Rebelocracy:
Social Order in the Colombian Civil War
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Errata and Supplementary Materials for Chapter 5

This online appendix presents two errata corrections as well as supplementary materials for Chapter 5.

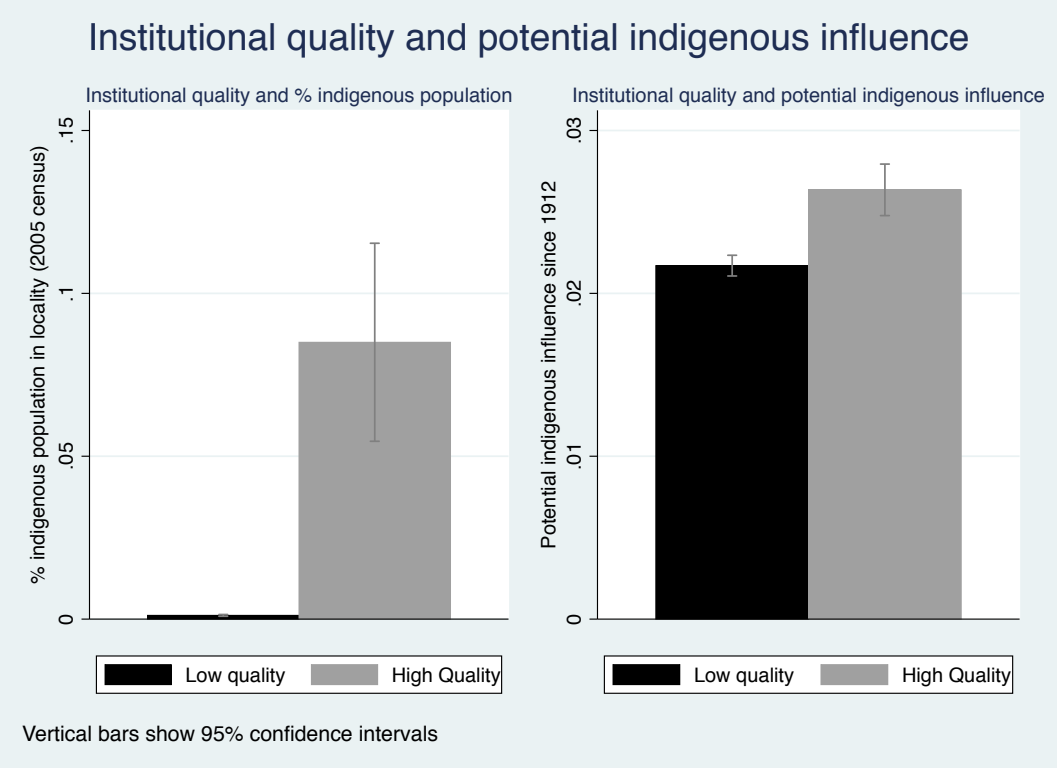
Errata: Corrections for Figure 5.22 and Table A2.6

While making corrections to the book, two errors were made in Figure 5.22 and Table A2.6. Below are the corrections.

Page 153, Figure 5.22

The correct version of Figure 5.22 is below. The text below this figure should read as follows: "As Figure 5.22 shows, the percentage of indigenous people is highly correlated with institutional quality, and the *potential* influence of indigenous people is higher in communities with high-quality local institutions. The instrument is significant at 6% in the first stage of the multilevel model. In an OLS regression, the instrument is significant at 1% and the F statistic is 37. See Appendix 2."

Figure 5.22



Page 350: Table A2.6 Multilevel linear models for rebelocracy using an instrumental variable

Second stage	
Fixed Portion	
High quality institutions (instrumented)	-3.52**
	(1.23)
Paramilitaries	6.48
	(3.81)
Strategic	0.31***
	(0.09)
Average Elevation	0.000
	(0.000)
Cabecera	1.89*
	(0.92)
Collective land	0.16
	(1.37)
(Intercept)	2.09
	(3.78)
Random Portion	
Municipality	1.404
	(1.185)
Locality	0.000
	(0.000)
Dyad	10.44***
	(3.23)
First Stage	
Fixed portion	
Indigenous	12.14^
	(6.72)
Collective land	-0.44***
	(0.07)
Paramilitaries	0.08
	(0.26)
Strategic	0.000
	(0.04)
Average Elevation	0.000
	(0.000)
Cabecera	0.01
	(0.03)
(Intercept)	0.01
	(0.35)

Random portion	
Municipality	0.254
	(0.504)
Armed organization fixed-effects	Yes
Year fixed effects	Yes
Observations	963

Note: standard errors in parentheses (bootstrapped in the second stage).
In an OLS model, the F statistic is 37. The robust Montiel-Pueger test for weak instruments rejects the null at the 5% level with a threshold of 5%.
* p<0.05, ** p<0.01, *** p<0.001 ^p=0.06

Additional robustness tests for the instrumental variable estimation for Rebelocracy in Chapter 5 using OLS

In the multilevel model for rebelocracy that uses an instrumental variable in Chapter 5, the instrumental variable is significant at 6%, which raises concerns about a weak instrument. Unfortunately, the literature on instrumental variables with multilevel models is very limited and there are no clear tests for weak instruments. For this reason, I explore the strength of the instrument using OLS. In order to avoid the problems of dependence caused by data on dyads, I focus on observations on locality-years where only one armed group operated, which requires dropping only 32 observations (less than 1% of the total observations). In this way, the data are structured as a panel where the unit of analysis is the locality-year.

Table 1 shows the results of a 2-stage least squares estimation with armed group fixed effects, and standard errors clustered at the municipality level. The F statistic in the first equation is 37, suggesting a strong instrument. The Montiel and Pueger test for weak instruments, which is robust to heteroskedasticity, serial correlation, and clustering, rejects the null that the instrument is weak at the 5% level with a threshold (tau) of 5%.

Table 1. OLS Models on Rebelocracy With an Instrumental Variable

Second Stage
Dependent variable: Rebelocracy

	(2)	(1)	(2)	(4)
High quality institutions (instrumented)	-7.672***	-8.224***	-6.333***	-6.265***
	(1.817)	(1.442)	(1.168)	(0.938)
Collective land			-0.186	-0.556
			(1.424)	(1.387)
Paramilitaries			5.445*	4.854*
			(1.901)	(2.065)
Strategic			1.156*	0.803
			(0.515)	(0.641)
Average Elevation			0.000	0.000
			(0.000)	(0.000)
Cabecera			0.794	1.017
			(1.541)	(1.460)
(Intercept)	10.604***	10.823***	4.334*	4.48*
	(0.806)	(0.933)	(2.145)	(2.220)
Armed organization fixed-effects	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	No	Yes
Observations	932	932	932	932

First Stage
Instrumented variable: Institutional Quality

	(1)	(2)	(3)	(4)
Indigenous	9.918***	9.939***	12.117***	12.633***
	(1.650)	(1.722)	(2.022)	(2.086)
Collective land			0.117	0.101
			(0.329)	(0.336)
Paramilitaries			0.073	-0.003
			(0.243)	(0.248)
Strategic			-0.034	-0.081
			(0.046)	(0.061)
Average Elevation			0.000*	0.000*
			(0.000)	(0.000)
Cabecera			-0.103	-0.105
			(0.203)	(0.201)
(Intercept)	0.058	0.005	0.054	0.102
	(0.226)	(0.248)	(0.268)	(0.319)
Armed organization fixed-effects	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	No	No
Observations	932	932	932	932
F statistic	36.1	33.3	35.8	36.6
Effective F statistic (Montiel-Pflueger)	37.4	34.5	37.1	37.93

Note: * p<0.05, ** p<0.01, *** p<0.001

Standard errors in parentheses

Alternatives to Hierarchical Multilevel Models in Chapter 5

In Chapter 5 I mentioned that the results of the hierarchical multilevel models are consistent with the results obtained using other types of models. Below I present the results using OLS models, cross-nested multilevel models and a multinomial model.

1. OLS models

Tables 2 and 3 show the results of OLS models with armed group and year fixed effects, and standard errors clustered at the municipality level.[1]

Table 2. OLS Models on Order

Dependent variable: Order									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Indiscipline	-0.802***		-0.808***	-0.862***	-0.753***	-0.841***			
	(0.0948)		(0.0945)	(0.111)	(0.113)	(0.115)			
Indiscipline_lagged							-0.811***		
							(0.115)		
Indiscipline_dev_mean								-0.785***	-0.824***
								(0.0994)	(0.110)
Competition		-0.562**	-0.545***	-0.574***	-0.550***	-0.471***			
		(0.155)	(0.127)	(0.130)	(0.125)	(0.128)			
Competition_lagged							-0.434**		
							(0.134)		
Competition_mean								-1.105*	-1.229**
								(0.424)	(0.374)
competition_dev_mean								-0.445***	-0.451***
								(0.0977)	(0.0972)
Strategic				0.182*	0.222*				
				(0.0832)	(0.0874)				
High-quality institutions					-0.270				
					(0.139)				
HIgh-quality institutions & strategic					-0.226				
					(0.143)				
Resources						0.209			
						(0.127)			
Resources*Competition						-0.334			
						(0.184)			
Paramilitaries	0.737***	0.727***	0.790***	0.931***	0.669**	0.953***	0.963**	0.769***	1.000*
	(0.132)	(0.0784)	(0.103)	(0.244)	(0.183)	(0.249)	(0.281)	(0.116)	(0.363)
Altitude				0.0000677	0.0000452	0.0000741	0.0000623		
				(0.0000740)	(0.0000688)	(0.0000753)	(0.0000820)		
Altitude_mean									0.0000788
									(0.0000781)
Cabecera				-0.00264	-0.0934	0.00506	-0.0306		
				(0.130)	(0.116)	(0.131)	(0.131)		
Cabecera_mean									0.00358
									(0.272)
Constant	1.876***	1.851***	1.906***	1.558***	2.019***	1.527***	1.706***	1.932***	1.693**
	(0.221)	(0.219)	(0.161)	(0.355)	(0.264)	(0.368)	(0.402)	(0.138)	(0.503)
Armed group fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1231	1248	1231	1231	1175	1231	1112	1231	1231
Standard errors in parentheses									
* p<0.05, ** p<0.01, *** p<0.001	** p<0.01	*** p<0.001"							

[1] In models 8 and 9 the cluster mean of indiscipline is omitted due to collinearity with the armed group fixed effects.

Table 3. OLS Models on Rebelocracy

Dependent variable: Rebelocracy (index)

	(1)	(2)	(3)	(4)	(5)	(6)
Institutional quality	-4.250***	-4.031***			-3.209**	
	(1.087)	(0.932)			(0.976)	
State ruled			2.208**	1.853**		
			(0.772)	(0.633)		
Preinstiutions*Strategic					-2.308**	
					(0.679)	
Resistance lagged						0.822**
						(0.276)
Paramilitaries	5.463**	4.876*	3.756	3.966	4.622	4.341
	(1.838)	(2.290)	(2.452)	(2.659)	(2.281)	(2.240)
Strategic		1.073		0.929*	1.597**	1.358
		(0.533)		(0.443)	(0.540)	(1.199)
Altitude		-0.000457		-0.000290	-0.000469	0.000198
		(0.000338)		(0.000419)	(0.000326)	(0.000387)
Cabecera		1.468		1.910	1.394	0.273
		(1.232)		(1.103)	(1.186)	(0.879)
Constant	4.426***	3.603	4.196***	2.654	3.789	7.530***
	(0.598)	(1.938)	(0.852)	(1.701)	(1.909)	(1.466)
Observations	963	963	1010	1010	963	212
Armed group fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors clustered at the municipality level in parentheses

* p<0.05, ** p<0.01, *** p<0.001

2. Cross-nested or cross-classified multilevel models (CCMLM)

The literature on dyadic analysis often recommends using cross-nested or cross-classified multilevel models (CCMLM), which take into account the kind of non-hierarchical clustering that is typical of dyads (Rabe-Hesketh & Skrondal 2008; Rasbash & Browne 2008:ch.11; Gooty & Yammarino 2010). The data analyzed in chapters 5 and 8 exhibit such a structure because a given municipality can be home to different armed groups, while an armed group can be present in several municipalities. However, given that there are only about twenty armed groups belonging to ten organizations or federations, the sample size is too small to include a random effect for the armed group. As a robustness test, the models were estimated using CCMLM. Tables 4 and 5 show that the substantive results do not change.

Table 4. Cross-classified multilevel models on order

Dependent variable: Order Index

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fixed Portion									
Indiscipline	-0.902***		-0.928***	-0.936***	-0.898***	-0.937***			
	(0.0563)		(0.0503)	(0.0507)	(0.0529)	(0.0504)			
Lagged Indiscipline							-0.801***		
							(0.0584)		
Indiscipline_mean								1.473*	1.442*
								(0.615)	(0.615)
Indiscipline_dev_mean								-0.926***	-0.931***
								(0.0505)	(0.0505)
Competition		-0.571***	-0.567***	-0.571***	-0.555***	-0.524***			
		(0.0336)	(0.0304)	(0.0305)	(0.0300)	(0.0345)			
Lagged Competition							-0.400***		
							(0.0355)		
Competition _mean								-0.827	-1.157*
								(0.526)	(0.520)
Competition_dev_mean								-0.566***	-0.566***
								(0.0305)	(0.0305)
High-quality institutions					-0.199				
					(0.145)				
High-quality institutions & Strategic					0.0200				
					(0.0508)				
Resources						-0.00539			
						(0.0358)			
Resources & Competition						-0.165**			
						(0.0586)			
Paramilitaries	0.737**	0.441	0.650**	0.659**	0.849***	0.674**	0.762*	0.400	0.429
	(0.280)	(0.279)	(0.246)	(0.246)	(0.240)	(0.245)	(0.345)	(0.262)	(0.262)
Strategic				-0.0288	-0.0308				
				(0.0326)	(0.0364)				
Altitude				0.000*	0	0.000*	0.000*		
				(0.000)	(0.000)	(0.000)	(0.000)		
Cabecera				0.131	0.0973	0.141	0.0777		
				(0.124)	(0.133)	(0.124)	(0.126)		
Altitude_mean									0.000
									(0.000)
Cabecera_mean									0.319
									(0.286)
(Intercept)	2.019***	1.978***	2.174***	1.995***	2.059***	1.972***	1.834***	2.209***	1.969***
	(0.302)	(0.303)	(0.268)	(0.287)	(0.292)	(0.285)	(0.374)	(0.278)	(0.303)
Random portion (variance)									
Municipality	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Locality	0.102***	0.103***	0.114***	0.102***	0.102***	0.0998***	0.101***	0.113***	0.0874***
	(0.0538)	(0.0586)	(0.0545)	(0.0516)	(0.0511)	(0.0503)	(0.0509)	(0.0541)	(0.0472)
Dyad	0.205***	0.301***	0.193***	0.186***	0.181***	0.186***	0.188***	0.192***	0.193***
	(0.0454)	(0.0619)	(0.0421)	(0.0407)	(0.0418)	(0.0406)	(0.0415)	(0.0419)	(0.0420)
Armed organization fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1231	1248	1231	1231	1175	1231	1112	1231	1231

Note: * p<0.05, ** p<0.01, *** p<0.001

Standard errors in parentheses

Table 5. Cross-classified multilevel models on rebelocracy

	Dependent variable: Rebelocracy					
	(1)	(2)	(3)	(4)	(5)	(6)
Fixed Portion						
High-quality institutions	-4.065***	-3.897***			-3.675***	
	(-0.851)	(-0.863)			(-0.864)	
State ruled			1.883*	1.743*		
			(-0.866)	(-0.871)		
High-quality institutions & Strategic					-0.618*	
					(-0.249)	
Lagged resistance						-0.979***
						(-0.0769)
Paramilitaries	9.360***	9.658***	9.104***	9.395***	9.625***	0.162
	(-1.078)	(-1.074)	(-1.056)	(-1.052)	(-1.07)	(-0.239)
Strategic		0.569***		0.538***	0.769***	-0.0418
		(-0.159)		(-0.153)	(-0.178)	(-0.0748)
Altitude		0.000		0.000	0.000	0.000
		(0.000)		(0.000)	(0.000)	(0.000)
Cabecera		0.85		1.339	0.819	1.636
		(-0.846)		(-0.941)	(-0.843)	(-1.337)
(Intercept)	2.229	0.897	-0.0948	-1.464	0.81	8.781***
	(-1.274)	(-1.482)	(-1.298)	(-1.422)	(-1.475)	(-1.186)
Random portion						
Municipality	0.000***	0.000	0.000	0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Locality	3.438	3.937*	0.000	0.576	3.803*	1.483
	(-2.355)	(-2.52)	(0.000)	(-2.404)	(-2.501)	(-2.726)
Dyad	6.976***	6.538***	11.91	11.06***	6.511***	10.32***
	(-1.792)	(-1.724)	(0.000)	(-2.883)	(-1.725)	(-3.64)
Armed organization fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	932	932	978	978	932	199

Note: * p<0.05, ** p<0.01, *** p<0.001
Standard errors in parentheses

3. Multinomial model

In Chapter 2, I defined order as the existence of stable rules that give rise to predictability; rebelocracy and aliocracy are defined on the basis of the scope of the armed actor in defining those stable rules. Based on this conceptualization, rebelocracy and aliocracy cannot exist under disorder. For this reason, I approach the question of whether order or disorder emerges as a separate question from whether order takes the form of aliocracy or rebelocracy, conditional on order having emerged. There are reasons to believe that there is not a problem of selection bias. To give an intuitive example, if we investigate the effect of a treatment for cancer we would only compare patients with cancer who received and did not receive treatment; we would not compare them to the general population. Given the complexity of multilevel models, estimating separately the determinants of order and the determinants of rebelocracy is a better strategy.

However, as a robustness I estimate a multinomial model to test the central hypotheses on order and rebelocracy, where each observation is classified as either disorder, rebelocracy, or aliocracy, using the dichotomous variables described in Chapter 6, and with standard errors clustered at the level of the municipality. The results do not change in any substantial way, as Table 6 shows.

Table 6. Multinomial models for social order

	Dependent variable: Type of social order	
	Base category: disorder	Base category: aliocracy
Disorder		
Competition		5.338***
		(1.278)
Indiscipline		1.933*
		(0.826)
High-quality institutions		-1.523
		(0.908)
Constant		-0.494
		(0.73)
Alliocracy		
Competition	-5.338***	
	(1.278)	
Indiscipline	-1.933*	
	(0.826)	
High-quality institutions	1.523	
	(0.908)	
Constant	0.494	
	(0.73)	
Rebelocracy		
Competition	-3.265***	2.073
	(0.653)	(1.211)
Indiscipline	-1.357***	0.576
	(0.396)	(0.794)
High-quality institutions	-0.916*	-2.438**
	(0.456)	(0.775)
Constant	3.031***	2.537***
	(0.504)	(0.673)
Observations	1175	1175

Note: * p<0.05, ** p<0.01, *** p<0.001
Standard errors clustered at the municipality level in parentheses