Extreme Bounds of Democracy

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Introduction

There are many stories of democracy. Efforts to test the empirical implications of various theories have produced a long list of variables that purportedly explain democracy. There is, however, little consensus over which variables robustly determine democracy. We address this issue by applying Sala-i-Martin's (1997) Extreme Bounds Analysis (EBA) to test the robustness of more than 55 various proposed factors. We assess both the factors leading to the emergence of democracy as well as the factors explaining the persistence of democracy. To be clear from the outset, our approach is extreme. We evaluate over 1.7 million regressions of the emergence of democracy, and over 1.4 million regressions for the survival of democracy.

The most striking of our findings is that most of the variables suggested in the literature do not survive the rigorous EBA robustness test. While many of the factors we test have been shown elsewhere to produce significant effects in plausible and well-specified models, when put to the rigors of being tested along with many other plausible variables, the significance of their effects simply do not survive.

We do not suggest that this implies these factors are unimportant. Many of the findings we build off of are valid within the confines of the original statistical model proposed in the literature. Moreover, to the extent that some variables fail out test, this could be because they are poor proxies for otherwise strong theories of democracy. The standard of surviving the test of EBA is just a very a high one, and only the strongest of relationships survive it.

Some variables, however, do indeed survive. We suggest that these variables may be the most important factors determining democracy.

Regarding the emergence of democracy, we find that economic growth has a robust negative effect. This finding, standing in stark contrast to Modernization Theory, suggests that autocracies with strong economic performance are unlikely to see democracy emerge. Instead, economic contraction causes dictatorships to break down. Also in contrast to Modernization Theory, but consistent with the argument of Przeworski et al. (2000), the level of GDP per capita does not have a robust relationship with the emergence of democracy. The only other variables that have a robust significant effect are fuel exports and the share of the population that is Muslim. We suspect that the latter two findings are largely driven by the Middle East and seek to pursue this possibility further.

Regarding the survival of democracy, GDP per capita has a positive significant effect. The finding confirms Przeworski et al. (2000) and Przeworski (2005). We also find that being surrounded by democracies also increases the likelihood of staying a democracy, consistent with Gleditsch (2002). In line with Cheibub (2006), we find that democracies with executives who are formal military officers are more likely to experience a democratic breakdown. Finally, we find that past transitions also reduce the survival probability of democracies. It turns out that a past history of transitions cuts both ways, making both democracies and dictatorships less sturdy, as Przeworski et al. (2000) argue.

The paper proceeds as follows. We begin with a brief review of the literature (note: this section is still in progress). We then introduce the EBA method in detail and then present the results. Details on the variables included in the study (a working list – comments most appreciated) at the end.

Background

In an early large-n study of democracy, Almond and Verba (1963) propose a cultural explanation of democracy. Using survey-based research in five countries, they argue that a "participant" culture (as opposed to a "subject" or "parochial" culture) is required for democracy. The "civic culture" argument is tested cross-nationally in the work, of Inglehart (1988), who finds that democracy is correlated with the percentage of people reporting high levels interpersonal trust, low levels of support for revolutionary change, and high levels of life satisfaction. His findings are of course, disputed by Seligson (2002), who shows that the correlation disappears when one controls for level of economic development. Przeworski et al. (2000) test a full range of other cultural variables, finding that none has a robust relationship with democracy once one accounts for level of economic development.

Economic explanations of democracy date back to Lipset (1959) who is often cited as the first "modernization theorist." Modernization Theory argues that as countries develop economically, social structures become too complex for authoritarian regimes to manage – technological change endows owners of capital with some autonomy and private

information, complex labor processes require active cooperation rather than coercion, and civil society emerges. At some point in this process, dictatorship collapses and democracy emerges as the alternative.

Huntington (1968) adds that sustainable democracy requires political development along with economic development, but basically agrees that as a dictatorship experiences economic development democratization becomes more likely. Without political development, however, rapid economic development can also destabilize democracies. Thus he proposes a "bell-shaped" pattern of stability of regimes with respect to economic development.

In their expansive large-n study of democracy and development, Przeworski et al. (2000) thoroughly explore the relationship. They begin with the observation that the correlation between level of economic development and democracy is strong. They question, however, the process by which this correlation is driven. They suggest, in contrast to modernization theorists, that this correlation is possible even if the emergence of democracy is completely random with respect to economic development. The correlation may be driven instead by a relationship between economic development and the survival of democracy.

This is in fact what their book argues. The emergence of democracy has no relationship with level of economic development; the correlation instead is entirely driven by the survival of democracy. In other work, Przeworski (2005: 253) argues that "Democracy

prevails in developed societies because too much is at stake in turning against it."
Conversely, in poor democracies, "the value of becoming a dictator is greater and the
accumulated cost of destroying capital stock is lower" (Przeworski and Limongi, 1997:
166 fn. 1).

It should be noted, however, that while Przeworski et al. (2000) show that transitions to
democracy are not well predicted by economic development and survival of democracy
is, the estimated effect of economic development on the transition to democracy is
statistically significant in their specification.[1] We suspect (and show below) that it is not
a robust relationship.

Since the Przeworski et al. (2000) study, many large-n studies of democracy have been
pursued – too many to adequately review here. We are in the process of collecting data
from all available studies and we describe them briefly in the appendix. (*Suggestions of
data from studies we still need to collect would be greatly appreciated*.) Given the
interests of the particular audience for this conference, we continue by highlighting some
specific studies.

The Przeworski et al. (2000) study ignores the oil rich countries of the Middle East. As
these scholars were originally interested in estimating the effect of regime on economic
growth, they chose not to include oil rich countries, whose process of augmenting GDP

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[1] The insignificant coefficient reported indicates that the difference between the coefficients for the
emergence and survival of democracy is not significant.

per capita is much different from that of other countries. Nevertheless, these countries present a real challenge to the modernization theory argument that should be considered.

The argument of Boix (2003) provides a compelling answer.[2] He argues that level of economic development, income distribution, and – importantly – asset specificity together impact the probability of the emergence of democracy. Where asset specificity is high and the income distribution is highly skewed, such as in many oil-rich countries, the rich face severe redistributional consequences for allowing popular sovereignty, and they have no credible threat to flee the country taking their productive capacity with them. Thus, it is in their interest to pay high costs of repressing democracy, maintaining dictatorial rule. If assets are not highly specific, however, the rich have a credible exit threat. If the rich flee the country, taking the productive capacity along with them, they can severely harm the national economy. The credible threat restrains the redistributional demands of the poor and may make democracy possible even in countries with relatively low levels of economic development, such as India. Asset specificity aside, if redistributional demands diminish at higher levels of economic development, Boix argues that economic development should make democracy more likely both to emerge and to survive.

Acemoglu and Robinson (2006) also propose a theory of democracy where elites may prefer dictatorship but must pay the costs of repression as the masses threaten disorder. Where repression costs are high and elites cannot credibly promise concessions otherwise, democracy can offer a compelling alternative under specific conditions.

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[2] See also Boix and Stokes (2003) on this matter.

Factors identified by their theory as determinants of democracy include measures of civil society, political institutions, economic crises, income distribution, the structure of the economy, and the forces of globalization.

Another story that addresses a regional pattern of regime such as found in the Middle East is suggested by Gleditsch (2002). His thesis, summarized nicely by the title of his book, is that all (international) politics are local. Diffusion theorists suggest that through various forces that spill over borders – political, cultural, and economic – regime in one country is likely to be correlated with regime in a neighboring country. Thus we have solidly democratic regions, such as Europe, dictatorial regions, such as the Middle East, and regions where countries tend to transition in waves, such as Latin America.

A related story is suggested by Pevehouse (2002a,b), who argues that participation in international organizations that are dominated by one regime or another influences both the emergence and survival of democracy. He provides an innovative mechanism by which diffusion may operate – participation in regional organizations provides incentives for countries to encourage democratic standards amongst the membership.

Due to time constraints, we turn now to the empirical section of the paper – we intend to more fully develop the theoretical section in the next draft of the paper, highlighting the full spectrum of variables we intend to test in the next section.

The motivation for the test presented in the following section is as follows:

There is a vigorous debate on the determinants of democracy. Most papers, however, present but a handful of possible specifications, controlling for very few of the possible combinations of different variables. Of course, each paper presents valid theoretical justifications for how the specifications are chosen. But looking across the vast literature, there appears to be little consensus on the theory. Findings that are presented as statistically significant in the presence of some variables may or may not be significant in the presence (or absence) of other variables that other scholars have proposed. We, therefore, suggest testing the bounds of the significance proposed variables.

Empirical Method

Since there are many studies that investigate the determinants of democracy, there is a long list of potential explanatory variables.[3] Studies often restrict their analysis to certain subsets of these variables and often ignore the effects of any omitted variable bias when other variables are not included. In addition to any model uncertainty, the limited number of observations often restricts the power of statistical tests that rule out irrelevant explanatory variables.

To address these issues we use extreme bounds analysis (EBA), as proposed by Leamer (1983) and Levine and Renelt (1992). EBA enables us to examine which explanatory variables are robustly related to our democracy measure and is a relatively neutral way of

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[3] See Table A1 in the Appendix for a summary of 14 recent empirical studies.

coping with the problem of selecting variables for an empirical model in situations where there are conflicting or inconclusive suggestions in the literature.

We begin with a basic model of democracy which assumes that the probability of observing democracy at time t (measured in years in our data) follows a first order Markov process. Let D be a dummy variable coded 1 if a country is a democracy, and 0 otherwise. Then,

$$\Pr(D_t \mid D_{t-1}) = (1 - D_{t-1}) * \Pr(D_t \mid D_{t-1} = 0) + (D_{t-1}) * \Pr(D_t \mid D_{t-1} = 1).$$

As the likelihood function for this model is additively separable, it can be easily estimated as two logistic functions, where the transition probabilities are defined as follows:

$$\Pr(D_t \mid D_{t-1} = 0) = \Phi\left(\beta^{AD'} x_{t-1} \right)$$

$$\Pr(D_t \mid D_{t-1} = 1) = \Phi\left(\beta^{DD'} x_{t-1} \right),$$

where Φ is the cumulative distribution function of the logistic normal distribution, x_{t-1} is the vector of variables that determine democracy, β^{AD} is a vector of coefficients capturing the effects of these variables on the probability of transition from **A**uthoritarianism to **D**emocracy, and β^{DD} is a vector of coefficients capturing the effects of these variables on the survival of democracy ("transitioning" from **D**emocracy to **D**emocracy). While it is of course not necessary to assume that the same variables determine both the emergence and survival of democracy, most scholars in practice do, and we will be testing all variables in both setups.

To conduct an EBA, we define:

$$\beta^{AD'} x_{t-1} = \beta_M^{AD'} M_{t-1} + \beta_F^{AD'} F_{t-1} + \beta_Z^{AD'} Z_{t-1}$$

$$\beta^{DD'} x_{t-1} = \beta_M^{DD'} M_{t-1} + \beta_F^{DD'} F_{t-1} + \beta_Z^{DD'} Z_{t-1},$$

where M is a vector of "commonly accepted" explanatory variables for the emergence of democracy; and F is a vector containing the variables of interest; and Z is an additional vector containing up to three possible additional explanatory variables (as in Levine and Renelt, 1992) which, according to the broader literature, are related to the dependent variable.

The EBA test for a variable in F states that if the lower extreme bound for βF – i.e., the lowest value for βF minus two standard deviations – is negative, while the upper extreme bound for βF – i.e., the highest value for βF plus two standard deviations – is positive, the variable F is not robustly related to our democracy measure.

Sala-i-Martin (1997) argues that this testing criterion is far too strong for hardly any variable to ever pass it. If the distribution of the parameter of interest has both positive and negative support, then a researcher is bound to find at least one regression model for which the estimated coefficient changes sign if enough regressions are run. Consequently, in what follows we not only report the extreme bounds, but also the percentage of the regressions in which the coefficient of the variable F is statistically different from zero at the five percent significance level. Moreover, instead of only analyzing the extreme bounds of the estimates of the coefficient of a particular variable, we follow Sala-i-Martin's (1997) recommended procedure and analyze the entire

distribution. Accordingly, we also report the unweighted parameter estimate of βF and its

standard error, as well as the unweighted cumulative distribution function, CDF(0). The

latter represents the proportion of the cumulative distribution function lying on each side

of zero. CDF(0) indicates the larger of the areas under the density function either above

or below zero, i.e., whether this happens to be CDF(0) or 1 - CDF(0). So CDF(0) always

lies between 0.5 and 1.0. However, in contrast to Sala-i-Martin, we use the unweighted,

instead of the weighted, CDF(0).[4]

Another objection to EBA is that the initial partition of variables in the M and in the Z

vector is likely to be arbitrary. However, as pointed out by Temple (2000), there is no

reason why standard model selection procedures (such as testing down from a general

specification) cannot be used in advance to identify variables that are particularly

relevant. Furthermore, some variables are included in the large majority of studies and

are by now common in this branch of the literature.

In our view, the inclusion of GDP per capita (PPP) in the M vector is the only non-

contentious inclusion as a regressor. We are conscious of not prejudging the importance

of other explanatory variables for the outcome of the EBA. Thus, we sort all other

variables in the F vector and test their relevance individually. The list of all variables,

their definitions and sources is given in Table 7. All variables (except the time-invariant)

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[4] Sala-i-Martin (1997) proposes using the integrated likelihood to construct a weighted CDF(0). However, missing observations for some of the variables poses a problem. Sturm and de Haan (2002) show that the goodness-of-fit measure may not be a good indicator of the probability that a model is the true model and that the weights constructed in this way are not invariant to linear transformations of the dependent variable. Hence, changing scales could result in different outcomes and conclusions. We therefore employ the unweighted version.

are included in the model with a lag of one year. One the one hand, this mitigates potential endogeneity problems and on the other hand this also allows us to interpret the relationships as being causal.

The basic idea of the EBA is to run many regressions continuously permutating explanatory variables and to test how the variable in the centre of attention "behaves" (e.g., how often it is significant) with respect to the conditioning set. In the basic model regression estimation equations include GDP per capita as well as combinations of up to three further variables. In the *F* vector regressions, GDP per capita is included as well the variable in focus plus up to three additional variables out of the *F* vector. Overall, we estimate a total of 1,776,379 specifications for the emergence of democracy and 1,492,029 specifications for the survival of democracy. As we use logit regressions we exclude estimations with convergence problems as well as estimations where the optimizing algorithm breaks down. Finally, we control our output variables by calculating medians. However, these values are very similar to the calculated means.

Results

The results of our empirical analysis are summarized in Tables 1 and 2. They read as follows: **Avg. Beta** and **Avg. S.E.** give the unweighted averages over all regressions of the coefficient and the standard error, respectively. **%Sign.** gives the percentage of regressions in which the respective coefficient is statistically significant at the 5 percent level. **CDF(0)** is the unweighted cumulative distribution function which reports the larger of the areas under the density function either above or below zero (as described above).

All variables are sorted according to this criterion and the cutoff point for a variable to be considered robustly linked to our dependent variable is a CDF(0) value of 0.9 or higher following Sala-i-Martin (1997). **Regres.** represents the number of regressions run for each variable tested, and **Avg. Obs.** reports the average number of observations for these regressions.

Table 1 contains the results for the transitions from autocracies to democracies – the *emergence* of democracy. The first result to note is that GDP per capita does not explain democratic transitions. This confirms the Przeworski et al. (2000) critique of the Modernization Theory literature. Furthermore, the very low value of the CDF(0) indicates that this result is not even a "borderline" variable.

Turning to the other variables we see that the variable with the highest score on the CDF test is the number of previous transitions. Having had experience with regime changes increases the probability of becoming a democracy. One could describe this as having obtained the knowledge of how to change a system. Being an OECD member also increases the likelihood of a change towards a democracy. We included this variable following Ross (2001).

We find that democratic transitions are less likely in Muslim countries, as measured by the percentage of the population that is Muslim. We are not convinced from this finding that Islam is incompatible with democracy – the result calls for further investigation. Our variable is time-invariant, so this could be picking up on other country-specific

characteristics. It would be good to get a more nuanced measure. *Further suggestions on this finding are especially welcome.*

One possibility is that several Muslim countries are fuel exporters. We find the larger the share of fuel exports the less likely a country is to become a democracy. This is in part driven by the Arabic oil-producing countries which all have a long non-democratic tradition. The finding is consistent with the resource-curse literature (e.g. Ross 2001, Jensen and Wantchekon 2004).

The final variable passing the CDF test is annual GDP growth. Countries that are doing well are less likely to engage in a political transformation as in good time the "need" for a change might not be felt in the population and autocratic rulers can justify their position. This may seem intuitive, but it defies a basic idea in Modernization Theory that as a country develops, democracy should become more likely.

All other variables tested do not pass the CDF criterion (see Table 5).

Table 2 presents the results for the probability of staying a democracy – democracy's *survival*. GDP per capita plays a central role. Richer countries are more likely remain democracies. This confirms the findings in the previous literature.

Of the remaining variables we find having a (former) military leader to score highest on the CDF test. The result implies that countries which have a leader with a military background have a higher probability of a democratic breakdown.

Our finding with respect to the neighboring democracy variable indicates that there are positive spillover effects from democracies as the probability of remaining a democracy increases in the number of democratic neighbors.

Very interesting is the result for the previous transitions variable, which is the only variable that passes the CDF test in both models. Previous transitions increase the chances of democratic failure. Taking the result of Table 1 also into account, we can summarize that previous transitions increase the instability of the political system.

Again, all remaining variables fail to pass the CDF test (see Table 6).

To test whether the results of the EBA itself are robust and in order to get a point estimate of the magnitude for each variable we estimate "final" models including all variables which passed the CDF test. The results are presented in Tables 3 and 4. Our model predicts that the probability of a democratic transition taking place is 2% if all our explanatory variables are assigned their mean value. Remarkable in this respect is that each additional prior transition increases this chance by roughly 1%. While each percentage point of GDP growth reduces this probability by roughly 0.1%.

The probability of remaining a democracy is (at the mean of our variables) 99.8%. This also explains why basically all marginal effects are insignificant, except for GDP. Note, however, that in the estimation the number of past transitions is significant at the 5% level.

Conclusions

We conclude at this point that we have more work to do! We hope that the endeavor and first-draft results intrigue our readers. As we are in the early stages of the project, and we are especially looking forward to comments from conference participants.

Table 1: EBA results – Transitions from autocracy to democracy (robust variables)

Variable	Avg. Beta	Avg. S.E.	%Sign.	CDF(0)	Regres.	Avg. Obs
GDP p.c.,PPP (log)	-0.166	0.360	12.8	0.6041	32558	894
Number of past transitions	0.535	0.207	87.5	0.9750	30708	887
OECD member	2.359	0.986	82.1	0.9673	28263	939
Muslim Dummy	-2.112	1.235	68.9	0.9494	30860	820
Fuel exports	-0.058	0.041	67.5	0.9472	30758	543
GDP growth	-0.064	0.041	65.0	0.9267	30900	878

Notes: *Avg. Beta* and *Avg. S.E.* give the unweighted averages over all regressions of the coefficient and the standard error, respectively. *%Sign.* gives the percentage of regressions in which the respective coefficient is statistically significant at the 5 percent level. CDF(0) yields the result of the CDF test as described in the previous section. All variables are sorted according to this criterion. The cut-off value for a variable to be considered robustly linked to our dependent variable is 0.9. Finally, *Regres.* and *Avg. Obs.* report the number of regressions run for testing each variable and the average number of observations for each regression. The results are derived using logistic regressions conditional on being autocratic the year before.

Table 2: EBA results – Remaining a democracy (robust variables)

Variable	Avg. Beta	Avg. S.E.	%Sign.	CDF(0)	Regres.	Avg. Obs
GDP p.c.,PPP (log)	1.504	0.953	68.6	0.9285	31316	1014
Military Leader	-2.590	1.657	77.1	0.9558	22181	836
Neighboring democracies	2.903	1.999	49.4	0.9294	27681	821
Number of past transitions	-0.630	0.497	59.2	0.9140	29012	1020

Notes: See notes to Table 1 for the explanation of the abbreviations used. The results are derived using logistic regressions conditional on being democratic the year before.

Table 3: Final models – Transition from autocracy to democracy

	Coefficient	Marginal Effect	Variable Mean
Number of past transitions	0.5542	0.0111	0.3921
	$(5.05)^{***}$	$(4.10)^{***}$	
OECD member	1.1230	0.0386	0.0307
	$(2.19)^{**}$	(1.40)	
Muslim share	-1.1606	-0.0232	0.3247
	$(1.91)^{*}$	$(2.06)^{**}$	
Fuel exports	-0.0066	-0.0001	20.3009
	(0.86)	(0.87)	
GDP growth	-0.0711	-0.0014	4.4324
	$(2.69)^{***}$	$(2.70)^{***}$	
Constant	-3.2960		
	$(13.28)^{***}$		
Observations	1464		
Pseudo R-squared	0.1204		
Predicted Probability	0.0204		

Notes: The table shows the logistic regressions including the variables which passed the CDF test. The Marginal Effect is given in the respective column. The marginal effects were calculated at the sample means of each variable, given in the respective column. The predicted probability gives the probability predicted by the model for a transition from an autocracy to a democracy if all variables are assigned their mean value.

$^{*}/^{**}/^{***}$ indicates significance at the 10/5/1-percent level.

Table 4: Final models – Remaining a democracy

	Coefficient	Marginal Effect	Variable Mean
GDP p.c.,PPP (log)	1.8440	0.0033	8.5822
	$(3.78)^{***}$	$(1.61)^{*}$	
Military Leader	-0.8219	-0.0022	0.0414
	(1.04)	(0.65)	
Neighboring democracies	1.3768	0.0025	0.6718
	(1.17)	(0.99)	
Number of past transitions	-0.7277	-0.0013	0.7029
	$(2.39)^{**}$	(1.54)	
Constant	-9.8800		
	$(3.07)^{***}$		
Observations	966		
Pseudo R-squared	0.3060		
Predicted probability	0.9982		

Notes: The table shows the logistic regressions including the variables which passed the CDF test. The Marginal Effect is given in the respective column. The marginal effects were calculated at the sample means of each variable, given in the respective column. The predicted probability gives the probability predicted by the model for a democracy to remain a democracy if all variables are assigned their mean value.

$^{*}/^{**}/^{***}$ indicates significance at the 10/5/1-percent level.

Table 5: EBA results – Transition from autocracy to democracy (non-robust variables)

Variable	Avg. Beta	Avg. S.E.	%Sign.	CDF(0)	Regres.	Avg. Obs
Openness	-0.014	0.012	57.1	0.8969	30889	852
Military expenditure	-0.371	0.232	47.5	0.8859	30847	377
European settlers 1900	0.021	0.016	64.1	0.8854	30872	837
Military Leader	0.913	0.589	61.4	0.8833	30601	754
French colony	-0.877	0.677	33.2	0.8778	28782	934
GDP p.c. growth	-0.041	0.043	55.5	0.8706	30900	877
Spanish colony	0.976	0.720	52.7	0.8602	29761	909
FDI net inflows	-0.109	0.098	37.0	0.8574	30893	850
Spanish speaking	1.014	0.729	51.8	0.8570	29801	909
Latin America	0.912	0.725	54.6	0.8505	29758	849
Population (log)	0.194	0.172	37.6	0.8399	30895	882
Employment in Agriculture	0.026	0.035	25.6	0.8394	30790	233
Service employment, male	-0.036	0.070	9.1	0.8232	30640	181
Neighboring democracies	0.922	0.849	48.6	0.8204	30890	823
Portuguese speaking	1.487	0.950	18.0	0.8188	22758	1088
Colony	-0.922	0.711	38.5	0.8055	29956	845
Population share 65+	0.131	0.232	48.3	0.8034	30888	877
Oil exporter	-1.119	0.919	27.9	0.8014	26309	920
Literacy	0.015	0.016	30.1	0.7968	30882	756
World democracy	2.931	3.345	44.3	0.7900	30864	883
IO Score	0.045	0.064	42.0	0.7858	30773	768
French speaking	-0.622	0.676	13.4	0.7822	29142	925
Military personnel	0.000	0.000	4.2	0.7765	30909	435
Settler mortality (log)	0.365	0.403	19.4	0.7759	30712	628
Population share 0-14	-0.032	0.115	31.8	0.7661	30889	877
Tax revenue	0.042	0.085	16.7	0.7468	30350	212
IO score, change	0.019	0.222	27.3	0.7411	30589	770
Bonds investment	0.000	0.000	8.9	0.7225	30903	786
Socialist	-0.366	0.757	13.0	0.7112	26998	870
Life expectancy	0.071	0.085	12.0	0.7021	30489	262
Service employment, female	-0.013	0.036	3.9	0.7012	30728	181
Population share 15-64	0.034	0.130	18.4	0.6968	30890	877
Inequality	0.048	0.082	9.0	0.6782	30632	475
Telephone mainlines	-0.005	0.010	3.4	0.6634	30900	857
safrica	-0.269	0.684	13.0	0.6615	30727	827
Land area	0.000	0.000	3.7	0.6579	30913	88
Metal exports	0.009	0.032	3.5	0.6534	30615	572
Portuguese colony	-0.060	0.938	3.7	0.6279	22121	1095
U.K. Colony	-0.153	0.516	7.0	0.6253	30801	884
Infant mortality	-0.009	0.274	0.4	0.6141	30301	170
OPEC member	0.042	0.831	10.1	0.6131	26452	986
Portfolio investment	0.000	0.000	0.0	0.6104	30910	725
Arable land	0.000	0.000	17.3	0.5989	30913	878
Television sets	-0.001	0.013	3.7	0.5975	30898	845
Income taxes	0.010	0.055	4.0	0.5882	30395	210
Industry employment, female	-0.018	0.058	0.1	0.5819	30769	180
Middle East	-0.164	0.699	1.8	0.5805	28785	870

Globalization	-0.004	0.034	7.0	0.5772	30845	722
Urban population	0.004	0.019	3.8	0.5741	30886	871
Industry employment, male	-0.025	0.066	3.6	0.5377	30619	181
English speaking	0.016	0.517	2.9	0.5254	30743	886
Inflation	0.004	0.016	14.0	0.5220	30874	865
Equity investment	0.000	0.000	4.3	0.5026	30885	816

Table 6: EBA results – Remaining a democracy (non-robust variables)

Variable	Avg. Beta	Avg. S.E.	%Sign.	CDF(0)	Regres.	Avg. Obs
Colony	1.824	1.238	52.5	0.8884	27970	965
GDP p.c. growth	0.094	0.133	51.3	0.8159	29278	1009
Openness	0.022	0.178	38.5	0.8114	29361	1004
English speaking	0.864	1.000	25.1	0.8090	27983	1039
Telephone mainlines	0.031	0.513	0.8	0.8065	29178	1007
Muslim share	-0.718	2.730	33.7	0.7912	28901	935
Industry employment, male	0.267	0.298	0.3	0.7904	23129	602
U.K. Colony	0.738	1.051	14.6	0.7846	27980	1039
Spanish colony	-0.876	1.079	15.0	0.7759	23693	1140
Bonds investment	0.000	0.000	0.1	0.7702	30360	579
Industry employment, female	0.191	0.300	0.1	0.7701	26406	568
GDP growth	0.022	0.143	47.5	0.7693	29244	1010
Population share 65+	0.353	0.697	0.3	0.7558	29420	982
Infant mortality	-0.007	0.305	0.4	0.7447	21627	413
Service employment, female	0.081	0.274	0.2	0.7419	24304	594
Spanish speaking	-0.731	1.141	7.5	0.7406	23692	1140
IO score, change	0.390	0.608	0.6	0.7384	26107	752
French colony	0.619	0.986	7.0	0.7371	20309	1150
Tax revenue	0.256	0.442	0.2	0.7342	21504	311
World democracy	0.741	7.494	38.3	0.7294	29324	1012
Inequality	-0.163	0.209	3.3	0.7220	26598	685
Military expenditure	-0.172	0.421	1.2	0.7157	28761	559
IO Score	-0.007	0.282	2.5	0.7056	27054	744
Middle East	-0.976	1.314	5.8	0.6972	26138	1008
Inflation	0.085	0.173	20.3	0.6967	29599	996
Arable land	0.000	0.000	5.0	0.6902	30489	960
Population (log)	-0.354	0.477	4.7	0.6867	29182	1015
OECD member	-0.664	1.249	2.9	0.6786	15225	1352
Income taxes	0.017	0.386	1.3	0.6783	21947	300
FDI net inflows	0.116	0.231	0.2	0.6654	29419	978
Urban population	0.042	0.087	5.2	0.6622	29174	1013
Fuel exports	0.461	0.533	0.1	0.6608	28233	898
Military personnel	0.000	0.007	3.3	0.6437	30401	633
Employment in Agriculture	-0.049	0.369	2.8	0.6431	23979	683
Globalization	0.003	0.079	0.7	0.6414	29197	954
Metal exports	0.714	0.795	11.2	0.6401	28240	936
Television sets	0.009	0.782	0.5	0.6393	29737	989
French speaking	-0.486	0.903	1.2	0.6316	20550	1144
Life expectancy	-0.153	0.579	0.0	0.6145	20474	494
Population share 0-14	-0.158	0.262	0.5	0.5929	29484	981
Literacy	0.012	0.144	2.6	0.5888	29100	616
Land area	0.000	0.000	0.8	0.5879	30407	962
Equity investment	0.000	0.000	0.0	0.5842	30210	586
OPEC member	0.737	1.286	10.1	0.5755	15115	1290
Settler mortality (log)	-0.105	0.924	1.6	0.5752	28785	589
Oil exporter	-1.466	1.346	10.7	0.5672	15124	1202
Portfolio investment	0.000	0.000	0.0	0.5585	30497	902
Socialist	0.062	1.192	0.1	0.5580	16248	1051

European settlers 1900	0.006	0.026	0.4	0.5566	23701	1090
Service employment, male	0.013	0.153	0.9	0.5509	23479	603
Population share 15-64	-0.169	0.350	0.7	0.5331	29431	982
safrica	-0.233	1.020	2.8	0.5083	22400	1038
Latin America	0.112	1.131	1.1	0.5027	23691	1059

Table 7: Variables – Definitions and Sources

Variable	Definition	Source	Proposed by
Africa	Dummy variable for African Countries	Easterly and Sewadeh (2001)	Li and Reuveny (2003); López-Córdova and Meissner (2005)
Arable land	arable land (hectares)	World Bank (2006)	Crenshaw (1995)
Bonds investment	Portfolio investment, bonds (PPG + PNG) (NFL, current US$)	World Bank (2006)	Li and Reuveny (2003)
Colony	Dummy variable if ever in a colonial relationship	CEPII (2006)	Barro (1999); Boix and Stokes (2003)
Employment in Agriculture	Employment in Agriculture (% of total employment)	World Bank (2006)	Clague et al. (2001); Crenshaw (1995)
English speaking	if English is spoken by at least 9% of the population as a first language	CEPII (2006)	Clague et al. (2001)
Equity investment	Portfolio investment, equity (DRS, current US$)	World Bank (2006)	Li and Reuveny (2003)
European settlers 1900		Acemoglu and Robinson (2006)	Acemoglu and Robinson (2006)
FDI net inflows	Foreign direct investment, net inflows (% of GDP)	World Bank (2006)	Li and Reuveny (2003)
French colony	1 if ever in colonial relationship with France	CEPII (2006)	Barro (1999)
French speaking	1 if French is spoken by at least 9% of the population as a first language	CEPII (2006)	Clague et al. (2001)
Fuel exports	Fuel exports (% of merchandise exports)	World Bank (2006)	Ross (2001)
GDP growth	GDP growth (annual %)	World Bank (2006)	Boix and Stokes (2003); Fidrmuc (2003); Li and Reuveny (2003); Muller (1995)
GDP p.c. growth	GDP per capita growth (annual %)	World Bank (2006)	Pevehouse (2002a,b)
GDP p.c.,PPP	GDP per capita, PPP (current international $)	World Bank (2006)	Acemoglu et al.(2005); Boix and Stokes (2003); Crenshaw (1995); Gleditsch and Ward (2006); Muller (1995); Nieswiadomy and Strazcich (2004)
Globalization	KOF Index of Globalization	Dreher (2006)	this study
Income taxes	Taxes on income, profits and capital gains (% of total taxes)	World Bank (2006)	Ross (2001)

Variable	Definition	Source	Proposed by
Industry employment, female	Employees, industry, female (% of female employment)	World Bank (2006)	Ross (2001)
Industry employment, male	Employees, industry, male (% of male employment)	World Bank (2006)	Ross (2001)
Inequality	Industrial pay-inequality based on UNIDO's database of payments	UTIP (2001)	Barro (1999); Crenshaw (1995)
Infant mortality	Mortality rate, infant (per 1,000 live births)	World Bank (2006)	Barro (1999); Nieswiadomy and Strazcich (2004)
Inflation	Inflation, GDP deflator (annual %)	World Bank (2006)	Li and Reuveny (2003)
IO score	Highest democracy score of participated International Organization, calculated as average across all members' Polity IV score excluding the own value	Pevehouse (2002a,b)	Pevehouse (2002a,b)
IO score, change	First difference of IO score (see above)	Pevehouse (2002a,b)	Pevehouse (2002a,b)
Land area	Land area (hectares)	World Bank (2006)	López-Córdova and Meissner (2005)
Latin America	Dummy variable for Latin American countries	Easterly and Sewadeh (2001)	López-Córdova and Meissner (2005)
Life expectancy	Life expectancy at birth, total (years)	World Bank (2006)	Barro (1999); Clague et al. (2001); Nieswiadomy and Strazcich (2004); Ross (2001)
Literacy	Literacy rate, adult total (ages 15 and above)	World Bank (2006)	Clague et al. (2001)
Metal exports	Ores and metals exports (% of merchandise exports)	World Bank (2006)	Crenshaw (1995); Ross (2001)
Middle East	Dummy for Countries from the Middle East		Li and Reuveny (2003)
Military expenditure	Military expenditure (% of GDP)	World Bank (2006)	Ross (2001)
Military Leader	Executive leader is a former military officer	Gandhi and Przeworski (2006)	Cheibub (2006)
Military personnel	Military personnel, total	World Bank (2006)	Crenshaw (1995); Ross (2001)
Muslim share	Share of Muslim population	Przeworski et al. (2000)	Barro (1999); Boix and Stokes (2003); Clague et al. (2001); Muller (1995) ; Ross (2001)
Neighboring democracies	Share of surrounding democracies	Own calculations	Gleditsch and Ward (2006); Pevehouse (2002a)

Variable	Definition	Source	Proposed by
Number of past transitions	Number of previous transitions between autocracy / democracy	Przeworski et al. (2000)	Boix and Stokes (2003)
OECD member	Dummy variable for OECD membership	OECD (2007)	Ross (2001)
Oil exporter	Dummy variable for exporters of fuel/oil	Easterly and Sewadeh (2001)	Barro (1999); López-Córdova and Meissner (2005)
OPEC member	Dummy variable for OPEC membership	OPEC (2007)	Nieswiadomy and Strazcich (2004)
Openness	Trade (% of GDP)	World Bank (2006)	Li and Reuveny (2003); López-Córdova and Meissner (2005)
Population (log)	log of total population	World Bank (2006)	Acemoglu et al. (2005); Barro (1999); López-Córdova and Meissner (2005); Nieswiadomy and Strazcich (2004)
Population share 0-14	Population ages 0-14 (% of total)	World Bank (2006)	Acemoglu et al. (2005)
Population share 15-64	Population ages 15-64 (% of total)	World Bank (2006)	Acemoglu et al. (2005)
Population share 65+	Population ages 65 and above (% of total)	World Bank (2006)	Acemoglu et al. (2005)
Portfolio investment	Portfolio investment, excluding LCFAR (BoP, current US$)	World Bank (2006)	Li and Reuveny (2003)
Portuguese colony	1 if ever in colonial relationship with Portugal	CEPII (2006)	Barro (1999)
Portuguese speaking	1 if Portuguese is spoken by at least 9% of the population as a first language	CEPII (2006)	Clague et al. (2001)
Service employment, female	Employees, services, female (% of female employment)	World Bank (2006)	Ross (2001)
Service employment, male	Employees, services, male (% of male employment)	World Bank (2006)	Ross (2001)
Socialist	1 if present or former socialist country		Muller (1995)
Spanish colony	1 if ever in colonial relationship with Spain	CEPII (2006)	Barro (1999)
Spanish speaking	1 if Spanish is spoken by at least 9% of the population as a first language	CEPII (2006)	Clague et al. (2001)
Tax revenue	Tax revenue (% of GDP)	World Bank (2006)	Ross (2001)
Telephone mainlines	Telephone mainlines (per 1,000 people)	World Bank (2006)	Ross (2001)

Variable	Definition	Source	Proposed by
Television sets	Television sets (per 1,000 people)	World Bank (2006)	Ross (2001)
U.K. Colony	1 if ever in colonial relationship with United Kingdom	CEPII (2006)	Barro (1999); Boix and Stokes (2003); Clague et al. (2001); Crenshaw (1995)
Urban population	Urban population (% of total)	World Bank (2006)	Barro (1999); Nieswiadomy and Strazcich (2004); Ross (2001)
World democracy	Global share of democracies	Own calculations	Boix and Stokes (2003); Gleditsch and Ward (2006)

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Appendix

Table A1: Summary of Previous Empirical Studies on the Determinants of Democracy

Author	Period	Countries	Obs.	Democracy Measure	Explanatory Variables	Effect	Sign.	Method
Crenshaw (1995)	1980	83	83	Bolen	Democracy index 1965	~	-	OLS
					log real GDP pc	+	++	
					Secondary school enrollment	+	+	
					British colonial heritage	+	+	
					Military personnel	-	~	
					log of Agricultural density	+	+	
					Demographic inheritance	+	++	
					Agricultural inequality	+	-	
					Income inequality in 1970	-	-	
					Semiperiphery dummy	-	+	
					Periphery dummy	-	-	
					Commodity concentration	-	-	
					log foreign capital penetration	+	-	
Muller (1995)	1980	58	58	Bolen	Democracy index in 1965	+	~	OLS
					log real GDP pc	+	++	
					GDP growth	+	-	reject non-linear
					Income inequality	-	+	relationship of
					top 20% income share	-	++	GDP
					Communist dummy	-	+	
					British Colony	+	++	
					Protestant share	-	-	
					Islam share	-	-	
					log years of continuous popular elections	+	-	

Author	Period	Countries	Obs.	Democracy Measure	Explanatory Variables	Effect	Sign.	Method
Barro (1999)	1960-1995	103	103	Freedom House	5-year lag of dependent variable	+	++	SUR
					10-year lag of dependent variable	+	+	
					log GDP	+	++	
				Bollen	Years of primary schooling	+	+	
					Gap between male and female primary	-	++	
					Urbanization rate	-	+	
					Log(population)	+	~	
					Oil country dummy	-	++	
					Log(life expectancy at birth)	+	-	
					Infant mortality rate	-	-	
					Years of upper schooling	-	-	
					Income inequality	-	-	
					Share of middle class in income	+	-	
					Educational inequality	-	-	
					Ethnolinguistic fractionalization	-	+	
					Rule-of-law index	+	-	
					Dummy for former colony	-	-	
					Dummy for British colony	-	-	
					Dummy for French colony	-	-	
					Dummy for Spanish colony	+	-	
					Dummy for Portuguese colony	+	-	
					Dummy for other colony	-	-	
					Muslim religion fraction	-	-	
					Protestant religion fraction	+	-	
					Hindu religion fraction	+	-	
					Buddhist religion fraction	+	-	
					Miscellaneous eastern religion fraction	-	-	
					Jewish religion fraction	+	-	
					Nonreligion fraction	-	+	
					Other religion fraction	-	-	

Author	Period	Countries	Obs.	Democracy Measure	Explanatory Variables	Effect	Sign.	Method
Ross (2001)	1971-1997	113	2183	Polity IV	Oil (export value)	-	++	pooled time-series
					Minerals (export value)	-	++	cross-section
					GDP	+	++	
					Share of Muslim	-	++	
					OECD dummy	+	++	
					Food (export value)	+	+	
					Agriculture (export value)	+	-	
					Large States	+	+	
					Mideast	-	++	
					Sub-Saharan Africa	-	++	
					Arabian Peninsula	-	++	
					Taxes	+	++	
					Government Consumption	-	++	
					Government/GDP	-	++	
					Military/GNP	-	-	
					Military Personnel	-	+	
					Ethnic Tensions	-	-	
					Men in Industry	+	++	
					Women in Industry	+	++	
					Men in Services	+	++	
					Women in Services	-	++	
					Male Secondary Enrollment	+	-	
					Women Secondary Enrollment	+	-	
					College Enrollment	-	-	
					Telephones	-	++	
					TVs	-	-	
					Life Expectancy	+	-	
					Urbanization rate	-	-	

Author	Period	Countries	Obs.	Democracy Measure	Explanatory Variables	Effect	Sign.	Method
Clague et al. (2001)	1960-1994	146	146	Clague	Former British Colony	+	++	two-sided tobit
					Island dummy	+	~	
				Freedom	Muslim population share	-	++	period averages
				House	Labor force in agriculture	-	~	
					European ancestry population share	+	++	
					Share of native speakers of Colonizer	+	+	
					Language penetration by British colonizer	+	+	
					Language penetration by democratic colonizer	+	+	
					Ethnic homogeneity	+	+	
					Autocratic minority rule dummy	-	+	
					literacy rate	+	+	
					log 1962 Life expectancy	+	++	
Pevehouse (2002a)	1950-1992	76	1552	Polity IV > 6,	GDP pc	+	+	Cox hazard
		52	805	duration	GDP pc, change	+	~	model
				Gasiorowski,	IO score	+	-	Weibull hazard
				duration	IO score, change	+	+	model
					Share of neighboring democracies	+	-	(here all signs are
					Dummy for previous democratic breakdown	-	-	multiplied by -1)
					Disputes in region	+	-	
					Dummy for political violence	~	-	
					Dummy for presidential or mixed system	~	-	
					Dummy for established democracies	~	-	

Author	Period	Countries	Obs.	Democracy Measure	Explanatory Variables	Effect	Sign.	Method
Pevehouse (2002b)	1950-1992	106	2776	Polity IV > 6	GDP pc	-	-	logit
		86	2299	Gasiorowski	GDP pc, change	~	-	
					IO score	+	++	
					IO score, change	~	-	
					Number of democracies in region	+	+	
					Dummy for being previously democratic	+	++	
					Disputes in region	-	~	
					Dummy for political violence	+	++	
					Dummy for military control	-	++	
					Years of independence	+	-	
Boix and Stokes (2003)	1950-1990 1850-1990	135	3991 6143	Przeworski	GDP pc	+	++	Dynamic probit
					GDP growth	+	-	
					Turnover rate of chief executives	-	++	
					Religious fragmentation	-	++	
					Percentage Catholic	+	-	
					Percentage Protestant	+	-	
					Percentage Muslim	-	-	
					Former colony	+	-	
					Number of previous democratic breakdowns	-	++	
					British colony	+	++	
					Proportion of democracies in the world	+	+	
					Education index	+	~	
					Percentage of family farms	+	-	
					Occupational diversification	-	-	

Author	Period	Countries	Obs.	Democracy Measure	Explanatory Variables	Effect	Sign.	Method
Fidrmuc (2003)	1990-2000	25	250	Freedom House	Economic liberalization, t-1	-	-	Panel OLS
					Democracy, t-1	+	++	Granger causality
					Lagged growth	+	+	
					GNP per capita (log)	+	+	
					War dummy	-	-	
					Distance from Brussels	-	++	
					central planning	-	+	
Li and Reuveny (2003)	1970-1996	127	2,021	Polity IV Freedom House	Trade openness	-	++	pooled OLS
					Net inflows of FDI	+	+	fixed effects
					Net inflows of portfolio investment	+	+	random effects
					lagged democracy	+	++	
					Number of democratic countries in region	+	+	
					Inflation (GDP deflator)	+	+	
					log of real GDP pc	+	++	
					real GDP growth	+	-	
					time trend	+	++	
					time trend * FDI	-	+	
					time trend * portfolio	-	+	
					time trend * inflation	-	+	
					time trend * GDP pc	-	++	
					Memberships in international NGOs	+	++	
					semiperiphery * GDP pc	~	~	
					periphery * GDP pc	-	-	
					Europe dummy	+	-	
					Middle East dummy	-	+	
					Africa dummy	-	+	
					Asia dummy	-	-	

Author	Period	Countries	Obs.	Democracy Measure	Explanatory Variables	Effect	Sign.	Method
Nieswiadomy and Strazcich (2004)	1972-2001	136	136	Freedom House	Common law	+	~	Tobit
					Muslim law	-	++	
					Resources	-	++	period averages
					Education	+	+	
					Economic Freedom	+	+	
					Ethno linguistic diversity	-	-	
					GDPpc	+	-	
					infant mortality rate	+	-	
					life expectancy	-	-	
					population	+	-	
					Urbanization rate	-	-	
					OPEC	-	-	
Acemoglu et al. (2005)	1960-2000	150	3,701	Freedom House	lagged democracy	+	+	pooled OLS
	1840-2000	27	662		log real GDP pc	~	~	fixed effects
					log population	~	~	Anderson-Hsiao
				Bollen	Education	~	~	Arellano-Bond
				Polity IV	Age structure (0 to 15, 15 to 30, 30 to 45, 45 to 60, and 60 and above)	~	~	2SLS
					Labor share of value added	+	-	
					Trade-weighted world democracy	-	-	Annual, 5-year and
					Crisis dummy (growth rate drop exceeding 3%; 4%; 5%, respectively)	+	++	10-year intervals

Author	Period	Countries	Obs.	Democracy Measure	Explanatory Variables	Effect	Sign.	Method
López-Córdova and Meissner (2005)	1870-2000	?	4184	Polity IV, change	Openness	+	++	OLS
					population	+	+	2SLS
					land area	~	~	
					landlocked	~	~	
					no boarders	-	+	
					same language	~	+	
					lagged dependent	+	++	
				instruments	Distance Equator	+	++	
					Ethnolinguistic fractionalization	+	++	
					Primary commodity exp dummy	-	++	
					Petroleum exporter	~	~	
					East Asia Dummy	-	++	
					Eastern Europe/CIS states Dummy	-	++	
					Middle East/North Africa dummy	-	++	
					South Asia	-	++	
					Western Europe	-	+	
					Sub-Saharan Africa	-	++	
					Latin America/ Caribbean	-	+	
Glenditsch and Ward (2006)	1951-1998	?	6159	Polity IV > 6	log GDP pc	+	++	Dynamic probit
					Share of Neighboring Democracies	+	++	
					Civil War	~	-	
					Years of Peace	~	~	
					Economic Growth	~	~	
					Global Portion of Democracies	+	~	
					Neighboring Transition to Democracy	+	++	
					Years of Democracy	+	++	
					Years of Autocracy	-	-	

Notes: *Obs.* Gives the number of observations, *Sign.* Reports the significance of each variable: ++ is significant at the 1% level, + significant at the 10%-level, ~ indicates changing significance level, i.e. sometimes significant sometimes not. Polity IV is the democracy measure developed by Marshall and Jaggers (2000); Bollen is taken from Bollen (1993), Freedom House represents Freedom House (2006), Gasiorowski refers to Gasiorowski (1996) and Przeworski comes from Przeworski et al. (2000).