Credit Default Swap Spreads and Sovereign Ratings

Ivan M. Rodriguez, Jr.

Abstract

This research memo examines the relation between sovereign debt ratings and credit default swap spreads. We find that the information contained in the average credit default swap spread over the last two years is a major determinant in explaining the rating agencies' factor weightings. Through the combined use of univariate and multivariate cross-sectional OLS regressions from 2005 to 20012, we find that over time, the power of the spread to single-handedly determine sovereign ratings has fallen due to reverberations from financial crisis which lead to the euro-zone crisis.

What factors affect sovereign debt ratings? Packer and Cantor (1996) found six macroeconomic variables that explain an overwhelming amount of the various agencies ratings. Maltritz and Molchanov (2013) applied Bayesian model averaging which over 30 macroeconomic and political variables in explaing rating returns. Their results match with Packer and Cantor in that some macroeconomic variables were found to be important while finding that political variables have very low influence. However, there does not seem to be literature linking credit default swap spreads as an explaining variable to ratings.

Intuitively, it appears that credit default swaps (which can be loosely thought of as insurance against sovereign default) should contain information about the "pricing" of a countries debt. This paper explores the empirical linkage between these two variables, albeit at a rather limited scope. Firstly, we replicate the regression function used by Packer and Cantor (1996). The variables they include in their multivariate OLS regression can be see in table 1. The results of the replication can be found in table 2.

When I compare our results to Cantor and Packers, it seems to confirm the importance of the variables. However, our R^2 is signigicantly lower. It may be that changes in rating methodologies may have taken place. There have been great advances in computation and newer statistical and economic measures have been introduced over the last twenty years. These changes seem to have affected the forecasting ability of their economic variables. Maybe a new variable may capture more information than the previous macroeconomic factors did.

I test the CDS spread's explanatory power in two ways. Firstly, run a univariate OLS regression and see what kind of effect our average two year spread will have on ratings. Secondly, I add the addional eight macroeconomic variables as a control to see if the CDS spread is still significant. I do this crossectional regression from 2008 to 2012 for both tests. Please see tables 3 and 4 on the presentation for full results. Only the most recent results appear in this memo.

The tests show that the CDS spread has remarkable explanatory power, and that over time, the explanatory power has decreased slightly due to the turbulent macroeconomic environment over the last 8 years.

1 Packer and Cantor Variable Table

Table 1: Variables used by Cantor and Packer (1996).

Variable	Unit	$\mathbb{E}(Sign)$	Definition
GNI	\$	+	Per capita income at $t-1$
GDP growth	%	+	Average GDP growth from $t-1$ to $t-4$
Inflation	%	-	Average inflation from $t-1$ to $t-3$
Fiscal Balance	%	+	Average fiscal balance relative to GDP from $t-1$ to $t-3$
External Balance	%	+	Average current account surplus realtive to GDP $t-1$ to $t-3$
External Debt	%	-	Foreign currency debt relative exports at $t-1$
Development Indicator	1/0	+	IMF classification at t
Default Indicator	1/0	-	Default in the last 25 years

2 Replication Results

```
## Using rating as value column: use value.var to override.
```

```
##
## Replication
## ========================================================================
##                                        Dependent variable:
##                                 -------------------------------------
##                                              rating
##                                 Moody's     S&P      Diff      Avg
##                                   (1)       (2)      (3)       (4)
## ------------------------------------------------------------------------
## log(GNI_cap)                   3.262*** 2.955***   0.307   3.109***
##                                (1.014)   (0.890)  (0.352)   (0.938)
##
## GDP_grw                         0.340    0.440**   -0.100   0.390*
##                                (0.234)   (0.205)  (0.081)   (0.216)
##
## log(inf)                        -1.557   -2.046*   0.488    -1.802
##                                (1.211)   (1.063)  (0.421)   (1.120)
##
## ext_bal                         0.118    0.187**  -0.068**  0.152*
##                                (0.095)   (0.083)  (0.033)   (0.088)
##
## fsc_bal                         0.230*    0.173    0.057     0.201
##                                (0.130)   (0.114)  (0.045)   (0.121)
##
## ext_dbt                         0.002     0.003   -0.002*    0.002
##                                (0.003)   (0.002)  (0.001)   (0.003)
##
## def                             -0.590    0.479   -1.069*   -0.055
##                                (1.544)   (1.355)  (0.536)   (1.428)
##
## dev                             -1.132   -1.098    -0.034   -1.115
##                                (1.885)   (1.655)  (0.655)   (1.743)
##
## Constant                       -19.044* -16.807*   -2.237  -17.925*
##                                (9.719)   (8.530)  (3.377)   (8.987)
##
## ------------------------------------------------------------------------
## Observations                      40       40        40       40
## R2                               0.719     0.760    0.296     0.744
## Adjusted R2                      0.647     0.698    0.114     0.678
## Residual Std. Error (df = 31)    2.939     2.579    1.021     2.717
## F Statistic (df = 8; 31)       9.917*** 12.264***  1.629   11.267***
## ========================================================================
## Note:                                      *p<0.1; **p<0.05; ***p<0.01
```

3 Cross-sectional Results Over Time- Univariate (*PRELIMINARY*)

```
##
## Univariate
## ========================================================
##                                  Dependent variable:
##                              ---------------------------
##                                         rating
##                                Moody's 2012     S&P 2012
##                                     (1)            (2)
## --------------------------------------------------------
## log(CDS)                          -5.105***     -4.720***
##                                    (0.469)       (0.458)
##
## Constant                          35.725***     33.672***
##                                    (2.382)       (2.323)
##
## --------------------------------------------------------
## Observations                         41             41
## R2                                  0.752         0.731
## Adjusted R2                         0.746         0.725
## Residual Std. Error (df = 39)       2.506         2.444
## F Statistic (df = 1; 39)          118.277***     106.245***
## ========================================================
## Note:                          *p<0.1; **p<0.05; ***p<0.01
```

4 Cross-sectional Results Over Time - Multivariate (*PRELIMINARY*)

```
##
## Multivariate
## ================================================================
##                                    Dependent variable:
##                                ----------------------------
##                                           rating
##                                 Moody's 2012     S&P 2012
##                                      (1)            (2)
## ----------------------------------------------------------------
## log(GNI_cap)                         0.426          0.627
##                                     (0.606)        (0.621)
##
## GDP_grw                             -0.225         -0.023
##                                     (0.135)        (0.139)
##
## log(inf)                             0.122         -0.668
##                                     (0.651)        (0.667)
##
## ext_bal                             -0.030          0.065
##                                     (0.052)        (0.053)
##
## fsc_bal                             -0.130         -0.122
##                                     (0.078)        (0.080)
##
## ext_dbt                             -0.002          0.0004
##                                     (0.001)        (0.001)
##
## def                                 -1.238         -0.053
##                                     (0.801)        (0.820)
##
## dev                                 2.491**         1.875*
##                                     (1.049)        (1.074)
##
## log(CDS)                           -4.836***      -3.969***
##                                     (0.521)        (0.533)
##
## Constant                           29.673***      23.176***
##                                     (7.263)        (7.435)
##
## ----------------------------------------------------------------
## Observations                          40             40
## R2                                   0.927          0.916
## Adjusted R2                          0.906          0.890
## Residual Std. Error (df = 30)        1.518          1.554
## F Statistic (df = 9; 30)           42.607***      36.182***
## ================================================================
## Note:                           *p<0.1; **p<0.05; ***p<0.01
```