

# The Use of Corruption Indicators in Sovereign Ratings

An Update

Prepared for the Innovation in Citizen Services  
Division by:

Satoshi Araki  
Ugo Panizza

Institutions for Development  
Sector

Innovation in Citizen  
Services Division

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## ABSTRACT

This technical note reproduces all the tables and figures of the document “The Use of Corruption Indicators in Sovereign Ratings” (Panizza, 2017) using data updated to December 2017. Most results are qualitatively identical to those of the original document. The few instances where the results contain new information or are different from those of the original document are highlighted.

**JEL Codes:** D73, H63

**Keywords:** corruption, government debt, sovereign ratings

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# 1 INTRODUCTION

This technical note reproduces all the tables and figures of the document “The Use of Corruption Indicators in Sovereign Ratings” (henceforth, Panizza, 2017).<sup>1</sup> Panizza (2017) used ICRG data for the period 1984–2013, WGI data for the period 1996–2015, and sovereign rating data for the period 1990–2015. Herein, all the data are updated to December 2017.<sup>2</sup>

All the tables and figures are numbered as in Panizza (2017) but with an “A” before the

original number. Thus, Table A1 in this paper corresponds to Table 1 in Panizza (2017) and Figure A1 to Figure 1.

Most of the updated results are qualitatively identical to those of the original document, although the updated results tend to have more observations. We only comment on the few cases in which the updated results provide new information or differ from those in the original document.

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<sup>1</sup> The original document is available at: <http://dx.doi.org/10.18235/0000849>.

<sup>2</sup> PRS Group (2012) discloses the ICRG methodology; Kaufmann et al. (2011) the WGI methodology; and Transparency International (2012) the TI methodology. For the sovereign rating methodologies, see Fitch (2018), Moody's (2018), and Standard & Poor's (2017).





# 2 THE CORRELATION BETWEEN SOVEREIGN RATING AND CORRUPTION INDICATORS

## Measuring Corruption and Sovereign Ratings

In Figure A1, the ICRG control of corruption score by the median borrowing member country of the Inter-American Development Bank (IDB) remains lower than the cross-country average. However, since 2015, the median value for the Latin American and Caribbean (LAC) region overlaps with the 25th percentile of the world-wide distribution of the indicator. In 2017, there were only five IDB borrowing member countries with a score above 2.5.<sup>3</sup>

The WGI control of corruption indicator continues to exhibit no trend in the overall mean, except for a limited recovery observed in 2016. However, the distance between the median IDB borrowing member country and the cross-country average continues to widen. The median IDB borrowing member country is at its closest to the bottom 25th percentile, as the distance narrows to 0.22 in 2017 further down from 0.25 in 2015. In 2017, there were only five IDB borrowing member countries with a positive (i.e., above the cross-country average) control of corruption score and only four countries with a score greater than 1.<sup>4</sup>

## The Correlation between Corruption Indicators and Sovereign Ratings

Most results are unchanged. However, with the updated data the ICRG corruption indicator is always statistically significant. (See Table A7; this indicator was not statistically significant in column 2 of Table 7 in Panizza [2017].)

There are two small differences between Table A9 and Table 9 in Panizza (2017). In this table, we use panel data and now find that both the ICRG corruption indicator and the WGI corruption indicator are significantly correlated with Moody's rating and that WGI indicator is not significantly correlated with the Fitch rating. In Panizza (2009), we had found no statistically significant correlation between ICRG and Moody's rating and a statistically significant correlation between the WGI indicator and Fitch rating. The lack of a statistically significant correlation between WGI and Fitch rating is surprising because the Fitch methodology explicitly mentions that it uses the WGI.

<sup>3</sup> These countries are: Bahamas (4.5), Chile (4.2), Costa Rica (3.2), Peru (2.6), and Uruguay (4.5).

<sup>4</sup> These countries are: Bahamas (1.17), Barbados (1.42), Chile (1.04), Costa Rica (0.47), and Uruguay (1.29).

**Table A1: Summary Statistics and Country Coverage**

Variable	Summary statistics				
	Obs	Mean	Std. Dev.	Min	Max
S&P	2,753	13.90	5.28	1	21
Moody's	2,610	13.96	5.29	1	21
Fitch	2,029	13.56	5.08	1	21
ICRG	4,485	2.937	1.34	0	6
WGI	3,903	−0.00	1.00	−1.87	2.47
TI	1,037	42.93	19.70	8	92
	Country coverage				
	Number of countries				
	Period	Min		Max	
S&P	1990–2017*	31	(1990)	128	(2016)
Moody's	1990–2017*	30	(1990)	128	(2017)
Fitch	1994–2017*	25	(1994)	111	(2017)
ICRG	1990–2017**	125	(1990)	140	(2017)
WGI	1996–2017	187	(1996)	212	(2013)
TI	2012–2017***	165	(2015)	180	(2017)

Source: Authors' elaboration.

Notes: \* Data are available from the 1970s, but this paper uses data starting from 1990. \*\* Data are available from 1984, but this paper uses data starting in 1990. \*\*\* Older data are not comparable.

**Table A2: Correlation Matrix**

	S&P	Moody's	Fitch	ICRG	WGI	TI
S&P	1.00					
Moody's	0.98***	1.00				
Fitch	0.99***	0.98***	1.00			
ICRG	0.72***	0.71***	0.74***	1.00		
WGI	0.81***	0.81***	0.82***	0.87***	1.00	
TI	0.79***	0.77***	0.79***	0.96***	0.99***	1.00

Source: Authors' elaboration.

Note: \*\*\* Indicates that the correlation is statistically significant at the 1% confidence level.

**Table A3: Conditional Correlation between Sovereign Ratings and the ICRG Corruption Indicator**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Corr (ICRG)	1.207*** (0.301)	1.661*** (0.265)	0.966*** (0.354)	1.773*** (0.244)	1.764*** (0.260)	1.737*** (0.260)	2.088*** (0.238)	2.149*** (0.255)	2.096*** (0.246)
ln(GDP PC)	2.209*** (0.439)	1.472*** (0.415)	2.322*** (0.566)	2.279*** (0.299)	2.525*** (0.375)	2.138*** (0.327)	1.574*** (0.290)	1.624*** (0.322)	1.638*** (0.320)
Debt-to-GDP	-1.030 (1.017)	0.408 (1.001)	0.187 (1.104)	-1.060 (0.750)	-1.682** (0.754)	-1.006 (0.753)	-1.709** (0.666)	-2.100*** (0.705)	-1.497** (0.678)
CA-to-GDP	19.408*** (6.887)	16.065** (6.051)	13.139* (7.652)	-1.173 (3.325)	-5.693* (3.365)	-2.064 (3.563)	11.185*** (3.551)	10.069*** (3.714)	8.545** (3.768)
ln(infl)	-1.350*** (0.262)	-0.907*** (0.235)	-1.020*** (0.264)	-1.614*** (0.284)	-1.797*** (0.317)	-1.723*** (0.314)	-0.831*** (0.273)	-0.910*** (0.297)	-0.888*** (0.283)
Constant	-7.602* (3.975)	-4.196 (4.029)	-8.672* (4.915)	-10.774*** (2.680)	-12.578*** (3.449)	-9.063*** (2.968)	-6.474** (2.664)	-6.833** (2.987)	-7.157** (2.964)
Observations	63	69	49	97	93	92	110	112	106
R-squared	0.799	0.763	0.795	0.837	0.839	0.838	0.835	0.820	0.832
Rating agency	S&P	Moody's	Fitch	S&P	Moody's	Fitch	S&P	Moody's	Fitch
Period	1990s	1990s	1990s	2000–07	2000–07	2000–07	2008–17	2008–17	2008–17

Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, ICRG and World Bank data.

Note: \* Statistically significant at the 90% confidence interval, \*\* at the 95% confidence interval, and \*\*\* at the 99% confidence interval.

**Table A4: Conditional Correlation between Sovereign Ratings and the WGI Corruption Indicator**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Corr (WGI)	2.227*** (0.447)	3.009*** (0.413)	2.438*** (0.432)	2.921*** (0.314)	2.897*** (0.351)	2.710*** (0.301)	2.526*** (0.301)	2.657*** (0.310)	2.499*** (0.296)
ln(GDP PC)	1.463*** (0.483)	0.461 (0.440)	1.211** (0.523)	1.310*** (0.312)	1.526*** (0.412)	1.563*** (0.298)	1.114*** (0.320)	1.255*** (0.353)	1.229*** (0.320)
Debt-to-GDP	-0.821 (0.959)	0.084 (1.008)	0.396 (0.911)	-1.628** (0.655)	-1.552** (0.706)	-1.058 (0.665)	-1.969*** (0.687)	-2.106*** (0.695)	-1.549** (0.669)
CA-to-GDP	18.497*** (6.490)	4.880 (5.693)	12.778** (6.302)	4.510 (2.826)	-2.705 (3.070)	-0.539 (3.054)	18.170*** (3.345)	14.590*** (3.362)	13.239*** (3.606)
ln(infl)	-0.988*** (0.266)	-0.554** (0.245)	-0.552** (0.220)	-1.016*** (0.268)	-1.182*** (0.308)	-1.183*** (0.277)	-0.740*** (0.275)	-0.707** (0.289)	-0.870*** (0.274)
Constant	1.848 (4.425)	9.153** (4.228)	2.890 (4.765)	1.759 (2.887)	-0.053 (3.894)	-0.386 (2.863)	3.315 (3.057)	2.005 (3.441)	2.263 (3.074)
Observations	64	73	51	108	99	100	123	122	113
R-squared	0.819	0.744	0.862	0.849	0.850	0.866	0.816	0.816	0.830
Rating agency	S&P	Moody's	Fitch	S&P	Moody's	Fitch	S&P	Moody's	Fitch
Period	1990s	1990s	1990s	2000–07	2000–07	2000–07	2008–17	2008–17	2008–17

Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, and World Bank data.

Note: \* Statistically significant at the 90% confidence interval, \*\* at the 95% confidence interval, and \*\*\* at the 99% confidence interval.

**Table A5: Conditional Correlation between Sovereign Ratings and Transparency International's Control of Corruption Index**

	(1)	(2)	(3)
Corr (TI)	0.132*** (0.016)	0.140*** (0.016)	0.132*** (0.015)
ln(GDP PC)	1.034*** (0.302)	1.135*** (0.325)	1.264*** (0.314)
Debt-to-GDP	-1.755** (0.679)	-1.866*** (0.679)	-1.480** (0.664)
CA-to-GDP	18.244*** (3.260)	14.630*** (3.222)	12.624*** (3.560)
ln(infl)	-0.764*** (0.275)	-0.739** (0.286)	-0.838*** (0.274)
Constant	-1.824 (2.622)	-3.156 (2.893)	-4.073 (2.753)
Observations	123	122	114
R-squared	0.818	0.822	0.830
Rating agency	S&P	Moody's	Fitch
Period	2012–17	2012–17	2012–17

Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, TI, and World Bank data.

Note: \* Statistically significant at the 90% confidence interval, \*\* at the 95% confidence interval, and \*\*\* at the 99% confidence interval.

**Table A6: Correlation among Governance Indicators**

	ICRG					WGI				
	CoC	RoL	IP	BQ	CoC	Eff	CoC	Reg	Gov	Voice
Control of Corruption (ICRG)	1.00									
Rule of Law (ICRG)	0.64***	1.00								
Investment protection (ICRG)	0.32***	0.45***	1.00							
Bureaucratic Quality (ICRG)	0.69***	0.64***	0.53***	1.00						
Control of Corruption (WGI)	0.87***	0.73***	0.69***	0.82***	1.00					
Government Effectiveness (WGI)	0.81***	0.71***	0.72***	0.89***	0.93***	1.00				
Rule of Law (WGI)	0.82***	0.77***	0.73***	0.84***	0.94***	0.93***	1.00			
Regulation (WGI)	0.76***	0.65***	0.79***	0.82***	0.87***	0.93***	0.90***	1.00		
Government Stability (WGI)	0.65***	0.65***	0.60***	0.61***	0.74***	0.70***	0.78***	0.65***	1.00	
Voice and Accountability (WGI)	0.71***	0.47***	0.60***	0.73***	0.77***	0.76***	0.83***	0.78***	0.68***	1.00

Source: Authors' elaboration based on ICRG, TI, and World Bank data.

Note: \* Statistically significant at the 90% confidence interval, \*\* at the 95% confidence interval, and \*\*\* at the 99% confidence interval.

**Table A7: Conditional Correlation between Sovereign Ratings and the ICRG Corruption Indicator Controlling for other Governance Indicators**

	(1)	(2)	(3)	(4)	(5)	(6)
Corr (ICRG)	0.602** (0.260)	0.577* (0.298)	0.566* (0.297)	1.075*** (0.325)	1.209*** (0.344)	1.104*** (0.339)
Ln (GDP PC)	0.622* (0.326)	1.029** (0.394)	1.059*** (0.314)	0.828*** (0.304)	0.841** (0.331)	0.982*** (0.320)
Debt-to-GDP	-1.160* (0.632)	-1.937*** (0.661)	-1.485** (0.661)	-1.697** (0.664)	-1.719** (0.689)	-1.392** (0.673)
CA-to-GDP	6.290** (2.829)	0.043 (2.955)	5.491* (3.187)	12.648*** (3.223)	12.189*** (3.343)	10.758*** (3.439)
ln(infl)	-0.519* (0.272)	-0.594* (0.324)	-0.765** (0.299)	-0.301 (0.269)	-0.307 (0.288)	-0.340 (0.284)
ICRG_low	0.880*** (0.237)	0.622*** (0.231)	0.538** (0.224)	0.438* (0.234)	0.387 (0.238)	0.352 (0.235)
ICRG_investment	0.834*** (0.162)	0.746*** (0.177)	0.863*** (0.183)	0.744*** (0.182)	0.932*** (0.191)	0.791*** (0.190)
ICRG_bureau	1.137*** (0.333)	1.533*** (0.379)	0.991** (0.383)	0.653* (0.368)	0.351 (0.382)	0.572 (0.363)
Constant	-7.527*** (2.385)	-10.032*** (2.892)	-9.503*** (2.640)	-6.836** (2.606)	-8.060*** (2.853)	-8.388*** (2.826)
Observations	97	93	92	110	112	106
R-squared	0.901	0.894	0.895	0.869	0.861	0.867
Rating agency	S&P	Moody's	Fitch	S&P	Moody's	Fitch
Period	2000-07	2000-07	2000-07	2008-17	2008-17	2008-17

Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, and ICRG data.

Note: \* Statistically significant at the 90% confidence interval, \*\* at the 95% confidence interval, and \*\*\* at the 99% confidence interval.

**Table A8: Conditional Correlation between Sovereign Ratings and the WGI Corruption Indicator Controlling for the Rule of Law WGI Indicator**

	(1)	(2)	(3)	(4)	(5)	(6)
Corr (WGI)	0.349 (0.754)	0.831 (0.790)	0.710 (0.779)	-0.562 (0.675)	0.048 (0.680)	-0.152 (0.692)
ln(GDP PC)	1.035*** (0.303)	1.282*** (0.406)	1.440*** (0.292)	0.795*** (0.298)	0.939*** (0.338)	1.007*** (0.302)
Debt-to-GDP	-1.766*** (0.619)	-1.763** (0.683)	-1.247* (0.646)	-2.110*** (0.627)	-2.247*** (0.650)	-1.628** (0.623)
CA-to-GDP	6.713** (2.730)	-0.381 (3.062)	1.825 (3.072)	16.663*** (3.061)	14.663*** (3.140)	13.093*** (3.357)
ln(infl)	-0.718*** (0.265)	-0.917*** (0.310)	-0.946*** (0.281)	-0.399 (0.259)	-0.440 (0.277)	-0.569** (0.265)
Rule of Law (WGI)	3.167*** (0.854)	2.546*** (0.879)	2.411*** (0.871)	3.842*** (0.767)	3.248*** (0.767)	3.233*** (0.774)
Constant	3.894 (2.782)	1.897 (3.808)	0.428 (2.782)	5.828** (2.829)	4.611 (3.273)	3.850 (2.886)
Observations	108	99	100	123	122	113
R-squared	0.867	0.862	0.877	0.849	0.841	0.854
Rating agency	S&P	Moody's	Fitch	S&P	Moody's	Fitch
Period	2000-07	2000-07	2000-07	2008-17	2008-17	2008-17

Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, and World Bank data.

Note: \* Statistically significant at the 90% confidence interval, \*\* at the 95% confidence interval, and \*\*\* at the 99% confidence interval.

**Table A9: Conditional Correlation between Sovereign Ratings and Corruption Indicator**

	(1)	(2)	(3)	(4)	(5)	(6)
CORR	0.280 (0.215)	0.452* (0.255)	-0.054 (0.221)	0.094 (0.532)	2.002*** (0.602)	0.779 (0.583)
ln(GDP PC)	3.817*** (0.688)	2.747*** (0.800)	3.792*** (0.715)	3.877*** (0.727)	2.771*** (0.764)	3.103*** (0.763)
Debt-to-GDP	-4.036*** (0.503)	-3.514*** (0.607)	-3.311*** (0.498)	-3.489*** (0.518)	-3.431*** (0.586)	-2.905*** (0.511)
CA-to-GDP	1.499 (1.950)	1.154 (2.388)	1.532 (2.170)	2.461 (2.041)	0.447 (2.270)	1.069 (2.235)
ln(infl)	-0.299** (0.135)	0.125 (0.156)	-0.113 (0.133)	-0.293** (0.142)	0.264* (0.149)	0.066 (0.134)
Observations	270	274	247	295	294	264
Number of countries	110	113	107	123	124	115
Rating agency	S&P	Moody's	Fitch	S&P	Moody's	Fitch
Corruption indicator	ICRG	ICRG	ICRG	WGI	WGI	WGI

Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, ICRG, and World Bank data.

Note: \* Statistically significant at the 90% confidence interval, \*\* at the 95% confidence interval, and \*\*\* at the 99% confidence interval.

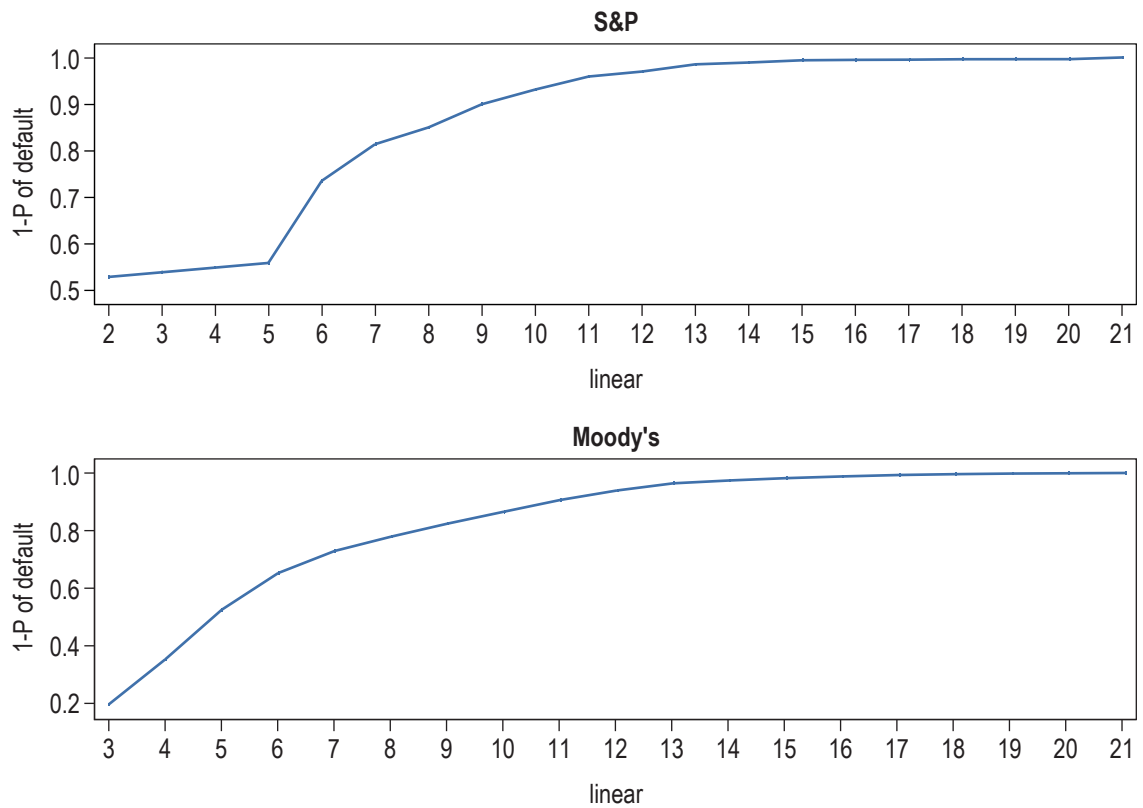
**Figure A1. Evolution of Corruption Indicators**



Source: Authors' elaboration based on ICRG and World Bank data.

Notes: The solid black line plots the cross-country average of the indicator and the dotted lines plot the interquartile range. The solid gray line plots the median value for the 26 IDB borrowing countries.

**Figure A2. Linear Coding of Credit Rating versus Default Probabilities**

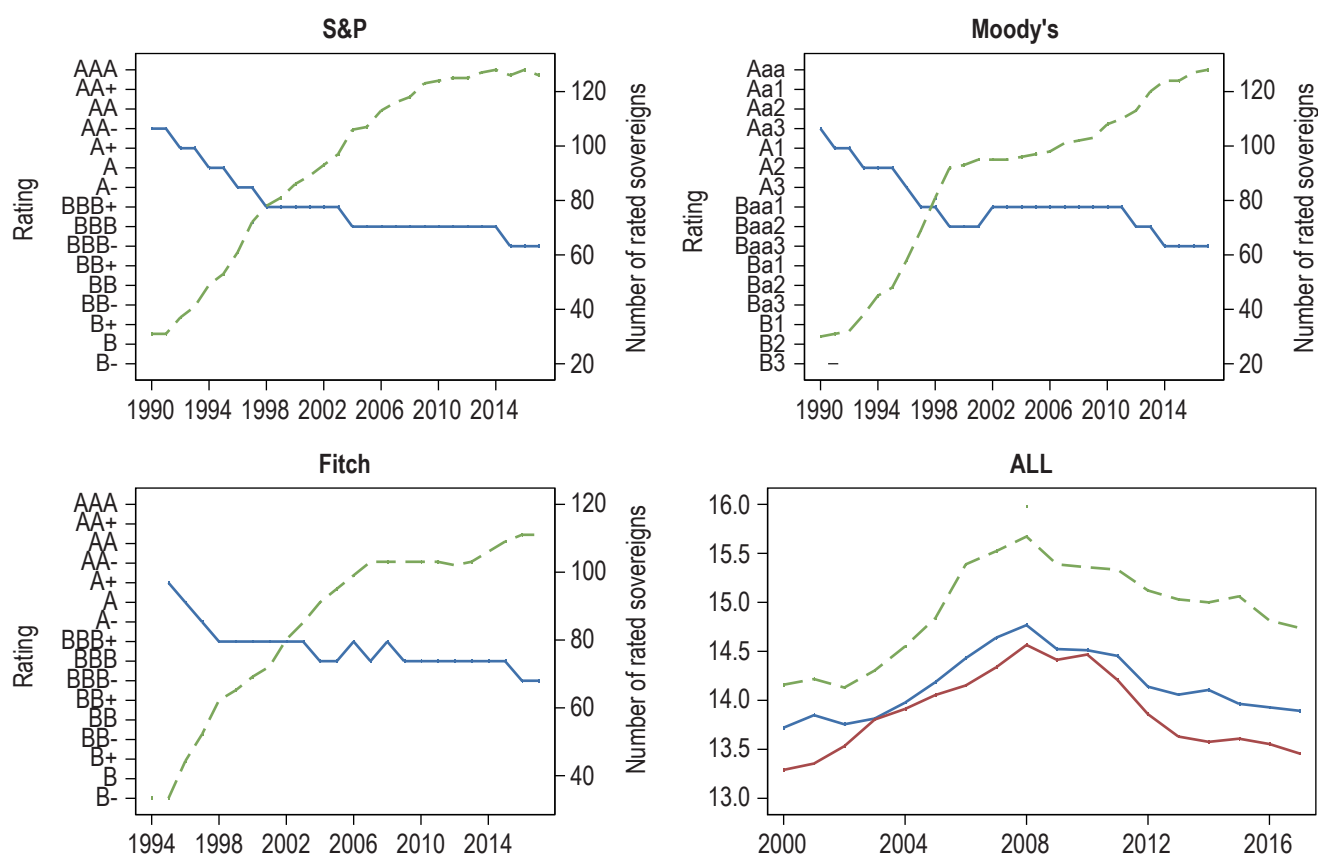


Source: Authors' elaboration based on Moody's and Standard & Poor's data.

Note: The horizontal axis plots credit ratings coded linearly (1 = SD; 21 = AAA with each notch being a one-point increment) and the vertical axis maps ratings into 1-empirical default probability.



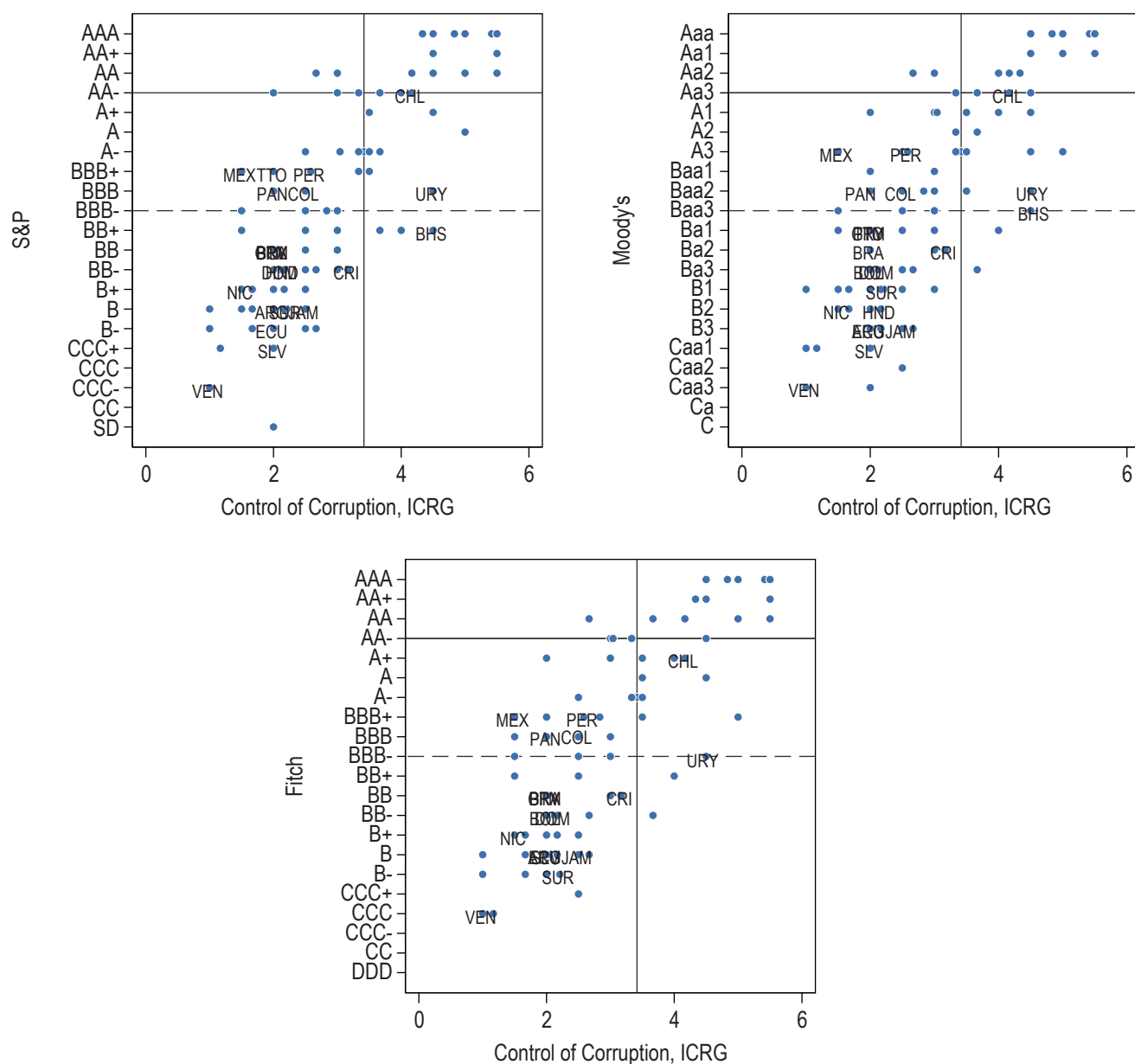
**Figure A3. Evolution of Credit Ratings**



Source: Authors' elaboration based on data from Fitch, Moody's, and Standard & Poor's.

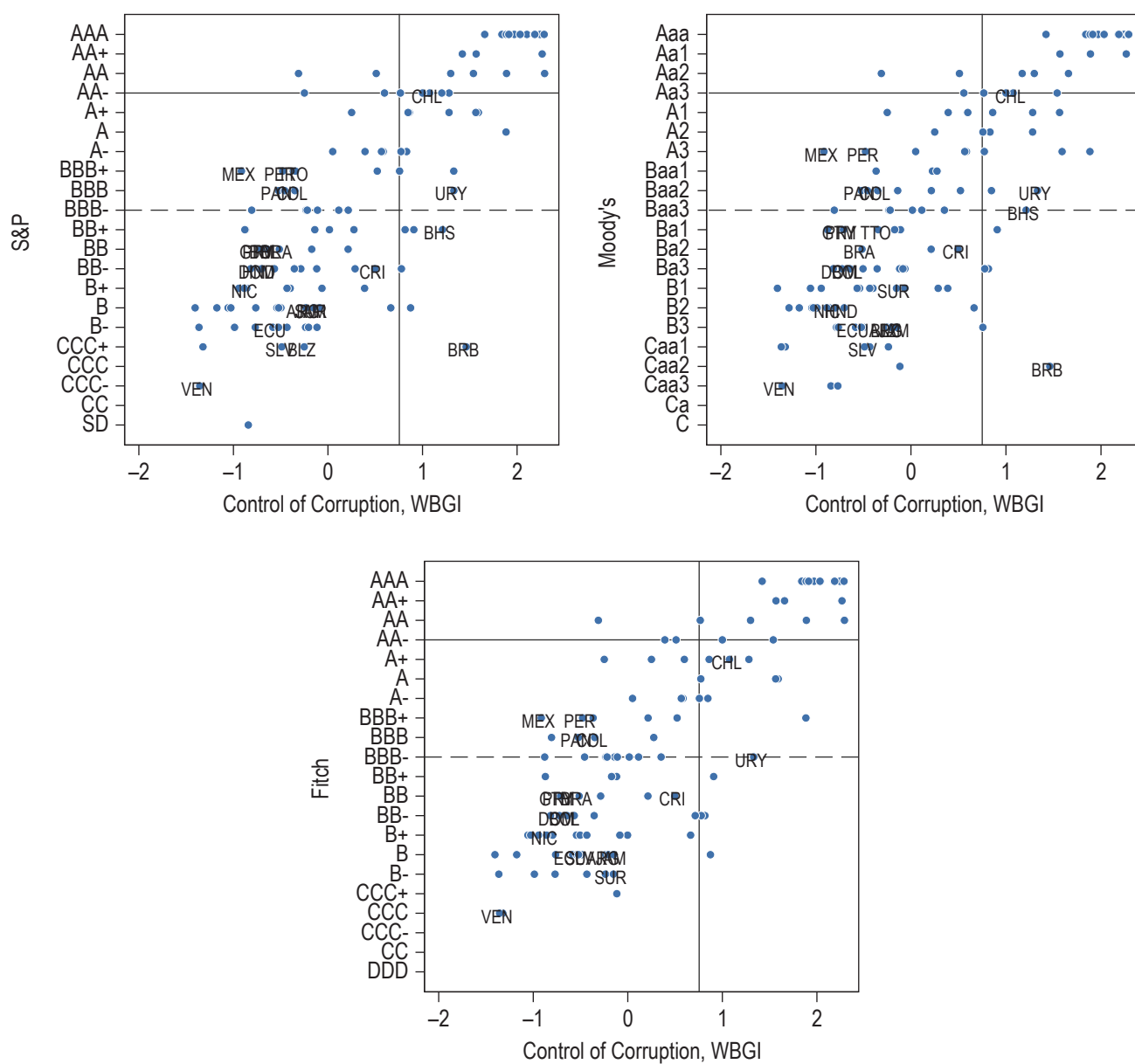
Notes: In the first three graphs, the solid line plots the average rating and the dashed line is the number of rated sovereigns (right axis). The last graph plots average credit ratings focusing on a constant sample of countries for which there was a rating in the year 2000. The red line plots the average Standard & Poor's rating, the blue line plots the average Moody's rating and the green dotted line plots the average Fitch rating.

Figure A4. Correlation between Sovereign Rating and ICRG Control of Corruption Indicator (2017 data)



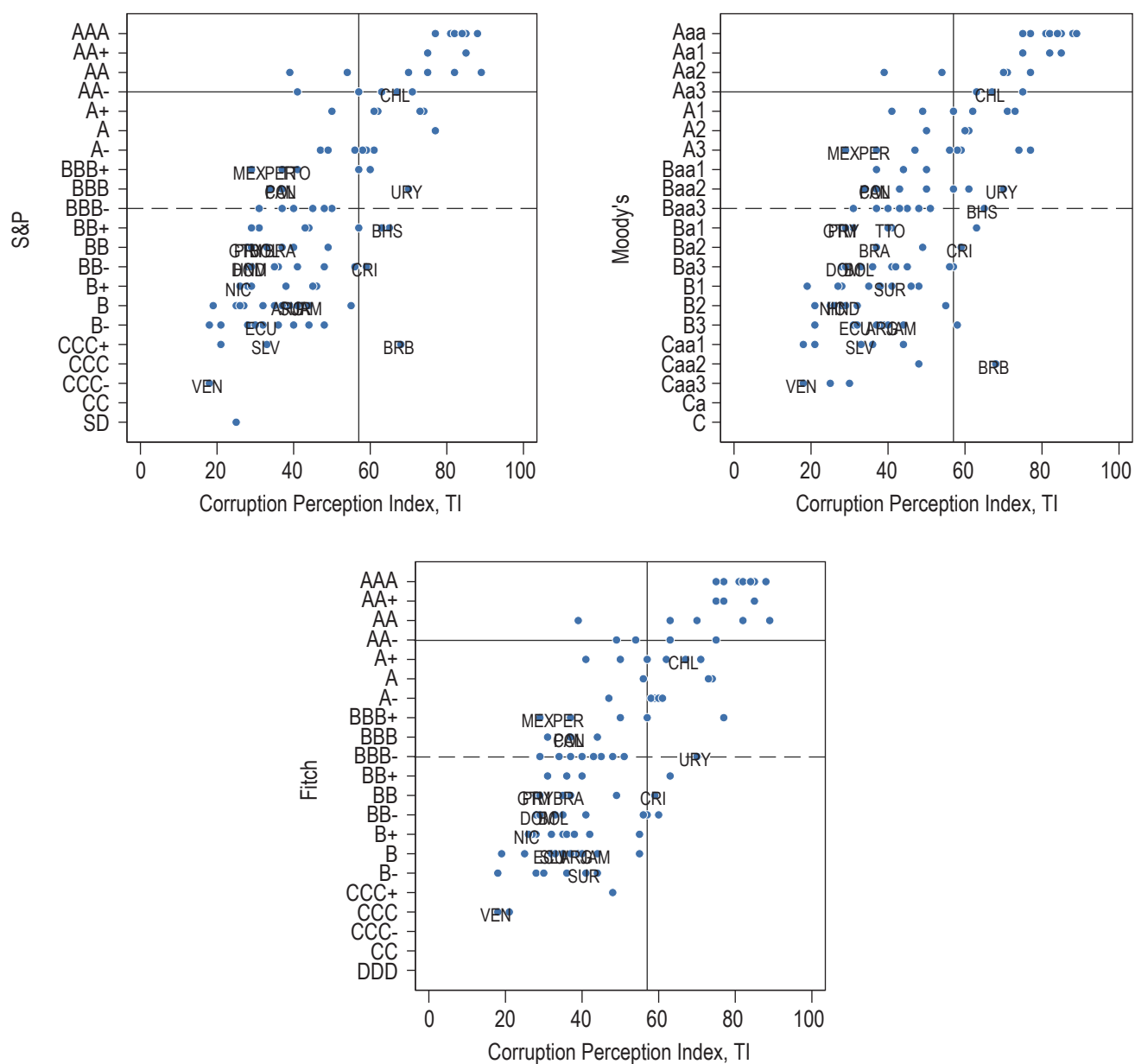
Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, and ICRG data.

Figure A5. Correlation between Sovereign Rating and WGI Control of Corruption Indicator (2017 data)



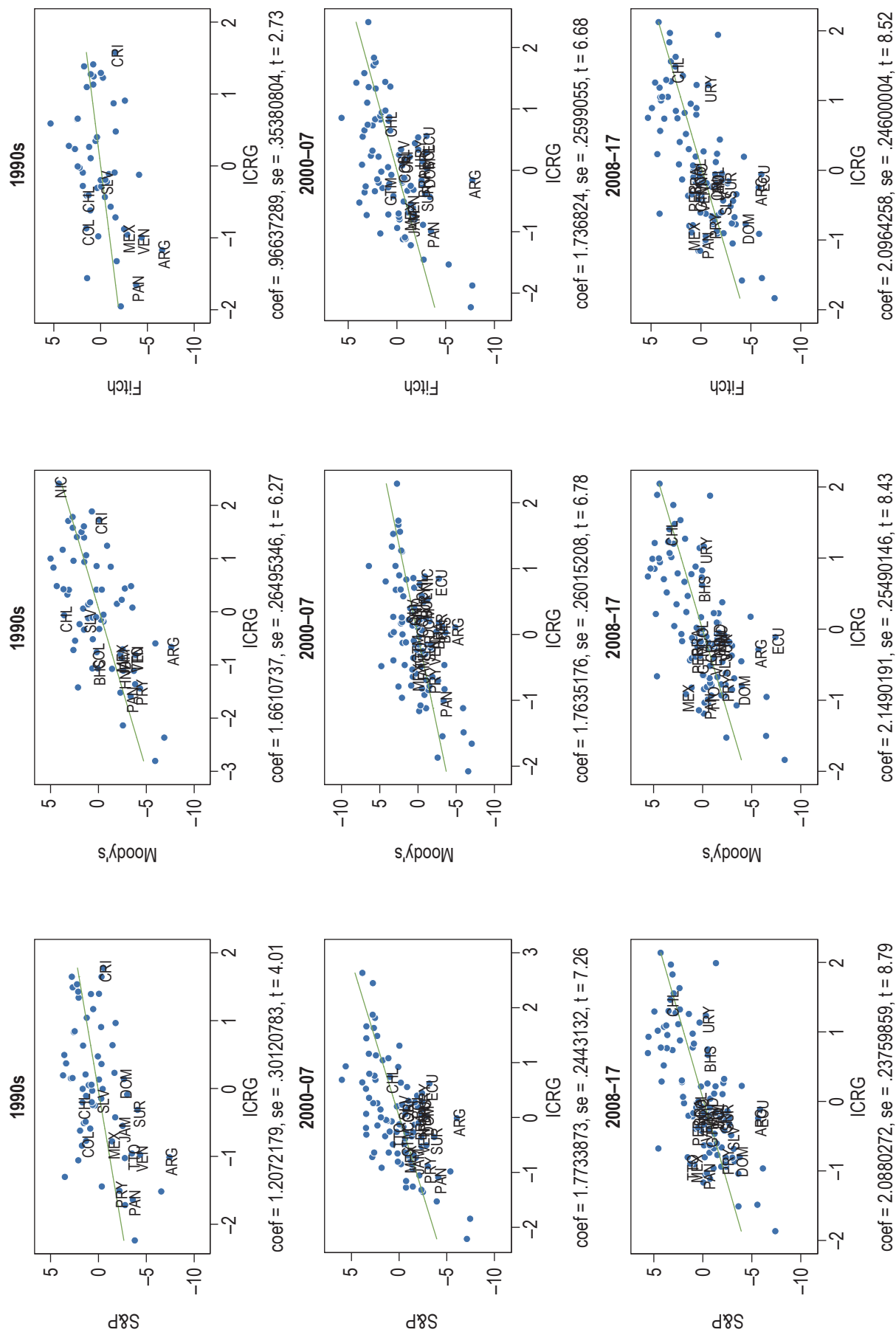
Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, and World Bank data.

**Figure A6. Correlation between Sovereign Rating and TI Corruption Perception Index (2017 data)**



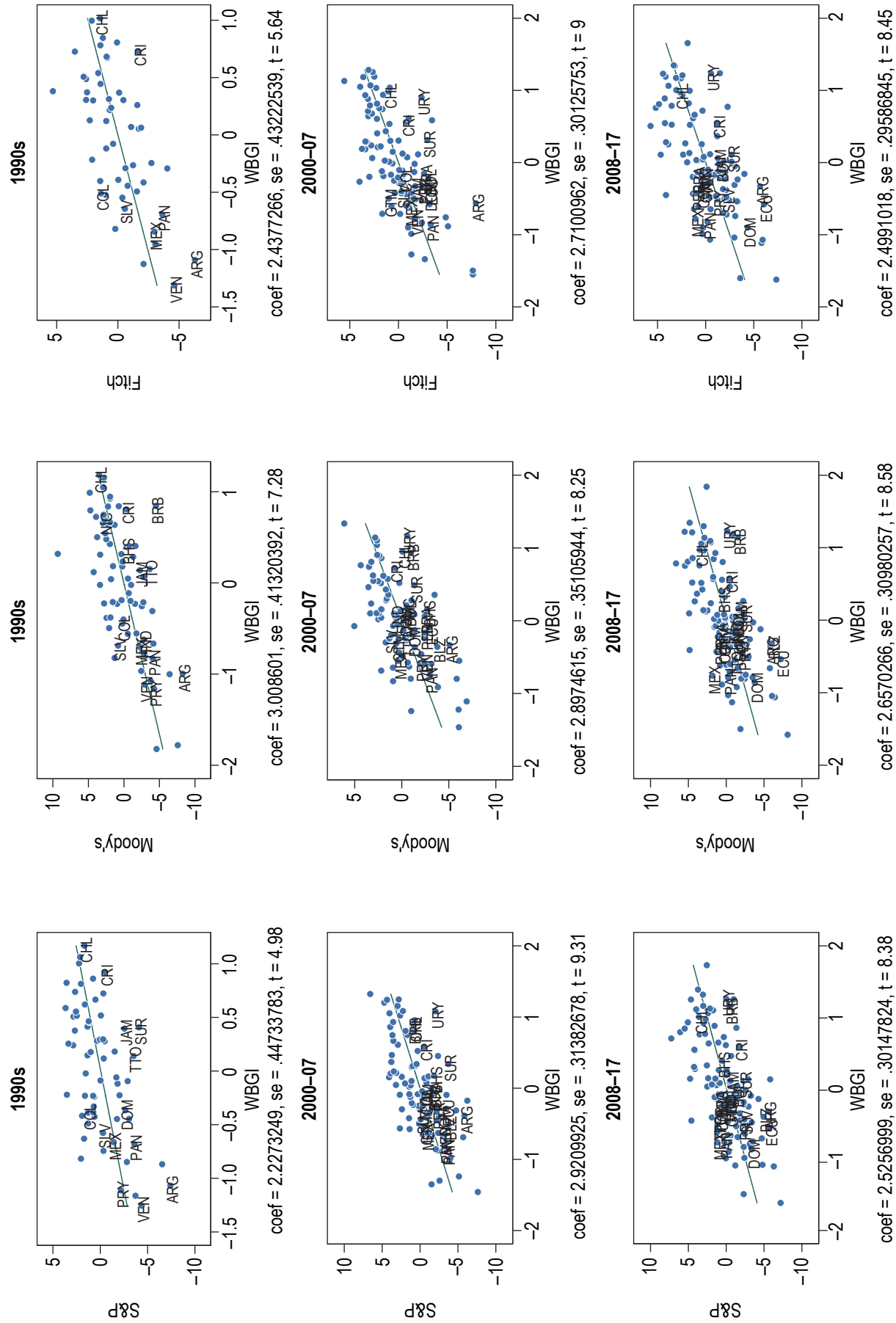
Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, and TI data.

Figure A7. Conditional Correlation between Sovereign Ratings and the ICRG Control of Corruption Indicator



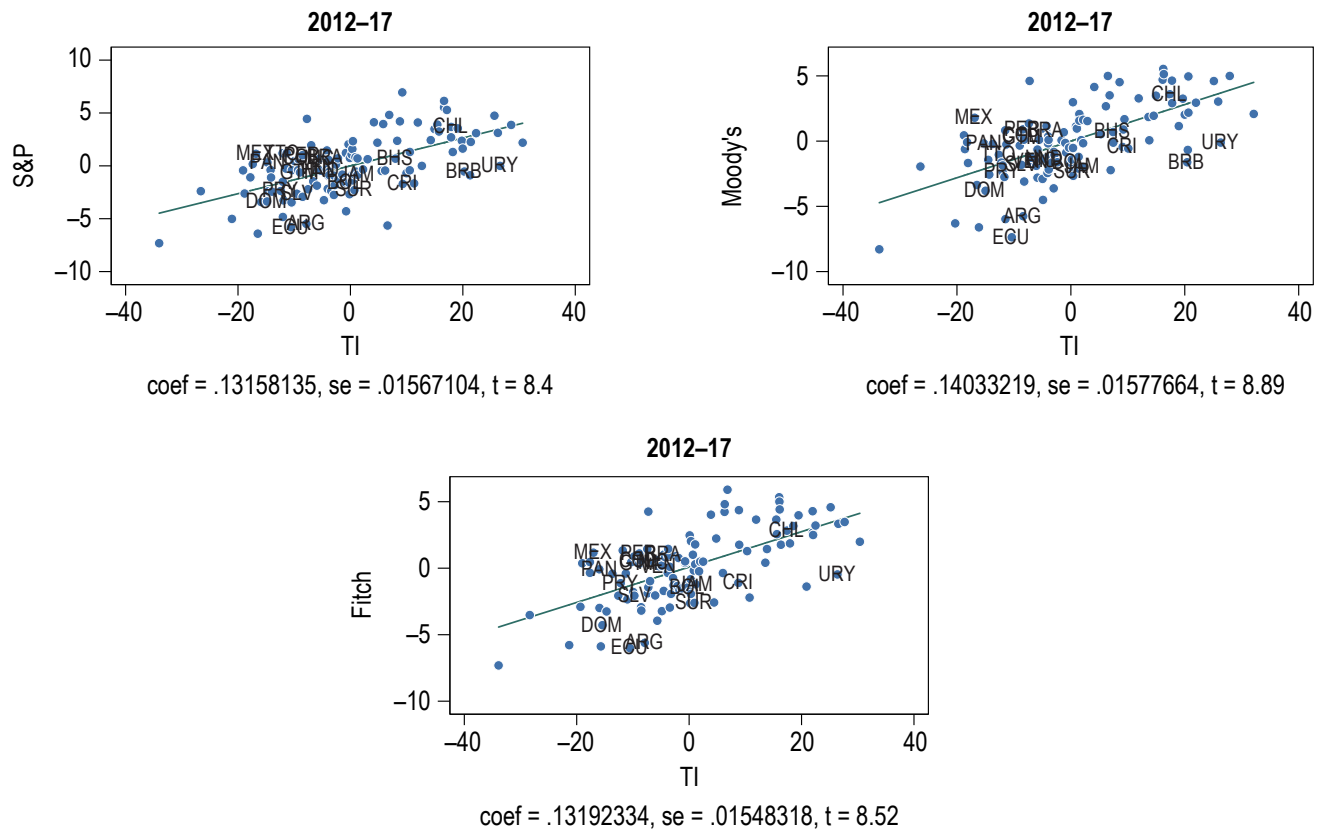
Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, ICRG, and World Bank data.  
Note: Based on the results of Table A3.

Figure A8. Conditional Correlation between Sovereign Ratings and the WGI Control of Corruption Indicator



Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, and World Bank data.  
 Note: Based on the results of Table A4.

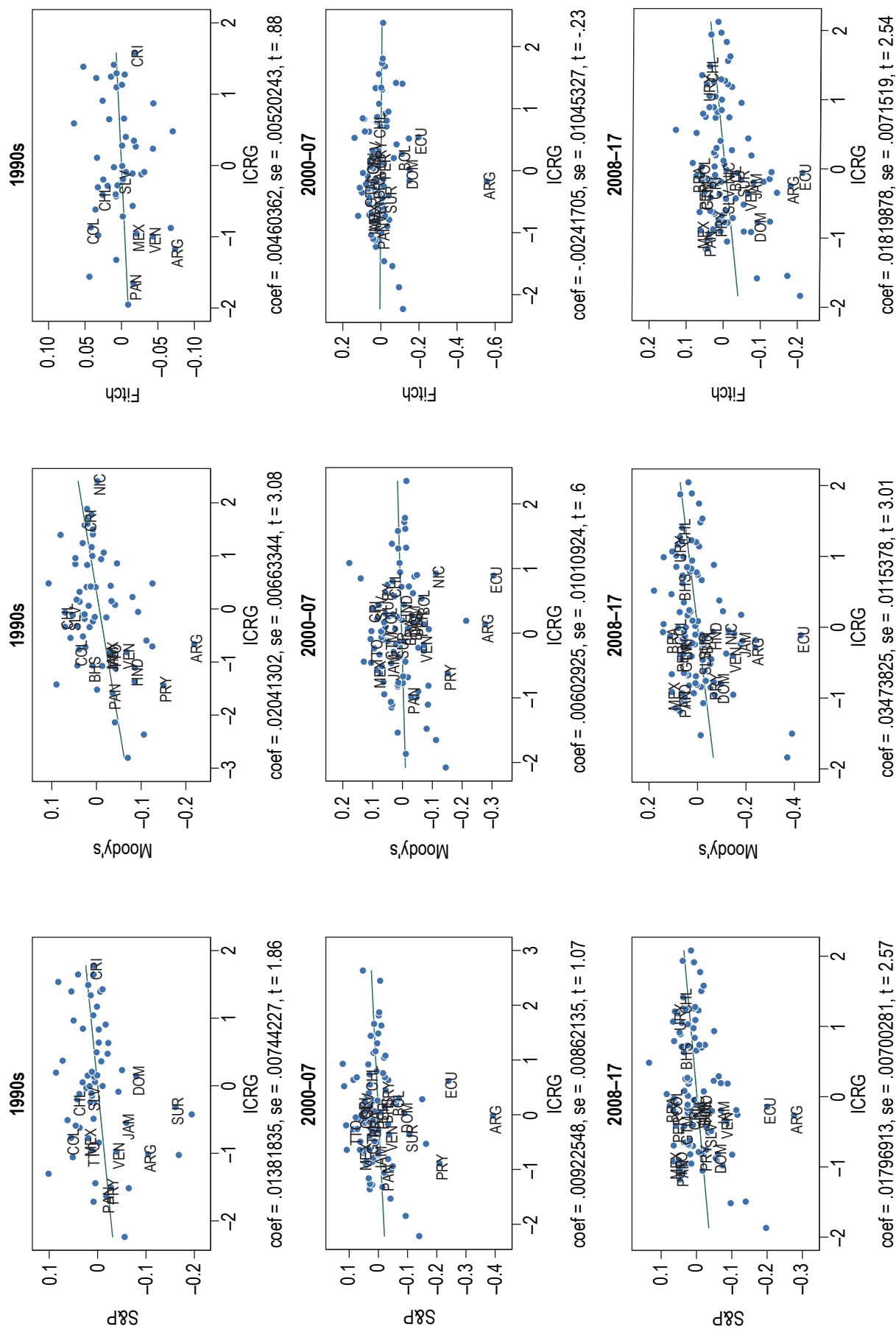
**Figure A9. Conditional Correlation between Sovereign Ratings and TI's Corruption Perception Index**



*Source:* Authors' elaboration based on Fitch, Moody's, Standard & Poor's, TI, and World Bank data.

*Note:* Based on the results of Table A5.

Figure A10. Conditional Correlation between Sovereign Ratings (measured a 1-probability of default) and the ICRG Control of Corruption Indicator

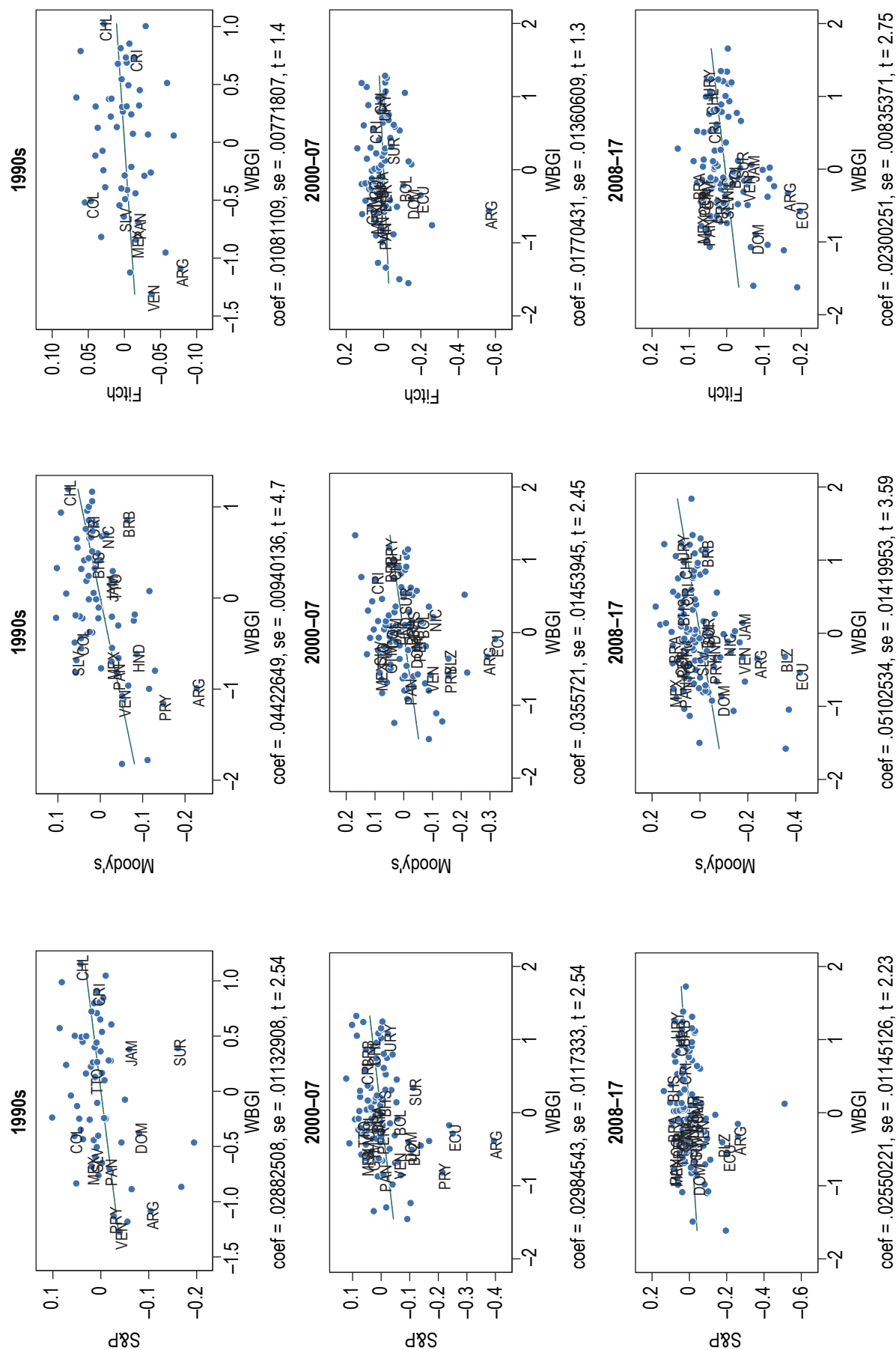


Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, ICRG, and World Bank data.

Note: The graphs are based on the results of a set of estimations similar to those of Table A3 but with the rating variables codes as 1-P of default (see Figure A2).



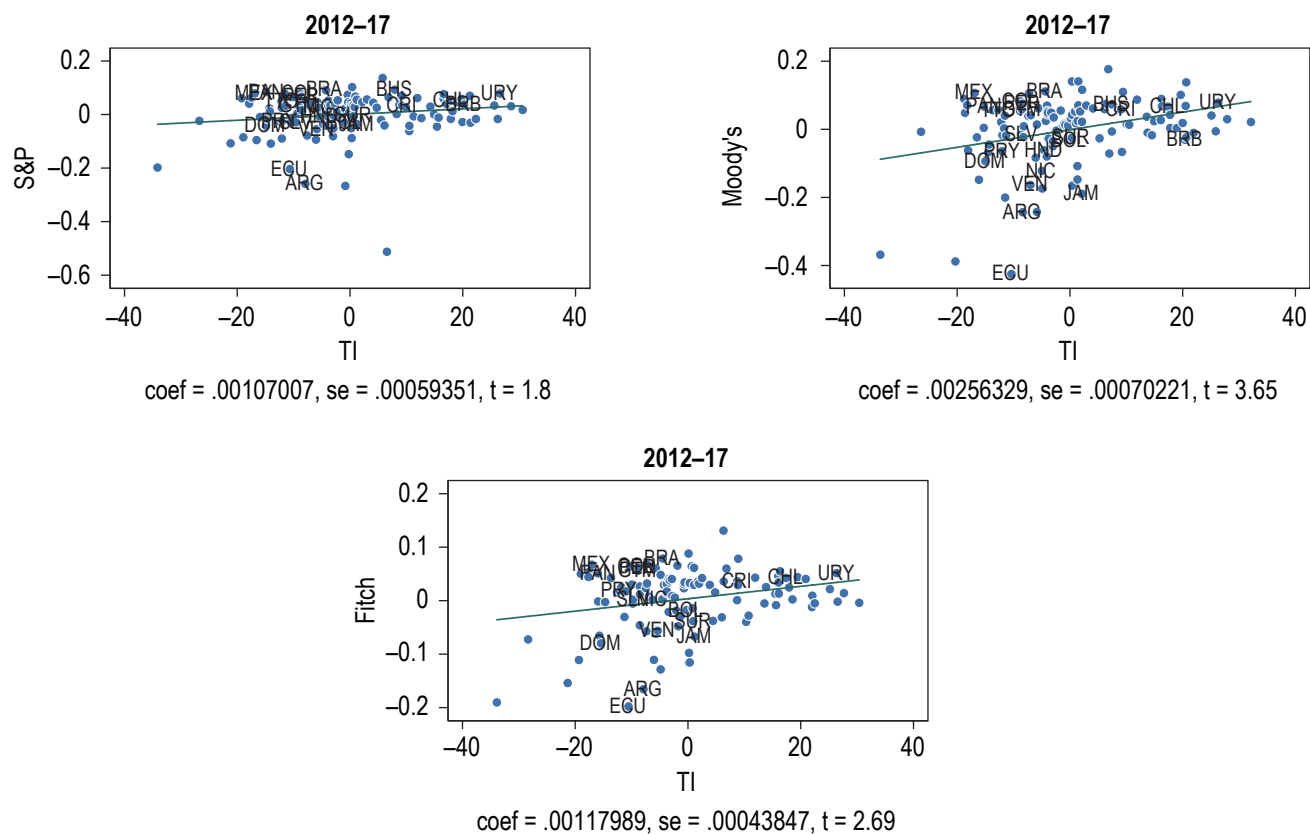
Figure A11. Conditional Correlation between Sovereign Ratings (measured as 1-probability of default) and the WGI Control of Corruption Indicator



Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, and World Bank data.

Note: The graphs are based on the results of a set of estimations similar to those of Table A4 but with the rating variables codes as 1-P of default (see Figure A2).

**Figure A12. Conditional Correlation between Sovereign Ratings (measured as 1-probability of default) and TI's Corruption Perception Index**



Source: Authors' elaboration based on Fitch, Moody's, Standard & Poor's, TI, and World Bank data.

Note: The graphs are based on the results of a set of estimations similar to those of Table A5 but with the rating variables codes as 1-P of default (see Figure A2).

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