Arend Lijphart's Dimensions of Democracy: Logical Connections and Institutional Design

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Lijphart's (1999) analysis maps countries along two dimensions of democratic institutions: 'executives-parties' or 'joint-power', and 'federal-unitary' or 'divided-power'. My 'meta-study' maps the methodology of Lijphart's mapping: the nature of indices (inputs or outputs), their logical interconnections, their susceptibility to institutional design ('constitutional engineering'), and their suitability for expressing the intended underlying concepts. Strikingly, the joint-power indicators are highly correlated and mostly logically connected output measures, which are not susceptible to institutional design, while the opposite is true for the divided-power dimension. For this dimension most indices are expert estimates of inputs, marginally correlated, yet subject to institutional design, limited by size dependence. Surprisingly, the parliamentary-presidential aspect of institutional design does not affect the picture. The connection between cabinet life and the number of parties is even stronger than found by Lijphart. Interest groups and central bank independence fit his dimensions empirically but less so logically. In sum, institutional design may be more difficult than sometimes assumed, but offers hope.

Arend Lijphart's book *Patterns of Democracy* (1999) is another landmark in the study of institutions, expanding the endeavor of his previous *Democracies* (1984) to map democracies in a two-dimensional field. Given the clarity and succinctness of the book, it may affect the actual design of institutions more than most political science books do – witness Lijphart's past impact, ranging from South Africa to Estonia. Some political scientists are so used to being ignored by practising politicians that they almost make a virtue of it. But scholarly understanding and applicability are not mutually exclusive.

When the present study asks questions such as whether Lijphart's indices are input or output indices, it may look abstract – a sort of a meta-study that maps some features underlying Lijphart's mapping of institutions. Yet such distinctions matter not only philosophically but also for applicability. Output indices can only be observed; input indices are subject to purposeful institutional design.

My first objective is to specify this input-output nature of Lijphart's indices. He distinguishes two dimensions of democratic institutions, which he calls 'executives-parties' (or 'joint-power') and 'federal-unitary' (or 'divided-power') dimensions (Lijphart, 1999, p. 5). Lijphart measures each dimension through five indices. It will be shown that most of the joint-power indices are not subject to direct institutional design; they are logically interconnected and hence highly correlated. In contrast, the divided-power indices are subject to direct and separate institutional design. This relative independence is possible because they are not

interconnected through logical quantitative models,[1] and hence their correlation is much weaker.

A second objective is to inquire whether the indices chosen by Lijphart are suitable for expressing the underlying concepts. Most problematic for the joint-power dimension is the use of deviation from proportional representation (PR) as a measure of electoral rules, and the use of cabinet life as a proxy for executive dominance. Some important side issues are discussed in Appendices. Measurement of cabinet life is reworked. Parliamentary-presidential contrasts are considered. For the divided-power dimension, possible dependence on the size of countries is investigated.

The Joint-Power (Executives–Parties) Dimension

Lijphart's (1999, p. 3) five indices are presented here in a different order from his, in line with the scheme of logical interconnections shown in Figure 1.

1. Disproportionality of the electoral rules, using Gallagher's 'least squares' measure:
    $Gh = [0.5\Sigma(s_i - v_i)^2]^{0.5}$, where s_i and v_i are the seat and vote shares, respectively, of the ith party.[2]
2. The number of parliamentary parties, measured as Laakso-Taagepera effective number, $N = 1/\Sigma s_i^2$. Note that the other four indices have high values for the majoritarian pole, but N is high for the opposite consensus pole.
3. Concentration of executive power, measured through cabinet format – the percentage of minimal winning and/or one-party cabinets (designated here as *MW/OP*). It is the incidence of one-party majority cabinets, plus one-half of the incidence of multi-party minimal winning and one-party minority cabinets (Taagepera, 2002).
4. Executive dominance, measured basically as cabinet life (C), in years.
5. Interest group pluralism, measured by Siaroff's (1999) complex aggregate index (*IP*).

As Lijphart (1999, p. 306) observes, four of the five elements are structurally connected, while there is no such connection to *IP*. Figure 1 gives an overview of these relationships. Rectangles stand for institutionally determined quantities and ovals for observed quantities hardly subject to direct design. Dashed arrows represent imperfect logical connections that impact on some of the variables. The labels at the arrows stand for quantitative logical models that will be invoked in the more detailed discussion to follow. By these logical connections N would be expected to be the central variable. Empirically, however, *MW/OP* is connected better (Figure 2) in Lijphart's factorial analysis.[3]

The following two sets of questions should be asked.

1. Which of these indices are imposed through legislation and thus are subject to direct institutional design ('constitutional engineering')? Which other indices are empirically connected to such designable indices and are thus indirectly and partly modifiable by institutional design? An important companion

Figure 1: Logical Connections between Lijphart's (1999) Five Measures of Joint-Power Dimension and Effective Magnitude/Threshold
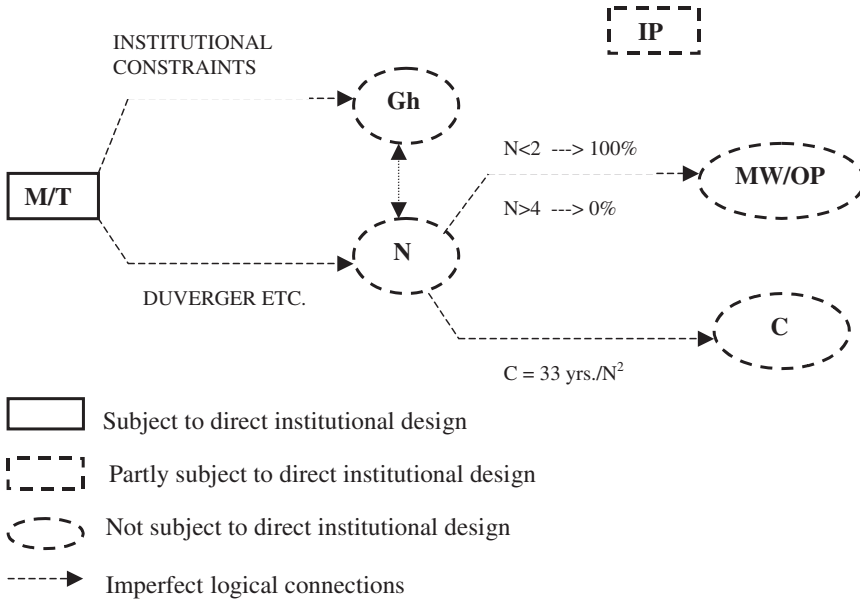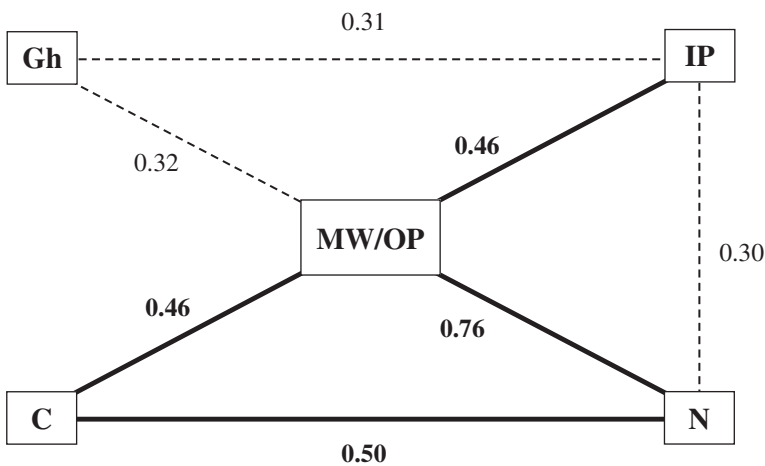
INSTITUTIONAL
CONSTRAINTS

IP

Gh

N<2 ---> 100%

MW/OP

M/T

N>4 ---> 0%

DUVERGER ETC.

N

C

$C = 33 \text{ yrs.}/N^2$

Subject to direct institutional design

Partly subject to direct institutional design

Not subject to direct institutional design

------> Imperfect logical connections

Figure 2: Correlations among the Five Measures of Joint-Power Dimension

Gh

0.31

IP

0.32

0.46

MW/OP

0.30

0.46

0.76

C

0.50

N

Note: R^2 values of 0.25 or less have been omitted

question is whether the empirical connections receive support by quantitative logical models.

2.   Are the indices used suitable for expressing the underlying conceptual notions?

For the first set of questions each of the five indices will be considered separately, followed by an overview of entry points for institutional design. The fit to conceptual notions is considered thereafter.

Deviation from Proportional Representation (PR)

Electoral rules are eminently subject to legislation. Indeed, legislation is their only conceivable source, if one includes unwritten rules developed through tradition. The various features of the electoral rules can be imperfectly condensed into indices such as effective magnitude, M (Taagepera and Shugart, 1989), or effective threshold, T (Lijphart, 1994), which are interconnected (Lijphart, 1999, p. 153). They are derived from the notions of district magnitude (the number of seats allocated within an electoral district) and legal thresholds. At times the discussion is clearer using M, while within some other contexts T is more suitable. Figure 1 uses M/T to symbolize the electoral rules.

The analysis in Lijphart (1999) however, does not use any index of electoral rules as such. Instead, it measures the impact of electoral rules through an output index, deviation from PR. Lijphart (1999, pp. 162–3) observes a connection between deviation from PR and magnitude: Gh is above 10 percent for $M = 1$, while for multi-seat PR it is below 10 percent, except for presidential systems. But he does not go into the reasons behind this empirical dichotomy (nor the marked differences within the two categories).

A quantitative logical link between magnitude M and deviation from PR can be deduced from a model of institutional constraints (Taagepera, 2001). This model is limited to very simple electoral rules and hence could be applied to only a fraction of the 36 countries Lijphart covers.[4] But even if some average relationship between electoral rules and Gh applies, the institutional design of electoral rules can impact Gh only indirectly, along with many other factors. There is no way to legislate deviation from PR as such.[5]

The Number of Parties

The number of parties has rarely been the object of direct institutional design. Nigeria has tried to legislate a two-party system. During the *abertura* of the late 1970s the Brazilian military also tried to induce two parties, and many US requirements explicitly favor the two large parties. But by far, the attempts to affect the number of parties have been limited to indirect impact through electoral rules. Thus the hopes for direct constitutional engineering regarding the number of parties are almost as remote as in the case of deviation from PR. Besides electoral rules, many other factors influence the number of parties, such as the number of issue dimensions (Taagepera and Shugart, 1989, pp. 92–8).

Of course, electoral rules do have some effect on the number of parties, as expressed early on by the well-known Duverger's law and hypothesis. The afore-

mentioned institutional constraints model (Taagepera, 2001) specifies the effective number of parties in the case of simple electoral rules, but country-specific politics can alter the outcomes appreciably.[6]

The logical connection between the effective number of parties (N) and deviation from PR (Gh) is doubly indirect, through M/T. Lijphart (1999, p. 244) finds a correlation of only $R^2 = 0.25$ between the two.

Minimal Winning/One-party Cabinets

MW/OP is Lijphart's (1999) way of measuring the occurrence of minimal winning cabinets (of any number of parties) and one-party cabinets (whether majority or minority). One-party majority cabinets are counted at full weight. Multi-party minimal winning cabinets as well as one-party minority cabinets carry half weight. MW/OP is logically tied to the effective number of parties as follows (Taagepera, 2002). For $N < 2$ one-party majority cabinets are always possible, while for $N > 4$ they are always impossible. An imperfect simple logical model results, connecting N and the incidence of one-party majority cabinets, the main component of MW/OP.[7]

Lijphart (1999, p. 244) obtains a very high correlation ($R^2 = 0.76$) between N and MW/OP. It would be even higher if the non-linear relationship proposed in the model above were taken into account. Thus, to the extent that N can be indirectly engineered, the transfer of this engineering to cabinet format is appreciable. Yet direct institutional design of cabinet format is limited. Some countries (such as Greece) require an absolute majority upon investiture, thus almost eliminating the possibility of minority cabinets. Such measures enhance the incidence of minimum winning cabinets but also the risk of impasses. By far, cabinet format depends heavily on the number of parties, and direct institutional design is impractical.

Cabinet Life

Lijphart (1999, pp. 132–3) averages two different definitions of cabinet life or duration (C), Cabinet Life I and II. He then applies various rather impressionistic corrections so as to express 'executive dominance'. The fewer the number of parties, the longer the cabinets are observed to last. Using data in Lijphart (1984), a quantitative logical model has been proposed and tested, to tie cabinet life to the effective number of parliamentary parties (Taagepera and Shugart, 1989, pp. 99–103): $C = 400$ months$/N^2 = 33$ years$/N^2$. It is based on the number of communication channels among parties and presumes the more liberal 'Cabinet Life I'. Figure 3 shows that, apart from Switzerland, the fit to Lijphart's new 1999 data is solid.[8]

Details of the measurement and meaning of cabinet life are discussed in Appendix A. They lead to the conclusion that Lijphart's (1999) way of measuring executive dominance might be less than optimal. The correlation between N and his adjusted C is $R^2 = 0.50$ (Lijphart, 1999, p. 244). It is bound to be higher when Cabinet Life I is used alone. Indeed, the degree of fit in Figure 3 exceeds that of any graph shown in Lijphart (1999).

Figure 3: Average Cabinet Life I (*C*) vs. Effective Number of Parliamentary Parties (*N*)
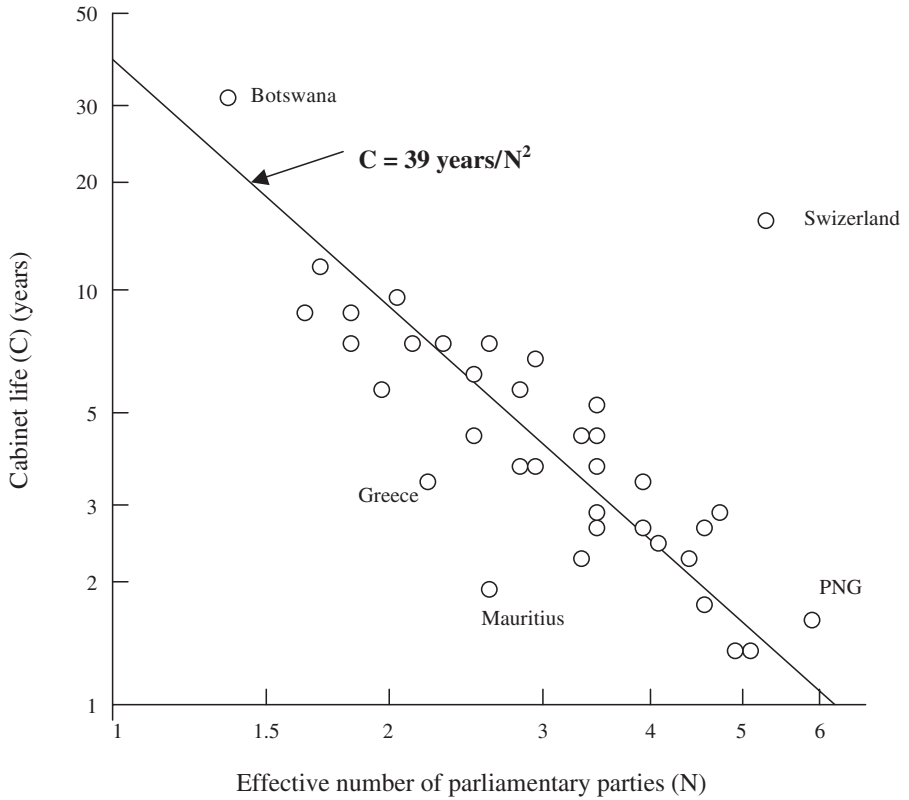
Note: Data from Lijphart (1999, pp. 76–77, 132–133). PNG = Papua New Guinea.

To the limited extent that the number of parties can be engineered, the same extends indirectly to cabinet life, given that its relationship to the number of parties does follow a quantitative logical model fairly closely. This dependence on *N* can be avoided by making the cabinet, once formed, independent of parliamentary confidence. Switzerland demonstrates the feasibility of such institutional design – but also its rarity. At a milder level, voting rules in the assembly can make the toppling of cabinets more or less difficult.

Interest Group Pluralism

Lijphart (1999, pp. 171–84) contrasts competitive and uncoordinated pluralism of interest groups with compromise-oriented corporatism where interest groups are channeled into relatively few peak organizations. Pluralism of interest groups is

empirically connected to the majoritarian pole of the four previously discussed variables, while corporatism ties in to the consensus pole. The previous Figure 1 shows Siaroff's (1999) index of interest group pluralism (*IP*) as partly subject to direct institutional design, because direct institutional design enters at its corporatist pole, where adherence to peak organizations of employers and employees often is mandatory (for example, in Austria). However, no institutional design enters at the majoritarian pole, where pluralism of interest groups seems spontaneous.

Lijphart's (1999, p. 244) analysis shows a fair correlation between *IP* and the previous indices (except for cabinet life, where $R^2 = 0.14$) – cf. Figure 2. Yet no quantitative logical model seems to exist to connect them. Moreover, even the qualitative logical tie seems ambiguous. Coordination between interest groups and the government does agree with the spirit of consensus, and a free-for-all for interest groups agrees with the competitive spirit of majoritarianism (see Lijphart, 1999, pp. 172, 306; Katzenstein, 1985, pp. 32, 157). But it feels odd that two-party systems would go with a profusion of interest groups, while multi-party systems require a two-group interest pattern. Of course, one may see here some complementarity, a sort of conservation rule: 'the concentration of parties plus interest groups is constant'. Maybe such a balance between the two is needed. But until a logical model to express such a tie is formulated, *IP* stands apart from the other four measures of the joint-power dimension. The fairly high empirical correlation remains to be explained.

Entry Points for Institutional Design

In sum, the only major entry point for 'constitutional engineering' is offered by the electoral rules, an institutional feature Lijphart (1999) does not characterize by any direct index, although he has done so previously (1994) in the form of effective threshold. Instead, he now uses deviation measure *Gh* as a proxy – but deviation from PR is already a joint output of electoral rules and many other factors. It is hard to see how *Gh* could be designed in a direct way. Also, it is empirically least correlated to the other indices (see Figure 2).

The effective number of parliamentary parties (*N*) is similarly a joint output of electoral rules and many other factors. Direct institutional design opportunities are extremely limited. Logically (and according to simple quantitative models), electoral rules affect *Gh* and *N* in a complementary way: as deviation from PR increases, the number of parties should decrease. However, recall that Lijphart (1999) finds a correlation of only $R^2 = 0.25$ between *Gh* and *N*. This suggests that electoral rules can be designed, but their impact on *Gh* and *N* is moderate. Moreover, part of the correlation is due to causality flowing in the reverse direction, from the number of parties towards electoral rules.[9]

Cabinet format *MW/OP* and cabinet life *C* both have a strong logical (and empirical) connection to *N* but are even more remotely affected by the design of electoral rules. At the same time, direct institutional design opportunities for these indices are very limited.

Interest group pluralism (*IP*) is open to design in a corporatist but not in the majoritarian direction. In the absence of quantitative models to show how it would logically tie in to the previous indices, engineered changes in *IP* cannot be expected to have any impact on the other indices.

One important entry point for institutional design is the choice between parliamentary and presidential dominance. Surprisingly, as discussed in Appendix B, it seems to stand quite apart from the joint-power dimension.

Indices and Underlying Concepts

Are the indices used by Lijphart (1999) suitable for expressing the underlying concepts – and does it matter? Let us review what Lijphart aims at measuring and what he actually measures. The impact of electoral rules could be measured in at least three different ways, one direct and two indirect:

(1) *Effective magnitude or threshold.* This is what constitutional engineering can alter. In the threshold form, it also directly tells us how large a party must be before it can expect to achieve appreciable representation. A high effective threshold should act as a deterrent to small parties. The trouble is that it does not always do so.

(2) *Deviation from PR.* It depends on the effective threshold but also – and this the electoral rules cannot impose – on how many small parties decide to accept the challenge, yet fail to achieve appreciable representation. Deviation from PR can be measured in many different ways, but *Gh* is as good as any.

(3) *The number of parliamentary parties.* This too depends on the effective threshold but also on many other factors. The effective number is as good a measure as any.

Lijphart (1999) has decided to use *Gh* and *N*. However, maybe a direct measure of electoral rules (such as effective threshold) should be considered, if one has institutional design in mind, as Lijphart's final chapters clearly intimate.

For Lijphart, cabinet life *C* serves as proxy for executive dominance, but it's an imperfect one. Cabinet life has often been claimed to be a measure of regime stability; I concur with Lijphart's blunt statement (1999, p. 130) that 'this view is as wrong as it is prevalent'. But not being a good measure of stability doesn't necessarily make it a great measure of executive dominance. Some minority cabinets might conceivably last long precisely because they are so weak as to be non-threatening, though this may be rare in practice. At the same time, one is at a loss to propose a better measure of executive dominance.

But does it matter? Part of progress in physics arguably has been due to a shift from intuitive concepts to measurable ones.[10] Maybe political science, too, would be better off if we focused on measurable quantities and their relations, leaving intuitive notions to *belles-lettres*. In other words, in the present case, maybe we should get interested in cabinet life for its own sake rather than as a proxy for something else.

The same goes for concentration of executive power and its proxy, the percentage of minimal winning/one-party cabinets (*MW/OP*). *MW/OP* might be taken as an

interesting quantity in its own right, regardless of how it relates to the intuitive notion of executive power.

All preceding measures (with the partial exception of *MW/OP*) are in principle simple, rather than mechanical composites of many simple measures. When it comes to interest-group pluralism Lijphart shifts to a complex aggregate index (Siaroff, 1999) that takes into account eight different aspects of the pluralism-corporatism contrast. By so doing one may come closer to expressing the intuitive notion of 'interest-group pluralism'. However, some parts of the composite might be difficult to measure for some countries. Certain researchers may prefer adding or deleting some aspects or weighting some of them more heavily. Without passing judgement, let us simply observe that for the four previous measures Lijphart has preferred simplicity to comprehensiveness, while for interest groups the reverse is the case.

The Divided-Power (Federal-Unitary) Dimension

Lijphart (1999) measures the divided-power (federal-unitary) dimension using the following indices. They are all set up in such a way that federal systems have high and unitary ones low values. Compared to Lijphart (1999, p. 3), I present them in a different order, in line with the scheme of logical interconnections shown in Figure 4, to be discussed later on.

1. Federal and decentralized government, rated from 1 (unitary and centralized) to 5 (federal and decentralized).[11]
2. Rigid constitution, rated from 1 (change by ordinary legislature majorities) to 4 (large super-majorities needed).
3. Judicial review, rated from 1 (none) to 4 (strong).
4. Bicameralism, rated from 1 (unicameralism) to 4 (two powerful chambers elected on different bases).
5. Central bank independence, calculated by Lijphart as the mean of three existing ratings.

Compared to the previous measures for the joint-power dimension, those used to characterize the federal-unitary dimension are strikingly different in their nature. The following contrasts can be observed, as listed in Table 1. Each will be discussed in some detail.

The Nature of Indices

We saw that the joint-power dimension involves four fairly simple and operationally measured indices, plus one composite index (interest-group plurality) partly subject to intelligent estimates. Being based on measurement, the values of these indices are spread along a quasi-continuum.

In contrast, the only continuous variable for the federal-unitary dimension is central bank independence, based on three separate ratings which themselves are located on a continuous scale.[12] The four other measures are based on Lijphart's expert estimates on a five- or four-point scale, where countries largely are assigned
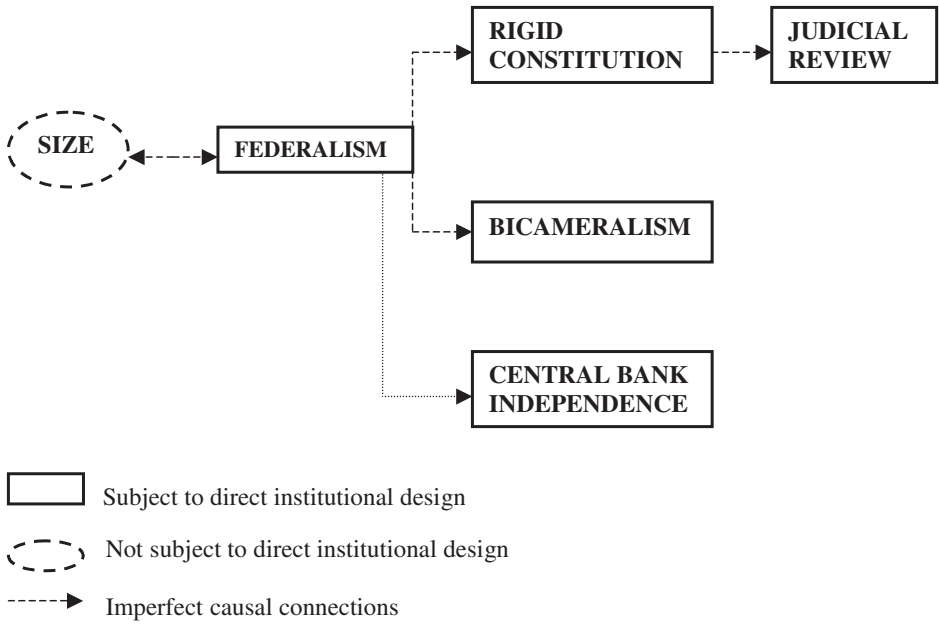
full points, so that the scale is essentially discontinuous.[13] The central variable, federal government, is rated on a five-point scale: federal and decentralized; federal but centralized; semi-federal; unitary but decentralized; unitary and centralized.[14] Bicameralism is rated strong, medium, weak or nonexistent. Rigid constitution and judicial review are also rated on a four-point scale.

Expert estimates offer one advantage compared to operational measures: one is free to estimate what one intuitively considers essential. For instance, the number of relevant parties based on gut feelings might feel like a more sensitive measure of party systems, compared to the effective number of parties. The sole advantage of the latter is being operationally fairly foolproof. The same goes for other operational measures Lijphart uses for joint-power dimension. Intelligent estimates may go deeper into the gist of what one wants to measure, but it comes with a price: different estimators will offer somewhat different ratings.

Without passing judgement on the overall value of the two approaches let us merely observe that Lijphart tackles his two dimensions in quite different ways. The choice was not intentional. For the components of joint-power dimension, operational indices fairly readily presented themselves, while this was not the case for the federal-unitary dimension. The two dimensions differ on this 'meta-level'.

Table 1: Contrasts Between the Indices for Lijphart's Two Dimensions

Joint-power dimension	Federal-unitary dimension
Mostly operationally measured indices, on a quasi-continuous scale.	Mostly intelligent estimates, mainly on discontinuous scale.
Logical connections between most indices, supported by quantitative logical models.	Mostly logical connections, but not supported by such models.
Not subject to direct institutional design.	Largely subject to such design.
Mostly high correlations: $R^2 = 0.11$ to 0.76	Lower correlations: $R^2 = 0.12$ to 0.41
Uniform distribution of country scores.	Skewed distribution of scores.

Logical Connections and Support by Logical Quantitative Models

Figure 4 gives an overview of conceivable logical connections among the federal-unitary variables.[15] In addition to the five variables used by Lijphart, country size is added, discussed in Appendix C. Federalism seems directly connected to all other variables, apart from judicial review, in logical ways to be discussed next. Among the other factors, Figure 4 places rigid constitutions first, because it arguably represents a causal link between federalism and judicial review.

It could be argued that federations definitely need rigid constitutions, so as to specify the respective rights of the central and local governments (Lijphart, 1999, p. 4). If so, then we should expect higher than average rigidity scores (3 or 4, with a mean of 3.5) for all eight countries rated as federal or semi-federal (scores 5 and 4). The actual mean is 3.4. Without such need for rigidity, unitary countries can range from flexible to rigid constitutions (scores 1 to 4). In the absence of any further information, we should expect their mean to be 2.5. The actual mean for the 28 unitary countries is 2.8. The overall $R^2 = 0.29$ between federalism and constitutional rigidity reflects this causal connection for the federal minority, yet randomness for the unitary majority of democracies. No quantitative logical models exist.

Rigid constitutions, in turn, could argued to need judicial review, because otherwise the central parliament could all too easily construe the wording of the constitution in its favor. At the other extreme, no judicial review can possibly take place in the absence of a written constitution (Lijphart, 1999, p. 218), and this is so, indeed, for all such countries. However, the extremely flexible constitution of Colombia is still subject to fair judicial review and, at the other extreme, fully federal Switzerland has none, so that almost all combinations are observed and $R^2 = 0.15$ between constitutional rigidity and judicial review (on the basis of Lijphart 1999 p. 244). No quantitative logical models exist.

Strong bicameralism could be seen as necessary in federal structures, so as to give voice to federal units as such, in a separate chamber (Lijphart, 1999, p. 4). Unitary countries are in principle free to have either one or two chambers. Thus connection to the degree of federalism could be expected to be weak. Yet empirical correlation of bicameralism with federalism is relatively high: $R^2 = 0.41$. This is

by far the highest R^2 among the five indices of the federal-unitary dimension (on the basis of Lijphart, 1999, p. 244). These might hence be fruitful grounds for developing a logical quantitative model.

Central bank independence is empirically part of the federal-unitary dimension. It is correlated to the other four indices with R^2 ranging from 0.32 (for federalism) to 0.12 (for bicameralism). However, the logical connection is remote. Following Goodin (1996, p. 36), Lijphart (1999, p. 5) notes the common feature of power diffusion by means of institutional separation: 'division of power between separate federal and state institutions, two separate chambers, and separate and independent high courts and central banks'. Yet when it comes to the central bank chapter itself, the only logical tie Lijphart mentions (1999, p. 240) connects central bank independence to corporatism, which is part of his other dimension. No empirical connection between the two is observed. Elaborating on institutional separation, I might add the following. If central banks were not independent, the central government might subdue them to the point of being able to put heavy financial pressure on the local governments. Once more, no quantitative logical model exists to express the connection.

Amenability to Institutional Design, and Degree of Correlation

We have seen previously that the indices used for Lijphart's joint-power dimension offer no entry points for direct institutional design, with the partial exception of interest-group pluralism. In contrast, all indices of the federal-unitary dimension are in principle subject to such design. The degrees of federalism, bicameralism, constitutional rigidity, judicial review and central bank independence all emerge from legislation (or pre-existing tradition that can be altered through legislation).

This is not to say that all combinations make equal sense in practice, and some are logically impossible (such as judicial review of an unwritten constitution). But there are many potential entry points for institutional design, and their independent existence explains the low degree of correlation among the indices: only $R^2 = 0.12$ to 0.41 (average: 0.21), as compared to $R^2 = 0.11$ to 0.76 (average: 0.36) in the case of the joint-power dimension. When dealing with indices that can be altered by institutional design independently of each other, one should expect lower correlation compared to indices which are connected by logically based quantitative models and not subject to separate interference by institutional design.

This being so, one may ask: why are the five federal-unitary variables correlated at all? Lijphart intimates a link via political culture and the predisposition to institute non-majoritarianism by means of separate institutions. It should also be recalled that, at least in its clearly decentralized format (Australia, Canada, Germany, Switzerland, USA), federalism logically seems to need a rigid constitution, a modicum of judicial review, strong bicameralism (exception: Canada) and possibly central bank independence (exception: Australia). Remove these five countries from Lijphart's graphs (1999, pp. 214, 229, 241), and the correlation for the remaining 31 countries fades to near-nothing.

Skewed Distribution of Country Loadings

One further contrast remains. In the review graph (Lijphart, 1999, p. 248, Figure 14.1), the country scores are spread quite uniformly on the joint-power scale, between −2 and +2 standard deviations (8, 10, 9, and 9 countries, respectively, per standard deviation interval). The distribution is symmetric. In contrast, on the federal-unitary scale they are spread very non-uniformly between −3 and +2 standard deviations (2, 5, 5, 22, and 2 countries, respectively). In other words, countries are overwhelmingly (22 out of 36) moderately unitary. The distribution is highly asymmetric, skewed by the existence of a few highly federal and decentralized countries (Germany, USA, Canada, Australia, Switzerland). With such a skewed distribution, the notion of standard deviation itself loses meaning.

Discussion and Conclusions

To characterize the joint-power dimension of democracies, Lijphart (1999) has used four simple measures that are logically interlinked and in principle affected by the electoral rules, plus one composite measure (of interest groups) that stands apart. Its empirical correlation with the other four is not (at least yet) supported by a quantitative logical model. While electoral rules are subject to institutional design ('constitutional engineering'), the four interlinked measures cannot be designed directly to any significant degree, and design of electoral rules affects them only indirectly and partly. The fifth measure, interest groups, is partly subject to direct design. The connection between cabinet life and the number of parties is even stronger than found by Lijphart (Appendix A). Surprisingly, the parliamentary-presidential aspect of constitutional engineering does not seem to affect the picture (Appendix B). The country scores on the joint-power dimension are spread uniformly.

Lijphart's other dimension, federal-unitary, is also characterized by five measures, but in this case they are all subject to separate institutional design. They are institutional inputs rather than outputs. Being separately designable (within some limitations, including size dependence, both geographic and demographic – see Appendix C), they are less correlated empirically. Their values are qualitatively estimated rather than operationally measured (in contrast to the output measures of the joint-power dimension). The country scores on the federal-unitary dimension are concentrated in the moderately unitary range.

In both dimensions, there is one index that fits empirically but is hard to tie in logically. These are the new features Lijphart has added since his earlier book (1984) – central bank independence for the federal-unitary dimension and interest group plurality for the joint-power dimension. Maybe the logical ties will become firmer with further work, but right now they look odd.

In sum, Lijphart's two dimensions emerge as very different in kind. They differ in the nature of indices used (operationalized measurement vs. expert estimate), the existence of quantitative logical models to connect the indices, the tightness of correlations among the indices, the distribution of country scores and, most impor-

tant for practising politicians, the number of entry points for institutional design. Broadly speaking, the joint-power dimension is based on output indices (not subject to institutional design), while the federal-unitary dimension is based on input indices (subject to such design).

We are as yet far from efficient institutional design. We should be patient and not expect quick, spectacular results. Meanwhile, mapping the various aspects of democratic institutions is interesting and most likely useful in its own right – just as geographical map-drawers accept what they find. In this respect Lijphart's recent book (1999) represents another significant step, on top of his earlier one (1984). It is controversial in various aspects, but it sets a standard for work to come. The present study has tried to fill a few corners of this edifice.

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Appendix A: Measuring Cabinet Life

Lijphart (1999, pp. 116–42) constructs an 'executive dominance' index out of two measured components and one impressionistic. The measured components are based on two different ways to define cabinet life. Along with Dodd (1976), 'Life I' uses a single criterion for duration of the same cabinet: its party composition must not change. 'Life II' is more demanding, starting the count anew whenever there is an election or a change of prime minister or a change in cabinet format (minimal winning, oversized or minority). Thus Life II never yields higher values than Life I, but sometimes it is drastically lower (3.9 years instead of 31 years for Botswana, 0.99 instead of 16.2 years for Switzerland).

Lijphart takes the arithmetic mean of Life I and Life II, seemingly assigning equal weight to both definitions but actually weighing Life I more heavily whenever it is appreciably larger than Life II. For example, the mean of 8.6 years still leaves Switzerland the second-highest country, although its Life II value (0.99 years) makes it the lowest of all countries. To weigh both approaches equally, one should use the geometric mean, which is 4.0 years in the case of Switzerland.

Are both approaches equally valid? Lijphart intentionally preferred Life I.[16] Indeed, its excellent fit with $C = 39$ yr/N^2 in Figure 3 suggests that Life I captures something essential in the connection between cabinet life and the number of parties. This is lost when introducing Life II, which yields a markedly poorer correlation with N.

Lijphart himself is also dissatisfied with the mean of Life I and Life II and proceeds to make drastic and rather *ad hoc* adjustments. The five presidential systems are lowered, mostly to 1 year. So is Switzerland, dropping from 8.6 to 1 year (which happens to be Life II). For Costa Rica, both Life I and II are around 4 years, but the adjusted value is 1 year. On the other hand, five former British colonies (ranging from 6.0 to 17.6 years) are lowered to 5.5 years simply because this is the

mean for the UK, and Lijphart deems no cabinet more dominant than the British. Finally, equalization with the UK raises France from 2.5 years to 5.5 years. In sum, 11 out of 36 countries have their values altered. The basis in measurement of cabinet life is lost to such an extent that one might as well give it up completely, in favor of purely subjective ratings of 'executive dominance'.[17]

The best fit to the number of parties is obtained by using Life I alone (as in above Figure 3). Focusing on the measured quantities might be more fruitful than guessing at hard-to-operationalize conceptual notions.

Appendix B: Parliamentary and Presidential Systems

One of the most important entry points for institutional design should be the choice between parliamentary and presidential dominance. The five presidential countries (Colombia, Costa Rica, USA, Venezuela, plus semi-presidential France) in Lijphart's collection of 36 countries might be expected to stand out as a distinct and somewhat extreme group on the five joint-power indices. Surprisingly, this is the case only for deviation from PR, which tends to be high for presidential countries even when the legislative elections use PR.

As for the other indices, *N* is medium for presidential systems, *MW/OP* and *IP* are anywhere from medium to high, and cabinet life is a mixed bag. In the overall analysis (Lijphart, 1999, p. 248), where countries range from close to −2 to close to +2 standard deviations, the presidential ones range from 0 to +1, with a median (+0.4) not appreciably different from the overall median (−0.2). What does it mean?

The balance between 'presidents and assemblies' (Shugart and Carey, 1992) has involved a most visible and disputed institutional choice. Could it be less crucial for democratic outputs than has been commonly assumed? Or is it part of a third institutional dimension orthogonal to the ones generated by Lijphart?[18] With only five cases at best, it is too early to say.

Appendix C: Size Dependence of the Federal-Unitary Dimension

Several indices of Lijphart's federal-unitary dimension seem to depend on the size of countries, while the indices of the joint-power dimension do not. Larger countries arguably are more conducive to federalism, although we lack a quantitative logical model to express this connection. If so, then the institutional choice regarding the federal-unitary dimension may be heavily constrained.

What is a large country? One could go by population or area or some other variable. Lijphart (1999, p. 252) observes a tie to population size: the combined index for federal dimension is correlated to the logged population size as $R^2 = 0.25$. The pattern actually is curved. Up to a population of 4 million, all 11 countries are on the unitary side.

Geographical extent may also matter. Even a huge population might hardly lead to federalism, if packed into a very restricted area (a super-Singapore). Yet, a large but empty territory may not have the human resources to uphold federal admin-

Figure 5: Degree of Federalism and Decentralization Versus Logarithm of Population × Area
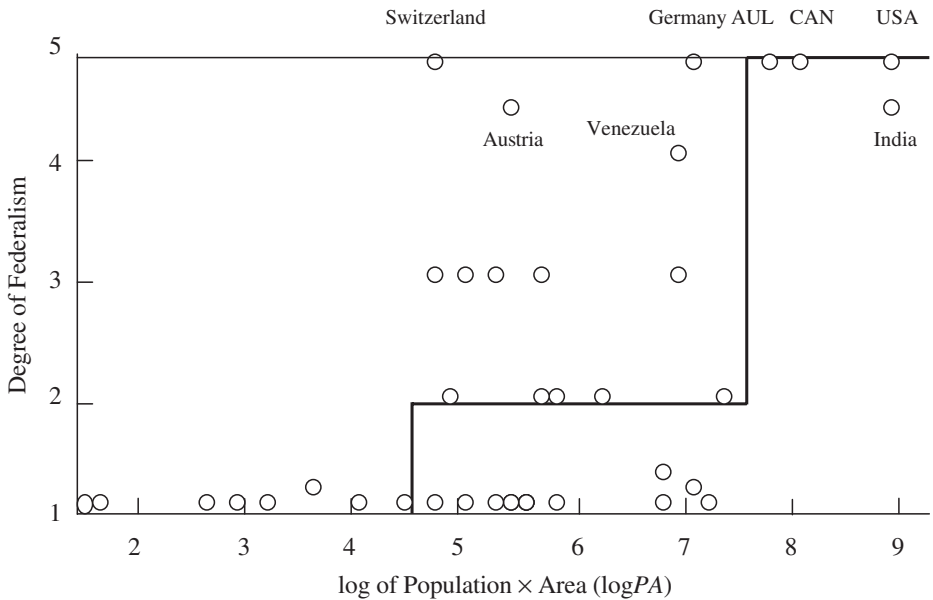
Note: Areas in Million Square Miles. AUL = Australia; CAN = Canada.

istrative machinery. So both area and population may matter. As a first approximation I will use the logarithm of the product of population (from Lijphart, 1999, p. 56) and area (in million square miles).

One could expect that geographically large countries need more decentralization and that they can afford it better, if they also have large populations.[19] This conjecture is confirmed empirically for Lijphart's 36 countries (Figure 5). However, there is more structure than mere uniform scatter around a straight line or other curve.

At log*PA* less than 4.5, all 7 countries are unitary and centralized. At log*PA* above 7.5, all 4 countries are federal and decentralized. In the intervening range, almost one-half of the 25 countries are unitary and centralized, while the other half are scattered all over the range. The median index value remains around 2 throughout this middle range of log*PA*, without any tendency to increase with size. Possibly, the pressure against any decentralization is overwhelming below log*PA* = 4.5, while above 7.5 the pressure to federalize in a decentralized way is strong. In the middle range, other factors than size seem to determine the outcome.[20]

The pattern is analogous for bicameralism (no graph shown). No country at log*PA* < 4.5 exceeds 2 points, and no country at log*PA* > 7.5 falls below 3 points (out of a possible maximum of 4). In the middle, range the scatter is again extreme, but

the median increases from 2 to 3 gradually (in contrast to the step pattern in Figure 5). Here population is as good a predictor as area.

Rigidity of constitution, judicial review and central bank independence show hardly any size dependence (no graphs shown). All countries at $\log PA > 7.5$ are at or above the overall median. Small countries ($\log PA < 4.5$) are all close to the median. Surprisingly, the middle-size countries, scattered as they are, tend to be on the low side. However, the sample of 36 is small, and the differences are most likely due to other factors than size.[21]

As a first approximation, country size itself is independent of institutional design, and a large size may be conducive to a federal structure for reasons presented earlier. However, the causal arrow may also run in the opposite direction. Existing self-governing territories may agree to join, contingent on preserving some autonomy. In such a case, institutional design to form a federation comes first, and increased size is a by-product. Historically, this has been the case for Switzerland, the USA, Canada and Australia, among the fully federal countries. On the other hand, in India, Venezuela, Austria and post-1945 Germany, the joint territory pre-existed and was subject to design of federal institutions. Hence my Figure 4 shows arrows in both directions but still considers size as essentially non-designable.

Notes

1 By logical quantitative models, I mean models that specify the relation between variables on reasoned grounds and are more specific than vague expressions such as $dy/dx > 0$ ('as x increases, y increases'). The so-called 'empirical models', such as resulting from correlation analysis, also specify the relationship – and even with more precision – but they do so only *post facto* and without giving reasons for the specific relationship observed.

2 I use Gh rather than G for Gallagher's index of disproportionality so as to avoid possible confusion with Gini index of inequality. 'LSq' has often been used, but the index involves simply squares, not 'least squares'.

3 Lijphart (1999, p. 244) uses R, which has the advantage of distinguishing between positive and negative correlations. Here I have converted his values of R into R^2, which reflect the extent of variation accounted for, or 'explained' in a strictly statistical sense of the term. Logical explanation needs more than that.

4 Taagepera (2001) calculates the expected seats and votes distributions for parties at various party size rankings, based on a model involving district magnitude and the total number of votes and seats. The results are then compared to the means of many elections. Using these data, the following actual vs. expected values of Gh emerge. UK 1922–92: 10.4 vs. 14.7 percent. New Zealand 1890–1993: 8.9 vs. 14.3 percent. Finland 1907–1995: 2.1 vs. 1.4 percent. The Netherlands: 1.1 vs. 0.2 percent. Subtraction of two fairly equal quantities (s_i and v_i) always compounds resulting error.

5 A further difficulty is that an extraneously caused increase in the number of parties tends to cause an increase in deviation from PR. This enhanced deviation, in turn, exerts pressure on survival of small parties (Duverger's 'psychological effect') and may lead to a later decrease in the number of parties (see Taagepera and Shugart, 1989, pp. 122–3). Thus the values of indices of deviation are interconnected, in a complex way, with the number of parties, to be discussed next.

6 Taagepera (2001) lists the following actual vs. expected values of effective number of parliamentary parties. UK 1922–92: 2.2 vs. 2.6. New Zealand 1890–1993: 2.1 vs. 2.0. Finland 1907–95: 4.5 vs. 3.7. The Netherlands: 4.7 vs. 5.9.

7 This model underestimates MW/OP when N exceeds 3, since Lijphart's MW/OP also includes, though at half-weight, multi-party minimal winning and one-party minority cabinets. It makes vague sense that the latter become less frequent as the number of parties becomes large. However, no quantitative logical way has been proposed to connect the incidence of multi-party minimal winning and one-party minority cabinets to N.

8 Figure 3 uses logarithmic scales so as to turn the curved relationship of form $C = k/N^2$ into a linear one. Instead of previous $C = 33$ years/N^2, the best fit now is closer to $C = 39$ years.

9 This is so because pre-existing two-party constellations are likely to prefer introduction of majoritarian rules so as to limit competition. In contrast, pre-existing multi-party constellations may wish to adopt PR, for sheer self-preservation, if major parties are uncertain of their future popularity. The Czech Republic illustrates both trends. In the early 1990s, when none of the newly formed parties could be certain of their future fortunes, PR was written into the constitution. In 2000 the two major parties, which together had come to enjoy a solid and durable majority, were trying to change the rules toward as little PR as the constitutional interpretations could tolerate, using small districts *and* imperiali divisors *and* nationwide threshold.

10 Take 'work'. It is not intuitive that keeping a heavy burden from rolling down a slope involves no work, but this is how the term is defined in physics. No work is done unless a force *moves* some mass to a different place. This definition also involves a rather non-intuitive notion of 'mass'.

11 Recent work on federalism and decentralization suggests that these concepts are by no means synonymous. Some federal systems are highly centralized, and some unitary systems are decentralized. One might make use of Hans Keman's (2000) distinction between the 'right to decide' (federalism) and the 'right to act' (decentralization), and treat the two indicators separately. Lijphart assumes a hierarchical structure where decentralization is a necessary condition for federalism. This might be problematic, but here I will accept it.

12 Actually, no country in Lijphart's list (1999, pp. 236–7) has all three ratings available. In 8 cases out of 36, the 'mean' represents a single rating. However, given that all three ratings have similar means (0.37, 0.40 and 0.37, respectively), the missing data problem seems manageable.

13 Non-integer values occur mainly as averages when a country's rating changes over time. Such cases are few. Only 6 countries out of a total of 36 are assigned non-integer ratings for federalism, 7 for bicameralism, 4 for rigid constitution and 5 for judicial review.

14 In his 1984 book Lijphart did use a continuous variable to measure decentralization: the central government's tax share. In 1999 he gave up on this measure as well as on the Lane and Ersson (1994, p. 224) institutional autonomy index because these were 'available for only about half of the 36 democracies' (Lijphart, 1999, p. 192). For the 21 countries for which the central government's tax share was available, correlation with Lijphart's ratings is appreciable: $R^2 = 0.44$ (Lijphart, 1999, pp. 193–4).

15 As in Figure 1, rectangles stand for institutionally determined quantities and ovals for quantities not subject to institutional design (at least not directly). Dashed arrows represent expected limited causal connections that impact some variables.

16 Private communication by Arend Lijphart: 'Your geometric mean suggestion makes good sense ... but I intentionally did not want to reduce the effect of Cabinet Life I too much, believing that this is really the more important element.'

17 The counterproductive nature of these *ad hoc* adjustments emerges when it comes to Lijphart's Figure 7.2 (1999, p. 138–9), which graphs the resulting 'executive dominance' vs. *MW/OP* and leads to $R^2 = 0.46$. The correlation would be appreciably higher, if one simply took the *geometric* means of Life I and Life II, omitting the subsequent adjustments. In particular, the adjustments for Costa Rica, the USA, Venezuela and France are strongly counterproductive. Only Switzerland becomes an outlier.

18 The presidential countries are even more dispersed regarding the measures of Lijphart's other (federal-unitary) dimension. In the overall analysis (Lijphart, 1999, p. 248), they follow the general pattern.

19 Geographical isolation due to mountains could substitute for long distances, but I will keep away from such further complexity.

20 One could also graph federalism vs. $\log A$ and $\log P$ separately. When going by population alone, federal Australia and Canada fall below unitary France, UK and Italy, causing a drop in federalism as population increases from 20 to 50 million. When going by area alone, the picture in Figure 5 is largely preserved, with a fluid zone extending from 7,000 to 500,000 square miles.

21 For all three indicators, the ratings at the high end of the scale are boosted more by area than by population, thanks to Australia and Canada.

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