**Appendix**

**A Elections covered**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Country | Election years | | | | | | | | | |
| Botswana | 1969 | 1974 | 1979 | 1984 | 1999 | 2004 | 2009 |  |  |  |
| Canada | 1945 | 1949 | 1953 | 1957 | 1958 | 1962 | 1963 | 1965 | 1968 | 1972 |
|  | 1974 | 1979 | 1980 | 1984 | 1988 | 1993 | 1997 | 2000 | 2004 | 2006 |
|  | 2008 | 2011 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| India | 1977 | 1980 | 1984 | 1989 | 1991 | 1996 | 1998 | 1999 | 2004 | 2009 |
| Jamaica | 1944 | 1949 | 1955 | 1959 | 1962 | 1967 | 1972 | 1976 | 1980 | 1983 |
|  | 1989 | 1993 | 1997 | 2002 | 2007 |  |  |  |  |  |
| New Zealand | 1946 | 1949 | 1951 | 1954 | 1957 | 1960 | 1963 | 1966 | 1969 | 1972 |
|  | 1975 | 1978 | 1981 | 1984 | 1987 | 1990 | 1999 |  |  |  |
| Trinidad and Tobago | 1966 | 1971 | 1976 | 1981 | 1986 | 1991 | 1995 | 2000 | 2001 | 2002 |
| UK | 1835 | 1837 | 1841 | 1847 | 1852 | 1857 | 1859 | 1865 | 1868 | 1874 |
|  | 1880 | 1885 | 1886 | 1892 | 1895 | 1900 | 1906 | 1910 | 1918 | 1922 |
|  | 1923 | 1924 | 1929 | 1931 | 1935 | 1945 | 1950 | 1951 | 1955 | 1959 |
|  | 1964 | 1966 | 1970 | 1974 (Feb) | 1974 (Oct) | 1979 | 1983 | 1987 | 1992 | 1997 |
|  | 2001 | 2005 | 2010 |  |  |  |  |  |  |  |
| US | 1834 | 1836 | 1838 | 1840 | 1842 | 1844 | 1846 | 1848 | 1850 | 1852 |
|  | 1854 | 1856 | 1858 | 1860 | 1862 | 1864 | 1866 | 1868 | 1870 | 1872 |
|  | 1874 | 1876 | 1878 | 1880 | 1882 | 1884 | 1886 | 1888 | 1890 | 1892 |
|  | 1894 | 1896 | 1898 | 1900 | 1902 | 1904 | 1906 | 1908 | 1910 | 1912 |
|  | 1914 | 1916 | 1918 | 1920 | 1922 | 1924 | 1926 | 1928 | 1930 | 1932 |
|  | 1934 | 1936 | 1938 | 1940 | 1942 | 1944 | 1946 | 1948 | 1950 | 1952 |
|  | 1954 | 1956 | 1958 | 1960 | 1962 | 1964 | 1966 | 1968 | 1970 | 1972 |
|  | 1974 | 1976 | 1978 | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 | 1992 |
|  | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 | 2006 | 2008 | 2010 | 2012 |
| Zambia | 1991 | 2006 |  |  |  |  |  |  |  |  |

*Table A2: ANOVA analysis, differences between countries (related to typology in figure 6)*

|  |  |  |
| --- | --- | --- |
| Type of election outcome | ANOVA: differences between countries (F-test) | ANOVA: differences  between countries (F-test) |
| Sample | all elections | elections after 1946 |
|  |  |  |
| Duverger | 18.23\*\* | 17.23\*\* |
| Dominant party | 8.63\*\* | 8.13\*\* |
| Local Duverger | 3.26\*\* | 2.82\*\* |
| Equilibria | 5.05\*\* | 5.16\*\* |
| Spillover | 8.41\*\* | 5.62\*\* |
| Equilibria + spillover | 2.32\* | 1.36 |
| Other | 9.42\*\* | 4.79\*\* |

\* *p* < 0.05, \*\* *p* < 0.01**Appendix B Measurement and alternative indicators**

**Appendix B1: Measuring spill-over from the centre to the periphery**

The spill-over index is aimed at distinguishing between elections with multi-party competition at the constituency level due to Non-Duvergerian equilibria (i.e. a tight race between the second and the third candidate), and territorial party splits with different sets of parties running in each region, but national parties running countrywide.

* While there might be some empirical overlap between the two explanations, most elections should be characterised either according to Cox’s explanation (where the degree of competition is high, and similar in different types of districts), or to the spill-over explanation (where the degree of competition varies between districts). Elections are either characterised by a high SF-ratio and multiparty competition, or by a high spill-over index, but the two are not linked to each other. Indeed, for elections with more than 2.5 effective parties (by votes, nationally), the two measures do not correlate (r=0.03), and after 1946 they correlate negatively (r=-0.24).[[1]](#footnote-1)
* Furthermore, one might question whether this negative correlation arises as an artefact of the aggregation of election results. (Generally, high SF-ratios occur in electoral districts with a larger effective number of parties.[[2]](#footnote-2)) Therefore, I have calculated the empirical correlation of the two measures for elections with fewer than 2.5 effective parties, for which high SF-ratio should not occur. Here, the direction of the correlation changes and now becomes highly positive (r=0.51). Thus, there is a significant difference between the general correlation of the two measures (positive), as opposed to the correlation for elections in multi-party systems, where the spill-over index and the SF-ratio should differentiate between different explanations. In other words, the negative correlation for party systems with more than 2.5 effective parties is not the product of an artefact.

*Table B1: Spill-over effect and SF-ratio, correlation coefficients*

|  |  |  |
| --- | --- | --- |
|  | < 2.5 effective parties (national) | ≥2.5 effective parties (national) |
| all years | 0.51 | 0.03 |
| after 1946 | 0.61 | -0.24 |

**Spill-over and Cox’ equilibria**

The analysis identifies two competing explanations for multi-party competition at the level of districts; Cox’s equilibria (explanation 1), and spill-over effects from the national party system (explanation 3). Do the two rivalling explanations coincide for the same cases?

Figure B1 plots indicators for both explanations: the X-axis displays the SF-ratio (indicating strategic equilibria), the Y-axis the index for spill-over effects. The figure only includes cases with local multi-party competition.

In my data, the two explanations are mutually exclusive. Almost all cases fall in three of the four sectors. A first set of the elections can be characterised by spill-over effects (top left section). These include elections in Canada, primarily between 1945 and 1968, and some elections after 1968, which only marginally qualify for both explanations, and India in 1999 and 2009. A few elections in Canada and the United Kingdom are characterised by tight competition (lower right), and for many other cases, neither of the two explanations apply (lower left sector). There are hardly any overlapping cases, except for the Canadian election of 1965, which is marginally above the cut-off on both dimensions.

*Figure B1: SF-ratio and spill-over effects (only elections with >2.5 local parties)*



**B2: Alternative measures of the number of parties**

For the identification of Non-Duvergerian electoral outcomes, this article relies on the effective number of parties. There are several alternative measures to assess the ‘two-party-ness’ of electoral competition, where ‘two-party-ness’ is defined as a tight 50-50 race between two candidates or parties, with no smaller candidates or parties. Two such measures (the D- and the T-index) were suggested by Gaines and Taagepera (2013), and one (Gap-index) by Dunleavy (2014). In a case of perfect two-party competition, the indices score the highest (either 1 or 100). For Non-Duvergerian elections, all three indices will score 0. This can be because the competition is very fragmented, or due to a dominant candidate or party, meaning that there is a large gap (in terms of the vote share) between the top two candidates.

In this appendix, I show that the three measures, as well as the effective number of parties, are related to each other, although they differ in two aspects. First, the four indices differ in their degree of rigidity, i.e. some of the measures tend to report Duvergerian outcomes more often than others. Second, while the effective number of parties distinguishes two entirely different types of Non-Duvergerian outcomes, differentiating between multi-party systems and dominant-party systems, the three alternative indices lump the two types together. The fundamentally different nature of these indices of ‘two-party-ness’ from the effective number of parties also alters the results of some of the analyses that are presented in the main text of this article.

Using the election results from my sample of elections under the plurality vote, I compare the three alternative indices to the effective number of parties. In a first step, I correlate the four indices at the constituency level. Table B2 reports the correlation coefficients between the effective number of parties and the three alternative indices. I split the sample into electoral districts with 2 or more effective parties (right) and those with fewer than 2 effective parties (left).

The three alternative indicators correlate strongly. In the right-hand part of the table (in districts with more than 2 effective parties), they also barely differ from the effective number of parties, whereas in the left-hand part there is a strong negative correlation with the effective number of parties. Hence, even if they are built very differently, the effective number of parties and the three alternative indicators, applied to real-world district results, tend to measure the same underlying concept – with the important caveat that the three alternative indicators measure the “two-party-ness” of a competition, but do not distinguish between dominant-party- and multi-party-constituencies.

*Table B2: Correlations between measures of party-competition, districts with <2 effective parties/candidates (left), ≥2 effective parties/candidates (right)*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Effective # of parties | D-Index | T-Index | Gap-Index |  |  | Effective # of parties | D-Index | T-Index | Gap-Index |
|  |  |  |  |  |  |  |  |  |  |  |
| Effective # of parties | 1 |  |  |  |  | Effective # of parties | 1 |  |  |  |
| D-Index | 0.972 | 1 |  |  |  | D-Index | -0.623 | 1 |  |  |
| T-Index | 0.889 | 0.969 | 1 |  |  | T-Index | -0.516 | 0.971 | 1 |  |
| Gap-Index | 0.803 | 0.825 | 0.7571 | 1 |  | Gap-Index | -0.606 | 0.947 | 0.957 | 1 |
|  |  |  |  |  |  |  |  |  |  |  |
| N=38877 |  |  |  |  |  | N=33748 |  |  |  |  |

Furthermore, I illustrate the implications which the use of the three alternative indices can have for two of the analyses in the paper (selecting the two analyses where the effective number of parties is central). Figures B2-B4 replicate figure 1, assessing the competitiveness of elections at the national and at the constituency level, but relying on the three alternative indices. At first glance it seems, the analysis reproduces the results from figure 1: for all three indices, Non-Duvergerian districts are more frequent in national elections with a Non-Duvergerian national competition. The correspondence between the national and the constituency level is even stronger. In elections with a Non-Duvergerian competition at the national level, the largest proportion of constituencies are also characterised by a Non-Duvergerian competition. Vice-versa, for the T-index (figure B3), there is also a larger share of Non-Duvergerian constituencies in elections with a two-party competition at the national level. However, the distributions vary considerably between the three indices.

*Figure B2: Competitiveness at the national and constituency level, measured by the D-Index*



*Figure B3: Competitiveness at the national and constituency level, measured by the T-Index*



*Figure B4: Competitiveness at the national and constituency level, measured by the Gap-Index*



Moreover, I aggregate this analysis to the level of elections, and replicate in figures B5-B7 the analysis of *Local Duvergerian* cases (cf. figure 2 in the main text). These are elections with a two-party race at the constituency level, but multi-party competition at the national level. However, instead of employing the effective number of parties as a measure, I rely on the D- and the T-index by Gaines and Taagepera, and the Gap-index by Dunleavy.

The results look very different from figure 2. In figure B5, based on the T-index, the number of elections with a Local Duvergerian pattern is much smaller. Most elections with an important difference in the number of parties between the national and the district level, including all the contemporary cases, no longer display a Local Duvergerian pattern. The remaining cases date back to the pre-1906 United Kingdom and United States. Four recent elections in India, Botswana, and Trinidad and Tobago fall marginally into this pattern, with two-party competition in slightly more than 50% of the districts.

When the T-index is used, other contemporary elections are no longer classified as *Local Duvergerian* cases. In a number of elections, the constituency-level results are very heterogeneous. While some of the districts are two-party-competitive, a non-negligible number constituencies is dominated by a single party. In the analysis of *Local Duvergerian* cases in the main text, which is based on the effective number of parties, I consider both types of constituencies jointly (both count fewer than 2.5 effective parties), and I classify cases with a predominance of two-party- or dominant-party constituencies, but a national multi-party system as *Local Duvergerian* cases. This is not possible for the alternative indices: dominant- and multi-party-constituencies are a single type, and Non-Duvergerian. Therefore, most of the *Local Duvergerian* cases from figure 2 are re-classified as *Non-Duvergerian* both at the local and the national level.

The D-Index is much less sensitive to deviations from “two-partyness”, and classifies many more cases as Duvergerian (figure B6). Dunleavy’s Gap-Index (figure B7) is in between the effective number of parties and the T-Index: the Gap-Index classifies more elections as *Duvergerian* than the D-Index, and fewer than the T-Index. However, it also has the property of considering elections with a mixture of two-party-competitive districts and dominant districts as Non-Duvergerian at the local level.

*Figure B5: National and local competition, aggregated at the national level, T-index*

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*Figure B6: National and local competition, aggregated at the national level, D-index*



*Figure B7: National and local competition, aggregated at the national level, Gap-index*



The analyses relying on the three alternative indices are suited to identifying schoolbook cases of the *Local Duvergerian* explanation – the combination of a local two party-competition with a national multi-party system. However, such elections are rare, and primarily occurred before 1945. This is arguably also a consequence of an overly strict understanding of the *Local Duvergerian* application. A less restrictive operationalisation, which also considers mixtures of dominant-party and two-party-constituencies, looks to be a valid measure of the theoretical concept (territorial splits, and different sets of parties competing in different parts of the country). For the present analysis, the effective number of parties (employed in the main text) offers a somewhat less strict operationalisation, but a common-sense operationalisation of *Local Duvergerian* elections.

Third, I assess and plot the distributions of Duvergerian vs. Non-Duvergerian districts by elections (figures B8-B9). For these figures, I have selected two countries (UK and Botswana), which show important empirical variance in the frequency of two-party districts over time. The first panel measures competition by the effective number of parties, distinguishing two-party competition, multi-party competition, and dominant-party districts. The three further panels plot the distribution measured by the three indices, in three categories (Non-Duvergerian, intermediate [0.33-0.66], and Duvergerian). Two of the indices are exigent: Duvergerian districts almost disappear (see also Gaines and Taagepera 2013, 397-8 for a different visulisation) unless the cut-off point is set very low, so that even the intermediate cases are classified as Duvergerian. Again, two conclusions are possible. Either Duvergerian patterns in constituencies are extremely rare, or the indices are too rigid to examine elections in the real world.

*Figure B8: Distribution of districts by election: United Kingdom*

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*Figure B9: Distribution of districts by election: Botswana*

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# Appendix C1: National aggregation of the constituencies

*Figure C1: Effective number of parties in districts, means versus share of two-party districts*



**C2: SF-ratios by type of national party system**

SF-ratios identify electoral districts where the second and third parties are similarly strong in electoral districts. There are two different types thereof (Gaines 1999).

In some electoral districts, a high SF-ratio overlaps with a dominant party: e.g. if the votes are distributed 60% - 20% - 19% - 1%, we do not expect strategic defection towards two-party competition. First, this is because two of the challengers, with 20% and 19% of the votes, are equally viable. Second, there is nothing to gain from strategic voting, as the dominant party holds a safe seat in this district. These districts are characterised by an SF-ratio close to 1, and an effective number of parties below 1.9.

In other electoral districts, e.g. with the vote distribution 40% - 30% - 30%, the strongest candidate could be defeated by the voters who do not support her or him. However, a coordinated effort to defeat the candidate is impeded because the potential challengers are equally viable; i.e. the SF-ratio is close to 1, but in the absence of a dominant candidate, these districts are characterised by an effective number of candidates above 2.5 Cox (1997, 87-8) identifies districts with multi-party competition and high SF-ratios as equilibria; other scholars have used a less restrictive operationalisation (Chhibber and Kollman 2004, 53-5).

Figure C2 plots SF-ratios by number of parties in the national arena (rows) *and* in the district arena (columns). It shows that electoral districts with a dominant party, but two equally viable second and third candidates, are rare. Instead, districts with two equally viable second and third candidates (Cox equilibria) occur primarily in elections with a dominant national party, or elections with a national two-party system. Hence, while Cox’s explanation works in some of the elections at the district level, it is not systematically related to national multi-party systems.

*Figure C2: Distribution of SF-ratios at the constituency level, by degree of competitiveness at the national level*



While the global view of the type of electoral districts highlights that Cox’s equilibria at the local level are relatively rare, or even the result of an entirely random distribution, it does not allow for the identification of elections where Non-Duvergerian outcomes at the national level can be accounted for by Cox’s explanation (see appendix C2 for an analysis by type of national party system). A bipolar distribution, with a relatively higher number of electoral constituencies with Non-Duvergerian equilibra only emerges in elections with a nationally dominant party system. Examples of this occur primarily in three-candidate competitive districts in the UK elections in 1841 and 1865.[[3]](#footnote-3)

The aggregation of SF-ratios at the level of elections allows the identification of elections with tight local races between the second and the third party, which are not visible when the district results are pooled across all elections (figures 2, C2). A case thereof are elections in Canada: figure C3 shows the SF-ratios for Canadian elections since the 1960s. In this period, the Canadian party system permanently featured 3 or more effective parties at the national level, and over most elections, an average of 2.5 parties or more at the district level. This also implies higher SF-ratios than in two-party districts. For most elections, the distributions of SF-ratios are flat or single-peaked in the middle, which implies that there is no evidence for Non-Duvergerian strategic three-party equilibria. An exception to this rule are the 1997 elections, with a clear right-peaked distribution: in many districts, the eventual ranking of the second and the third candidate was hard to anticipate, making strategic voting difficult, if not impossible. This peak was not visible in the pooled analysis of election results (figures 2, C2).

*Figure C3: SF-ratios in Canada (1962-2011), by election. Districts with multiparty competition*



Figure C4 uses a less restrictive operationalisation of equilibria, without regarding the degree of electoral competition, thus identifying all districts where the challenger candidate cannot clearly be identified. This adds districts with a low SF-ratio, but in none of the elections does this substantially alter the distribution of high SF-ratios.

*Figure C4: SF-ratios in Canada (1962-2011), by election. All districts*

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Using this less restrictive operationalisation of equilibria, which does not distinguish between dominant- and multi-party districts, this appendix also replicates the analysis of national elections. Figure C5 shows the distribution of different types of election outcomes by country. Compared to the restrictive operationalisation (figure 6 in the main text), there are more elections in Canada and in Great Britain characterised by equilibria.

*Figure C5: Distribution of type of election outcomes, by country*

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**Appendix D: Re-analysis for elections since 1946 only.**

This appendix replicates the analyses, including only election data after 1946.

*Table D1: National versus district competition*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | National competition (by votes) | | | | |  |
|  | dominant party systems | | two-party systems | multi-party systems | | Total |
| District competition | (1 to 1.5) | (1.5 to 1.9) | (1.9 to 2.5) | (2.5 to 3.0) | (>3.0) |  |
|  |  |  |  |  |  |  |
| Dominant party (1 to 1.5) | 26 | 129 | 2649 | 63 | 50 | 2917 |
| Dominant party (1.5 to 1.9) | 5 | 75 | 6372 | 392 | 568 | 7412 |
| Two-party comp. (1.9 to 2.5) | 3 | 45 | 9813 | 2282 | 5310 | 17453 |
| multi-party comp. (2.5 to 3.0) | 0 | 1 | 760 | 1530 | 5863 | 8154 |
| multi-party comp. (> 3.0) | 0 | 0 | 141 | 260 | 3370 | 3371 |
| Total | 34 | 250 | 19735 | 4527 | 15161 | 39707 |

N= 39707 constituencies in 133 elections

*Figure D1: Competition in constituencies by type of national competition*



*Figure D2: Distribution of SF-ratios at the constituency level, by type of national party system (rows) and type of constituency (columns)*

*Figure D3: National and local competition, aggregated at the national level. Effective number of parties by seats (left) and by votes (right)*



*Figure D4: Identifying Non-Duvergerian equilibria*



Due to space limitations, data labels in heavily populated areas are omitted. BO=Botswana; CA=Canada; GB=United Kingdom; IN=India, JM=Jamaica, NZ=New Zealand; TT=Trinidad and Tobago; US=United States; ZM=Zambia.

*Figure D5: Dominant-party elections at the local and national level*



Note: national number of parties right-censored at 2.5.

*Figure D6: Territorial splits and spill-over effects. Only elections with more than 2.5 effective parties (by votes, national level)*



Note: Election labels only for elections with territorial splits. Spill-over scores censored at 0.5.

*Figure D7: SF-ratio and spill-over effects (only elections with >2.5 local parties)*



*Figure D8: Distribution of type of election outcomes, by country*

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N= 132 elections.

1. The correlation is calculated with national elections as units of analysis. A similar effect is seen if I measure the average SF-ratio instead of the share of districts with a high SF-ratio (>0.6), or if I only include elections with more than 25% districts in the periphery. [↑](#footnote-ref-1)
2. The effective number of parties (by votes) and the SF-ratios are conceptually linked. Apart from very special cases, a high SF-ratio is only possible in districts with a large effective number of vote-winning parties. This is reflected in a strong positive correlation of the effective number of vote-winning parties with the SF-ratio, both at the level of districts, as well as when aggregated to the level of elections. At the level of electoral constituencies, they correlate at r=0.68. After aggregation to the level of elections, the average SF-ratio correlates with the average effective number of parties in the constituencies at r=0.78, and with the effective number of parties, by votes, nationally, r=0.43. [↑](#footnote-ref-2)
3. The right-handed peak disappears if the period of analysis is restricted to elections after 1946 (appendix D). [↑](#footnote-ref-3)