Moody's Sovereign Ratings

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Introduction: What is the goal ?

- Who determine the Moody's Ratings ?
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Introduction: variables used

Variable	Description
BCA	Current Account Balance
Dummy EU	Country member of the European Union
Dummy Deficit	Total Revenue - Total Expenditure negative
Dummy Unemploy	Unemployment rate greater than 10
Dummy Growth	GDP growth negative
Dummy Inflation	Inflation rate greater than 4
GGXWDN NGDP	General Government Net Debt
NGDP	Gross Domestic Product
NGDPDPC	Gross Domestic Product per Capita
Previous Default	Has the country ever defaulted ?
Dummy Outlook	Positive:1 Stable:0 Negative:-1
Previous Rating	Last rating received by the country

Model using only macroeconomic variables: first linear regression

Number of observation and variable

n = 452 and k = 11

Linear equation of first model

Dependent Variable: SCORE_DISTRIBUTION
Method: Least Squares
Date: 04/10/19 Time: 17:33
Sample (adjusted): 2 441
Included observations: 175 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	39.31175	7.075079	5.556368	0.0000
BCA	-0.009205	0.029815	-0.308727	0.7579
DUMMY_EU	9.911401	4.638832	2.136616	0.0341
DUMMY_DEFICIT	8.046695	7.044498	1.142267	0.2550
DUMMY_UNEMPLOY	-17.50935	5.044771	-3.470791	0.0007
DUMMY_GROWTH	1.377686	5.282468	0.260803	0.7946
DUMMY_INFLATION	-15.71419	5.014613	-3.133679	0.0020
GGXWDN_NGDP	-0.104794	0.069858	-1.500098	0.1355
NGDPD	0.000318	0.000265	1.200731	0.2316
NGDPDPC	0.000581	9.82E-05	5.915649	0.0000
PREVIOUS_DEFAULT	-6.888618	8.712917	-0.790621	0.4303

R-squared	0.500560	Mean dependent var	53.44754
Adjusted R-squared	0.470106	S.D. dependent var	35.16332
S.E. of regression	25.59673	Akaike info criterion	9.383601
Sum squared resid	107451.5	Schwarz criterion	9.582530
Log likelihood	-810.0651	Hannan-Quinn criter.	9.464292
F-statistic	16.43675	Durbin-Watson stat	0.516271
Prob(F-statistic)	0.000000		

Model using only macroeconomic variables: linear regression with K=6

Dependent Variable: SCORE_DISTRIBUTION
Method: Least Squares
Date: 04/10/19 Time: 17:39
Sample (adjusted): 1 449
Included observations: 342 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	41.06795	3.095552	13.26676	0.0000
DUMMY_EU	10.81376	3.455019	3.129872	0.0019
DUMMY_UNEMPLOY	-15.97584	3.335430	-4.789740	0.0000
DUMMY_INFLATION	-6.099322	3.205147	-1.902977	0.0579
NGDPDPC	0.000638	7.34E-05	8.697800	0.0000
PREVIOUS_DEFAULT	-9.456074	4.211419	-2.245342	0.0254

R-squared	0.420713	Mean dependent var	50.34781
Adjusted R-squared	0.412092	S.D. dependent var	33.10476
S.E. of regression	25.38312	Akaike info criterion	9.323434
Sum squared resid	216485.7	Schwarz criterion	9.390711
Log likelihood	-1588.307	Hannan-Quinn criter.	9.350235
F-statistic	48.80464	Durbin-Watson stat	0.704015
Prob(F-statistic)	0.000000		

Model using only macroeconomic variables: Wald test

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	0.704191	(5, 164)	0.6211
Chi-square	3.520956	5	0.6202

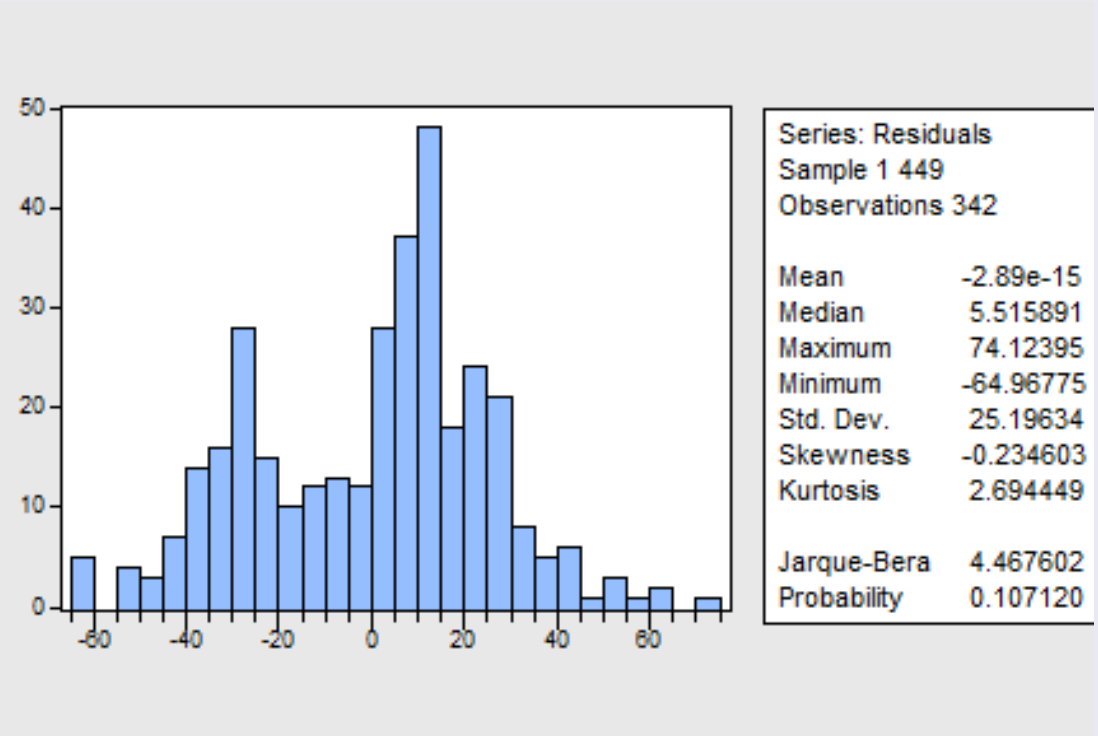
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-0.009205	0.029815
C(4)	8.046695	7.044498
C(6)	1.377686	5.282468
C(8)	-0.104794	0.069858
C(9)	0.000318	0.000265

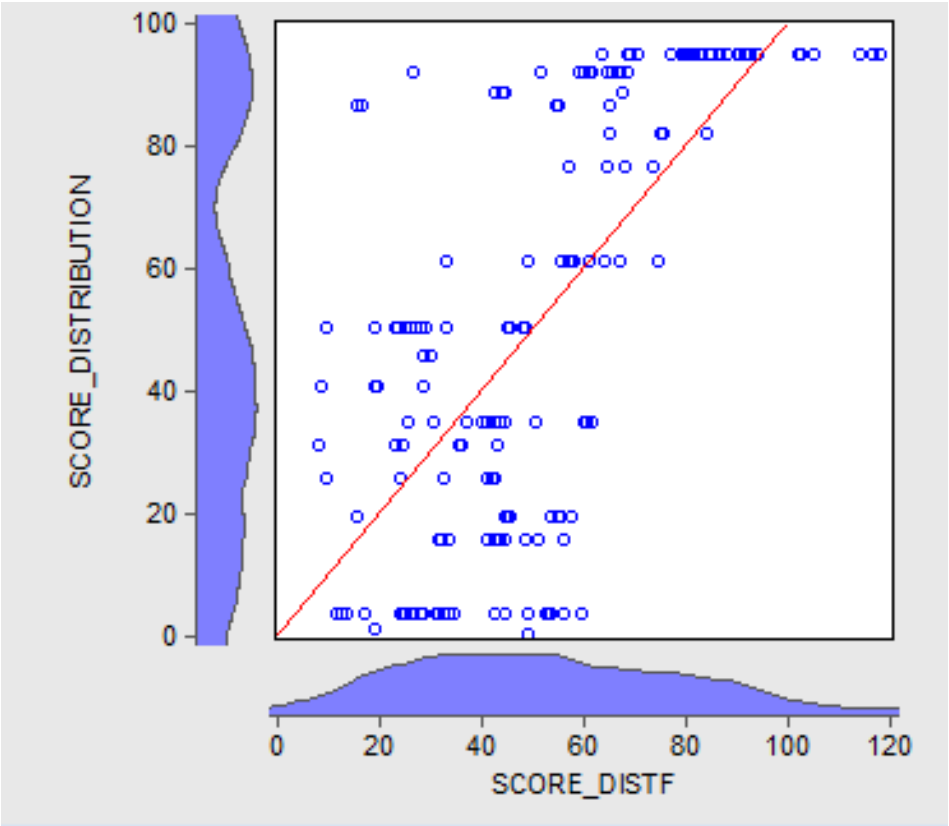
Restrictions are linear in coefficients.

Model using only macroeconomic variables: Jarque-Bera test

GRAPH



Model using only macroeconomic variables: Scatter



Model with Moody's variables: Linear Regression

Number of observation and variable

n = 452 and k = 13

linear equation of general model

Dependent Variable: SCORE_DISTRIBUTION
Method: Least Squares
Date: 04/10/19 Time: 16:56
Sample (adjusted): 2 441
Included observations: 168 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	8.136460	4.564516	1.782546	0.0766
BCA	-0.004743	0.020679	-0.229356	0.8189
DUMMY_DEFICIT	3.722273	4.184847	0.889464	0.3751
DUMMY_GROWTH	-0.064802	3.130777	-0.020698	0.9835
DUMMY_UNEMPLOY	-5.190646	3.290265	-1.577577	0.1167
DUMMY_EU	-1.370100	2.847086	-0.481229	0.6310
DUMMY_INFLATION	-6.297990	3.032364	-2.076924	0.0395
DUMMY_OUTLOOK	4.022803	2.574295	1.562681	0.1202
NGDPD	-0.000280	0.000160	-1.745996	0.0828
NGDPDPC	0.000133	6.34E-05	2.103157	0.0371
PREVIOUS_DEFAULT	-11.01298	5.119518	-2.151176	0.0330
PREVIOUS_RATING_DISTRI...	0.804096	0.045084	17.83561	0.0000
GGXWDN_NGDP	-0.007057	0.046902	-0.150457	0.8806

R-squared	0.835826	Mean dependent var	52.86321
Adjusted R-squared	0.823116	S.D. dependent var	35.46488
S.E. of regression	14.91568	Akaike info criterion	8.316926
Sum squared resid	34483.99	Schwarz criterion	8.558661
Log likelihood	-685.6217	Hannan-Quinn criter.	8.415033
F-statistic	65.76008	Durbin-Watson stat	2.041107
Prob(F-statistic)	0.000000		

Model with Moody's variables:Linear Regression with K=5

Dependent Variable: SCORE_DISTRIBUTION
Method: Least Squares
Date: 04/10/19 Time: 17:26
Sample (adjusted): 2 449
Included observations: 271 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	4.019139	1.627543	2.469451	0.0142
DUMMY_OUTLOOK	4.192745	1.487258	2.819111	0.0052
NGDPDPC	0.000139	4.19E-05	3.331142	0.0010
PREVIOUS_DEFAULT	-4.356805	2.668411	-1.632734	0.1037
PREVIOUS_RATING_DISTRI...	0.832080	0.031164	26.70029	0.0000

R-squared	0.828133	Mean dependent var	48.52731
Adjusted R-squared	0.825549	S.D. dependent var	32.25584
S.E. of regression	13.47241	Akaike info criterion	8.057443
Sum squared resid	48280.58	Schwarz criterion	8.123903
Log likelihood	-1086.784	Hannan-Quinn criter.	8.084128
F-statistic	320.4276	Durbin-Watson stat	1.832826
Prob(F-statistic)	0.000000		

Model using Moody's variables: Wald test

Wald Test:
Equation: EQ_MOODYS

Test Statistic	Value	df	Probability
F-statistic	1.305439	(8, 155)	0.2446
Chi-square	10.44351	8	0.2353

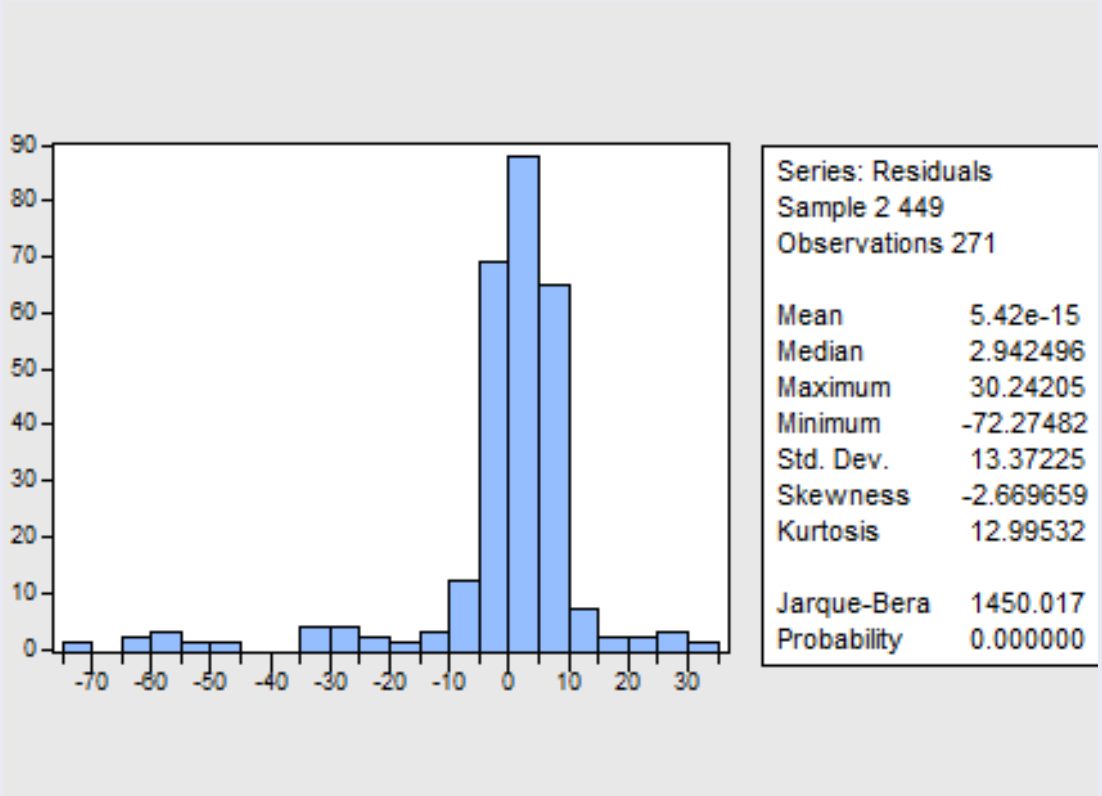
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-0.004743	0.020679
C(3)	3.722273	4.184847
C(4)	-0.064802	3.130777
C(5)	-5.190646	3.290265
C(6)	-1.370100	2.847086
C(7)	-6.297990	3.032364
C(9)	-0.000280	0.000160
C(13)	-0.007057	0.046902

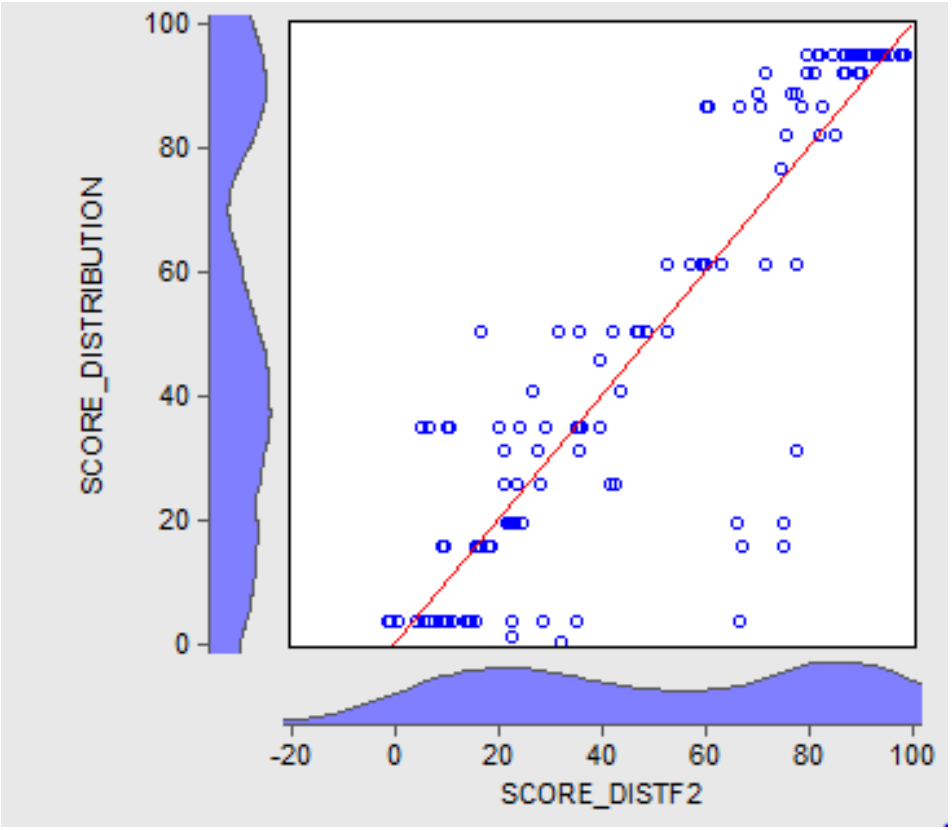
Restrictions are linear in coefficients.

Model with Moody's variables: Jarque-bera test

GRAPH



Model with Moody's variables: Scatter



To conclude

	Macroeconomic variables	Moody's variables
R^2	0,42	0,83
$R^2_{adjusted}$	0,41	0,82
insignificant variables	0	1
F-test	no rejected	no reject