

Using Regulation Bias to Maintain Regime Stability

Agricultural Distortions in Authoritarian Regimes, 1972–2010

(Online Appendix)

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Abstract

We extend the Stigler-Peltzman theory of government regulation to authoritarian regimes in order to develop a more general “general theory of regulation” (Peltzman 1976; Stigler 1971). Policy is affected by politicians’ marginal rate of substitution between producers’ and consumers’ support (Rogowski and Kayser 2002). In the political market, leaders are either responsive to the highly organized special interests for monetary support, or to the mass for electoral support, which is manifested in votes in democracies, and *lack* of protests in the context of authoritarian regimes. Using panel data of 2,729 country-years over the period of 1972–2010, we find evidence that incumbent regimes display different patterns in agricultural regulations, dependent on whether they are under the special interest pressure from producers, or “electoral” pressure from consumers: Authoritarian leaders lower food price in order to maintain stability in the urban area (Bates 2005, Ch. 2), while democratic leaders are more likely to pass regulations that favor the highly organized agricultural producers. We also demonstrate that the possibility of civil unrest increases significantly as the regime adopts policies that favor the farmers (which is inevitable in the face of shocks), while the negative relationship between urban bias and civil unrest is dampened in democracies. In line with MacIntyre (2003), we argue that the mechanism is that democratic leaders are more *efficient* at cooperating over policy adjustment in the case of a shock than leaders in authoritarian regimes.

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A1. Observations

The data set includes 2,729 country-year observations covering 77 countries from 1972–2010.

Country	Counts	Country	Counts	Country	Counts
Argentina	39	Ghana	37	Philippines	38
Australia	39	Greece	30	Poland	39
Austria	39	Hungary	38	Portugal	37
Bangladesh	38	India	39	Romania	38
Belgium	39	Indonesia	39	Russian Federation	19
Benin	34	Ireland	39	Senegal	38
Brazil	39	Israel	31	Slovak Republic	18
Bulgaria	39	Italy	39	Slovenia	19
Burkina Faso	38	Japan	39	South Africa	37
Cameroon	38	Kazakhstan	16	Spain	36
Canada	39	Kenya	39	Sri Lanka	39
Chad	30	Korea, Rep. (S)	38	Sweden	39
Chile	39	Latvia	19	Switzerland	39
China	39	Lithuania	19	Taiwan, China	39
Colombia	39	Madagascar	35	Tanzania	39
Cote d'Ivoire	29	Malaysia	39	Thailand	37
Cyprus	6	Mali	38	Togo	37
Czech Republic	18	Mexico	39	Turkey	39
Denmark	39	Morocco	30	Uganda	37
Dominican Republic	39	Mozambique	36	Ukraine	19
Ecuador	39	Netherlands	39	United Kingdom	39
Egypt, Arab Rep.	39	New Zealand	39	United States	39
Estonia	19	Nicaragua	37	Vietnam	34
Ethiopia	34	Nigeria	37	Zambia	38
Finland	39	Norway	39	Zimbabwe	30
France	39	Pakistan	38		

Table 1: Country-Year Observations in the Study

A2. Descriptive statistics

	Min.	Max.	Mean	SD	Median
NRA	-0.87	4.32	0.19	0.56	0.05
Regime type	0.00	1.00	0.56	0.50	1.00
Population (log)	13.85	21.04	16.87	1.34	16.60
Urban population (log)	12.78	20.29	16.10	1.39	15.89
GDP pc (log)	4.25	11.39	7.67	1.71	7.59
Executive constraint	1.00	7.00	4.95	2.19	6.00

Table 2: Descriptive statistics

A3. Outcome variable

The outcome variable is the nominal rates of assistance to producers (NRA), and it is measured as the percentage by which government policies have raised gross returns to farmers above what they would be without the government's intervention. That is, a positive NRA indicates government's pro-rural stance, and a negative NRA indicates government's pro-urban stance while adopting policies (Anderson and Nelgen 2013). One particular advantage of using the CTE to measure food price is that it is expressed as a percentage of the undistorted world price (Anderson 2009). That is, we can compare such measures cross-nationally *without* a need to control for exchange rates, or pre-intervention prices (Weinberg 2012). The figure below shows the density of the NRA. Note that authoritarian regimes, compared to democracies, have a lower mean in the NRA ($\mu_{\text{NRA}}^{\text{aut}} \approx -0.074$; $\mu_{\text{NRA}}^{\text{dem}} \approx 0.416$).

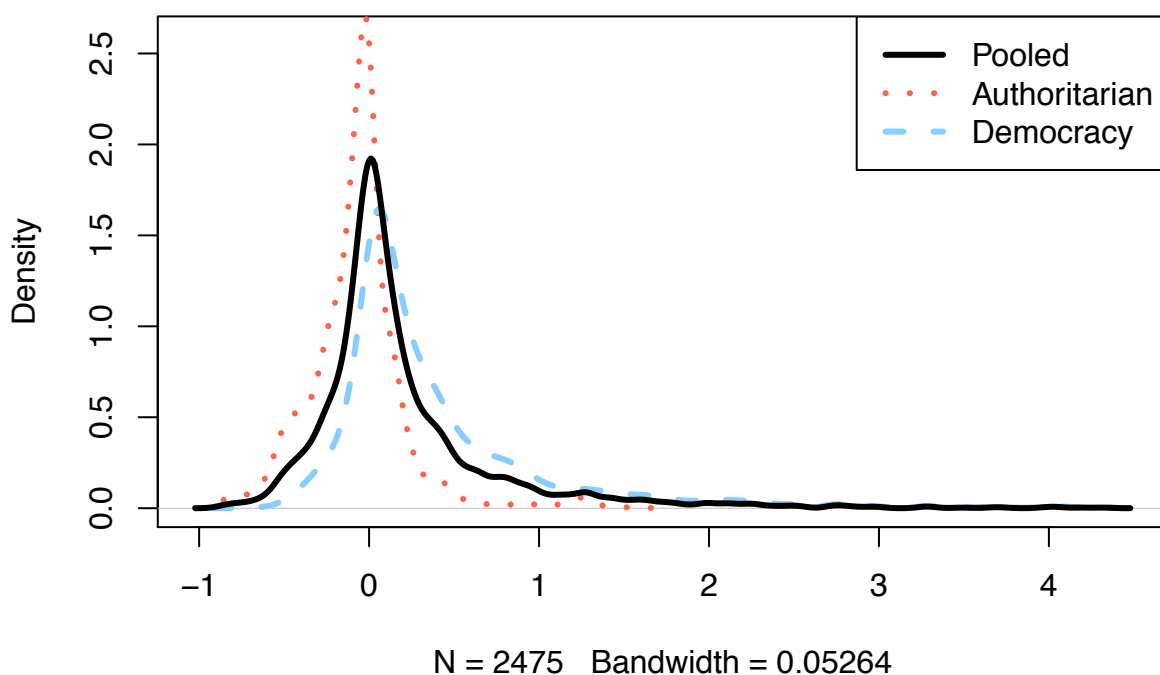


Figure 1: NRA (by Regime Type)

A4. Explanatory Variables

One explanatory variable (**unrest**) is a count of total instances of unrest within each country-year observation. There are a total of 4,132 social unrest recorded in this data set. The data come from the Cross-national Time-series (hereafter, CNTS) Data Archive Banks (Banks and Wilson 2017). CNTS is one of the most commonly used cross-sectional time-series data set that includes information on unrest such as anti-government protests. The figure below shows the distribution of the outcome variable. Note that the distribution of **unrest** is positively skewed, which suggests that we should use non-linear models for the analysis. For robustness checks, we also include a zero-inflation model in order to allow for frequent zero-valued observations (Lambert 1992).

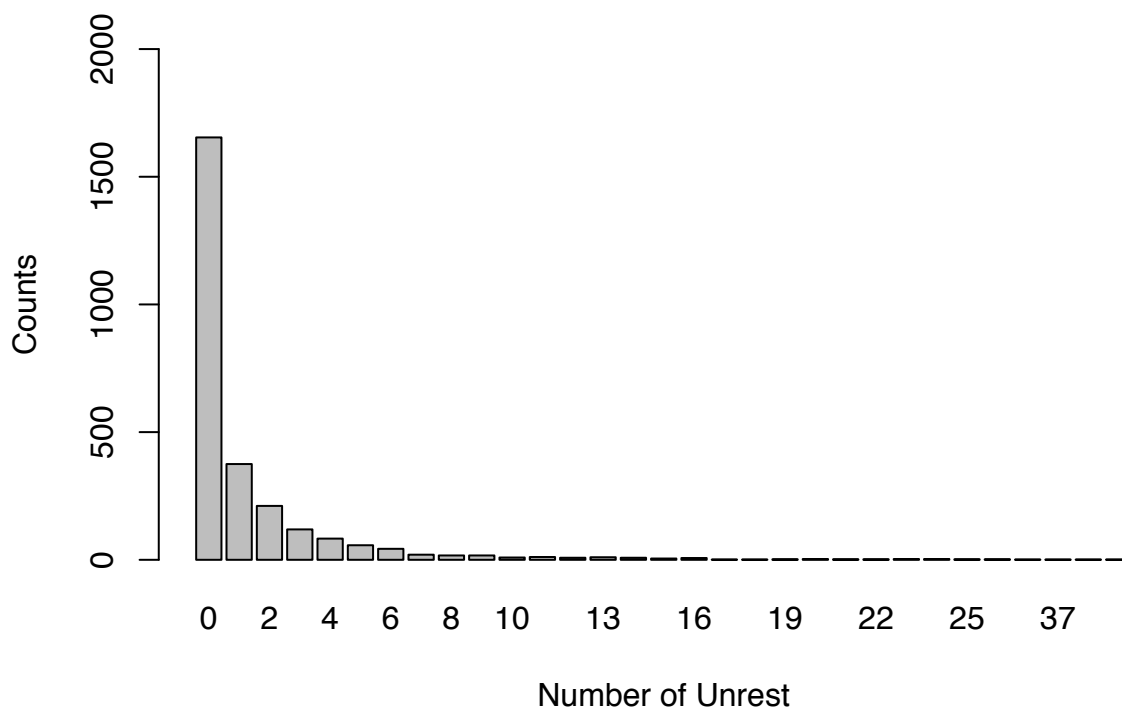


Figure 2: Outcome Variable: Unrest

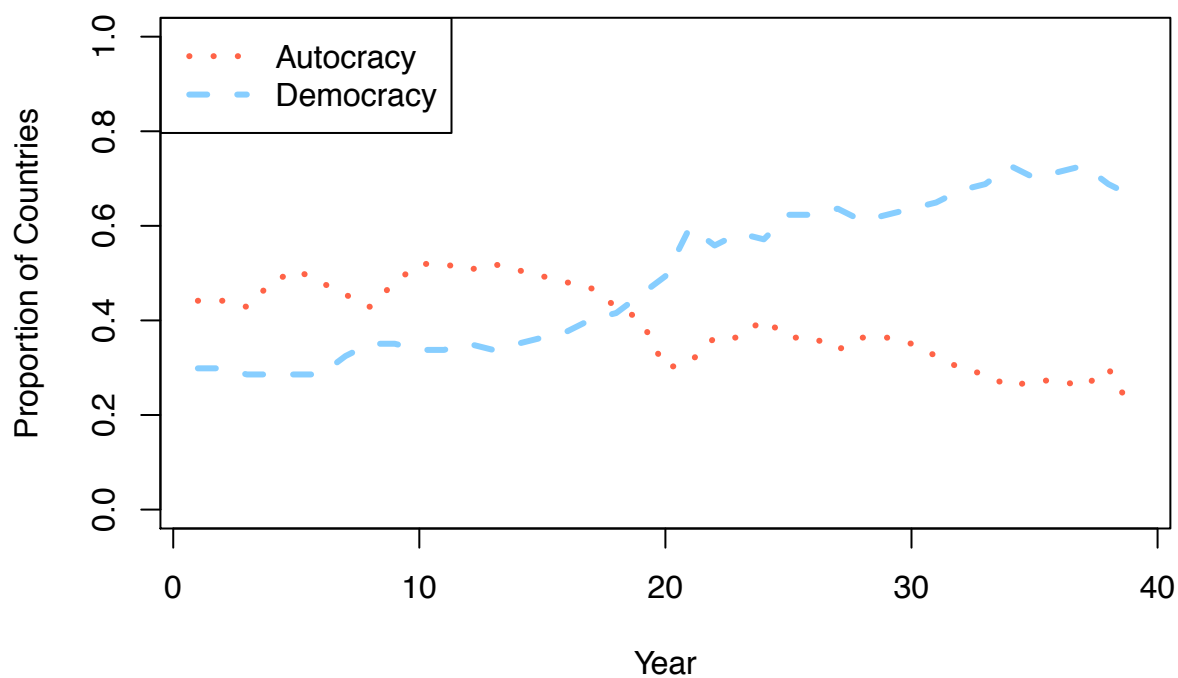


Figure 3: Number of Democracies and Autocracies

Figure (3) shows the numbers of democracies and autocracies in our sample each year.

A5. Motivation: Policy Bias under Stigler-Peltzman Framework

Table 3: Regime Type Explains Regulation Bias

	Regulation Bias, Measured by NRA			
	(1)	(2)	(3)	(4)
Regime type	0.4475*** (0.0189)	0.1246*** (0.0170)	0.1461*** (0.0174)	0.0939*** (0.0158)
log(Population)				0.3327*** (0.1044)
log(Urban population)				0.1291** (0.0551)
(Intercept)	-0.0661*** (0.0090)	-0.2960*** (0.0249)	-0.3599*** (0.0366)	-8.1176*** (1.0603)
Year FE	No	No	Yes	Yes
Country FE	No	Yes	Yes	Yes
Cluster SE	Yes	Yes	Yes	Yes
N	2,463	2,463	2,463	2,418
R ²	0.1549	0.7562	0.7903	0.8070
Adjusted R ²	0.1545	0.7483	0.7801	0.7973
Residual Std. Error	0.5155	0.2813	0.2629	0.2503
F Statistic	450.9476***	96.0523***	76.9297***	82.9658***

*p < .1; **p < .05; ***p < .01

Table (3) shows that regulators have bias. Authoritarian regimes, compared to democracies, tend to favor pro-urban policies. In particular, the NRA in a democracy is about 15.0% higher than that in an authoritarian regime, once controlling for unobserved, time-invariant heterogeneity over time and countries.

A6. Baseline Specification

Table 4: Domestic Unrest Explains Agricultural Distortion

	RuralBias_t			ΔRuralBias_t		
	ARDL	ARDL (Democracy)	ARDL (Autocracy)	ECM	ECM (Democracy)	ECM (Autocracy)
	(1)	(2)	(3)	(4)	(5)	(6)
Unrest _t	−0.0030*	−0.0003	−0.0033**			
	(0.0017)	(0.0015)	(0.0016)			
RegimeType _t	0.0202					
	(0.0169)					
Δ Unrest _t				−0.0032*	−0.0003	−0.0033**
				(0.0017)	(0.0015)	(0.0016)
Δ RegimeType _t				0.0317		
				(0.0193)		
Unrest _{t−1}	0.0029**	−0.0019	0.0034**	0.0002	−0.0022	0.0001
	(0.0012)	(0.0017)	(0.0015)	(0.0016)	(0.0017)	(0.0018)
RegimeType _{t−1}	0.0161			0.0365***		
	(0.0169)			(0.0124)		
RuralBias _{t−1}	0.7819***	0.7761***	0.6889***	−0.2178***	−0.2239***	−0.3111***
	(0.0329)	(0.0427)	(0.0596)	(0.0329)	(0.0427)	(0.0596)
Unrest _t × RegimeType _t	0.0038*					
	(0.0020)					
Δ Unrest _t × Δ RegimeType _t				−0.0005		
				(0.0063)		
Unrest _{t−1} × RegimeType _{t−1}	−0.0035*			0.0003		
	(0.0018)			(0.0021)		
Δ Unrest _t × RegimeType _{t−1}				0.0045**		
				(0.0022)		
Unrest _{t−1} × Δ RegimeType _t				−0.0006		
				(0.0047)		
(Intercept)	−0.2024***	−0.1377***	−0.1831***	−0.2027***	−0.1377***	−0.1831***
	(0.0352)	(0.0466)	(0.0521)	(0.0352)	(0.0466)	(0.0521)
N	2,380	1,386	996	2,380	1,386	996
Adjusted R ²	0.9137	0.9245	0.7832	0.1788	0.2588	0.1608
F Statistic	210.9765***	167.1649***	42.3162***	5.2457***	5.7412***	3.1908***
Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster SE	Yes	Yes	Yes	Yes	Yes	Yes

*p < .1; **p < .05; ***p < .01

A7. Final Specification

A key threat to identification might arise due to omitted-variable bias. We use country and year fixed effects to account for unobserved time invariant heterogeneity. In addition to country and year FEs, specifications in Table (5) include various sets of control variables in order to account for unobserved time-varying heterogeneity. More populated countries might experience more volatile political change, so we control for the country’s total population. For robustness checks, we control for the urban population, and the results remain similar.

Another important source of unobserved heterogeneity is state capacity: Strong states can not only repress protests when they happen, but also deter citizens from protesting in the first place because they expect a regime crackdown. We use constraint on executive (Acemoglu and Johnson 2005; Marshall and Jaggers 2004) to control for state capacity.

Table 5: Final Specification, with Controls

	RuralBias _t		Δ RuralBias _t	
	ARDL	ARDL	ECM	ECM
	(1)	(2)	(3)	(4)
Unrest _t	-0.0038** (0.0016)	-0.0039** (0.0016)		
RegimeType _t	0.0037 (0.0162)	0.0078 (0.0170)		
Δ Unrest _t			-0.0040** (0.0016)	-0.0040** (0.0016)
Δ RegimeType _t			0.0109 (0.0189)	0.0115 (0.0192)
Unrest _{t-1}	0.0024* (0.0013)	0.0027** (0.0012)	-0.0013 (0.0016)	-0.0012 (0.0016)
RegimeType _{t-1}	0.0151 (0.0162)	0.0098 (0.0174)	0.0189* (0.0114)	0.0176 (0.0116)
RuralBias _{t-1}	0.7513*** (0.0364)	0.7513*** (0.0364)	-0.2485*** (0.0365)	-0.2485*** (0.0365)
$\log(\text{Population}_{t-1})$	0.2062*** (0.0682)	0.2052*** (0.0676)	0.2068*** (0.0681)	0.2054*** (0.0675)
$\log(\text{Urbanization}_{t-1})$	0.0373 (0.0374)	0.0359 (0.0375)	0.0366 (0.0375)	0.0356 (0.0375)
$\log(\text{GDP pc}_{t-1})$	0.0161 (0.0157)	0.0155 (0.0156)	0.0160 (0.0157)	0.0154 (0.0156)
ExecConstraint _{t-1}		0.0005 (0.0005)		0.0005 (0.0005)
Unrest _t \times RegimeType _t	0.0044** (0.0020)	0.0047** (0.0020)		
Δ Unrest _t \times Δ RegimeType _t			0.0021 (0.0060)	0.0022 (0.0060)
Unrest _{t-1} \times RegimeType _{t-1}	-0.0033* (0.0018)	-0.0036** (0.0018)	0.0011 (0.0021)	0.0011 (0.0021)
Δ Unrest _t \times RegimeType _{t-1}			0.0049** (0.0021)	0.0049** (0.0021)
Unrest _{t-1} \times Δ RegimeType _t			0.0018 (0.0046)	0.0030 (0.0048)
(Intercept)	-4.4252*** (0.8778)	-4.3832*** (0.8649)	-4.4239*** (0.8775)	-4.3815*** (0.8634)
N	2,334	2,334	2,334	2,334
Adjusted R ²	0.9155	0.9156	0.1998	0.2000
F Statistic	208.3057***	206.6712***	5.6987***	5.6647***
Country-Year FE	Yes	Yes	Yes	Yes
Cluster SE	Yes	Yes	Yes	Yes

*p < .1; **p < .05; ***p < .01

A8. Stationarity

In this section, we check whether the outcome variable (NRA_i) and covariates (RegType_i and unrest_i) are stationary.

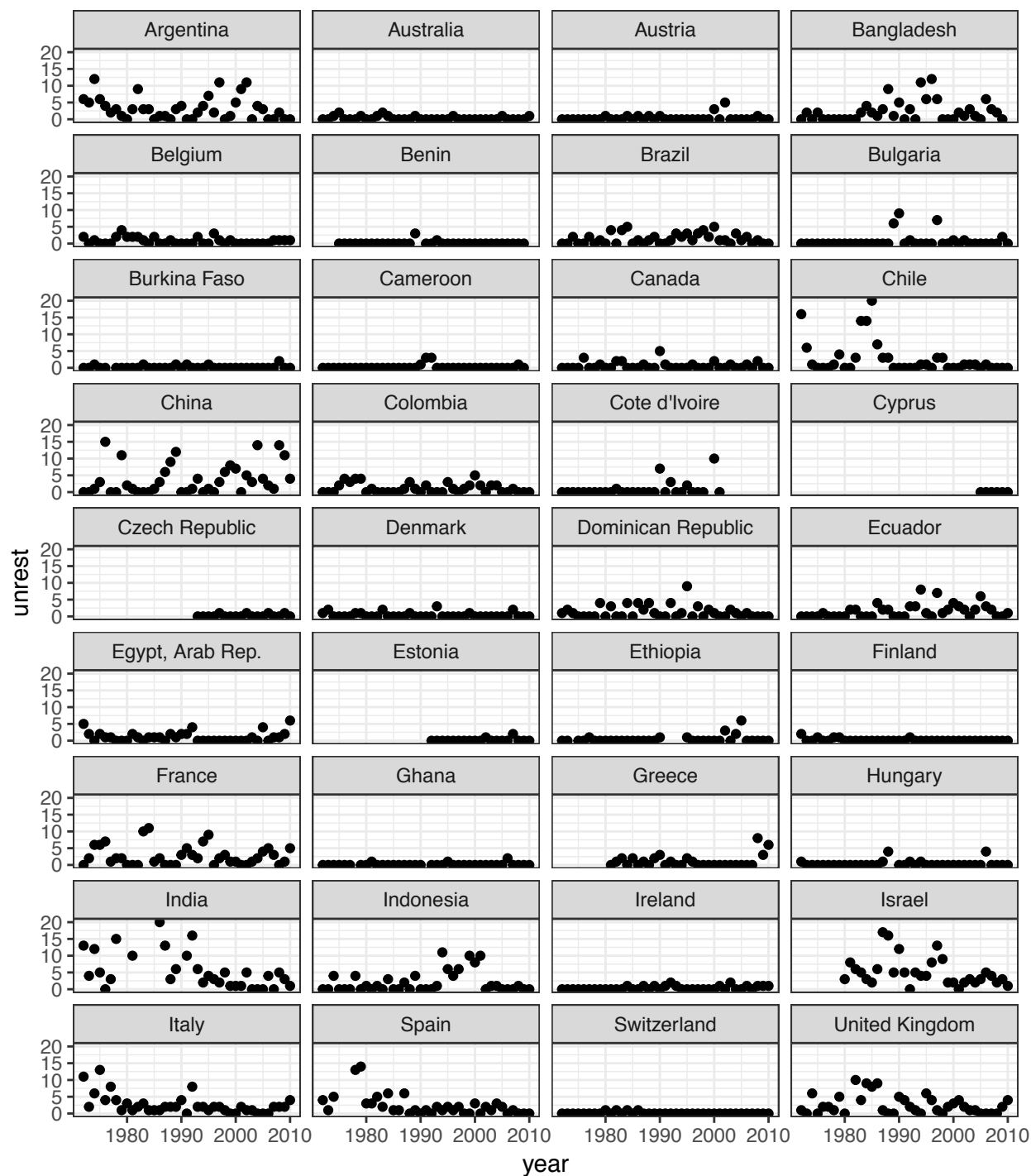


Figure 4: Unrest (by Country)

A9: Robustness Check: Year Trend

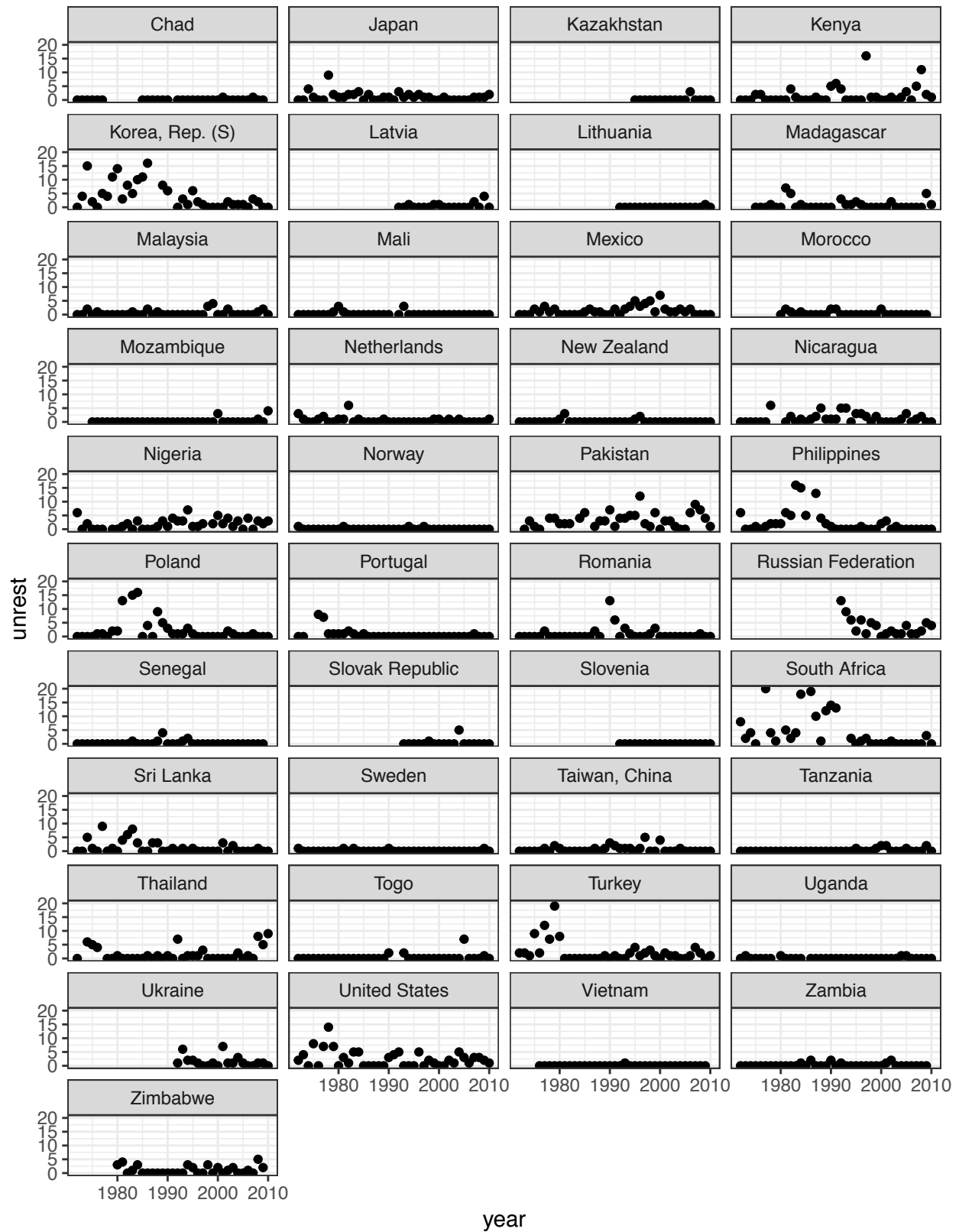


Figure 5: Unrest (by Country), cont.

Table 6: Final Specification, with Controls

	RuralBias_t	ΔRuralBias_t
	ARDL	ECM
	(1)	(2)
Unrest _t	−0.0036** (0.0015)	
RegimeType _t	0.0029 (0.0162)	
ΔUnrest _t		−0.0037** (0.0016)
ΔRegimeType _t		0.0093 (0.0169)
Unrest _{t−1}	0.0038*** (0.0012)	0.0001 (0.0016)
RegimeType _{t−1}	0.0088 (0.0170)	0.0115 (0.0114)
RuralBias _{t−1}	0.7547*** (0.0353)	−0.2450*** (0.0354)
log(Population _{t−1})	0.2436*** (0.0690)	0.2432*** (0.0688)
log(Urbanization _{t−1})	0.0397 (0.0381)	0.0393 (0.0381)
log(GDP pc _{t−1})	0.0265* (0.0146)	0.0262* (0.0146)
ExecConstraint _{t−1}	0.0006 (0.0005)	0.0006 (0.0006)
Year	−0.0072*** (0.0013)	−0.0071*** (0.0013)
Unrest _t × RegimeType _t	0.0044** (0.0020)	
ΔUnrest _t × ΔRegimeType _t		−0.0019 (0.0058)
Unrest _{t−1} × RegimeType _{t−1}	−0.0042** (0.0018)	0.0004 (0.0022)
ΔUnrest _t × RegimeType _{t−1}		0.0047** (0.0021)
Unrest _{t−1} × ΔRegimeType _t		0.0009 (0.0043)
(Intercept)	9.1035*** (1.9763)	9.0446*** (1.9754)
N	2,334	2,334
Adjusted R ²	0.9060	0.1092
F Statistic	259.3468***	4.2127***
Country FE	Yes	Yes
Year Trend	Yes	Yes
Cluster SE	Yes	Yes

*p < .1; **p < .05; ***p < .01

A10. Robustness Check: Extra Lags for ARDL Model

Table 7: ARDL Model with Extra Lags

	RuralBias_t			
	(1)	(2)	(3)	(4)
Unrest _t	−0.0030*	−0.0038**	−0.0034**	−0.0036**
	(0.0017)	(0.0016)	(0.0015)	(0.0015)
RegimeType _t	0.0202	0.0238	0.0259	0.0230
	(0.0169)	(0.0167)	(0.0169)	(0.0170)
Unrest _{t−1}	0.0029**	0.0034***	0.0030***	0.0030***
	(0.0012)	(0.0010)	(0.0010)	(0.0010)
RegimeType _{t−1}	0.0161	0.0078	0.0008	0.0001
	(0.0169)	(0.0167)	(0.0171)	(0.0171)
RuralBias _{t−1}	0.7819***	0.7689***	0.7625***	0.7655***
	(0.0329)	(0.0517)	(0.0511)	(0.0550)
RuralBias _{t−2}		0.0340	−0.0813	−0.0803
		(0.0513)	(0.0565)	(0.0600)
RuralBias _{t−3}			0.1570***	0.1575**
			(0.0389)	(0.0615)
RuralBias _{t−4}				−0.0032
				(0.0529)
Unrest _t × RegimeType _t	0.0038*	0.0045**	0.0043**	0.0046**
	(0.0020)	(0.0020)	(0.0019)	(0.0019)
Unrest _{t−1} × RegimeType _{t−1}	−0.0035*	−0.0038**	−0.0038**	−0.0037**
	(0.0018)	(0.0017)	(0.0017)	(0.0017)
(Intercept)	−0.2024***	−0.1828***	−0.0046	0.0182
	(0.0352)	(0.0313)	(0.0296)	(0.0351)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Cluster SE	Yes	Yes	Yes	Yes
N	2,380	2,304	2,229	2,155
R ²	0.9181	0.9206	0.9233	0.9225
Adjusted R ²	0.9137	0.9162	0.9190	0.9179
Residual Std. Error	0.1635	0.1612	0.1590	0.1603
F Statistic	210.9765***	210.8624***	211.6053***	201.6229***

*p < .1; **p < .05; ***p < .01

A11. Robustness Check: Extra Lags for ECM Model

Table 8: ECM Model: Extra Lags

	$\Delta \text{RuralBias}_t$			
	(1)	(2)	(3)	(4)
ΔUnrest_t	-0.0032* (0.0017)	-0.0041** (0.0016)	-0.0036** (0.0015)	-0.0039*** (0.0015)
$\Delta \text{RegimeType}_t$	0.0317 (0.0193)	0.0325* (0.0188)	0.0349* (0.0192)	0.0328* (0.0193)
Unrest_{t-1}	0.0002 (0.0016)	-0.0002 (0.0016)	-0.0001 (0.0016)	-0.0003 (0.0016)
RegimeType_{t-1}	0.0365*** (0.0124)	0.0319*** (0.0124)	0.0270** (0.0126)	0.0235* (0.0129)
RuralBias_{t-1}	-0.2178*** (0.0329)	-0.2307*** (0.0518)	-0.2370*** (0.0512)	-0.2339*** (0.0552)
RuralBias_{t-2}		0.0338 (0.0513)	-0.0814 (0.0566)	-0.0806 (0.0601)
RuralBias_{t-3}			0.1567*** (0.0389)	0.1578** (0.0615)
RuralBias_{t-4}				-0.0039 (0.0531)
$\Delta \text{Unrest}_t \times \Delta \text{RegimeType}_t$	-0.0005 (0.0063)	0.0045 (0.0058)	0.0038 (0.0058)	0.0041 (0.0058)
$\text{Unrest}_{t-1} \times \text{RegimeType}_{t-1}$	0.0003 (0.0021)	0.0005 (0.0021)	0.0003 (0.0021)	0.0007 (0.0021)
$\Delta \text{Unrest}_t \times \text{RegimeType}_{t-1}$	0.0045** (0.0022)	0.0052** (0.0021)	0.0050** (0.0020)	0.0054*** (0.0021)
$\text{Unrest}_{t-1} \times \Delta \text{RegimeType}_t$	-0.0006 (0.0047)	0.0020 (0.0044)	0.0016 (0.0043)	0.0017 (0.0043)
(Intercept)	-0.2027*** (0.0352)	-0.1831*** (0.0313)	-0.0051 (0.0296)	0.0189 (0.0351)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Cluster SE	Yes	Yes	Yes	Yes
N	2,380	2,304	2,229	2,155
R ²	0.2209	0.2031	0.2246	0.2162
Adjusted R ²	0.1788	0.1586	0.1797	0.1691
Residual Std. Error	0.1636	0.1613	0.1590	0.1603
F Statistic	5.2457***	4.5576***	4.9998***	4.5943***

*p < .1; **p < .05; ***p < .01

A12. Visualization of Autoregressive Relationship

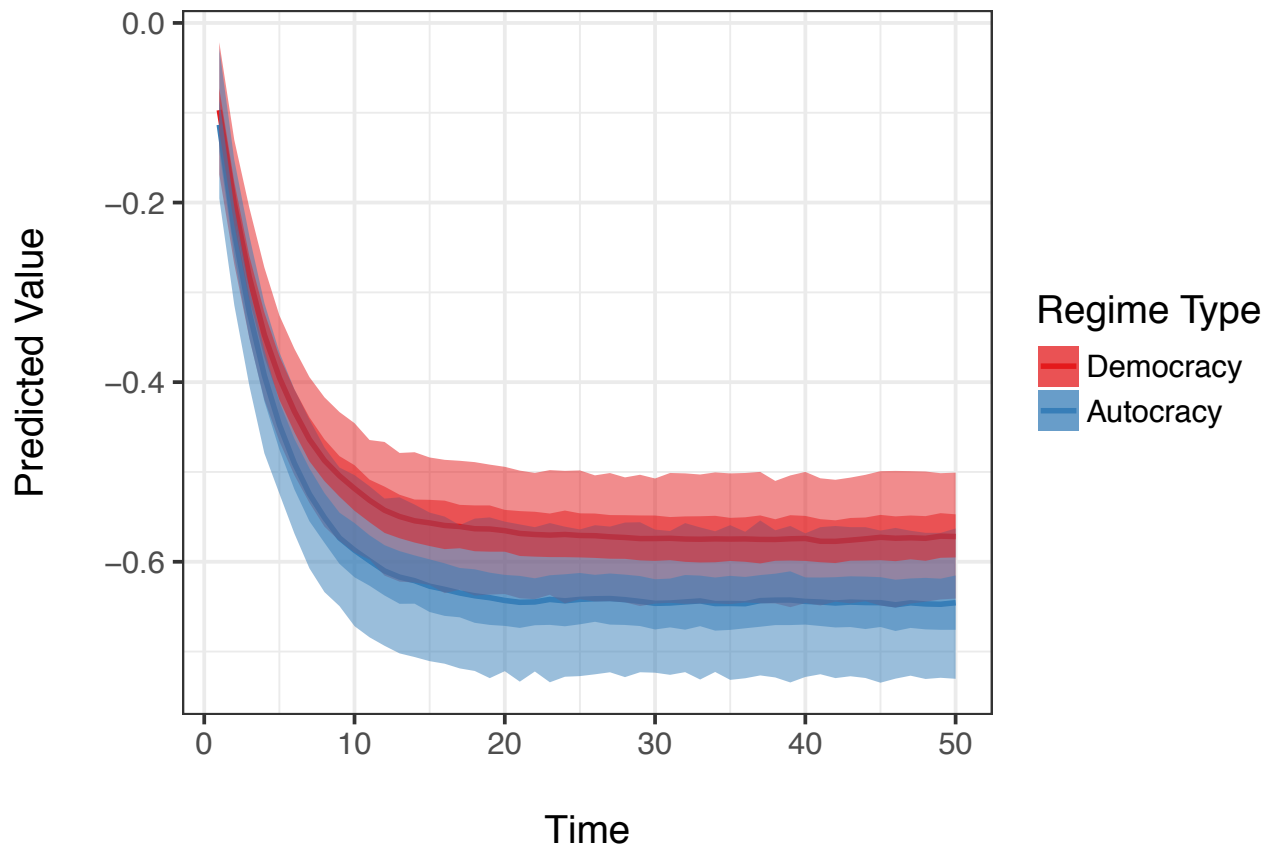


Figure 6: Autoregressive Relationship (Australia)

A13. Dynamic Simulation of Unrest Shocks

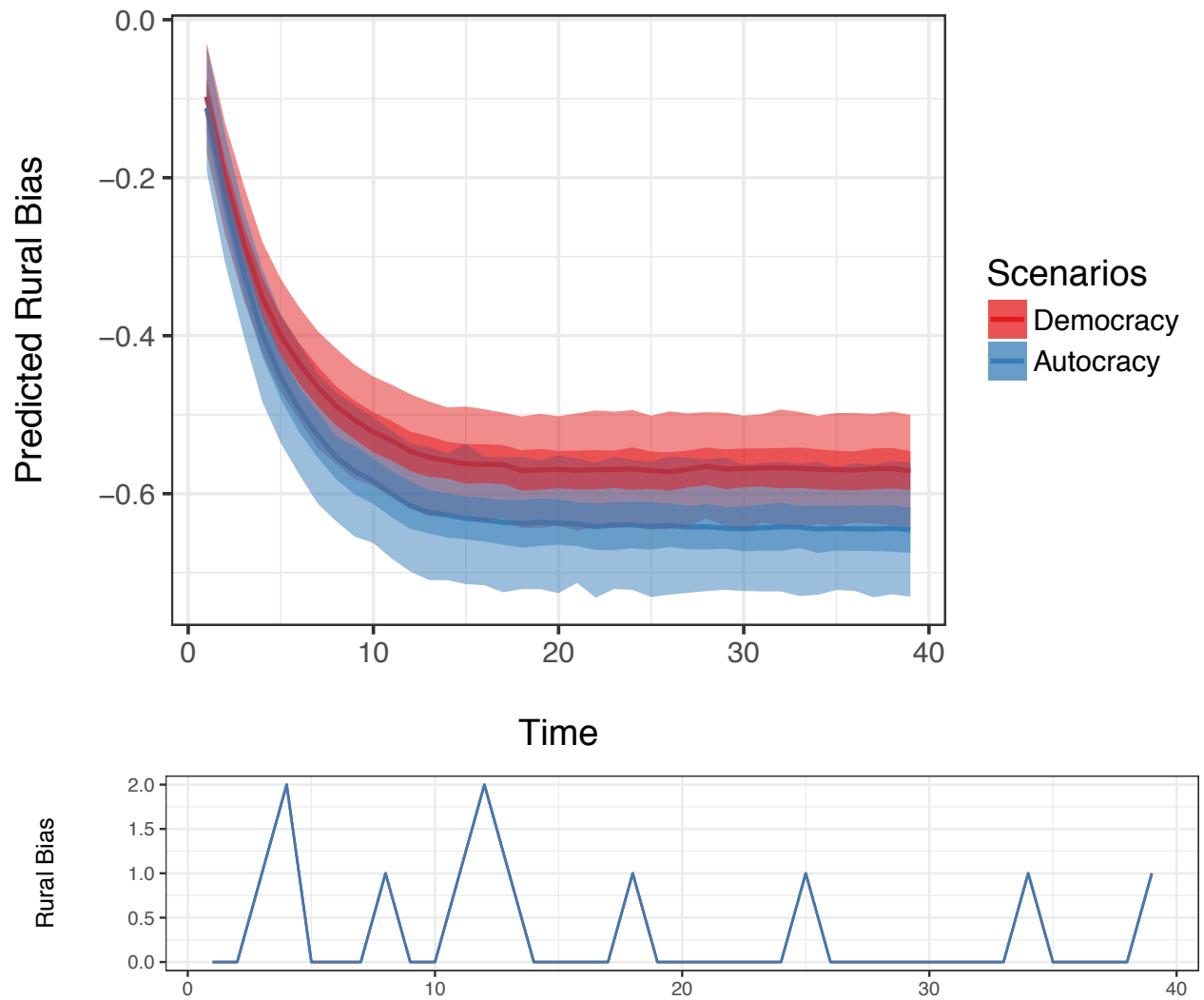


Figure 7: Simulated Effects of Unrests on Rural Bias (Australia)

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