Appendix:
Is Civilian Control Self-Reinforcing? A Measurement-Based Analysis of Civil-Military Relations

Contents

1 Table of Manifest Indicators 1

2 Correlation Among Manifest Indicators 2

3 Drift Parameter Estimates 4

4 Difficulty and Discrimination Parameter Estimates 6

5 Estimates of Uncertainty 10

6 Posterior Predictive Checks 11

7 Latent Civilian Control Estimates By Decade 15

8 Civilian Control Estimates by Regime Type 23

9 Alternate Definitions of Civilianized Regimes 24

10 Model Estimates Omitting the Cold War Era 26

11 Drift in Non-Civilianized Regimes 28

12 Comparison with "Years Since Last Coup" Indicator 32

13 Civilian Control and Coup Proofing 34

14 Alternative Theoretical Mechanisms: Obsolescence 36

15 Left-Censoring 38

16 Comparison with a Standard Dynamic Model 44

1 Table of Manifest Indicators

Table A.1 lists each of the manifest indicators used to generate both static and drift model estimates.

Table A.1: Observing Military Involvement in Politics; Data Sources and Variables

Data source	Variable Name	Description
Horowitz and Stam (2014)	*Leader Military Experience*	Leaders classified based on three categories: (1) no military experience; (2) served in the military; (3) had a career in the military. Data covers 1946-2001.
Database of Political Institutions (DPI) (Beck et al., 2001)	*Military Leader*	The chief executive maintains a military rank in office. Data covers 1975-2010.
White (2017)	Military Participation in Government	The executive cabinet has: (1) no active duty military personnel in the national cabinet; (2) one military member of cabinet; or (3) multiple military members of cabinet.
Svolik (2012)	*Military Entry*	The military was involved in the entry of the standing leader into office. Data covers 1946-2008.
	Military Involvement in Politics	States classified according to four categories of military involvement: (1) none; (2) indirect; (3) personal; (4) corporate. Data covers 1946-2008.
Weeks (2012)	*Militarism Index*	States are categorized into a four category index based on the political autonomy of the military. Data covers 1946-2000
Geddes, Wright and Frantz (2014) Autocratic Regime Data (GWF)	*GWF Military Regime*	An autocratic regime in which a group of officers control access to political power. Data covers 1946-2010.
	Prior Military Regime	The preceding regime was characterized by military rule according to the GWF classification. Data covers 1946-2010.
Democracy and Dictatorship (CGV) (Cheibub, Gandhi and Vreeland, 2010)	*CGV Military Regime*	An autocratic regime where the effective head of state is a current or past member of the military. Data covers 1947-2009.
Hadenius and Teorell (2007) Authoritarian Regimes Data	*ARD Military Regime*	An autocratic regime where political power is maintained through the actual or threatened use of military force by the armed services. Data covers 1973-2010.

2 Correlation Among Manifest Indicators

Figure A.1 displays the correlation matrix of the manifest indicators used in the static and drift models. Virtually all pairwise correlations are positive, as one would expect if the indicators were reflective of a similar underlying concept. The nearest exception is the prior military regime indicator obtained from the GWF data, which shares a weak correlation with the other indicators. This is driven in part by the fact that the collapse of military regimes often gives way to non-military regimes, where we are less likely to observe overt instances of military involvement in politics. Keeping this indicator in the models is nevertheless warranted because these indicators help identify contexts where regime leaders are inheriting a military with a tradition of political involvement.

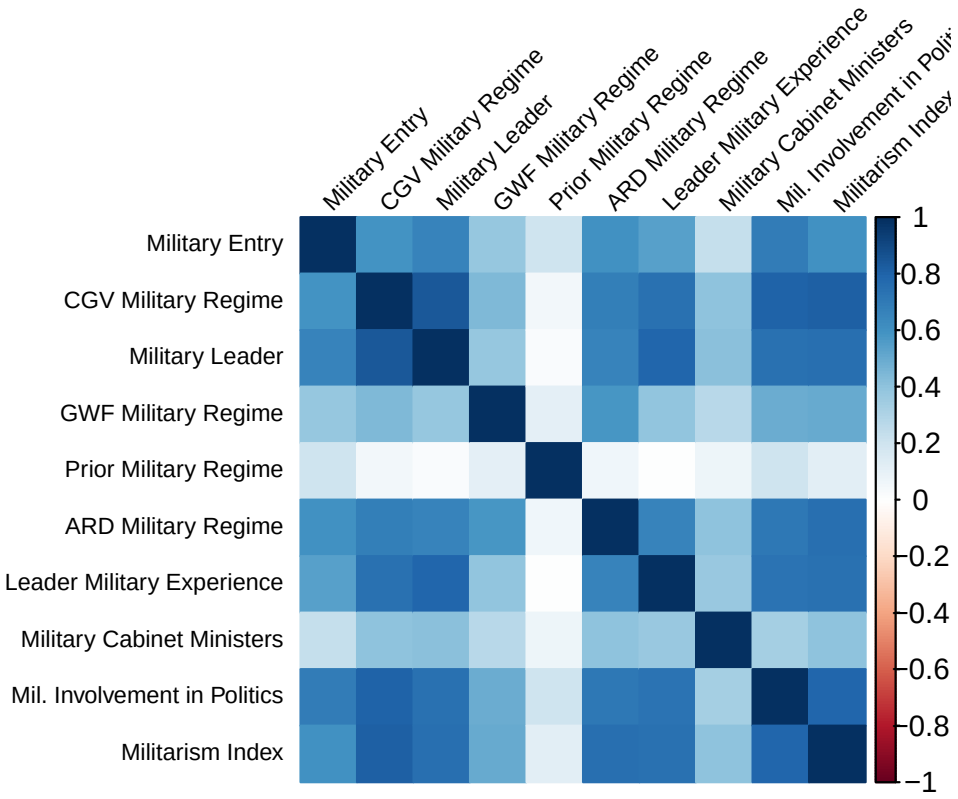

Figure A.1: Correlation Among Manifest Indicators

Note: Plot reports Spearman correlations among manifest indicators

3 Drift Parameter Estimates

In Figure 2 of the main text, we compare the static and drift model by subsetting our data to civilianized regimes and comparing estimates by the number of years a regime has experienced drift in our data. It is also useful to examine the raw values of the drift parameter estimates. Recall that the prior assigned to the latent trait in the drift model was

$$\begin{aligned} \theta_{it=1} &\sim N(0,1) \\ \theta_{it\neq 1} &\sim N(\theta_{it-1} + C_{t-1}\delta_{t^*}, \sigma_\theta) \end{aligned} \tag{1}$$

such that δ_{t^*} captures the extent to which civilian control is expected to change with each successive year of civilianized rule, adjusting for the value of the latent trait in the prior year, θ_{it-1}. Recall also that the value of δ is allowed to vary by the number of years a regime has remained civilianized, indexed by t^*. Thus, the values of δ_{t^*} correspond to increases or decreases in the level of civilian control between periods t^* to t^*+1. Given the relatively small number of regimes surviving past their 65th year, we assign the drift parameter a fixed value beyond this point.

The left panel of Figure A.2 reports the values of the drift parameter δ_{t^*} and the right panel reports the "cumulative drift" or the summed amount a country has drifted since it first became civilianized. As expected, the drift parameter is typically positive. Individually, these effects are often small and their credible intervals contain zero. Their cumulative effect, however, remains positive and over time produces large, significant effects. The annual drift parameter is largest very early and relatively late in a regime's history. This is consistent with the empirical observation that political regimes are often the most fragile in their infancy – surviving the first few years of civilianized rule yields significant dividends for civilian control. The overall trend of positive drift is further evidence of self-reinforcing patterns of civilian control.

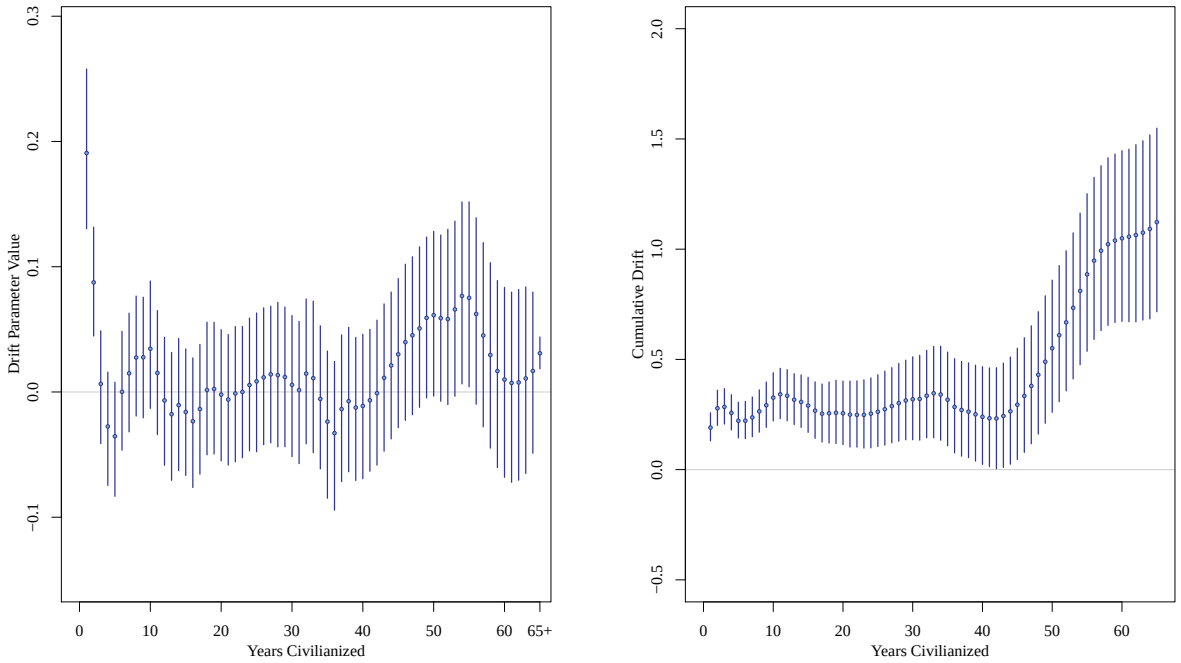

Figure A.2: Drift Parameter Across Age of Civilianized Regimes

Note: Figure reports estimates of the drift parameter δ_{t^*}. The left panel reports the value of the drift parameter across the observed values of t^*, the number of years a regime has remained civilianized. This corresponds to the extent to which civilian control is expected to increase or decrease with every subsequent year of civilianized rule. The right panel reports estimates of the cumulative amount of drift a civilianized regime will experience at each time period.

4 Difficulty and Discrimination Parameter Estimates

Table A.2 reports the item-specific parameters from both the static and drift models. The discrimination parameter, β corresponds to the degree to which an item splits observations along the latent trait. This is analogous to a slope parameter in a canonical regression model. Items with high discrimination parameters indicate that there is a strong relationship between the indicator and the latent trait, while values near zero correspond to a weak relationship. The difficulty parameters, α, are similar to intercepts for dichotomous indicators and cut-points for ordinal indicators. A graphical representation of the relationship between the items and latent trait is displayed in Figure A.3, for the static model parameters and Figure A.4 for the drift model parameters. Each display item characteristic curves (ICCs), which show the predicted values of the manifest variables along the range of the latent civilian control spectrum.

Two general relationships are noteworthy. First, many of the indicators have high difficulty parameters. Within Figures A.3 and A.4 this is reflected in the fact that few of the militarism indicators are predicted to be present when civilian control is high. As discussed in the text, this is a reflection of the fact that civilian control (or instances of military involvement in politics) become increasingly difficult to observe at high levels. In these cases the drift model exerts a comparative advantage by leveraging information from the dynamic prior structure.

Second, the indicators generally do a good job splitting observations along the civilian control spectrum. The *Prior Military Regime* and indicator is an exception, with β values below one in each model. This is perhaps unsurprising, given the fact that this indicator remains unchanged throughout the duration of a political regime and contains information about the prior regime. Overall however, these results indicate that the manifest variables perform relatively well in conveying information about the latent trait, though there is a need for more information on subtle violations of civilian control in states with well-developed civil-military relations. This is a promising area for future data collection efforts.

Table A.2: Comparison of Model Difficulty and Discrimination Parameters

Item	Parameter	Static IRT		Drift IRT	
Leader Military Experience					
	β	3.535	[3.307,3.785]	4.041	[3.625,4.495]
	α_1	1.375	[1.236,1.515]	0.08	[-0.309,0.491]
	α_2	2.667	[2.484,2.851]	1.478	[1.083,1.902]
Military Leader					
	β	6.2	[5.594,6.878]	6.345	[5.615,6.878]
	α_1	4.921	[4.433,5.47]	2.601	[1.947,5.47]
Military Participation in Government					
	β	1.106	[1.029,1.183]	1.314	[1.189,1.443]
	α_1	0.192	[0.131,0.256]	-0.379	[-0.519,-0.236]
	α_2	1.285	[1.212,1.359]	0.836	[0.696,0.98]
Military Entry					
	β	2.416	[2.245,2.593]	2.59	[2.326,2.593]
	α_1	2.319	[2.15,2.496]	1.568	[1.297,2.496]
Military Involvement in Politics					
	β	5.146	[4.754,5.577]	5.789	[5.172,6.467]
	α_1	4.473	[4.093,4.895]	3.02	[2.411,3.663]
	α_2	4.906	[4.503,5.349]	3.522	[2.895,4.178]
	α_3	8.118	[7.553,8.726]	6.913	[6.212,7.674]
Weeks Militarism Index					
	β	4.68	[4.321,5.056]	6.737	[5.993,7.552]
	α_1	1.077	[0.854,1.314]	-0.369	[-1.028,0.326]
	α_2	1.538	[1.298,1.793]	0.262	[-0.395,0.961]
	α_3	3.942	[3.599,6.317]	3.481	[2.775,4.237]
	α_4	5.838	[5.397,6.317]	6.032	[5.242,6.88]
GWF Military Regime					
	β	2.792	[2.566,3.037]	3.43	[3.026,3.037]
	α_1	4.894	[4.592,5.221]	4.474	[4.023,5.221]
Prior Military Regime					
	β	0.277	[0.2,0.356]	0.539	[0.457,0.356]
	α_1	2.013	[1.942,2.083]	1.856	[1.772,2.083]
CGV Military Regime					
	β	7.784	[7.025,8.684]	8.019	[7.033,8.684]
	α_1	6.481	[5.846,7.227]	3.621	[2.804,7.227]
ARD Military Regime					
	β	4.988	[4.535,5.482]	5.526	[4.86,5.482]
	α_1	5.563	[5.068,6.101]	4.134	[3.504,6.101]
	σ			0.101	[0.091,0.113]

Note: Mean posterior estimates reported for each parameter. 95% credible interval reported in brackets.

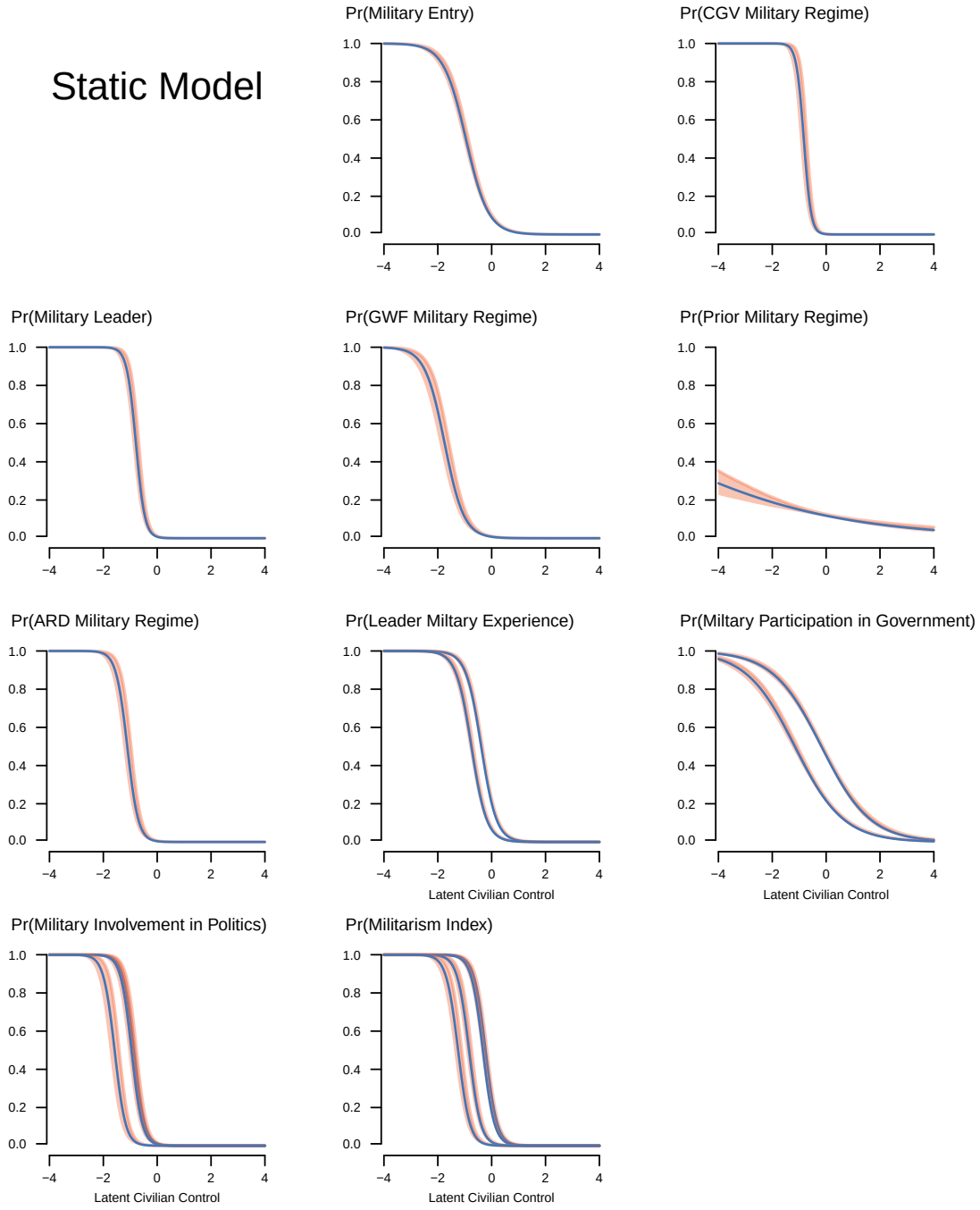

Figure A.3: Item Characteristic Curves - Static Model

Note: Figure displays the item characteristic curve for each manifest variable using the item-based parameters of the static model, reported in Table A.2. In all panels, the horizontal axis displays the range of the latent civilian control measure obtained from the dynamic model. The vertical axis displays the probability of being coded in a particular category for each item across the range of latent civilian control scores. For dichotomous items, the curve pertains to being coded positively for the given trait. For ordinal variables a series of curves are reported pertaining to the cumulative probability of being in successive categories. 95 percent credible intervals are reported in orange. The strength of the relationship between the latent trait and each manifest variable is approximated in the slope of each line.

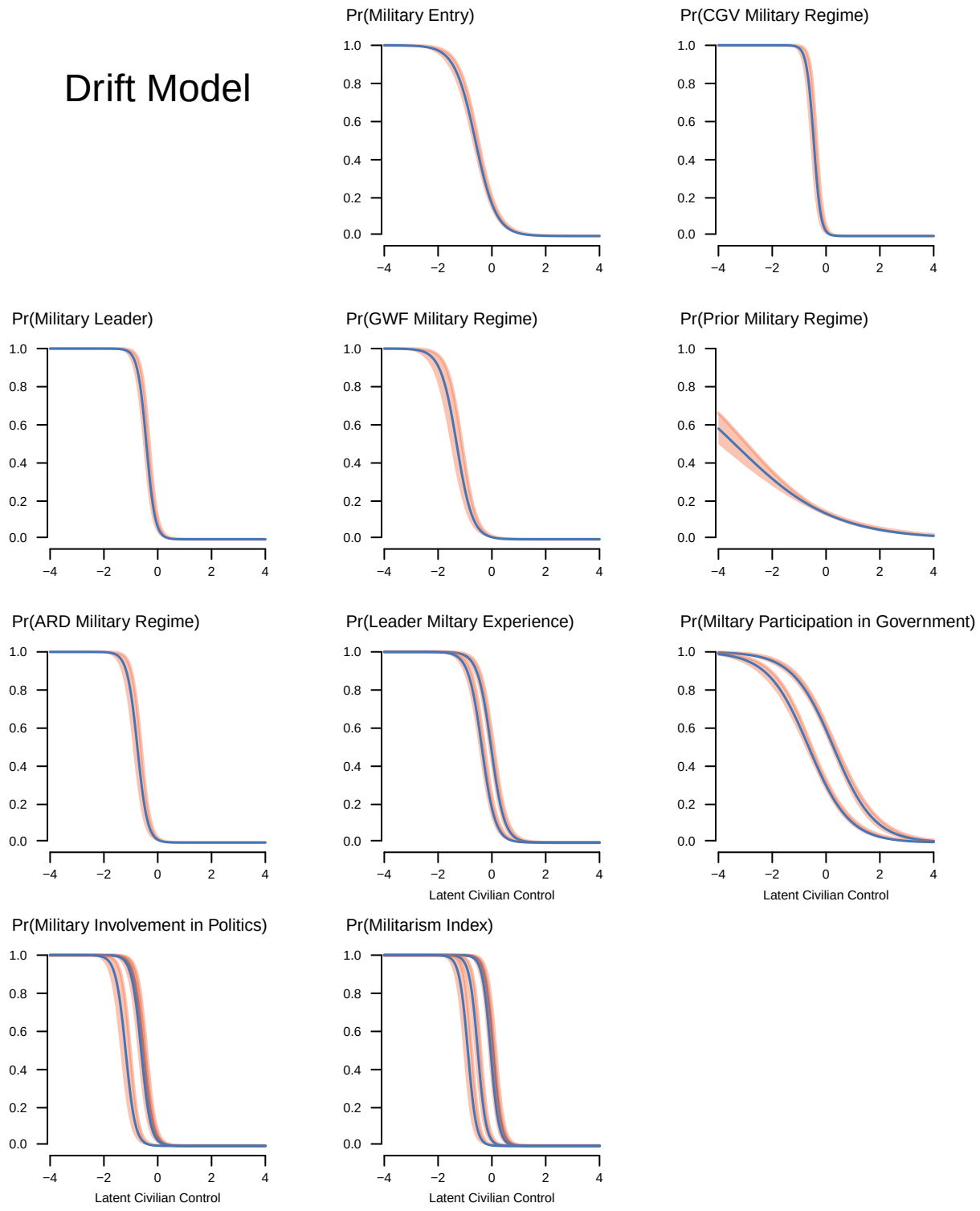

Figure A.4: Item Characteristic Curves - Dynamic Model

Note: Figure displays the item characteristic curve for each manifest variable using the item-based parameters of the drift model, reported in Table A.2. In all panels, the horizontal axis displays the range of the latent civilian control measure obtained from the dynamic model. The vertical axis displays the probability of being coded in a particular category for each item across the range of latent civilian control scores. For dichotomous items, the curve pertains to being coded positively for the given trait. For ordinal variables a series of curves are reported pertaining to the cumulative probability of being in successive categories. 95 percent credible intervals are reported in orange. The strength of the relationship between the latent trait and each manifest variable is approximated in the slope of each line.

5 Estimates of Uncertainty

The drift model produces lower estimates of uncertainty around the latent trait. This is displayed visually in Figure A.5, and evidenced by the bulk of points falling north of the diagonal line. One thing to note, though is that, extreme high or low values tend to be assigned higher estimates of uncertainty. This is a property of virtually all quantitative measurement models.[1]

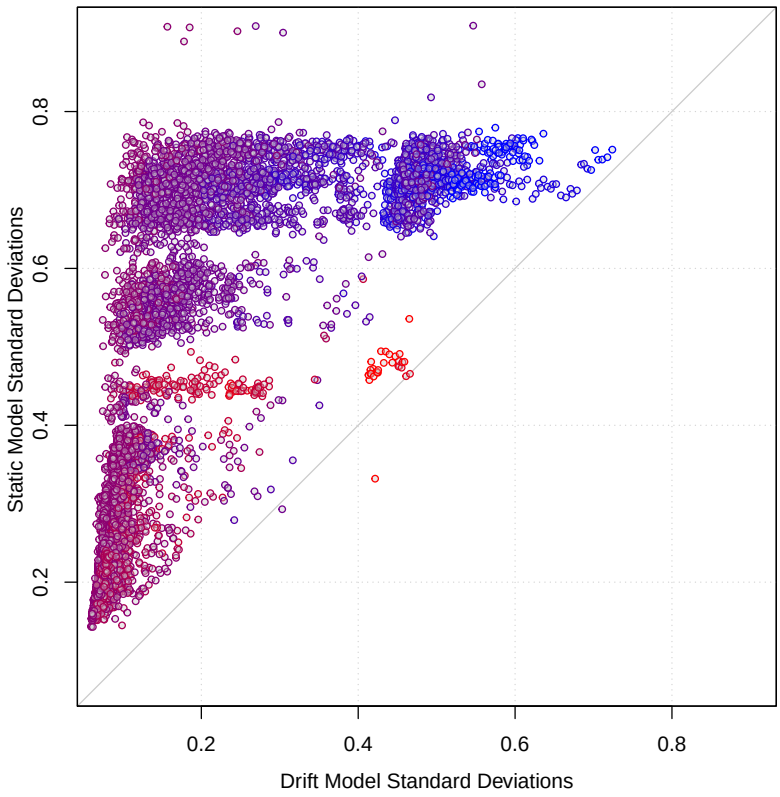

Figure A.5: Estimates of Uncertainty Around the Latent Trait

Note: Plot displays the standard deviations assigned to each country-year estimate of civilian control produced by each model. Points are color coded according to the drift model estimates ranging from low (red) to high (blue)

[1] See Goertz and Mahoney (2012) for an discussion of this property and how it contrasts with assumptions about uncertainty using qualitative measurement techniques.

6 Posterior Predictive Checks

Figure 3 in the main text reports differences in the accuracy of each model's posterior predictions of the manifest indicators. Figures A.6 and A.7 report the raw accuracy values from the in-sample and out-of-sample analyses, respectively.

In the main text, we showed that the drift model generally outperformed the static model both in terms of in-sample posterior predictive checks and when predicting the values of manifest indicators that were held out of model estimation. The lone exception was the leader military experience indicator which, when held out, was better predicted by the static model estimates of civilian control than by the drift model. As an additional check, we also examined how leaving out the leader military experience indicator affected in-sample performance. These results are displayed in Figure A.8, which displays the difference in in-sample posterior predictive accuracy between the static and drift model when holding out the leader military experience indicator. The drift model again outperforms the static model for all indicators.

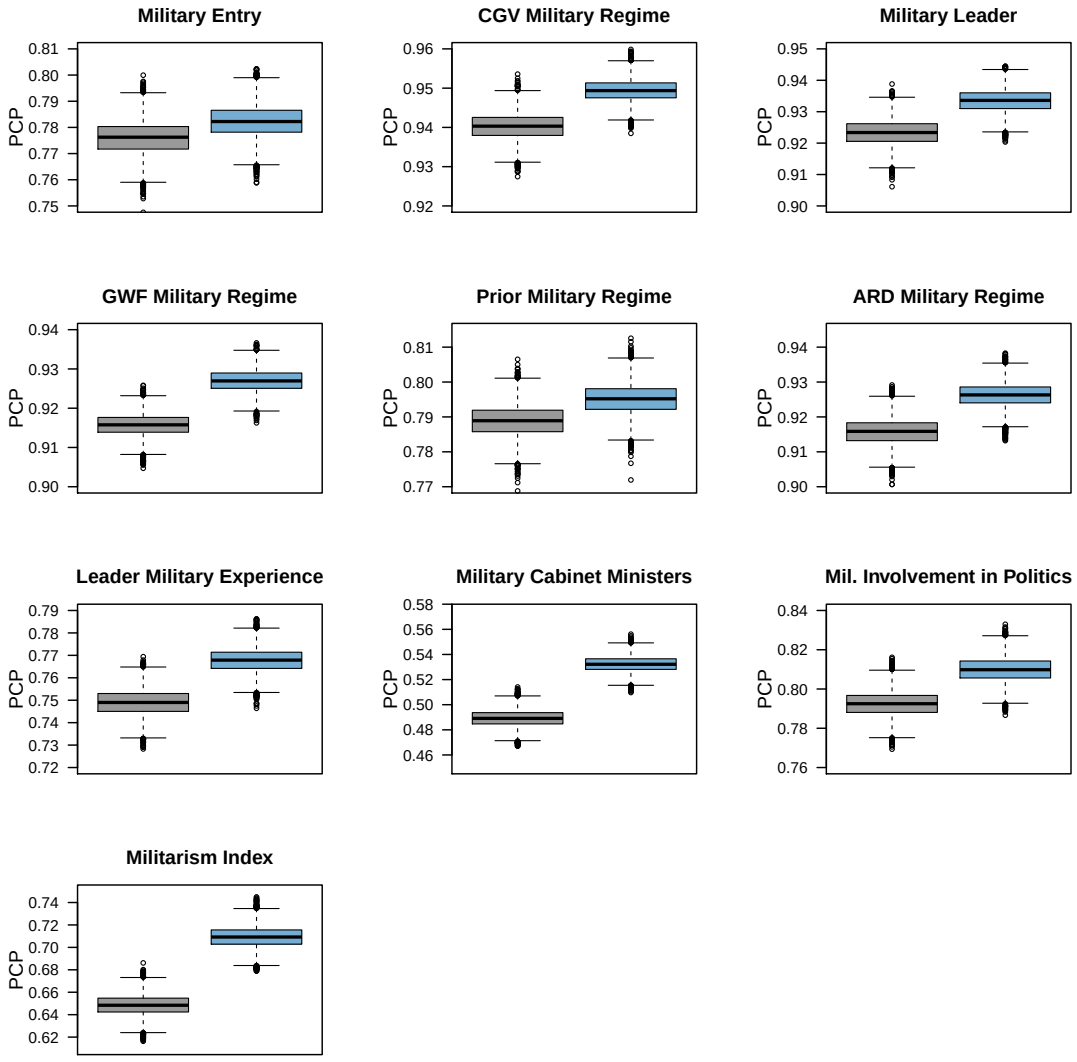

Figure A.6: Summary of Posterior Predictive Checks, in Sample

Note: Plots displays the percentage of items correctly predicted by the static (grey) and drift (blue) models across 1,000 draws from the posterior distributions of each model. The drift model generally produces more accurate predictions than the static model.

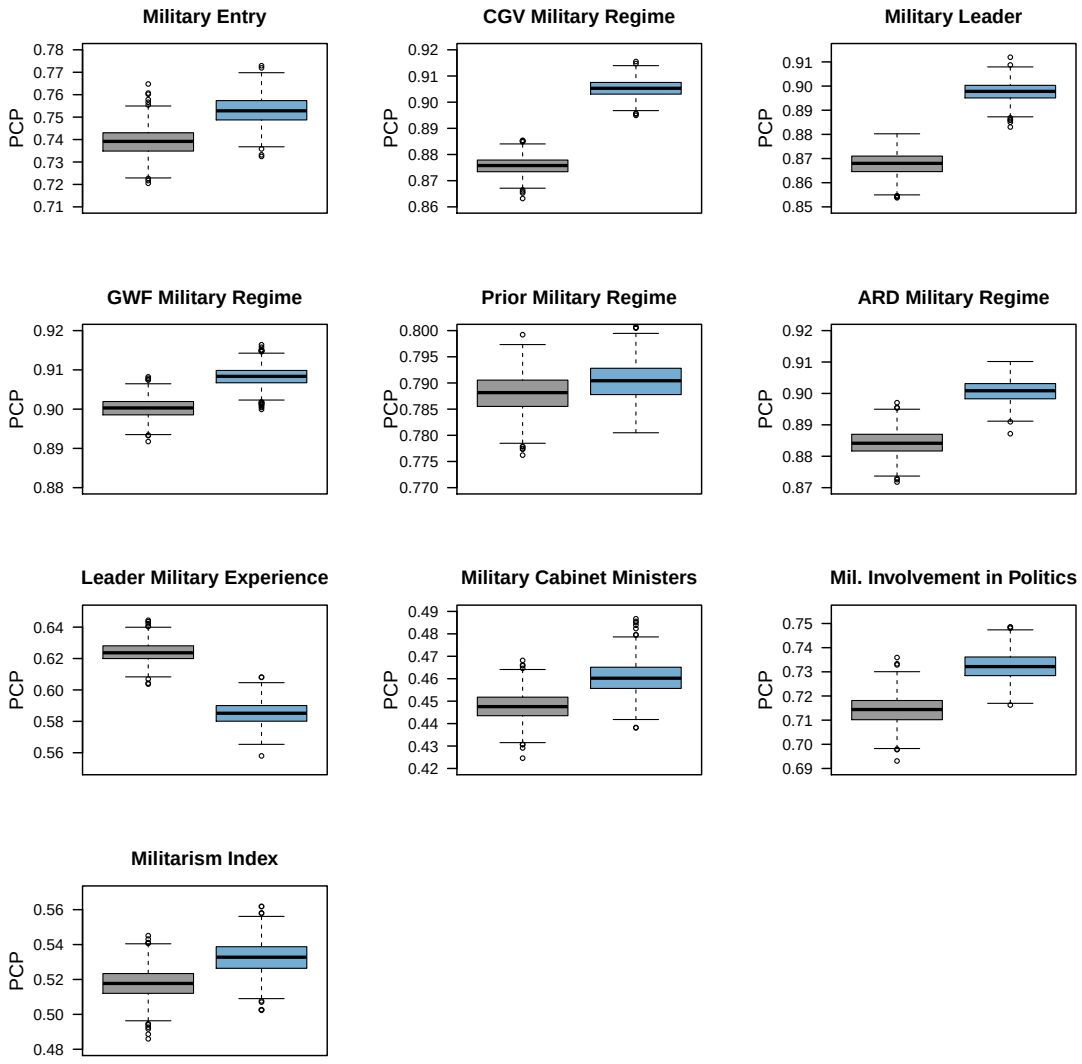

Figure A.7: Summary of Posterior Predictive Checks, Leave One Item Out Cross Validation

Note: Plots displays the percentage of items correctly predicted by the static (grey) and drift (blue) models in a leave one out cross validation analysis. Each model was iteratively estimated leaving one manifest indicator out, and the resulting estimates of civilian control are used to predict the left out item. The drift model generally outperforms the static model.

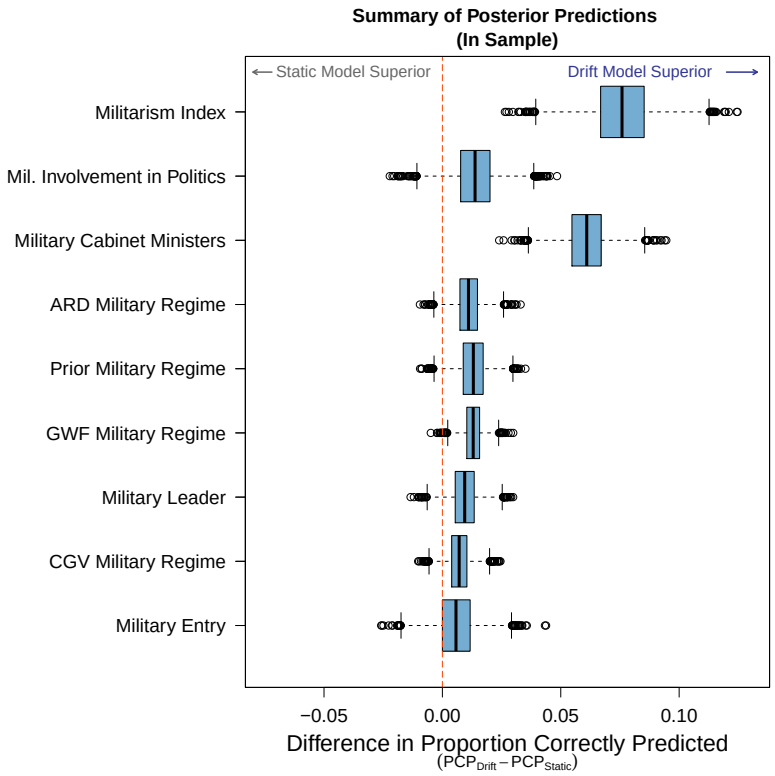

Figure A.8: Summary of In-Sample Posterior Predictive Checks when Omitting Leader Military Experience Indicator

Note: Plots display the distribution of the difference in each models ability to accurately predict each manifest indicator using parameter estimates. Box plots summarize the distribution of the difference in the percent of observations correctly predicted by each model across one thousand draws from the posterior distributions generated by each model. Positive values correspond to superior fit by the drift model.

7 Latent Civilian Control Estimates By Decade

Figures A.9 through A.15 display the cross-section of civilian control estimates by decade. Across these plots, the static model increasingly assigns high and homogeneous estimates for countries that have adopted civilianized institutions, while the drift model generates variation among these contingent on the amount of time a country has remained civilianized. Countries are ordered based on the mean estimates of civilian control from the drift model.

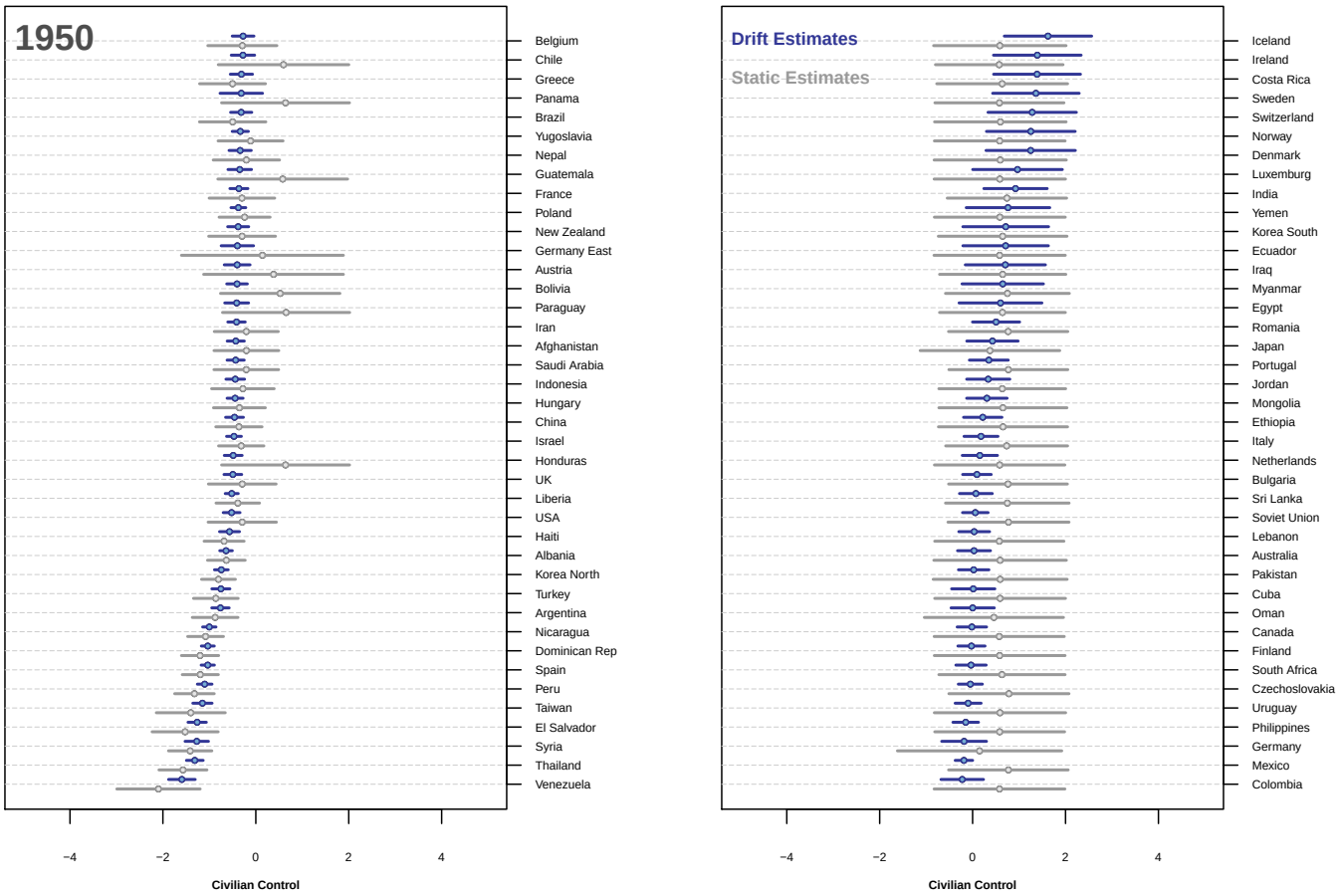

Figure A.9: Posterior estimates and 95 percent credible intervals, 1950

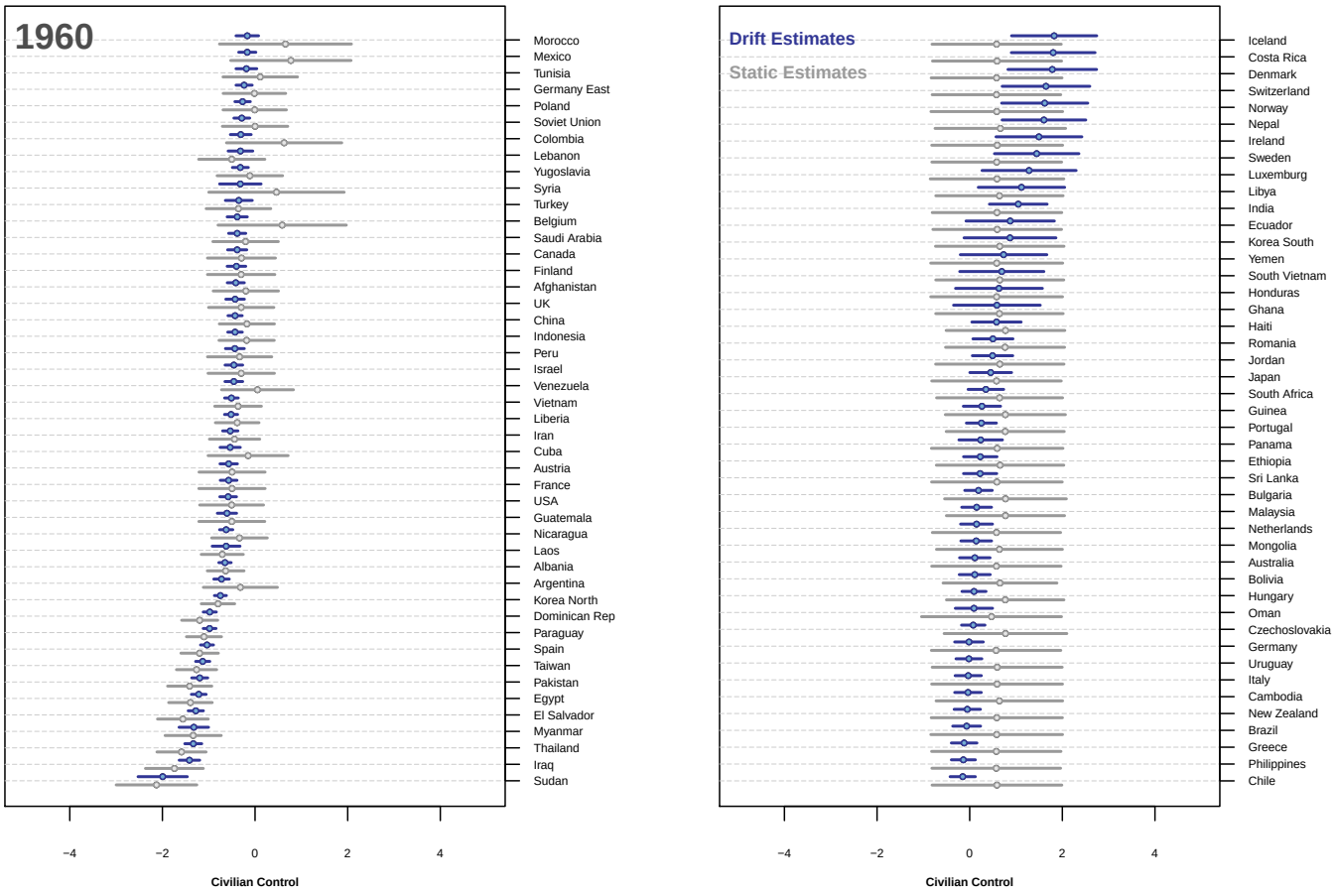

Figure A.10: Posterior means and 95 percent credible intervals, 1960

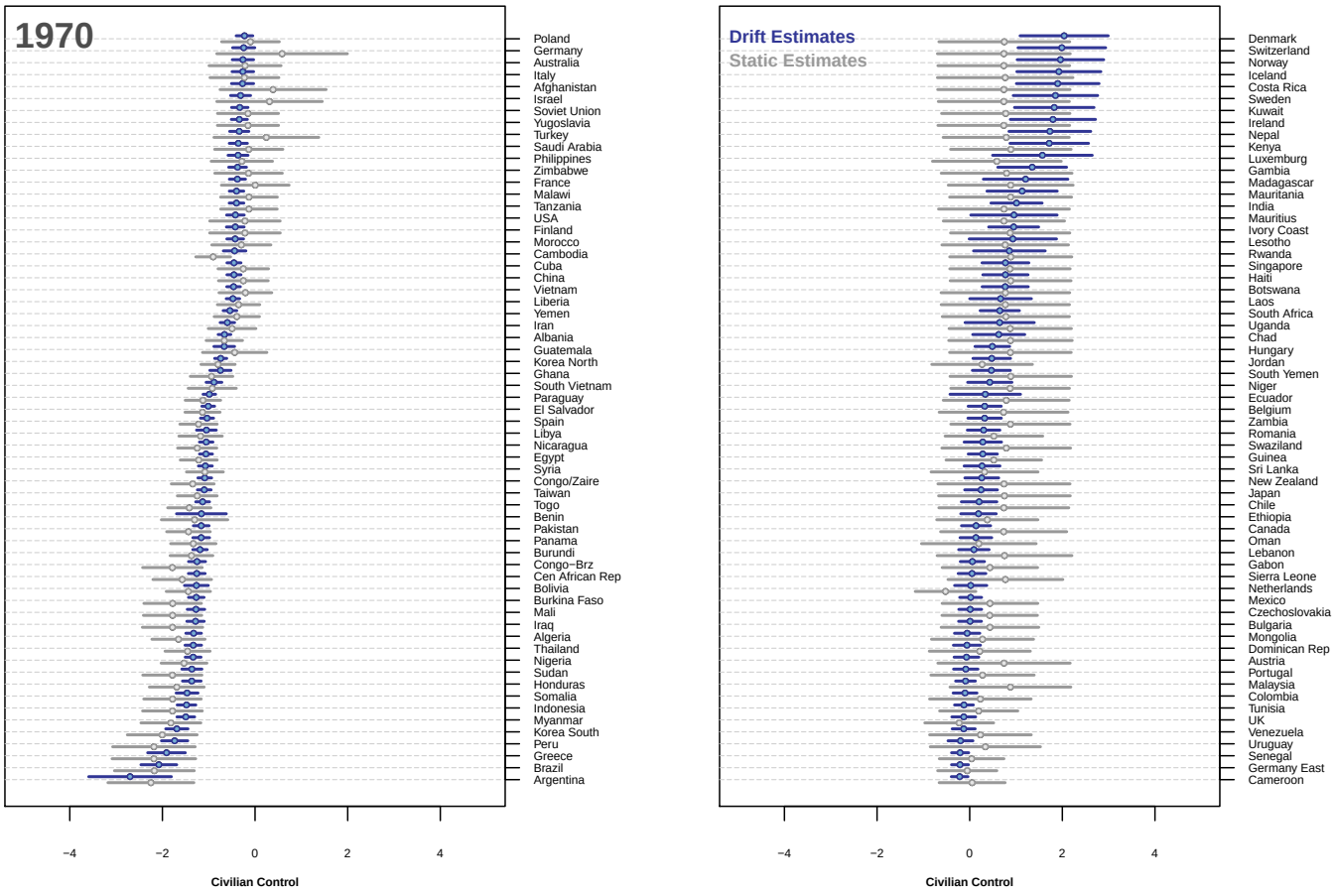

Figure A.11: Posterior means and 95 percent credible intervals, 1970

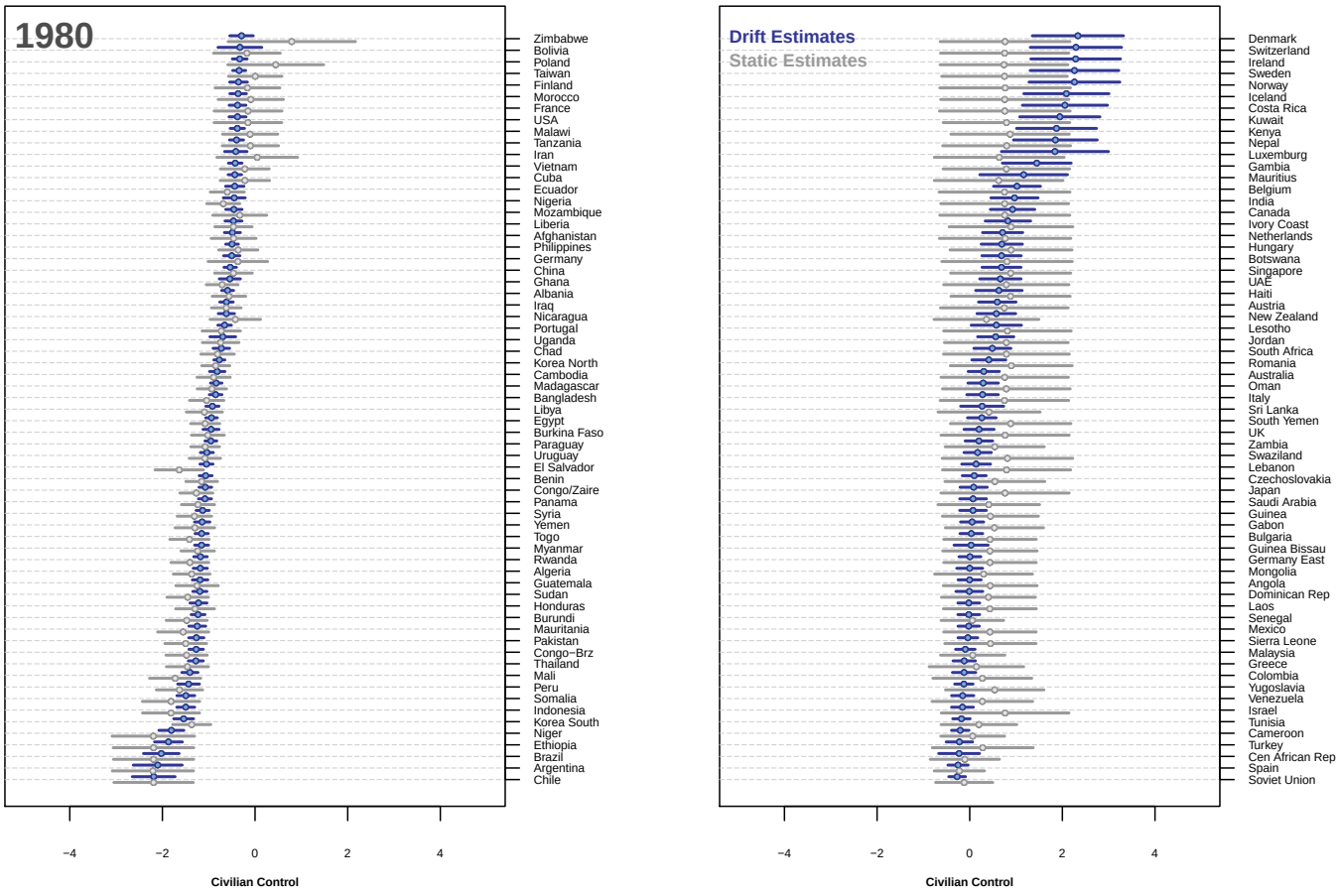

Figure A.12: Posterior means and 95 percent credible intervals, 1980

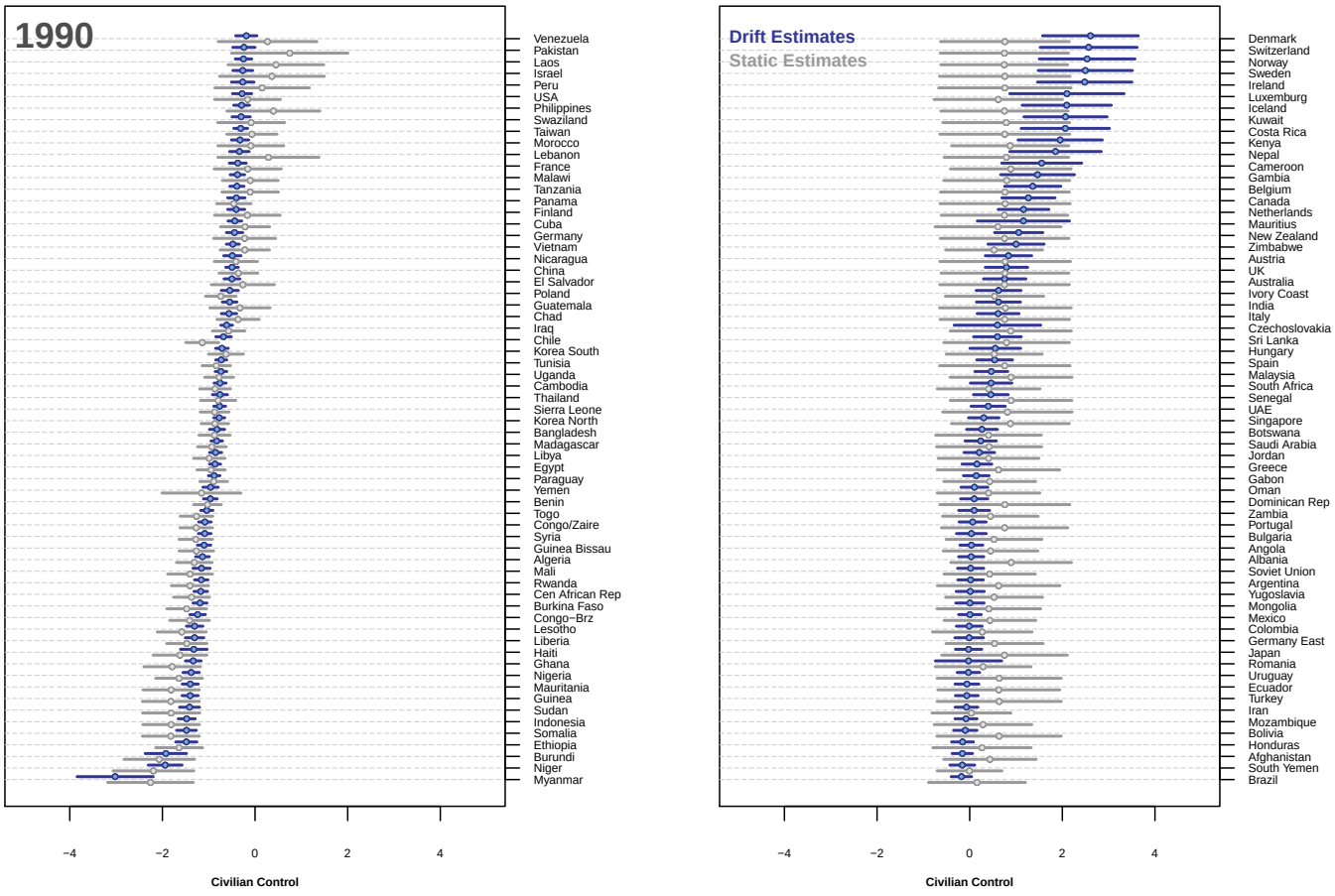

Figure A.13: Posterior means and 95 percent credible intervals, 1990

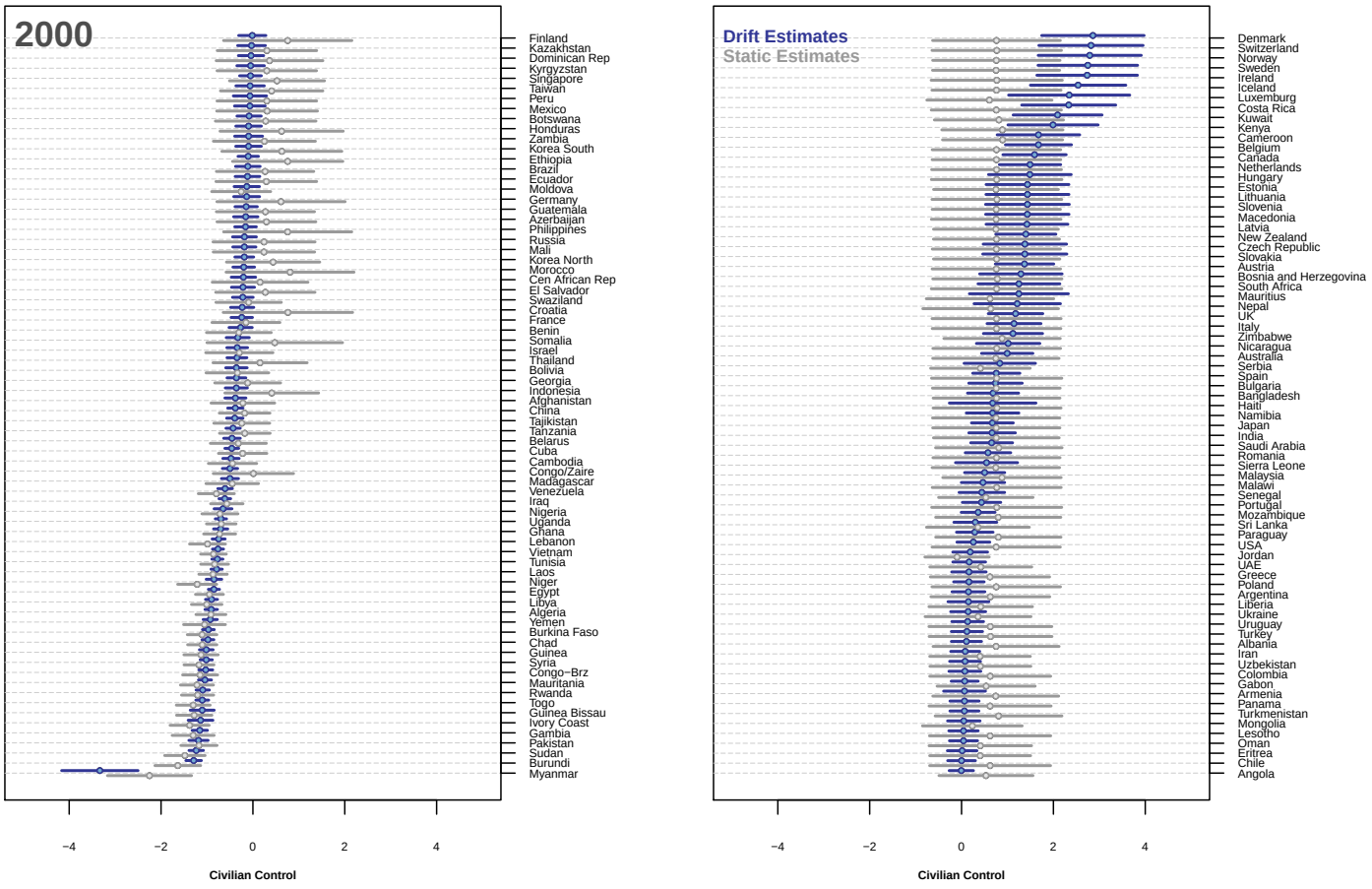

Figure A.14: Posterior means and 95 percent credible intervals, 2000

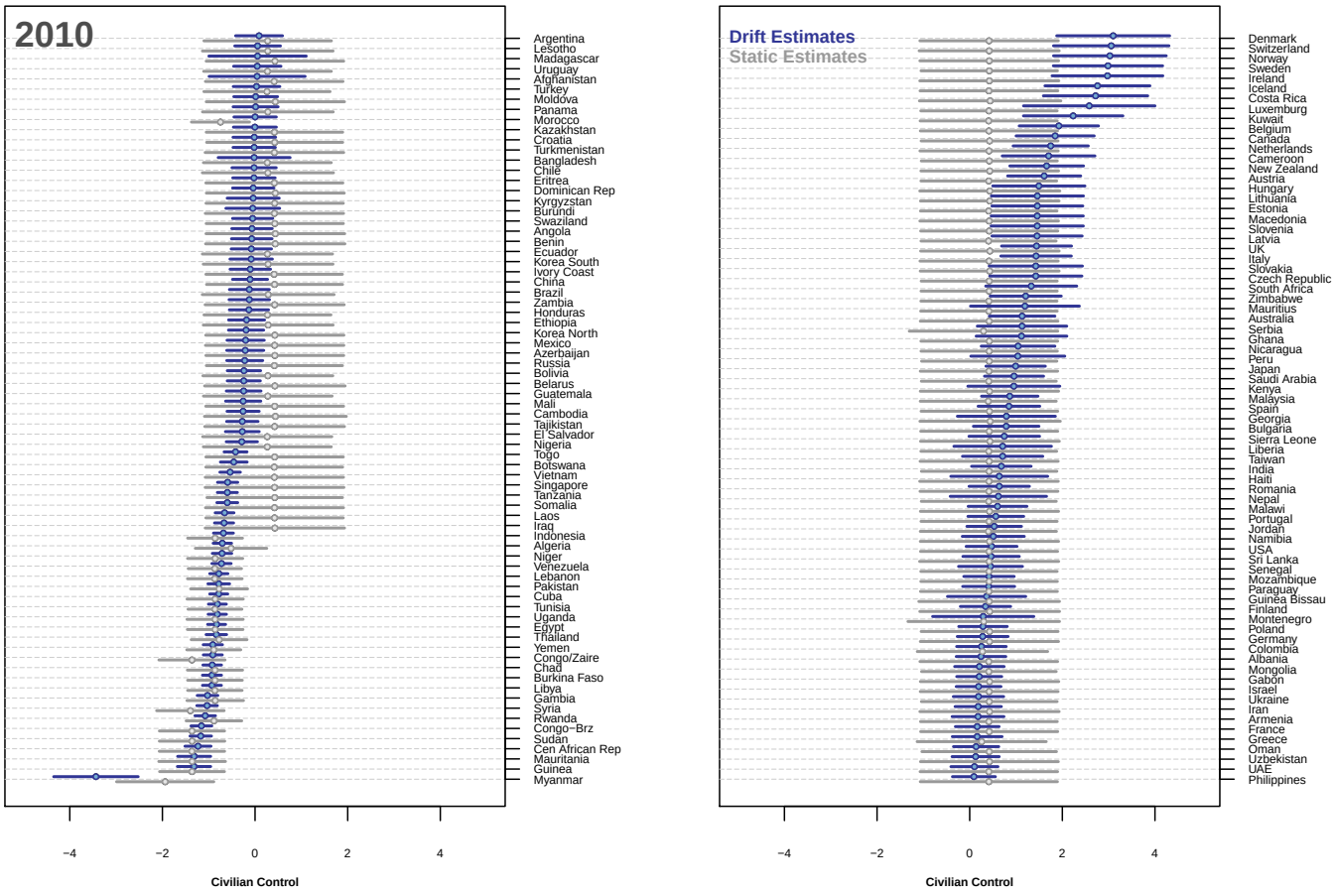

Figure A.15: Posterior means and 95 percent credible intervals, 2010

8 Civilian Control Estimates by Regime Type

Figure A.16 reports the distribution of static and drift model estimates across GWF regime categories. As expected, each of these measures uncovers significant variation in civilian control both within and across regime types.

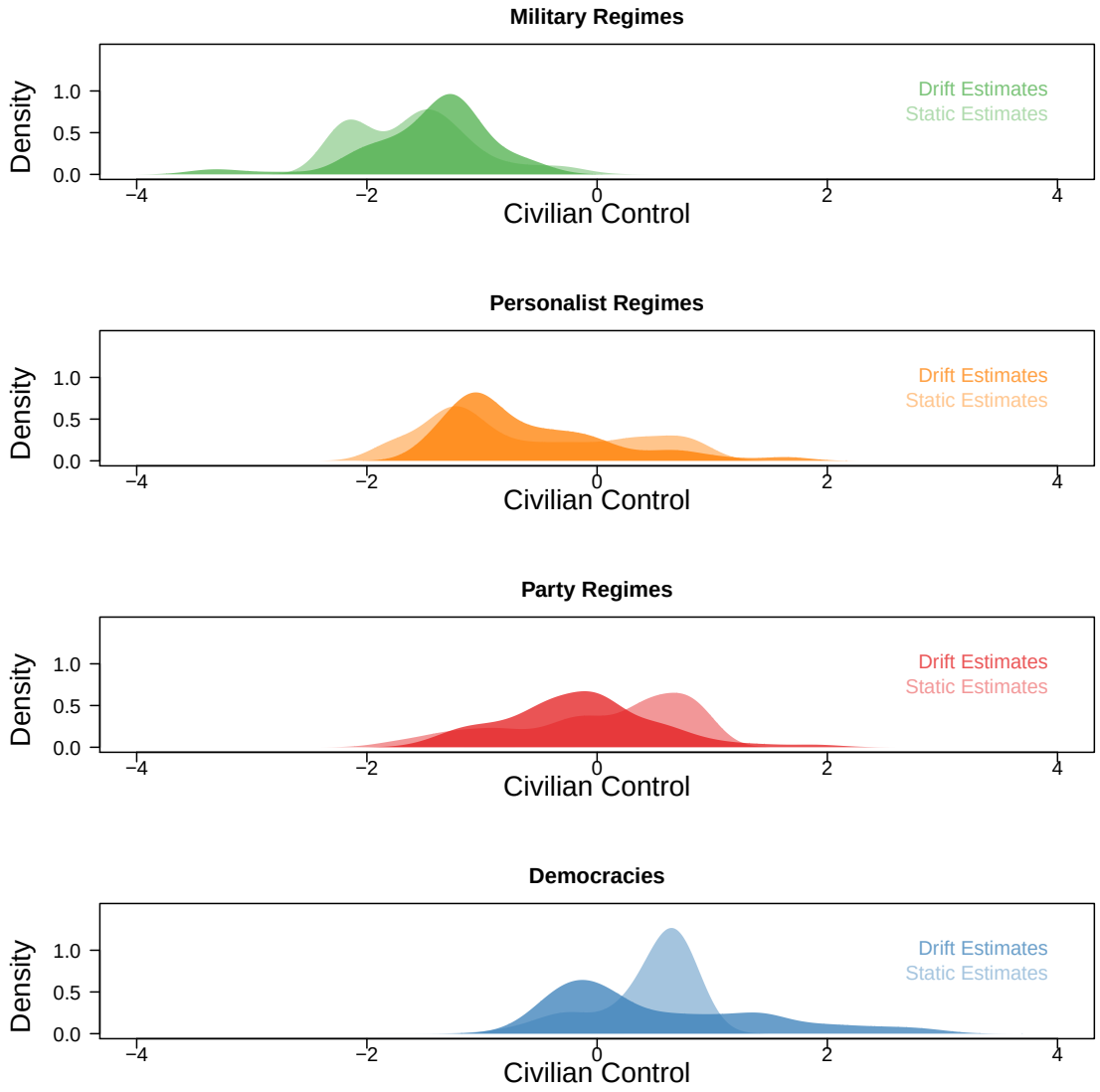

Figure A.16: Distribution of Civilian Control Estimates Across Regime Type

Note: Plot displays kernel density function for model estimates of civilian control. Regimes are classified using the GWF ontology. Bandwidth is set to 0.02.

9 Alternate Definitions of Civilianized Regimes

In the main text we employed a inclusive definition of what constitutes civilianized regimes, requiring only that a country-year is classified as a non-military regime according to the CGV, DPI, GWF, and ARD regime type indicators and the indexes obtained from the Svolik (2012) and Weeks (2012). In addition, we construct two models that add additional requirements to these baseline criteria. The first adds the requirement that a regime has no recent history of military involvement in politics – specifically, it requires that the *Prior Military Regime* and *Military Entry* indicators are both equal to zero. The second adds to the original criteria the requirement that there are no military members of cabinet according to the *Military Participation in Government* indicator. The impact of these operationalizations on the estimates of cumulative drift are reported in Figure A.17. The estimates from our primary specification are displayed in black, while the mean estimates from the models described above are displayed in green and blue, respectively. Across both conditions, the estimates of cumulative drift remain positive, significant, and increase over time, corresponding to persistent evidence that civilian control is self-reinforcing.[2]

[2]In addition, we also estimated drift parameters from a model that defined civilianized regimes as those where all manifest indicators were set to their lowest value, corresponding to complete military absence from politics. Taking this approach eliminates much of the variation in civilian control that would otherwise determine the value of the drift parameter. As a result, model estimates are volatile and sensitive to minor perturbations in the data. The results are nevertheless consistent with those reported in A.17, with cumulative drift ranging between values of 0.30 for young civilianized regimes, and as high as 13 for old civilianized regimes.

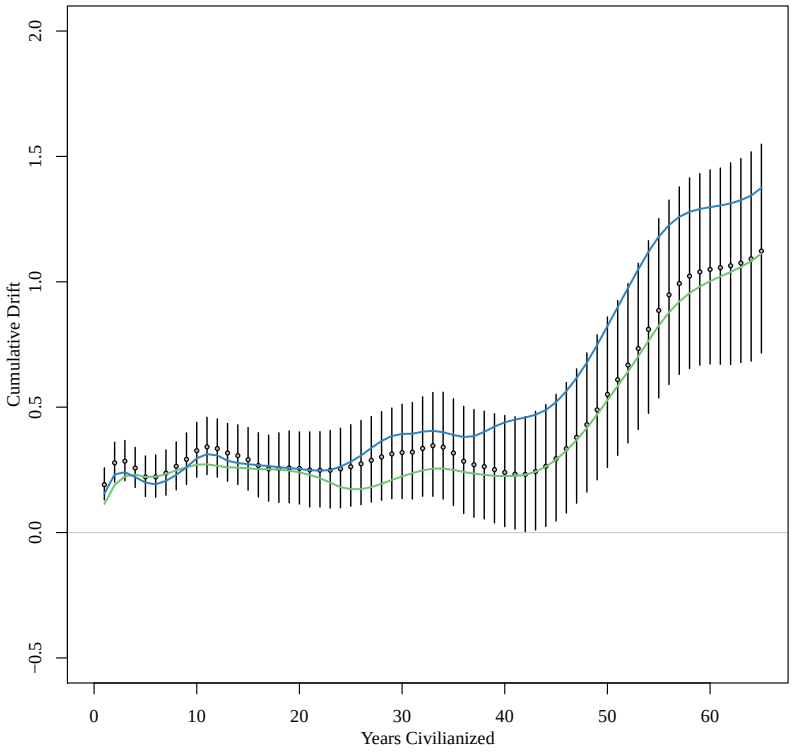

Figure A.17: Drift Parameter Across Age of Civilianized Regimes

Note: Figure reports estimates of cumulative drift using different definitions of civilianized regimes. See Appendix 3 for a full discussion of drift parameters values in the primary model specification. Estimates from the primary model specification reported in the main text are reported in black. Mean estimates of cumulative drift using three different operationalizations of civilianized regimes are reported in green and blue. All estimates are positive and increasing across time, indicating a self-reinforcing pattern of civilian control.

10 Model Estimates Omitting the Cold War Era

To determine whether our results are an artifact either of the Cold War or result from the involvement of the World War II generation in politics, we estimate a second series of models using only country years between 1992 and 2010. In doing so, we treat 1992 as the first period of observation and ignore any history of civilian control prior to that point. The United States, for example, is therefore coded as experiencing its first year of civilianized rule in 1992. While deliberately naive, taking this approach allows us to determine whether we would observe a similar self-reinforcing pattern if model estimates are driven exclusively by post-cold war factors.

We find a similar pattern to that reported in the main text – the drift model continues to find evidence of self-reinforcing civilian control. Figure A.18 plots mean civilian control estimates by the number of years a regime has remained civilianized. Due to the shortened time frame, the longest observed period of civilian rule is now only 18 years. Even so, the estimates from the drift model steadily increase over time, while those of the static model are relatively stationary. As is to be expected given the shortened panel length, the divergence in model estimates is less extreme than that which was observed over the full 1946-2010 panel, but the trend remains consistent.

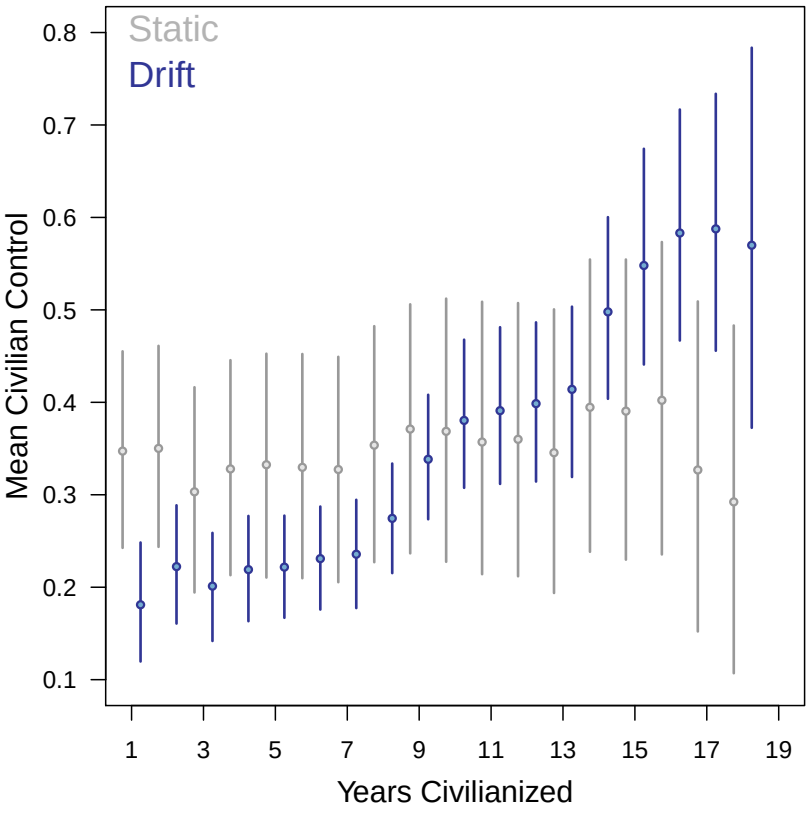

Figure A.18: Mean Estimates of Civilian Control for Civilianized Observations, 1992-2010

Note: Plots display mean estimates of civilian control from the static (grey) and drift (blue) model for civilianized regimes. Models estimates are generated using only data between 1992 and 2010. The drift model continues to produce a pattern consistent with self-reinforcing civilian control, while the static model does not.

11 Drift in Non-Civilianized Regimes

The dynamic theory of civilian control seeks to explain the emergence of robust civilian control and this is reflected in our empirical analysis. Nevertheless, we also performed an additional analysis with a model that assigns a separate drift parameter to non-civilianized regimes. Doing so results in very few changes to civilian control scores; the estimates from this model and that reported in the text correlate at .998. We continue to find strong evidence that civilian control is self-reinforcing in civilianized regimes. We also find evidence that civilian control increases over time in non-civilinaized regimes, though this is driven more by institutional factors than the impact exerted by history, either through the dynamic prior or the drift parameter.

In general, we observe fewer regimes surviving under non-civilianized rule than we do under civilianized rule. For example, 86 countries in our sample remained civilianized for at least 20 years, 44 countries did so for at least 40 years, and 19 remained civilianized for 64 years, the full period of observation. By contrast, we observed only 37 countries remaining non-civilianized for at least 20 years, and there were only six cases that persisted under non-civilianized rule longer than 40 years. To avoid over-fitting a small number of cases, when estimating the drift parameter for non-civilianized regimes, we grouped all cases surviving past 40 years into a single category, such that the value of the drift parameter was fixed to a single value for countries surviving past their 40th year.

The drift parameters themselves are reported in Figure A.19, which parallels Figure A.2 in Section 3. The left panel reports the annual drift estimates for both civilianized and non-civilianized regimes, while the right panel reports the cumulative drift for these two groups. The inclusion of a drift parameter for non-civilianized regimes does not meaningfully affect the estimates of drift for civilianized regimes, which are of similar value to our primary model.

The drift parameter estimates for non-civilianized regimes are displayed in green. There is some evidence of drift in non-civilianized regimes, though it is milder than that we observe for civilianized regimes. In the left panel of Figure **??**, for example, the value of the drift parameter is often small, but positive – we never observe the high levels of drift that civilianized regimes experience later in their life. The cumulative effect of this drift does, however, become probabilistically distinguishable from zero as time progresses, as observed in the right panel of Figure **??**.

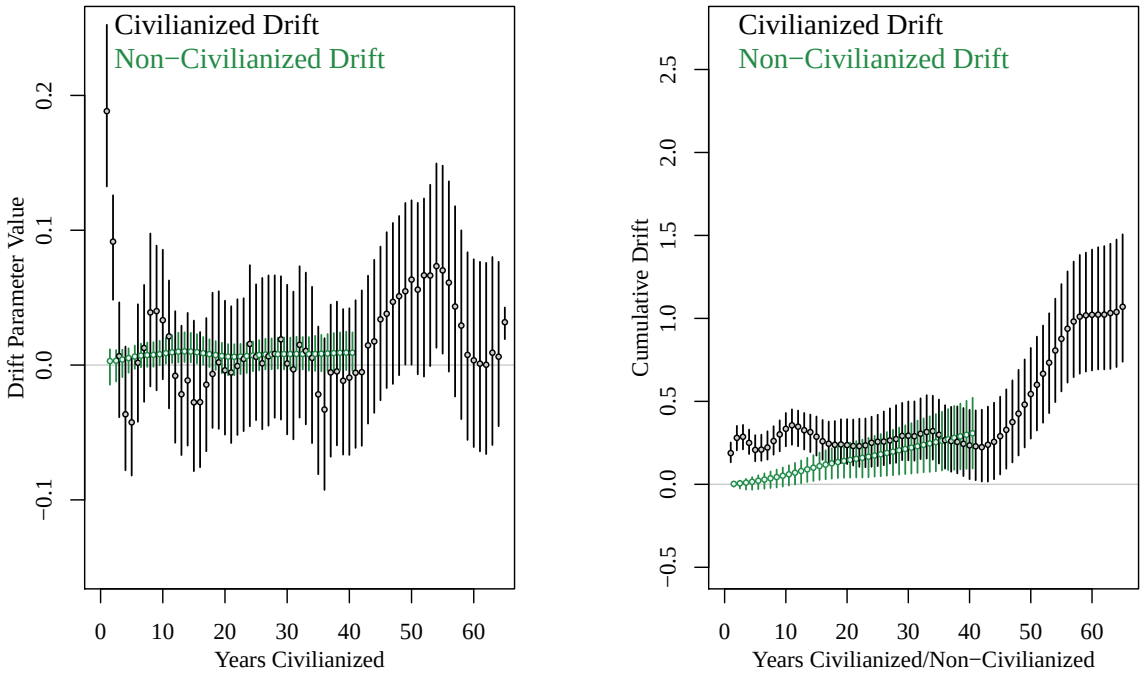

Figure A.19: Drift Parameter Across Duration Civilianized or Non-Civilianized, Dual-Drift Model

Note: Figure reports estimates of the drift parameter δ_{t^*} for civilianized (black) and non-civilianized (green) observations. The left panel reports the value of the drift parameter across the observed values of t^*. This corresponds to the extent to which civilian control is expected to increase or decrease with every subsequent year of civilianized rule. The right panel reports estimates of the cumulative amount of drift a civilianized regime will experience at each time period.

The drift estimates for non-civilianized regimes have less impact on the overall civilian control estimates for this group than it does among civilianized regimes. This can be seen in Figure A.20, which reports the mean civilian control estimates stratified across the amount of time a regime has either remained civilianized or non-civilianized. Again, the same pattern emerges for civilianized regimes as that reported in the text – the drift estimates of civilian control increase steadily over time and the static estimates do not. The drift model's estimates for non-civilianized regimes, however, track much more closely with those from the static model. That the drift parameter has less impact on the time trends for non-civilianized regimes is in part a function of the fact that there is more variation in the manifest indicators within this group, and this variation swamps out the effects of drift. Though outside the theoretical scope of this paper, the fact that we observe this trend toward increased civilian control among non-civilianized regimes may be indicative either of the inherent fragility of military rule (Geddes, 1999; Finer, 1988) or movement from collegial military rule toward strongman rule (Svolik, 2012). Regardless, the drift estimates for non-civilianized regimes are both lower in magnitude than those for civilianized, and have less impact on the overall civilian control score.

To summarize, incorporating drift and dynamic priors has a much larger effect on the estimates for civilianized regimes than non-civilianized regimes. This is partly to be expected–our theoretical expectations center upon normative and learning processes that are unlikely to take root in the absence of a baseline degree of civilian control. Nevertheless, it is interesting that we observe civilian control steadily increasing in non-civilian regimes, indicating that military rule may be self-undermining. This may result from the inherent fragility of military rule (Geddes, 1999; Finer, 1988), combined with personalization emerging from collegial military rule. Others have provided theoretical treatments of this form of personalization (Svolik, 2012). We do not full unpack these mechanisms here, but simply note that this process appears to be more readily captured by the institutional indicators and that modeling temporal dynamics among these regimes has a smaller impact on what we observe about civilian control.

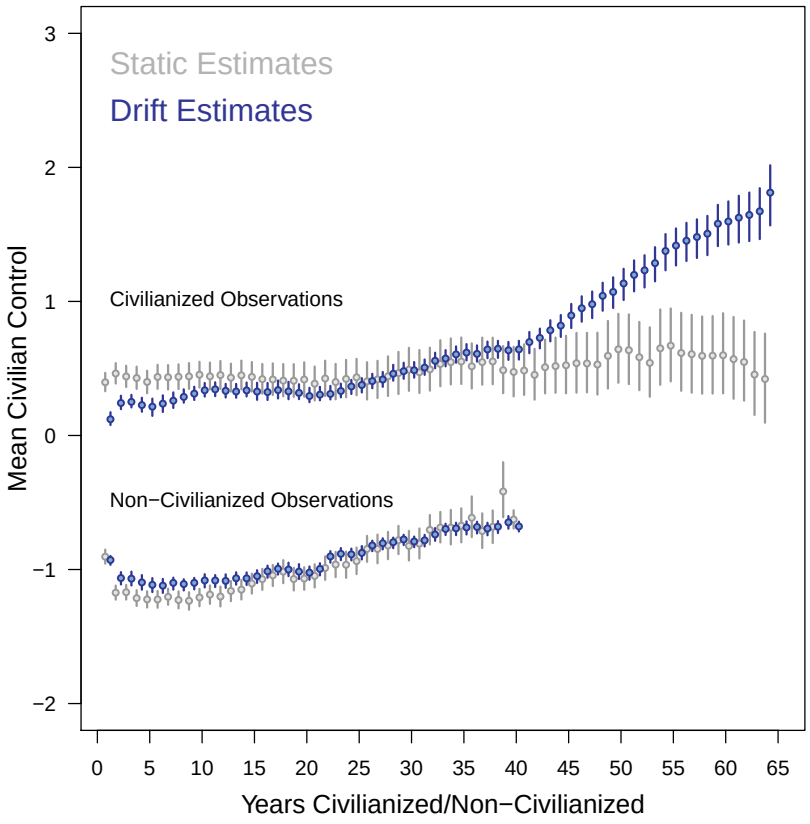

Figure A.20: Mean Estimates of Civilian Control for Civilianized and Non-Civilianized Observations, Dual Drift Model

Note: Plots display mean estimates of civilian control from the static (grey) and dual-drift (blue) model for civilianized regimes (top) and non-civilianized regimes (bottom). The same patterns reported in the main text obtain for civilianized regimes. The estimates from each model are more similar for non-civilianized regimes, suggesting that incorporating historic dynamics and drift does less to impact civilian control estimates for this group.

12 Comparison with "Years Since Last Coup" Indicator

As an additional validity check, we compare the static and drift measures to an indicator of the years since a country experienced its last coup, as measured using the Powell and Thyne (2011) data.[3] If the static and drift models are adequately capturing civilian control, they should positively correlate with the number of years since a country's last coup. Yet, this correlation should not be perfect, as civilian control of the military encompasses many more forms of military involvement in politics apart from coup-related behavior alone. The results displayed in figure A.21 confirm that this is the case – both the static and drift measures correlate with the number of years since the last coup, but there is considerable variance. This is consistent with the expectation that the measures positively relate to coup behavior while still capturing an analytically distinct concept.

[3]Note that the years since last coup is conceptually and empirically distinct from the years of civilian rule, which is endogenized with parameter estimates in the drift model.

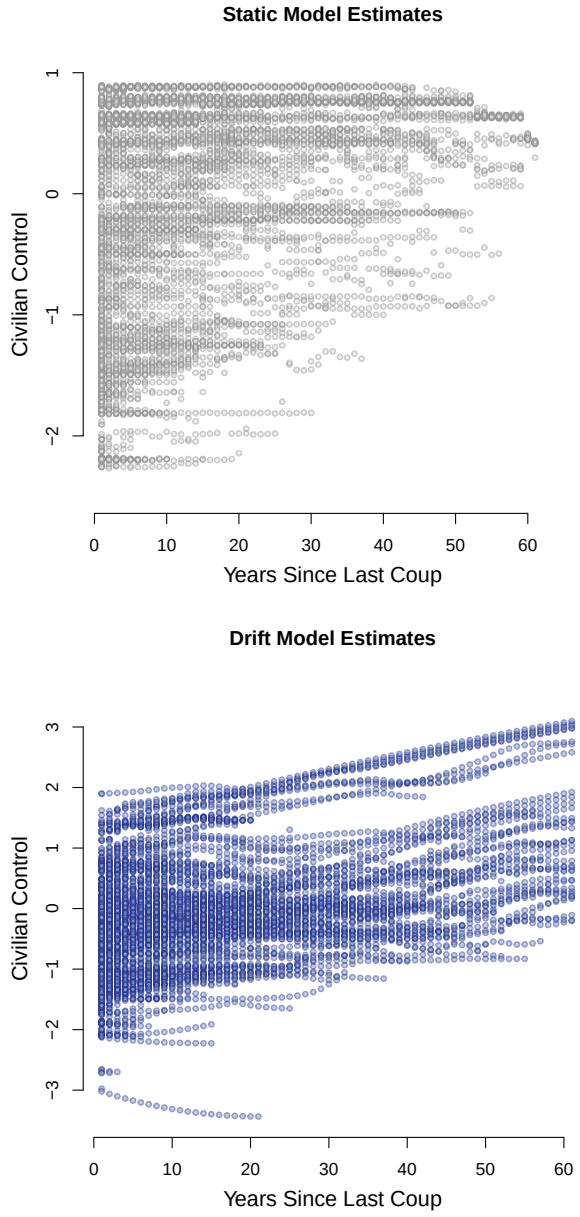

Figure A.21: Civilian Control and Years Since Last Coup

Note: Plot reports mean country-year civilian control estimates from the static (top panel) and drift (bottom panel) models along the vertical axis, and years since the last coup recorded in Powell and Thyne (2011) along the horizontal axis. The pearson correlation coefficient for the drift model and coup years is 0.402, while that for the static model is 0.320. Both indicators also uncover significant variation among observations across the values of the coup years indicator.

13 Civilian Control and Coup Proofing

Coup-proofing encompasses a variety of actions taken to reduce the risk that a small (often military) group can effectively seize the state. Coup-proofing strategies are diverse and include: political appointments; counterbalancing strategies involving the creation of multiple, competing military organizations; and intrusive involvement in military decision-making processes (Quinlivan, 1999).

In the main text we argued that civilian control is a conceptually and empirically distinct from coup-proofing. To validate this assumption and our measures, we conduct a discriminant validity check by comparing our measure to existing coup-proofing indicators. If these measures are indeed tapping distinct concepts, we should observe relatively weak correlations. Indeed, that is what we find. Figure A.22 plots the latent scores against the military counterweights measure produced by De Bruin (2017) (top row) and the counterbalancing measure from Böhmelt, Ruggeri and Pilster (2017) (bottom row).

The relationship between the static measure of civilian control and coup-proofing is particularly weak, with a correlation of 0.078 using the De Bruin (2017) measure and -0.087 using the Böhmelt, Ruggeri and Pilster (2017) measure. The correlations with the drift estimates are slightly stronger, though still quite modest. The correlation between the De Bruin (2017) data and the drift measure is 0.084. The positive correlation–suggesting coup-proofing is slightly more common when civilian control increases–is likely driven partly by the fact that the De Bruin (2017) data are only collected for developing states where self-reinforcing civilian control is unlikely. In fact, none of the countries in De Bruin's (2017) sample have a civilian control score over about 1.5 with the drift measure. The Böhmelt, Ruggeri and Pilster (2017) cover a wider sample of high-control regimes, and here a negative correlation of -0.111 obtains. This is consistent with the intuition that coup-proofing is slightly less likely in states where civilian control is high. More important, the weak correlations strongly support our assumption that coup-proofing and civilian control are distinct concepts.

While these results suggest a weak relationship, we are agnostic about the broader causal effect of coup-proofing on civilian control. It may be that some regimes survive a tumultuous infancy through successful coup-proofing. This is not incompatible with the dynamic theory presented in the main text. Though outside the scope of this study, the measurement modeling structure introduced here could be integrated with coup-proofing data to more fully unpack this question.

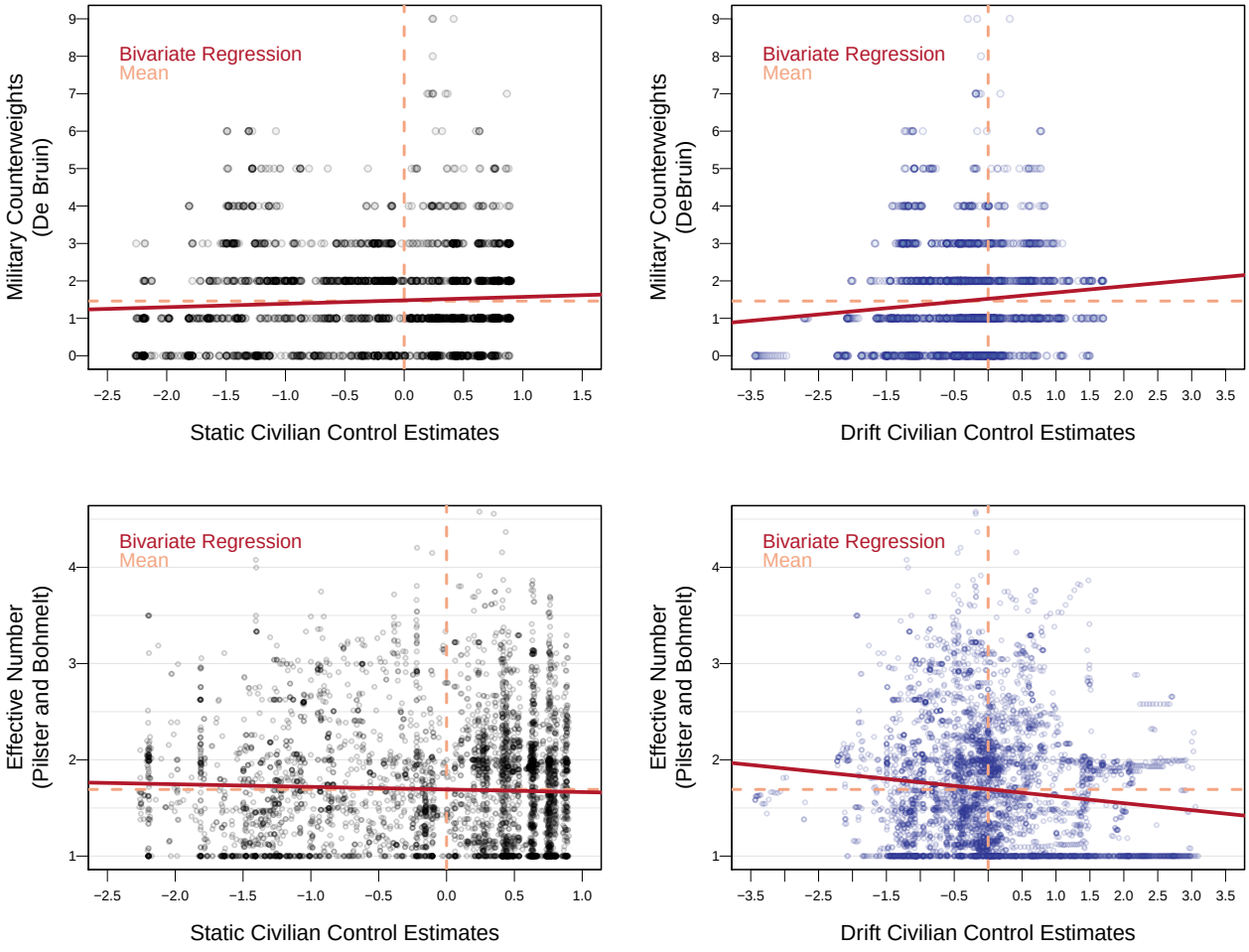

Figure A.22: Civilian Control and Coup-Proofing

Note: The panels display the relationship between civilian control estimates and military counterweights (De Bruin, 2017) (top row) and counterbalancing (Böhmelt, Ruggeri and Pilster, 2017) (bottom row). Spearman correlations are: .078 (top left); .084 (top right); -.087 (bottom left); -.111 (bottom right). The relatively weak correlations in each panel demonstrate that the civilian control measures are distinct from measures of coup-proofing.

14 Alternative Theoretical Mechanisms: Obsolescence

In the main text, we identify a combination of norm development and learning as the most plausible mechanisms that drive civilian control's self-reinforcing dynamics. This theory is therefore making a prediction about how the relationship between civilian control and its observed manifestations change with the passage of time. There are nevertheless competing explanations that could potentially predict similar dynamics driven by alternative mechanisms. One such mechanism relates to the possibility that militaries are increasingly obsolete in the modern international system. This would not be a concern for our theory if reductions in the relative size of the armed forces was itself caused by increasing civilian control, which indeed may be plausible. It may, however, be problematic if the relationship between the latent trait and manifest indicators were changing, not because of norms and learning, but because of the reduced utility of large standing armies in the modern era.

An important distinction between the obsolescence hypothesis and the self-reinforcing view is what *type* of time matters. The self-reinforcing view predicts that civilian control strengthens as it persists–here, the critical ingredient is time of civilianized rule. By contrast, the obsolescence view has more to do with the calendar year, as the progression of time has left large standing armies antiquated. Regression analyses seem to confirm this (Table A.3, model 1)–using COW's National Material Capabilities data, we found that the calendar year is negatively associated with the percentage of total population in the military. By contrast, the number of years a regime has remained civilianized in our data is actually associated with larger standing armies. This alone suggests that small standing armies are not the sine qua non of civilian control.

The obsolescence hypothesis could also be problematic for our analyses if the drift model was outperforming the static model, not because of civilianized regimes aging (more consistent with norms and learning) but rather because of the overall passage of time (more consistent with increased obsolescence). To determine whether this was the case, we regressed the difference in the drift and static model estimates among civilianized regimes on a variable recording the calendar year, and a variable recording the number of drift years a regime has experienced (i.e. how long has civilian control been self-reinforcing in our data). These results are reported in Table A.3, model 2. Years of drift is positive and significant, even after controlling for the calendar year, suggesting that obsolescence alone could not account for the patterns we observe. The calendar year indicator is insignificant, further underscoring this conclusion. The relative

difference (and advantage) of the drift model therefore stems from years of civilianization, as the self-reinforcing theory predicts, and not from the overall passage of time, as the obsolescence view would predict. In other words, we can more safely conclude that civilian control is reinforcing because of regime age, as predicted by the self reinforcing view, and not because of the overall passage of time alone, as a theory centered on obsolescence would suggest.

Table A.3: Evaluating the Obsolescence Hypothesis

	Dependent variable:	
	Percent of Population Enlisted	$\theta_{Drift} - \theta_{Static}$
	(1)	(2)
Years of Drift	0.002**	0.016***
	(0.001)	(0.001)
Calendar Year	−0.006***	−0.0005
	(0.001)	(0.0005)
Constant	13.205***	0.620
	(1.200)	(0.956)
Observations	7,453	5,344

Note: Data on the percent of total population enlisted in the military is obtained from the Correlates of War National Material Capabilities data, Version 4.0 (Singer, Bremer and Stuckey, 1972). Model 2 is subset to civilianized regimes. *p<0.1; **p<0.05; ***p<0.01.

15 Left-Censoring

As we note in the main text, 35 of the 485 political regimes in our data existed more than ten years prior to 1946. Accounting for the impact of history is difficult in these cases since we lack sufficient data on civil-military institutions prior to this date. To address this issue, we take two steps. First, we generate approximate estimates of how long civilian control persisted in every case and assign drift parameter estimates accordingly. Second, we show that our results are not disproportionately affected by left-censoring by comparing static and drift model estimates after dropping left-censored regimes.

In the first step, our task is to determine how long civilianization had persisted in left-censored regimes prior to their entry into the data. Recall that we classify a regime as being civilianized if: the regime leader does not hold a rank while in office according to the DPI data; the regime is not classified as military by GWF, CGV, or ARD; the regime is classified as "none" or "indirect" on the *Military Involvement in Politics* scale; and has the minimum score on the Weeks *Militarism Index*. Due to missing data, we cannot apply these exact same criteria prior to 1946, so we generate estimates based on information from the GWF data and outside research. Table A.4 lists the censored regime names, their regime type according to GWF, and our estimate for how long civilian rule had persisted prior to 1946. Our procedure was straightforward. When evidence suggested that a regime was civilianized throughout its duration, we simply substituted the GWF regime duration indicator as the number of years of civilianization. For example, GWF records the start date of the current regime in Sweden as 1919, so we treat this case as having been civilianized for 27 years upon entry into the data. In the remaining six cases, we determined that military involvement in politics was sufficiently pervasive that a regime could not be classified as civilianized. When this was the case, the years of civilianization indicator was set to zero and so they were not assigned a drift parameter in our model. This was often the case for several regimes that GWF coded as personalist, but nonetheless featured substantial ties between the standing leader and the military (e.g. Trujillo in the Dominican Republic).

Table A.4: Civilianized Duration for Right-Censored Regimes

Regime Name	Civilianized Duration at Entry	GWF Regime Type
Afghanistan, 29-73	17	Monarchy
Australia, 01-NA	45	Democracy
Belgium, 20-NA	26	Democracy
Canada, 21-NA	25	Democracy
Chile, 32-73	14	Democracy
Colombia, 34-49	12	Democracy
Costa Rica, 19-48	27	Democracy
Denmark, 01-NA	45	Democracy
Dominican Rep. 30-62	0	Personalist
Egypt, 22-52	24	Monarchy
El Salvador, 31-48	0	Personalist-Military
Ethiopia, 1889-1974	57	Monarchy
France, 1875-NA	71	Democracy
Honduras, 33-56	0	Personalist
Iran, 25-79	21	Monarchy, civilian
Iraq 32-58,	14	Monarchy, civilian
Ireland 21-NA,	25	Democracy
Luxemburg 1870-NA,	76	Democracy
Mexico, 15-00	0	Single Party
Mongolia, 21-93	25	Single Party
Nepal, 1846-1951	100	Monarchy
Netherlands, 1870-NA	76	Democracy
New Zealand, 07-NA	39	Democracy
Norway, 1885-NA	61	Democracy
Oman, 1741-NA	205	Monarchy
Portugal, 26-74	0	Personal
Saudi Arabia, 27-NA	19	Monarchy
South Africa, 10-94	36	Oligarchy
Soviet Union, 17-91	29	Single Party
Sweden, 19-NA	27	Democracy
Switzerland, 1870-NA	76	Democracy
Turkey, 23-50	0	Single Party
UK, 11-NA	35	Democracy
USA, 1871-NA	75	Democracy
Yemen, 18-62	28	Monarchy

Note: *Non-civilianized regimes that existed prior to 1946.

The resulting duration indicator is then used to assign an appropriate drift parameter, based on the procedure outlined in the main text. Thus, Sweden begins self-reinforcing at a rate commensurate with a 27 year old regime, rather than a newborn regime. Taking these steps allows us to better determine the year-to-year rate at which civilian control is self-reinforcing. Note, however, that we still lack institutional data prior to 1946 and there is therefore still uncertainty about what each regimes starting point should be upon entry into the data–that is, there is uncertainty about what the cumulative impact of drift should have been prior to 1946.[4] As a result, it is possible that our estimates may be conservative for states like Switzerland, which have both remained highly civilianized, and have persisted for long durations.[5] Nevertheless, these regimes are already among the most civilianized in the world, and it is unlikely that shifting their scores in the latent space will substantially alter analyses.

Nevertheless, we also took additional steps to ensure that these cases do not alter our conclusions by re-running our analysis after dropping left-censored regimes. The results are displayed in Figure A.23, which parallels Figure 2 in the text. The pattern between the static and drift model estimates is again consistent–the static model shows relatively little change over time in civilian control scores among civilianized regimes, while the drift model shows a steady increase, that accelerates after about four decades. Figure A.24 displays the drift parameters, paralleling Figure A.2 above.[6] Here again, we find that civilian control increases substantially after a regime survives its first two years of existence, but then the rate of reinforcement slows, only to increase substantially again after about four decades. Regardless of left-censoring, we find clear evidence of self-reinforcing civilian control.

Finally, in Figure 2 of the main text we report results based on drift years, or the number of consecutive years a regime had been civilianized since its birth or, for left censored regimes, since entering the data in 1946. For this latter subset of cases, the years of drift will be less than the overall age of the civilianized regime. Figure A.14 therefore displays these results by civilianized regime age. Again, the same patterns persist: the drift model estimates increase over time, accelerating after about 40 years, while the static model

[4]For this reason we continue to assign all regimes a standard normal distribution upon entry into the data. This is the standard identification strategy in dynamic measurement models, and still allows data-driven estimates to be generated Reuning, Kenwick and Fariss (2019).

[5]This is less likely to impact estimates regimes like France and the United States, where the effect of drift is balanced against the persistence of current and former military personnel in high-level political positions.

[6]Due to reducing sample size, we fix the annual drift parameter value to a single value for regimes fifty years or older

estimates change relatively little over time.

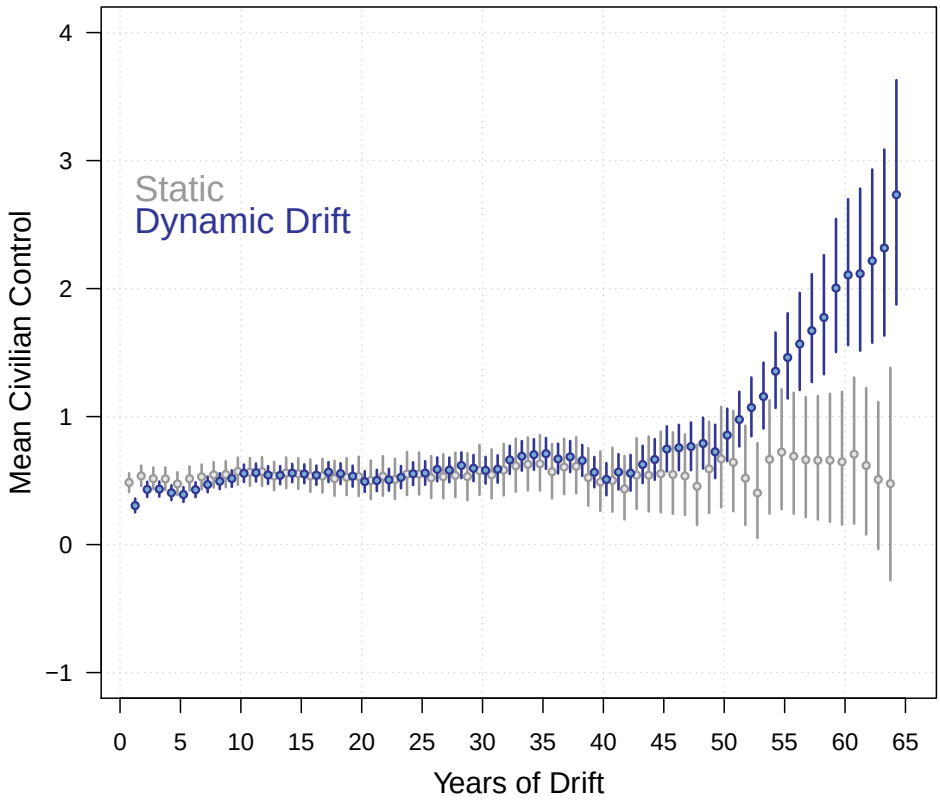

Figure A.23: Mean Estimates of Civilian Control for Civilianized Regimes, Dropping Left-Censored Regimes

Note: Plots display mean estimates of civilian control from the static (grey) and drift (blue). Regimes existing for more than ten years prior to 1946 are dropped. The drift model produces a self-reinforcing pattern of civilian control, while the static model does not.

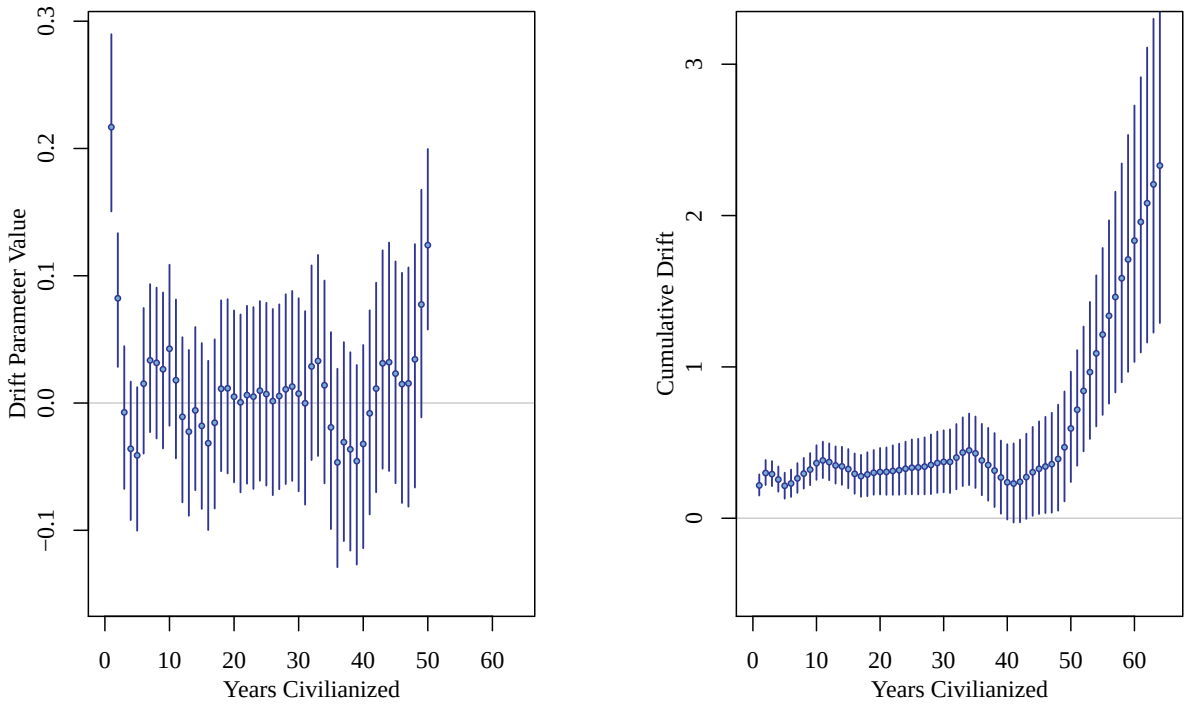

Figure A.24: Drift Parameter Across Age of Civilianized Regimes, Dropping Left-Censored Regimes

Note: Figure reports estimates of the drift parameter δ_{t^*} for a model dropping all regimes that existed for more than ten years prior to 1946. The left panel reports the value of the drift parameter across the values of t^*, the number of years a regime has remained civilianized. Due to a reduced sample size, we fix the annual drift parameter to a single value for regimes that have been civilianized for 50 years or longer. The right panel reports estimates of the cumulative amount of drift a civilianized regime will experience at each time period.

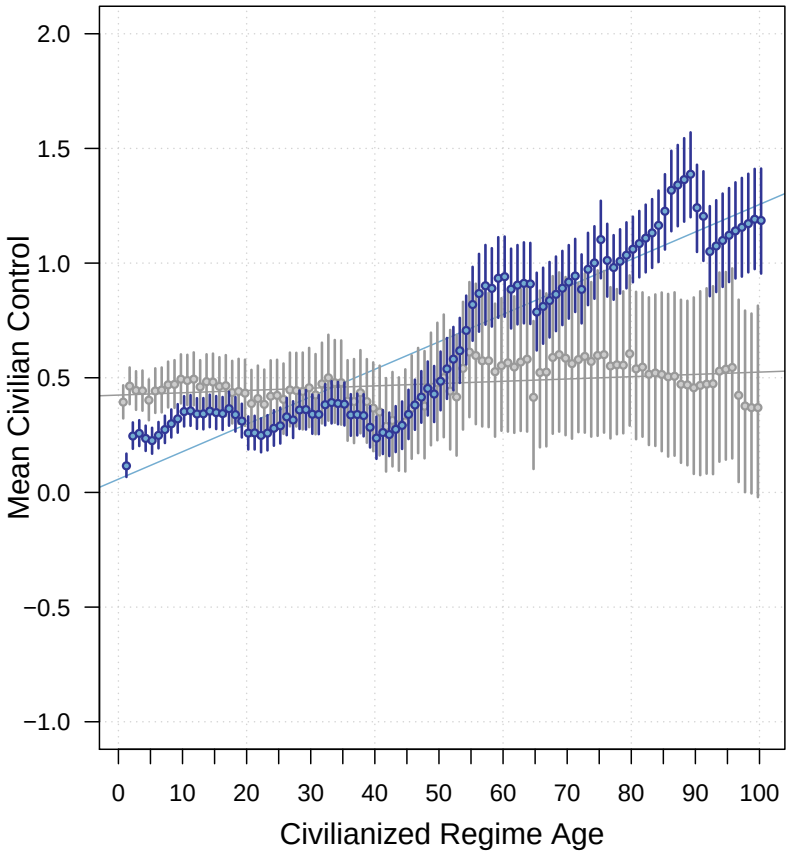

Figure A.25: Mean Estimates of Civilian Control for Civilianized Regimes

Note: Plot displays mean estimates of civilian control from the static (grey) and drift (blue) model for civilianized regimes. The horizontal axis stratifies civilianized regimes by overall age. The drift model produces a self-reinforcing pattern of civilian control, while the static model does not.

16 Comparison with a Standard Dynamic Model

In the main text, our drift model is an adaptation of the standard dynamic latent variable model employed by Martin and Quinn (2002) and others. The addition of the drift parameter is intended to allow for more variability dynamic processes, particularly with regard to self-reinforcing patterns. It is not, however, strictly necessary to test our expectations–the standard dynamic model will similarly assign higher scores to regimes with a history of civilian control, and lower scores when military involvement in politics is more pervasive. As an additional check, we also ran a standard dynamic model and compared its estimates to those reported in the main text. We found that the dynamic and drift model produced very similar estimates. This can be seen below in Figure A.26, which parallels Figure 2 in the main text. Most importantly, both the standard dynamic and drift model provide strong evidence of self-reinforcing civilian control, whereas the static model does not. The core difference is that the drift model uncovers a more strongly non-linear relationship than the dynamic model. Both models find accelerating civilian control after about several decades, but the increase is more intense with the drift model. That the relationship is more linear in the dynamic model is again a function of the more constrained specification. While it is difficult to conduct a comparative validation of two models that correlate so highly, we have more faith in the drift model, since the specification structure nests the dynamic model. In short, we adopted the drift model for its flexibility, but this choice does not affect our core substantive conclusions.

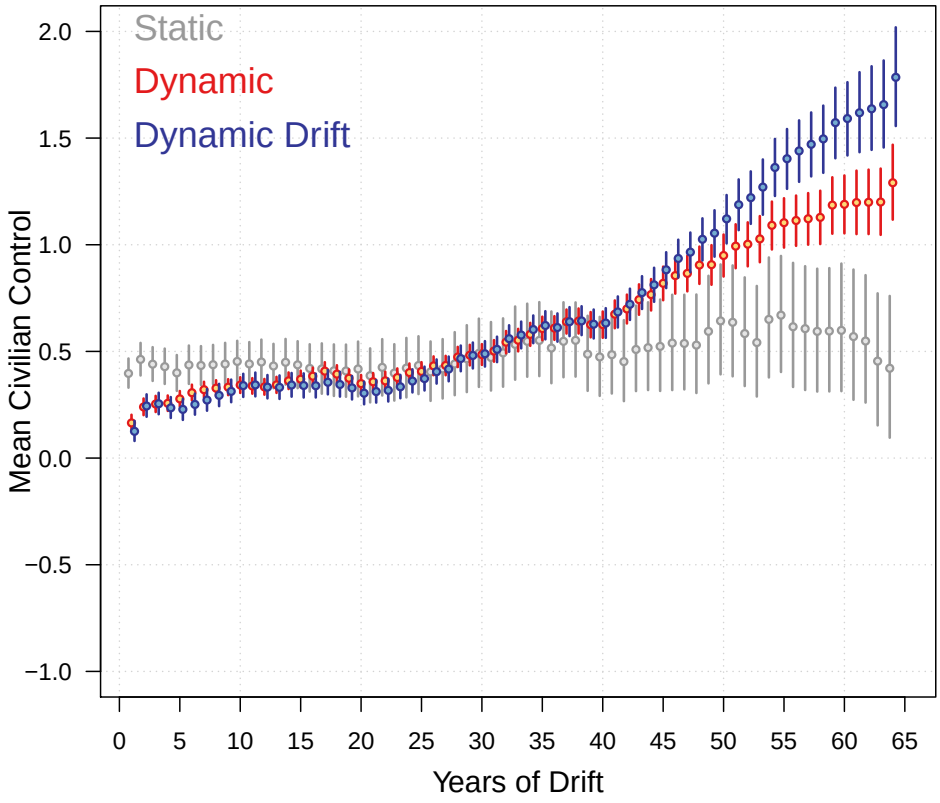

Figure A.26: Mean Estimates of Civilian Control for Civilianized Regimes

Note: Plots display mean estimates of civilian control from the static (grey), dynamic (orange), and drift (blue) model for civilianized regimes. The drift and dynamic models produces a self-reinforcing pattern of civilian control, while the static model does not.

References

Beck, Thorsten, George Clarke, Alberto Groff, Philip Keefer and Patrick Walsh. 2001. "New Tools in Comparative Political Economy: The Database of Political Institutions." *World Bank Economic Review* 15:1(September):165–176.

Böhmelt, Tobias, Andrea Ruggeri and Urlich Pilster. 2017. "Counterbalancing, Spatial Dependence, and Peer Group Effects." *Political Science Research and Methods* 5(2):221–239.

Cheibub, José Antonio, Jennifer Gandhi and James Raymond Vreeland. 2010. "Democracy and Dictatorship Revisited." *Public Choice* 143(2-1):67–101.

De Bruin, Erica. 2017. "Preventing Coups d'état: How Counterbalancing Works." *Journal of Conflict Resolution* Forthcoming.

Finer, Samuel E. 1988. *The Man on Horseback : The Role of the Military in Politics*. Westview Press.

Geddes, Barbara. 1999. "What Do We Know about Democratization after Twenty Years?" *Annual Review of Political Science* 2:115–144.

Geddes, Barbara, Joseph Wright and Erica Frantz. 2014. "New Data Set: Autocratic Breakdown and Regime Transitions." *Perspectives on Politics* 12(2).

Goertz, Gary and James Mahoney. 2012. "Concepts and Measurement: Ontology and Epistemology." *Social Science Information* 51(2):205–216.

Hadenius, Axel and Jan Teorell. 2007. "Pathways from Authoritarianism." *Journal of Democracy* 18(1):143–156.

Horowitz, Michael and Allan C. Stam. 2014. "How Prior Military Experience Influences The Future Militarized Behavior of Leaders." *International Organization* 68(3):527–559.

Martin, Andrew D. and Kevin M. Quinn. 2002. "Dynamic Ideal Point Estimation via Markov Chain Monte Carlo for the U.S. Supreme Court, 1953–1999." *Political Analysis* 10(2):134–53.

Powell, Jonathan and Clayton Thyne. 2011. "Global Instances of Coups from 1950-present." *Journal of Peace Research* 48(2):249–259.

Quinlivan, James. T. 1999. "Coup-Proofing: Its Practice and Consequences in the Middle East." *International Security* 24(2):131–165.

Reuning, Kevin, Michael R. Kenwick and Christopher J. Fariss. 2019. "Exploring the Dynamics of Latent Variable Models." *Political Analysis* Online First.

Singer, J. David, Stuart Bremer and John Stuckey. 1972. Capability Distribution, Uncertainty, and Major Power War 1820-1965. In *Peace, War, and Numbers*, ed. Bruce Russett. Sage.

Svolik, Milan W. 2012. *The Politics of Authoritarian Rule*. Cambridge University Press.

Weeks, Jessica. 2012. "Strongmen and Straw Men: Authoritarian Regimes and the Initiation of International Conflict." *American Political Science Review* 106(2):326–347.

White, Peter B. 2017. "Crises and Crisis Generations: International Crises and Military Political Participation." *Security Studies* 26(4):575–605.