Measuring party system concentration including the cabinet level

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Abstract: Accurate evaluation of electoral systems requires precise measurement of both the disproportionality and the concentration of party systems. While the measurement of disproportionality has been investigated systematically and clear guidance for measurement exists, such treatment is lacking for the concentration dimension. This paper clarifies the theoretical concept of concentration in focusing on the directness of the voter-government link and differences between types of coalitions. In light of this concept, a new measure is introduced and the different measures are compared theoretically as well as empirically. In conclusion, the effective number of parties measure provides a fruitful framework, but should be applied to the cabinet instead of the parliament level in order to clearly identify substantial features of party system concentration.

Keywords: Party System; Concentration; Fragmentation; Effective Number of Parties; Electoral System
1. Introduction

When assessing party systems with respect to the performance of electoral systems, researchers are usually concerned with two key dimensions: the (dis)proportionality of the seat distribution relative to the vote distribution and the concentration of the ensuing party system. The first dimension is concerned with the question of whether the parliament accurately, i.e. proportionally, reflects public opinion. At its core, the latter is concerned with the type of government the election results lead to and whether there exists a direct link between voters’ choices and government formation (Farrell, 2011; Lijphart and Grofman, 1984; Nohlen, 1984). In the case of necessary coalition negotiations the direct link would be distorted and government accountability potentially weakened (Powell, 2000). Depending on the coalition structure, this distortion can be minor or severe as we will broadly discuss in the next section. The question of valid measurement, however, importantly concerns accurate identification of polar scenarios as much as it concerns accurate distinction between intermediate outcomes.

However, while measurement of the proportionality dimension is relatively straightforward and the differences between various measures have been discussed rigorously (see Gallagher, 1991; Lijphart, 1994; Monroe, 1994; Taagepera and Grofman, 2003), the situation is different as concerns the concentration dimension. While different measures have been proposed and while the merits of particular measures have been discussed (see, e.g., Golosov, 2010; Taagepera, 2007: 47-64), there is a critical gap still to be addressed: with an eye on intermediate cases of concentration, we will show how existing measures struggle to clearly distinguish between different types of coalition governments which become feasible after an election – a seemingly crucial requirement for making nuanced judgments about intermediate cases of party system concentration. This paper seeks to tackle this problem by proposing a measurement approach that includes the cabinet level and takes differences between types of coalition governments into account. By subsequently subjecting this new approach and existing alternatives to a comprehensive, systematic comparison with regard to their aptitude to capture key developments of party system concentration, we seek to supply measurement advice. The key requirement characterizing a good measure is considered to be performing well with regard to both the identification of polar and intermediate cases.

Therefore, it is first necessary to clearly define the concept which we seek to measure, the concentration of a party system. The focus here lies on the directness of a voter-government link as a continuous phenomenon (section 2). We then introduce the different indices applied in order to measure party system concentration (section 3). Here, we will also propose our
new measurement approach. In section 4, we discuss these different measures’ merits in light of the theoretical concept and also solicit theoretically viable measures to an empirical assessment based on a large-n dataset (549 elections in 34 countries) as well as on looking at party system developments in specific countries. Following this thorough investigation of the different measures’ relative strengths and weaknesses, we map the implications for accurate measurement of party system concentration.

2. The concept of party system concentration – what are we trying to measure?

Before considering the measurement of the concept of party system concentration, we need to clearly map out what this concept entails (see Goertz, 2008; Sartori, 1970). Specifically, we focus on what this concept entails from the perspective of electoral system research since ‘how we count depends on where we look’ (Blau, 2008: 167). When the evaluation of an electoral system with respect to the concentration dimension is the task at hand, the central empirical question usually becomes whether or not a single party is able to obtain a majority of the parliamentary seats (Farrell, 2011: 10-11). Yet, this empirical question is tied to the more substantial question of whether there exists a direct link between voters’ choices and government formation (Duverger, 1984). Based on such a direct link, so the argument goes, voters can hold the government accountable at the next election as they are able to assign responsibility in a straightforward manner (e.g. Powell, 2000; Powell and Whitten, 1993). Such a direct link is seen as a central benefit of two-party systems – typically emerging in majoritarian electoral systems – which usually produce single-party governments (Hellwig and Samuels, 2008: 73). Consequently, its absence in cases where coalition bargaining becomes necessary has been criticized as a drawback of multiparty systems, typically resulting under PR electoral rules (see Fisher and Hobolt, 2010). What is central here is that the conceptual focus primarily lies on the cabinet level as opposed to the electoral and parliamentary levels (see also Blau, 2008). While the seat distribution in the parliament obviously constrains government formation, the structure of the resulting government and how it affects the voters’ ability to hold it accountable are clearly of central interest.

Although the above discussion makes it seem that measurement of party system concentration in light of electoral system evaluation should be fairly straightforward by simply distinguishing between those constellations where one party holds a majority of the seats and all other cases, things are not that easy. Obviously, there are important differences between

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1 Of course, a plethora of (institutional) factors affect voters’ ability to hold governments accountable in practice (Hellwig and Samuels, 2008).
those ‘other’ cases where no single-party government ensues (see Mair, 2002). Crucially, the concept of party system concentration is not dichotomous but continuous (Rose, 1984). If there is no single-party majority, it is of substantial importance how close election outcomes come to the threshold of single-party majority and what types of coalitions are able to form the government. This also, if somewhat implicitly, includes minority coalitions where the governing party (or parties) require additional support from other parties to organize legislative majorities. The emphasis on the type of support needed is warranted because different types of coalitions imply different levels of directness of the voter-government link.

Concerning the question of whether election outcomes clearly lead to government formation and how far voters are removed from the process of selecting who will be part of the government, it is of crucial importance whether one party receives close to 50 percent of the seats and forms the government alongside a small partner with the large party only being vulnerable to a large multiparty coalition – this was the case in the United Kingdom in 2010 where the Conservatives won 47.2 percent of the seats and in New Zealand in 2011 were the National Party missed an absolute majority by just two seats – or whether no party receives such a clear mandate to govern. The latter is the case when there exist many coalition options, multiple of which excluding the strongest party (or even the two strongest parties as was the case in the Netherlands in 2010 and in Israel in 2013) from the government and subsequently force two or even multiple moderately to large sized parties to enter a coalition. Clearly, different sets of coalition options carry very different potential to heavily distort the voter-government link via the stage of coalition formation.

The continuous nature of the concept and the relevance of taking size distributions into account when considering a government’s policy output are also highlighted by research on the accountability of different types of coalition governments. It is what Hobolt et al (2013: 169) term “government clarity” based on the coalition structure that is crucial for the voters’ ability to assign responsibility. For example, a coalition between two large parties might make it very difficult for voters to assign responsibility, while a coalition of a large party with a considerably smaller partner, might impose fewer constraints on a voter’s ability to do so (see Banaszak and Doerschler, 2012; Fisher and Hobolt, 2010: 360; Hobolt et al, 2013).2 Thus, the occurrence of pre-electoral coalitions (party blocs typically consisting of a larger party and one or more smaller partners). Voters think of such bloc-coalitions as government options instead of singular parties and then are able to hold these coalitions accountable (Bargsted and Kedar, 2009; Gallagher, 2005: 562-563; Mair, 2002: 106; Shugart, 2001: 25-26; Shugart and Wattenberg, 2001). Studies of voting behaviour have recently shown that voters do take the structure of possible coalition governments into account when making their choice (e.g. Bytzek et al, 2012; Duch et al, 2010; Hobolt et al, 2013).
while from an electoral system perspective reaching the threshold of single-party government in any case fulfills the requirement of a direct voter-government link, the absence of a single-party majority does not necessarily suggest the complete absence of said connection. The structure of the possible coalition governments and changes to this structure are therefore important to consider when assessing party system concentration. In sum, the concentration dimension is concerned with the set of government options and the likely size structure of the ensuing government resulting from an election with single-party government as one ‘polar characteristic’ (see Sartori, 1976: 273, 315).

What we seek to measure is thus not just whether but to which extent the voter-government link is a direct one. Furthermore, it is the structure of the government which we are ultimately concerned about. Thus, next to the constraining parliamentary seat distribution it is especially the concentration on the cabinet level which lies at the heart of what party system concentration implies.

3. Measures of party system concentration

When it comes to the indices applied to measure the concentration dimension, these stem from a pool consisting of both indices initially devised to measure fragmentation as a more general characteristic of a party system as well as of indices devised for more specific purposes. In this section, we introduce the different measures and the conceptual problems with regard to the concentration dimension which have sparked the development of respective alternatives. In the same spirit, we will then suggest a way of measuring concentration which comes closer to what the theoretical concept implies than existing measures by including the cabinet level in a nuanced fashion.

3.1. An overview of existing measures

The different approaches taken so far may be ordered roughly from those indices which focus solely on the parliamentary level to those which take the cabinet level (and therefore the majority threshold) into consideration. The most simple fragmentation measure counts the number of parties holding seats in the parliament, treating all parties as equals \((N; \text{e.g. Sartori, 1976: 119-120})\). As this procedure does not take into account the relative size of different parties, alternative measures of fragmentation were devised. Both Rae’s (1967) \(F\) and Laakso and Taagepera’s (1979) “effective number of parties” (from here on referred to as \(N_{LT}\)) convey the exact same information about the fragmentation of a party system (see Laakso and Taagepera, 1979: 4). However, as \(N_{LT}\) has the intuitive interpretation of signaling to the
researcher the “number of hypothetical equal-size parties that would have the same total effect on fractionalization of the system as have the actual parties of unequal size” (Laakso and Taagepera, 1979: 4), it quickly became the most widely used measure of party system fragmentation (Golosov, 2010: 173). \( N_{LT} \) takes into consideration the relative size of the parties (via their vote share or, as in this case, seat share \( s \)):

\[
N_{LT} = \frac{1}{\sum_{i=1}^{N} \frac{1}{s^2}}.
\]

As a response to the critique that \( N_{LT} \) fails to properly identify situations in which a single party holds a large amount of the seats while no other party is coming close to it (see Bogaards, 2004; Molinar, 1991; Pedersen, 1980) and based on previously proposed alternatives (Dunleavy and Boucek, 2003; Molinar, 1991), Golosov (2010) has developed a closely related alternative to \( N_{LT} \):

\[
N_G = \sum_{i=1}^{N} \frac{s_i}{s_1 - s_1^2 - s_i^2},
\]

where \( s_1 \) denotes the seat share of the largest party. The main difference with respect to \( N_{LT} \) lies in the fact that in \( N_G \) the largest party becomes the reference for the assessment of the relative size of all remaining parties. Thus how these latter parties impact the overall \( N_G \) depends not only on their seat share but importantly also on their relative seat share compared to the largest party (Golosov, 2010: 183). Due to this computation, \( N_G \) does not have quite an intuitive interpretation as \( N_{LT} \) in that it provides a measure of the ‘effective’ number of parties with respect to the largest party which counts as one while smaller parties count as fractions of one based on their relative size compared to the largest party.

Clearly focusing on the majority threshold, Taagepera (1999) has suggested considering only the largest party for an additional measure of party system concentration, supplementing \( N_{LT} \). Taagepera (1999: 502) tries to alleviate the problem that \( N_{LT} \) typically fails to identify one-party-majorities by also reporting the inverse of the share of the largest party:\(^3\)

\[ s_{1^{-1}} = \frac{1}{s_1}. \]

This focus on the predominance of the largest party at least implicitly shifts the focus from the parliamentary to the cabinet level where the key question revolves around whether or not the largest party will be able to form a single-party government.

\(^3\) Taagepera (1999) uses the inverse as it places \( s_{1^{-1}} \) into a common mathematical framework with \( N_{LT} \). Obviously, the information is the same if one simply reports the share of the largest party. Shugart (2001: 31-32) also provides a variant of this measure, capturing ‘majority approximation’ by dividing the majority quota of 0.5 by the seat-share of the largest party and assigning the value 1 to all cases where the largest party holds a majority of the seats.
The cabinet level and thus the concrete government options are explicitly included in measures which are based directly on the decision rule of majority. Viewed in a dichotomous way, and hence largely neglecting the structure of the parliamentary seat distribution, the researcher could simply consider concentration to be present if there is a single-party majority (SPM) and to be absent if no single party holds a majority of the seats. Going beyond this simplistic perspective, an alternative is to consider the extent to which parties are relevant for government formation. Referring to the notion of the relevance of parties given their coalition viability (Sartori, 1976: 122), several authors have suggested to use indices of voting power based on the (mathematical) coalition viability of parties in order to assess their relative weights (see Caulier and Dumont, 2005; Grofman, 2006; Kline, 2009; Taagepera and Shugart, 1989: 259). Based on work by Caulier and Dumont (2005) who suggest using the normalized Banzhaf index of voting power,4 Kline (2009: 264) presents the “effective number of relevant parties” (Caulier and Dumont, 2005):

\[ N_{B_z} = \frac{1}{\sum_{i=1}^{N} B_{zi}^2} \]

Focusing not only on the largest party but on all parties which are viable for coalition government (by being a swing voter in at least one winning coalition) is taking the majority threshold fully into account. This then pairs the identification of single-party majorities with additional information, especially including stronger consideration of small-sized but pivotal parties (see Sartori, 1994: 35).

3.2. Shifting the focus to the cabinet level

Based on the theoretical concept, we suggest including the cabinet level even more strongly. Given the importance of taking the coalition structure into account leads to the question of how concentrated the government will be (see Blau, 2008: 168; Carey and Hix, 2011: 387-388; Fisher and Hobolt, 2010: 364). However, we still aim to measure party systems generally and not the singular governments to which they led under specific conditions. Precisely, we consider the potential coalition size structures and what they imply for eventual government formation. In this way, we will be able to assess election outcomes’ implications for

4 The normalized Banzhaf index-score \( B_{zi} \) of party \( i \) is calculated by dividing the amount of times this party is a swing voter in any of the winning coalitions, \( S_{wi} \), by the total amount of swing voters existing in all winning coalitions (see Banzhaf, 1965): \( B_{zi} = \frac{S_{wi}}{\sum_{i=1}^{N} S_{wi}} \). Having a swing means, that a party turns a winning coalition into a coalition without majority when leaving it.
government formation by considering which coalition options become feasible after an election instead of only reporting the structure of the actual government.

Staying in the well-established logic of $N_{LT}$, we measure how fragmented a coalition government is in order to find out by which type of coalition voters are confronted with. Specifically, investigating whether voters will be governed by a coalition which consists of one large party and one small partner or by a coalition without a clear leader (e.g. a grand coalition or a coalition of multiple small-to-moderately sized parties), we here apply the effective number of parties measure within a coalition $C$:

$$N_{LT}(C) = \frac{1}{\sum_{i=1}^{K_C} s_i(C)^2}$$

with $K_C$ denoting the (pure) number of parties in coalition $C$ and $s_i(C)$ denoting the relative seat share of party $i$ in coalition $C$.\(^5\) $N_{LT}(C)$ thus increases with the number of parties in a coalition, but also with the similarity of these parties’ sizes. We here use seat shares in order to approximate parties’ sizes. An alternative would be to estimate party sizes by their shares of cabinet posts within a government. This option might be more desirable from a theoretic standpoint (Blau, 2008; Fisher and Hobolt, 2010), but is not applicable practically since distributions of cabinet posts are only observable for actual governments but not for potential ones. As seat shares are a nearly perfect predictor for the share of portfolios (Gamson, 1961; Warwick and Druckman, 2006) a critique that seat shares are a substitute only is of little empirical relevance.

Being interested in the question of how fragmented a coalition in a certain party system must at least be in order to hold a majority, we denote by $N_{LT}(C)_{\text{min}}$ the effective number of parties in the most concentrated winning coalition:

$$N_{LT}(C)_{\text{min}} = \min_{C \in \mathcal{W}} N_{LT}(C).$$

This new indicator for party system concentration conveys what is the minimum effective number of parties within a government. For example, a senior-junior coalition of party A (holding .41 of the parliamentary seats) and party B (.1) would lead to $N_{LT}(C) = 1.46$, while a grand coalition of two identical-sized partners would lead to $N_{LT}(C) = 2$, and a multi-party coalition of A (.24), B (.19), and C (.16) to $N_{LT}(C) = 2.92$.

Why do we not focus on actual governments formed (Carey and Hix, 2011) but on the most concentrated coalition? Indeed, with a view to actual government formation, considering only

\(^5\) Formally, $s_i(C) = \sqrt[2]{{\sum_{j=1}^{K_C} s_j(C)^2}}$. 
the minimal winning coalition with the lowest effective number of parties may be highly misleading as, e.g., ideological considerations might render this coalition unlikely. It is important to understand that, nevertheless, the focus on the most concentrated winning coalition leads to the more appropriate measure. Although we formally focus on one specific coalition in choosing the minimum $N_{LT}(C)$ value, this is not to mean that we seek to predict the eventual government coalition. On the contrary, the theoretical concept of party system concentration asks for the *potential* that a certain party system structure has for government formation, not for an explanation of why a certain government has formed including further variables that are not or only partially influenced by electoral systems. The question, thus, is not how (coalition) governments *did* look like but how they *could* look like when assuming they need support of a majority in a specific parliament. The exclusion of further variables and the focus on the most concentrated government are therefore not shortcomings of our approach but necessary specifications in order to capture the concept optimally.\(^6\) We will still explore in how far $N_{LT}(C)_{\text{min}}$ is representative of more than the specific coalition option it derives from in the empirical section.

This approach to measuring the concentration dimension thus promises to provide us with more helpful and easily comprehensible information regarding which types of coalitions may form after an election and to fill this attention gap in the canon of party system concentration measures. In subjecting these measures to an indepth assessment in light of the theoretical concept, the next section will assess the relative merits of different measures and especially investigate in how far $N_{LT}(C)_{\text{min}}$ is able to deliver on its promise.

### 4. Comparing measures as to their conceptual quality

In the following, we will assess the conceptual quality of the different measures from a theoretical standpoint. In order to fully understand differences between measures and illustrate their substantive meaning, we will furthermore provide empirical applications using a large-n dataset as well as single country cases covering a broad range of cases. The structure of the comparison is as follows: The different measures will be compared looking at two different general settings. The first includes all cases where there is full concentration (i.e. where a single-party majority exists). The second includes all other cases where distinguishing between different levels of concentration becomes the critical task. This

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\(^6\) As an aside, with a conscious exclusion of variables beyond concentration like policy aspects, $N_{LT}(C)_{\text{min}}$ we are completely in line with hitherto existing indices. In a three-party system with parties of equal size, for example, neither $N_{LT}$ nor $N_{Bz}$ do ask whether or not all two-party combinations are likely, but just result in the number of 3.
A twofold comparison of viable measures will then allow us to make an overall judgment of the measures’ conceptual quality. The overly simplistic measures \( N \) and \( SPM \) can initially be discarded without further dwelling on their empirical features as it immediately follows from the discussion of the theoretical concept in section 2 that they will not suffice in accurately capturing different levels of party system concentration. Furthermore, in order to save space, we from here on omit an additional discussion of \( Ng \) as the measure is conceptually so close to \( NLT \) that all conclusions with respect to \( NLT \) can be read to also hold for \( Ng \) with the only difference being that \( Ng \) tends to report a slightly lower effective number of parties where one party is especially large. For now, then, \( NLT, N1-1, NBz, \) and \( NLT(C)_{\min} \) remain to be discussed.

4.1. The single-party majority cases

Concerning the polar situation of a single-party majority and thus the first part of the comprehensive assessment of concentration measures, it is clear that measures can be grouped based on how much they take the important majority-threshold into account. It is well-known that \( NLT \) does not indicate single-party majorities with a clear value or range of values (e.g., Taagepera, 1999; Golosov, 2010). \( NLT \) can take a lot of different values depending on the exact seat share of the majority party and the number and the strengths of the minority parties. An additional chink is a missing cut point discriminating party systems with single-party majorities from those without. While \( NLT \) generally becomes smaller when party system concentration rises, it is easy to construct examples showing that the \( NLT \) value for a party constellation with a single-party majority may be larger than the effective number of parties in a constellation where a coalition is needed to form a majority. For example, in a three party system with the seat shares (.48, .47, .05), \( NLT = 2.20 \); in another three party system (.55, .25, .2), \( NLT = 2.47 \).

The three remaining measures remedy this problem (for \( NBz \) see Caulier and Dumont, 2005). For the single-party majority case, \( NBz \) and \( NLT(C)_{\min} \) share the property of taking on the value of 1: if there is a single-party majority, only one single party is needed to form a winning government. Thus, this party is the only one getting a ‘swing point’, whereas all other parties hold a Banzhaf value of 0. Applying the effective number of relevant parties to such a situation, this leads to \( NBz = 1 \). Conversely, \( NBz = 1 \) can only occur, if there is a single-party majority. If there is not, this means that at least one minimal winning coalition with at least two parties exists. As a consequence, at least these two parties get ‘swing points’ and, thus, \( NBz > 1 \).
Similarly, \( N_{LT}(C)_{min} = 1 \) if (and only if) one party holds an absolute majority. This party, then, may form a winning ‘coalition’ on its own. Then, \( N_{LT}(C) \) equals 1 for this coalition, what is also the possible minimum. On the other side, if there is no single-party majority, all winning coalitions include at least two parties with \( s_i > 0 \). Therefore, \( N_{LT}(C) \) is larger than 1 for all these coalitions and hence the minimum, \( N_{LT}(C)_{min} \), will be too.

Suggested by Taagepera (1999) as a supplement to \( N_{LT} \), \( s_{1^{-1}} \) is a hybrid in that it clearly suggests when there is a single-party majority (this is the case once \( s_{1^{-1}} \) is below 2) and when this is not the case (then \( s_{1^{-1}} \geq 2 \)), but also traces differences between cases of full concentration in that it reports the exact seat share of the largest party. It thus differentiates between cases where the largest party holds say 58 percent of the seats and those where it holds 63 percent of the seats, although both cases are structurally identical. This means that, in light of the theoretical concept, \( s_{1^{-1}} \) partly suggests non-meaningful variation.\(^7\)

Thus, while \( s_{1^{-1}} \), \( N_{BS} \), and also the newly introduced \( N_{LT}(C)_{min} \) all clearly signal when there is full concentration, the often used \( N_{LT} \)-measure is unable to clearly identify this polar case of full concentration.

### 4.2. Cases without a single-party majority

In focusing on all cases without single-party majorities, the rest of this comparison will cast light on the relative performance of different measures with regard to capturing different (intermediate to low) levels of concentration. Because with this second group of cases, conclusions are not as straightforward as for the first, we will also refer to the empirical performance of different measures in order to highlight their strengths and weaknesses.

As outlined in section 2, the types of coalition options become highly relevant for party systems in which there is no single-party majority. \( N_{BS} \) and \( N_{LT}(C)_{min} \) are the two measures which directly take the decision rule of majority and thus the relevance of winning coalitions into account. By signaling the lowest possible level of within-government fragmentation, \( N_{LT}(C)_{min} \) also directly incorporates the size structure of a coalition and is able to provide an idea of what type of government voters will potentially be faced with given the election results. It signals whether the election results allow for a coalition of a large party with a relatively small partner (in this case, \( N_{LT}(C)_{min} \) will approach 1) or whether the best possible (from a concentration perspective) government will still be a relatively fragmented coalition.

\(^7\) Of course, one could force such a measure to take on a common value for single-party majority cases (see Shugart, 2001). Yet, this would lead to differences in computation between cases of full concentration and all other cases which is a problematic feature for a general measure of concentration.
government (e.g. involving two large parties in a grand coalition or multiparty coalitions – then, \( NLT(C)_{\text{min}} \) will be closer to 2 or lie even higher). \( NLT(C)_{\text{min}} \) thus clearly signals not only when there is a single-party majority (value equals 1) but also gives an indication as to how close to this polar situation the actual government can maximally come. \( NBz \), on the contrary, neglects party size and instead only focuses on the relative bargaining power (based only on pivotality for the formation of winning coalitions). Therefore, \( NBz \) is often unable to convey information about the likely size structure of any coalition. Figure 1 presents pairwise plots of the different indices based on the parlgov dataset (Döring and Manow, 2012) which includes complete results (for all parties winning seats) of 549 parliamentary elections in 34 OECD countries. The plots depicted show the discussed structural differences empirically.\(^8\) The inspection of the top-right corner of Figure 1 highlights that party systems which have exactly three effective relevant parties \((NBz = 3)\) may allow for vastly different best-case coalitions with respect to their size structure. The according \( NLT(C)_{\text{min}} \) values vary between approximately 1 and around 2, implying that in some of these cases senior-junior coalitions are possible, whereas in others grand coalitions of two larger parties or three-party coalitions are the smallest possible coalitions. At the same time, an approximately vertical line around \( NLT(C)_{\text{min}} = 2 \) is eye-catching. The cases in this area indicate that party systems with up to six effective relevant parties may still allow for best-case coalitions which are not more fragmented than in party systems with only three effective relevant parties. Thus, the different theoretical focus of \( NBz \) clearly shows in the strong empirical variation at different levels of \( NLT(C)_{\text{min}} \).

Regarding these different values of \( NLT(C)_{\text{min}} \), additional data analysis importantly shows that \( NLT(C)_{\text{min}} \)’s formal focus on one specific, the least fragmented, government option does not prevent it from supplying information about a party system’s concentration more generally: for cases in which no single-party majority ensues, the median difference between \( NLT(C)_{\text{min}} \) and \( NLT(C) \) of the second most concentrated coalition is a mere .05 with only ten percent of the cases leading to a difference higher than .28.\(^9\)

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\(^8\) Figure 1 also visualizes the conclusions drawn in section 4.1 empirically: \( NLT \) varies widely while \( NLT(C)_{\text{min}} \) and \( NBz \) are at a value of 1 (see top-left and mid-left of Figure 1). The hybrid character of \( s_1 \) is also visible as it is constantly below 2 once \( NLT(C)_{\text{min}} \) and \( NBz \) equal 1 but does vary even if full concentration of the party system is achieved.

\(^9\) Furthermore, there is virtually no correlation \((r = .02)\) between \( NLT(C)_{\text{min}} \) and the difference between \( NLT(C)_{\text{min}} \) and \( NLT \) of the second most concentrated coalition, meaning that the index is as reflective of multiple government options in fairly concentrated systems as it is in highly fragmented ones.
Figure 1: Comparing different measures empirically

Notes: Summary statistics (N = 549) are the following: \(N_{LT}\): mean = 3.57 (standard deviation = 1.35); \(N_{Bz}\): 2.97 (1.64); \(s_1^{-1}\): 2.56 (.83); \(N_{LT}(C)_{min}\): 1.53 (.52).

While \(N_{Bz}\) may not convey the information needed with regard to the concept of party system concentration due to it neglecting seat shares, \(N_{LT}\) considers the parliamentary seat distribution without referring to the implications for government fragmentation and, since very different size distributions may lead to the same \(N_{LT}\) score,\(^{10}\) it does not convey any information about

\(^{10}\) Obviously, this phenomenon of different size distributions leading to the same index-value applies to all measures which aim at providing information about more than two parties (see Rozenas, 2012: 235-236).
which type of government may be possible after an election. Thus, $N_{Be}$ and $N_{LT}$ are actually related as concerns their focus on the parliamentary level (in case of $N_{Be}$, with reference to the majority threshold) about which both indices provide important information. Obviously, $N_{LT}$ and $N_{Be}$ were successfully devised to provide a more general overview of the structure of the whole party system, and as such general measures naturally run into some trouble when applied to a more specific task such as describing the cabinet level.\textsuperscript{11} This is also visible from comparing $N_{LT}$ to $N_{LT}(C)_{\text{min}}$ which shows relatively great variation of $N_{LT}$ at various levels of $N_{LT}(C)_{\text{min}}$ (see mid-left of Figure 1). Yet, the clustering of index-scores between $N_{LT}(C)_{\text{min}} = 1$ and $N_{LT}(C)_{\text{min}} \approx 2$ also highlights that $N_{LT}(C)_{\text{min}}$ is restricted in focusing on the cabinet level while $N_{LT}$ provides an overview of the constraining parliamentary level. $N_{LT}(C)_{\text{min}}$ is unable to signal unambiguously on which type of parliamentary size distribution the best-case coalition is based and thus also how many potential coalition partners for larger parties there are. In focusing on the parliamentary level, $N_{LT}$ and $N_{Be}$ enable the researcher to get an idea of what the pool of parliamentary parties looks like, their value for the inference of likely coalition structure is limited. Thus, despite high correlations between the measures (see Figure 1), there are critical differences in what is measured and which substantial interpretations become possible. We will further establish this last point by investigating country cases in the following sub-section.

Instead of $N_{LT}$, it is the meant-to-be-supplement $s_{1}^{-1}$ with its implicit focus on the majority decision rule and thus the cabinet level which comes rather close to what the theoretical concept implies in that it captures how much, if any, support the largest party needs in order to form a winning coalition. Surely, comparing $s_{1}^{-1}$ and $N_{LT}$, a high correlation of .94 and the lack of systematic disagreements (see bottom-left of Figure 1) are not surprising as both are based on parliamentary seat shares in their computation (see section 3). However, it is $s_{1}^{-1}$’s focus on whether the largest party will be able to govern on its own and, if not, how much support it will need, which makes it conceptually close to $N_{LT}(C)_{\text{min}}$. This conceptual similarity – barring the divergent treatment of single-party majorities – is highlighted empirically by a high correlation between $s_{1}^{-1}$ and $N_{LT}(C)_{\text{min}}$ (see mid-right of Figure 1). Comparing the plot of $s_{1}^{-1}$ vs. $N_{LT}(C)_{\text{min}}$ to that of $s_{1}^{-1}$ vs. $N_{LT}$ also suggests that $s_{1}^{-1}$ seems to be an even closer relative to $N_{LT}(C)_{\text{min}}$ than to $N_{LT}$. Yet, at the same time, the variation between $s_{1}^{-1}$ and $N_{LT}(C)_{\text{min}}$ does suggest that the size of the largest party alone is not always enough to

\textsuperscript{11} This is not meant to be a general critique. More general indices like $N_{LT}$ are highly appropriate to measure party system concentration from other perspectives such as an indicator of party system consolidation in new democracies (see, e.g., Olson, 1998) or as a result of the impact of political cleavage structures (e.g. Ordeshook and Shvetsova, 1994; Coppedge, 1997).
solicit the best-case concentration of the government coalition. This problem was immediately recognized by Taagepera (1999: 502) leading him to suggest the supplement-approach via which $N_{LT}$ and $s_1^{-1}$ balance each other’s weaknesses. However, not only is this supplement-approach inefficient from a measurement perspective, it may still fail to provide us with the needed information about the cabinet level as the following example (see Table 1) and subsequent case evidence will indicate.

Table 1: Index-values for stylized examples

<table>
<thead>
<tr>
<th>Parliamentary seat shares</th>
<th>$N_{LT}$</th>
<th>$s_1^{-1}$</th>
<th>$N_{LT}(C)_{min}$</th>
<th>$N_{Bz}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(.45; .26; .25; .04)</td>
<td>2.99</td>
<td>2.22</td>
<td>1.85</td>
<td>3.00</td>
</tr>
<tr>
<td>(.41; .38; .11; .10)</td>
<td>2.99</td>
<td>2.44</td>
<td>1.46</td>
<td>3.00</td>
</tr>
</tbody>
</table>

The stylized example shows how the supplement-approach can be rather misleading regarding the cabinet level: while the two seat distributions lead to identical values for $N_{Bz}$ and $N_{LT}$, $s_1^{-1}$ suggests that the level of concentration decreases based on the largest party’s share. However, as captured accurately by a sharp decrease in $N_{LT}(C)_{min}$, the latter scenario actually seems more concentrated since, unlike in the first scenario, the strongest party can form a senior-junior coalition with a considerably smaller partner. Thus, even if we compare $N_{LT}(C)_{min}$ with the supplement-approach, there are still cases for which the information conveyed by $N_{LT}(C)_{min}$ will strongly add to our understanding of the structure of the party system and provide unambiguous information about party system concentration.

Next to an overall empirical discussion of the different measures and stylized examples such as the one above, a complete assessment demands looking even more closely for important nuanced differences by considering specific, factual cases. Therefore, the following subsection seeks to deepen the comparison by focusing on the selected country cases of the United Kingdom, Germany and the Netherlands which provide for a broad sample of party systems covering polar and intermediate levels of party system concentration. With a rather concentrated (UK), an intermediate (Germany) and a rather fragmented (Netherlands) party system, we show that our newly proposed index is better able to detect significant changes in party system developments than traditional indices are for most different cases.

4.3. Three illustrative country cases

4.3.1. The United Kingdom
The significant changes – from the electoral system perspective – to the party system of the United Kingdom occurred in 1974 (February) and 2010 where the election did not lead to a single-party majority but to a ‘hung parliament’ forcing coalition negotiations. As discussed in section 4.1, both $N_{Bz}$ and $N_{LT}(C)_{min}$ will clearly signal once a party system deviates from full concentration and thus do so for the British case (see Figure 2). While $N_{LT}$ each time suggests that the party system has become more fragmented compared to the last legislature, $N_{LT}$ does the same for, e.g., 1955, 1992, and 2005 where each time a single-party majority existed. Furthermore, $N_{LT}$ suggests no change between the two elections in 1974 whereas the October election actually provided for a single-party majority and thus marked a tremendous development from the standpoint of the theoretical concept.

**Figure 2: Different indices for the United Kingdom**

While able to signal full concentration, looking at specific elections highlights how the $N_{Bz}$ measure is prone to overestimate the diminishing effect on party system concentration caused by the presence of small parties. The spikes in Figure 2 emphasize that $N_{Bz}$ often suggests very low levels of concentration where actually one party has received a large bulk of seats and is able to govern with very little additional support due to the presence of multiple potential junior partners. In this rather extreme tendency, $N_{Bz}$ actually suggests a full breakdown of concentration in 1974 (February) and 2010, making the UK party system seem
similar to that of the Netherlands (see Figure 4) although each time the largest party held close to 50 percent of the seats and could govern in a senior-junior coalition. This structural aspect is accurately and clearly reflected by \(NLT(C)_{min}\) and \(s_1^{-1}\) which each signal only a minor but important change to the party system with respect to its concentration. \(s_1^{-1}\) and \(NLT(C)_{min}\) thus both capture the important change to a hung parliament but also signal that there is potential for a rather lopsided senior-junior coalition government. For the UK case, \(s_1^{-1}\)'s ignorance towards all parties except the largest does not lead to a problematic empirical performance as indeed in each case where there was no single-party majority, a relatively small partner was available to form a government. However, the UK case does highlight that with respect to the concept of party system concentration \(s_1^{-1}\) suggests variation where no meaningful changes occur (e.g., between 2001 and 2005 \(s_1^{-1}\) varies while each time a single-party majority exists). Such non-meaningful variation can be especially misleading if one compares changes in \(s_1^{-1}\) without considering the majority-threshold: one could, for example, believe that the British party system changed more between 1945 and 1950 than between 1970 and 1974 (February) by looking at absolute changes. From an electoral system perspective, quite the opposite is true.

4.3.2. Germany
As regards the German party system as a moderately fragmented case, major changes to be considered are the development from a multiparty to a three-party system between 1949 and 1961, a stable phase with two larger and one smaller party until 1983 and the electoral success of two further parties thereafter. Special cases regarding party system concentration are the single-party majority of the Christian Democrats (CDU/CSU) in 1957 as well as the party system after the 2005 election which made any two-party senior-junior coalition impossible for the first time after 1949 (see Figure 3).

First, while all measures are able to capture the dramatic increase in concentration following the first election in 1949, \(NLT\) again fails to identify the presence of a single-party majority in 1957 and cannot distinguish that election from those between 1969 and 1976. Second, \(NBz\) highlights the stability of the amount of coalition viable parties between 1961 and 2002. Yet, in neglecting size structure, \(NBz\) fails to recognize crucial developments regarding the type of coalition government in suggesting a constant level of concentration. For instance, it is unable to distinguish between the 2009 and, e.g., 1969 elections where \(s_1^{-1}\) and \(NLT(C)_{min}\) highlight that the largest party needed considerably more support in 2009. Third, considering the important change of coalition structure in 2005, Figure 3 shows that while \(NLT\) suggests less
concentration in 2009, \( s_1^{-1} \) and, even more so, \( N_{LT}(C)_{min} \) and \( N_{Bz} \) suggest otherwise and thus are able to capture the increase in party system concentration based on coalition structure.

Finally, Figure 3 also shows the subtle but important differences between \( N_{LT}(C)_{min} \) and \( s_1^{-1} \). The development of the German party system between 1961 and 1969 highlights how \( s_1^{-1} \) might miss important developments concerning coalition structure by taking into account only the largest party. In this period, the Free Democrats (FDP) went from holding 13.4 percent of the seats in 1961 to only 6 percent in 1969 – while the stability of the \( s_1^{-1} \) scores suggests that the largest party in each case would only need a rather small partner to form a winning coalition, the decrease of \( N_{LT}(C)_{min} \) conveys that the best-case senior-junior coalition became more and more lopsided over time. Furthermore, the relative stability of \( s_1^{-1} \) and the increase of \( N_{LT} \) from 2005 to 2009 highlight that a failure of the supplement-approach is not merely a theoretical problem – this approach would not capture the important development of coalition possibilities while \( N_{LT}(C)_{min} \) does.

**Figure 3: Different indices for (West) Germany**

4.3.3. The Netherlands

The Dutch party system has always been rather fragmented and multiparty coalitions have been the norm. The entrance of new parties (especially during the 1960s) as well as party-mergers (e.g. the Christian Democratic parties KVP, ARP, and CHU merging into the CDA
before the 1977 election) influenced the overall structure of the party system. In 2010, five parties were each holding between 10 and 20.7 percent of the seats.

**Figure 4: Different indices for the Netherlands**

![Figure 4: Different indices for the Netherlands](image)

Figure 4 shows how the different measures disagree as regards the early development of the party system: between 1946 and 1967 $N_{LT}(C)_{min}$ suggests high stability of party system concentration while $N_{LT}$ and $N_{Bz}$ show that the effective number of (relevant) parties varied widely on the parliamentary level. $s_{1}^{-1}$ highlights variation with regard to the largest party. While during this timeframe the party system became more fragmented (as captured especially by $N_{LT}$), the coalition structure basically remained stable: from 1946 to 1967 a winning coalition would have either had to include the two largest parties or needed multiple at least moderately sized parties and thus a high level of government-fragmentation was necessary in each case. For example, in 1956 the most concentrated winning coalition would have been a PvdA-KVP grand coalition ($N_{LT}$(PvdA-KVP) = $N_{LT}(C)_{min} = 2$), the second most concentrated coalition option would have been a PvdA-led four-party coalition consisting of 2.02 effective government-parties. Similarly, in 1963 a KVP-PvdA grand coalition would have been the most concentrated option ($N_{LT}$(KVP-PvdA) = 1.99) with the second most concentrated option again being a five-party coalition this time being led by the KVP and consisting of 2.02 effective government-parties. These findings also highlight that the
clustering of $N_{LT}(C)_{min}$ around the 2-mark is not based solely on grand coalitions usually consisting of about two effective parties. It again shows, in contrast, that $N_{LT}(C)_{min}$ does not strongly depend on one certain – maybe unrealistic – potential coalition but captures the fragmentation structure of potential coalition governments more generally.

The situation of the party system moderately changed in 1971 which marked the first election where a coalition between the two largest parties was not possible anymore (the Social Democrats (PvdA) and the KVP combined for only 49.3 percent of the seats). Thus, in light of the theoretical concept, $N_{LT}(C)_{min}$ signaling stagnation with respect to party system concentration seems warranted in this case and enables the researcher to clearly detect changes to the cabinet level such as that from 1967 to 1971. On the contrary, the other indices signal a more pronounced change from 1963 to 1967 whereas the coalition structure hardly differed. Obviously, as regards the pool of potential government parties, $N_{LT}$ and $N_{Bz}$ clearly signal changes to this pool while $N_{LT}(C)_{min}$ (especially before 1977) clusters at the 2-mark suggesting that even the ideal scenario would lead to a low level of concentration on the cabinet level.

After this period, all measures capture the important changes of the concentration of the Dutch party system in 1977.12 There is another (minor) disagreement between measures going from the 1981 to the 1982 election: while $N_{LT}$ and $N_{Bz}$ suggest an increase in party system concentration, $s_{1-1}$ and $N_{LT}(C)_{min}$ signal the opposite. Here, the former measures react to the success of the VVD (24 percent) which joined the PvdA (31.3) and the CDA (30) as a third major party and the relative decline of the liberal D66 (11.3 in 1981 vs. 4 in 1982). Yet, the latter measures signal no meaningful change as the largest party (or the second largest, for that matter) would still need the support of an almost equal sized or multiple moderately to small sized partners. After 1982, then, all measures are very much in agreement about the development of the party system.

5. Conclusion

The above investigation highlights that with measuring concentration accurately the devil is in the detail. Viewed in light of the theoretical concept, $N_{LT}$ and $N_{Bz}$ are able to paint a relatively clear picture of the parliamentary level but lose much of their viability as one tries to make inferences about the possible structure of the ensuing government. In terms of their substantial

12 The 1977 election marked the first postwar election in which it became at least possible for a larger party to govern alongside a considerably smaller partner as the PvdA (35.3 percent) or the CDA (32.7) could have reached a majority via the support of the liberal VVD (18.7).
interpretation, it is often unclear what a decrease in \(N_{LT}\) actually implies for the cabinet level and thus the directness of the voter-government link. \(N_{Bz}\) especially suffers from largely neglecting parties’ relative sizes. A shift in \(N_{Bz}\) does not convey much information as to how the government may look like based on the election outcomes and, as the UK example highlights, \(N_{Bz}\) may exaggerate developments of concentration.

Crucially, the electoral system perspective shifts our attention to the cabinet level and highlights the importance of coalition structure. Here, \(N_{LT}(C)_{\text{min}}\)’s properties have shown to be well-suited for measuring party system concentration. \(N_{LT}(C)_{\text{min}}\) could be shown to fulfill the key demand of capturing key developments within party systems by distinguishing between polar (single-party majorities, highly fragmented governments) and intermediate (senior-junior coalitions) levels of concentration. Although \(s_{11}^{-1}\) also provides an implicit focus on the cabinet level, \(N_{LT}(C)_{\text{min}}\) holds two distinct advantages over this measure. The first is conceptual in that \(N_{LT}(C)_{\text{min}}\) shifts the view to the cabinet level but continues to take all parties and their sizes into consideration for computing an index-value of party system concentration – it is a full measure of concentration, not a supplement. \(N_{LT}(C)_{\text{min}}\) reports the best concentration level attainable, distinguishing clearly between types of coalitions, while \(s_{11}^{-1}\) is restricted to signaling the size of the largest party. Furthermore, \(N_{LT}(C)_{\text{min}}\) assigns the same value to all cases of full concentration whereas \(s_{11}^{-1}\) produces some non-meaningful variation for these cases. The second advantage is that \(N_{LT}(C)_{\text{min}}\) carries over the straightforward intuitive meaning of the effective number of parties, now applied to the cabinet level. For example, thinking about voters trying to ascribe responsibility, \(N_{LT}(C)_{\text{min}}\) yields the minimum number of hypothetical equal-sized parties which voters have to consider when assigning responsibility to parties and evaluating the government. In sum, we advocate moving away from the almost universal application of \(N_{LT}\) and suggest using \(N_{LT}(C)_{\text{min}}\) for measuring party system concentration as its focus on the cabinet level renders it more apt to also identify more nuanced differences between intermediate levels of concentration.

At the same time, it is important to emphasize the usefulness of applying \(N_{LT}\) and \(N_{LT}(C)_{\text{min}}\) as two computationally related indices describing a party system on different levels. \(N_{LT}\) focuses on the pool of potential government parties while \(N_{LT}(C)_{\text{min}}\) gives an account of what the government can ideally look like from a concentration perspective by taking coalition structure into account.

Coming back to electoral system research, the potential advantages of applying a cabinet-focused measurement approach are quite clear. For a more nuanced understanding and evaluation of institutions such as electoral systems trying to balance competing demands of
representation and concentration, taking coalition structure into account should yield a clearer picture of how such systems perform with respect to both key dimensions of electoral systems. Furthermore, by capturing crucial developments which go beyond the simple distinction between single-party majorities and highly fragmented systems, the proposed measurement approach could also help to increase the precision of analyses of, e.g., government stability based on party system concentration (see also Somer-Topcu and Williams, 2008).

References


