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Explaining the size of assemblies. A longitudinal analysis of the design and reform of assembly sizes in democracies around the world

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ABSTRACT

Why would parliamentarians vote for a bill reducing the number of seats of their own legislature? After all, this would resemble 'turkeys voting for Christmas.' This question is all the more pressing as the 2008 economic crisis triggered debates about reducing the number of parliamentarians. However, our knowledge of (changes to) assembly sizes is limited. In this study we develop a novel theoretical framework and test it empirically. We advance three main explanations: the gap between the expected size (based on population size) and the actual one, the effective number of parties and perceived voter hostility stemming from economic recessions. We test the framework using OLS regression (1800–2008) and event history analysis (1945–2008) for all democracies. We find a strong connection between population and assembly size when these assemblies are originally designed. Increases in assembly size are influenced by population growth and the effective number of parties. Reductions are influenced mainly by having recently experienced an economic recession.

1. Introduction[1]

Why would any parliamentarian agree to cut the number of parliamentary seats? After all, such cuts have real consequences, not the least for individual parliamentarians. Indeed parliamentarians approving a reduction of the assembly size would be like 'turkeys voting for Christmas' (Riera and Montero, 2014). Nevertheless, as data covering all democracies show, at least 69 genuine reductions in assembly size took place since 1945. One explanation may be that especially during economic recessions governments decide to shrink the size of the legislature. In many countries, the 2008 economic recession triggered debates about whether or not to reduce the total number of parliamentarians in the legislature (the so-called 'assembly size'). Indeed, in France (2012), Hungary (2010, 2011), Ireland (2011), Italy (2012), Japan (2012), Mexico (2009, and 2012), The Netherlands (2011), Portugal (2011), Romania (2009) and the United Kingdom (2011) such discussions were held, partially as a sign to show that politicians were willing to cut their own flesh (Farrell, 2014). While some of these discussions floundered, others were successful.[2] But are they the exception or the rule? After all, the 2008 economic crisis was no simple recession but rather a large-scale financial crisis (Reinhart and Rogoff, 2009). And more generally what explains the size of assemblies? Are the factors explaining the increases of the assembly size different from the ones explaining reductions? Unfortunately, to date we have little insight into what explains the size of assemblies, let alone reductions of it (with the seminal work of Taagepera (1972), Taagepera and Shugart (1989), Taagepera and Recchia (2002) and Colomer (2004) being notable exceptions).

This is all the more surprising as an increasing body of literature shows that assembly sizes have real inter-party, intra-party and 'patronage' effects. Already in 1967, Rae pointed to the effects of assembly sizes on *inter-party* competition arguing that the number of parliamentarians of the legislature affects disproportionality. At the time it was, however, difficult to assess the size of this effect. In his standard work on electoral systems, Farrell (2011, p. 159) shows

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[2] Specifically reductions were approved in Ireland, the United Kingdom and Hungary.

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that smaller assembly sizes have 'distinctly higher levels of disproportionality.' Lundell (2012, p. 14) found that the assembly size effect holds even when controlling for other elements of the electoral system such as the electoral formula, the effective threshold and apparentement (see also Barkan et al., 2006). Assembly size also has an impact on the effective number of parties. Indeed as Taagepera (2007, p. 17) shows 'assembly size affects the chances of smaller parties' (see also Taagepera, 1999), especially in first past the post systems (Lundell, 2012). It also has *intra-party* effects: the higher the assembly size, the greater the chances of minorities to gain representation (Kjaer and Elklit, 2014; see also Roberts et al., 2013), something that voters consider the most persuasive argument in favor of increasing the assembly size (Frederick, 2010:102). Contrariwise, as Frederick (2010:119) notes, having more parliamentarians means that the relative influence of individual MP in the legislative process is diluted. Moreover, individual MPs face a stronger competition for so-called 'mega-seats' – influential or attractive parliamentary offices such as committee chairmanships (Martin, 2014). The sheer number of parliamentarians also determines how many seats a party can offer its members (something one could label *patronage effects*). Indeed, it matters greatly whether a party gaining approximately 15% of the seats gets this percentage of 250 or 354 seats. For individual parliamentarians cutting the assembly size can significantly reduce their job safety, while expanding the assembly size offers political parties more options to reward loyal party members (Riera and Montero, 2014).

However, even though there is ever more evidence that assembly size matters, we know little about what factors influence it. Indeed the scarce research on the topic consists mainly of analyses correlating population and assembly size (Taagepera and Shugart, 1989; Taagepera, 1972). Yet these are cross-sectional tests without controls for factors that typically affect the design and reform of electoral systems such as parties' self-interest (Benoit, 2004; Colomer, 2004; Renwick, 2010). Indeed Colomer (2004) has suggested that the (effective) number of parties should be taken into account: a few big parties would prefer a smaller assembly size, while multiple smaller parties would prefer a larger one. Especially the second part of this expectation is powerful because the 'few big parties' are unlikely to reduce the assembly size given its patronage effects (Taagepera, 2007). Unfortunately so far, research on the topic has remained cross-sectional (not longitudinal) and no tests have been carried out including both population and the number of parties. All in all, we have little insight in what might explain changes to assembly size.

This paper aims to fill this gap. Specifically, the question guiding our research will be: *Which factors best explain the size of assemblies?* It will not only examine factors influencing the original size of an assembly in a country but also those affecting the likelihood of assembly size increases and reductions. We propose that our understanding of assembly sizes can be improved substantially by differentiating between a design phase (when the assembly is put in place) and a reform phase (when the size is adapted).

We will proceed as follows: first we will discuss the theoretical framework where we will build upon theoretical insights from the electoral reform literature and translate them to the study of assembly sizes. Indeed given that assembly size is one of the 'four main dimensions' of an electoral system (Lijphart, 1994), this is a good starting point to build our theoretical framework. In the empirical section we will carry out an Ordinary Least Squares regression analysis of new parliaments formed since 1800. Next, we will carry out a longitudinal analysis examining which factors explain increases and decreases of assembly sizes, using event history/survival analysis based on a unique dataset covering 133 democracies between 1945 and 2008. We find that the population explanation indeed works well in the design phase. However, once a given assembly size is agreed upon, adjusting this size is a somewhat different game where a political logic dependent on the effective number of parties (increases) and economic recessions (reductions) are also or even more important.

2. Population size, electoral reform and the size of assemblies

Since the mid-1990s scholars have started to look not only at the *consequences* of electoral systems, but also at *explanations* of the origin and changes to these electoral systems (Farrell, 2011, p. 172). While the focus originally centered on major reforms of the electoral formula, since the mid-2000s scholars have adopted a more comprehensive approach studying other elements of the electoral legislation (Leyenaar and Hazan, 2011, p. 438). Nowadays, scholars try to explain changes to such elements as ballot structure (Renwick, 2011), gender quota (Celis et al., 2011), district magnitude (Ganghof et al., 2015; Pilet, 2007) or electoral thresholds (Hooghe and Deschouwer, 2011). By doing so, virtually all 'major' dimensions are now covered (Lijphart, 1994, p. 10). There is one exception though, and that is the assembly size. The scarce research that tries to explain the size of legislatures is mainly based on Rein Taagepera (1972) population explanation (the so-called 'cube root law'). In what follows we will first discuss the cube-root law briefly and show why it is likely to only be partly true. Afterwards we offer a theoretical framework encompassing insights from the broader literature on electoral system design and reforms and discuss amongst others the role of parties (Colomer, 2004).

2.1. The population explanation

The core of the most common explanation of assembly sizes, the cube root law, is that the size of a legislature is expected to be close to the cube root of the population. Or more formally:

$$S = P^{1/3} \quad (1)$$

Here S is the size of the legislature and P the population size. The law consists of two elements: a theoretical, deductive rationale and an empirical regularity (Taagepera and Shugart, 1989). The theoretical argument starts from the assumption that communication with constituents and other members of parliament is the most time-consuming activity of representatives (Taagepera and Shugart, 1989, p. 173). To minimize the number of 'communication channels' an optimal assembly size can be calculated.[3] As Taagepera and Shugart (1989, pp. 179–182) elegantly show, this optimal size approximates the cube root law of the population size. Crucially, however, if the cube root law is genuinely a law, it should also hold in the future and as a consequence assemblies should adjust to population growth (Taagepera and Shugart, 1989, p. 179). This has not yet been examined. The empirical support for the cube root law consists of cross-sectional analyses based on population and assembly size data from 1965 (Taagepera, 1972) and 1985 (Taagepera and Shugart, 1989). Both analyses are 'static': they compare the sizes of legislatures and population at one point in time. These analyses are based on the assumption that assembly sizes of all countries were chosen in 1965 or 1985 respectively. In reality, countries do not change their assembly size every year. Therefore in these two studies the cause (the size of the population in 1965 or 1985) does not precede the effect (as the size of the assembly was set before these two dates). Moreover, it is unlikely

[3] The rationale being that by minimizing the number of communication channels, politicians maximize an important aspect of efficiency (Taagepera and Recchia, 2002:167).

that population sizes are the only factor taken into consideration when determining assembly size. Other factors, such as the number of parties, are likely to be at play as well (Colomer, 2004).[4] Multivariate analyses that explicitly take the timing of the change into account are therefore needed.

It is, however, unclear which other factors should be included in an explanation of assembly size. Factors determining assembly size, other than population, have remained understudied. Given that assembly size is a part of the electoral system (cf. Lijphart, 1994, p. 12), one can expect that traditional explanations for changes of electoral systems can be applied to assembly size as well. As such, they constitute a good starting point to look for other factors that may explain changes in the assembly size.

2.2. The original design of electoral systems

When electoral systems are designed and the 'original' assembly size is determined, this is often done as part of a transition to democracy or independence. Farrell (2011) distinguishes between three waves of electoral system designs: a first wave when Western countries introduced universal suffrage, a second when a substantial number of former colonies gained independence and a third one when a number of former autocratic countries became democratic. Given that during the electoral system design phase the whole electoral system is under scrutiny, the assembly size is unlikely to be the main focus of self-interested politicians. Additionally one can question to what extent this is even possible: even if parties exist, it is uncertain what their electoral support is.[5] Lastly, the designers have to establish a *legitimate* system that symbolizes a new, more democratic reality.[6] As Jacobs and Leyenaar (2011) have found, these circumstances provide the perfect fertile soil for principled or more technocratic arguments such as the population size. Hence we can expect that:

Hypothesis 1. *At the time of the original design, population size is associated with assembly size according to the cube root law.*

2.3. The reform of electoral systems

However, it is one thing to design an electoral system for a newly established polity; it is quite another to change an electoral system for an existing one. Under such circumstances fairly technocratic arguments such as the 'optimal assembly size' may be less important. After establishing the size of an assembly, changing that size may well be considered as a 'traditional' electoral reform. One can distinguish three schools of thought in the field of electoral reform: the *rational choice, systemic* and *historical comparativist* schools (Farrell, 2011; Leyenaar and Hazan, 2011).[7]

According to a first school, epitomized by Ken Benoit (2004) and Josep Colomer (2004), reformers are primarily interested in increasing their vote shares. According to this model, electoral reforms will occur when reformers have the ability (i.e. the required majority) to change the electoral system to their benefit. The best example of such a reform is the French 1985 shift to PR when the ruling French Socialist party was set to lose the upcoming election and wanted to limit its losses (Renwick, 2010). More generally, one can expect more electoral reforms when the effective number of parties is higher (Colomer, 2004, p. 5).

A second school, epitomized by Matthew Shugart (Shugart and Wattenberg, 2001; Shugart, 2008) uses a systemic perspective and points to a combination of inherent and contingent factors. The core of their argument is that electoral systems may have *inherent problems* and produce systemic failures and anomalous outcomes. For instance, majoritarian electoral systems can produce 'wrong winners' when the party with the most seats is not backed by a plurality of the voters. Such problems often lead to calls for reform, and incidentally to actual reforms.

A third school, epitomized by Gideon Rahat (2008) and Alan Renwick (2010), focuses on the broader picture using detailed case studies to examine the actual processes that led to the reform. One of the key insights of the school is that public opinion can have an impact on electoral reform through so-called 'elite-mass interaction'. In such cases, a minority of reformist politicians succeeds in implementing electoral reform by reacting to (perceived or real) 'widespread voter hostility' or 'citizen disengagement' (so-called 'passive mass impetus') (Renwick, 2011, p. 458).[8] Under such circumstances the position of politicians protecting the status quo is weaker while the position of reformers is stronger (Renwick, 2010).

To sum up, one can expect reforms are more likely when (1) reformers increase their seat shares by doing so and/or (2) when the current electoral system fails to deliver (3) and/or when politicians believe there is widespread citizen disengagement or voter hostility.

2.4. Applying the reform explanations to the study of assembly sizes

How does this all translate to the study of assembly sizes? The more technocratic reasoning outlined by Taagepera and Shugart (1989) fits best with the systemic school: when the number of MPs is too low, this may lead to policy failures, which in turn may be a reason to increase the assembly size. The population explanation should also work for decreases of the assembly size. Indeed, as Taagepera and Shugart (1989) show, optimizing the assembly size is a fine balancing act between too many and too few MPs. Consistent with the simple reasoning outlined by Taagepera and Shugart (1989) one can thus expect that:

Hypothesis 2a. *The more the cube root of a country's population exceeds its actual assembly size, the more likely enlargments of the assembly are.*

Hypothesis 2b. *The more the cube root of a country's population falls below its actual assembly size, the more likely decreases of the assembly are.*

The dominant electoral reform approach sees MPs as rational actors seeking to maximize their own benefit. Assembly size indeed has an impact on the proportionality of the electoral system:

[4] In the final (best-fitting) model, population size is multiplied by literacy rates and working age population (Taagepera and Shugart, 1989, p. 179). This is not aligned with the theory underpinning the cube root law, which is built on communication with *all* constituents (i.e. the whole electorate) and suggests that other variables may influence the relationship between population and assembly size. In all fairness, all three are probably a remnant of data availability and the statistical state of the art at the time of the writing (1972 and 1989 respectively). Taagepera (2007, p. 189) later on explicitly hinted at problems with data availability.

[5] It is important to note that the impact of proportionality should be studied very carefully as in many cases it may not have been an issue for constitutional designers, in particular in the pre-1920-period. While in theory this can be tested statistically, our number of cases is too low to do this in a meaningful way. In order to examine the impact of proportionality in the pre-1920 period case studies are therefore more appropriate.

[6] If anything one would expect a slightly 'too large' assembly (cf. risk aversion; Colomer, 2004).

[7] The three schools do not necessarily exclude one another, but are different in their focus and as a result suggest different factors to include in analyses of electoral reforms.

[8] Instances of 'active mass impetus' where public dissatisfaction leads to e.g. demonstrations explicitly calling for electoral reform are extremely rare (Renwick, 2011).

increasing the assembly size typically affects the district magnitude and thereby the effective electoral threshold.[9] Enlargement of the legislature therefore reduces the seat shares of the larger parties, unless some form of compensation takes place. This mechanism is labeled the micro-mega rule by Colomer (2004, p. 3): large parties have few incentives to increase the assembly size. However, changes to the assembly size not only have inter-party effects (disproportionality), they also have intra-party ones: a bigger assembly size reduces the personal power of individual politicians, as they have to compete with an increased number of other MPs for committee chairmanships and other mega-seats (Martin, 2014), for the ownership of topics that are most popular with the media and the important positions within their own party. In sum, the power of individual politicians within the party is reduced as the number of direct competitors increases. Lastly, assembly sizes also have what one could label 'patronage' effects: a larger assembly size also means that a party has more seats to offer to its members. This is also why, as Taagepera (2007, p. 84) puts it, 'the large learn to appreciate (…) larger assemblies' (despite their effects on proportionality).

Combining these three elements, one can expect increases in the assembly size when party leaders want to reduce the power of individual MPs or when smaller parties in the parliament have the power to negotiate their way into a coalition government. Hence one can expect more calls for expanding the assembly size as the number of smaller parties in the parliament increases and specifically when they enter office in a coalition government. Under such circumstances, increasing the assembly size grants the smaller parties a relatively limited benefit in terms of seat shares, but bigger parties have the benefit of weakening their MPs, increasing the power of the party leadership (especially in proportional systems) and have more seats to offer their members.[10] However, given that even large parties may come to appreciate larger assemblies, it is unlikely that the reverse holds true: a lower (effective) number of parties should have no impact on the likelihood of decreases in the assembly size. Therefore we can only expect that:

Hypothesis 3. *A higher* (*effective*) *number of parties increases the likelihood of assembly size enlargements* (*but has no effect on reductions*).

The comparative historical approach uses the longitudinal comparative case study method (hence the name) to study a country's instances of electoral reform and it highlights long-term and short-term factors that play a role in actual reform processes. This approach suggests that politicians implement reforms when there is perceived voter hostility or citizen discontent. There are at least two reasons why economic recessions are moments when changes to assembly sizes are likely to be on the agenda. First, especially during times of economic recession, the government parties can expect to face hostility and discontent as under these circumstances they are held 'tightly accountable' (Lewis-Beck and Nadeau, 2012, p. 472). Second, given the nature of assembly size (i.e. the number of politicians there are in a parliament) one can expect that politicians who desire doing something about the perceived hostility/discontent want to please public opinion and revert to reducing the assembly size (or do not dare to expand the assembly size). At the same time, the position of incumbents trying to protect their seat is weaker and they are less likely to be able to organize successful resistance against reform attempts (cf. Renwick, 2010).

Based on the available literature two theoretical mechanisms may be at work: legitimacy-induced motivations (Renwick, 2010) and key jangling (Farrell, 2014). The *legitimacy mechanism* holds that legitimacy is a powerful consideration when politicians contemplate reforms. They shy away from reforms they (rightly or wrongly) think are 'unpopular', while they tend to be more likely to introduce perceived popular ones.[11] This does not necessarily mean that citizens really want such a reduction, but as Frederick (2010:6) puts it succinctly in his analysis of the U.S. House, cutting the assembly size can be perceived as 'a small yet symbolically meaningful contribution to the goal of eliminating unneeded spending.' The reverse - increasing the number of politicians - will face an uphill struggle: it will be very hard convince media, public opinion and pundits that more politicians are needed (e.g. to deal with the crisis).[12] Applying this to assembly sizes one can expect that enlargements of the legislature are less likely while reductions are more likely.

In the *key jangling mechanism*, however, politicians do not consider legitimacy a powerful incentive but rather see implementing electoral reforms as one instrument in their toolbox to divert the attention from other policies – mostly budget cuts. In this explanation politicians do not really believe that increasing the assembly size will hurt them (as they are unpopular already and have nothing left to lose) but rather that decreasing the assembly size is a useful tool to draw away some of the negative attention. In this explanation, the likelihood of introducing increases of the assembly size is not affected ('nothing left to lose'). However, one can expect recessions to increase the likelihood of introducing *reductions* ('divert the attention'). Specifically we hypothesize that:

Hypothesis 4. *Experiencing an economic recession increases the likelihood of assembly size reductions* (*but has no effect on enlargements*)

3. Data and method

3.1. Methods

This article combines two different analyses. The first analysis looks at the relationship between assembly size and population size during the design phase; that is: the first time these assemblies are 'formed'. We use an *OLS regression* with logged assembly size and population, a standard way to estimate a power law relationship in physics (see e.g. Tighe et al., 2010).[13] We use Zelig to visualize effect sizes (Kosuke et al., 2008, 2009). We do this for a sample for assemblies that have been instituted in the period 1800–2014. We cannot prove a causal link between population size and assembly size in the design phase: this analysis can show that the connection between population size and assembly size persists when we look at original assemblies.

Second, we carry out a *survival analysis* examining the effect of our independent variables on assembly size increases and

[9] We use the word 'typically' as there are exceptions, such as single member district systems. In those systems an increase in assembly size increases the number of districts, which benefits regionally concentrated smaller parties, if the new seats are located in their 'heartland'.

[10] Based on the French 1985 elections, one could also hypothesize that large parties who expect to lose an upcoming election increase the assembly size to ensure their MPs keep their seats despite the vote share loss. Unfortunately this cannot be tested with our data.

[11] In more recent work Renwick (2011) suggested that 'passive mass impetus' may have more impact in recent years than in say the 1950s. We ran analyses testing this expectation but found no such effect for assembly size reforms.

[12] Examining which electoral reforms are popular among the electorate is still largely uncharted terrain, but clearly deserves more attention (cf. Farrell, 2011).

[13] Any power law relationship between two variables (whether a cube root, quadratic relationship etc.) can be expressed as a linear relationship between two logged variables:$y = x^z \log(y) = \log(x^z) \log(y) = z * \log(x)$.

reductions. This technique is best-suited to carry out a longitudinal analysis of factors influencing the 'survival of cases' (here: how long it takes before an assembly size is changed). As population size, economic recession and the effective number of parties change over time, we organized the data in the subject-period format to ensure the independent variables can vary over time.[14] Specifically, we use a *Cox regression* in this study given that we have no strong theoretical grounds to expect that the baseline hazard function has any specific shape. To test whether the proportional hazards assumption is violated we use Schoenfeld residuals (cf. Appendix 4).[15] We control for instances where countries experienced multiple consecutive increases or decreases (so-called 'repeated events') by introducing shared frailties.[16] Lastly, countries can experience two different outcomes (increase or decrease) and they are simultaneously at risk to experience either one of them. We accommodate for these divergent outcomes by estimating two separate models: one for increases and one for reductions (cf. Mills, 2011, p. 192).[17]

3.2. Operationalizations, data and pool of countries

In the static, design analysis, the *dependent variable* is the log of the actual size of the assembly; in the longitudinal analysis, the dependent variables are dummies indicating changes to the size of assemblies. In total 235 increases occurred, while the assembly size was reduced 77 times.[18] Conceptually this approach mirrors insights from detailed case studies that the precise shape of actual electoral reforms is often hard to predict as the process leading up to electoral reform typically requires a lot of bargaining about the precise content of a reform, something Rahat and Hazan (2011:486, 488) even call a 'major barrier' to the success of a reform proposal. In our analysis we therefore set the bar as low as possible (did a change occur or not) as arguably this is the most important threshold to cross. In Appendix 5 we also add results of an analysis where we set the cut-off point at 10%. This analysis shows very similar results to the ones presented in our empirical section.[19]

For the period 1945–2014, we obtained our assembly sizes from Bormann and Golder (2013) who have a comprehensive data set of the electoral system for every legislative election in democratic countries since the Second World War. This includes the size of the assembly that is elected. It covers 134 democracies and a total of 1197 legislative elections. We obtained data on the assembly size before 1945 either from established handbooks on election results (Nohlen et al., 2001a, 2001b; Nohlen et al., 1999; Nohlen and Stöver, 2010; Nohlen, 2005a, 2005b), online databases of election results or the texts of first constitutions (See Appendix 1).[20] A list of the 'original' assemblies can be found in Appendix 1. These are assemblies that are not the successor of a pre-existing regional or territorial assembly in countries that became independent or the first assemblies formed in countries that democratized.

We derive population data from the Maddison (2008). This offers yearly population data for the period 1820 and 2008. In the design analysis, we use logged population size as an *independent variable*. In the reform analysis, we calculate the gap between the expected size of the assembly and the actual size:

$$G = \frac{P^{1/3} - S}{S} \quad (2)$$

The actual assembly size (S) is subtracted from the expected assembly size. The resulting number represents the seat gap between the expected and the actual assembly size. The bigger the gap, the more likely a change of the assembly is (according to the Taagepera–Shugart model). To obtain the ratio or relative gap (G) we divide this gap by the actual number of seats, as we expect that a single seat difference is much more pressing in a small legislature then in a large legislature.[21]

The Argentinean legislature for instance counted 149 members in 1951. As there were 17,506,714 Argentines at the time, based on the cube root law we would expect 260 MPs. The gap between the expected assembly size (260) and the actual assembly size (149) is thus 111 seats. If we divide this by the actual size, we get 0.75. This means that the assembly needed to be expanded by three quarters of its existing membership to meet the cube root law expectation.

In the longitudinal analysis, we use a number of additional independent variables and controls. When operationalizing these variables for a longitudinal study of a relatively rare event such as changes to the assembly size one has to choose between depth and coverage. Detailed data ('depth') are typically only available for a limited time period and number of cases, while data that cover a wide time-span for a large number of countries ('coverage') often yield cruder operationalizations and mostly capture the beginning of the causal chain. There are two reasons why we decided to opt for coverage instead of depth. First, the countries for which the detailed data are available (depth) are not representative for democracies in the world (coverage): these are the rich, developed countries and as a result an analysis using detailed indicators is problematic.[22] Second, the number of changes to the assembly size is reduced significantly if we opt for the more detailed indicators. Especially reductions to the assembly size do not occur often in the countries during the remaining time frame: a mere 17 events are left. This in turn limits the number of variables that can be included

[14] This means we have values per election period nested in countries.

[15] It is assumed that e.g. when the risk of increasing the assembly size in country A is twice that of country B, this risk ratio should remain more or less the same over time.

[16] With repeated events we mean: increases following previous increases or decreases following previous decreases. Introducing shared frailties is identical to a random effects approach (Mills, 2011: 168). In our analysis, the distribution of the frailties is specified as the gamma-distribution. Similar results were acquired when we used a log-normal distribution. We include shared frailties as a way to account for unobserved heterogeneity (cf. Mills, 2011:165). To test whether our results are robust, we reran our analyses using clustering instead of frailties. The results remain the same, the only difference being that the rational choice variable has a considerably lower p-value. We also reran our analyses adding the raw number of previous changes as an independent variable, again to address repeated events. Once more, the results remain the same.

[17] The low number of assembly size decreases prevents analyzing sequences (e.g. first decrease than increase).

[18] Of these 75 and 24 were increases/decreases where the change was bigger than 10%. We also ran models with the big changes as dependent variables (presented in Appendix 5).

[19] Lijphart (1994:13) proposes a 20% cut-off point for electoral reforms, though he admits this is "necessarily arbitrary." In our dataset the number reductions of assembly size in our final analysis would then drop to 14. The number of increases would drop to 27. These numbers are very low and this obviously affects the overall quality of the analysis. Nevertheless, analyses using this cut-off point also show that our three main independent variables remain significant.

[20] Seven first constitutions (Argentina, Chile, Colombia, the Federal Republic of Central America, Peru, Uruguay and Venezuela) do not mention an exact number of seats but rather a relationship between population size and seats. For those cases we have estimated the size of the assembly by applying that rule.

[21] We also ran the models with the absolute number of seats as a predictor. This did not lead to substantially different conclusions: the effect is roughly the same, while the p-values are higher.

[22] Losing many of the countries that are not rich and developed which would especially be problematic regarding the analysis of the economic recession hypothesis. Indeed, there is no reason to expect rich countries would not be affected by economic recessions, but the number of economic recessions they have gone through in the post-1945 period is far lower. In fact there are so few economic recession years that any meaningful analysis of the economic recession hypothesis would become problematic.

in the analysis and increases the risk of Type II errors.[23] Given that the theories explaining assembly size are not well-established yet, the second would be a severe handicap in the analysis. The drawback of using indicators that are cruder and capture the earliest steps in the causal mechanism, is that we are more likely to find insignificant effects. If we do find significant effects, this is strong evidence that something is going on.

Combining different data sets reduces the number of countries for which data is available. In total 95 countries were covered both by the Maddison economic and population data and the Bormann and Golder assembly size data. These are listed in Appendix 2. Countries are excluded from the Maddison data because of size, for instance, and from the Bormann and Golder data because they are not considered democratic.

We use the effective number of parties in the parliament to test our rational choice hypothesis and a dummy for economic recession to capture the comparative historical hypothesis (descriptives can be found in appendix 3). This operationalization is a good example of the depth-coverage trade-off. The rational choice expectation ideally is measured by looking at the presence of smaller parties in government coalitions, as we expect that increases of the assembly size are most likely when smaller parties join a coalition and use their bargaining power to include the increase in the coalition agreement. However, while such data is available, it is only so for a small number of countries. Several alternative options are available, though all of these alternatives rely on the (raw or adjusted) number of parties in the *Lower House*. Specifically one can consider the inverse of the largest fractional share, the raw number of seat-winning parties, the effective number of (legislative) parties (Taagepera, 2007:48–49) and the number of relevant parties (Sartori, 1976). Which of these four is the most suited? Given that the inverse of the largest fractional share only uses information about the largest party in the Lower House (Taagepera, 2007:48), it tells us very little about the fragmentation of the party system and the number (and type) of parties that are needed to form a government. It is therefore less useful for our analysis, as we need information about the other parties. Sartori's number of relevant parties, which counts parties that have been in government or have the power to blackmail the government, is also less useful for our analysis. Indeed, given that decisions on which parties are relevant typically rely on expert judgments, Sartori's index is vulnerable to reliability issues when one analyzes a large number of countries, like we do (cf. Jacobs and Leyenaar, 2011).

This leaves us with the raw number of parties and the effective number of parties. The raw number of parties may seem appealing at first sight, but it is vulnerable to inflation when many tiny parties are in the Lower House. Indeed our causal mechanism suggests that smaller parties need to enter the government before they can demand to increase the assembly size (or block reductions). A large number of tiny parties by itself is not going to be enough. In that sense, they have to be small, but also large enough to be potential government parties.[24] In short we need some sort of measure of fragmentation that reflects the number and sizes of the parties in the Lower House but is not vulnerable to inflation by tiny parties (cf. Taagepera, 2007: 57) that stand no chance of entering the government. The effective number of parties does precisely this: it presents a measure that is shielded from inflation by tiny parties (*versus* the raw number of parties). Moreover, it still takes smaller parties into account (*versus* largest fractional share) but does not rely on expert judgment to identify which parties are relevant (*versus* relevant parties). It should not come as a surprise then that, as Taagepera (2007:58) notes, the effective number of parties allows one to estimate the minimal number of parties needed to form a majority coalition.[25] Indeed, the higher the effective number of parties, the more likely that at least one smaller party will need to be included in the coalition.

Data on the effective number of parties is available in the Bormann and Golder (2013) data set and therefore for the same countries and time frame for the rest of the analysis. This variable is lagged to ensure we measure the effective number of parties when the reform was passed. Admittedly, it is a less detailed and cruder indicator of the rational choice expectation, and a definitive test of our rational choice expectation can only be carried out when one directly uses information about the presence of smaller parties in a government. Nevertheless, the effective number of parties seems to be the best of the alternatives.

We also included an economic variable, based on data from Maddison (2008). When a country experienced at least one year of recession in the time interval, it scored a 1. This is a fairly low threshold, but again if this low threshold dummy already yields an effect, it is likely only to be stronger when the threshold is higher.[26] We also add three control variables, namely the number of years a country is democratic, a dummy measuring whether or not a country has a single member district electoral system, and a measure of bicameralism. In order to measure the years a country is democratic we use the Polity IV data set (Marshall et al., 2014).[27] The single member district dummy is included because the assembly size works differently in such political systems given the constituency service of MPs (cf. Colomer, 2004).[28] Bicameralism was added because having a second chamber may well influence debates about changes to the number of parliamentarians. The impact of bicameralism on the assembly size has not been examined cross-nationally and one could think of several opposing expectations. First it could be that bicameral systems experience less changes because there are two chambers that can be adjusted. Second, the reverse could also be true: bicameral systems may experience more Lower House changes to offset or balance changes to the Upper House. Third and last, it could be that bicameralism captures the degree to which government parties use both houses of parliament as a means to provide jobs for party members (cf. the patronage usage of assemblies) and it could be that the electorate and politicians are used to having a large number of MPs. If this were to be true, one should see bicameralism only having an effect on assembly size increases. Here, we use data from the Political Institutions and Political Events dataset (Przeworksi, 2011).

[23] Rare event Cox regression can accommodate the second problem, but not the first. It is also incompatible with repeated events (i.e. multiple consecutive changes in one country).

[24] Obviously, exceptions will undoubtedly exist, but on the whole there have been very few e.g. one-seat parties who were able to enter a government coalition.

[25] One can estimate this minimum number of required parties by dividing the effective number of parties by 2 and rounding the result (Taagepera, 2007:58).

[26] We ran additional analyses with higher thresholds and this is indeed the case. The low threshold has the advantage that the economic recession dummy not only has a value of 'one' at times of exceptional global economic crises.

[27] While some researchers have been quite critical of this indicator, on the whole it is the best of the longitudinal democracy indicators (for an overview of the strengths and weaknesses of the Polity IV and other democracy indicators, see: Munck and Verkuilen, 2002).

[28] Some might suggest that average district magnitude, presidentialism or the previous assembly size may influence the likelihood of an assembly size change. We ran additional (combined and separate) analyses with these variables as extra controls. These analyses yielded no substantial effects and did not influence the effects of our three main independent variables.

4. Static analysis: examining the design of assembly sizes

We test whether population size affects assembly size in the design phase for original assemblies the period 1800–2014. The main reason that we use such a long time period is that the formation of an original assembly on a particular territory is a rare phenomenon. We count thirteen occurrences between 1945 and 2014. Since 1945, a lot of countries democratized and became independent, but very often there was a preceding regional or territorial council (in countries that were newly independent), such as the Territorial Assembly that preceded the National Assembly in the Republic of the Congo, or an elected council from authoritarian period continued after the democratic transition, such as the Polish *Sejm* in 1991. Such cases do not provide valid tests of our hypotheses because there will always be MPs who have an interest in keeping their seat and therefore the status quo: we find that two out of five assemblies of countries that were democratized or became independent when a council from the colonial or authoritarian period existed, have the *exact same size* of this preceding council. This indicates that for assembly sizes there is considerable path dependency during such a transition to democracy or independence. These assemblies were not created *ex nihilo*, rather there was a previously existing assembly. This means, however, that these are not the right cases to assess whether the cube root law holds in cases of design: essentially these are cases of re-design or reform, not design.

Therefore, we stretched the time frame of our analysis to include a substantial number of original assemblies created since 1800. An example of such an assembly would be the Belgian Chamber of Representatives. There was no popularly elected assembly for that territory before the institution of the Chamber of Representatives in 1830. The list was compiled by determining the composition of the original assembly in every independent country by going through the compilations of election results in Nohlen et al. (2001a, 2001b), Nohlen et al. (1999), Nohlen and Stöver (2010) and Nohlen (2005a, 2005b). We did not include countries if these or other sources indicated that the assembly was a continuation of a council that pre-dated independence, if the size of the original assembly was not included in these sources and could not be determined by means of other sources, if the assembly was instituted before 1800 and if no population data could be obtained for the year of the institution of the assembly (from Maddison, 2008). We identified 51 cases that did not meet any criterion for exclusion.

For this data set we estimated a two models: a deductive and an inductive model.[29] The first means that we simply look at how the Taagepera–Shugart model performs, which holds that the relationship between population size and assembly size follows the cube root law. We calculate what share of the total variance in assembly size is explained by the cube root law (the 'r-squared'). The Taagepera–Shugart model specifies an intercept of zero. As we test whether the equation of Taagepera and Shugart fits the data and not estimate a traditional regression, we cannot calculate the standard error or report the significance of the estimate. Second, we also take an inductive approach where we use the logged population size as an independent variable to explain the logged assembly size.

Table 1
Models for design hypothesis.

Variable	Model 1	Model 2
Intercept	0 (NA)	−0.74 (1.02)
Logged Population	0.33 (NA)	0.36*** (0.07)
R-squared	0.29	0.39
N	51	51

Dependent variable: logged assembly size.
*** > 0.01 > ** > 0.05 > * > 0.1.

We present the regressions in Table 1 and Fig. 1. We look at the relationship between the logged population and the logged assembly size in order to estimate the power law relationship. In Model 1, one can see the deductive model: the cube root law explains 29% of the variance of assembly sizes. The inductive model (Model 2, also visualized in Fig. 2) is very similar to the cube root model. The cube root law falls within the 95% confidence interval around the predicted value for the inductive model. It explains 39% of the variance. The picture that emerges from these two analyses is consistent.[30] Population size is indeed a key covariate of assembly size during design periods.

5. Longitudinal analyses: examining the reform of assembly sizes

The 'static' analysis revealed that population size is strongly correlated to the assembly size when these assemblies are designed. In what follows we will examine what explains changes to the assembly size. Table 2 shows the results of the Cox regressions, while Fig. 2a and b give insight in the size of the effect.

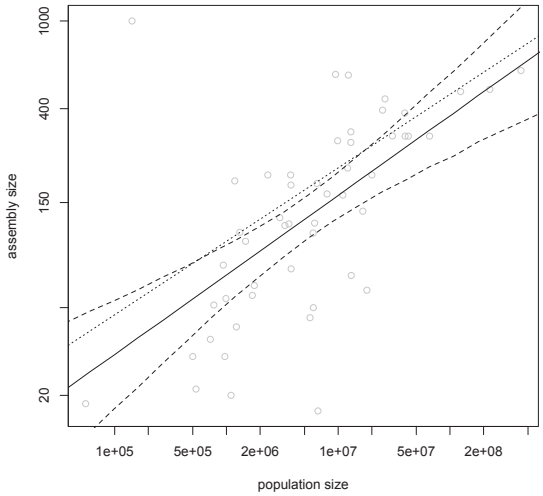
Based on the theory we would expect a positive and significant coefficient of our population variable on increases of the assembly size and a negative on decreases of it (cf. hypothesis 2a and 2b). The direction of the coefficient of the first analysis is indeed positive, as we expected. The effect of population appears to be fairly substantial and is firmly significant ($p = 0.000$). Indeed, the hazard ratio coefficient indicates that, keeping the other covariates constant, the likelihood of experiencing an enlargement of the legislature increases by 76% per one-unit increase in our population gap variable.[31] Fig. 2a shows the effect for the full range of meaningful values of the variable.[32]

[29] Of the 51 cases, 29 should be treated with caution: the size of the parliament was estimated, the country was a successor state of a country that lost considerable territory but also had a pre-existing assembly, the country was a merger of pre-existing territories that had their own legislature, the country no longer exists or the assembly was not elected. 22 countries do not have such issues. We ran analyses on both country selections (51 and 22). The results are not significantly different for the 22-case model: the exponent for population is 0.28 (with standard error of 0.11). The r-squared for the inductive model is 26% and 16% for the deductive model.

[30] As a robustness check we ran models with three control variables: economic recession, bicameralism and democracy. The economic recession dummy is one if the country had seen a year of negative growth in the last ten years with data from Maddison (2008). We use this variable to assess whether relatively recent experiences with economic recessions make politicians more 'conservative' when deciding on the size of the assembly. Choosing a cut-off point (in this case one year in the last decade) necessarily entails some arbitrariness, but we opted to cast the net relatively wide. If we already find an effect for this operationalization, it is likely to be only stronger when using a stricter one (e.g. one recession year in the last five years). We also include a variable on bicameralism, as countries that opt for a two-house system may opt for a smaller assembly because citizens are also represented in the higher house, from Przeworksi (2011). Finally, we include a control variable that measures the level of democracy from Marshall et al. (2014). Despite reducing the N of the analyses (less than a quarter of the cases remains if all three controls are included), inclusion of these variables does not have a significant effect on the size of the assemblies and not lead to a significant reduction of the coefficient for the population variable.

[31] We use the label 'likelihood' to describe hazards/risks, as this makes interpretations more intuitive.

[32] Meaningful, as in: excluding the outlier values. Here, the figure highlights that because of the limited meaningful range, the effect is actually slightly smaller than it seems at first sight: the meaningful range is smaller than one (0.70).

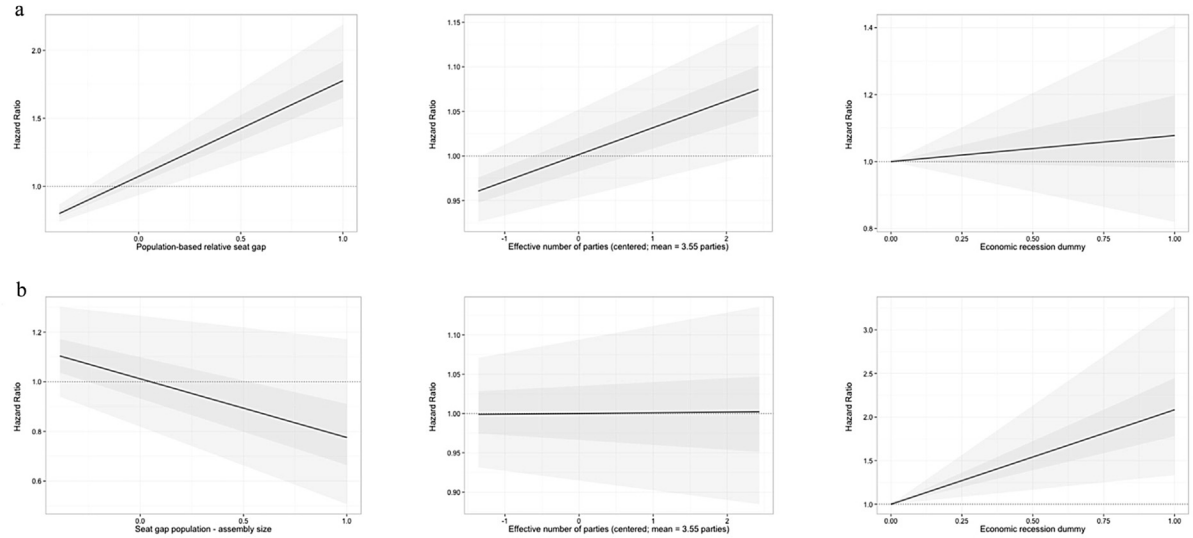


Note: Derived from Model 1 and 2. Upper, dotted, line represents the Shugart-Taagepera model and lower, full line with the dashed 95% confidence interval represents Model 2.

Fig. 1. The population and seats.

positive, as we expected.[33] The coefficient also suggests that the effect is substantial: for every additional party, the likelihood of an enlargement of the legislature increases by 2.9%. Fig. 2a shows that the effect of the effective number of parties is smaller than the effect of population. A country with six parties is about 11% more likely to experience an increase in the assembly size than a country with just two parties. Furthermore, and again in line with hypothesis 3, the number of parties seems to influence the increase but not the decrease of the assembly size: as Fig. 2b nicely shows, the line is virtually horizontal indicating a complete absence of relationship between the number of parties and the likelihood of reducing an assembly size.

Regarding the effect of economic recessions, our analyses point to the key jangling mechanism rather than the legitimacy mechanism. Indeed, having experienced an economic recession has no significant effect on increases of the assembly size, but it matters greatly when looking at decreases of the assembly size: the likelihood of reducing the number of MPs is almost twice as high compared to government periods that did not experience a recession. Going through a recession seems to provide a fertile soil for reducing the number of MPs. Clearly not all recessions lead to a decrease of the assembly size, but the likelihood of one occurring are markedly higher. Hence, hypothesis 4 seems to be corroborated.



Note: Given that we plot hazard ratios the confidence interval should not include 1 if the effect is significant (instead of 0 in OLS regressions, but similar to odds ratios in ogit). We used simulations to calculate the quantities of interest. To avoid distortion by outliers, the minimum/maximum value is always based on approximately 1.5 times lhe inter-quartile distance. *Note 2*: The number of parties is centered as hazard ratios always take 0 as the point of reference, a value that does not occur in our dataset. The llark blue ribbon depicts 50% of the simulations; the light blue ribbon depicts the remaining 45%.

Fig. 2. a. Effect of main independent variables on *increases* of assembly size. b. Effect of main independent variables on *reductions* of assembly size.

Countries that are 67% 'too small' (according to the cube root law) are about 50% more likely to experience an expansion of the assembly size than those that are already 3% too large. However, population size has no significant impact on decreases of the assembly size: even though the coefficient is in the expected direction, it does not come close to conventional levels of significance ($p = 0.320$). As such, hypothesis 2a is corroborated, but hypothesis 2b is not.

The rational choice perspective suggests that assembly sizes increase when the effective number of parties increases (cf. hypothesis 3). This seems to be the case. The p-value of the parties variable is below the 0.1 threshold ($p = 0.083$) and the effect is

Moving on to the control variables, countries with a single member district system are not more likely to expand or reduce their legislatures. Contrariwise, the number of years that a country is democratic seems to matter. Long-standing democracies are more likely to increase their assembly size than newly established

[33] We would like to stress that because (1) our operationalization of the rational choice expectation is fairly crude and (2) we could not include a measurement of the theoretical expectation that parties expecting to lose the election want to expand the Lower House just to keep their MPs in, we are likely to underestimate the impact of the self-interest of parties on expanding the number of MPs: in reality it is likely that the effect is stronger.

Table 2
Cox-regression models.

	Increases of assembly size				Reductions of assembly size			
	Model 1a		Model 1b		Model 2a		Model 2b	
	Coef. (s.e.)	Haz. rat.	Coef. (s.e.)	Haz. rat.	Coef. (s.e.)	Haz. rat.	Coef. (s.e.)	Haz. rat.
H2a & H2b. Gap expected/actual assembly size (G)			**0.568***** (0.128)	**1.764**			−0.246 (0.247)	0.781
H3. Effective number of parties			**0.029*** (0.017)	**1.030**			−0.000 (0.033)	0.999
H4. Economic crisis			0.079 (0.172)	1.082			**0.731**** **(0.269)**	**2.077**
Years democratic	0.019*** (0.003)	1.020	0.023*** (0.004)	1.023	0.001 (0.003)	1.001	0.001 (0.003)	1.001
Single Member Districts	−0.131 (0.192)	0.877	−0.346 (0.202)	0.707	−0.045 (0.354)	0.955	−0.039 (0.373)	0.962
Bicameralism	0.391*** (0.177)	1.479	0.541*** (0.181)	1.71	−0.277 (0.269)	0.758	−0.275 (0.270)	0.760
Years democratic:time	*−0.002**** *(0.000)*	*0.998*	*−0.002**** *(0.000)*	*0.998*				
Events/Observations	171/729		171/729		60/729		60/729	
LR test	61.19***		80.98***		1.16		9.86	
Generalized R2	0.47		0.57		0.01		0.10	

$^{***} > 0.01 > {}^{**} > 0.05 > {}^{*} > 0.1$; *Note*: All models include controls for number of past events (shared frailties). To accommodate breaches of the proportional hazards assumption, interactions with time were included where required (cf. Allison, 2014, p. 44). Note that the main effect of time 'disappears' because it is absorbed in the baseline hazard function (as is normal with Cox regressions). The models examining reductions of the assembly size showed no breaches of the proportional hazards assumption.

ones. We know from the literature that new democracies change their electoral systems quite frequently, but they typically focus on other elements that have a more direct impact on seat shares (Bielasiak and Hulsey, 2013). In newer democracies, parties apparently have other priorities than changing the assembly size. Lastly, bicameralism also seems to matter, though the effect is only significant when it comes to increases in assembly size. As proposed above bicameralism may capture the extent to which governing parties employ both houses as a way to ensure jobs for their members or to which the electorate and politicians are more tolerant of a large number of MPs in a bicameral system. Obviously more (case study) research is needed to establish whether or not bicameralism genuinely caused or facilitated these increases. Indeed, our dataset includes several countries, such as Argentina, Barbados, Brazil, Croatia, Japan, the Dominican Republic, and the Philippines, that are bicameral and experienced multiple increases. Additionally, The Danish and Swedish case are well-suited to examine the effect of the abolition of Upper Houses on the size of Lower Houses.[34] All can be considered useful countries for such case studies.

6. Conclusion

This study set out to examine which factors affect a democracy's assembly size. We distinguished three possible explanations: a rational choice explanation based on the effective number of parties (cf. Benoit, 2004; Colomer, 2004), a systemic explanation based on population size (cf. Shugart, 2008) and a comparative-historical one based on (perceived) public opinion and economic crises (cf. Renwick, 2010). We differentiated between the design and reform phases.

We find a strong empirical connection between population size and assembly size in the design phase, based on a dataset covering all original assemblies since 1800. This suggests that the designers take the size of their population into account when designing an assembly – but of course detailed case studies are necessary to establish whether they actually used such criteria. However the design of electoral systems is a fairly rare event while reforms occur far more often. In this sense reform is much more important than design. Here we find less support for the population expectation. Discrepancies between population and assembly size do affect increases of the assembly size, but play no role in explaining decreases. The evidence presented here supports the hypothesis that the effective number of parties matters for assembly size: the more fractionalized a party system is, the more likely the expansion of an assembly. One of the reasons is, we propose, that larger assembly sizes tend to be more proportional: smaller parties are likely to win a bigger seat share (Lundell, 2012). While these benefits may be offset by (changes to) an electoral threshold (Riera and Montero, 2014), even in such cases small parties still benefit slightly in terms of their absolute number of seats when an assembly expands.

Cutting the number of MPs seems to be a completely different game. The discrepancy between the population and assembly size and the effective number of parties play no role in such discussions. The most important factor explaining reductions of the assembly size is whether or not a country has experienced an economic recession. Under such circumstances politicians may try to divert the attention from budget cuts by reducing the number of politicians (cf. key jangling). Our analyses show that it is important to keep the direction of the reform in mind when one wants to explain assembly sizes: the factors explaining increases of the assembly size are different from the ones that affect the likelihood of decreases. Our analyses also show that while most of the available literature examines the effect of population size, other factors such as the effective number of parties and experiencing economic recessions, play a role as well in the reform of assembly sizes.

While our analysis goes beyond the scope of most current research on assembly sizes by offering both a historical and longitudinal analysis, there are a few areas where more research is needed. One venue for future research concerns the overall method of our study. Real-life electoral reforms are typically explained by structural opportunities that are exploited (or not) by actors. While statistical analyses are well-suited to examine more structural, contextual factors such as the party system, the state of the economy or the population size; case studies do a better job at capturing how actors use these structural opportunities. Case studies using careful process tracing of changes in the assembly size are therefore very useful to complement our analyses. Next to case studies, statistical studies refining our analyses are also important. We prioritized a broad 'coverage' of countries over 'detailed' indicators, as the latter would severely bias the countries included in our analyses and would reduce the number of assembly size changes included in the dataset so heavily that meaningful analyses would be impossible. Nevertheless, once

[34] There were too few cases of such abolitions to examine this effect statistically.

more detailed data are available; replications of our analyses with more detailed indicators will also become possible. Specifically, researchers may try to collect data on indicators that can test the expectation that government parties expecting severe vote losses in upcoming elections will try to expand the assembly to provide seats for their politicians.

A last recommendation relates to the broader question of how many MPs we 'need.' When contemporary political scientists are asked to advice on the right assembly size, they often refer to the population size because of the real-life correlation between both (e.g. Lijphart, 1998). However, as our analyses have shown, this correlation should not be taken for granted: population size is not the only explanation for the size of assemblies. This opens the door to new types of research examining which factors should be taken into account when determining the appropriate size. One could, for instance think of the electoral formula, the task of the MPs, the budget and the staff an MP is provided with. Under particular circumstances relatively small assemblies may well make sense (e.g. homogenous society with PR and substantial supporting staff) compared to countries that have the same number of inhabitants but lack these features. Indeed, assemblies are not a means by themselves; they are a tool of representation. As such, determining the circumstances under which assemblies are able to function as a representative body matter greatly.

Appendix 1. Countries included in the static analysis

#	Country	Inclusion	Ind.	Population	Referent election	Seats	Source	Notes
1	Albania	1	1912	937,000	1921	78	Nohlen and Stöver (2010, p.128)	
2	Argentina	2	1810[a]	534,000	1810	21	1819 Constitution	Estimated[b]
3	Australia	2	1901	3,795,000	1901	75	Nohlen et al. (2001, p.610)	Merger
4	Austria	2	1918	6,455,000	1920	183	Nohlen and Stöver (2010, p.219)	Successor
5	Bahrain	1	1971	968,877	1972	30	Nohlen et al. (2001, p.55)	
6	Bangladesh	1	1971	42,403,000	1973	300	Nohlen et al. (2001, p.543)	
7	Belgium	1	1830	3,750,000	1830	200	Nohlen and Stöver (2010, p.282)	
8	Bolivia	1	1825	1,100,000	1825	20	1826 Constitution	
9	Cameroon	2	1961	5,995,682	1964	50	Nohlen et al. (1999, p.182)	Merger
10	Canada	2	1867	3,781,000	1867	180	Nohlen (2005, p.138)	Merger
11	Chile	2	1810	771,447	1818	514	1818 Constitution	Estimated[b]
12	China	1	−221	6,04E+08	1912	596	Joseph (2014, p.53)	
13	Colombia	2	1810	1,706,000	1810	57	1810 Constitution	Estimated[b]
14	Cuba	1	1902	1,775,000	1901	63	Nohlen (2005, p.209)	
15	Czechoslovakia	2	1918	12,979,000	1920	281	Nohlen and Stöver (2010, p.489)	No longer exists
16	Denmark	1	965	1,484,000	1849	100	Nohlen and Stöver (2010, p.501)	
17	DR Congo	1	1960	16,610,482	1960	137	Nohlen et al. (1999, p.293)	
18	Ecuador	1	1822	500,000	1830	30	1830 Constitution	
19	Egypt	1	1922	12,144,000	1923	215	Sternberger et al. (1978, p.294)	
20	Federal Republic of Central America	2	1823	1,227,000	1821	41	1821 Constitution	Estimated[b]; no longer exists
21	Germany	2	1871	39,456,000	1871	382	Nohlen and Stöver (2010, p.788)	Merger
22	Hungary	2	1918	7,950,000	1920	164	Nohlen and Stöver (2010, p.929)	Successor state
23	India	2	1947	2,27E+08	1951	489	Nohlen et al. (2001, p.577)	A Central Legislative Assembly existed for the territory of Pakistan, Burma and India before independence
24	Iran	1	1905	10,994,000	1906	162	Nohlen et al. (2001, p.62)	
25	Ireland	2	1921	3,002,000	1922	128	Nohlen and Stöver (2010, p.1016)	First Dail consisted out of Irish members of UK Parliament
26	Israel	2	1948	3,623,420	1949	120	Nohlen et al. (2001, p.130)	An Assembly of Representatives existed for the Jewish population in British Palestine before independence
27	Italy	2	1861	26,249,000	1861	443	Nohlen and Stöver (2010, p.1082)	Merger
28	Japan	1	1890	39,688,000	1889	300	Fraser et al. (1995)	
29	Libya	1	1951	989,591	1952	55	Sternberger et al. (1978, p.1138)	
30	Mexico	1	1821	6,587,000	1814	17	1814 Constitution	
31	Nepal	1	1768	5,957,000	1959	109	Nohlen et al. (2001, p.624)	
32	North Korea	2	1945	9,471,140	1948	572	Nohlen et al. (2001, p.398)	
33	Oman	2	1650	5,599,197	1981	45	Nohlen et al. (2001, p.199)	Not elected
34	Pakistan	1	1947	65,705,964	1970	300	Nohlen et al. (2001, p.686)	
35	Paraguay	1	1811	143,000	1811	1000	1811 Constitution	
36	Peru	2	1821	1,317,000	1823	110	1823 Constitution	Estimated[b]
37	Poland	1	1918	24,935,000	1922	394	Nohlen and Stöver (2010, p.1509)	
38	Portugal	1	1143	3,335,000	1822	118	ISCSP (n.d.)	
39	Romania	2	1878	12,340,000	1919	568	Nohlen and Stöver (2010, p.1609)	Merger
40	Russia	1	1721	1,25E+08	1906	478	Sakwa (1998, p.13)	
41	Saudi Arabia	2	1932	18,057,781	1993	60	Nohlen et al. (2001, p.210)	Not elected

(*continued*)

#	Country	Inclusion	Ind.	Population	Referent election	Seats	Source	Notes
42	South Africa	2	1910	6,153,000	1910	121	Nohlen et al. (1999, p.835)	Merger
43	South Korea	1	1946	20,027,000	1948	200	Nohlen et al. (2001, p.463)	
44	Switzerland	2	1848	2,346,000	1848	200	Nohlen and Stöver (2010, p.1881)	Merger
45	Tanzania	2	1964	1,187,412	1965	188	Nohlen et al. (1999, p.882)	Merger
46	Thailand	2	1238	13,087,000	1932	70	Nohlen et al. (2001, p.266)	Not elected
47	Turkey	2	1923	9,882,000	1923	286	Nohlen et al. (2001, p.238)	Successor
48	Uruguay	2	1825	55,000	1830	18	1830 Constitution	Estimated[b]
49	Venezuela	2	1811	718,000	1812	36	1812 Constitution	Estimated[b]
50	Yemen	2	1990	30,543,983	1993	301	Nohlen et al. (2001, p.309)	Merger
51	Yugoslavia	2	1918	12,987,000	1923	314	Meštrović (1960)	No longer exists

[a] Independence declared.
[b] Seven first constitutions do not mention an exact number of seats but rather a relationship between population size and seats. For those cases we have estimated the size of the assembly on using that rule.
Inclusion: 2 included only in the analyses with all 51 cases. 1 included in both analyses (with the 51 cases and the 22 cases).

Appendix 2. Countries included in the longitudinal analysis

#	Country
1	Albania
2	Argentina
3	Armenia
4	Australia
5	Austria
6	Bangladesh
7	Belgium
8	Benin
9	Bolivia
10	Brazil
11	Bulgaria
12	Burundi
13	Canada
14	Cape Verde
15	Central African Republic
16	Chile
17	Colombia
18	Comoros
19	Congo
20	Costa Rica
21	Croatia
22	Cuba
23	Czech Republic
24	Czechoslovakia
25	Denmark
26	Dominican Republic
27	Ecuador
28	El Salvador
29	Estonia
30	Finland
31	France
32	Georgia
33	Ghana
34	Greece
35	Guatemala
36	Guinea-Bissau
37	Honduras
38	Hungary
39	India
40	Indonesia
41	Ireland
42	Israel
43	Italy
44	Jamaica
45	Japan
46	Kenya
47	Latvia
48	Lebanon
49	Lithuania
50	Macedonia
51	Madagascar

(*continued*)

#	Country
52	Malawi
53	Mali
54	Mauritius
55	Mexico
56	Moldova
57	Mongolia
58	Myanmar
59	Nepal
60	Netherlands
61	New Zealand
62	Nicaragua
63	Niger
64	Nigeria
65	Norway
66	Pakistan
67	Panama
68	Paraguay
69	Peru
70	Philippines
71	Poland
72	Portugal
73	Romania
74	Sao Tome and Principe
75	Senegal
76	Serbia and Montenegro
77	Sierra Leone
78	Slovakia
79	Slovenia
80	Somalia
81	South Korea
82	Spain
83	Sri Lanka
84	Sudan
85	Sweden
86	Switzerland
87	Taiwain
88	Thailand
89	Trinidad and Tobago
90	Turkey
91	Ukraine
92	United Kingdom
93	United States of America
94	Uruguay
95	Venezuela

Appendix 3. Descriptives of the main variables (valid)

Name variable	Minimum	Maximum	Mean
Increase in assembly size	0	1 (171 observations)	0.23
Decrease in assembly size	0	1 (60 observations)	0.08
Relative population size gap	−0.45	2.78	0.38
Effective number of parties	1	45.740	3.55
Economic recession	0	1 (212 recession observations)	0.27
Total valid N: 729			

Appendix 4. Schoenfeld residuals test

	ρ	χ^2	p-value
Gap expected/actual assembly size (G)	−0.0383	0.249	0.6175
Effective number of parties	−0.0314	0.165	0.6864
Economic crisis	−0.0374	0.238	0.6255
Years democratic	*−0.1651*	*4.527*	*0.0334**
Single Member Districts	0.1726	5.311	0.0212*
Bicameralism	−0.0707	0.857	0.3546
GLOBAL		9.318	0.1565

*p < 0.05 Note: p-values lower than 0.05 may signify a breach of the proportional hazards assumption. The way to test whether there is genuinely a breach of the proportionality assumption is to include interactions with time. If the interaction is significant, there is a breach, but the interaction is also the solution for the breach (cf. Allison, 2014:44). The interaction between years democratic and time is significant, but the interaction with SMD is not, hence we excluded it from the analysis.

	ρ	χ^2	p-value
Gap expected/actual assembly size (G)	0.0033	0.001	0.9791
Effective number of parties	0.0349	0.082	0.7746
Economic crisis	0.0000	0.000	0.9998
Years democratic	−0.2030	2.770	0.0963
Single Member Districts	0.2150	3.280	0.0703
Bicameralism	−0.0017	0.001	0.9904
GLOBAL		6.13e+00	0.9074

*p < 0.05 Note: p-values lower than 0.05 may signify a breach of the proportional hazards assumption.

Appendix 5. Robustness check: large increases and reductions only

	Increases of assembly size		Reductions of assembly size	
	Model 1		Model 2	
	Coef. (s.e.)	Haz. rat.	Coef. (s.e.)	Haz. rat.
H2a & 2b. Gap expected/actual assembly size (G)	1.258*** (0.229)	3.521	−0.128 (0.399)	0.880
H3. Effective number of parties	0.049** (0.020)	1.050	0.036 (0.029)	1.037
H4. Economic crisis	0.155 (0.341)	1.168	1.174** (0.483)	2.775
Years democratic	0.032*** (0.007)	1.033	−0.001 (0.007)	−0.999
Single Member Districts	−1.144** (0.450)	0.319	−1.296 (1.062)	0.273
Bicameralism	0.571* (0.338)	1.770	−0.835* (0.491)	0.434
Years democratic:time	−0.004*** (0.001)	0.996	*NA*	*NA*
Events/Observations	50/729		19/729	
LR test	69.79***		15.23**	
Generalized R2	0.52		0.15	

*** > 0.01 > ** > 0.05 > * > 0.1; *Note*: All models include controls for number of past events (shared frailties). Only the democracy variable showed a bread of the proportional hazards assumption (Schoenfeld residuals: p = 0.0003) and an interaction of that variable with time was included (cf. Allison, 2014:44). Note that the main effect of time 'disappears' because it is absorbed in the baseline hazard function (as is normal with Cox regressions).

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