Do weak institutions prolong crises?

On the identification, characteristics and duration of declines during economic slumps

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Motivation

- For every story of a "growth miracle" we can easily find a "miraculous collapse" as a counterpart
- Since Pritchett (2000), many empirical studies argue that growth is an inherently unstable process
- Flurry of papers identifying and analyzing different patterns: accelerations, slowdowns, slumps, recoveries, and so on.
- We now know that growth is easy to ignite (Hausmann et al. 2005) but hard to sustain (Berg et al. 2012). What about loosing previous gains?
- Add to this an empirical fact: there is a strong correlation between GDP *levels* and institutions, but little correlation with *growth rates*. Is there a role for institutions in growth experiences since 1950?

Contribution

- We *identify slumps* which are truly *negative and pronounced departures from a previously positive trend*
- We show that slumps go together with *endogenous institutional change*
- We try to identify the variables that determine how long a slump lasts and ask: *do weak institutions prolong crises?*
- We find that slumps matter for divergence, are preceded by weak institutions and that their duration is longer in *weakly institutionalized and ethnically fragmented* societies

Some background

- Large body of political economy theory puts social conflict and the ability of (constrained and durable) institutions to manage such conflict at the center stage
- Some argue that (1) weakly institutionalized societies are prone to collapses, and (2) crises put further stress on institutions (e.g. North et al. 2009)
- Institutions determine "... whether there will be *significant swings in the political and social environment leading to crises*, and whether politicians will be induced to *pursue unsustainable policies* in order to remain in power *in the face of deep social cleavages*." (Acemoglu et al. 2003)
- Delayed stabilizations literature stresses heterogeneity (Alesina & Drazen, 1991) and role of institutions (Spoalore, 2004)

Applied macro literature

Three strands of related literatures

1. Growth episodes: accelerations, collapses, etc. (e.g. Rodrik 1999, HPR et al. 2005, HRW 2008, Berg et al. 2012)
2. Macroeconomic volatility & institutions (e.g. Acemoglu et al. 2003, Mobarak 2005, Klomp & de Haan 2009)
3. Broken trend stationarity & unit roots (e.g. Zivot & Andrews 1992, Ben-David & Papell 1998, Papell & Prodan 2011a)

Why add to the study of slumps and their duration?

- Literature still struggles with identifying slumps and generic structural breaks algorithms don't do well on slumps
- Unit root literature faced issue of structural breaks for some time and provides new approaches (Pappel & Prodan 2011a,b)

Identifying slumps

Three criteria which we translate into econometrics

- *a departure from a positive trend* –> structural break
- *negative* –> beginning with a drop (in the intercept)
- *pronounced* –> passing a significance criterion

A *restricted* structural change model (s.t. $\beta > 0$ and $\gamma_0 < 0$):

$$y_t = \alpha + \beta t + \gamma_0 DU_1 + \gamma_1 DT_1 + \gamma_2 DT_2 + \sum_{i=1}^{p} \delta_i y_{t-i} + \epsilon_t$$

- $DU_1 \equiv \mathbf{1}(t > tb_1)$ is an intercept break
- $DT_1 \equiv (t - tb_1)\mathbf{1}(t > tb_1)$ is a trend break
- $DT_2 \equiv (t - tb_2)\mathbf{1}(t > tb_2)$ is a second trend break

Sequential break search

Problems

- Endogenous breaks could occur at any point in the series
- Wald-statistics on the coefficients are not independent.

Solved with a sequential break search algorithm (Bai 1997, 1999, Papell and Prodan 2011a) and a recursive parametric bootstrap (Diebold and Chen 1996).

1. Fit the model to each GDP per capita series in PWT 7.0
2. Compute sup-W test ($\mathbb{H}_0 : \gamma_0 = \gamma_1 = \gamma_2 = 0$) over all possible break dates (subject to trimming and min. distance)
3. Bootstrap the empirical distribution of these test statistics
4. Collect breaks with $\leq 1/10$ probability of occurring by chance
5. Split sample before 1^{st} and after 2^{nd} break, repeat from (1) until no more significant breaks or $T < 20$

Dating the trough

A slump is finished if pre-slump GDP per capita is recovered. More formally, given the set $A = \{a \mid a \in (\widehat{tb}_1, T] \text{ and } y_a \geq y_{\widehat{tb}_1}\}$, define $a_0 = \min A$, corresponding to the (certain) end of the slump. We estimate that the trough occurs at

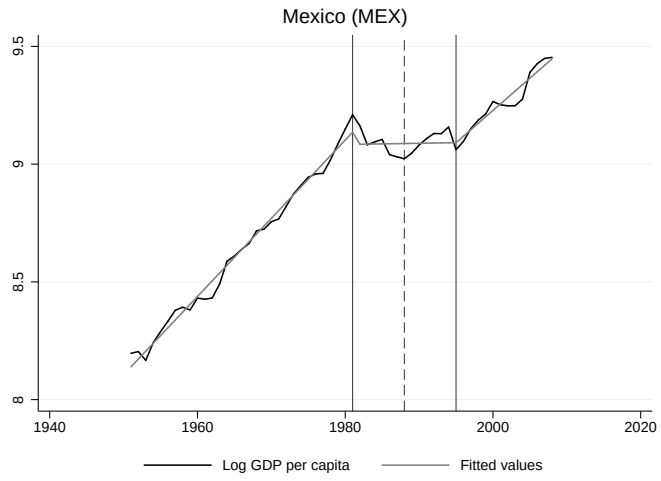
$$t_{min} = \begin{cases} \text{argmin}_{j \in (\widehat{tb}_1, a_0]} \, y_j, & \text{if } c = 0 \\ \text{argmin}_{j \in (\widehat{tb}_1, T]} \, y_j, & \text{if } c = 1. \end{cases}$$

where the censoring indicator is $c = \mathbf{1}(\max_{j \in (\widehat{tb}_1, T]} y_j < y_{\widehat{tb}_1})$.

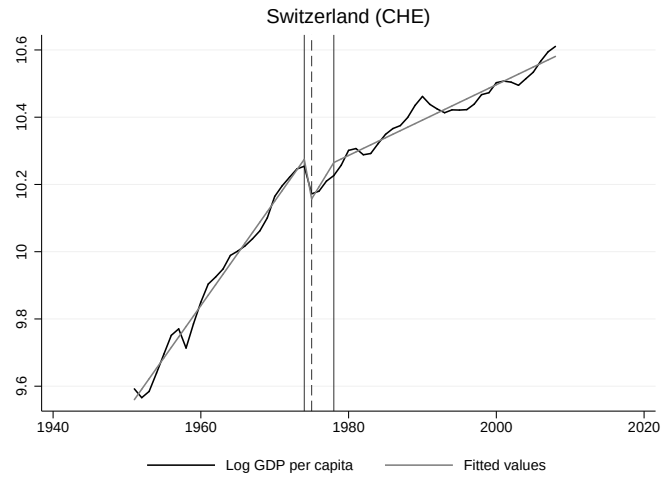
A provisional trough occurs when y_t attains a minimum after $\widehat{tb}_1$. The duration of the decline phase is simply $\tilde{t}_D = \hat{t}_{min} - \widehat{tb}_1$.

A diversity of slumps

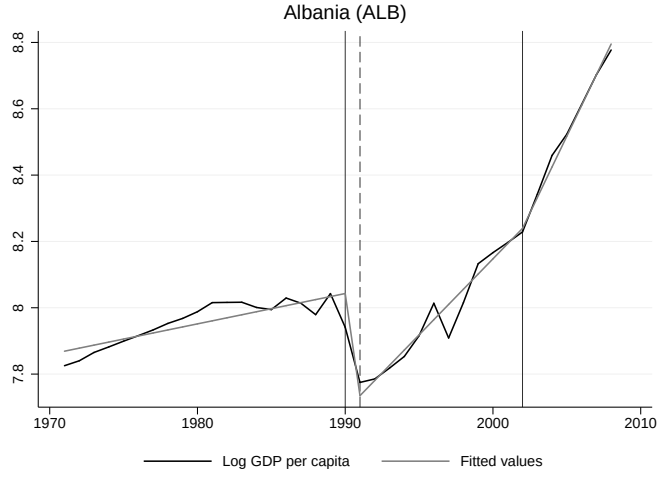
(a) finished & unchanged trend



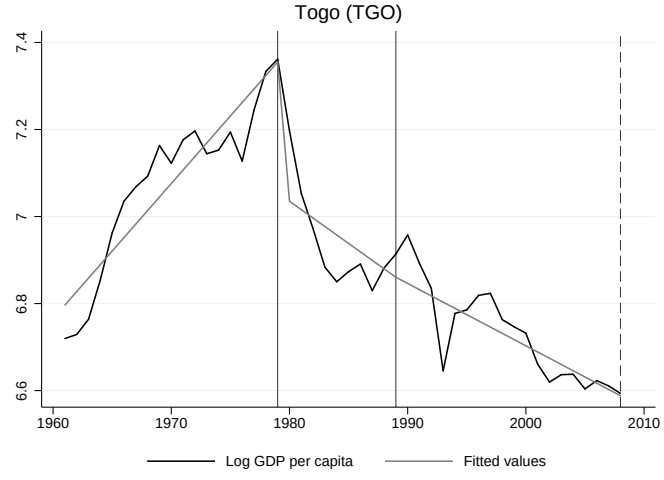
(b) finished & decelerated trend



(c) finished & accelerated trend



(d) unfinished & negative trend

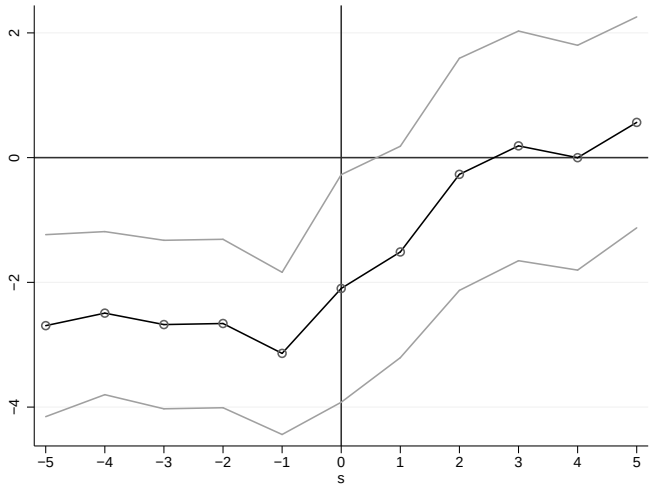


Depth and distribution of slumps

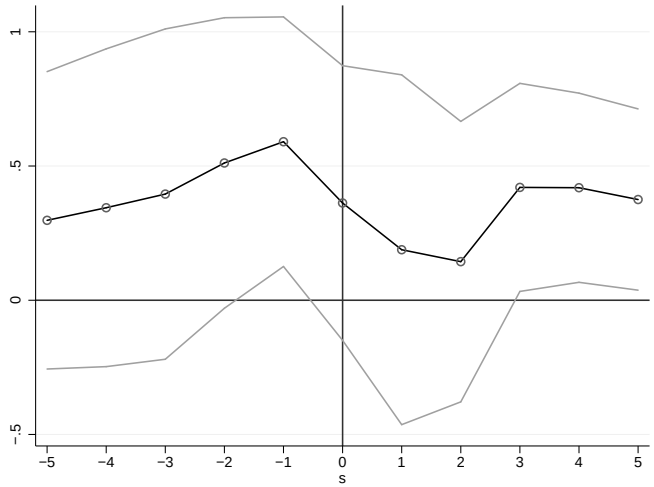
	Mean Depth	Mean Duration	Median Duration	Number of Spells	Censored Spells	Number of Countries
Income Level						
High Income (OECD)	-7.12	2.00	1	12	0	29
High Income (Other)	-20.84	5.38	2	8	1	12
Upper Middle Income	-21.20	5.39	2	16	2	30
Lower Middle Income	-27.40	6.00	3	11	3	34
Low Income	-34.17	15.75	16	11	4	33
Geographical Region						
East Asia & Pacific	-13.63	2.30	2	10	0	17
Eastern Europe & Central Asia	-19.70	3.40	2	5	0	10
Europe (excl. Eastern Europe)	-8.37	1.50	1	6	0	22
Latin America & Caribbean	-17.34	5.27	3	15	1	23
Middle East & North Africa	-33.24	8.66	9	7	3	17
North America	-2.51	1.00	1	1	0	2
South Asia	-5.33	1.00	1	1	0	6
Sub-Saharan Africa	-37.14	17.74	16	13	6	41
Total	-21.87	7.69	3	58	10	138

Endogenous institutions

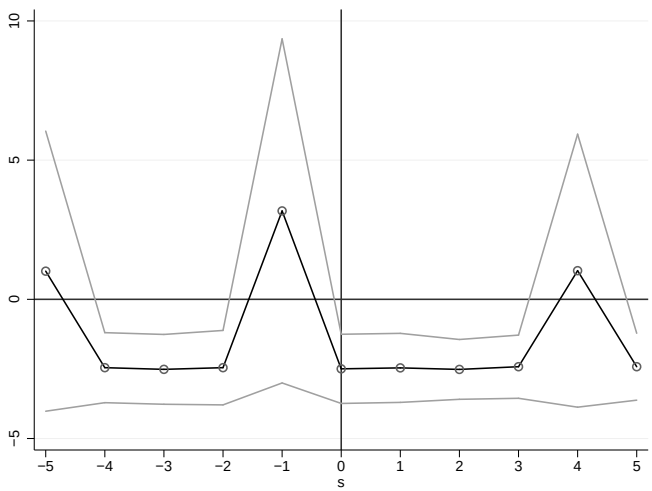
(a) Polity Score



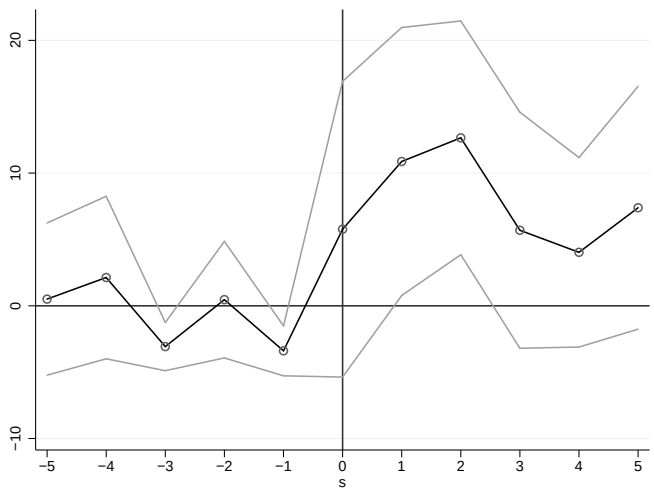
(b) Corruption (ICRG)



(c) Negative Regime Change



(d) Positive Regime Change



Econometric specification

Log-normal AFT models of duration until exit of the decline phase

$$\ln \tilde{t} \equiv \ln(t - t_0) = \alpha + \beta INS_0 + \gamma ELF + \mathbf{x}_0'\boldsymbol{\xi} + \mathbf{z}_t'\boldsymbol{\zeta} + \epsilon_t$$

where INS_0 is *Executive Constraints* (Polity IV), ELF is fractionalization (Desmet et al., 2012), $\mathbf{x}_0$ are fixed covariates, $\mathbf{z}_t$ are exogenous covariates, and $\epsilon_t \sim \mathcal{N}(0, \sigma_\epsilon)$.

INS_0 and $\mathbf{x}_0$ are fixed at $t_0 = \hat{tb}_1$ (last year before the slump) in order to avoid endogeneity. SEs are clustered on repeated spells.

- coefficient > 0 time passes slower $\rightarrow$ decelerated exit
- coefficient < 0 time passes faster $\rightarrow$ accelerated exit

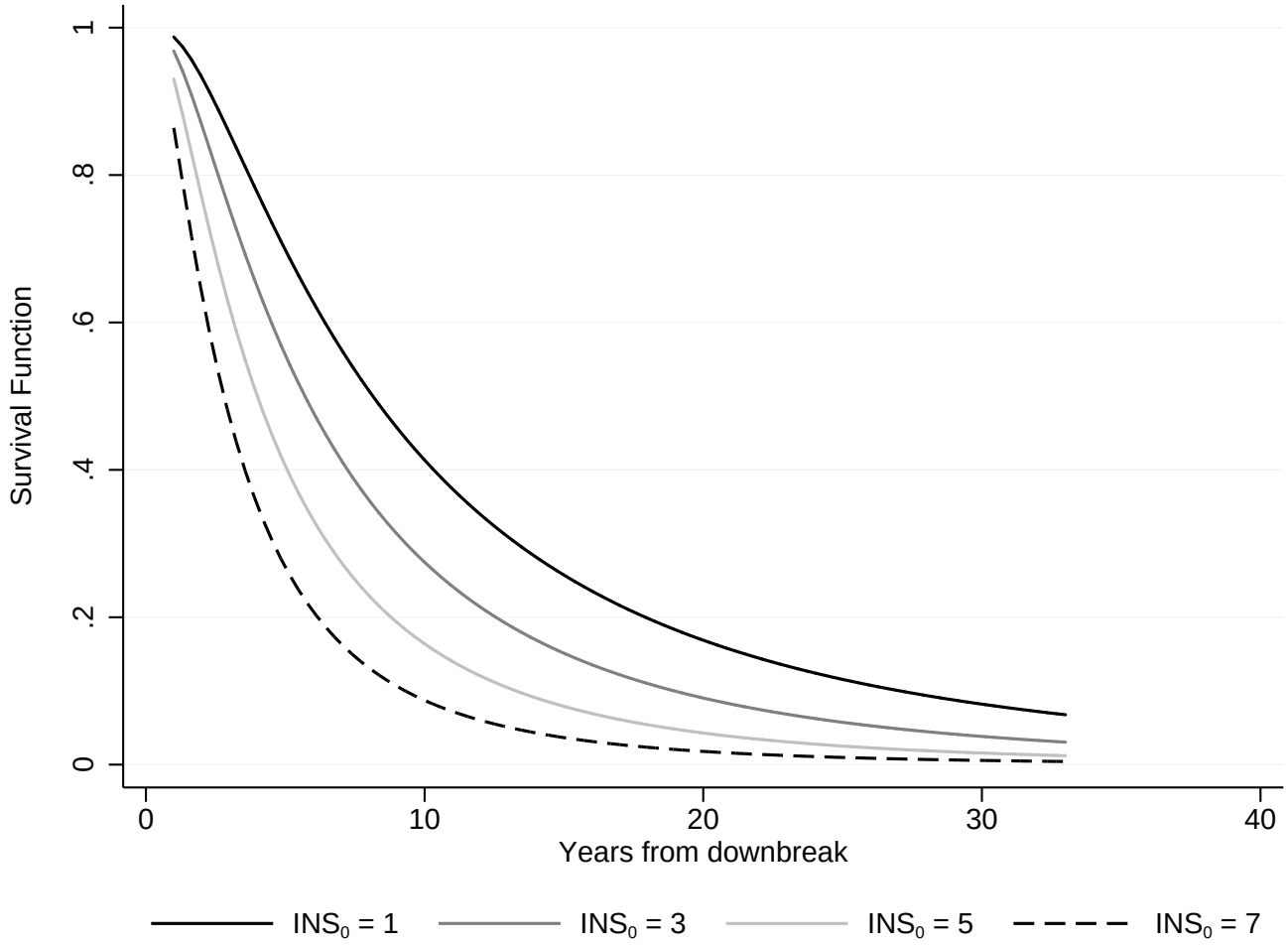
The coefficients are semi-elasticities of the duration w.r.t. to the covariate, elasticities if the covariate is in logs.

Results (I)

VARIABLES	(1) $\ln \tilde{t}$	(2) $\ln \tilde{t}$	(3) $\ln \tilde{t}$	(4) $\ln \tilde{t}$	(5) $\ln \tilde{t}$
Executive Constraints (INS_0)	-0.178***	-0.165***	-0.172***	-0.161***	-0.111*
	(0.058)	(0.059)	(0.064)	(0.061)	(0.064)
Fractionalization ($ELF15$)	0.016***	0.021***	0.015***	0.012**	0.014***
	(0.004)	(0.006)	(0.004)	(0.006)	(0.005)
Initial ln GDP per capita	0.197*	0.247**	0.401***	0.213*	0.459***
	(0.106)	(0.105)	(0.124)	(0.111)	(0.164)
Real US Interest Rate	0.087*	0.081*	0.070	0.091**	0.074*
	(0.048)	(0.048)	(0.045)	(0.039)	(0.042)
Polarization ($POL15$)		-0.009			
		(0.007)			
Education			-0.088		
			(0.069)		
Country RE	NO	NO	NO	YES	NO
Region FE	NO	NO	NO	NO	YES
Exits	47	47	45	47	47
Spells	57	57	55	57	57
Years of Decline	346	346	325	346	346
Log-$\mathcal{L}$	-72.090	-71.309	-66.142	-71.867	-63.827
Pseudo-R^2	0.168	0.177	0.202	0.111	0.263

Constant not shown. SEs clustered at the country level.

Predicted survival functions



ExConst $= 1$, expected decline is 9.1 years, *ExConst* $= 7$ expected decline is 3.1 years, and at mean *ExConst* expected decline is 7.1 years.

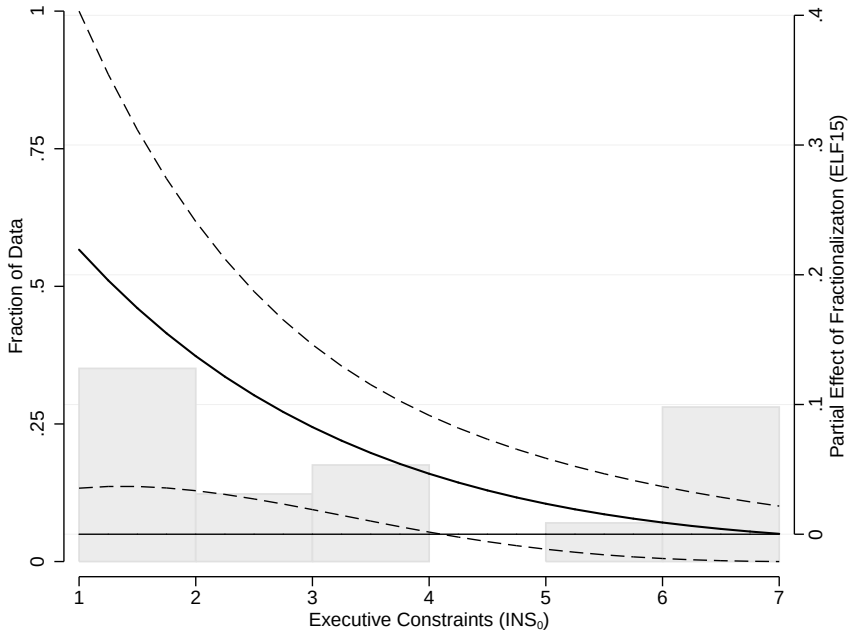
Results (II)

VARIABLES	(1) $\ln \tilde{t}$	(2) $\ln \tilde{t}$	(3) $\ln \tilde{t}$	(4) $\ln \tilde{t}$	(5) $\ln \tilde{t}$
Executive Constraints ($\widetilde{INS_0}$)	-0.288***	-0.275***	-0.286***	-0.279***	-0.217**
	(0.080)	(0.087)	(0.089)	(0.080)	(0.087)
Fractionalization ($\widetilde{ELF15}$)	0.018***	0.019***	0.017***	0.015***	0.017***
	(0.004)	(0.006)	(0.004)	(0.005)	(0.004)
Interaction ($\widetilde{INS_0} \times \widetilde{ELF15}$)	-0.004***	-0.004**	-0.004***	-0.004**	-0.003**
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Initial ln GDP per capita	0.198*	0.215**	0.407***	0.208*	0.439***
	(0.106)	(0.104)	(0.124)	(0.110)	(0.163)
Real US Interest Rate	0.098**	0.095**	0.076*	0.093**	0.076*
	(0.047)	(0.047)	(0.044)	(0.040)	(0.042)
Polarization ($POL15$)		-0.003			
		(0.007)			
Education			-0.089		
			(0.071)		
Country RE	NO	NO	NO	YES	NO
Region FE	NO	NO	NO	NO	YES
Exits	47	47	45	47	47
Spells	57	57	55	57	57
Years of Decline	346	346	325	346	346
Log-$\mathcal{L}$	-69.540	-69.455	-63.255	-69.319	-61.681
Pseudo-R^2	0.197	0.198	0.236	0.142	0.288

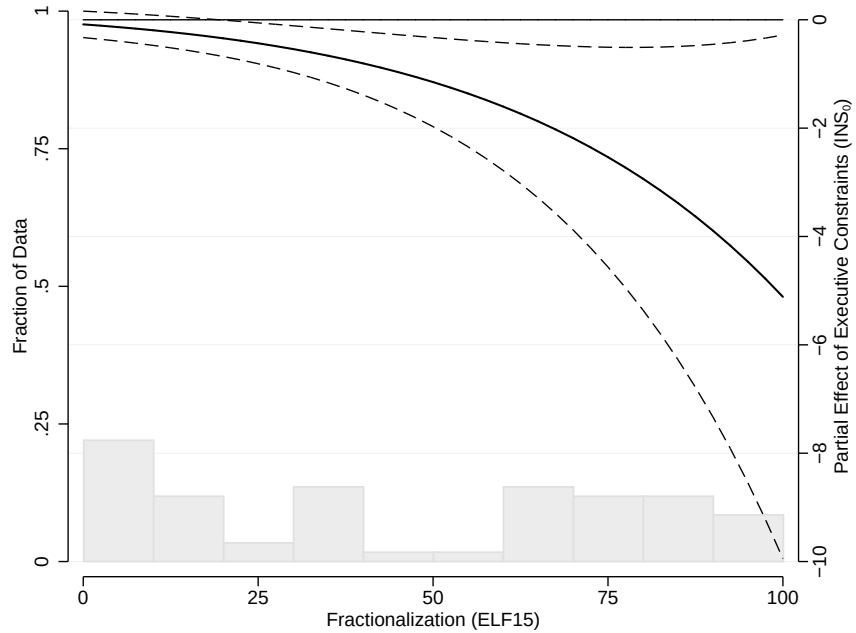
Constant not shown. SEs clustered at the country level.

Partial effects in conditional model

(a) Fractionalization ($ELF15$)



(b) Executive Constraints (INS_0)



$$\ln \hat{\tilde{t}} = -.217^{***}\,\widetilde{INS}_0 + .017^{***}\,\widetilde{ELF}_0 - .003^{**}(\widetilde{INS}_0 \times \widetilde{ELF}_0) + \mathbf{x}_0'\hat{\boldsymbol{\xi}} + \mathbf{z}_t'\hat{\boldsymbol{\zeta}} + \hat{\mu}_R$$

Robustness (I)

VARIABLES	(1) Log-normal $\ln \tilde{t}$	(2) Log-logistic $\ln \tilde{t}$	(3) Exponential $\ln \tilde{t}$	(4) Weibull $\ln \tilde{t}$	(5) Cox PH $\ln \tilde{t}$
	Coefficients		*Hazard Ratios* ($\mathbb{H}_0$: HR = 1)		
Executive Constraints (*INS*$_0$)	-0.178***	-0.185***	1.229***	1.263***	1.221***
	(0.058)	(0.067)	(0.074)	(0.089)	(0.082)
Fractionalization (*ELF*15)	0.016***	0.016***	0.978***	0.974***	0.979***
	(0.004)	(0.005)	(0.005)	(0.007)	(0.006)
Initial ln GDP per capita	0.197*	0.235**	0.787	0.765	0.768
	(0.106)	(0.112)	(0.119)	(0.146)	(0.137)
Real US Interest Rate	0.087*	0.084*	0.947	0.928	0.951
	(0.048)	(0.051)	(0.058)	(0.061)	(0.064)
Exits	47	47	47	47	47
Spells	57	57	57	57	57
Years of Decline	346	346	346	346	346
Log-$\mathcal{L}$	-72.090	-73.286	-75.295	-73.940	-143.142
AIC	156.180	158.571	160.590	159.879	294.285
Pseudo-R^2	0.168	0.164	0.208	0.210	0.088

Constant and shape parameters not shown. SEs clustered at the country level.

Robustness (II)

- Effect of fractionalization is large & very robust, effect of institutions is also large & robust in most samples but not all. In interaction model, both effects remain similarly robust.
- Robust to accounting for recurrent spells and dropping of influential observations or entire regions.
- Sub-Saharan Africa accounts for large effect of ELF.
- Two financial measures (credit & depth) weaken the effect of institutions and their inclusion halves the sample. We argue that financial development is an institutional outcome.
- Effects do not run through the *average rate of decline*.
- Robust to use of alternative data on heterogeneity (EPR), alternative GDP series (Maddison) and different parameters during the break search (significance and spacing of breaks).

Concluding remarks

- Our analysis of slumps provides new *stylized facts* on growth. Slumps matter for medium-run growth performance.
- Institutions play a role in the run up to a slump and we find evidence of *positive institutional change* after a slump hits.
- We provide robust evidence that the time to exiting the decline depends on institutions and ethnic cleavages.
- Effective coordination and responses to slumps are impeded by a high degree of fragmentation but stronger institutions help to resolve these conflicts.
- The literature on delayed stabilization does not capture this conditional effect and the role of fractionalization (we are working on a political economy model that does).

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