is in contrast with the IMF study by Chan-Lau and Kim.

Both papers on sovereign credit markets conclude that the most liquid markets lead the others in general. Furthermore, they assert that the CTD option shows up as an important factor in market imperfections. From this point of view, it makes sense to see CDS markets leading bond markets during periods of distress, since the liquidity shifts towards CDS markets during distress periods, making them more liquid. Overall, the findings in these studies deviate from the findings of the corporate literature. These findings lead to question the efficiency of the sovereign bond markets.

Compared to the studies above, our research spans a more comprehensive period and it covers a larger cross section. We extend the corporate research to sovereign cases while improving the existing literature on sovereign credit markets technically as well as conceptually. Overall, we examine sovereign CDS and bond markets from a broader and a more robust point of view.

B - Explaining the Spreads: Global and Local Factors

Longstaff, Pan, Pederson, and Singleton (NBER, 2007) assert that sovereign risk is mainly driven by global factors (VIX Index, US corporate high yield spreads) rather than local factors (local stock market return, exchange rates, foreign reserves). The authors use monthly CDS spreads in 2000-2007 for 23 emerging markets plus 3 developed markets in their study. They find that the CDS spreads are majorly driven by three main classes of global factors: global financial markets, global risk premia, and global investment flows. The details can be found in Appendix 1.

In addition, Powell and Martinez (Inter-American Development Bank, 2008) argue in the same way that a small number of global factors can explain the variation in CDS spreads. However, they do show that the growth, fiscal balance, and EU membership effect the spreads over and above the effect of the credit ratings assigned by the agencies. Their data includes daily CDS spread information for 20 emerging markets for the 2006-2007 time period.

In contrast to the studies highlighted in part B, our paper focuses solely on the relationship between sovereign CDS and Bond Spreads rather than explaining the spread levels. However, it is useful to include them in our review, since some of the factors pointed out in these papers might give some helpful insights on sovereign credit markets.

3 - Hypotheses and Contributions

Our study is an important bridge between the corporate and sovereign literature related to the time-series characteristics of CDS and bond markets. We extend previous research in three major aspects. First, our study spans a longer time period and covers a larger cross section that has never been examined before. Specifically, we cover 30 emerging markets (monthly observations) for the 2001-2007 period. Our findings confirm that the cointegration relation between sovereign CDS and Bond markets have become stronger, thus the sovereign credit markets have matured over time.

Second, our study follows a slightly different econometric methodology compared to the earlier studies. Similar to the existing literature, we use Johansen's Cointegration Test to find out whether there is a long-run equilibrium relationship between CDS and bond markets. As a proxy for price discovery, we adopt the adjustment coefficients of the VECM framework. These coefficients tell us the speed of adjustment of the CDS and bond spreads to deviations from the long-run equilibrium. We differ from the existing literature in that we question the validity of Gonzalo-Granger (1995) scaling for price discovery in our case. Alternatively, we suggest a more meaningful and simple measure for the appropriate error correction mechanism. Third, we bring up an important discussion related to lag-length selection procedures. Our sensitivity analysis demonstrates the departure in results when we use different measures for lag-length selection.

Overall, our results strengthen some of the previous findings while contradicting others. In terms of price discovery, we find that bond markets lead CDS markets, which is in line with the IMF study (Chan-Lau &

Kim, 2004) but in contrast with most of the corporate literature. However, we show that the equilibrium relationship between the CDS and Bond markets are more significant compared to earlier periods (Table-1).

In terms of econometric methodology, we test the following interdependent sets of hypotheses.

Ho1: The time series CDS and bond spreads data is non-stationary
Ha1: The time series CDS and bond spreads data is stationary

Ho2: There is no cointegration between sovereign bond and CDS spreads.
Ha2: There is a strong cointegration between sovereign bond and CDS Spreads

In the last step, we try to detect any significant lead-lag relationship between the two markets with the use of VECM framework. Briefly, our results show that the data is non-stationary (30/30) and in the majority (27/30) of countries, with SBIC measure for lag-length selection, we have the cointegration relationship confirmed. The exceptions are Brazil, Turkey, and Hungary. Unfortunately, we are not able find a general price discovery rule for the two markets. In the majority of the markets (13/27) we have the CDS spreads adjusting faster, whereas in some we have Bond Markets acting faster (6/27). We also find out that, in eight countries the two markets are equally important. These findings point out the leading role of bonds over CDSs in the sovereign case.

For the three countries mentioned above, we cannot perform a test since we cannot confirm that the spreads are cointegrated (see Tables 1 to 3 for details). Blanco et al. (2005) and Zhu (2006) show that CDS markets clearly lead bond markets in the corporate world. Therefore, our results cast some doubt on the extent of efficiency in the sovereign CDS and bond markets compared to corporate world.

4 - Data Description

Our comprehensive data set includes daily CDS spreads from 2001 January to 2007 November covering eighty countries (55 Emerging Markets, 25 Developed Markets), thanks to Markit Group - London. Markit Group is an independent source of credit derivative pricing, including portfolio valuations and over-the-counter (OTC) derivatives processing. Markit has privileged relationships with 16 major banks, and its clients include investment banks, hedge funds, asset managers, central banks, regulators, rating agencies and insurance companies. Some of the IMF working papers and Credit Trade also refer to Markit Group as their data provider. For the emerging markets, the average CDS spread is 2.6% (standard deviation = 1.1%), whereas for the developed markets this figure is only 0.1% (standard deviation = 0.023%). In addition to the five year CDS spreads, the most liquid derivative instruments, we also have access to spreads with different maturities, from 6 month CDS spreads to 30 year CDS spreads. However, the data includes a lot of discontinuities.

We also would like to thank JP Morgan for the EMBIG spread (monthly) data they have provided for 32 countries. EMBIG spreads are frequently used in IMF and NBER papers in similar studies. EMBIG is a traditional, market-capitalization weighted index. The index includes U.S. dollar denominated Brady Bonds, Eurobonds, traded loans, and local market debt instruments issued by sovereign and quasi-sovereign entities. EMBIG only includes the emerging market debt denominated in U.S. dollars, with a minimum current face value outstanding of US$500 million, and at least 2.5 years to maturity. Once added, an instrument may remain in the EMBIG until twelve months before it matures. Unlike EMBI+, EMBIG does not consider additional liquidity tests; therefore it covers nearly twice as many countries (JPMorgan Securities Inc., Emerging Market Research, 1999).

Overall, our data set covers the 2001-2007 period (monthly) for 30 emerging markets (see appendix II for a detailed picture). While other empirical studies employ daily spreads, we use monthly observations. Since cointegration tests are to examine the long-run relationship between the two markets, monthly frequency appears more robust compared to daily or weekly data.

5 - Econometrics and Time Series Analysis

A - Econometric Methodology

Our econometric discussion heavily borrows from recent literature on the relationship between the CDS and Bond markets. However, we provide some extensions to the straightforward time-series methodologies. In general, a three-step procedure is widely used by the related econometric studies. The first step checks the stationarity. If the variables in question are non-stationary then we can move on with the next step. In the second step, we perform cointegration tests which examine whether the long-run equilibrium relationship holds for the two markets. If the variables are cointegrated, then a Vector Error Correction Model (VECM) is appropriate to check for the price discovery mechanism as the final step. If the variables in question are not cointegrated, we can perform Granger Causality tests with or without the first differences depending on the stationarity aspect.

An important point raised about the dynamics of a cointegrated system is that the conventional wisdom was incorrect. If the linear relationship between two variables is already stationary, meaning that they are cointegrated, differencing the relationship entails a misspecification error. Therefore, as we pointed out earlier, some of the findings of the literature on CDS and Bond Markets are simply wrong in using Granger Causality tests as the two markets are theoretically cointegrated.

The crucial feature of the cointegrated systems is that the extent of any deviation from the long-run equilibrium has an impact on the time path of the variables, i.e. at least some of the variables have to adjust in order for the system to return to equilibrium. A typical example of such a feedback mechanism is the interest rate markets. *Term Structure Theory of the Interest Rates* implies that there is a long-run equilibrium relationship between the long and short term interest rates. If the gap between the two is too large, the short term rate has to rise relative to the long term rate or vice versa. This is called the Vector Error Correction Model (VECM). Below is the application of the three step methodology applied to our case, the dynamic relation between sovereign CDS and bond markets.

1 - First, we perform Augmented Dickey-Fuller (ADF) with Schwarz Criterion (SC) lag length selection method, and confirm that the data is non-stationary so that we can proceed with the cointegration test. We also specify a time trend in our model, since we observe that the spreads have been steadily decreasing since 2001. The model and the hypothesis tests are as follows. Detailed ADF tests up to 12 month lags can be found in Appendix III.

$$\Delta Y_t = a_0 + a_1 t + \beta Y_{t-1} + C_1 \Delta Y_{t-1} + C_2 \Delta Y_{t-2} + \dots + C_P \Delta Y_{t-P} + e_t \quad (1)$$

$H_0: \beta = 0, Y_t$ *is characterized by a unit root, therefore it is nonstationary*
$H_a: \beta \neq 0, Y_t$ *is not characterized by a unit root, therefore it is stationary*

2 - After confirming the non-stationarity in the previous step, we can move on with the cointegration tests, to test the long-term relationship between the Bond and CDS markets. Initially, the following vector auto regression (VAR) model is constructed.

$$X_t = A_0 + A_1 X_{t-1} + A_2 X_{t-2} + \cdots + A_P X_{t-P} + \epsilon_t \quad (2)$$

where,
X = (2x1) vector of CDS and Bond Spreads,
A_0 = (2x1) vector of intercept terms
A_i = (2x1) vector of coefficient parameters
ϵ_t = (2x1) vector of stochastic shocks that may or may not be correlated with each other

The cointegration test estimates the following form.

$$\Delta X_t = \delta X_{t-1} + \sum_{i=1}^{p-1} R_i \Delta X_{t-1} + e_t \quad (3)$$

The rank of the matrix δ is crucial since the term δX_{t-1} has to be stationary, i.e. I(0). In our case, the determinant of this matrix should be equal to zero, or the rows should be linearly dependent, in order for the cointegration relation to hold. If the two markets are cointegrated, the coefficient matrix δ has a rank of 1, and there exist 2x1 vectors α and β, such that $\delta = \alpha\beta^T$, where β is the cointegrating vector and α is the vector of speed of adjustment parameters. The null and the alternative hypothesis take the following form.

H_0: *the coefficient matrix* δ has a full rank of 2, the two spreads are not cointegrated
H_a: *the coefficient matrix* δ has a reduced rank of 1, the two spreads are cointegrated

In the cointegration tests, to determine the optimal lag length we used the pre-estimation version of STATA *varsoc procedure* which reports the final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC), and the Hannan and Quinn information criterion (HQIC) for lag-order selection statistics for a series of vector autoregressions (VAR) of order maximum length up to 12 lags. When there is a conflict between the criterions, we used SBIC for optimal lag selection. After determining the optimal lag length, we performed Johansen's maximum likelihood cointegration rank test via

johans procedure in Stata. We observed that the results are very sensitive to the specified optimal lag lengths and maximum lag option. A short discussion and a sensitivity analysis related to lag-length selection procedures can be found in Table-1 in Part B.

3 - The final step is to estimate the Vector Error Correction Model (VECM) framework to find out the dynamic lead-lag relationship between the CDS and Bond markets.

$$\mathrm{CDS_t} - \beta_i \mathrm{Bond_t} - \gamma_i = \mathrm{z_t} = \mathrm{I(0)} \tag{4}$$

$$\begin{bmatrix} \Delta CDS_t \\ \Delta Bond_t \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} + \begin{bmatrix} \boldsymbol{\alpha_1} \\ \boldsymbol{\alpha_2} \end{bmatrix} (\mathrm{z_{t-1}}) + \begin{bmatrix} \sum_{j=1}^{p} \mathrm{r_{1,j}}\, \Delta \mathrm{CDS_{t-j}} \\ \sum_{j=1}^{p} \mathrm{r_{2,j}}\, \Delta \mathrm{CDS_{t-j}} \end{bmatrix} + \begin{bmatrix} \sum_{j=1}^{p} \mathrm{k_{1,j}}\, \Delta \mathrm{Bond_{t-j}} \\ \sum_{j=1}^{p} \mathrm{k_{2,j}}\, \Delta \mathrm{Bond_{t-j}} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} \tag{5}$$

The residuals of the first regression, cointegrating equation (4), should be stationary, I(0), in order for the two markets to be cointegrated. The second equation (5) is the VECM, which is a simultaneous regression equations matrix. In such a framework, one would mainly focus on the adjustment parameters. The *alphas*, speed of adjustment parameters, are interpreted as price discovery measures which give us an idea of the relative efficiency of the markets. In our case, by comparing the magnitudes and the signs of the alpha coefficients we can conclude whether the CDS or bond markets are leading in price discovery.

The β matrix gives us the long run equilibrium relationship between sovereign CDS and bond markets. As an example, we can talk about Ukraine. In this case (after confirming that the data is non-stationary) the AIC and SBIC measures choose the same lag length for cointegration. The β and α matrices give us the following cointegrating equation and accompanying adjustment speeds.

$$\mathrm{CDS_t} - 1.22^{***} \mathrm{Bond_t} - 0.01 = \mathrm{I}\,(0)$$

$$\begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} = \begin{bmatrix} -0.584^{***} \\ -0.063 \end{bmatrix}$$

The adjustment coefficients tell us that CDS spreads adjust to close the gap, and bond spreads do not significantly adjust. In other words, this means that bond spreads are leading CDS spreads. A more interesting example is Brazil. In this case, we reject the cointegrating relation with SBIC statistic, whereas we cannot reject with AIC statistic. We believe that this finding is surprising and requires more in-depth research. We will focus on the lag selection methods in detail in the next section (Table-1 and Table-2).

In evaluating the appropriate error correction mechanism, we make an important departure from Blanco et al. (2005) and Zhu (2006). In their study, the authors only consider significantly negative α_1, and significantly positive α_2, as the appropriate adjustments to correct the error. Enders (2004), on the other hand, argues that the gap can be closed with at least three different scenarios. We argue that there are five different cases that a positive gap can be closed, for a negative gap we would add another five scenarios similar to the ones below.

1 - An increase in CDS spread and a larger increase in bond spread
2 - A decrease in CDS spread and a smaller decrease in bond spread
3 - A decrease in CDS spread and an increase in bond spread
4 - A decrease in CDS spread and no change in bond spread
5 - No change CDS spread + an increase in bond spread

In Table-3, we provide a very simple measure, $\alpha_2 - \alpha_1$, to check whether one of the five scenarios above occurs as an appropriate error correction mechanism. In any of the five cases, a positive value for $\alpha_2 - \alpha_1$ will be enough for the appropriate error correction.

B - Time Series Analysis - Empirical Results

B.1 Cointegration and the Long-Run Equilibrium Relationship

Table - 1: Cointegration & Lag Length Selection

5 YEAR CDS & EMBIG SPREADS
TIME - SERIES ANALYSIS SUMMARY

	Countries	CDS & EMBIG Spreads Data Coverage			#obs	ADF stationarity cds	#lags	bond	#lags	Johansen Cointegration	FPE #lags	Johansen Cointegration	AIC #lags	Johansen Cointegration	HQIC #lags	Johansen Cointegration	SBIC #lags
1	BRAZIL	1/30/2001	-	11/30/2007	83	no	3	no	4	yes	11	yes	12	yes	11	no	4
2	BULGARIA	2/30/2001	-	11/30/2007	82	no	11	no	2	yes	12	yes	12	yes	12	yes	1
3	CHILE	2/30/2002	-	11/30/2007	70	no	4	no	1	yes	9	yes	9	no	4	yes	1
4	CHINA	1/30/2001	-	11/30/2007	83	no	1	no	1	yes	1	yes	1	yes	1	yes	1
5	COLOMBIA	3/30/2001	-	11/30/2007	81	no	1	no	1	no	9	no	9	yes	1	yes	1
6	CROATIA	1/30/2001	-	5/30/2004	41	no	1	no	1	yes	10	yes	12	yes	12	yes	1
7	DOMINICAN REP.	6/30/2003	-	11/30/2007	54	no	2	no	1	yes	12	yes	12	yes	2	yes	2
8	ECUADOR	1/30/2004	-	11/30/2007	47	no	2	no	1	yes	1	yes	1	yes	1	yes	1
9	EGYPT	3/30/2002	-	11/30/2007	69	no	7	no	1	yes	6	yes	6	yes	6	yes	2
10	EL SALVADOR	4/30/2003	-	11/30/2007	56	no	1	no	1	no	2	no	2	yes	1	yes	1
11	HUNGARY	2/30/2001	-	11/30/2007	82	no	1	no	1	no	1	no	2	no	1	no	1
12	KOREA	3/30/2001	-	3/30/2004	37	no	1	no	1	yes	11	yes	12	yes	12	yes	12
13	LEBANON	3/30/2003	-	11/30/2007	57	no	1	no	1	yes	1	yes	1	yes	1	yes	1
14	MALAYSIA	4/30/2001	-	11/30/2007	80	no	3	no	1	no	9	no	9	yes	1	yes	1
15	MEXICO	1/30/2001	-	11/30/2007	83	no	1	no	1	yes	9	yes	11	yes	2	yes	1
16	MOROCCO	3/30/2001	-	10/30/2006	68	no	1	no	1	yes	2	yes	2	yes	2	yes	1
17	PAKISTAN	6/30/2004	-	11/30/2007	42	no	1	no	1	yes	1	yes	12	yes	12	yes	1
18	PANAMA	2/30/2002	-	11/30/2007	70	no	1	no	2	no	2	no	2	no	2	yes	1
19	PERU	2/30/2002	-	11/30/2007	70	no	1	no	1	yes	1	yes	1	yes	1	yes	1
20	PHILIPPINES	3/30/2001	-	11/30/2007	81	no	1	no	1	yes	1	yes	1	yes	1	yes	1
21	POLAND	1/30/2001	-	11/30/2007	83	no	5	no	1	yes	8	yes	12	yes	8	yes	1
22	RUSSIA	1/30/2002	-	9/30/2007	73	no	1	no	1	yes	9	yes	9	no	6	yes	1
23	SOUTH AFRICA	1/30/2001	-	11/30/2007	83	no	1	no	1	yes	1	yes	1	yes	1	yes	1
24	THAILAND	1/30/2002	-	2/30/2006	61	no	1	no	1	no	10	yes	12	yes	1	yes	1
25	TUNISIA	10/30/2005	-	11/30/2007	26	no	1	no	1	yes	8	yes	7	yes	7	yes	7
26	TURKEY	1/30/2001	-	11/30/2007	83	no	1	no	1	yes	12	yes	12	yes	5	no	2
27	UKRAINE	7/30/2003	-	11/30/2007	53	no	1	no	1	yes	1	yes	1	yes	1	yes	1
28	URUGUAY	1/30/2005	-	11/30/2007	35	no	1	no	1	yes	1	yes	1	yes	1	yes	1
29	VENEZUELA	2/30/2001	-	11/30/2007	82	no	1	no	1	yes	1	yes	1	yes	1	yes	1
30	VIETNAM	11/30/2005	-	11/30/2007	25	no	1	no	1	yes	7	yes	8	yes	8	yes	8

According to Akaike Information Criterion (AIC), we have 5 countries for which we cannot confirm the cointegration, the long-run equilibrium relationship. Namely, we have Colombia, El Salvador, Hungary, Malaysia, and Panama as the exceptions in cointegration tests. According to Schwarz's Bayesian information criterion (SBIC), we have only 3 countries that we cannot confirm the cointegration relation, Brazil, Hungary, and Turkey.

Reviewing the literature on the lag selection procedures, we have Blanco et al. (2005) and Euro Bond Market Study (ECB, 2004) using AIC measure. Whereas Zhu (2006) and Norden and Weber (2004) use both AIC and SBIC. On the other hand, Chan-Lau & Kim (IMF, 2004) and Ammer & Cai (FRB, 2007) favor SBIC. Lastly, we have Stata Time Series Manual (Release 9) favoring SBIC and HQIC over FPE and AIC based on the discussion of Lutkepohl (1993). Lutkepohl asserts that SBIC and HQIC provides consistent estimates of the true lag order, whereas AIC and FPE will overestimate the true lag order with a positive probability.

At this point, we believe that it would not make any difference for corporate studies to use AIC or SBIC since both measures will give approximately the same results. That is probably why these studies did not emphasize the lag length selection procedures as an important part of their discussion. However, for the sovereign case we need to choose one measure over the others since they do not necessarily yield the same results.

Zhu (2006) claims that the AIC and SBIC measures generally point to one or two periods with a maximum of five days as the optimal lag length. Similarly, Norden and Weber (2004), with daily and weekly frequencies of data, mention that the maximum lag order for daily frequency is 5 and for weekly frequency is 2. The IMF study by Chan-Lau and Kim use 1, 5, 10, and 20 days lag lengths to compare their results. Considering the corporate studies and the sovereign study by IMF, it makes more sense to have a short (i.e. one or two months) optimal lag length.

Accordingly, we prefer SBIC measure over other measures since this measure gives us shorter and reasonable lag lengths (Table-1). If we ignore the countries with very low number of observations (i.e. less than 40, Korea, Tunisia and Vietnam), generally we have one or two lags (except Brazil). After we conclude the discussion of lag-length selection procedures and cointegration among the sovereign CDS and bond markets, our third and last step is to move on with the VECM framework. Table-2 summarizes the whole discussion.

It is important to note that the CDS markets are very new in the sovereign case, and it is very natural to see some countries deviating from the theoretical cointegrating relation. Namely, we have Brazil, Hungary, and Turkey as the three markets which are not in line with the theory. In general, one can count liquidity conditions, contract specifications (i.e. CTD), and investor base as the potential explanations for such deviations (Chan-Lau & Kim, IMF, 2004, and Ammer & Cai, FRB, 2007). However, we believe that the liquidity conditions need further exploration, and some microeconomic and behavioral aspects can be underlined.

Concerning Brazil, the big jump in basis occurs in 2001-2003 period when the country suffered from a major financial crisis and political tensions related to presidential elections (Appendix II - Graph 1). We believe that this sharp increase is primarily due to the increasing concerns about the economy and rising demand for default protection (Deutsche Bank Research). One can also argue that the active players (hedge funds and short-term traders) in the CDS markets overreacted to news, whereas the more passive-committed players (i.e. major banks) did not panic since they form their strategies for the long-term.

Concerning Hungary, (Appendix II - Graph 11), one can argue that the integration to the European Union in 2004 might uncover some issues related to the regulations. Additionally, the fiscal deficit and uncertainties in mid-2006 put a pressure on the economy, and the integration to the EU has not been very smooth for Hungary. In addition, deteriorating growth and weak domestic demand contributed to the undesired economic picture. More importantly, Hungary is recognized as falling behind regional peers in maintaining its overall business climate according to competitiveness measures (IMF Country Report, July 2007). All these factors can be combined to explain why the long-run equilibrium relation is rejected for Hungary.

Concerning Turkey, the crisis with the following currency devaluation in 2001 and the continued financial uncertainties during the 2001-2003 period seemed to contribute to the irregularities in bond markets. Even though the IMF agreements have reduced the tensions, a large current-account deficit and heavy reliance on short-term capital inflows leave the economy vulnerable to sharp changes in investor sentiment (the Economist, Country Briefings, Turkey).

There is no doubt that a more in-depth research is required to learn the specific reasons for the deviations from the long-run equilibrium relation.[1] All the factors mentioned above are reasons of macroeconomic instability and do not necessarily explain why bond and the CDS markets deviate from each other. A quick microeconomic explanation might be that the two markets are still segmented, and the investor base is completely separate.

For the corporate world, the CDS market is dominated by hedge funds and Wall Street firms, whereas in cash (bond) markets we have longer-term investors such as mutual funds, insurance companies and pension funds (Ng and Lauricella, WSJ, May-23-2008). In other words, one can argue that the CDS market is dominated by active money managers who focus majorly on the short-run, whereas bond investors are more dedicated, and less prone to speculation. For the sovereign case, we can tell a similar story and point to the different players and their short-run vs. long-run motivations in explaining some of the anomalies.

In addition, the measures we use for CDS markets (5 Year CDS Premium) and Bond Markets (EMBIG) are not perfect matches, and the differences in the instruments and methodologies in calculating the two spreads might also account for some of the deviations. Therefore, a specific regulation or a specific bond issuance policy for a sovereign might well account for the disequilibrium in bond markets.

B.2 VECM Framework and the Price Discovery Analysis

Looking at the picture in Table-2, our first observation is that with SBIC, the number of countries (17) which have proper adjustment is larger compared to the number suggested by AIC (13). Second, we have numerous (8 with AIC, 4 with SBIC) countries in which the error correction works in an unexpected direction. We interpret this result as the outcome of market imperfections for those markets.

Compared to the Chan-Lau Kim (IMF, 2004) study, our results are much stronger. In their study, which covers 2001-2003 period, the authors could not confirm the cointegration relationship in three (Mexico, Philippines, Turkey) out of eight emerging markets. In our study, we can see that in all countries the spreads are non-stationary, and in twenty-seven (with SBIC measure) out of thirty countries they are cointegrated with the exceptions of Brazil, Turkey, and Hungary. These results confirm that the sovereign CDS and bond markets have been developing, so that in the long-run they move in the same direction. However, in terms of market efficiency there are still some problems. Namely, we cannot see the expected error correction mechanism in some markets with our VECM framework. This finding is a sign that sovereign CDS and bond markets still have a long way to go to reach the corporate market efficiency levels.

[1] We have also performed Granger Causality tests for the three countries we could not confirm the cointegration. We find no significant one-way causality in these cases. Results are available upon request.

Table - 2: Cointegration Equations & VECM Speed of Adjustment (Alpha) Coefficients

$$\mathrm{CDS_t} - \beta_i \mathrm{Bond_t} - \gamma_i = \mathrm{z_t} = \mathrm{I}(0)$$

$$\begin{bmatrix} \Delta CDS_t \\ \Delta Bond_t \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} + \begin{bmatrix} \boldsymbol{\alpha_1} \\ \boldsymbol{\alpha_2} \end{bmatrix} (\mathrm{z_{t-1}}) + \begin{bmatrix} \sum_{j=1}^{p} \mathrm{r_{1,j}}\, \Delta \mathrm{CDS_{t-j}} \\ \sum_{j=1}^{p} \mathrm{r_{2,j}}\, \Delta \mathrm{CDS_{t-j}} \end{bmatrix} + \begin{bmatrix} \sum_{j=1}^{p} \mathrm{k_{1,j}}\, \Delta \mathrm{Bond_{t-j}} \\ \sum_{j=1}^{p} \mathrm{k_{2,j}}\, \Delta \mathrm{Bond_{t-j}} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix}$$

5 YEAR CDS & EMBIG SPREADS

Cointegration and VECM Coefficients with Significance Levels

	AIC - Cointegrating Equation		AIC - VECM			SBIC - Cointegrating Equation		SBIC - VECM		
Countries	constant	β_1	α1	α2	proper adjustment	constant	β1	α1	α2	proper adjustment
1 BRAZIL	0.029	-1.490 ***	-1.13 ***	-0.64 ***	yes	no cointegration				
2 BULGARIA	-0.003	0.006	-0.11 ***	-0.09 **	yes	0.003	-0.823 ***	-0.28 ***	0.14	yes
3 CHILE	-0.003	-0.083	-0.15 ***	-0.17 ***	no	0.012	-1.706 ***	-0.21 ***	0.04	yes
4 CHINA	-0.001	-0.227	-0.13 ***	-0.21 **	no	-0.001	-0.227	-0.13 ***	-0.21 **	no
5 COLOMBIA	no cointegration					0.013	-1.414 ***	0.12	0.34 ***	yes
6 CROATIA	-0.011	0.059	-0.39	-0.72 **	no	-0.030	1.508	-0.05 *	-0.05 **	?
7 DOMINICAN REP.	0.017	-1.578 ***	-1.50 ***	0.05	yes	0.021	-1.689 ***	-0.81 ***	0.03	yes
8 ECUADOR	0.018	-1.247 ***	-0.44 ***	-0.15	yes	0.018	-1.247 ***	-0.44 ***	-0.15	yes
9 EGYPT	0.002	-1.408 ***	-0.50 ***	0.02	yes	0.000	-1.137 ***	-0.35 ***	-0.18 ***	yes
10 EL SALVADOR	no cointegration					0.021	-1.635 ***	-0.04	0.22 ***	yes
11 HUNGARY	no cointegration					no cointegration				
12 KOREA	-0.006	-0.065	0.23	-0.49	?	-0.006	-0.065	0.23	-0.49	?
13 LEBANON	-0.043	0.121	-0.16 ***	-0.08 *	yes	-0.043	0.121	-0.16 ***	-0.08 *	yes
14 MALAYSIA	no cointegration					0.005	-0.887 ***	-0.09	0.22	?
15 MEXICO	0.011	-1.161 ***	-0.33	0.27	?	0.010	-1.089 ***	-0.16	0.10	?
16 MOROCCO	0.006	-1.196 ***	-0.23 ***	0.21 **	yes	0.006	-1.136 ***	-0.24 ***	0.08	yes
17 PAKISTAN	-0.031	0.421	-1.32 ***	-1.42 ***	no	-0.002	-0.999 ***	-0.41 *	-0.05	yes
18 PANAMA	no cointegration					0.017	-1.420 ***	-0.48 ***	0.03	yes
19 PERU	0.006	-1.062 ***	-0.29 *	-0.12	yes	0.006	-1.062 ***	-0.29 *	-0.12	yes
20 PHILIPPINES	0.008	-1.161 ***	-0.10	0.11	?	0.008	-1.161 ***	-0.10	0.11	?
21 POLAND	0.000	-0.308 ***	-0.29 ***	-0.61	yes	0.000	-0.365 ***	-0.11 ***	0.09	yes
22 RUSSIA	0.007	-0.990 ***	-0.86 ***	-0.38 *	yes	0.007	-1.146 ***	0.28 ***	0.40 ***	yes
23 SOUTH AFRICA	0.004	-0.990 ***	-0.06	0.09	?	0.004	-0.990 ***	-0.06	0.09	?
24 THAILAND	-0.083	16.300 ***	-0.01 ***	0.00	yes	0.003	-1.128 ***	-0.09	0.42 ***	yes
25 TUNISIA	0.016	-2.210 ***	1.04 ***	0.56	no	0.016	-2.210 ***	1.04 ***	0.56	no
26 TURKEY	0.014	-1.637 ***	0.14	0.25	no	no cointegration				
27 UKRAINE	0.006	-1.219 ***	-0.58 ***	-0.06	yes	0.006	-1.219 ***	-0.58 ***	-0.06	yes
28 URUGUAY	0.014	-1.335 ***	-0.23	0.40 **	yes	0.014	-1.335 ***	-0.23	0.40 **	yes
29 VENEZUELA	0.026	-1.439 ***	-0.22	-0.28	no	0.026	-1.439 ***	-0.22	-0.28	no
30 VIETNAM	0.006	-0.994 ***	2.27 ***	7.22 **	no	0.006	-0.994 ***	2.27 ***	7.22 **	no
> Cointegration hypotheses testing performed according to Trace Statistic					yes = 13/30					yes = 17/30

B.3 A New Price Discovery Measure

Blanco et al. (2005) and Zhu (2006) suggest Gonzalo-Granger (GG) measure (1995) as a scale for the causality relation between CDS and Bond Markets. The measure is simply given as $\alpha_2/(\alpha_2 - \alpha_1)$. If GG is less than 0.5 we can conclude that the Bond markets lead CDS markets in price discovery. If GG is larger than 0.5, we can conclude that the CDS markets lead Bond markets in price discovery. However, the GG measure would not give us meaningful results if α_1 is not significantly negative, and α_2 is not significantly positive. As noted earlier, we argue that this measure is only appropriate for highly efficient markets. For the sovereign case, we suggest to accept any case out of our five possible scenarios if the coefficients work in an error correcting direction.

As a new and comprehensive measure, we suggest $\alpha_2 - \alpha_1$ (ignoring the significance levels of the coefficients) to check for the correct sign of adjustment. For instance, if the error at previous time period is positive, the measure $\alpha_2 - \alpha_1$ should be positive for the gap to close in any of the five scenarios we discussed earlier. Similarly, if the error is negative, again the measure should be positive for the gap to close. So, regardless of the sign of the error at time t_{-1}, $\alpha_2 - \alpha_1$ measure should be positive for the error correction mechanism to work properly. Table-3 reports the $\alpha_2 - \alpha_1$ values.

With the SBIC measure as a reference, 5 countries out of 27, China, Croatia, Korea, Tunisia, and Venezuela, the price discovery mechanism is not appropriate and we observe inefficiency in sovereign credit markets. In 14 cases (with SBIC), we have CDS spreads significantly adjusting (decrease) in the expected direction. Whereas we have only 6 cases in which Bond spreads significantly adjust (increase) to correct the error. These results tell us that, in general, CDS spreads adjust to correct the errors; therefore bond spreads lead the CDS spreads.

These results are partly in line with the paper by Chan-Lau & Kim (IMF, 2004). The authors note that the bond market may dominate price discovery because the banks are both the investors and the insurance (CDS) buyers. In addition, they assert that the CDS positions are more buy-and-hold natured since the banks do not trade these instruments, whereas bond markets are more active. They conclude that the bond market has a greater liquidity and trading volume, therefore it leads the CDS market. As a footnote, the authors note that the CDS markets price the default risk better in times of financial crises, therefore one might argue that the CDS spreads should lead bond spreads during market turbulence.

Table - 3: A New Price Discovery Measure

VECM - Appropriate Error Correction														
	AIC - Cointegrating Equation		AIC - VECM		AIC	Appropriate Error	SBIC - Cointegrating Equation		SBIC - VECM		SBIC	Appropriate Error
Countries	constant	β_1	α1	α2	α2-α1	Correction	constant	β1	α1	α2	α2-α1	Correction
1 BRAZIL	0.029	-1.490 ***	-1.13 ***	-0.64 ***	0.49	yes	no cointegration					
2 BULGARIA	-0.003	0.006	-0.11 ***	-0.09 **	0.02	yes	0.003	-0.823 ***	-0.28 ***	0.14	0.42	yes
3 CHILE	-0.003	-0.083	-0.15 ***	-0.17 ***	-0.02	**no**	0.012	-1.706 ***	-0.21 ***	0.04	0.25	yes
4 CHINA	-0.001	-0.227	-0.13 ***	-0.21 **	-0.08	**no**	-0.001	-0.227	-0.13 ***	-0.21 **	-0.08	**no**
5 COLOMBIA	no cointegration						0.013	-1.414 ***	0.12	0.34 ***	0.22	yes
6 CROATIA	-0.011	0.059	-0.39	-0.72 **	-0.33	**no**	-0.030	1.508	-0.05 *	-0.05 **	-0.003	**no**
7 DOMINICAN REP.	0.017	-1.578 ***	-1.50 ***	0.05	1.55	yes	0.021	-1.689 ***	-0.81 ***	0.03	0.84	yes
8 ECUADOR	0.018	-1.247 ***	-0.44 ***	-0.15	0.29	yes	0.018	-1.247 ***	-0.44 ***	-0.15	0.29	yes
9 EGYPT	0.002	-1.408 ***	-0.50 ***	0.02	0.52	yes	0.000	-1.137 ***	-0.35 ***	-0.18 ***	0.18	yes
10 EL SALVADOR	no cointegration						0.021	-1.635 ***	-0.04	0.22 ***	0.26	yes
11 HUNGARY	no cointegration						no cointegration					
12 KOREA	-0.006	-0.065	0.23	-0.49	-0.71	**no**	-0.006	-0.065	0.23	-0.49	-0.71	**no**
13 LEBANON	-0.043	0.121	-0.16 ***	-0.08 *	0.08	yes	-0.043	0.121	-0.16 ***	-0.08 *	0.08	yes
14 MALAYSIA	no cointegration						0.005	-0.887 ***	-0.09	0.22	0.31	yes
15 MEXICO	0.011	-1.161 ***	-0.33	0.27	0.60	yes	0.010	-1.089 ***	-0.16	0.10	0.27	yes
16 MOROCCO	0.006	-1.196 ***	-0.23 ***	0.21 **	0.44	yes	0.006	-1.136 ***	-0.24 ***	0.08	0.31	yes
17 PAKISTAN	-0.031	0.421	-1.32 ***	-1.42 ***	-0.10	**no**	-0.002	-0.999 ***	-0.41 *	-0.05	0.36	yes
18 PANAMA	no cointegration						0.017	-1.420 ***	-0.48 ***	0.03	0.51	yes
19 PERU	0.006	-1.062 ***	-0.29 *	-0.12	0.18	yes	0.006	-1.062 ***	-0.29 *	-0.12	0.18	yes
20 PHILIPPINES	0.008	-1.161 ***	-0.10	0.11	0.21	yes	0.008	-1.161 ***	-0.10	0.11	0.21	yes
21 POLAND	0.000	-0.308 ***	-0.29 ***	-0.61	-0.32	**no**	0.000	-0.365 ***	-0.11 ***	0.09	0.19	yes
22 RUSSIA	0.007	-0.990 ***	-0.86 ***	-0.38 *	0.48	yes	0.007	-1.146 ***	0.28 ***	0.40 ***	0.12	yes
23 SOUTH AFRICA	0.004	-0.990 ***	-0.06	0.09	0.15	yes	0.004	-0.990 ***	-0.06	0.09	0.15	yes
24 THAILAND	-0.083	16.300 ***	-0.01 ***	0.00	0.003	yes	0.003	-1.128 ***	-0.09	0.42 ***	0.51	yes
25 TUNISIA	0.016	-2.210 ***	1.04 ***	0.56	-0.48	**no**	0.016	-2.210 ***	1.04 ***	0.56	-0.48	**no**
26 TURKEY	0.014	-1.637 ***	0.14	0.25	0.11	yes	no cointegration					
27 UKRAINE	0.006	-1.219 ***	-0.58 ***	-0.06	0.52	yes	0.006	-1.219 ***	-0.58 ***	-0.06	0.52	yes
28 URUGUAY	0.014	-1.335 ***	-0.23	0.40 **	0.63	yes	0.014	-1.335 ***	-0.23	0.40 **	0.63	yes
29 VENEZUELA	0.026	-1.439 ***	-0.22	-0.28	-0.05	**no**	0.026	-1.439 ***	-0.22	-0.28	-0.05	**no**
30 VIETNAM	0.006	-0.994 ***	2.27 ***	7.22 **	4.94	yes	0.006	-0.994 ***	2.27 ***	7.22 **	4.94	yes

6 - Conclusions and Further Research

In this paper, we showed that the ties between sovereign CDS and bond markets have strengthened substantially in 2001-2007 period compared to earlier periods. Our analysis extended the literature with three major contributions. First, we have looked at a period and a cross section that has never examined before. This has become possible through the use of EMBIG which uses an expanded sample compared to the earlier studies which made use of EMBI+ or corresponding bond spreads.

Second, we questioned the long-run equilibrium relationship between the two markets. Consequently, we have shown that sovereign CDS and bond markets have been more and more integrated. At first, we measured the improvement via cointegration tests, and confirmed that twenty-seven out of thirty countries (90%) have a long-run equilibrium relationship between bond and CDS markets.

A measure for market efficiency is the condition that the derivative markets dominate the asset markets in price discovery. For example, the changes in the value of a call option should give an early signal for the direction of the underlying stock price; therefore the call option price should be leading the underlying stock price. In our case the CDS markets should be leading the bond markets since the market view is more frequently reflected via CDS spreads. Even though the recent studies confirmed that this principle holds in the US and European corporate markets (Zhu, 2006, Norden and Weber, 2004), the findings in sovereign context are in sharp contrast. However, our results are in line with Chan-Lau and Kim's (2004) discussion. We show that bond markets lead CDS markets in general (48% of the time), but lag CDS spreads in some cases (22% of the time). Even though we can argue that the efficiency of sovereign markets have improved over the 2001-2007 period, the bond market still matters more because of its higher liquidity and trading volume.

Third, we improved the time-series econometric analysis. Specifically, we extended the adjustment mechanism to more than two possible scenarios, and we created a simple measure to check for the appropriate error correction. Additionally, we provided an extensive sensitivity analysis for the lag length selection procedures, and argued that the SBIC measure is more robust compared to AIC for the sovereign case.

There are a few candidates for explaining the deviation of sovereign markets from corporate markets in terms of efficiency. First, the no-arbitrage assumptions do not perfectly hold in sovereign markets. For instance, it is not possible to short the sovereign bonds in many cases. This is also pointed out by Blanco et al. (2005) with the emphasis on non-zero repo costs. Second, the contract specifications matter. As Blanco et al. (2005) and Chan-Lau & Kim (2004) asserted, the cheapest-to-deliver option (CTD) has a significant effect on the behavior of the markets. Third, shifts in liquidity are also a common factor mentioned in most of the studies. Moreover, it is important to keep in mind that the EMBIG spreads are only proxies for five year sovereign bond spreads. In addition, the results are still sensitive to the specific instruments and methods used by JP Morgan in calculating the EMBIG. The calculation of the EMBIG spread for each sovereign involves accumulating Brady Bonds, Eurobonds, traded loans, and local market debt instruments into the same pool. Unfortunately, we do not have access to the specific weights of these debt instruments in the pool used to calculate for each sovereign bond spread. An uneven composition in these pools might as well lead to some anomalies.

There is no doubt that our study can be improved in various directions. First, acquiring a daily frequency data would be desirable to check for the robustness of our results. In addition, the VAR modeling can be extended with various variables such as stock market indices, exchange rates or global factors, such as VIX. In addition, case studies can be performed to see anomalies such as political instability or dependence on commodity prices in different countries. Lastly, the incentives in international finance and the impact of the contract specifications can be examined. Some sovereigns have begun to issue bonds with Collective Action Clauses (CAC) to prevent the moral hazard and deadweight losses in the international finance paradigm (Eichengreen, 2003). A closer look at the contract specifications, i.e. whether the sovereign bond issue has CAC mechanism or not, might as well lead to interesting findings.

REFERENCES

Amato, Remolona. (2003). The Credit Spread Puzzle. BIS Quarterly Review

Ammer, Cai. (2007). Sovereign CDS and Bond Pricing Dynamics in Emerging Markets: Does the Cheapest-to-Deliver Option Matter? Federal Reserve Board. SSRN.

Andritzky. (2006) Sovereign Default Risk Valuation. Springer.

Blanco, Brennan, Marsh. (2005). An Empirical Analysis of the Dynamic Relation between Investment Grade Bonds and Credit Default Swaps. The Journal of Finance.

Chan-Lau, Kim. (2004). Equity Prices, Credit Default Swaps, and Bond Spreads in Emerging Markets. IMF. SSRN.

Cavanagh, Long. (1999). Introducing the J.P. Morgan Emerging Markets Bond Index Global (EMBI Global).

Deutsche Bank Research. Financial Market Monitoring. How do CDS spreads compare to bond spreads?

Duffie. (1998). Credit Swap Valuation. Research Paper.

Duffie, Pedersen, Singleton. (2003). Modeling Sovereign Yield Spreads: A Case Study of Russian Debt. The Journal of Finance.

Eichengreen. 2003. Restructuring Sovereign Debt. Journal of Economic Perspectives.

Enders. (2004). Applied Econometric Time Series. Second Edition.

European Central Bank (2004). The Euro Bond Market Study.

Gonzalo, Granger. (1995). Estimation of Common Long-Memory Components in Cointegrated Systems. Journal of Business & Economic Statisctics.

Gaillard. (2007). Fitch, Moody's, and S&P's SovereignRatings, and EMBI Global Spreads: Lessons from 1993-2006. Des Sciences Fondation Nationale Politiques.

Hartelius. Kashiwase. Kodres. (2008). Emerging Market Spread Compression: Is it real or is it Liquidity? IMF. SSRN.

Hilscher. Nosbuch. (2007). Determinants of Sovereign Risk: Macroeconomic Fundamentals and Pricing of Sovereing Debt. Brandeis University. LSE.

Hull, Predescu, White. (2004). The Relationship between Credit Default Swap Spreads, Bond Yields, and Credit Rating Announcements. Journal of Banking and Finance.

Hull, White. (2000). Valuing Credit Default Swaps I: No Counter Party Default Risk

Jahjah. Yue. (2004). Exchange Rate Policy and Sovereign Bond Spreads in Developing Countries. IMF.

Johansen, Juselius (1990). Maximum Likelihood Estimation and Inference on Cointegration-with Applications to the Demand for money. Campos, Ericsson, Hendry (2005) General-to-Specific Modeling Volume I. International Library of Critical Writings in Econometrics.

Longstaff. Pan. Pederson. Singleton. (2007). How Sovereign is Sovereign Credit Risk ? NBER Working Paper. SSRN.

McGuire, Schrijvers. (2003). Common Factors in Emerging Market Spreads. BIS Quarterly Review.

Narag. (2004). The Term Structure and Default Risk in Emerging Markets. UCLA.

Norden, Weber. (2004). The comovement of Credit Default Swap, Bond and Stock Markets: An Empirical Analysis. CEPR.

Pan, Singleton. (2006). Default and Recovery Implicit in the Term Structure of Sovereign CDS Spreads. NBER.

Packer, Suthiphongchai. (2003). Sovereign Credit Default Swaps. BIS Quarterly Review.

Powell. Martinez. (2008). On Emerging Economy Sovereign Spreads and Ratings. Inter-American Development Bank.

Remolona. Scatigna. Wu. (2007). Interpreting Sovereign Spreads. BIS Quarterly Review

Singh. Andritzky. (2005). Overpricing in Emerging Market CDS Contracts: Some Evidence from Recent Distress Cases. IMF.

Singh. (2003). Are Credit Default Swap Spreads High in Emerging Markets? An Alternative Methodology for Proxying Recovery Value. IMF.

Singh. Andritzky. (2006) The Pricing of Credit Default Swaps During Distress. IMF.

Skinner, Nuri. (2007). Hedging Emerging Market Bonds and the Rise of the Credit Default Swap. International Review of Financial Analysis.

Sy. (2001). Emerging Market Bond Spreads and Sovereign Credit Ratings: Reconciling Market Views with Economic Fundamentals. IMF. SSRN

Sy. (2004). Rating the Rating Agencies: Anticipating Currency Crisis Or Debt Crisis? IMF. SSRN

Stata Time Series Reference Manual, Release 9 (2005). Stata Press.

Zhu. (2006). An Empirical Comparison of Credit Spreads between the Bond Market and the Credit Default Swap Market. Journal of Financial Services Research.

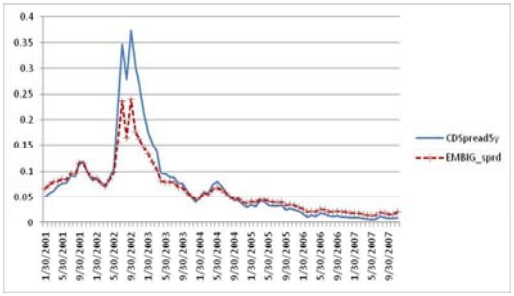
APPENDIX I – Literature Review

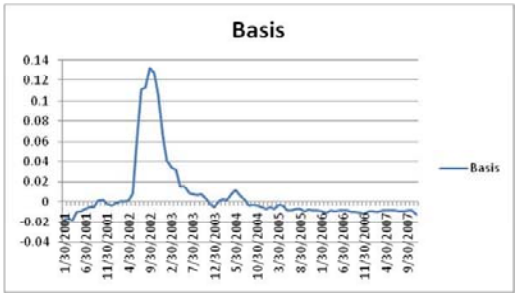
	Date	Authors	Title of the Paper	Data	Major Conclusions	Methodology
1	December 2003	McGuire & Schrijvers BIS Quarterly Review	Common Factors in Emerging Market Spreads	The changes in daily spreads, EMBIG 15 Emerging Markets 31 March 1997 to 18 June 2003 (25 Emerging Markets August 1999 to June 2003) (Investment Grade vs. Non-Investment Grade)	The authors show that a common factor accounts for 1/3 of variation in the emerging market daily spreads, remaining 2/3 attributed to the idiosyncratic factors. The common factor is highly correlated with (through PCA analysis) equity indices (S&P 500), US interest rates (10 year Treasury yield) and other measures (VIX index, High yield spread). The authors argue that this common factor is a reflection of the international investors' attitude toward risk.	Principal Component Analysis Factor Analysis OLS
2	December 2007	Longstaff, Pan, Pederson, Singleton NBER	How Sovereign is Sovereign Credit Risk ? SSRN	Monthly CDS (5 year) Spread for 26 Countries 23 Emerging + 3 Advanced Countries Coverage: October 2000 - May 2007 Local Stock Market Returns (MSCI, S&P IFC), VIX US Stock Markets, Treasury & Corporate Yields Exchange Rates, Foreign Currency Reserves	Changes in Sovereign Credit Spreads are driven by changes in 3 common global factors; 1-Global Financial Markets (US Corp. High Yield Spread) 2- Global Risk Premia (VIX Index, Equity (S&P E/P) Risk Premium 3-Global Investment Flows (Bond & Equity Flows of Mutual Funds) as opposed to to country specific variables such as changes in local stock market return, exchange rate, and foreign reserves which have a much smaller explanatory power.	Principal Component Analysis Credit Cluster Analysis OLS Correlation Analysis Sharpe Ratio Analysis
3	January 2008	Powell, Martinez Inter-American Development Bank	On Emerging Economy Sovereign Spreads and Ratings	Replicate AGR - ECB 2007 Paper with (S&P, Moody's) US Treasury, Corporate High Yield, VIX Coverage: 2004-2007 2006-2007 Daily CDS(5yr) Spreads - 20 Emerging Mrkts Hausmann and Panizza Data Set for Debt Original Sin Variable, Volatility of Exchange Rate	Although a small number of economic fundamentals explain ratings reasonably well, variations/improvements in those fundamentals are themselvers explained by a small number of global financial factors Ratings do matter in determining EMBI Spreads even after controlling for the major macroeconomic variables. Growth, Fiscal Balance, and EU Membership effect EMBI spreads over and above ratings. Changes in policies of FED and the ECB (injecting liquidity) served to reduce the CDS Spreads, the news of Sub-prime crisis was interpreted as a US centered problem, and did not effect the sovereign CDS spreads. VIX and High Yield Variables Contribute to CDS spreads reduction.	OLS Ordered Probit, Logit Principal Component Analysis
4	January 2008	Hartelius, Kashiwase, Kodres IMF	Emerging Market Spread Compression: Is it real or is it Liquidity? SSRN	Sovereign Ratings/Outlooks, Moody's and S&P (monthly) 3 Month Fed Funds Futures Rates Daily/ Monthly observations from Jan 1991 to Feb 2007 30 Emerging Markets and US financial data, EMBI, EMBIG	Regress Bond Spreads over fundamentals (credit ratings) and expectations/liquidity (US interest rates and volatility) "Carry Trade", 90 Rolling Volatility measure for FFFR VIX (CBOE); risk appetite Incorporates Outlooks (not a big imporovement)	OLS Fixed Effects
5	March 2007	Remolona, Scatigna, Wu BIS Quarterly Review	Interpreting Sovereign Spreads	Corporate and Sovereign CDS Spreads (monthly) 26 Emerging Market Countries Ratings Implied Dafault Probabilities (mapping) Fitch, Moody's, S&P	Sovereign Spreads can be divided into two major components; expected loss (default risk) and risk premium (investors). Risk premium is often larger part of the spread. Explain CDS Spreads with RIPD (or ratings), bond outstanding (liquidity), and VIX (global risk).	OLS
6	October 2001	Sy IMF	Emerging Market Bond Spreads and Sovereign Credit Ratings: Reconciling Market Views with Economic Fundamentals SSRN	Perform a univariate regression (unbalanced panel) using 17 EMBI+ Spreads and an average of Moody's and S&P's long-term foreign currency debt from January 1994 to April 2001 monthly observations	Striking progression in the relationship between spreads and ratings from 1994 to 2001 The relationship between the spreads and the ratings are less significant during period of crises (1997-98) the spreads adjust asymmetrically when there are significant deviations from the estimated relationship: when spreads are excessively low, the rating upgrade effect dominates the spread widening effect when spreads are excessively high, the spread tightening effect is more important than the downgrade effect high spreads in Russia versus lower spreads in Asia in 1999-2000 periods on a rating adjusted basis possibly because of liquidity conditions and broadening investor base for Asian Bonds. higher risk appetite of investors in 1994-1997 periods	Spearman Rank Correlation OLS Residual Analysis
7	February 2004	Chan-Lau, Kim. IMF	Equity Prices, Credit Default Swaps, and Bond Spreads in Emerging Markets SSRN	Daily CDS (from Deutsche Bank and Credit Trade) Bond (JPMorgan Chase EMBI+), and Equity prices (MSCI) from March 2001 to May 2003. 8 Emerging Markets	There is a strong correlation between CDS and bond spreads in Brazil, Bulgaria, Colombia, Russia, and Venezuela. No equilibrium price relationship between the CDS and bond markets in Mexico, the Philippines, and Turkey. Equity Markets, although very liquid, play a negligible role in price discovery except Russia. CDS and bond spreads can diverge because of the "cheapest-to-deliver" option in the CDS contract, or because of the relative liquidity in these two markets. In general, price discovery occurs in the most liquid market. In Emerging Markets, however, the bond market tend to be more liquid, suggesting that the bond markets should always dominate the bond markets. However, when default risk is high CDS market tend to price default risk better than the bond market. As a result, Bond Markets and CDS Markets tend to alternate in discovering the price.	Cointegration Analysis Granger Causality Test Price Discovery measures Hasbrouck (1995) Gonzalo & Granger (1995) Merton's Model
8	March 2007	Norbert Gaillard Fondation Nationale Des Sciences Politiques.	Fitch, Moody's, and S&P's Sovereign Ratings, and EMBI Global Spreads: Lessons from 1993-2006	Unbalanced Panel Sovereign Ratings, JP Morgan EMBIG Spreads (DataStream) 32 Sovereigns	1 - Moody's has more often disagreed with the market whereas Fitch Ratings have diverged more rarely. 2 - Moody's adjust less to market spreads whereas S&P and Fitch generally try to stick to the spreads. 3 - For all three agencies, there is an asymmetric adjustment of ratings, the agencies are more likely to downgrade following the high spreads, whereas they are reluctant to upgrade when the spreads are very low. 4 - In line with Sy's results (2001), the relationship between ratings and market spreads is weaker in times of market turbulence (1998) and in times of low risk aversion (2005-2006). 5 - Reactions of spreads to rating changes show that S&P downgrades and Moody's upgrades have the most significant impact.	OLS
9	December 2007	Ammer, Cai Federal Reserve Board	Sovereign CDS and Bond Pricing Dynamics in Emerging Markets: Does the Cheapest-to-Deliver Option Matter? - SSRN	Daily 5 Year Dollar Denominated Sovereign CDS from February 26, 2001 to March 31, 2005. 9 Matching Emerging Mrkts 5 Yr Bond Spread (bloomberg)	CDS Markets seem to lead bond markets in price discovery in some instances, but lag bond prices in other cases. Relatively more liquid market tends to lead the other. Contract specifications is also another factor of deviation. CTD Option is an important determinant of the CDS basis, and should be included in any pricing or risk model.	Johansen Cointegration VECM Framework Gonzalo and Granger Price Discovery Measure
10	2004	Hull, Predescu, White Journal of Banking and Finance	The relationship between credit default swap spreads, bond yields, and credit rating announcements	January 1998-May 2002 Data on CDS of Corporations, Sovereigns, and Quasi-Sovereigns.	CDS prices rise sharply, thus predict all three types of rating changes outlook) well in advance (actual downgrade, negative review, and negative outlook)	Logistic Regression McFadden's LRI
11	2004	SY IMF	Rating the Rating Agencies: Anticipating Currency Crisis Or Debt Crisis? - SSRN	13 Emerging Markets, Monthly EMBI Spreads, 1990-2002	Ratings do predict sovereign debt distress (spreads exceeding 1000 bp) cases.	

12	August 2004.	Haibin Zhu. BIS Working Papers No 160	An Empirical Comparison of credit spreads between the bond market and the credit default swap market.	Daily US and EU Corporate Bond and CDS Markets January 1st 1999 to December 31st 2002 Panel Data	CDS Markets lead cash and bond markets in rating events and price adjustment in general. Relative importance of CDS vs. Bond Markets depend on the specific firm, liquidity also matters. Two Credit Markets are cointegrated in the long-run. When swap rates are used as benchmark risk-free rates, the price discrepancies between bond spreads and CDS premia are quite small. A number of explantory variables are suggested to explain basis spreads; lagged basis spread, changes in CDS spread, rating level and rating change, contractual arrangements, liquidity factors, macroeconomic conditions. Most of these factors (rating change being the most important) seem to be significant except the last one.	Cointegration Test Granger Causality VECM EM Algorithm
13	June 2005	Singh, Andritzky,	Overpricing in Emerging Market CDS Contracts: Some Evidence from Recent Distress Cases.	Argentina, Brazil, Dominican Republic 2001-2004 period, unbalanced EMBI and CDS spreads	Restructurings result in high recovery values, much higher than the theoretical benchmark 20%. Thus the protection buyers should pay less for the CDS contract	
14	December 2003.	Singh. IMF	Are Credit Default Swap Spreads High in Emerging Markets? An Alternative Methodology for Proxying Recovery Value.			
15	November 2006	Andritzky & Singh, IMF	The Pricing of Credit Default Swaps During Distress,	1yr,3yr, 5yr CDS spreads, EMBIG country sub-index, and CTD bond from Brazil's distress in 2002-2003	the recovery rate for CDS contracts is much higher than traditionally assumed (25%) which drives "the basis" basis effects: delivery option, issuance of new bonds, short selling abilities, repo specialness (positive) counterparty risk, bond illiquidity, funding risk (negative) most of these effects are hard to detect empirically compute implied recovery values from 3yr and 5yr CDS spreads and show that its significantly higher than 25%. Disagree with Pan & Singleton 2005 Paper on common global factors explaining a large part of variation in CDS spreads	
16	November 2004	Jahjah & Yue IMF	Exchange Rate Policy and Sovereign Bond Spreads in Developing Countries.	51 Developing Countries over 1990-2001 period Primary Bond Market Spreads Exchange Rate Regime Classification (IMF)	There is a significant impact of exchange rate policy on sovereign bond issue decisions and bond spreads. Real Exchange rate overvaluation significantly increases sovereign bond issue probability and raises bond spreads Exchange rate misalignment under a hard peg significantly increases bond spreads	OLS
17	November 2007	Hilscher, Nosbuch Brandeis University LSE	Determinants of Sovereign Risk Macroeconomic Fundamentals and Pricing of Sovereing Debt	32 Emerging Markets, Daily EMBIG from January 1994 to 2006 (or Annual Mean) Annual Macroeconomic Variables 1994 to 2003	Emphasis on Volatility of Fundamentals, especially Terms of Trade and Gowth Volatlity. Commodity (Exports) Prices Very low R-Squared values	OLS, Logit Regression

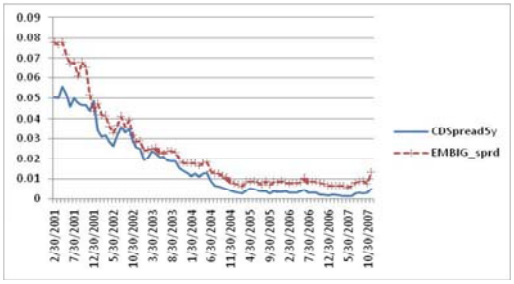
APPENDIX II - 5 Year CDS Spreads and EMBIG Spreads over 2001 – 2007 Period

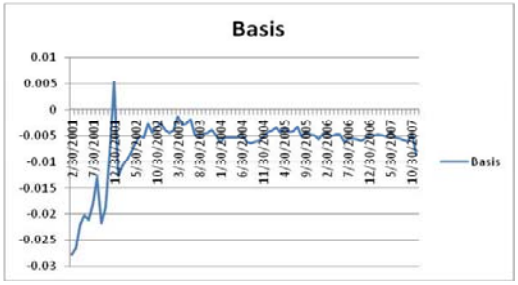
1 - Brazil



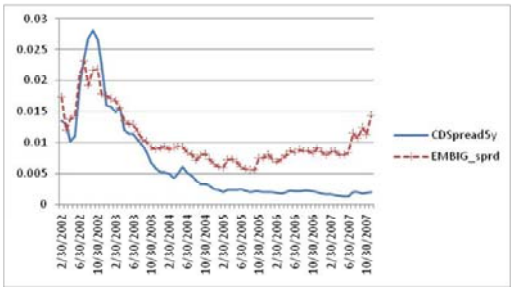


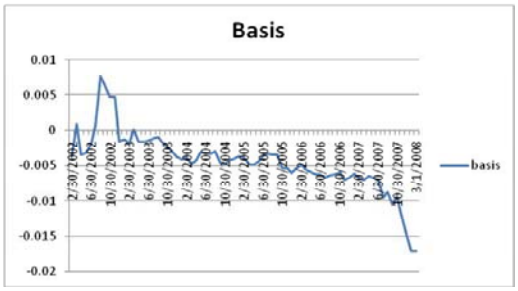
2 - Bulgaria



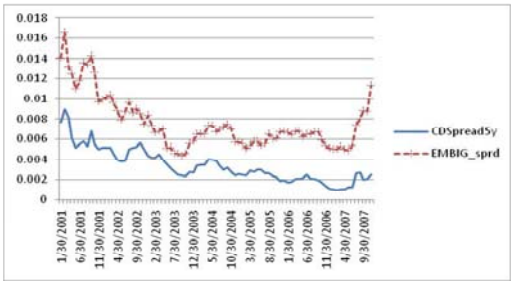


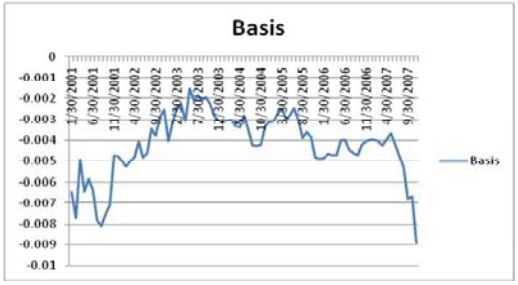
3 - Chile



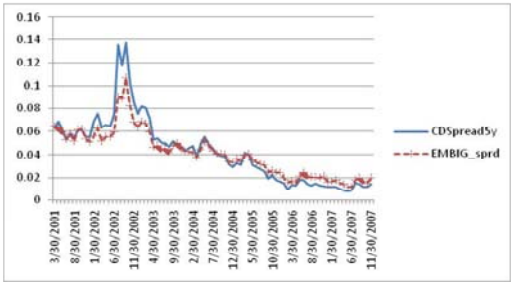


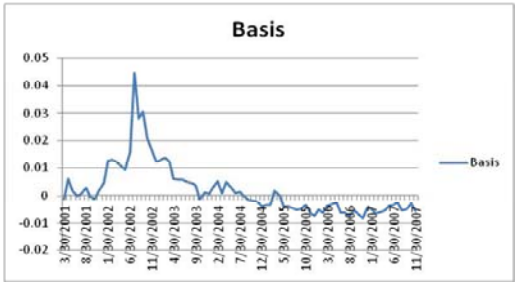
4 - China



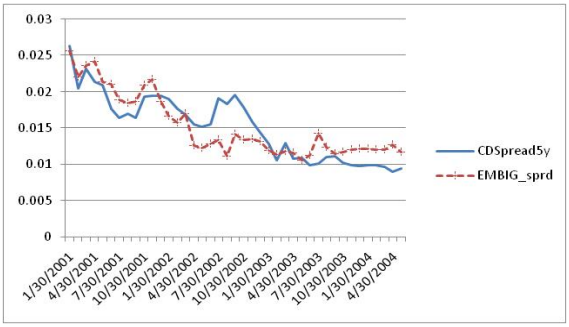


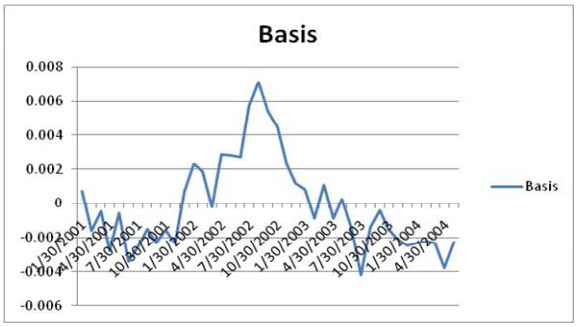
5 - Colombia



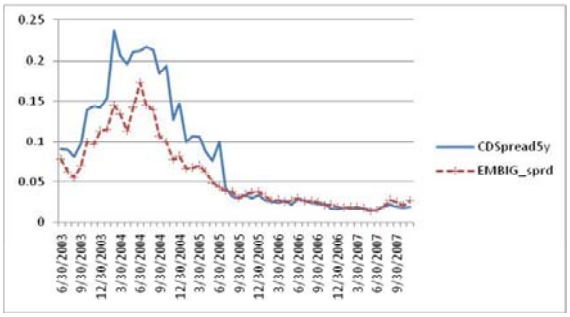


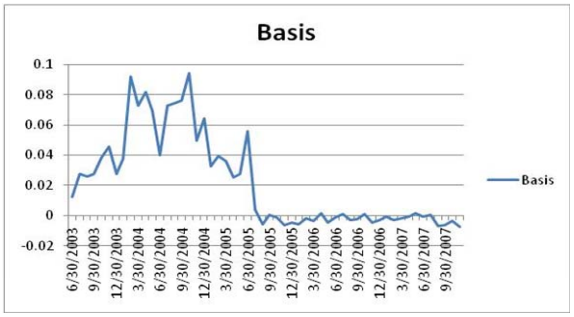
6 - Croatia



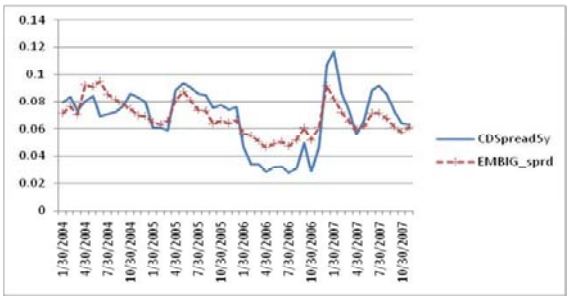


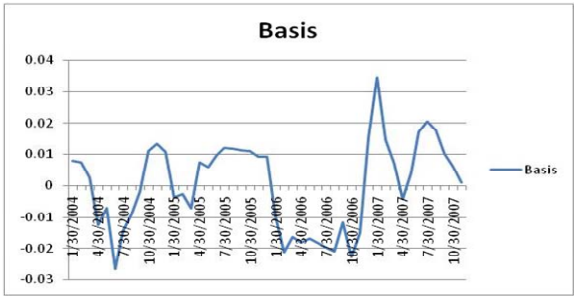
7 - Dominican Republic



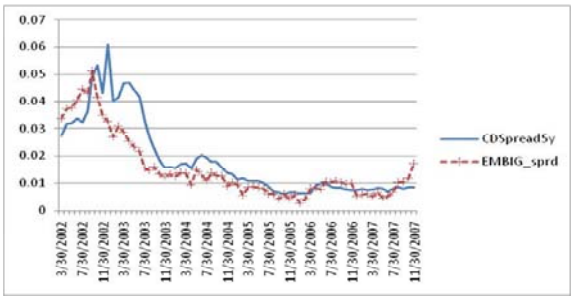


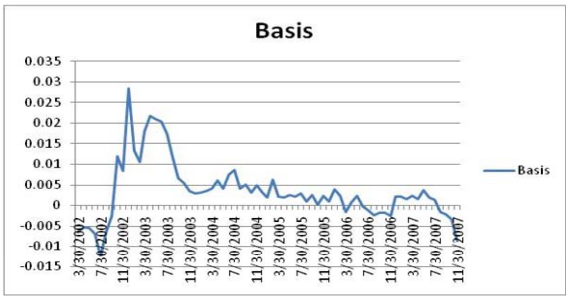
8 - Ecuador



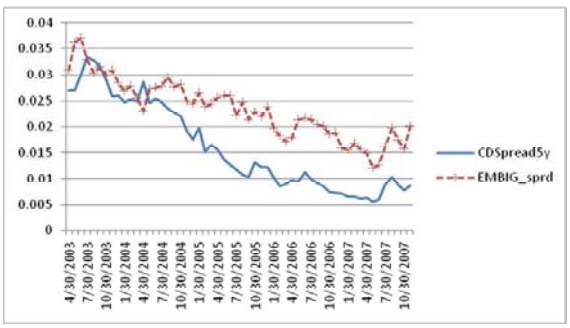


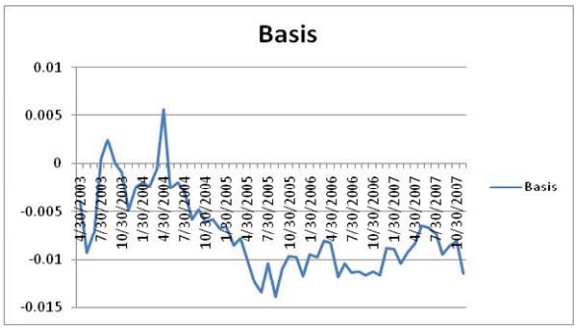
9 - Egypt



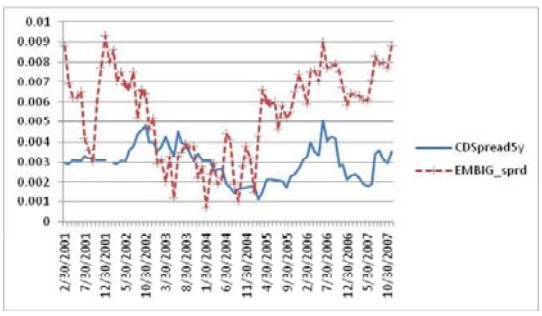


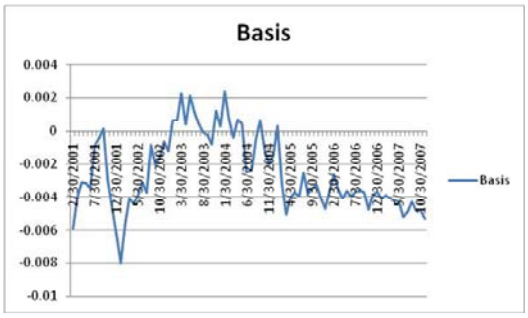
10 - El Salvador



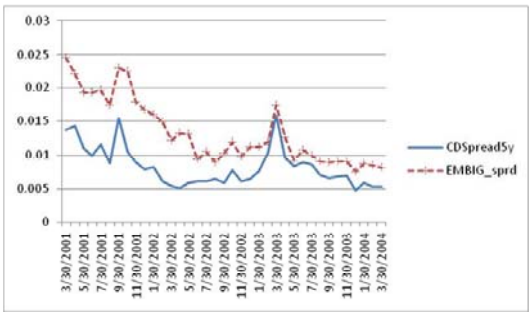


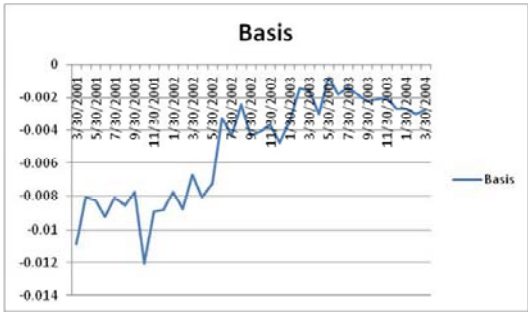
11 - Hungary



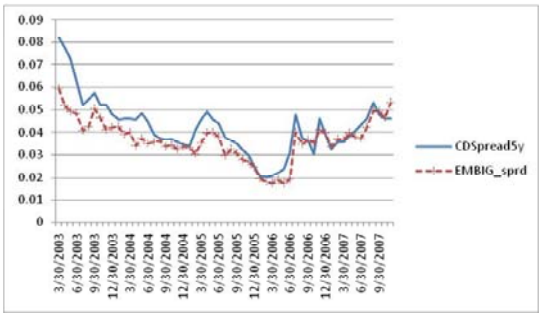


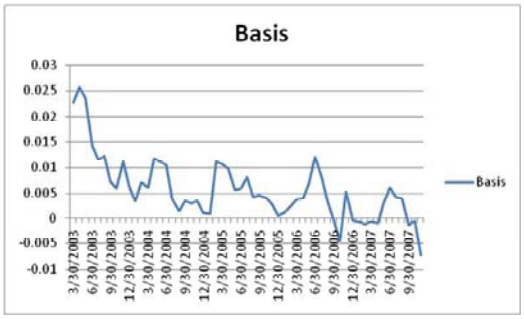
12 - Korea



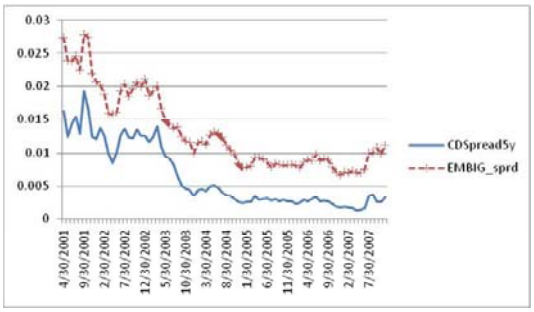


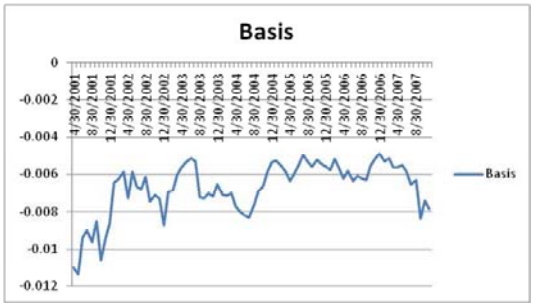
13 - Lebanon



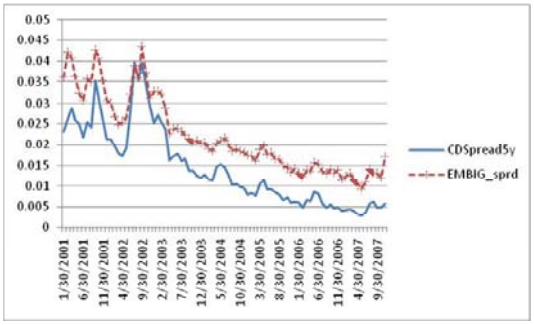


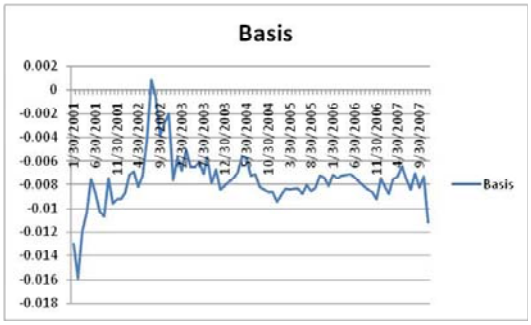
14 - Malaysia



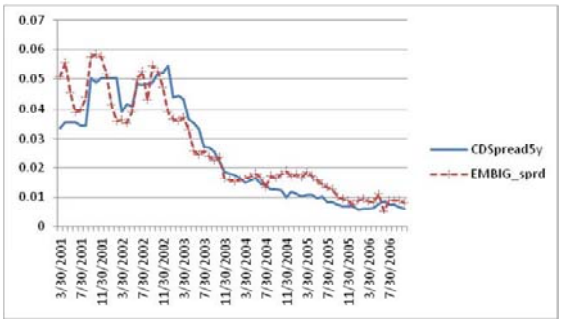


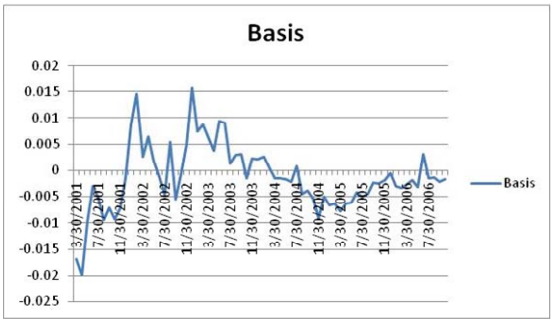
15 - Mexico



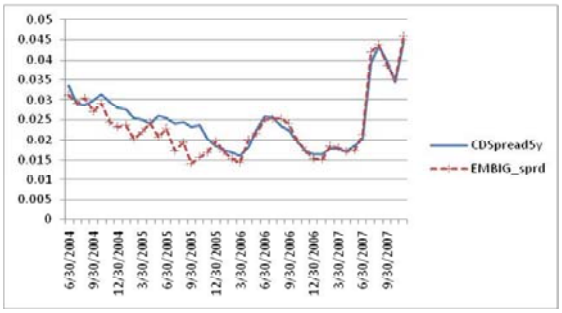


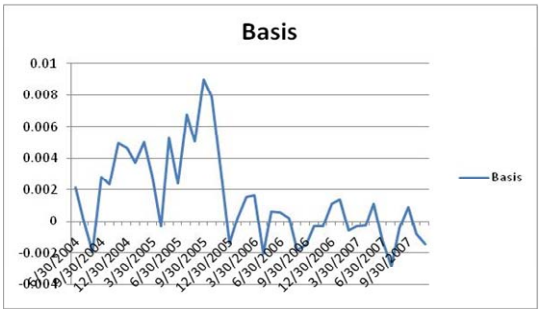
16 - Morocco



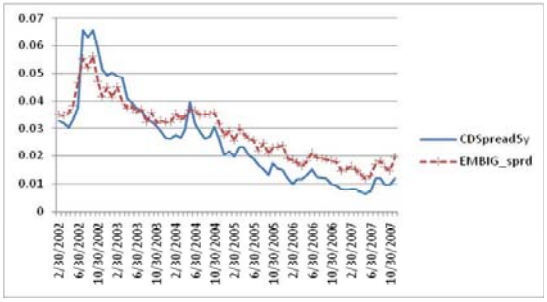


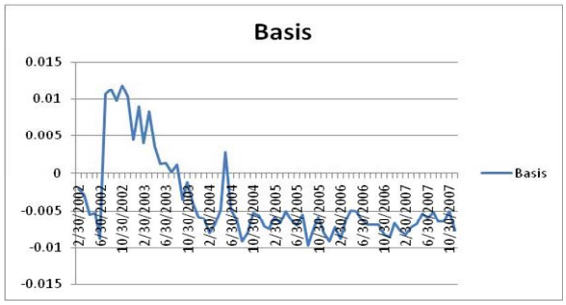
17 - Pakistan



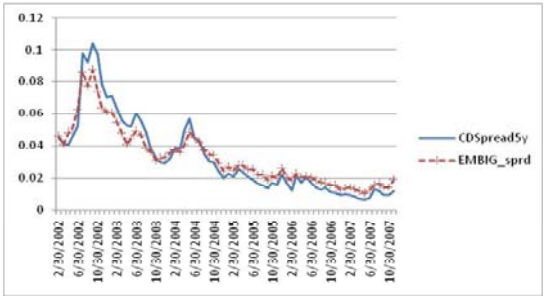


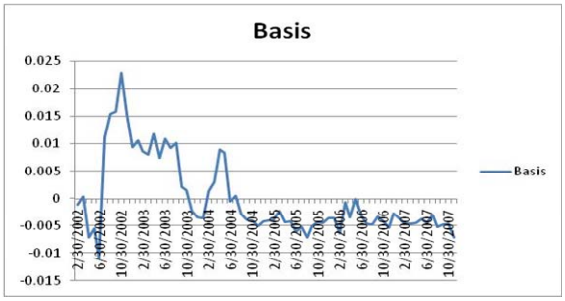
18 - Panama



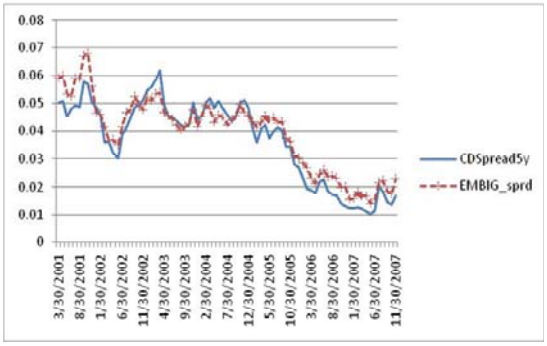


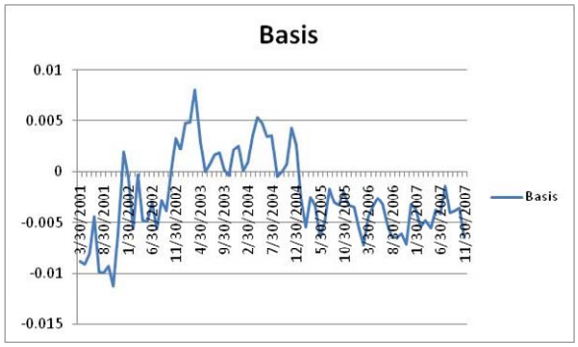
19 - Peru



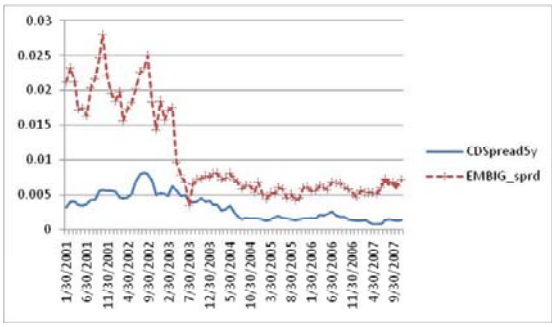


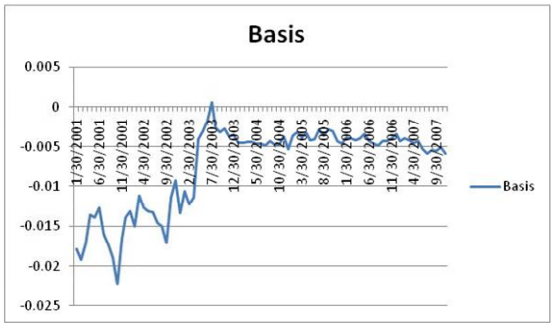
20 – Philippines



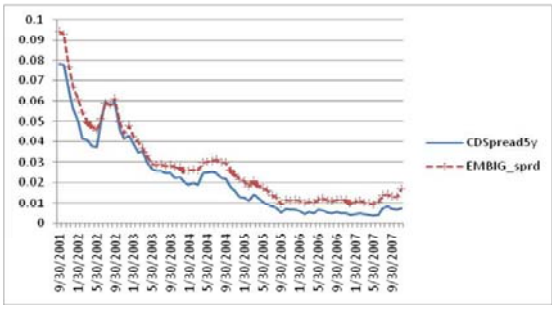


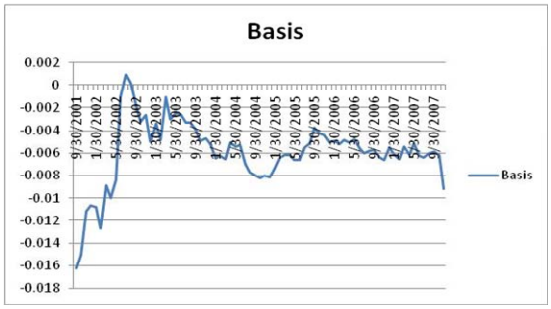
21 - Poland



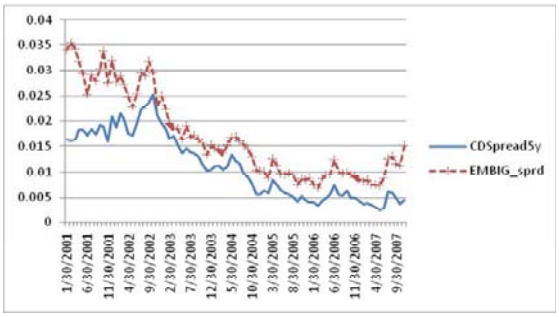


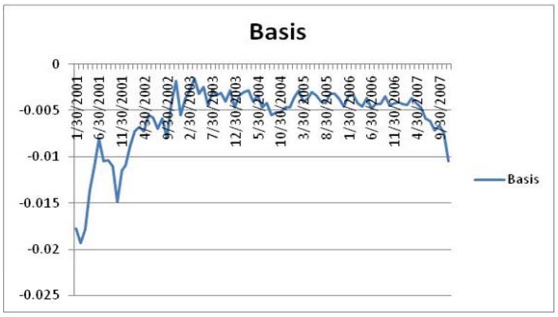
22 - Russia



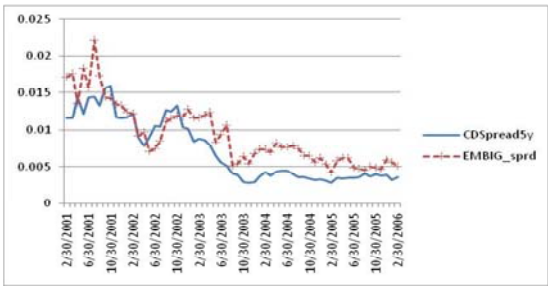


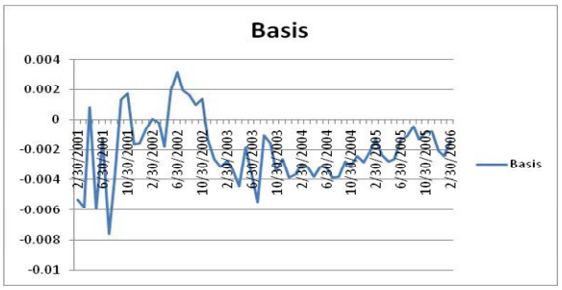
23 - South Africa



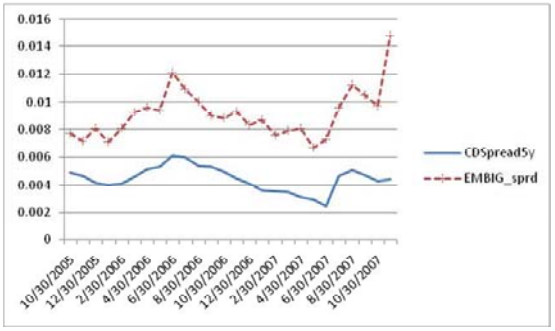


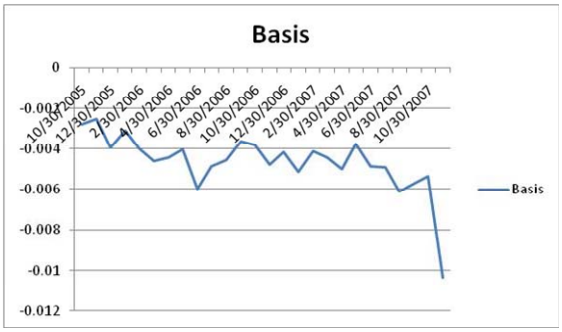
24 - Thailand



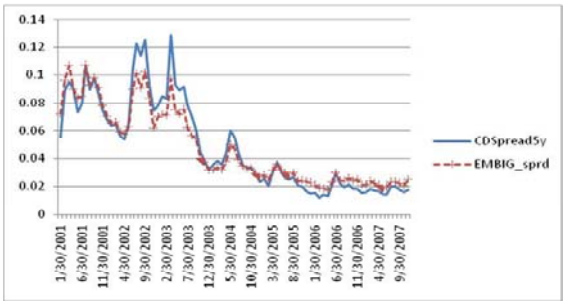


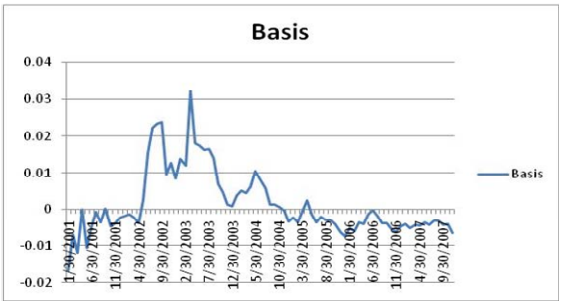
25 - Tunisia



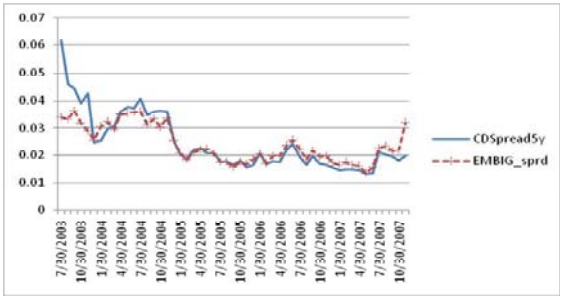


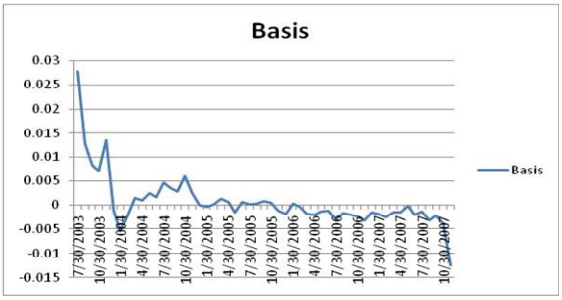
26 - Turkey



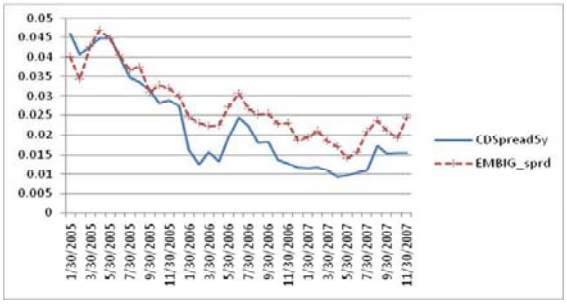


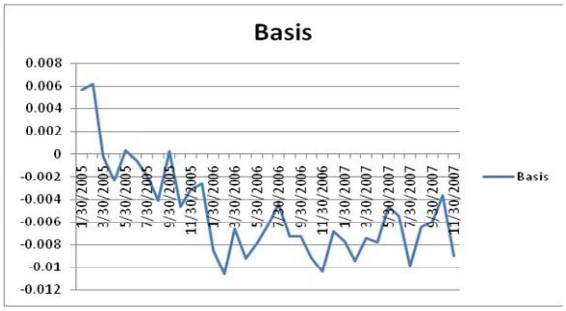
27 - Ukraine



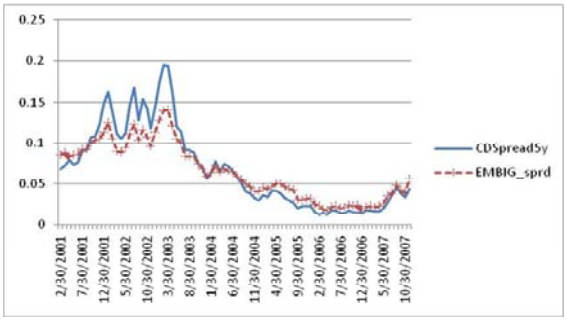


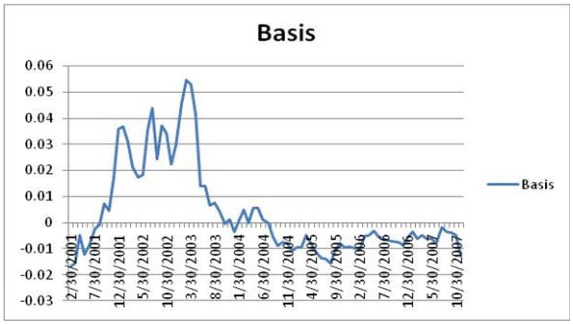
28 - Uruguay



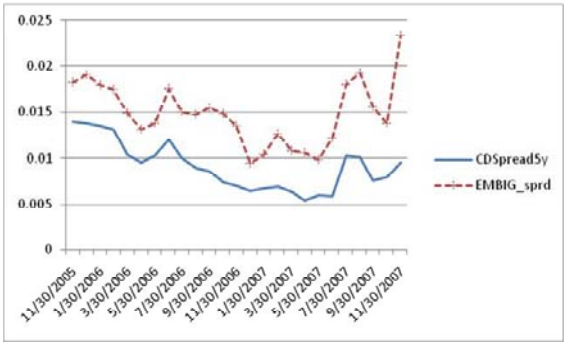


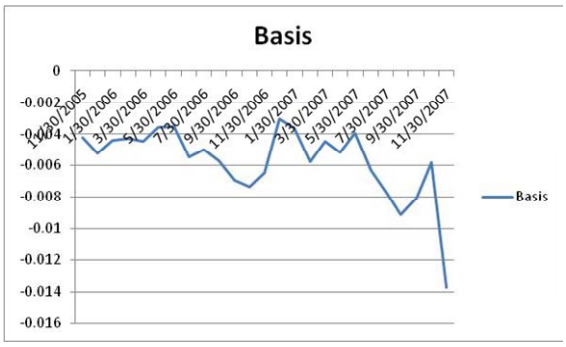
29 - Venezuela





30 - Vietnam





APPENDIX III - ADF Tests (with trend) for CDS and Bond Spreads
(1 to 12 Lags – Monthly Observations)

BRAZIL

Augmented Dickey-Fuller for unit root		Number of obs = 81			
5 YEAR CDS SPREADS					
			interpolated Dickey-Fuller		
		Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
lags					
1	Z(t)	-2.493	-4.082	-3.469	-3.161
2	Z(t)	-3.343	-4.084	-3.47	-3.162
3	Z(t)	-3.343	-4.084	-3.47	-3.162
4	Z(t)	-3.127	-4.088	-3.472	-3.163
5	Z(t)	-2.823	-4.091	-3.473	-3.164
6	Z(t)	-2.654	-4.093	-3.474	-3.164
7	Z(t)	-2.531	-4.095	-3.475	-3.165
8	Z(t)	-2.491	-4.097	-3.476	-3.166
9	Z(t)	-2.683	-4.099	-3.477	-3.166
10	Z(t)	-2.979	-4.102	-3.478	-3.167
11	Z(t)	-3.152	-4.104	-3.479	-3.167
12	Z(t)	-3.319	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 3					
(Stata "varlag" procedure)					
EMBIG SPREADS					
1	Z(t)	-2.408	-4.082	-3.469	-3.161
2	Z(t)	-3.001	-4.084	-3.47	-3.162
3	Z(t)	-3.774	-4.086	-3.471	-3.163
4	Z(t)	-3.266	-4.088	-3.472	-3.163
5	Z(t)	-2.82	-4.091	-3.473	-3.164
6	Z(t)	-2.675	-4.093	-3.474	-3.164
7	Z(t)	-2.59	-4.095	-3.475	-3.165
8	Z(t)	-2.272	-4.097	-3.476	-3.166
9	Z(t)	-2.267	-4.099	-3.477	-3.166
10	Z(t)	-2.707	-4.102	-3.478	-3.167
11	Z(t)	-3.002	-4.104	-3.479	-3.167
12	Z(t)	-3.15	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 4					

BULGARIA

Augmented Dickey-Fuller for unit root		Number of obs = 80			
5 YEAR CDS SPREADS					
			interpolated Dickey-Fuller		
		Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
lags					
1	Z(t)	-1.132	-4.084	-3.47	-3.162
2	Z(t)	-1.362	-4.086	-3.471	-3.163
3	Z(t)	-1.594	-4.088	-3.472	-3.163
4	Z(t)	-0.913	-4.091	-3.473	-3.164
5	Z(t)	-1.003	-4.093	-3.474	-3.164
6	Z(t)	-0.827	-4.095	-3.475	-3.165
7	Z(t)	-1.158	-4.097	-3.476	-3.166
8	Z(t)	-1.619	-4.099	-3.477	-3.166
9	Z(t)	-1.711	-4.102	-3.478	-3.167
10	Z(t)	-2.721	-4.104	-3.479	-3.167
11	Z(t)	-0.511	-4.106	-3.48	-3.168
12	Z(t)	-0.843	-4.108	-3.481	-3.169
SC test result for Lag Length Selection = 11					
(Stata "varlag" procedure)					
EMBIG SPREADS					
1	Z(t)	-1.858	-4.084	-3.47	-3.162
2	Z(t)	-2.421	-4.086	-3.471	-3.163
3	Z(t)	-2.282	-4.088	-3.472	-3.163
4	Z(t)	-2.201	-4.091	-3.473	-3.164
5	Z(t)	-2.622	-4.093	-3.474	-3.164
6	Z(t)	-1.936	-4.095	-3.475	-3.165
7	Z(t)	-4.06	-4.097	-3.476	-3.166
8	Z(t)	-4.887	-4.099	-3.477	-3.166
9	Z(t)	-3.343	-4.102	-3.478	-3.167
10	Z(t)	-2.076	-4.104	-3.479	-3.167
11	Z(t)	-2.714	-4.106	-3.48	-3.168
12	Z(t)	-1.435	-4.108	-3.481	-3.169
SC test result for Lag Length Selection = 2					

CHILE

Augmented Dickey-Fuller for unit root		Number of obs = 68			
5 YEAR CDS SPREADS					
			interpolated Dickey-Fuller		
		Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
lags					
1	Z(t)	-2.9	-4.11	-3.482	-3.169
2	Z(t)	-2.763	-4.113	-3.483	-3.17
3	Z(t)	-2.135	-4.115	-3.484	-3.17
4	Z(t)	-2.074	-4.117	-3.485	-3.171
5	Z(t)	-1.785	-4.119	-3.486	-3.172
6	Z(t)	-2.027	-4.121	-3.487	-3.172
7	Z(t)	-4.993	-4.124	-3.488	-3.173
8	Z(t)	-6.12	-4.126	-3.489	-3.173
9	Z(t)	-6.377	-4.128	-3.49	-3.174
10	Z(t)	-3.127	-4.13	-3.491	-3.175
11	Z(t)	-3.869	-4.132	-3.492	-3.175
12	Z(t)	-3.194	-4.135	-3.493	-3.176
SC test result for Lag Length Selection = 4					
(Stata "varlag" procedure)					
EMBIG SPREADS					
1	Z(t)	-0.811	-4.11	-3.482	-3.169
2	Z(t)	-0.7	-4.113	-3.483	-3.17
3	Z(t)	-0.609	-4.115	-3.484	-3.17
4	Z(t)	-0.599	-4.117	-3.485	-3.171
5	Z(t)	-1.522	-4.119	-3.486	-3.172
6	Z(t)	-1.032	-4.121	-3.487	-3.172
7	Z(t)	-1.302	-4.124	-3.488	-3.173
8	Z(t)	-2.441	-4.126	-3.489	-3.173
9	Z(t)	-1.216	-4.128	-3.49	-3.174
10	Z(t)	-0.846	-4.13	-3.491	-3.175
11	Z(t)	-0.812	-4.132	-3.492	-3.175
12	Z(t)	-0.462	-4.135	-3.493	-3.176
SC test result for Lag Length Selection = 1					

CHINA

Augmented Dickey-Fuller for unit root		Number of obs = 81			
5 YEAR CDS SPREADS					
			Interpolated Dickey-Fuller		
		Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
lags					
1	Z(t)	-4.859	-4.082	-3.469	-3.161
2	Z(t)	-4.278	-4.084	-3.47	-3.162
3	Z(t)	-3.034	-4.086	-3.471	-3.163
4	Z(t)	-2.228	-4.088	-3.472	-3.163
5	Z(t)	-2.328	-4.091	-3.473	-3.164
6	Z(t)	-2.946	-4.093	-3.474	-3.164
7	Z(t)	-2.79	-4.095	-3.475	-3.165
8	Z(t)	-3.956	-4.097	-3.476	-3.166
9	Z(t)	-2.389	-4.099	-3.477	-3.166
10	Z(t)	-2.439	-4.102	-3.478	-3.167
11	Z(t)	-2.12	-4.104	-3.479	-3.167
12	Z(t)	-2.087	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 1					
(Stata "varlag" procedure)					
EMBIG SPREADS					
1	Z(t)	-1.819	-4.082	-3.469	-3.161
2	Z(t)	-0.684	-4.084	-3.47	-3.162
3	Z(t)	-0.458	-4.086	-3.471	-3.163
4	Z(t)	0.121	-4.088	-3.472	-3.163
5	Z(t)	-0.462	-4.091	-3.473	-3.164
6	Z(t)	-0.964	-4.093	-3.474	-3.164
7	Z(t)	-1.307	-4.095	-3.475	-3.165
8	Z(t)	-2.07	-4.097	-3.476	-3.166
9	Z(t)	-1.372	-4.099	-3.477	-3.166
10	Z(t)	-0.23	-4.102	-3.478	-3.167
11	Z(t)	-0.135	-4.104	-3.479	-3.167
12	Z(t)	-0.085	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 1					

COLOMBIA

Augmented Dickey-Fuller for unit root		Number of obs = 81			
5 YEAR CDS SPREADS					
			Interpolated Dickey-Fuller		
		Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
lags					
1	Z(t)	-2.643	-4.086	-3.471	-3.163
2	Z(t)	-3.243	-4.088	-3.472	-3.163
3	Z(t)	-3.01	-4.091	-3.473	-3.164
4	Z(t)	-2.375	-4.093	-3.474	-3.164
5	Z(t)	-2.747	-4.095	-3.475	-3.165
6	Z(t)	-3.399	-4.097	-3.476	-3.166
7	Z(t)	-3.279	-4.099	-3.477	-3.166
8	Z(t)	-3.299	-4.102	-3.478	-3.167
9	Z(t)	-3.373	-4.104	-3.479	-3.167
10	Z(t)	-3.169	-4.106	-3.48	-3.168
11	Z(t)	-2.975	-4.108	-3.481	-3.169
12	Z(t)	-4.007	-4.11	-3.482	-3.169
SC test result for Lag Length Selection = 1					
(Stata "varlag" procedure)					
EMBIG SPREADS					
1	Z(t)	-3.084	-4.086	-3.471	-3.163
2	Z(t)	-3.484	-4.088	-3.472	-3.163
3	Z(t)	-2.985	-4.091	-3.473	-3.164
4	Z(t)	-2.61	-4.093	-3.474	-3.164
5	Z(t)	-3.305	-4.095	-3.475	-3.165
6	Z(t)	-3.038	-4.097	-3.476	-3.166
7	Z(t)	-2.975	-4.099	-3.477	-3.166
8	Z(t)	-3.425	-4.102	-3.478	-3.167
9	Z(t)	-3.263	-4.104	-3.479	-3.167
10	Z(t)	-3.007	-4.106	-3.48	-3.168
11	Z(t)	-2.99	-4.108	-3.481	-3.169
12	Z(t)	-4.495	-4.11	-3.482	-3.169
SC test result for Lag Length Selection = 1					

CROATIA

Augmented Dickey-Fuller for unit root		Number of obs = 40			
5 YEAR CDS SPREADS					
			Interpolated Dickey-Fuller		
		Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
lags					
1	Z(t)	-2.211	-4.251	-3.544	-3.206
2	Z(t)	-3.756	-4.26	-3.548	-3.209
3	Z(t)	-3.702	-4.27	-3.552	-3.211
4	Z(t)	-2.78	-4.279	-3.556	-3.214
5	Z(t)	-2.162	-4.288	-3.56	-3.216
6	Z(t)	-2.104	-4.297	-3.564	-3.218
7	Z(t)	-1.941	-4.306	-3.568	-3.221
8	Z(t)	-1.693	-4.316	-3.572	-3.223
9	Z(t)	-2.212	-4.325	-3.576	-3.226
10	Z(t)	-2.377	-4.334	-3.58	-3.228
11	Z(t)	-2.049	-4.343	-3.584	-3.23
12	Z(t)	-2.506	-4.352	-3.588	-3.233
SC test result for Lag Length Selection = 1					
(Stata "varlag" procedure)					
EMBIG SPREADS					
1	Z(t)	-1.735	-4.251	-3.544	-3.206
2	Z(t)	-1.621	-4.26	-3.548	-3.209
3	Z(t)	-1.729	-4.27	-3.552	-3.211
4	Z(t)	-1.487	-4.279	-3.556	-3.214
5	Z(t)	-1.39	-4.288	-3.56	-3.216
6	Z(t)	-0.765	-4.297	-3.564	-3.218
7	Z(t)	-0.582	-4.306	-3.568	-3.221
8	Z(t)	-0.553	-4.316	-3.572	-3.223
9	Z(t)	-0.889	-4.325	-3.576	-3.226
10	Z(t)	-2.011	-4.334	-3.58	-3.228
11	Z(t)	-2.36	-4.343	-3.584	-3.23
12	Z(t)	-2.275	-4.352	-3.588	-3.233
SC test result for Lag Length Selection = 1					

DOMINICAN

Augmented Dickey-Fuller for unit root		Number of obs = 81			
5 YEAR CDS SPREADS					
			Interpolated Dickey-Fuller		
		Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
lags					
1	Z(t)	-2.115	-4.146	-3.498	-3.179
2	Z(t)	-2.486	-4.148	-3.499	-3.179
3	Z(t)	-2.576	-4.15	-3.5	-3.18
4	Z(t)	-2.531	-4.159	-3.504	-3.182
5	Z(t)	-2.731	-4.168	-3.508	-3.185
6	Z(t)	-3.097	-4.178	-3.512	-3.187
7	Z(t)	-2.625	-4.187	-3.516	-3.19
8	Z(t)	-2.837	-4.196	-3.52	-3.192
9	Z(t)	-2.45	-4.205	-3.524	-3.194
10	Z(t)	-2.856	-4.214	-3.528	-3.197
11	Z(t)	-1.995	-4.224	-3.532	-3.199
12	Z(t)	-1.621	-4.233	-3.536	-3.202
SC test result for Lag Length Selection = 2					
(Stata "varlag" procedure)					
EMBIG SPREADS					
1	Z(t)	-2.429	-4.146	-3.498	-3.179
2	Z(t)	-2.764	-4.148	-3.499	-3.179
3	Z(t)	-2.495	-4.15	-3.5	-3.18
4	Z(t)	-2.511	-4.159	-3.504	-3.182
5	Z(t)	-2.352	-4.168	-3.508	-3.185
6	Z(t)	-2.125	-4.178	-3.512	-3.187
7	Z(t)	-1.949	-4.187	-3.516	-3.19
8	Z(t)	-2.488	-4.196	-3.52	-3.192
9	Z(t)	-2.412	-4.205	-3.524	-3.194
10	Z(t)	-2.619	-4.214	-3.528	-3.197
11	Z(t)	-1.127	-4.224	-3.532	-3.199
12	Z(t)	-2.617	-4.233	-3.536	-3.202
SC test result for Lag Length Selection = 1					

ECUADOR

Augmented Dickey-Fuller for unit root		Number of obs = 45			
5 YEAR CDS SPREADS					
			Interpolated Dickey-Fuller		
		Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
lags					
1	Z(t)	-3.197	-4.196	-3.52	-3.192
2	Z(t)	-2.299	-4.205	-3.524	-3.194
3	Z(t)	-2.227	-4.214	-3.528	-3.197
4	Z(t)	-1.761	-4.224	-3.532	-3.199
5	Z(t)	-1.688	-4.233	-3.536	-3.202
6	Z(t)	-2.294	-4.242	-3.54	-3.204
7	Z(t)	-2.197	-4.251	-3.544	-3.206
8	Z(t)	-2.523	-4.26	-3.548	-3.209
9	Z(t)	-2.492	-4.27	-3.552	-3.211
10	Z(t)	-1.675	-4.279	-3.556	-3.214
11	Z(t)	-0.798	-4.288	-3.56	-3.216
12	Z(t)	-0.803	-4.297	-3.564	-3.218
SC test result for Lag Length Selection = 2					
(Stata "varlag" procedure)					
EMBIG SPREADS					
1	Z(t)	-2.821	-4.196	-3.52	-3.192
2	Z(t)	-2.708	-4.205	-3.524	-3.194
3	Z(t)	-2.461	-4.214	-3.528	-3.197
4	Z(t)	-2.254	-4.224	-3.532	-3.199
5	Z(t)	-1.927	-4.233	-3.536	-3.202
6	Z(t)	-2.358	-4.242	-3.54	-3.204
7	Z(t)	-2.265	-4.251	-3.544	-3.206
8	Z(t)	-2.104	-4.26	-3.548	-3.209
9	Z(t)	-1.51	-4.27	-3.552	-3.211
10	Z(t)	-1.116	-4.279	-3.556	-3.214
11	Z(t)	-0.689	-4.288	-3.56	-3.216
12	Z(t)	-1.156	-4.297	-3.564	-3.218
SC test result for Lag Length Selection = 1					

EGYPT

Augmentec Dickey-Full for unit root		Number of obs =	67	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-1.638	-4.113	-3.483	-3.17
2 Z(t)	-1.715	-4.115	-3.484	-3.17
3 Z(t)	-2.256	-4.117	-3.485	-3.171
4 Z(t)	-2.424	-4.119	-3.486	-3.172
5 Z(t)	-1.926	-4.121	-3.487	-3.172
6 Z(t)	-2.004	-4.124	-3.488	-3.173
7 Z(t)	-2.744	-4.126	-3.489	-3.173
8 Z(t)	-3.004	-4.128	-3.49	-3.174
9 Z(t)	-2.469	-4.13	-3.491	-3.175
10 Z(t)	-1.484	-4.132	-3.492	-3.175
11 Z(t)	-1.539	-4.135	-3.493	-3.176
12 Z(t)	-2.31	-4.137	-3.494	-3.176
SC test result for Lag Length Selection = 7				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-0.575	-4.113	-3.483	-3.17
2 Z(t)	-0.729	-4.115	-3.484	-3.17
3 Z(t)	-1.411	-4.117	-3.485	-3.171
4 Z(t)	-1.334	-4.119	-3.486	-3.172
5 Z(t)	-1.605	-4.121	-3.487	-3.172
6 Z(t)	-2.919	-4.124	-3.488	-3.173
7 Z(t)	-2.59	-4.126	-3.489	-3.173
8 Z(t)	-1.882	-4.128	-3.49	-3.174
9 Z(t)	-1.365	-4.13	-3.491	-3.175
10 Z(t)	-0.497	-4.132	-3.492	-3.175
11 Z(t)	-1.03	-4.135	-3.493	-3.176
12 Z(t)	-1.964	-4.137	-3.494	-3.176
SC test result for Lag Length Selection = 1				

ELSALVADOR

Augmentec Dickey-Full for unit root		Number of obs =	54	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-1.528	-4.141	-3.496	-3.178
2 Z(t)	-1.454	-4.143	-3.497	-3.178
3 Z(t)	-1.215	-4.146	-3.498	-3.179
4 Z(t)	-0.512	-4.148	-3.499	-3.179
5 Z(t)	0.26	-4.15	-3.5	-3.18
6 Z(t)	0.218	-4.159	-3.504	-3.182
7 Z(t)	-0.161	-4.168	-3.508	-3.185
8 Z(t)	0.311	-4.178	-3.512	-3.187
9 Z(t)	-0.32	-4.187	-3.516	-3.19
10 Z(t)	-0.166	-4.196	-3.52	-3.192
11 Z(t)	-0.027	-4.205	-3.524	-3.194
12 Z(t)	-0.066	-4.214	-3.528	-3.197
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-3.482	-4.141	-3.496	-3.178
2 Z(t)	-3.325	-4.143	-3.497	-3.178
3 Z(t)	-2.827	-4.146	-3.498	-3.179
4 Z(t)	-2.766	-4.148	-3.499	-3.179
5 Z(t)	-3.191	-4.15	-3.5	-3.18
6 Z(t)	-3.143	-4.159	-3.504	-3.182
7 Z(t)	-3.127	-4.168	-3.508	-3.185
8 Z(t)	-3.249	-4.178	-3.512	-3.187
9 Z(t)	-3.656	-4.187	-3.516	-3.19
10 Z(t)	-3.027	-4.196	-3.52	-3.192
11 Z(t)	-2.684	-4.205	-3.524	-3.194
12 Z(t)	-2.34	-4.214	-3.528	-3.197
SC test result for Lag Length Selection = 1				

HUNGARY

Augmentec Dickey-Full for unit root		Number of obs =	79	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.116	-4.091	-3.473	-3.164
2 Z(t)	-1.932	-4.095	-3.475	-3.165
3 Z(t)	-2.342	-4.099	-3.477	-3.166
4 Z(t)	-1.931	-4.104	-3.479	-3.167
5 Z(t)	-2.186	-4.108	-3.481	-3.169
6 Z(t)	-2.404	-4.113	-3.483	-3.17
7 Z(t)	-2.227	-4.117	-3.485	-3.171
8 Z(t)	-2.524	-4.121	-3.487	-3.172
9 Z(t)	-1.791	-4.126	-3.489	-3.173
10 Z(t)	-1.698	-4.13	-3.491	-3.175
11 Z(t)	-1.652	-4.132	-3.492	-3.175
12 Z(t)	-1.559	-4.135	-3.493	-3.176
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-2.341	-4.084	-3.47	-3.162
2 Z(t)	-2.095	-4.086	-3.471	-3.163
3 Z(t)	-1.799	-4.088	-3.472	-3.163
4 Z(t)	-1.954	-4.091	-3.473	-3.164
5 Z(t)	-1.644	-4.093	-3.474	-3.164
6 Z(t)	-1.412	-4.095	-3.475	-3.165
7 Z(t)	-1.013	-4.097	-3.476	-3.166
8 Z(t)	-1.125	-4.099	-3.477	-3.166
9 Z(t)	-1.42	-4.102	-3.478	-3.167
10 Z(t)	-2.059	-4.104	-3.479	-3.167
11 Z(t)	-2.084	-4.106	-3.48	-3.168
12 Z(t)	-2.504	-4.108	-3.481	-3.169
SC test result for Lag Length Selection = 1				

KOREA

Augmentec Dickey-Full for unit root		Number of obs =	35	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.629	-4.288	-3.56	-3.216
2 Z(t)	-2.156	-4.297	-3.564	-3.218
3 Z(t)	-1.813	-4.306	-3.568	-3.221
4 Z(t)	-1.84	-4.316	-3.572	-3.223
5 Z(t)	-1.74	-4.325	-3.576	-3.226
6 Z(t)	-2.936	-4.334	-3.58	-3.228
7 Z(t)	-2.428	-4.343	-3.584	-3.23
8 Z(t)	-2.456	-4.352	-3.588	-3.233
9 Z(t)	-2.386	-4.362	-3.592	-3.235
10 Z(t)	-2.795	-4.371	-3.596	-3.238
11 Z(t)	-2.48	-4.38	-3.6	-3.24
12 Z(t)	-2.278	-4.38	-3.6	-3.24
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-2.674	-4.288	-3.56	-3.216
2 Z(t)	-1.735	-4.297	-3.564	-3.218
3 Z(t)	-1.926	-4.306	-3.568	-3.221
4 Z(t)	-1.602	-4.316	-3.572	-3.223
5 Z(t)	-1.532	-4.325	-3.576	-3.226
6 Z(t)	-2.169	-4.334	-3.58	-3.228
7 Z(t)	-2.983	-4.343	-3.584	-3.23
8 Z(t)	-3.213	-4.352	-3.588	-3.233
9 Z(t)	-2.417	-4.362	-3.592	-3.235
10 Z(t)	-2.709	-4.371	-3.596	-3.238
11 Z(t)	-2.165	-4.38	-3.6	-3.24
12 Z(t)	-1.427	-4.38	-3.6	-3.24
SC test result for Lag Length Selection = 1				

LEBANON

Augmentec Dickey-Full for unit root		Number of obs =	55	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.697	-4.139	-3.495	-3.177
2 Z(t)	-2.638	-4.141	-3.496	-3.178
3 Z(t)	-1.959	-4.143	-3.497	-3.178
4 Z(t)	-1.485	-4.146	-3.498	-3.179
5 Z(t)	-1.666	-4.148	-3.499	-3.179
6 Z(t)	-1.804	-4.15	-3.5	-3.18
7 Z(t)	-1.457	-4.159	-3.504	-3.182
8 Z(t)	-1.63	-4.168	-3.508	-3.185
9 Z(t)	-1.332	-4.178	-3.512	-3.187
10 Z(t)	-0.91	-4.187	-3.516	-3.19
11 Z(t)	-0.828	-4.196	-3.52	-3.192
12 Z(t)	-0.663	-4.205	-3.524	-3.194
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-1.289	-4.139	-3.495	-3.177
2 Z(t)	-0.921	-4.141	-3.496	-3.178
3 Z(t)	-0.903	-4.143	-3.497	-3.178
4 Z(t)	-0.674	-4.146	-3.498	-3.179
5 Z(t)	-0.884	-4.148	-3.499	-3.179
6 Z(t)	-1.113	-4.15	-3.5	-3.18
7 Z(t)	-0.858	-4.159	-3.504	-3.182
8 Z(t)	-0.475	-4.168	-3.508	-3.185
9 Z(t)	-0.479	-4.178	-3.512	-3.187
10 Z(t)	-0.304	-4.187	-3.516	-3.19
11 Z(t)	-0.053	-4.196	-3.52	-3.192
12 Z(t)	0.136	-4.205	-3.524	-3.194
SC test result for Lag Length Selection = 1				

MALAYSIA

Augmentec Dickey-Full for unit root		Number of obs =	78	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.024	-4.088	-3.472	-3.163
2 Z(t)	-1.276	-4.091	-3.473	-3.164
3 Z(t)	-1.529	-4.093	-3.474	-3.164
4 Z(t)	-1.216	-4.095	-3.475	-3.165
5 Z(t)	-2.737	-4.097	-3.476	-3.166
6 Z(t)	-1.754	-4.099	-3.477	-3.166
7 Z(t)	-0.993	-4.102	-3.478	-3.167
8 Z(t)	-0.679	-4.104	-3.479	-3.167
9 Z(t)	-0.867	-4.106	-3.48	-3.168
10 Z(t)	-0.823	-4.108	-3.481	-3.169
11 Z(t)	-0.626	-4.11	-3.482	-3.169
12 Z(t)	-0.583	-4.113	-3.483	-3.17
SC test result for Lag Length Selection = 3				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-1.645	-4.088	-3.472	-3.163
2 Z(t)	-1.298	-4.091	-3.473	-3.164
3 Z(t)	-1.873	-4.093	-3.474	-3.164
4 Z(t)	-1.188	-4.095	-3.475	-3.165
5 Z(t)	-2.786	-4.097	-3.476	-3.166
6 Z(t)	-2.279	-4.099	-3.477	-3.166
7 Z(t)	-0.859	-4.102	-3.478	-3.167
8 Z(t)	-0.222	-4.104	-3.479	-3.16
9 Z(t)	-0.46	-4.106	-3.48	-3.168
10 Z(t)	-0.326	-4.108	-3.481	-3.169
11 Z(t)	0.862	-4.11	-3.482	-3.169
12 Z(t)	0.585	-4.113	-3.483	-3.17
SC test result for Lag Length Selection = 1				

MEXICO

Augmentec Dickey-Full for unit root		Number of obs =	81	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-3.156	-4.082	-3.469	-3.161
2 Z(t)	-3.555	-4.084	-3.47	-3.162
3 Z(t)	-3.012	-4.086	-3.471	-3.163
4 Z(t)	-2.987	-4.088	-3.472	-3.163
5 Z(t)	-2.948	-4.091	-3.473	-3.164
6 Z(t)	-2.81	-4.093	-3.474	-3.164
7 Z(t)	-2.421	-4.095	-3.475	-3.165
8 Z(t)	-1.737	-4.097	-3.476	-3.166
9 Z(t)	-1.616	-4.099	-3.477	-3.166
10 Z(t)	-1.978	-4.102	-3.478	-3.167
11 Z(t)	-2.217	-4.104	-3.479	-3.167
12 Z(t)	-2.373	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-3.233	-4.082	-3.469	-3.161
2 Z(t)	-3.355	-4.084	-3.47	-3.162
3 Z(t)	-3.048	-4.086	-3.471	-3.163
4 Z(t)	-2.283	-4.088	-3.472	-3.163
5 Z(t)	-2.439	-4.091	-3.473	-3.164
6 Z(t)	-2.302	-4.093	-3.474	-3.164
7 Z(t)	-1.765	-4.095	-3.475	-3.165
8 Z(t)	-1.823	-4.097	-3.476	-3.166
9 Z(t)	-1.592	-4.099	-3.477	-3.166
10 Z(t)	-1.295	-4.102	-3.478	-3.167
11 Z(t)	-1.148	-4.104	-3.479	-3.167
12 Z(t)	-1.65	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 1				

MOROCCO

Augmentec Dickey-Full for unit root		Number of obs =	66	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.159	-4.115	-3.484	-3.17
2 Z(t)	-2.327	-4.117	-3.485	-3.171
3 Z(t)	-2.501	-4.119	-3.486	-3.172
4 Z(t)	-2.877	-4.121	-3.487	-3.172
5 Z(t)	-3.323	-4.124	-3.488	-3.173
6 Z(t)	-1.533	-4.126	-3.489	-3.173
7 Z(t)	-1.172	-4.128	-3.49	-3.174
8 Z(t)	-1.235	-4.13	-3.491	-3.175
9 Z(t)	-1.484	-4.132	-3.492	-3.175
10 Z(t)	-2.038	-4.135	-3.493	-3.176
11 Z(t)	-2.167	-4.137	-3.494	-3.176
12 Z(t)	-3.727	-4.139	-3.495	-3.177
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-3.234	-4.115	-3.484	-3.17
2 Z(t)	-3.113	-4.117	-3.485	-3.171
3 Z(t)	-3.038	-4.119	-3.486	-3.172
4 Z(t)	-2.456	-4.121	-3.487	-3.172
5 Z(t)	-1.899	-4.124	-3.488	-3.173
6 Z(t)	-1.601	-4.126	-3.489	-3.173
7 Z(t)	-1.509	-4.128	-3.49	-3.174
8 Z(t)	-1.4	-4.13	-3.491	-3.175
9 Z(t)	-1.546	-4.132	-3.492	-3.175
10 Z(t)	-1.791	-4.135	-3.493	-3.176
11 Z(t)	-1.706	-4.137	-3.494	-3.176
12 Z(t)	-1.759	-4.139	-3.495	-3.177
SC test result for Lag Length Selection = 1				

PAKISTAN

Augmented Dickey-Full for unit root			Number of obs =	40
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-0.913	-4.242	-3.54	-3.204
2 Z(t)	0.025	-4.251	-3.544	-3.206
3 Z(t)	1.128	-4.26	-3.548	-3.209
4 Z(t)	-0.601	-4.27	-3.552	-3.211
5 Z(t)	-0.644	-4.279	-3.556	-3.214
6 Z(t)	-0.103	-4.288	-3.56	-3.216
7 Z(t)	-0.139	-4.297	-3.564	-3.218
8 Z(t)	0.497	-4.306	-3.568	-3.221
9 Z(t)	0.891	-4.316	-3.572	-3.223
10 Z(t)	0.943	-4.325	-3.576	-3.226
11 Z(t)	0.914	-4.334	-3.58	-3.228
12 Z(t)	1.54	-4.343	-3.584	-3.23
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-1.171	-4.242	-3.54	-3.204
2 Z(t)	-0.906	-4.251	-3.544	-3.206
3 Z(t)	0.416	-4.26	-3.548	-3.209
4 Z(t)	-0.601	-4.27	-3.552	-3.211
5 Z(t)	-0.885	-4.279	-3.556	-3.214
6 Z(t)	-0.766	-4.288	-3.56	-3.216
7 Z(t)	-0.358	-4.297	-3.564	-3.218
8 Z(t)	-0.299	-4.306	-3.568	-3.221
9 Z(t)	-0.311	-4.316	-3.572	-3.223
10 Z(t)	-0.686	-4.325	-3.576	-3.226
11 Z(t)	-0.443	-4.334	-3.58	-3.228
12 Z(t)	-1.623	-4.343	-3.584	-3.23
SC test result for Lag Length Selection = 1				

PANAMA

Augmented Dickey-Full for unit root			Number of obs =	68
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-3.504	-4.11	-3.482	-3.169
2 Z(t)	-4.286	-4.113	-3.483	-3.17
3 Z(t)	-3.888	-4.115	-3.484	-3.17
4 Z(t)	-3.516	-4.117	-3.485	-3.171
5 Z(t)	-1.826	-4.119	-3.486	-3.172
6 Z(t)	-2.392	-4.121	-3.487	-3.172
7 Z(t)	-1.963	-4.124	-3.488	-3.173
8 Z(t)	-2.528	-4.126	-3.489	-3.173
9 Z(t)	-1.832	-4.128	-3.49	-3.174
10 Z(t)	-1.668	-4.13	-3.491	-3.175
11 Z(t)	-1.383	-4.132	-3.492	-3.175
12 Z(t)	-1.475	-4.135	-3.493	-3.176
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-3.733	-4.11	-3.482	-3.169
2 Z(t)	-4.464	-4.113	-3.483	-3.17
3 Z(t)	-4.835	-4.115	-3.484	-3.17
4 Z(t)	-2.935	-4.117	-3.485	-3.171
5 Z(t)	-2.401	-4.119	-3.486	-3.172
6 Z(t)	-2.189	-4.121	-3.487	-3.172
7 Z(t)	-2.065	-4.124	-3.488	-3.173
8 Z(t)	-1.966	-4.126	-3.489	-3.173
9 Z(t)	-2.554	-4.128	-3.49	-3.174
10 Z(t)	-2.003	-4.13	-3.491	-3.175
11 Z(t)	-1.83	-4.132	-3.492	-3.175
12 Z(t)	-1.638	-4.135	-3.493	-3.176
SC test result for Lag Length Selection = 2				

PERU

Augmented Dickey-Full for unit root			Number of obs =	68
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-3.277	-4.11	-3.482	-3.169
2 Z(t)	-4.307	-4.113	-3.483	-3.17
3 Z(t)	-4.461	-4.115	-3.484	-3.17
4 Z(t)	-3.485	-4.117	-3.485	-3.171
5 Z(t)	-2.238	-4.119	-3.486	-3.172
6 Z(t)	-2.562	-4.121	-3.487	-3.172
7 Z(t)	-2.027	-4.124	-3.488	-3.173
8 Z(t)	-1.622	-4.126	-3.489	-3.173
9 Z(t)	-1.817	-4.128	-3.49	-3.174
10 Z(t)	-2.077	-4.13	-3.491	-3.175
11 Z(t)	-3.194	-4.132	-3.492	-3.175
12 Z(t)	-2.77	-4.135	-3.493	-3.176
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-3.17	-4.11	-3.482	-3.169
2 Z(t)	-3.655	-4.113	-3.483	-3.17
3 Z(t)	-3.67	-4.115	-3.484	-3.17
4 Z(t)	-2.711	-4.117	-3.485	-3.171
5 Z(t)	-3.19	-4.119	-3.486	-3.172
6 Z(t)	-3.184	-4.121	-3.487	-3.172
7 Z(t)	-3.21	-4.124	-3.488	-3.173
8 Z(t)	-2.426	-4.126	-3.489	-3.173
9 Z(t)	-1.844	-4.128	-3.49	-3.174
10 Z(t)	-1.745	-4.13	-3.491	-3.175
11 Z(t)	-2.937	-4.132	-3.492	-3.175
12 Z(t)	-3.732	-4.135	-3.493	-3.176
SC test result for Lag Length Selection = 1				

PHILIPPINES

Augmented Dickey-Full for unit root			Number of obs =	79
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.315	-4.086	-3.471	-3.163
2 Z(t)	-2.29	-4.088	-3.472	-3.163
3 Z(t)	-2.524	-4.091	-3.473	-3.164
4 Z(t)	-2.273	-4.093	-3.474	-3.164
5 Z(t)	-2.11	-4.095	-3.475	-3.165
6 Z(t)	-1.885	-4.097	-3.476	-3.166
7 Z(t)	-1.453	-4.099	-3.477	-3.166
8 Z(t)	-1.685	-4.102	-3.478	-3.167
9 Z(t)	-1.659	-4.104	-3.479	-3.167
10 Z(t)	-1.444	-4.106	-3.48	-3.168
11 Z(t)	-1.87	-4.108	-3.481	-3.169
12 Z(t)	-1.818	-4.11	-3.482	-3.169
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
1 Z(t)	-2.761	-4.086	-3.471	-3.163
2 Z(t)	-2.574	-4.088	-3.472	-3.163
3 Z(t)	-2.899	-4.091	-3.473	-3.164
4 Z(t)	-2.502	-4.093	-3.474	-3.164
5 Z(t)	-2.424	-4.095	-3.475	-3.165
6 Z(t)	-2.537	-4.097	-3.476	-3.166
7 Z(t)	-2.085	-4.099	-3.477	-3.166
8 Z(t)	-1.901	-4.102	-3.478	-3.167
9 Z(t)	-1.861	-4.104	-3.479	-3.167
10 Z(t)	-1.763	-4.106	-3.48	-3.168
11 Z(t)	-2.072	-4.108	-3.481	-3.169
12 Z(t)	-2.137	-4.11	-3.482	-3.169
SC test result for Lag Length Selection = 1				

POLAND

Augmented Dickey-Full for unit root			Number of obs =	81
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.744	-4.082	-3.469	-3.161
2 Z(t)	-2.878	-4.084	-3.47	-3.162
3 Z(t)	-3.166	-4.086	-3.471	-3.163
4 Z(t)	-2.669	-4.088	-3.472	-3.163
5 Z(t)	-2.375	-4.091	-3.473	-3.164
6 Z(t)	-2.037	-4.093	-3.474	-3.164
7 Z(t)	-2.459	-4.095	-3.475	-3.165
8 Z(t)	-1.853	-4.097	-3.476	-3.166
9 Z(t)	-1.915	-4.099	-3.477	-3.166
10 Z(t)	-1.839	-4.102	-3.478	-3.167
11 Z(t)	-2.101	-4.104	-3.479	-3.167
12 Z(t)	-2.06	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 5				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-2.254	-4.082	-3.469	-3.161
2 Z(t)	-2.007	-4.084	-3.47	-3.162
3 Z(t)	-2.279	-4.086	-3.471	-3.163
4 Z(t)	-1.186	-4.088	-3.472	-3.163
5 Z(t)	-1.124	-4.091	-3.473	-3.164
6 Z(t)	-0.951	-4.093	-3.474	-3.164
7 Z(t)	-1.185	-4.095	-3.475	-3.165
8 Z(t)	-1.24	-4.097	-3.476	-3.166
9 Z(t)	-1.135	-4.099	-3.477	-3.166
10 Z(t)	-0.871	-4.102	-3.478	-3.167
11 Z(t)	-1.257	-4.104	-3.479	-3.167
12 Z(t)	-1.169	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 1				

RUSSIA

Augmented Dickey-Full for unit root			Number of obs =	73
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-4.1	-4.099	-3.477	-3.166
2 Z(t)	-3.075	-4.102	-3.478	-3.167
3 Z(t)	-2.724	-4.104	-3.479	-3.167
4 Z(t)	-1.752	-4.106	-3.48	-3.168
5 Z(t)	-1.289	-4.108	-3.481	-3.169
6 Z(t)	-1.176	-4.11	-3.482	-3.169
7 Z(t)	-0.116	-4.113	-3.483	-3.17
8 Z(t)	0.169	-4.115	-3.484	-3.17
9 Z(t)	-0.749	-4.117	-3.485	-3.171
10 Z(t)	-1.924	-4.119	-3.486	-3.172
11 Z(t)	-1.925	-4.121	-3.487	-3.172
12 Z(t)	-2.623	-4.124	-3.488	-3.173
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-4.678	-4.099	-3.477	-3.166
2 Z(t)	-2.587	-4.102	-3.478	-3.167
3 Z(t)	-2.054	-4.104	-3.479	-3.167
4 Z(t)	-1.689	-4.106	-3.48	-3.168
5 Z(t)	-1.476	-4.108	-3.481	-3.169
6 Z(t)	-0.812	-4.11	-3.482	-3.169
7 Z(t)	-0.651	-4.113	-3.483	-3.17
8 Z(t)	-0.425	-4.115	-3.484	-3.17
9 Z(t)	-0.846	-4.117	-3.485	-3.171
10 Z(t)	-1.746	-4.119	-3.486	-3.172
11 Z(t)	-1.963	-4.121	-3.487	-3.172
12 Z(t)	-3.217	-4.124	-3.488	-3.173
SC test result for Lag Length Selection = 1				

SOUTH AFRICA

Augmented Dickey-Full for unit root			Number of obs =	81
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.48	-4.082	-3.469	-3.161
2 Z(t)	-2.593	-4.084	-3.47	-3.162
3 Z(t)	-2.518	-4.086	-3.471	-3.163
4 Z(t)	-1.908	-4.088	-3.472	-3.163
5 Z(t)	-2.257	-4.091	-3.473	-3.164
6 Z(t)	-1.923	-4.093	-3.474	-3.164
7 Z(t)	-1.941	-4.095	-3.475	-3.165
8 Z(t)	-1.785	-4.097	-3.476	-3.166
9 Z(t)	-1.71	-4.099	-3.477	-3.166
10 Z(t)	-2.441	-4.102	-3.478	-3.167
11 Z(t)	-1.507	-4.104	-3.479	-3.167
12 Z(t)	-1.654	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-1.364	-4.082	-3.469	-3.161
2 Z(t)	-1.419	-4.084	-3.47	-3.162
3 Z(t)	-1.547	-4.086	-3.471	-3.163
4 Z(t)	-0.656	-4.088	-3.472	-3.163
5 Z(t)	-0.11	-4.091	-3.473	-3.164
6 Z(t)	-0.101	-4.093	-3.474	-3.164
7 Z(t)	0.021	-4.095	-3.475	-3.165
8 Z(t)	0.371	-4.097	-3.476	-3.166
9 Z(t)	0.289	-4.099	-3.477	-3.166
10 Z(t)	0.253	-4.102	-3.478	-3.167
11 Z(t)	0.233	-4.104	-3.479	-3.167
12 Z(t)	-0.161	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 1				

THAILAND

Augmented Dickey-Full for unit root			Number of obs =	59
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.028	-4.13	-3.491	-3.175
2 Z(t)	-1.738	-4.132	-3.492	-3.175
3 Z(t)	-1.937	-4.135	-3.493	-3.176
4 Z(t)	-2.205	-4.137	-3.494	-3.176
5 Z(t)	-1.949	-4.139	-3.495	-3.177
6 Z(t)	-1.903	-4.141	-3.496	-3.178
7 Z(t)	-1.115	-4.143	-3.497	-3.178
8 Z(t)	-1.242	-4.146	-3.498	-3.179
9 Z(t)	-0.889	-4.148	-3.499	-3.179
10 Z(t)	-0.808	-4.15	-3.5	-3.18
11 Z(t)	-0.781	-4.159	-3.504	-3.182
12 Z(t)	-0.271	-4.168	-3.508	-3.185
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-2.604	-4.13	-3.491	-3.175
2 Z(t)	-2.451	-4.132	-3.492	-3.175
3 Z(t)	-2.732	-4.135	-3.493	-3.176
4 Z(t)	-2.786	-4.137	-3.494	-3.176
5 Z(t)	-4.559	-4.139	-3.495	-3.177
6 Z(t)	-3.778	-4.141	-3.496	-3.178
7 Z(t)	-3.971	-4.143	-3.497	-3.178
8 Z(t)	-3.541	-4.146	-3.498	-3.179
9 Z(t)	-4.144	-4.148	-3.499	-3.179
10 Z(t)	-4.081	-4.15	-3.5	-3.18
11 Z(t)	-3.812	-4.159	-3.504	-3.182
12 Z(t)	-3.12	-4.168	-3.508	-3.185
SC test result for Lag Length Selection = 1				

TUNISIA

Augmented Dickey-Full for unit root		Number of obs =	24	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.096	-4.38	-3.6	-3.24
2 Z(t)	-2.119	-4.38	-3.6	-3.24
3 Z(t)	-2.259	-4.38	-3.6	-3.24
4 Z(t)	-2.936	-4.38	-3.6	-3.24
5 Z(t)	-3.809	-4.38	-3.6	-3.24
6 Z(t)	-2.599	-4.38	-3.6	-3.24
7 Z(t)	-2.244	-4.38	-3.6	-3.24
8 Z(t)	-1.451	-4.38	-3.6	-3.24
9 Z(t)	-1.052	-4.38	-3.6	-3.24
10 Z(t)	-2.177	-4.38	-3.6	-3.24
11 Z(t)				
12 Z(t)				
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-1.124	-4.38	-3.6	-3.24
2 Z(t)	-0.569	-4.38	-3.6	-3.24
3 Z(t)	-0.926	-4.38	-3.6	-3.24
4 Z(t)	-1.567	-4.38	-3.6	-3.24
5 Z(t)	-1.919	-4.38	-3.6	-3.24
6 Z(t)	-1.434	-4.38	-3.6	-3.24
7 Z(t)	-1.205	-4.38	-3.6	-3.24
8 Z(t)	-0.168	-4.38	-3.6	-3.24
9 Z(t)	-0.406	-4.38	-3.6	-3.24
10 Z(t)	-0.752	-4.38	-3.6	-3.24
11 Z(t)				
12 Z(t)				
SC test result for Lag Length Selection = 1				

TURKEY

Augmented Dickey-Full for unit root		Number of obs =	81	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-3.165	-4.082	-3.469	-3.161
2 Z(t)	-3.091	-4.084	-3.47	-3.162
3 Z(t)	-3.237	-4.086	-3.471	-3.163
4 Z(t)	-3.022	-4.088	-3.472	-3.163
5 Z(t)	-2.521	-4.091	-3.473	-3.164
6 Z(t)	-2.061	-4.093	-3.474	-3.164
7 Z(t)	-1.984	-4.095	-3.475	-3.165
8 Z(t)	-1.683	-4.097	-3.476	-3.166
9 Z(t)	-1.702	-4.099	-3.477	-3.166
10 Z(t)	-1.598	-4.102	-3.478	-3.167
11 Z(t)	-1.867	-4.104	-3.479	-3.167
12 Z(t)	-2.272	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-3.029	-4.082	-3.469	-3.161
2 Z(t)	-2.611	-4.084	-3.47	-3.162
3 Z(t)	-3.069	-4.086	-3.471	-3.163
4 Z(t)	-2.411	-4.088	-3.472	-3.163
5 Z(t)	-2.186	-4.091	-3.473	-3.164
6 Z(t)	-1.97	-4.093	-3.474	-3.164
7 Z(t)	-1.565	-4.095	-3.475	-3.165
8 Z(t)	-1.48	-4.097	-3.476	-3.166
9 Z(t)	-1.275	-4.099	-3.477	-3.166
10 Z(t)	-0.921	-4.102	-3.478	-3.167
11 Z(t)	-1.189	-4.104	-3.479	-3.167
12 Z(t)	-1.409	-4.106	-3.48	-3.168
SC test result for Lag Length Selection = 1				

UKRAINE

Augmented Dickey-Full for unit root		Number of obs =	51	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fu	10% Critical	
	Test	1% Critical	5% Critical	
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.615	-4.148	-3.499	-3.179
2 Z(t)	-2.723	-4.15	-3.5	-3.18
3 Z(t)	-2.266	-4.159	-3.504	-3.182
4 Z(t)	-3.215	-4.168	-3.508	-3.185
5 Z(t)	-1.618	-4.178	-3.512	-3.187
6 Z(t)	-1.41	-4.187	-3.516	-3.19
7 Z(t)	-1.233	-4.196	-3.52	-3.192
8 Z(t)	-1.004	-4.205	-3.524	-3.194
9 Z(t)	-1.125	-4.214	-3.528	-3.197
10 Z(t)	-1.122	-4.224	-3.532	-3.199
11 Z(t)	-0.959	-4.233	-3.536	-3.202
12 Z(t)	-1.277	-4.242	-3.54	-3.204
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-1.086	-4.148	-3.499	-3.179
2 Z(t)	-1.001	-4.15	-3.5	-3.18
3 Z(t)	-0.431	-4.159	-3.504	-3.182
4 Z(t)	-0.701	-4.168	-3.508	-3.185
5 Z(t)	-1.301	-4.178	-3.512	-3.187
6 Z(t)	-1.01	-4.187	-3.516	-3.19
7 Z(t)	-0.933	-4.196	-3.52	-3.192
8 Z(t)	-0.802	-4.205	-3.524	-3.194
9 Z(t)	-0.735	-4.214	-3.528	-3.197
10 Z(t)	-0.626	-4.224	-3.532	-3.199
11 Z(t)	-0.03	-4.233	-3.536	-3.202
12 Z(t)	0.236	-4.242	-3.54	-3.204
SC test result for Lag Length Selection = 1				

URUGUAY

Augmented Dickey-Full for unit root		Number of obs =	33	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-1.437	-4.306	-3.568	-3.221
2 Z(t)	-1.249	-4.316	-3.572	-3.223
3 Z(t)	-1.757	-4.325	-3.576	-3.226
4 Z(t)	-1.592	-4.334	-3.58	-3.228
5 Z(t)	-0.975	-4.343	-3.584	-3.23
6 Z(t)	-0.977	-4.352	-3.588	-3.233
7 Z(t)	-1.532	-4.362	-3.592	-3.235
8 Z(t)	-1.813	-4.371	-3.596	-3.238
9 Z(t)	-1.473	-4.38	-3.6	-3.24
10 Z(t)	-1.751	-4.38	-3.6	-3.24
11 Z(t)	-1.729	-4.38	-3.6	-3.24
12 Z(t)	-1.238	-4.38	-3.6	-3.24
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-2.084	-4.306	-3.568	-3.221
2 Z(t)	-1.23	-4.316	-3.572	-3.223
3 Z(t)	-1.086	-4.325	-3.576	-3.226
4 Z(t)	-1.176	-4.334	-3.58	-3.228
5 Z(t)	-1.366	-4.343	-3.584	-3.23
6 Z(t)	-0.998	-4.352	-3.588	-3.233
7 Z(t)	-1.592	-4.362	-3.592	-3.235
8 Z(t)	-0.714	-4.371	-3.596	-3.238
9 Z(t)	-1.117	-4.38	-3.6	-3.24
10 Z(t)	-1.089	-4.38	-3.6	-3.24
11 Z(t)	-1.077	-4.38	-3.6	-3.24
12 Z(t)	0.751	-4.38	-3.6	-3.24
SC test result for Lag Length Selection = 1				

VENEZUELA

Augmented Dickey-Full for unit root		Number of obs =	80	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-2.687	-4.084	-3.47	-3.162
2 Z(t)	-2.431	-4.086	-3.471	-3.163
3 Z(t)	-2.62	-4.088	-3.472	-3.163
4 Z(t)	-2.172	-4.091	-3.473	-3.164
5 Z(t)	-2.092	-4.093	-3.474	-3.164
6 Z(t)	-2.306	-4.095	-3.475	-3.165
7 Z(t)	-2.042	-4.097	-3.476	-3.166
8 Z(t)	-2.265	-4.099	-3.477	-3.166
9 Z(t)	-1.931	-4.102	-3.478	-3.167
10 Z(t)	-1.17	-4.104	-3.479	-3.167
11 Z(t)	-0.774	-4.106	-3.48	-3.168
12 Z(t)	-1.237	-4.108	-3.481	-3.169
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-1.981	-4.084	-3.47	-3.162
2 Z(t)	-1.917	-4.086	-3.471	-3.163
3 Z(t)	-1.95	-4.088	-3.472	-3.163
4 Z(t)	-1.475	-4.091	-3.473	-3.164
5 Z(t)	-1.394	-4.093	-3.474	-3.164
6 Z(t)	-1.717	-4.095	-3.475	-3.165
7 Z(t)	-1.327	-4.097	-3.476	-3.166
8 Z(t)	-1.581	-4.099	-3.477	-3.166
9 Z(t)	-1.286	-4.102	-3.478	-3.167
10 Z(t)	-0.716	-4.104	-3.479	-3.167
11 Z(t)	-0.266	-4.106	-3.48	-3.168
12 Z(t)	-0.997	-4.108	-3.481	-3.169
SC test result for Lag Length Selection = 1				

VIETNAM

Augmented Dickey-Full for unit root		Number of obs =	23	
5 YEAR CDS SPREADS				
		Interpolated Dickey-Fuller		
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
lags				
1 Z(t)	-1.678	-4.38	-3.6	-3.24
2 Z(t)	-1.051	-4.38	-3.6	-3.24
3 Z(t)	-0.631	-4.38	-3.6	-3.24
4 Z(t)	0.431	-4.38	-3.6	-3.24
5 Z(t)	0.616	-4.38	-3.6	-3.24
6 Z(t)	0.618	-4.38	-3.6	-3.24
7 Z(t)	0.266	-4.38	-3.6	-3.24
8 Z(t)	-0.039	-4.38	-3.6	-3.24
9 Z(t)	-0.315	-4.38	-3.6	-3.24
10 Z(t)	-0.167	-4.38	-3.6	-3.24
11 Z(t)				
12 Z(t)				
SC test result for Lag Length Selection = 1				
(Stata "varlag" procedure)				
EMBIG SPREADS				
1 Z(t)	-1.464	-4.38	-3.6	-3.24
2 Z(t)	0.021	-4.38	-3.6	-3.24
3 Z(t)	0.526	-4.38	-3.6	-3.24
4 Z(t)	0.61	-4.38	-3.6	-3.24
5 Z(t)	-0.066	-4.38	-3.6	-3.24
6 Z(t)	0.086	-4.38	-3.6	-3.24
7 Z(t)	0.05	-4.38	-3.6	-3.24
8 Z(t)	0.624	-4.38	-3.6	-3.24
9 Z(t)	1.019	-4.38	-3.6	-3.24
10 Z(t)	-1.561	-4.38	-3.6	-3.24
11 Z(t)				
12 Z(t)				
SC test result for Lag Length Selection = 1				