Malapportionment and democracy: A curvilinear relationship

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A R T I C L E   I N F O

A B S T R A C T

This article examines electoral malapportionment by illuminating the relationship between malapportionment level and democracy. Although a seminal study rejects this relationship, we argue that a logical and empirically significant relationship exists, which is curvilinear and is based on a framework focusing on incumbent politicians' incentives and the constraints they face regarding malapportionment. Malapportionment is lowest in established democracies and electoral authoritarian regimes with an overwhelmingly strong incumbent; it is relatively high in new democracies and authoritarian regimes with robust opposition forces. The seminal study's null finding is due to the mismatch between theoretical mechanisms and choice of democracy indices. Employing an original cross-national dataset, we conduct regression analyses; the results support our claims. Furthermore, on controlling the degree of democracy, the single-member district system's effects become insignificant. Australia, Belarus, the Gambia, Japan, Malaysia, Tunisia, and the United States illustrate the political logic underlying curvilinear relations at democracy's various levels.

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1. Introduction

Electoral malapportionment—the disjuncture between the share of population in an electoral district and its share of seats—is an important theme in political processes. As a norm, equality in the value of a vote, or the one-person-one-vote principle, is a prerequisite for modern representative democracy. It also has several practical consequences. For example, the presence of malapportionment distorts election results (Boone and Wahman, 2015), cabinet portfolios (Bhavnani, 2015), and the allocation of government resources in favor of overrepresented constituencies (Ansolabehere and Snyder, 2008; Gibson, 2004; Horiuchi and Saito, 2003). Given the importance of this topic, international election-monitoring organizations have recently begun addressing malapportionment in their evaluations of electoral integrity among emerging democracies around the world (Handley et al., 2006).

While the past several decades have seen substantial advancements in the study of malapportionment (e.g., Handley and Grofman, 2008), one major issue remains unresolved: the relationship between the regime type and the degree of malapportionment. On the one hand, in a seminal article investigating malapportionment in a cross-national context, Samuels and Snyder (2001), hereafter S&S, reported that the degree of democracy is not a significant predictor of levels of malapportionment. On the other hand, as we discuss in more detail below, while some scholars argue that malapportionment is a result of authoritarian politics, others find that malapportionment is a cause of authoritarian longevity.

In this article, we attempt to resolve this disagreement by assessing the relationship between malapportionment and democracy. We maintain, contrary to S&S's findings, that there is a logical reason to expect a relationship between the two, empirically demonstrating that one such relationship exists. More specifically, we argue that there is a curvilinear relationship between malapportionment and democracy: malapportionment exists at relatively low levels in consolidated democracies and highly authoritarian countries and at relatively high levels in countries in the middle of the democratic—authoritarian spectrum. Such a relationship exists because the nature of the political regime influences politicians' incentives to manipulate electoral delimitation and the constraints they face. We provide empirical evidence for this claim using a newly constructed dataset of malapportionment levels for 160 countries and case studies of Australia, Belarus, the Gambia, Japan, Malaysia, Tunisia, and the United States that illustrate the

mechanisms underlying this relationship.

This study contributes to strands of several subfields in political science. First, it adds to research on electoral systems by advancing a new theory about the curvilinear relationship between malapportionment and democracy. As we show below, a large body of literature exists on the consequences of malapportionment, but studies addressing the causes of malapportionment are still very limited. Our study is one of the few attempting to theorize conditions influencing the degree of malapportionment. Another new insight of this paper is that while previous studies associated single-member district (SMD) plurality systems with higher malapportionment than was associated with proportional representation (PR) systems, we demonstrate quantitatively and qualitatively that this is not necessarily so; it depends on the nature of the political regime.

Second, the current study is an addition to a body of literature investigating the effects of democracy. A long series of studies have been conducted on the consequences of regime type regarding various aspects, such as effects on international peace (Russett, 1994), economic growth (Acemoglu et al., 2014), and media freedom (Adsera et al., 2003), among others. This study belongs to this tradition of research, connecting regime type and electoral malapportionment.

Third, this article contributes to the study of electoral authoritarianism. In our study, we deal with democracies and electoral authoritarian regimes—those regimes that "hold regular multi-party elections at the national level, yet violate liberal-democratic minimum standards in systematic and profound ways" (Schedler, 2013, p. 1). Many scholars have already pointed out that malapportionment is a tool used by autocrats to manipulate elections (Birch, 2011; Norris, 2014; Schedler, 2013). This paper introduces a more nuanced understanding of how autocrats deal with electoral manipulation, pointing out the conditions under which malapportionment is more likely to be included in autocrats' toolbox of manipulation measures.

In addition, the current study also contributes to database building in the social sciences because we introduce a new dataset of malapportionment, including 160 countries. In their seminal cross-national study of malapportionment, S&S provided a Loosemore—Hanby-index-based measurement of malapportionment for 112 countries. In our dataset, we employ the same measurement method as S&S, but we use newly collected data from original sources to provide wider, more up-to-date coverage than S&S.

Several caveats are in order before we proceed. First, our analysis does not concern malapportionment in upper houses. We exclude upper house elections because the Constitutional provisions on seat quotas often determine the degree of malapportionment for upper house elections and such provisions are the product of history rather than the current incentives of politicians, which we are attempting to theorize. Second, we adopt a minimalist, institutionalist definition of democracy. In other words, we do not use the "maximalist" definition of democracy that encompasses various issues, including the substantial benefits of the institutions of democracy (Munck and Verkuilen, 2002). As in many empirical studies, we define democracy as a type of political regime with institutional mechanisms of accountability, such as periodic elections and checks and balances (Schmitter and Karl, 1991).

Below, we begin by reviewing relevant existing studies to identify unresolved questions and then provide our hypothesis. A cross-national statistical analysis follows to test our hypothesis We then provide illustrative case studies to support our argument. In conclusion, we discuss future avenues of research.

2. A curvilinear theory of malapportionment and democracy

Existing studies of malapportionment have reached inconsistent conclusions about the relationship between malapportionment and the type of political regime. On the one hand, the seminal work by S&S finds no relationship. Based on regression analysis, using data from 112 countries, they report that there is no statistically significant relationship between the degree of malapportionment and the level of democracy. On the other hand, others argue that regime type and malapportionment do have some link, usually associating malapportionment with authoritarian politics. Studying post-democratization Latin America, Bruhn et al. (2010) argued that overrepresented districts are more prone to maintain authoritarian politics. Scholars who study Malaysia have found that malapportionment in favor of the ruling coalition is one of the main reasons why electoral authoritarianism has been maintained in the country (Ostwald, 2013; Lim, 2005). How can we resolve these conflicting claims?

Our basic premise is that malapportionment is essentially a political problem: malapportionment is a type of institutional arrangement with distributional consequences. As such, political actors (politicians and political parties) are involved, acting strategically in creating and/or maintaining malapportionment in their favor. In some instances, malapportionment can arise for reasons that are not strategic, e.g., due to "natural" or "historical" reasons. Natural reasons include population movements from one geographical area to another within a country, differential birth and mortality rates in different areas, and the manner in which a country's administrative units are divided. Historical reasons affecting malapportionment are usually found in constitutional provisions made at the founding of the country, such as the seat quota for each administrative unit, or for certain segments of the population, usually minority groups. Our theory does not address such naturally and historically induced malapportionment.

Another restriction for our theory is that we are only concerned with political regimes wherein elections serve as a device to elect national-level legislators and opposition forces can participate in those elections. In other words, our theory's scope does not include absolute monarchies and one-party regimes wherein opposition parties are practically banned. This means that the scope of our theory applies to democracies and electoral authoritarian regimes.

We focus on politicians' incentives and the institutional constraints that they face. As for incentives, regardless of regime type, we expect that incumbent politicians have an incentive to create malapportioned districts when they anticipate that doing so will increase their chances of increasing the number of legislative seats their party holds and remaining in power. For example, as in Japan up to the early 1990s and in Malaysia since independence to the present day, when the ruling party's main support base lies in the countryside, the rural districts are often overrepresented because such a scheme allows the ruling party to gain seats with fewer votes than when they have to win districts with larger numbers of voters (underrepresented districts). Opposition politicians, on the other hand, have incentives to reduce malapportionment to improve their own chances of winning.

When incumbents expect their tenure to be relatively safe, we expect that politicians have less incentive to create malapportioned districts. This situation practically excludes incumbents in democracies since a democratic political regime essentially implies a system in which a politician's tenure is insecure due to electoral competition. As for the rulers of non-democracies, we can classify them into two types. The first type is the autocrat who is already overwhelmingly strong electorally due to several pre-existing reasons, including abundant natural resources, personal popularity, or the fragmentation of opposition forces. This type would have little incentive to manipulate the boundaries because malapportionment is generally regarded as unfair conduct that degrade the legitimacy of electoral results; such autocrats have less

incentive to manipulate boundaries in ways that might undermine their legitimacy. Among the second type of autocrats, namely those who face strong electoral opposition and for whom electoral results are relatively uncertain, we expect a stronger desideratum for manipulating electoral boundaries.

We also expect that two core elements of democratic regimes constrain incumbent attempts at malapportionment, namely, (1) electoral competition that leads to regular government turnover and (2) checks and balances imposed on regime elites. These elements create the following mechanism. First, with political competition, democracies provide regular intervals of government change. When incumbents have an incentive to malapportion and the opposition has an incentive to undo it, there is a higher chance that in the wake of government change, the new incumbent party will pass legislation reforming malapportionment. As we illustrate in the cases of Australia and Japan below, malapportionment typically benefits the ruling parties, and the opposition parties often initiate reform attempts. When the opposition wins and seizes power, while there may be incentive to malapportion in their own favor, campaign promises compel them to reform electoral processes to reduce malapportionment.

Second, partly as a result of the first point, democracies tend to have a set of institutions of checks and balances that are more politically independent and effective than those found in autocracies. These include, for example, a judiciary that can reduce malapportionment as a violation of a principle of political equality and politically independent electoral commissions that oversee a politically neutral and equal drawing of district boundaries. In authoritarian regimes, in contrast, such constraining institutions may nominally exist but their actual power to constrain is substantially weaker than that found among such institutions in democracies.

The above combination of incumbent incentives and constraints leads us to expect a curvilinear inverted-U shape relationship between malapportionment and democracy. We expect that malapportionment will be lowest in established democracies and in electoral authoritarian regimes where the ruling party has an overwhelming majority. In long-standing democracies, incumbent politicians may wish to manipulate apportionment and districting, but government turnover and the presence of effective mechanisms of checks and balances work to curb malapportionment. In authoritarian regimes where the ruler's tenure is relatively secure due to other sources of electoral victory, autocrats have little incentives to malapportion, although theoretically they face few constraints on manipulate electoral rules.

We expect malapportionment to be highest in authoritarian regimes wherein the ruling party faces a vibrant electoral opposition. In a highly competitive electoral authoritarianism,[1] the demand for malapportionment is high, while institutions of checks and balances are distorted by autocrats in their favor.

To reiterate, our hypothesis is as follows:

Hypothesis. *The level of lower chamber malapportionment is low at the low and high levels of democracy and is high in the middle of the democratic–authoritarian spectrum, all other things being equal.*

One might question a possible reverse causality: having a highly malapportioned system tends to prevent the transition from electoral authoritarianism to democracy. We agree that this is partly relevant, as reported in the case of Malaysia (Ostwald, 2013). However, we maintain that the deeper reason why malapportionment hampers democratization is that authoritarian elites

manipulate the boundary delimitations to begin with (Pepinsky, 2014). Thus, we argue that theoretically, it is more important to highlight the causal direction running from the nature of political regime (degree of democracy) to malapportionment. At the same time, we address this issue in our regression analyses.

3. Cross-national analyses

3.1. Data description

We constructed an original dataset of malapportionment for 160 countries encompassing democracies and electoral authoritarian regimes. Our dataset relies on election data for the countries for which we could find district-level population or registered-voter data, and we use the data of the latest available election for each country. Our dataset's coverage expands and updates S&S's dataset, which has 112 countries and was created more than a decade ago. Appendix Table 1 provides the list of countries, the degrees of malapportionment, and the election years included in our dataset. For our sources of data, see Web Appendix A.

To calculate the levels of malapportionment, we employed the same measurement method used by S&S.[2] In measuring the degree of democracy, we mainly employ the Polity score (Marshall and Jaggers, n.d.), which ranges between −10 and 10, with 10 being the most democratic. The scores for each country in the given election year, as well as the 10-year average over the years preceding the given election year, are reported in Appendix Table 1.

Although S&S used the Freedom House (FH) index (Freedom House, n.d.) for testing the relationship between democracy and malapportionment, we do not consider this an ideal indice in the context of our theory. This is because of its broad definition of democracy. If one thinks in terms of Robert Dahl's two-dimensional formulation of the democracy concept (Dahl, 1971), our theory emphasizes the attributes related to the contestation dimension and not the participation-dimension attributes. The FH index covers both contestation and participation attributes, whereas the Polity index is mainly concerned with contestation. This may be a weakness of the Polity score generally (Munck and Verkuilen, 2002, p. 28), but it is favorable here because our hypothesis is built upon the function of democracy that facilitates contestation among political elites and different branches of government rather than the issue of participation, such as voting rights.

Table 1 reports the mean values of malapportionment according to different regime classifications, and Fig. 1 presents the scatter plot showing the relationship between malapportionment and Polity scores. The table reveals that countries with intermediate levels of democracy ("anocracy" in the terminology of Polity) tend to have higher malapportionment levels than those at the edges.

Table 1
Average degrees of malapportionment by regime categories.

Autocracy (n = 7)	Closed anocracy (n = 18)	Open anocracy (n = 23)	Democracy (n = 57)	Full democracy (n = 35)
0.059	0.130	0.121	0.076	0.045

Note: The regime classification scheme is based on the information provided on the Polity website (http://www.systemicpeace.org/polity/polity4.htm (accessed on March 11, 2017)): Autocracy (−10 to −6); Closed anocracy (−5 to 0); Open anocracy (1–5); Democracy (6–9); Full democracy (10). Twenty cases were excluded due to their non-classifiable status in the Polity database. These cases' mean MAL score is 0.112.

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[1] We use electoral authoritarianism and "anocracy," which is the term used in Polity to refer to an intermediate regime category that lies between democracy and autocracy, interchangeably in this paper.

[2] The formula for malapportionment is as follows: $MAL = (1/2) \sum |S - v|$, where s is the percentage of all seats allocated to district i and v is the percentage of the overall population (or registered voters) belonging to district i.
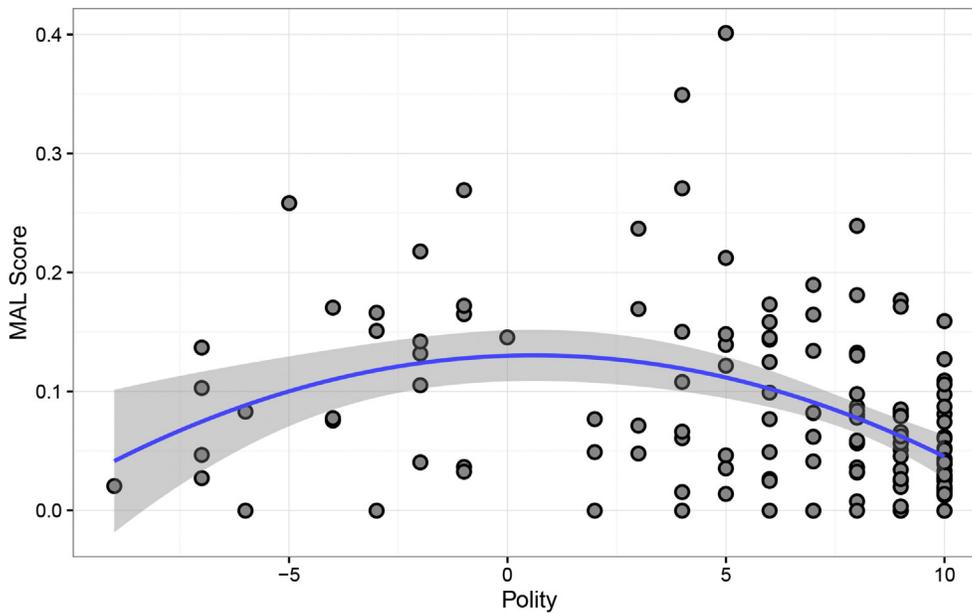
Fig. 1. Scatter plot of Polity and MAL.

One can also discern an inverted U-shape in the manner in which data points are scattered.[3] Although confounding factors are not controlled in our first-cut graphical analysis, they render initial support for our claim.

3.2. Curvilinear model

We provide results of three sets of regression exercises. First, we directly examine our curvilinear hypothesis by regressing the malapportionment levels on the linear and square terms of democracy indices. The curvilinear hypothesis expects the coefficient of the square term to be negative. Following Horiuchi (2004), we employed a natural log of MAL as MAL distribution is highly skewed to the right.[4] We measure the democracy levels by the Polity score of the same year as the election when the MAL is computed. There may be a reverse causal effect from malapportionment to the country's democracy levels. For example, it is possible that malapportionment undermines citizen support for the electoral system, thus hindering democratic consolidation. If such an effect is strong enough, our OLS regression would suffer a problem of reverse causality. To address this potential problem, we also estimate the same model with the ten-year average of the Polity score prior to the election year. As malapportionment is unlikely to impact past democracy levels, this model is less susceptive to the reverse causality problem.

Two sets of control variables are included. The first set comprises variables found to significantly affect the degree of malapportionment in existing studies. These are *SMD* and *Gini*. *SMD* is a dummy variable coded as 1 if the country adopts an SMD electoral system and 0 otherwise.[5] S&S, Horiuchi (2004), and Ardanaz and Scartascini (2013) showed that SMD systems tend to have a higher malapportionment level than systems with multi-member

districts, typically PR systems. These scholars posit that in comparison to PR, SMD systems tend to have greater technical difficulties in evenly drawing district boundaries. Another reason suggested is that incumbents may have stronger incentives to oppose reapportionment because reapportionment more directly affects those running in SMD systems (Samuels and Snyder, 2001, p. 670). We expect *SMD*'s coefficient to be positive, and our data comes from Bormann and Golder (2013).

Gini is the level of socio-economic inequality. Horiuchi (2004) and Ardanaz and Scartascini (2013) showed that more unequal countries tend to have higher levels of malapportionment. The rationale behind these findings is that political elites have stronger incentives to manipulate boundary delimitations when the level of preference heterogeneity is high, which is a result of high economic inequality levels. We use the Gini-index data developed in Solt (2009) for the relevant election years for each country. The expected coefficient for *Gini* is positive.

The second set of control variables are those that major existing studies include in their regression models but that were found not to have significant effects (Ardanaz and Scartascini, 2013; Samuels and Snyder, 2001). These include the following. The first is *Area*, which is the size of a country in square kilometers, taking the natural log. Countries with large land areas may be prone to over-represent territories that are sparsely populated. The expected direction of the coefficient is positive, and the data come from the CIA World Fact Book (U.S. Central Intelligence Agency, 2014). The second is a dummy variable for tiered electoral systems (*Tier*). Systems with upper tiers (usually mixed systems that combine SMD and PR systems) are expected to have lower degrees of malapportionment because the presence of the upper tiers tends to reduce malapportionment. We code as 1 when a county adopts a two-tier system and 0 otherwise. A negative coefficient is expected, and the data comes from Bormann and Golder (2013). Third, we include a dummy variable indicating whether a country adopts federalism (*Federalism*). Federal countries tend to provide representation by territorial units; they are expected to have higher levels of malapportionment than unitary systems. Federal countries are coded as 1, and unitary countries are coded as 0. We use the same data source as that for *Area*. Finally, regional differences are tested. We include dummy variables named *Africa, Asia*, and *Latin America*. These are

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[3] We also tested with the data set that excludes two outliers, namely Haiti and Papua New Guinea, countries that exhibit the first and second highest MAL scores, in Fig. 1 and obtained almost identical graphs.

[4] We report the results of regression analyses that exclude 15 countries that have MAL values of zero.

[5] Following S&S, countries that adopt multi-tiered systems in which one of the tiers is SMD are also coded as 1.

Table 2
Regression results.

DV: MAL (log)	Polity			Polity10		
Variable	Model 1	Model2	Model 3	Model 4	Model 5	Model 6
Democracy	0.011	0.005	0.029	0.005	0.001	0.020
	[0.018]	[0.019]	[0.017*]	[0.019]	[0.019]	[0.018]
Democracyˆ2	−0.012	−0.010	−0.009	−0.012	−0.010	−0.008
	[0.003***]	[0.003***]	[0.003***]	[0.003***]	[0.003***]	[0.004**]
SMD		0.037	0.186		0.017	0.134
		[0.136]	[0.156]		[0.133]	[0.153]
Gini		0.029	0.003		0.026	0.002
		[0.013**]	[0.015]		[0.014*]	[0.015]
Area			0.002			0.008
			[0.042]			[0.042]
Tier			−0.433			−0.378
			[0.166***]			[0.162**]
Federal			−0.144			−0.157
			[0.229]			[0.236]
Latin America			0.543			0.526
			[0.248**]			[0.244**]
Africa			0.307			0.382
			[0.276]			[0.283]
Asia			0.235			0.279
			[0.231]			[0.230]
Urban			0.005			0.005
			[0.003]			[0.003]
PopGrowth			0.241			0.217
			[0.089***]			[0.096**]
Intercept	−2.101	−3.324	−3.344	−2.130	−3.233	−3.450
	[0.128***]	[0.542***]	[0.772***]	[0.112***]	[0.555***]	[0.785***]
Adj. R2	0.190	0.252	0.390	0.209	0.258	0.370
N. of Obs.	127	124	123	124	121	120
Peark	0.452	0.261	1.591	0.233	0.058	1.251

*p < 0.1., **p < 0.05, ***p < 0 0.01.
Note: Robust standard errors in parentheses.

coded as 1 if the country belongs to the geographic region in question and 0 otherwise. These regional dummies are used to test the expectation suggested by S&S that some regions of the world might have especially high levels of malapportionment. The geographic regions follow the United Nation's region code. Furthermore, we also include two control variables that loomed potentially important in our above discussion. One is *PopGrowth*, which is the rate of population growth. Countries with higher rates of population growth are expected to have higher levels of malapportionment because different regions within the country tend to have varying degrees of population growth, which is likely to result in a disproportional habitation pattern. The second is *Urban*, which measures the degree of urbanization. A country whose population predominantly lives in rural areas is expected to have a higher level of malapportionment because rural areas are often overrepresented (Boone and Wahman, 2015). The data for both variables are from the World Bank Development Indicators.

Table 2 reports the results of OLS regression analyses. Models 1 to 3 use *Polity* as the independent variable of interest, and Models 4 to 6 use *Polity10*. Models 1 and 4 are bivariate regression analyses; Models 2 and 5 include the first set of control variables, namely those found to be significant in existing studies. Models 3 and 6 add a second set of control variables. Although these were suggested as correlating with malapportionment, they were not always found significant in previous studies, along with those considered worth testing based on our previous discussion.

In all models, in line with our hypothesis, the square of *Polity* exhibits negative coefficients, and they are statistically significant at the conventional level. To clarify the implication of the models, we also compute the "peak," i.e., the level of democracy where MAL is predicted to be the highest. The peaks are found in the range between 0 and 3, implying that regimes within this range of Polity scores are most susceptible to high malapportionment. In the classification scheme of the Polity IV database, scores between −5

and 5 are classified as "anocracies," a type of political regime that falls between democracy and dictatorship. The regression outcomes indicate that anocracies tend to have higher degrees of MAL than the rest of the sub-regime categories. More specifically, according to Model 3, the values of MAL for Polity scores of 10, 0, and −10 are 0.03, 0.10, and 0.05, respectively.

The models using the past degree of democracy (*Polity10*) yielded qualitatively identical results to those using *Polity*. This suggests that the direction of causality between these two runs is in the direction we theorized.[6]

Among the control variables, it is noteworthy that *SMD* is not significant in all models where *SMD* is included, whereas existing studies consistently show that *SMD* negatively influences malapportionment (Samuels and Snyder, 2001; Horiuchi, 2004; Ardanaz and Scartascini, 2013). Our results suggest that the SMD system is not a hindrance to fair apportionment when democracy functions properly, meaning that government turnover regularly occurs and the institutions of checks and balances are effective.

Another noteworthy finding is that the *Gini* coefficients in Models 3, 5, and 6 are not statistically significant. Although Horiuchi (2004) and Ardanaz and Scartascini (2013) found that economic inequality is positively and significantly related to malapportionment, our results do not support their findings. Therefore, these findings need further examination.

Some of the remaining control variables also differ from previous findings. In Models 3 and 6, *Tier* is significantly correlated with malapportionment, both negatively and statistically. This differs from the results of S&S, who found that tiered systems do not have a significant effect on malapportionment. *PopGrowth*, which we added as an explanatory variable, is positively and significantly

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[6] We also run the same regression models without two outlier cases of Haiti and Papua New Guinea, and the results remain almost identical.

associated with malapportionment. This suggests that countries that undergo rapid population growth tend to have more biased district delimitations. As far as we are aware, this is a new finding in the existing comparative malapportionment literature.

The results for the other control variables are identical to those found in previous studies. For the regional dummies, as found in S&S, only Latin America is positively correlated with malapportionment. *Area, Federalism*, and *Urban* are not significantly associated with our dependent variable.

In Web Appendix B, we present two sets of additional statistical tests we conducted to further examine the plausibility of our theory. First, we estimated alternative models to reveal the mechanisms behind the curvilinear association between malapportionment and democracy. Our theory implies that on the one hand, a higher level of electoral competition will be associated with a higher malapportionment level, and on the other, an increased degree of political constraints associated with lower malapportionment. We used the vote shares of the ruling party as the measure of competitiveness, and the judicial independence and media freedom to gauge political constraints. Our OLS regression results support the mechanisms we posit behind the curvilinear relationship in our theory.

Second, as the independent variable of interest, we used democracy indices other than Polity, namely, FH, Vanhanen's Democracy Index (Vanhanen, 2000) and Electoral Democracy and Liberal Democracy drawn from the Variety of Democracy database (V-dem, n.d.). The results are consistent with our theory; the coefficients of the square of democracy indices are mostly negative across specifications, if not statistically significant. We interpret this to be a result of using a less appropriate proxy for the theoretical concept including political participation.

4. Illustrative cases[7]

This section provides several "process-tracing" case studies to unpack the mechanisms behind our theory. We choose representative cases in three regime categories: autocratic Belarus, anocratic Malaysia, and democratic Australia, Japan, and the United States. We also examine cases that experienced regime transition: Tunisia, which shifted from autocracy to transitional democracy, and Gambia, which transformed from democracy to anocracy.

4.1. Autocratic regimes where the incumbent is overwhelmingly strong

In Belarus from the mid-1990s, an incumbent leader had overwhelming electoral strength in an autocratic setting. In 1996, President Alexander Lukashenko, elected in 1994, organized a controversial national referendum to ratify a new constitution that strengthened the powers of the presidency at the expense of those of the legislature and the judiciary. Under the 1996 Constitution, Belarus has a bicameral National Legislature, with the lower house members directly elected through a SMD plurality system. In the 2000, 2004, 2008, and 2012 elections, pro-Lukashenko representatives held the overwhelming majority of seats in the lower chamber. In 2000, opposition candidates won four seats out of 110. In succeeding elections, opposition forces entered the race but won no seats, although opposition candidates obtained about 10 per cent of the total votes.[8] Ash (2015) stated that Lukashenko's overwhelming strength is due to the repression of opposition forces and

their fragmentation, stemming from repression.

Belarus' lower house elections, as expected in our theory, exhibit a very low degree of malapportionment despite the use of the first-past-the-post system. The level of malapportionment in Belarus in 2008 was 0.032; in 2012, it was 0.027. These numbers are lower than those of many consolidated democracies using the same system (e.g., the United Kingdom) and lower even than those of consolidated democracies with PR systems (e.g., Finland and Norway). Should Lukashenko wish to draw district boundaries to favor his partisans, he could have done so with his vast executive powers. It follows that he does not have the incentive to malapportion the electoral system because the opposition forces are negligible under the current power configuration.

Tunisia is a case wherein the regime shifted from autocracy under Zine El Abidine Ben Ali to a transitional democracy in the wake of the "Jasmine Revolution" of 2011. Ben Ali assumed power through a bloodless coup in 1987 and ruled the country with a carefully crafted façade of electoral democracy until he was deposed in 2011 through street protests (Anderson, 2011).

Under Ben Ali's rule, his party, the Constitutional Democratic Rally (*Rassemblement Constitutionnel Démocratique* or RCD), had overwhelming electoral strength. In the first election after the coup, held in 1994, RCD obtained 100 per cent of the seats. For the sake of appearing "democratic" in the face of the international community (Sadiki, 2002), in the succeeding elections Ben Ali allowed the opposition parties to obtain seats through the change of the electoral system from an SMD plurality system to a mixed system in which the SMD tier and the nationwide PR tier are combined. With this change, the proportion of seats held by opposition parties increased to 25 per cent. All the opposition candidates were elected from the PR tier, while the SMD tier remained completely occupied by the ruling party. Correspondingly, and consistent with our hypothesis, Tunisia's malapportionment during Ben Ali's rule was very low, 0.030 in the case of the 2004 election for the SMD tier. Tunisian experts analyze that Ben Ali's overwhelming strength emanated from his economic achievements, repression towards the opposition, and the internal rivalry within the opposition (Zisenwine, 2014).

In the process of democratizing Tunisia, the level of malapportionment increased in comparison to the period under Ben Ali. In the post-Ben Ali era, the electoral system adopted was a PR system using each governorate (province) as one electoral district. From a technical viewpoint, it should be easier to draw fairly divided boundaries under PR than when using the SMD system, where districts are divided into smaller pieces. However, the level of malapportionment increased when the electoral system shifted from a SMD plurality to PR. It increased from 0.030 in 2004 to 0.071 in 2011 and again to 0.078 in 2014.[9] In response, international election monitors raised concerns about biased apportionment (The Carter Center, 2014). While the exact reasons for the emergence of such a trend are difficult to determine based on the available sources of information, the increase in the level of malapportionment from the period of secure authoritarianism to a democratizing period is consistent with our hypothesis.

4.2. Highly competitive authoritarian regimes

In Malaysia, an anocratic regime continued for more than 30 years. In addition, the degree of political competitiveness there has become increasingly severe over the past decade amidst the maintenance of authoritarianism. The country has a parliamentary system of government and uses an SMD system for the lower house

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[7] Unless noted specifically, the malapportionment figures in this section is calculated from the data sources listed in the Web Appendix A.

[8] The vote percentage of opposition forces in total is calculated by the authors based on Frear (2014, p. 351) and the Belarus Central Commission (2012, p. 9).

[9] Based on the authors' calculation using the CLEA database for the 2011 election and reports prepared by the Tunisian Electoral Commission for the 2014 election.

elections. Since attaining independence in 1957, Malaysia has been ruled by *Barisan National* (BN), a multi-ethnic coalition of parties led by the Malay-based United Malay National Organization (UMNO). From its first post-independence election to the 2004 election, BN consecutively won more than two-thirds of the seats. In the 2008 election, it lost its two-thirds majority, which meant that BN no longer had enough votes to amend the Constitution. From the 2008 election, the waning of BN support became apparent, and in the 2013 election, the opposition parties won a greater total number of popular votes than BN (50.9%), although BN still won the majority of seats (59.9%).

Along with this increased competitiveness in lower house elections, the degree of malapportionment has been increasing in Malaysia. In 1995, malapportionment was 0.135; in the most recent election of 2013, it was 0.172. The relatively high degree of malapportionment is the result of allocating greater number of seats to rural districts, where UMNO's major support base, namely Malays and the indigenous population, reside.

BN took advantage of several institutional contexts to manipulate electoral delimitations in its favor. First, it amended constitutional provisions to legitimately increase the overrepresentation of rural districts, where their main support base lies. The 1957 Constitution included the provision that rural constituencies be given some "weightage," but the degree to which rural districts can exceed the number of voters was limited to 15 per cent of the national average. The BN government, having more than two-thirds of the seats, revised this provision so the ceiling on rural weightage was gradually eased and finally abolished by the 1970s (Lim, 2005). Second, it practically ignored the delimitation plan made by the Electoral Commission, drawing up a plan that suited its own interests (Lim, 2005). Third, the judiciary was not politically immune from executive pressure. Such a situation hinders opposition parties and civic groups from appealing to the judiciary.

The Gambia represents a case of transition from democracy to electoral authoritarianism. It was one of the few African countries to maintain a democratic system from its independence in 1965 until the military coup d'état in 1994. During this period, the People's Progressive Party (PPP) continued to win the position of the president along with the majority of seats in the National Assembly. In 1994, Colonel Yahya Jammeh staged a coup and banned the major parties from political activities. This initiated a period of anocracy that has continued up to the writing of this article.[10] The electoral system of the National Assembly has used an SMD plurality throughout the pre- and post-coup period. Since the 1994 coup, President Jammeh and his party, the Alliance for Patriotic Reorientation and Construction (APRC), have continued to win elections, but they face fierce electoral competition. In the 2001 legislative election, the APRC won 51.8 per cent of the votes while winning 89.5 per cent of the seats, and in 2007 election, it won 59.7 per cent of the votes while obtaining 87.5 per cent of the seats (Saine, 2008).

Consistent with our hypothesis, the level of malapportionment increased in the Gambia as it shifted from a democracy to an electoral authoritarian regime. In the 1992 election, malapportionment was 0.13. This is relatively high by world standards, but elections under the authoritarian period show an even higher level of malapportionment. In the 2007 general elections, it scored 0.28, which is one of the highest scores in the world in our database. The main reason for the decreasing fairness in boundary delimitations is the political manipulation by the president of the process of delimitation. International election monitors' reports have repeatedly pointed out the

lack of political insulation of the Independent Electoral Commission (IEC), which was tasked with drawing boundaries (The Gambia Commonwealth Secretariat, 2011, 2006). From the ratification of a constitutional amendment in 2001, the task of boundary delimitation was transferred from the IEC to a Boundary Commission, but the latter was not established in time for the 2011 presidential election (The Gambia Commonwealth Secretariat, 2011).

4.3. Established democracies

On average, established democracies have relatively fair electoral boundary delimitations but a historical review reveals that these are the result of long-term political struggles. We highlight two types of mechanisms that democracy generates as follows: (1) government turnover that leads to institutional reforms to reduce malapportionment and (2) checks and balances imposed on regime elites by the judiciary.

Government turnover, a hallmark of democratic regimes, can reduce malapportionment by creating a momentum for institutional reforms. There are at least two types of such reforms. One creates rules that can periodically conduct impartial redistricting exercises. Australia is an excellent case of this mechanism. Australia's House of Representatives exhibits low malapportionment, about 0.034 in 2008. Its minimal malapportionment is mainly due to regular delimitation exercises that are governed by a politically independent body following strict rules, particularly in terms of allowable deviations.

The case of the state of South Australia, which was one of the earliest adopters of such strict rules, exemplifies the importance of government turnover in reforming the delimitation rules. Until the 1960s, boundary delimitations were biased in favor of the conservative Liberal Country League (LCL) at the expense of the Labor Party's urban support base. The Labor Party campaigned against malapportionment based on a one-person-one-vote principle starting in the 1960s. The issue gained public attention because the Labor Party failed to form a government in the 1962 election, although it won a greater number of popular votes than the LCL. The Labor claimed that malapportionment was a major reason for such results. In the next election, in 1965, the Labor Party won power but could not pass a reform law due to opposition in the upper house. However, by this time, electoral reform had become a common agenda item between the two major parties in South Australia, and the LCL government elected in 1968 passed a law to reform the boundary delimitation process. Further, in 1975, the Labor government passed a bill to amend the South Australian State Constitution. This created a politically independent Electoral Districts Boundaries Commission with decision-making power that was not bound by approval from parliament. With South Australia as the harbinger state, at the federal level, legislation to increase the political independence of the Election Commission also passed in 1984 under the Labor government (Newton-Farrelly, 2015).

The second type of reform prompted by government turnovers is the adoption of a new electoral system that reduces malapportionment. Japan's electoral reform is one such case. During the post-World-War-II period, the Liberal Democratic Party (LDP) continuously won elections until the 1993 election, when it lost to a coalition of 13 parties. A high level of malapportionment that favored rural districts had been challenged in the courts multiple times since the 1960s, but no major reform had taken place under the LDP government (Hata, 1990). In 1994, the non-LDP coalition passed a new election law that changed its electoral system from the single-non-transferable vote (SNTV) system to a mixed system combining SMD plurality and PR. This involved an overhaul of boundary delimitations, and the level of malapportionment was reduced substantially under the new electoral system (Horiuchi

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[10] The Polity score for the Gambia was 8 from 1965 to 1980, 7 from 1981 to 1986, and 8 until the coup of 1994. From the coup until 2014, the Gambia's Polity score was between −7 and −5.

and Saito, 2003). In the 1993 election, the last election using SNTV, malapportionment was 0.131. In 1996, after the introduction of the mixed electoral system, malapportionment decreased to 0.048. The reduction of malapportionment was not the main motivation behind the 1994 electoral reform but it was intended to reduce the patronage-driven nature of Japanese politics, where SNTV policies were believed to be a cause (Ozawa, 1994).

Judicial checks and balances are a second major mechanism for reducing malapportionment. The case of the United States House of Representatives is a leading example. The United States House election uses a SMD system but its level of malapportionment is one of the lowest in our dataset, 0.013 in the 2000 election. However, as recently as 1962, MAL for the United States House of Representatives was 0.084, about seven times higher. The situation was drastically altered in the mid-1960s after a series of Supreme Court verdicts were handed down. In 1962, in the case of *Baker v Carr,* Tennessee's gross inequalities in the size of legislative districts was successfully challenged. The verdict of *Gray v Sanders* in 1963 established the "one-man-one-vote" principle, and *Wesberry v Sanders* in 1964 created the precedent that the population of congressional districts should be equal. In reaction to these court-ordered reforms, the level of malapportionment was lowered to 0.037 by 1966.

In summary, the above case studies are only illustrative but we believe they capture the major, if not all, mechanisms that lead to reductions in malapportionment. At the same time, reference to these mechanisms can help explain why some democracies (not autocracies) have relatively higher levels of malapportionment than others. For example, as S&S found, many Latin American democracies tend to exhibit higher levels of malapportionment. As Snyder and Samuels (2004) suggested, one can explain this with reference to a lack of constraints on the executive branch or, more specifically, a lack of judicial intervention. Another insight we can draw is into why some SMD systems have low degrees of malapportionment, as in Australia and the United States. Although S&S (p. 663, fn. 28) treated these cases as exceptional cases, our framework informs us that these are cases in which the mechanisms of democracy—judicial checks and reform through government turnover—functioned to reduce malapportionment.

5. Conclusions

This article has developed a theory of malapportionment and democracy, arguing that there is a curvilinear relationship between the two. More precisely, malapportionment is the lowest in established democracies and uncompetitive electoral authoritarian regimes, and it is the highest in competitive authoritarian regimes followed by new democracies. In particular, we theorize that democracy's contestation and constraints attributes are more relevant than its participation attributes in this context. Our cross-national regression analyses provide strong support for this claim. Another noteworthy finding is that the use of an SMD system, which previous studies found to be correlated with higher malapportionment, loses significance when democracy variables are added. This suggests that democracy can function to reduce malapportionment even for electoral systems that are prone to biased delimitation. Our case studies provided illustrations for the concrete mechanisms underlying these relationships.

Two implications of this study can be highlighted. The first is about the use of democracy indices. In recent years, remarkable advances have been made in the availability of cross-national measurements of democracy. Correspondingly, scholars often use one or more democracy indices in their statistical analyses. This study highlights that the choice of a democracy index that does not properly address the theoretical construct in question can result in incorrect inferences. In the current study, FH, which encompasses

the participation component of democracy and is used by S&S, is inappropriate in the examination considered in our theory. Rather, Polity is the relevant index as it focuses on the contestation and constraint attributes of democracy. Scholars should carefully evaluate the characteristics of the index or indices they use, depending on the theoretical logic behind their theory.

Second, our findings shed new lights on the theory of electoral manipulation as our theory and empirical findings contradict the well-known work of Simpser (2013). He argues that autocrats manipulate elections excessively because they want to showcase their political strength. Our study revealed that overwhelmingly strong autocrats are less likely to manipulate electoral boundaries but weakening autocrats aggressively do so. This disagreement might be because Simper's analyses explore phenomena such as voter/candidate intimidation, vote buying, and the falsification of election results but not malapportionment. Nevertheless, our findings suggest that signaling strength may not be the most important concern for autocrats in some circumstances. We also contend that our curvilinear theory can apply to other tools of electoral manipulation. Future research is urged to resolve this disagreement by analyzing whether politicians' incentives to manipulate elections differ according to the types of manipulation tools they use, and if so, how.

Furthermore, we need more precise analyses of the aspects of democracy that affect malapportionment. Although we have demonstrated through case studies that government turnover and judicial checks are two possible mechanisms, there may be other mechanisms that we have not determined and are attributable to democratic politics, such as civil society and public opinion. The task ahead is first to identify the variety of mechanisms and then to test the extent to which they matter in cross-national and longitudinal settings. In this regard, while we already have fairly comprehensive cross-national data, creating a dataset for longitudinal data of malapportionment with comprehensive country coverage is another much-needed research endeavor.

Finally, we need a finer analysis of the phenomena of malapportionment itself. In this study, we relied on a measure of malapportionment that does not distinguish between apportionment (how many seats to distribute to each administrative units) and boundary drawing (how to draw boundaries within an administrative unit). Such a measure had been an industry standard until recently but scholars are beginning to distinguish between the two (Wada, 2016). It is possible that the political motivations behind apportionment and boundary drawing are different. For example, the former may involve political manipulation at the level of the national government, whereas the latter may be more influenced by local-level politics. Future research should distinguish these two levels of analysis to obtain better understandings about malapportionment.[11] At the same time, we need more cross-national study on malapportionment at the level of upper-house elections. For the upper chamber, with the exception of the United States Senate (Ansolabehere et al., 2003), we have relatively little knowledge about the causes and consequences of malapportionment, especially in a comparative perspective. Important new avenues for research lie in examining these questions.

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[11] Relatedly, we note that the study of malapportionment should be combined with the study of gerrymandering, a phenomenon in which districts are divided in favor of a certain party or group without having inequality of number of voters across districts. Politicians in less-than-fully democratic countries may prefer to use malapportionment instead of gerrymandering to gain an electoral advantage. The former is easier to conduct in the absence of detailed precinct-level voter data, a context that many non-democracies face. The existing cross-national studies on malapportionment have paid little attention to this aspect, and the lack of cross-national data on the degree of gerrymandering hinders such analysis in practice.

Acknowledgements

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.electstud.2017.06.004.

Appendix. Table 1 Scores of MAL, Polity, and FH.

No	Country	MAL	Year	POLITY	FH	No	Country	MAL	Year	POLITY	FH	No	Country	MAL	Year	POLITY	FH
1	Afghanistan*	0.165	2010	−1	12	55	Gambia, The	0.258	2007	−5	9	109	Norway	0.034	2013	10	2
2	Albania	0.02	2013	9	6	56	Georgia	0.145	2012	6	6	110	Pakistan	0.082	2013	7	9
3	Algeria	0.077	2012	2	11	57	Germany	0.028	2013	10	2	111	Panama	0.079	2014	9	4
4	Andorra	0.111	2015	−	2	58	Ghana	0.181	2012	8	3	112	PNG	0.349	1997	4	6
5	Angola	0.142	2012	−2	11	59	Greece	0.039	2014	10	4	113	Paraguay	0.051	2013	9	6
6	Antigua & Barbuda	0.179	2014	−	4	60	Grenada	0.114	2008	−	3	114	Peru	0.08	2006	9	5
7	Argentina	0.13	2015	9	4	61	Guatemala	0.081	2015	8	7	115	Philippines	0.133	2010	8	6
8	Armenia	0.014	2012	5	9	62	Guinea	0.066	2013	4	10	116	Poland	0.018	2015	10	2
9	Australia	0.025	2013	10	2	63	Guinea Bissau	0.125	2014	6	10	117	Portugal	0.087	2015	10	2
10	Austria	0.062	2013	10	2	64	Guyana	0.099	2015	6	5	118	Romania	0.046	2012	9	4
11	Azerbaijian	0.047	2010	−7	11	65	Haiti*	0.401	2015	5	10	119	Russia	0	2011	4	11
12	Bahamas	0.107	2012	−	2	66	Honduras	0.062	2013	7	8	120	Rwanda	0	2013	−3	11
13	Bangladesh	0.083	2014	1	7	67	Hungary	0.017	2014	10	4	121	Saint Kitts	0.15	2015	−	3
14	Barbados	0.044	2013	−	2	68	Iceland	0.091	2013	−	2	122	Saint Lucia	0.132	2011	−	2
15	Belarus	0.027	2012	−7	13	69	India	0.066	2014	9	5	123	Samoa	0.137	2011	−	4
16	Belgium	0.033	2014	8	2	70	Indonesia	0.056	2014	9	6	124	San Marino	0	2012	−	2
17	Belize	0.118	2015	−	3	71	Iraq	0.071	2014	3	12	125	SaoTome	0.186	2006	−	4
18	Benin	0.062	2007	7	4	72	Ireland	0.044	2011	10	2	126	Senegal	0.078	2001	8	7
19	Bhutan	0.139	2013	5	7	73	Israel	0	2015	10	3	127	Serbia	0	2014	8	4
20	Bolivia	0.165	2014	7	6	74	Italy	0.053	2013	10	2	128	Seychelles	0.063	2011	−	6
21	Bosnia	0.062	2014	−	7	75	Jamaica	0.085	2011	9	5	129	Sierra Leone	0.041	2012	7	5
22	Botswana	0.087	2014	8	5	76	Japan	0.051	2014	10	2	130	Singapore	0.041	2015	−2	8
23	Brazil	0.098	2014	8	4	77	Jordan	0.166	2013	−3	11	131	Slovakia	0	2012	10	2
24	Bulgaria	0.034	2013	9	4	78	Kazhakstan	0	2012	6	11	132	Slovenia	0.021	2014	10	2
25	Burkina Faso	0.145	2015	6	7	79	Kenya	0.177	2013	9	8	133	Solomon Island	0.239	2010	8	7
26	Burundi	0.049	2015	6	13	80	Kuwait	0.137	2012	−7	10	134	South Africa	0.003	2014	9	4
27	Cambodia	0.049	2013	2	11	81	Kyrgyzstan	0	2015	7	10	135	South Korea	0.084	2012	8	3
28	Cameroon	0.171	2002	−4	12	82	Latvia	0.008	2014	8	4	136	Spain	0.106	2015	10	2
29	Canada	0.06	2015	10	2	83	Lebanon	0.077	2009	6	8	137	Sri Lanka	0.048	2015	3	8
30	Cape Verde	0.109	2011	10	2	84	Lesotho	0.036	2015	8	6	138	Suriname	0.212	2015	5	5
31	Chad	0.132	2011	−2	13	85	Liberia	0.144	2011	6	7	139	Sweden	0.039	2014	10	2
32	Chile	0.159	2013	10	2	86	Liechtenstein	0.05	2013	−	2	140	Switzerland	0.03	2015	10	2
33	Colombia	0.134	2014	7	7	87	Lithuania	0.013	2012	10	2	141	Syria	0.103	2007	7	13
34	Comoros	0.171	2015	9	7	88	Luxembourg	0.127	2013	10	2	142	Taiwan	0.074	2012	10	3
35	Congo (Kinshaha)	0.046	2006	5	11	89	Macedonia	0.025	2014	9	7	143	Tajikistan	0.037	2000	−1	12
36	Costa Rica	0.025	2014	10	2	90	Madagascar	0.169	2013	3	9	144	Tanzania	0.269	2015	−1	7
37	Cote D'Voire	0.271	2011	4	9	91	Malawi	0.158	2014	6	7	145	Thailand	0.033	2007	−1	10
38	Croatia	0.066	2015	9	3	92	Malaysia	0.173	2013	6	8	146	Togo	0.218	2013	−2	8
39	Cyprus	0.172	2011	10	2	93	Maldives	0.252	2005	−	11	147	Trinidad &Tobago	0.027	2015	10	4
40	Czech Republic	0.026	2013	9	2	94	Mali	0.122	2013	5	9	148	Tunisia	0.082	2014	7	4
41	Denmark	0.03	2015	10	2	95	Malta	0.015	2013	−	2	149	Turkey	0.164	2014	9	7
42	Djibouti	0.108	2013	4	11	96	Mauritius	0.081	2014	10	3	150	Uganda	0.172	2011	−1	9
43	Dominica	0.165	2014	−	2	97	Mexico	0.032	2012	8	6	151	Ukraine	0.016	2014	4	6
44	Dominican Rep.	0.059	2010	8	4	98	Moldova	0	2014	9	6	152	United Kingdom	0.042	2015	10	2
45	East Timor	0	2012	7	7	99	Monaco	0	2013	−	3	153	United States	0.014	2010	10	2
46	Ecuador	0.148	2013	5	6	100	Mongolia	0.097	2012	10	3	154	Uruguay	0.04	2014	10	2
47	Egypt	0.076	2015	−4	11	101	Montenegro	0	2006	9	6	155	Uzbekistan	0.021	2004	−9	13
48	El Salvador	0.036	2015	8	5	102	Morocco	0.078	2011	−4	9	156	Vanuatu	0.158	2012	−	4
49	Estonia	0.057	2015	9	2	103	Mozambique	0.025	2014	6	7	157	Venezuela	0.15	2015	4	10
50	Ethiopia	0.151	2005	−3	10	104	Namibia	0	2014	6	4	158	Yemen	0.105	2008	−2	10
51	Fiji	0	2014	2	10	105	Nepal	0.026	2013	6	8	159	Zambia	0.19	2011	7	7
52	Finland	0.018	2015	10	2	106	Netherlands	0	2012	10	2	160	Zimbabwe	0.061	2013	4	11
53	France	0.062	2012	9	2	107	New Zealand	0.019	2014	10	2						
54	Gabon	0.237	2011	3	11	108	Nicaragua	0.057	2006	8	6						

*For Afghanistan, we used Polity score for 2014, since the score for 2010 was not available and 2014 is the closest year when Polity score becomes available. For the same reason, we used Haiti's 2009 Polity score.

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