Explaining the Tenure of Incumbent Governors in Russia: A Qualitative Comparative Analysis

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Keywords: Russia, incumbent governors, reappointment, dismissal, QCA
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*I would like to thank Ora John Reuter, Andrey Starodubtsev, Nena Oana, Claude Rubinson and the anonymous reviewer for helpful comments.

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1 Introduction

This paper studies the puzzle posed by the tenure of incumbent governors in Russia.\(^1\) In September 2004, President Putin proposed to abolish popular elections of regional executives in all Russian regions and introduced a new system of appointment that was in force between 2005 and 2012.\(^2\) The decision to end gubernatorial elections, however, implied the end of the term limit in office—the maximum of two five-year terms. As a result, some incumbent governors were reappointed and remained in office, with their tenure not being limited by any institutional constraints such as the term limit or compulsory retirement age.

There is consensus in the literature that the results of national elections determine the (re)appointment prospects of governors (Reuter and Robertson, 2012; Reuter, 2013; Rochlitz, 2016; Reisinger and Moraski, 2017). As the heads of ethnic regions deliver the highest electoral results (Reisinger and Moraski, 2010), we should expect that they have the best chances of staying in office. However, this is not the case. It is not the incumbents in the ethnic regions (republics) but the incumbents in the regions with a predominantly ethnic Russian population (oblasts and krais) that have remained in office the longest. For example, the governor of Belgorod Oblast Evgeny Savchenko has been in office since 1993 and is currently serving his seventh consecutive term, which implies that the region has not seen a transfer of power for the past quarter-century. To address the puzzle related to the tenure of incumbent governors in Russia, this paper raises the following research question: What conditions have accounted for the reappointment of incumbent governors in Russia between 2008 and 2012?

\(^1\)There are different types of subnational units in Russia including republics, oblasts, krais, cities of federal significance, autonomous okrugs, and an autonomous oblast. In the paper, I refer to all of them as regions and to their heads as governors or regional executives.

\(^2\)In 2012, popular elections were re-introduced.
The analysis concentrates on the period of 2008-2012 that corresponds to the presidency of Dmitry Medvedev. As previous studies suggest that, in contrast to Putin, Medvedev was less willing to reappoint incumbent governors (Turovskii, 2010; Blakkisrud, 2011), this paper explores why he nonetheless reappointed some of them. The analysis investigates an interplay of such conditions as the ability of governors to mobilize voters at national elections and to keep stability in the regions, the effectiveness of governors in managing their territories, as well as the popularity of governors. Rather than untangling their average effect, this study aims to detect what conditions or combinations of conditions have been necessary and sufficient for gubernatorial reappointment and dismissal.

Crisp-set Qualitative Comparative Analysis of 25 cases reveals that delivering high voting results at national elections, contrary to expectation, has not guaranteed the reappointment of incumbent governors. On the other hand, the failure to deliver high voting results has been among sufficient conditions leading to the dismissal of incumbents. The analysis also detects two sufficient combinations of conditions accounting for the reappointment that confirm the argument that the incumbents remain in office as long as they fulfill the main “federal priorities” of high voting results and political stability (Busygina et al., 2018; Libman and Rochlitz, 2019).

The paper is structured following a standard protocol of Qualitative Comparative Analysis. The next section outlines the puzzle of gubernatorial tenure. The third section conceptualizes the outcome and provides background on the reappointment of incumbents between 2008 and 2012. The fourth section reviews relevant literature and lists the main causal conditions that are expected to produce the outcome. The fifth section describes the methodology, data, and the calibration strategy. The sixth section presents and discusses the results. The final section concludes.


2 Gubernatorial tenure in Russia

Russia’s national executive Boris Yeltsin first spoke in the spring of 1991 about the creation of the position of a regional executive (a governor) who would be elected by the population (Tolz and Busygina, 1997, 410). First gubernatorial elections took place in Moscow, Leningrad (later renamed in Saint Petersburg), and the Republic of Tatarstan in June 1991. However, because some regional executives supported the August 1991 anti-democratic coup d’etat, direct elections in some regions were postponed and Yeltsin received the right to dismiss and appoint governors there. While the newly adopted 1993 Constitution of the Russian Federation prescribed that all regions are entitled to have elected executives, it did not specify the modes of their selection (Golosov, 2018, 2). As a result, they have varied over time.

In the 1990s, gubernatorial elections were postponed in all regions with the exception of the republics because their own legislation required their heads to be popularly elected or appointed by the regional legislative assembly. In October 1994, Yeltsin signed a decree stating that, until indicated otherwise, popular elections of regional executives could take place only if he authorized them. In August 1995, Yeltsin permitted gubernatorial elections in Sverdlovsk Oblast, but already in September he signed another decree to prolong the moratorium on direct elections until 1996 (Gel’man et al., 2000, 99). Eventually, Yeltsin allowed elections in twelve other regions in December 1995. However, as many incumbents lost to opposition candidates from the Communist Party, he again postponed gubernatorial elections. Previous accounts suggest that this prohibition was supposed to “facilitate the mobilization of voters” by the regional governments in support of Yeltsin’s re-election next summer (Gel’man et al., 2000, 98). In addition, from late 1995 to early 1996, several incumbents were dismissed because they lacked necessary mobilization abilities (Turovskii, 1996).
The first round of country-wide gubernatorial elections took place between 1996 and 1997 following Yeltsin’s re-election in July 1996. In this period, 55 regions elected their heads; 48 of them had elections for the first time since 1991 (Solnick, 1998, 48). Ethnic regions, however, held elections at least once before 1996. The Soviet incumbents tended to receive the majority of votes at these elections due to strong political machines that they managed to build there (Kahn, 2002; Hale, 2003). As a result, in the 1990s, executives in the ethnic regions had stayed in office the longest.

In September 2004, President Putin proposed to abolish direct gubernatorial elections in throughout Russia, including the ethnic regions. The appointment procedure initially implied that the president nominated a gubernatorial candidate for the approval of a regional legislative assembly, which formally had an option to reject a suggested candidate. In December 2005, this procedure was modified: it was the largest party in a regional legislative assembly—as a rule the United Russia party (Edinaya Rossiya)—that could propose potential candidates to the president. Since July 2009, following consultations with the Presidential Administration, the leadership of United Russia submitted a list of at least three candidates to the president. After that, the president selected one candidate and nominated him or her for the approval of the regional legislative assembly. This approval was rather symbolic as assemblies unanimously approved the nominated candidates.

Governors were appointed for five years, yet the president could dismiss the incumbent earlier and appoint a new governor instead. In cases of reappointment, however, the tenure of the incumbent could be quite long as he or she did not face any institutional constraints. Although in 1999 gubernatorial tenure was formally limited to the maximum of two five-year terms, in early 2001 the law was reinterpreted in such a way that the counting of terms began from their first election after the law was adopted in 1999 (Slider, 2008, 110). Consequently, the incumbents could remain in office for more than the original term limit. For example, the President of the Republic of Tatarstan Mintimer Shaimiev had
already served two terms in the 1990s, yet ran for office in 2001 and was again re-elected.

The 2004 decision to end gubernatorial elections implied complete abolishment of the
term limit as there were no formal constraints regarding the reappointment of incumbents.
Even following the re-introduction of popular elections in 2012, the incumbents could still
remain in office because in 2015 President Putin signed an amendment to federal law, which
stated that the terms of governors are to be counted from 2012. Table 1 below, however,
suggests that it is not the incumbents in the republics but the incumbents in oblasts and
krais that have stayed in office the longest in the 2000s.

Table 1: Tenure of incumbent governors in Russia, 2005-2020

<table>
<thead>
<tr>
<th>No</th>
<th>Region</th>
<th>Governor</th>
<th>Term starts</th>
<th>Reappointment year</th>
<th>Reelection year</th>
<th>Term ends</th>
<th>Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Udmurtia Republic</td>
<td>Volkov</td>
<td>2000</td>
<td>2009</td>
<td>-</td>
<td>2014</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>Astrakhan Oblast</td>
<td>Zhilkin</td>
<td>2004</td>
<td>2009</td>
<td>2014</td>
<td>2018</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>Belgorod Oblast</td>
<td>Savchenko</td>
<td>1993</td>
<td>2007</td>
<td>2012; 2017</td>
<td>In office</td>
<td>27</td>
</tr>
<tr>
<td>8</td>
<td>Kurgan Oblast</td>
<td>Bogomolov</td>
<td>1996</td>
<td>2009</td>
<td>-</td>
<td>2014</td>
<td>18</td>
</tr>
<tr>
<td>9</td>
<td>Vladimir Oblast</td>
<td>Vinogradov</td>
<td>1996</td>
<td>2005; 2009</td>
<td>-</td>
<td>2013</td>
<td>17</td>
</tr>
<tr>
<td>13</td>
<td>Ulyanovsk Oblast</td>
<td>Morozov</td>
<td>2004</td>
<td>2006; 2011</td>
<td>2016</td>
<td>In office</td>
<td>16</td>
</tr>
<tr>
<td>15</td>
<td>Chita Oblast</td>
<td>Geniatulin</td>
<td>1996</td>
<td>2008</td>
<td>-</td>
<td>2013</td>
<td>17</td>
</tr>
</tbody>
</table>

(Zabaikalsk Krai)

Source: Author’s dataset.

To address this puzzle, the analysis concentrates on the reappointment of incumbent
governors by President Medvedev between 2008-2012. The next section describes the
dataset of gubernatorial reappointments and dismissals.
3 Reappointment of incumbent governors between 2008 and 2012

The initial procedure of appointment involved presidential nomination of a gubernatorial candidate for the approval of a regional legislative assembly. Before the nomination, the president was supposed to consult with a presidential envoy (*polpred*) in the corresponding federal district (Goode, 2007, 372). The regional legislative body had the option to reject a suggested candidate and to propose a new candidate. However, if the regional legislative body rejected the candidate nominated by the president three times, the president could dissolve it. The appointment procedure was slightly modified in December 2005, as along with a presidential envoy, the largest party in a regional legislative assembly could also suggest potential candidates to the president.

Since July 2009, it was the political party with the most seats in a regional assembly that proposed at least three gubernatorial candidates to the president. When the term of an incumbent governor was expiring, the regional leadership of the United Russia party (which had the majority in all regional parliaments) started official consultations with the Presidential Administration concerning potential gubernatorial candidates. At this stage, the Presidential Administration played a crucial role approving potential candidates. After that, 45 days before the expiration of the gubernatorial term, the leadership of United Russia submitted a list of candidates to the president. In ten days, the president selected one candidate and nominated him or her for the approval of the regional legislative assembly. However, as before, their approval tended to be rather symbolic; assemblies unanimously approved nominated candidates, who were appointed for five years.

To explain the long-term tenure of incumbent governors, this analysis concentrates on reappointments made by President Medvedev between 2008 and 2012. It is selected because previous accounts suggest that Medvedev explicitly intended to replace incumbent
governors (Turovskii, 2010; Blakkisrud, 2011). Some scholars even argue that by dismissing the incumbents he attempted to carry out “progressive political change in Russia” (Moses, 2014, 1398). In the analysis I have relied on the newly constructed dataset of gubernatorial reappointments and dismissals that covers the period from May 2008 when President Medvedev made his first appointment to May 2012 when Medvedev’s presidential term came to an end.3

As the first step, I compiled a list of all incumbent governors relying on the public dataset of Russian governors’ biographies created by the International Center for the Study of Institutions and Development (ICSID) at the Higher School of Economics in Moscow.4 The list included 50 incumbents, out of which 14 were reappointed by President Medvedev. Out of 36 incumbents who left their office, I excluded 18 cases of promotions and resignations5 as well as 5 cases when incumbents publicly asked the president not to consider them as potential candidates,6 and two cases, for which no systematic data were available.7 As a result, the data set includes 14 reappointments and 11 dismissals—25 cases in total (see Table A.1). The next section lists the main conditions that are expected to produce the outcome—gubernatorial reappointment.

3In the 1990s, there were 89 subnational units in Russia. Between 2004 and 2008, their number decreased to 83 because of regions’ merger. As a result, there were 83 regions in Russia between 2008 and 2012.
4The dataset and the codebook are available at https://iims.hse.ru/en/csiddatabases.
5I excluded the following cases of promotions: Viktor Tolokonskii in Novosibirsk Oblast, Viktor Ishaev in Khabarovsk Krai, Aleksandr Khloponin in Krasnoyarsk Krai, and Valentina Matvienko in Saint Petersburg and resignations: Vyacheslav Pozgalev in Vologda Oblast, Mikhail Kuznetsov in Pskov Oblast, Yury Evdokimov in Murmansk Oblast, Egor Stroev in Oryol Oblast, Dmitry Zelenin in Tver Oblast, Yury Luzhkov in Moscow, Murtaza Rakhimov in Bashkortostan, Murat Zyazikov in Ingushetia, Vyacheslav Shtyrov in Sakha (Yakutia), Roman Abramovich in Chukotka, Segü Katanodov in Karelia, Aleksandr Chernogorov in Stavropol Krai, Pyotr Sumin in Chelyabinsk Oblast, Sergey Dar’kin in Primorsky Krai
6Mintimer Shaimiev in Tatarstan, Yury Neelov in Yamalo-Nenets Autonomous Okrug, Nikolai Volkow in Jewish Autonomous Oblast, Vladimir Chub in Rostov Oblast, and Boris Gromov in Moscow Oblast.
7Aleksandr Lebed’ in Khakassia and Aleksandr Filipenko in Khanty-Mansi Autonomous Okrug.
4 Conditions of gubernatorial reappointment

The "top-down" explanation tends to dominate the existing literature on gubernatorial (re)appointment. It posits that the (re)appointment of governors has been entirely depended on the Presidential Administration. This implies that as long as governors fulfill the main "federal priorities" of high electoral results and political stability they could remain in office (Busygina et al., 2018; Libman and Rochlitz, 2019). Empirical studies confirm that the results of the State Duma elections had the strongest effect on (re)appointment chances of governors (Reuter and Robertson, 2012; Rochlitz, 2016; Reisinger and Moraski, 2017). Based on these results, the ability of governors to mobilize voters is the first condition in the analysis.

Electoral incentives, however, are likely to matter more in the periods before elections and less in the periods after elections (Reuter and Robertson, 2012, 1016). As governors play a vital role in maintaining political stability in the regions (Sharafutdinova, 2010; Zubarevich, 2015), this condition could account for the reappointment of incumbents during the economic and financial crisis of 2008-2009 and a wave of mass protests of 2011-2012. Consequently, the ability of governors to keep stability in the regions is the second condition in the analysis. So far, it has not been systematically evaluated by existing empirical studies.

According to the alternative, "bottom-up" explanation, the efficiency of incumbents in governing their territory as well as their popularity could also account for their reappointment. It is plausible that the former is likely to matter in times of economic crisis (Konitzer, 2005). However, Reuter and Robertson (2012) find “weak and inconsistent evidence” that economic indicators have any effect on gubernatorial (re)appointment. Rochlitz (2016, 15) even shows a negative relationship between average economic
performance of a governor\textsuperscript{8} and the likelihood of his or her (re)appointment. This study evaluates whether the efficiency of governors as perceived by the Kremlin has played any role in the reappointment process in times of crisis. Therefore, the efficiency of governors in managing their territory is the third condition included in the analysis.

Additionally, previous empirical studies provide mixed evidence concerning the impact of the popularity of governors on their (re)appointment chances. Reuter and Robertson (2012, 1034) find that the relationship between the popularity of incumbents and the likelihood of their (re)appointment has changed over time, playing a more important role in the period prior to 2008. By contrast, Rochlitz (2016, 15) finds a strong positive effect of popularity on (re)appointment chances of governors. This analysis assesses whether the popularity of incumbents has played any role at the later stage of the appointment process; consequently, the popularity of governors is the fourth condition.

The broad expectation is that these conditions lead to the reappointment of incumbent governors in their presence. However, this analysis is different from previous accounts in three respects. First, rather than untangling their 'average effect' it detects what conditions or combinations of conditions are necessary and/or sufficient for gubernatorial reappointment. Second, it concentrates on the reappointment of incumbent governors. This outcome has not been tackled by any of previous studies that focus on gubernatorial appointments (Reuter and Robertson, 2012; Rochlitz, 2016; Reisinger and Moraski, 2017). Third, this is the first paper that employs Qualitative Comparative Analysis (QCA) to explain the reappointment of incumbent governors in Russia.\textsuperscript{9} As a result, this study builds on the assumption of asymmetric causation and, therefore, performs separate analyses of gubernatorial reappointment and dismissal.

\textsuperscript{8}Rochlitz (2016, 12-13) describes in detail the constructed measure.

\textsuperscript{9}Although recently, several QCA studies on regional governments have been published (e.g., Blatter et al., 2010; Mello, 2020; Oppermann and Brummer, 2020).
The theoretical expectation is that the ability of governors to mobilize voters has been necessary for gubernatorial reappointment as necessity implies that the outcome could not be achieved without the condition. Sufficiency, on the other hand, requires the presence of a condition or combinations of conditions where the outcome is also present. The "top-down" logic of gubernatorial reappointment suggests that the ability of governors to mobilize voters combined with the ability of governors to keep stability in the regions is sufficient for gubernatorial reappointment. Following Reuter (2013), who finds that popular governors can better mobilize voters for the United Russia party, the third expectation is that the ability to mobilize voters combined with the popularity of governors is also sufficient for the reappointment of incumbents. The final expectation is that the ability to mobilize voters combined with the effectiveness of incumbent governors in managing their territory is sufficient for reappointment.

The present analysis is limited to political and economic factors and does not account for all potentially relevant factors. For example, Petrov (2010) claims that a public conflict between a governor and the center has often led to the dismissal of the incumbent. Indeed, Moscow’s Yury Luzhkov, reappointed in 2007, was dismissed in 2010 because of a conflict with President Medvedev. Similarly, Bashkortostan’s Murtaza Rakhimiv and Dagestan’s Mukhu Aliev, both reappointed in 2006, resigned in 2010 because of their conflict with the center. Such conflicts, however, tended to happen quite sporadically and require a separate consideration and, therefore, are not included in this analysis.

Some authors also emphasize the increasing role of people with a background in security and military services (siloviki) under Putin and suggest that the president could have a motivation to dismiss an incumbent and to appoint a silovik instead (Bremmer and Charap, 2006; Petrov, 2012). However, Buckley et al. (2014) have examined the background of all newly appointed governors and found that siloviki accounted for only nine percent of them. Therefore, this condition is not considered in the present analysis.
Finally, as only the party with the majority of seats in a regional legislative assembly had the power to suggest potential gubernatorial candidates to the president, membership of the incumbents in the United Russia party might also matter as it dominated regional assemblies across the country (Petrov and Titkov, 2010; Moses, 2014, 1397). However, Reuter (2010, 2013) demonstrates that strong incumbent governors tended to join United Russia much later than less independent governors. Consequently, in this analysis, I assume that the membership in United Russia is not as important for the incumbents as for the newly appointed governors.

5 Methodology, data and calibration

5.1 Methodology

This study employs Qualitative Comparative Analysis (QCA) as it provides more opportunities for making inferences regarding the cases. QCA belongs to set-theoretic methods that perceive relations between social phenomena as set relations and emphasize complex causality that unfolds through equifinality, conjunctural causation, and asymmetry (Schneider and Wagemann, 2012, 5-6). As other set-theoretic methods, QCA operates on data, which consist of membership scores of cases in sets. The next subsection describes the calibration strategy in more detail.

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10Equifinality means that several conditions or combinations of conditions can produce the same outcome, therefore, there might be several alternative paths. Conjunctural causation refers to a situation when a single condition leads to the outcome only in a combination with other conditions and may not produce the outcome on its own. Finally, asymmetry suggests that the absence of conditions leading to the outcome may not lead to the absence of the outcome. For this reason, the analysis of occurrence and non-occurrence of the outcome is performed separately. Furthermore, it implies multifinality meaning that the same factor can produce different outcomes depending on the context.
5.2 Calibration of the outcome

The outcome of interest is the reappointment of incumbent governor (REAP). As the logic of the outcome concept as well as the data at hand is binary, the outcome was calibrated as a crisp set meaning if a governor was reappointed by President Medvedev he\textsuperscript{11} gets 1, if dismissed – 0.

5.3 Calibration of the conditions

As the outcome set has been calibrated as a crisp set, I calibrated the conditions similarly as crisp sets to establish qualitative differences in kind between the cases. The robustness tests confirm that it is not really meaningful to account for differences in degree in the conditions, but not the outcome, when assessing subset relations.\textsuperscript{12} Crisp-set QCA (csQCA) operates on sets where cases have either full membership (1) or full non-membership (0) in the sets (Ragin, 1987). The calibration strategy for each condition set is described below.

The ability of governors to mobilize voters (VOT)

The results of the presidential and State Duma elections are of interest to the center. In the 2008 presidential election, Dmitry Medvedev received the majority of votes in all Russian regions. The results of the State Duma elections, however, display more variation across the country.\textsuperscript{13} Therefore, I collected the data on the share of the United Russia party in the 2007 and 2011 elections and considered in the analysis the results of the elections that took place prior to the reappointment or dismissal of the incumbent. The database on economic and political indicators for the Russian regions in 1998-2014 provides information

\textsuperscript{11}All incumbents in this analysis are males.

\textsuperscript{12}I thank Eva Thomann for making this point.

\textsuperscript{13}For example, in 2007, the share of votes for the United Russia party varied from 48.78 to 99.36. In 2011, its share varied from 29.04 percent to 99.48 percent.
about the electoral results. To assign membership scores to cases, I set 51 percent as a threshold for inclusion in the set as this denotes a majority of votes in each region.

The ability of governors to keep stability (STAB)

In this analysis, protest activity is taken as a proxy for social and political stability in the Russian regions. There are several sources providing information about protest activity across the country. For example, the Russian protest event database by Lankina contains detailed data on protests across the country. However, it systematically covers mainly political protests and has limited information about their turnout. For this reason, I have relied on the monitoring reports published by the Communist Party that provide extensive data on political, social, and economic protests and their turnout. The data on protests’ turnout in each region one year preceding the reappointment or dismissal of the incumbent governors were employed in the calibration. Based on the observable gaps in the raw data, I set the inclusion threshold at 20,000 participants. The incumbents in the republics of Karachay-Cherkessia and Kalmykia, however, were assigned a score of 0 despite having low protest activity one year prior to their dismissal. Karachay-Cherkessia’s Mustafa Batdyev was dismissed as early as 2008 largely due to massive protests against Batdyev organized in 2004 following shocking kidnapping and then killing of seven people that involved Batdyev’s son-in-law (RBK, 2004). The local opposition in Kalmykia was actively protesting against the reappointment of Kirsan Ilyumzhivov for the fifth term (Ar’kov, 2010).

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15 The database and the codebook are available at https://popularmobilization.net/about/.
16 The reports are available at https://kprf.ru/analytics/.
17 Figure A.1 provides the distribution of the raw data.
The effectiveness of governors in managing their territory (EFF)

In 2007, the Kremlin introduced a new system for evaluating the efficiency of governors consisting of 43 indicators\(^{18}\) (Rochlitz et al., 2015; Rochlitz, 2016; Libman and Rochlitz, 2019, 58-59). The integral index showed the rank of all governors from 1 to 83 depending on their performance in managing a regional economy as well as such policy spheres as healthcare, education, construction, and housing. As the evaluation was based on statistical data and on assessments of citizens, the integral index may correlate with the approval rating of governors. Having this in mind, I employed a component of the integral index that is specifically related to statistical economic indicators of the region and governors’ performance: ”working efficiency of executive authorities.” The ICSID dataset provides the integral index of governors’ efficiency as well as its components. To assign crisp-set membership scores to cases, I set 40 as the inclusion threshold in the set as it is close to the mid-point of the index.

The popularity of governors (POPUL)

Several public opinion surveys rank governors according to their popularity. For example, the Russian Public Opinion Polling Center (VTSIOM) collects data about the satisfaction of citizens with government performance and public services measured as a percentage of total positive responses. An alternative source are GeoRating surveys conducted by the Public Opinion Foundation (Fond Obshchestvennoe Mnenie) in 68 Russian regions. The respondents were asked, “Do you think the leader of your region is doing a good job or a bad job?” The results of only the March 2009 survey are publicly available, while other survey data are private. Ora John Reuter kindly shared the commercial data by the Public Opinion Foundation (personal communication, January 2020). The database

\(^{18}\)It included 319 indicators in 2010. In August 2012, another presidential decree introduced a new list of 12 more general indicators for evaluating governors’ performance. Once gubernatorial elections were reintroduced in late 2012, these indicators were no longer used for the assessment of regional executives.
includes the approval and disapproval rates of the governor. For the analysis, the data on the approval and disapproval of the incumbents one year preceding their reappointment or dismissal were used. To assign crisp-set membership scores to cases, I set the approval rate of 40 percent as the inclusion threshold because the incumbents with the approval rate of higher than 40 percent had at the same time quite low disapproval rate. For example, the approval rate of Astrakhan’s Aleksandr Zhilkin and Chuvashia’s Nikolay Fedorov was 38.50 and 38.75 percent, respectively. Their disapproval rate, however, was 41.25 and 41.75 percent, correspondingly. In contrast, the approval rate of Penza’s Vasily Bochkarev and Krasnodar’s Aleksandr Tkachev was 42.00 and 44.50 percent with their disapproval rate being 29.50 and 21.25 percent, respectively. Table A.2 and Table A.3 display the raw and calibrated data.

6 Results and discussion

6.1 The analysis of the outcome gubernatorial reappointment

A condition is considered necessary if it passes a consistency threshold of at least 0.9 (Ragin, 2006).

In line with expectation, the ability of governors to mobilize voters passes this threshold with perfect consistency of 1.00. However, its relevance is only 0.182, which indicates its trivialness and implies that it should not be interpreted as a substantially necessary condition (Schneider and Wagemann, 2012, 236-237). Table A.4 reports parameters of fit for other conditions.

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19See also Figure A.2 and Figure A.3 for the distribution of the crisp set membership scores and the plots of the raw data against the crisp set membership scores.

20For the analysis, the R programming packages ‘QCA’ (Dusa, 2019) and ‘Set Methods’ (Oana and Schneider, 2018) were used.
The analysis of sufficiency is based on the logical minimization of sufficient truth table rows. Table 2 below displays the truth table representation of set membership scores of 25 cases in the condition sets and the outcome set.

Table 2: Truth table, outcome reappointment

<table>
<thead>
<tr>
<th>Cases</th>
<th>Reappointment</th>
<th>Dismissal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Row</strong></td>
<td><strong>VOT</strong></td>
<td><strong>STAB</strong></td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
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<td>16</td>
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<td>0</td>
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<tr>
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<td>0</td>
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<td>6</td>
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</tr>
<tr>
<td>8</td>
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<td>1</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Consistency cut-off = 1.00.
The first column indicates the row number as it appears in the software output. Columns two through five display the status of four conditions: 1 means present and 0 means absent. The column “OUT” denotes if a truth table row is sufficient for the outcome. The consistency score displayed in the column “incl.” along with the PRI score shown in the column “PRI”\(^{21}\) determine the decision about sufficiency. A recommended threshold for consistency is higher or equal to 0.75 (Schneider and Wagemann, 2010, 10). Taking into account the gaps in consistency and PRI scores, the threshold is set to 1.00. The column “n” shows how many cases belong to a given row; and the column “Cases” names them. The columns “Reappointment” and “Dismissal” speak for themselves.

The analysis of sufficiency applies rules of the Boolean algebra to reduce the complexity of sufficient truth table rows. It produces conservative, parsimonious, and intermediate solution formulas.\(^{22}\) In the present analysis, the parsimonious solution formula displays model ambiguity—see Table A.5. Conservative and intermediate solution formulas look identical and include two combinations of conditions.\(^{23}\) The first combination is the ability of governors to mobilize voters and to keep stability combined with the effectiveness of governors in managing their territory (VOT*STAB*EFF). The second combination is the ability of governors to mobilize voters and to keep stability combined with the popularity of governors (VOT*STAB*POPUL). Table 3 below reports parameters of fit and cases.\(^{24}\)

\(^{21}\)PRI means proportional reduction in inconsistency and indicates “how much it helps to know that a given X is specifically a subset of Y and not a subset of Y” (Schneider and Wagemann, 2012, 242).

\(^{22}\)The conservative solution formula is the most complex one as it is based only on empirically observed evidence. The parsimonious solution formula is based on assumptions about the logical remainsders, which contribute to parsimony and called simplifying assumptions. It is the least complex solution. The intermediate solution formula is based only on those simplifying assumptions that at the same time represent easy counterfactuals meaning they are consistent with theoretical directional expectations. The intermediate solution is often but not necessarily always less complex than the conservative solution and more complex than the parsimonious solution (Schneider and Wagemann, 2012, 174).

\(^{23}\)Directional expectations state that all conditions contribute to the outcome in their presence.

\(^{24}\)Figure A.4 displays sufficiency plot of the solution formula.
Table 3: Conservative solution formula, outcome reappointment

<table>
<thead>
<tr>
<th></th>
<th>Cons.</th>
<th>PRI</th>
<th>Raw cov.</th>
<th>Uniq. cov.</th>
<th>Typical cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOT<em>STAB</em>EFF +</td>
<td>1.000</td>
<td>1.000</td>
<td>0.286</td>
<td>0.143</td>
<td>Betin_TAM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vinogradov_VLA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Artamonov_KLU</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tuleev_KEM</td>
</tr>
<tr>
<td>VOT<em>STAB</em>POPUL</td>
<td>1.000</td>
<td>1.000</td>
<td>0.429</td>
<td>0.286</td>
<td>Korolev_LIP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Markelov_ME</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Merkushkin_MO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Morozov_ULY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Artamonov_KLU</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tuleev_KEM</td>
</tr>
<tr>
<td>Overall solution</td>
<td>1.000</td>
<td>1.000</td>
<td>0.571</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

1 Capital letters denote presence, * stands for logical AND, + stands for logical OR.
2 Uniquely covered cases are in bold.

Solution consistency is 1.000, which is perfect. However, solution coverage that shows how much of the outcome is in line with the results is only 0.571, which is quite modest. Typically, low coverage value means that many cases remain uncovered by the theoretical model (Rubinson et al., 2019, 5). In other words, it suggests that in some cases the reappointment process involved additional factors that were not included in the analysis.

Two conditions, VOT and STAB, are present in both sufficient combinations. None of them, however, is individually necessary for the reappointment. Consistency of the intersection is also low—only 0.714. Moreover, Figure A.5 displays the necessity plot with four deviant cases confirming that the intersection of VOT*STAB should not be interpreted as necessary but rather as very important INUS conditions.25

The first sufficient combination (VOT*STAB*EFF) has consistency of 1.000 and coverage of 0.286. Typical uniquely covered cases include the governors of Tambov and Vladimir oblasts. Consistency of the second combination (VOT*STAB*POPUL) is 1.000

\[\text{INUS means “Insufficient but Necessary part of a combination that is itself Unnecessary but Sufficient for the outcome” (Schneider and Wagemann, 2012, 4).}\]
and its coverage is 0.429. The governors of Lipetsk and Ulyanovsk oblasts along with the heads of the republics of Mari El and Mordovia represent typical uniquely covered cases. The unique coverage that indicates how much of the outcome is explained by the single solution path is 0.143 and 0.286 for the first and the second combinations, respectively.

### 6.2 The analysis of the outcome gubernatorial dismissal

The analysis of necessity confirms that VOT represents a trivial necessary condition as its consistency is 0.818, while its relevance is only 0.125. Additionally, the analysis shows that the lack of incumbent’s popularity (popul) has consistency of 0.909 and relevance of 0.600. However, as the necessity plot displays that Sverdlovsk Oblast’s Eduard Rossel represents a deviant case, this condition is not interpreted as substantively necessary.

For the analysis of sufficiency, a consistency threshold is set to 0.75—see Table A.7 for the truth table. Parsimonious and intermediate solution formulas look identical and are reported in Table A.8. As conservative solution formula provides richer evidence for interpretation, it is selected for substantive discussion. The solution formula includes two combinations of conditions. The first combination is the ability of governors to mobilize voters combined with their inability to keep stability in the regions and the lack of governors’ popularity (VOT*stab*popul). The second combination is the ability of governors to keep stability and the effectiveness of governors in managing their territory combined with the absence of other the two conditions (vot*STAB*EFF*popul). Solution consistency is 0.818, which is at the acceptable level. Solution coverage is also 0.818 meaning that these results ”cover” the majority of cases. Table 4 below reports parameters of fit and displays the typical and deviant cases.

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26Table A.6 and Figure A.6 display the parameters of fit and for the necessity plot, respectively.
Table 4: Conservative solution formula, outcome dismissal

<table>
<thead>
<tr>
<th></th>
<th>Cons.</th>
<th>PRI</th>
<th>Raw cov.</th>
<th>Uniq. cov.</th>
<th>Typical cases</th>
<th>Deviant cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOT<em>stab</em>popul +</td>
<td>0.778</td>
<td>0.778</td>
<td>0.636</td>
<td>0.636</td>
<td>Batdyev_KC, Zhilkin_AST, Ilyumzhinov_KL, Volkov_UD, Kulakov_VOR, Maksyuta_VGG, Shaklein_KIR, Chernyshov_ORE, Fedorov_CU, Polezhaev_OMS, Kress_TOM</td>
<td></td>
</tr>
<tr>
<td>vot<em>STAB</em>EFF*popul</td>
<td>1.000</td>
<td>1.000</td>
<td>0.182</td>
<td>0.182</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall solution</td>
<td>0.818</td>
<td>0.818</td>
<td>0.818</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Capital letters denote presence, small letters indicate absence, * stands for logical AND, + stands for logical OR.
2 Uniquely covered cases are in bold.

The first combination (VOT*stab*popul) has consistency of 0.778 and coverage of 0.636. The governors of Voronezh, Volgograd, Kirov and Orenburg oblasts along with the heads of Karachay-Cherkessia and Kalmykia represent typical uniquely covered cases. The governor of Astrakhan Oblast and the head of Udmurtia are deviant cases. Consistency of the second combination (vot*STAB*EFF*popul) is 1.000 and its coverage is 0.182. Typical uniquely covered cases include the governors of Omsk and Tomsk oblasts. The unique coverage is 0.636 and 0.182 for the first and the second combinations, respectively. The next subsection reports the results of the robustness tests.

6.3 Robustness tests

To test robustness of the results, Wagemann and Schneider (2015, 41) suggest to check if changes in the calibration, in the case selection, and in the raw consistency levels produce any “substantively different results.” The original analysis has been performed with the data assigned crisp set membership scores. Therefore, the alternative calibration strategy involves the assignment of fuzzy-set membership scores to cases in the the condition sets.
First, I employed the ‘indirect’ or theoretical method of calibration opting for a four-value fuzzy scale and assigning scores of 0, 0.33, 0.67, and 1 to cases (Ragin, 2009). The alternative analysis of the reappointment has yielded similar conservative solution formula as the one produced in the original analysis (see Table B.1 and Table B.2 for the truth table and the solution formula). However, it was not possible to perform the alternative analysis of the dismissal as none of the truth table rows had a consistency value of higher than or equal to 0.75 (see Table B.3).

For the second alternative analysis, I employed the ‘direct’ method of calibration, which fits the raw data in-between three qualitative anchors denoting full inclusion in the set, crossover point, and full exclusion from the set (Ragin, 2008; Schneider and Wagemann, 2012). The alternative conservative solution formula for the outcome reappointment consists of only one term—VOT*STAB*POPUL. This is because rows 14 and 16 were included in the minimization procedure, while row 15 was not included due to its low consistency of 0.675 (see Table B.4 and Table B.5 for the truth table and the solution formula). Similarly, only the raw 9 was included in the alternative analysis of the dismissal. Raw 7 with two cases of dismissal has a consistency of 0.709 and, therefore, was not included in the minimization procedure. The alternative conservative solution formula consists of one combination—VOT*stab*eff*popul (see Table B.6 and Table B.7 for the truth table and the solution formula). These two alternative analyses have confirmed the point that when accounting for differences in kind in the outcome, it is meaningful to account in differences in kind in the conditions as well.

For the third alternative analysis, I excluded the incumbents who served in office only for one term before being reappointed or dismissed as they had the shortest tenure. These 27The replication script provides the alternative calibration anchors for both the ‘indirect’ and ‘direct’ calibration strategies.
cases are Aleksandr Zhilkin and Sergey Morozov in Astrakhan and Ulyanovsk oblasts whose terms started in 2004 and 2005, respectively; and also Nikolay Shaklein in Kirov Oblast who was elected in 2004. The alternative solution formulas of the reappointment and dismissal look identical as the ones produced in the original analysis (see Table B.8 and Table B.9).

Finally, for the fourth alternative analysis, I employed the integral index of governors’ effectiveness to calibrate the condition the effectiveness of governors in managing their territory. The alternative solution formulas closely resemble the solutions of the original analysis (see Table B.10 and Table B.11). Overall, the alternative analyses have confirmed the robustness of the results.28 The next subsection provides their substantive interpretation.

6.4 Discussion of the results

The analysis has not confirmed the expectation that the ability of incumbent governors to deliver high electoral results ultimately leads to their reappointment. This is a very important insight as previous studies find a strong relationship between the electoral results and the chances of gubernatorial (re)appointment (Reuter and Robertson, 2012; Rochlitz, 2016; Reisinger and Moraski, 2017; Libman and Rochlitz, 2019). The present analysis reveals that the ability to deliver high electoral results, in fact, represents a trivial necessary condition meaning that it cannot be linked to the outcome or its absence because it is present in both instances of the outcome. There are two possible interpretations of this finding. The first interpretation is that the center expects all governors to deliver high electoral results so this is an established ‘rule of the game.’ Consequently, there are

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28I did not perform the alternative analysis altering the consistency cut-off as it was set in the original analysis at 1.00. The alternative cut-off would be 0.66, which is below the recommended inclusion score of 0.75.
no rewards for those who comply with the rules. The second interpretation is that the incumbent governors having stayed in office for many years are simply better skilled in delivering votes. Existing literature posits that to deliver votes, regional elites rely on political machines that are based on informal elite networks (Reuter, 2013; Golosov, 2014; Hertel-Fernandez, 2016). These theories assume that the longer the regional patron stays in office, the more extensive networks he or she builds, and the more effective they are in mobilizing voters (Frye et al., 2014, 2019a,b). Although this assumption is plausible, little empirical work has assessed it so far.

Additionally, the analysis of sufficiency has revealed two paths leading to gubernatorial reappointment. The first is the ability to mobilize voters and to keep stability in the regions in combination with the effectiveness of incumbents in managing their territory (VOT*STAB*EFF). The second is the ability to mobilize voters and to keep stability in combination with the popularity of incumbents (VOT*STAB*POPUL). These findings suggest that an intersection of VOT*STAB represents a very important INUS condition which is in line with the "top-down" explanation. It means that as long as the main "federal priorities" of high voting results and political stability in the region are fulfilled the incumbents stay in office (Busygina et al., 2018; Libman and Rochlitz, 2019).

On the other hand, this analysis suggests that intergovernmental interactions in Russia are quite complex and there is still some space for the "bottom-up" dynamics. It is a combination of fulfilled "federal priorities" either with the effectiveness of incumbents in managing their territory or with the popularity of incumbents. The latter scenario has been theorized in previous studies. For example, Reuter (2013) finds that the United Russia party performs better when governors are popular. This is because "even as appointed officials, regional governors remained by far the most powerful players in Russian regional politics" (Reuter, 2013, 106). However, none of previous analyses has found empirical support for the former scenario attempting to reveal "an average effect" of certain
independent variables (Reuter and Robertson, 2012; Rochlitz, 2016; Reisinger and Moraski, 2017). Yet it is quite plausible that during the economic crisis, President Medvedev paid attention to the development of the regional economy and rewarded a few incumbents who performed well. Then, further analysis is needed to explain why the incumbents, for example, in Kaluga or Vladimir oblasts, have performed as effective managers in the absence of any incentives from the center.

The present analysis has evaluated two explanations of gubernatorial (re)appointment that have been so far the most common in the literature. The analysis of sufficiency for the outcome reappointment, however, has yielded the solution formula with quite modest coverage of 0.571. This implies that the results cover slightly more than half of all cases of reappointment. Formal theory evaluation indicates that the theory formulated as VOT*STAB + EFF*POPUL explains 32 percent of total number of cases. It explains more than 57.14 percent of cases that display the outcome reappointment. These results confirm the complexity of the reappointment process and suggest that it involved additional factors that have not been detected by previous studies.

7 Conclusion

Existing literature suggests that under Putin the ability of regional elites to deliver high electoral results has become a crucial element of intra-elite bargaining and territorial politics in Russia more generally. This study, however, shows that the ability to deliver high voting results alone could not guarantee the reappointment of incumbent governors in Russia between 2008 and 2012. On the other hand, it reveals that the failure to do so has been among sufficient conditions leading to the dismissal of incumbents. The analysis also detects two sufficient combinations accounting for gubernatorial reappointment. They support the argument that the incumbents stay in office as long as they fulfill the main
"federal priorities" of high electoral results and political stability in the regions (Busygina et al., 2018; Libman and Rochlitz, 2019).

In contrast to the 1990s, when it was the executives in the ethnic regions who stayed in office the longest, in the 2000s it was the incumbents in the regions with a predominantly ethnic Russian population (oblasts and krais) who had the longest tenure. The findings of this analysis suggest that, being dependent on electoral results, the regional executives not only in the ethnic regions but also in the regions with a predominantly ethnic Russian population have relied on strong political machines to influence electoral outcomes. By doing so they have contributed to the authoritarian regression that took place in Russia over the 2000s.

According to the literature, elections at the subnational level is a distinctive feature of democratic federations (Filippov et al., 2004). The puzzle of Russian federalism is then that, despite the return to gubernatorial elections in 2012, it still displays clear authoritarian features (Obydenkova and Swenden, 2013; Kropp, 2019; Libman and Rochlitz, 2019). Therefore, further research needs to study how authoritarian federations mimic democratic federations by combining institutions that are associated with democracy (e.g., elections) with authoritarian distribution and reproduction of power.

References


## A Appendix

Table A.1: Cases selected for the analysis

<table>
<thead>
<tr>
<th>No</th>
<th>Region</th>
<th>Region code</th>
<th>Governor</th>
<th>Case label</th>
<th>Year</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Astrakhan Oblast</td>
<td>AST</td>
<td>Aleksandr Zhilkin</td>
<td>Zhilkin_AST</td>
<td>2009</td>
<td>reappointment</td>
</tr>
<tr>
<td>2</td>
<td>Udmurtia</td>
<td>UD</td>
<td>Aleksandr Volkov</td>
<td>Volkov_UD</td>
<td>2009</td>
<td>reappointment</td>
</tr>
<tr>
<td>3</td>
<td>Vladimir Oblast</td>
<td>VLA</td>
<td>Nikolay Vinogradov</td>
<td>Vinogradov_VLA</td>
<td>2009</td>
<td>reappointment</td>
</tr>
<tr>
<td>4</td>
<td>Kemerovo Oblast</td>
<td>KEM</td>
<td>Aman Tuleev</td>
<td>Tuleev_KEM</td>
<td>2010</td>
<td>reappointment</td>
</tr>
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<td>Mordovia</td>
<td>MO</td>
<td>Nikolay Merkushkin</td>
<td>Merkushkin_MO</td>
<td>2010</td>
<td>reappointment</td>
</tr>
<tr>
<td>6</td>
<td>Kursk Oblast</td>
<td>KRS</td>
<td>Aleksandr Mikhailov</td>
<td>Mikhailov_KRS</td>
<td>2010</td>
<td>reappointment</td>
</tr>
<tr>
<td>7</td>
<td>Marii El</td>
<td>ME</td>
<td>Leonid Markelov</td>
<td>Markelov_ME</td>
<td>2010</td>
<td>reappointment</td>
</tr>
<tr>
<td>8</td>
<td>Lipetsk Oblast</td>
<td>LIP</td>
<td>Oleg Korolev</td>
<td>Korolev_LIP</td>
<td>2010</td>
<td>reappointment</td>
</tr>
<tr>
<td>9</td>
<td>Kurgan Oblast</td>
<td>KGN</td>
<td>Oleg Bogomolov</td>
<td>Bogomolov_KGN</td>
<td>2010</td>
<td>reappointment</td>
</tr>
<tr>
<td>10</td>
<td>Penza Oblast</td>
<td>PNZ</td>
<td>Vasily Bochkarev</td>
<td>Bochkarev_PNZ</td>
<td>2010</td>
<td>reappointment</td>
</tr>
<tr>
<td>11</td>
<td>Tambov Oblast</td>
<td>TAM</td>
<td>Oleg Betin</td>
<td>Betin_TAM</td>
<td>2010</td>
<td>reappointment</td>
</tr>
<tr>
<td>12</td>
<td>Kaluga Oblast</td>
<td>KLU</td>
<td>Anatoly Artamonov</td>
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<td>2010</td>
<td>reappointment</td>
</tr>
<tr>
<td>13</td>
<td>Ulyanovsk Oblast</td>
<td>ULY</td>
<td>Sergey Morozov</td>
<td>Morozov_ULY</td>
<td>2011</td>
<td>reappointment</td>
</tr>
<tr>
<td>14</td>
<td>Krasnodar Krai</td>
<td>KDA</td>
<td>Aleksandr Tkachev</td>
<td>Tkachev_KDA</td>
<td>2012</td>
<td>reappointment</td>
</tr>
<tr>
<td>15</td>
<td>Karachay-Cherkessia</td>
<td>KC</td>
<td>Mustafa Batdyev</td>
<td>Batdyev_KC</td>
<td>2008</td>
<td>dismissal</td>
</tr>
<tr>
<td>16</td>
<td>Kirov Oblast</td>
<td>KIR</td>
<td>Nikolay Shaklein</td>
<td>Shaklein_KIR</td>
<td>2009</td>
<td>dismissal</td>
</tr>
<tr>
<td>17</td>
<td>Sverdlovsk Oblast</td>
<td>SVE</td>
<td>Eduard Rossel</td>
<td>Rossel_SVE</td>
<td>2009</td>
<td>dismissal</td>
</tr>
<tr>
<td>18</td>
<td>Voronezh Oblast</td>
<td>VOR</td>
<td>Vladimir Kulakov</td>
<td>Kulakov_VOR</td>
<td>2009</td>
<td>dismissal</td>
</tr>
<tr>
<td>19</td>
<td>Volgograd Oblast</td>
<td>VGG</td>
<td>Nikolay Maksyuta</td>
<td>Maksyuta_VGG</td>
<td>2010</td>
<td>dismissal</td>
</tr>
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<td>20</td>
<td>Kalmykia Republic</td>
<td>KL</td>
<td>Kirsan Ilyumzhinov</td>
<td>Ilyumzhinov_KL</td>
<td>2010</td>
<td>dismissal</td>
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<td>21</td>
<td>Orenburg Oblast</td>
<td>ORE</td>
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<td>Chernyshov_ORE</td>
<td>2010</td>
<td>dismissal</td>
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<td>22</td>
<td>Komi Republic</td>
<td>KO</td>
<td>Vladimir Torlopov</td>
<td>Torlopov_KO</td>
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<td>dismissal</td>
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<tr>
<td>23</td>
<td>Chuvashia Republic</td>
<td>CU</td>
<td>Nikolay Fedorov</td>
<td>Fedorov_CU</td>
<td>2010</td>
<td>dismissal</td>
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<td>24</td>
<td>Omsk Oblast</td>
<td>OMS</td>
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<td>2012</td>
<td>dismissal</td>
</tr>
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<td>25</td>
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<td>TOM</td>
<td>Viktor Kress</td>
<td>Kress_TOM</td>
<td>2012</td>
<td>dismissal</td>
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Table A.2: The raw data

<table>
<thead>
<tr>
<th>No</th>
<th>Case label</th>
<th>VOT raw</th>
<th>STAB raw</th>
<th>EFF raw</th>
<th>POPUL raw</th>
<th>REAP</th>
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<td>Zhilkin_AST</td>
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<td>38.50</td>
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<td>Vinogradov_VLA</td>
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<td>30</td>
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<td>1</td>
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<td>7958</td>
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<td>79.75</td>
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<td>Merkushkin_MO</td>
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Figure A.1: Distribution of the raw data

Figure A.2: Distribution of the crisp set membership scores
Figure A.3: Plots of the raw data against the crisp set membership scores

Table A.4: Parameters of fit, necessity, outcome reappointment

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Table A.5: Parsimonious solution formula, outcome reappointment (two models)

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1 Capital letters denote presence, small letters indicate absence, * stands for logical AND, + stands for logical OR.

2 Simplifying assumptions for M1 are 0101 and 0111; for M2 - 1001.

Figure A.4: Sufficiency plot, conservative solution formula, outcome reappointment
Figure A.5: Necessity plot, outcome reappointment

Table A.6: Parameters of fit, necessity, outcome dismissal

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Consistency threshold = 0.75.
Table A.8: Parsimonious solution formula, outcome dismissal

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Overall solution 0.818 0.818 0.818

1 Small letters indicate absence, * stands for logical AND, + stands for logical OR.
2 Intermediate solution formula looks identical. Directional expectations state that all conditions contribute to the outcome in their absence.
3 Simplifying assumptions are as follows: 0000, 0010, 0100.
4 Uniquely covered cases are in bold.
## B Robustness tests

Table B.1: Alternative truth table 1, outcome reappointment

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Consistency cut-off = 0.75.
Table B.2: Alternative conservative solution formula 1, outcome reappointment

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1 Capital letters denote presence, * stands for logical AND, + stands for logical OR.
2 Uniquely covered cases are in bold.
Table B.3: Alternative truth table 1, outcome dismissal

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Table B.4: Alternative truth table 2, outcome reappointment

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Consistency cut-off = 0.75.
Table B.5: Alternative conservative solution formula 2, outcome reappointment

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<th>Raw cov.</th>
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<th>Typical cases</th>
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| VOT*STAB*POPUL | 0.907 | 0.907 | 0.406 | Korolev_LIP  
Markelov_ME  
Merkushkin_MO  
Morozov_ULY  
Artamonov_KLU  
Tuleev_KEM |
| Overall solution | 0.907 | 0.907 | 0.406 | |

1 Capital letters denote presence, * stands for logical AND.
2 Uniquely covered cases are in bold.
Table B.6: Alternative truth table 2, outcome dismissal

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Table B.7: Alternative conservative solution formula 2, outcome dismissal

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<th>Deviant cases</th>
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1 Capital letters denote presence, small letters indicate absence, * stands for logical AND.

Table B.8: Alternative conservative solution 3, outcome reappointment

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<th>Typical cases</th>
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<td>0.583</td>
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1 Capital letters denote presence, * stands for logical AND, + stands for logical OR.
2 Uniquely covered cases are in bold.
Table B.9: Conservative solution formula 3, outcome dismissal

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<th>Deviant cases</th>
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1 Capital letters denote presence, small letters indicate absence, * stands for logical AND, + stands for logical OR.
2 Uniquely covered cases are in bold.

Table B.10: Alternative conservative solution 4, outcome reappointment

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<td>1.000</td>
<td>0.429</td>
</tr>
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<td></td>
</tr>
<tr>
<td>Overall solution</td>
<td>1.000</td>
<td>1.000</td>
<td>0.571</td>
</tr>
</tbody>
</table>

1 Capital letters denote presence, * stands for logical AND, + stands for logical OR.
2 Uniquely covered cases are in bold.
Table B.11: Conservative solution formula 4, outcome dismissal

<table>
<thead>
<tr>
<th></th>
<th>Cons.</th>
<th>PRI</th>
<th>Raw cov.</th>
<th>Uniq. cov.</th>
<th>Typical cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOT<em>stab</em>EFF*popul +</td>
<td>1.000</td>
<td>1.000</td>
<td>0.182</td>
<td>0.182</td>
<td>Chernyshov_ORE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fedorov_CU</td>
</tr>
<tr>
<td>vot<em>STAB</em>EFF*popul</td>
<td>1.000</td>
<td>1.000</td>
<td>0.182</td>
<td>0.182</td>
<td>Polezhaev_OMS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Kress_TOM</td>
</tr>
<tr>
<td>Overall solution</td>
<td>1.000</td>
<td>1.000</td>
<td>0.364</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Capital letters denote presence, small letters indicate absence, * stands for logical AND, + stands for logical OR.
2 Uniquely covered cases are in bold.
C Replication Script

```r
### Replication script to "Explaining the Tenure of Incumbent Governors
### in Russia: A Qualitative Comparative Analysis"

# Remove everything from the working environment:
rm(list=ls())

# Set your working directory:
setwd()
getwd()

# Load the packages:
library(QCA)
library(SetMethods)

# Load the raw data:
DT <- read.csv("raw_data.csv", row.names = 1, sep="",""
head(DT)

# Calibration ====

# VOT #
# Check the distribution of the raw data
hist(DT$VOT_raw,
   xlab = "VOT_raw",
   main = paste("Histogram of the raw VOT scores"))

VOT <- calibrate(DT$VOT_raw, type = "crisp", thresholds = 51)

DT$VOT <- VOT

# Visualize the crisp set scores using a histogram:
hist(DT$VOT,
   xlab = "VOT",
   main = paste("Histogram of the crisp set VOT scores"))

# Plot the raw data against the crisp set scores:
plot(DT$VOT_raw, DT$VOT)

# STAB #

# Check the distribution of the raw data
hist(DT$STAB_raw,
   xlab = "STAB_raw",
   main = paste("Histogram of the raw STAB scores"))

# To remove Maksyuta VGG as it represents a significant outlier
DT1 <- DT[-c(19),]
```

50
# Check the distribution of the raw data again
hist(DT1$STAB_raw, 
    xlab = "STAB_raw",
    main = paste("Histogram of the raw STAB scores"))

# Calibrate the raw data
STAB <- NA #empty vector
STAB[DT$STAB_raw <= 20000] <- 1
STAB[DT$STAB_raw > 20000] <- 0
STAB

# Add the new calibrated set to the data frame:
DT$STAB <- STAB

# for Batdyev KC
DT[15, 1:7]
DT[15, 7] <- 0
DT[15, 1:7]

# for Ilyumzhinov KL
DT[20, 1:7]
DT[20, 7] <- 0
DT[20, 1:7]

# Visualize the crisp set scores using a histogram:
hist(DT$STAB, 
    xlab = "STAB",
    main = paste("Histogram of the crisp set STAB scores"))

# Plot the raw data against the crisp set scores:
plot(DT$STAB_raw, DT$STAB)

# Maksyuta VOG again distorts the distribution of the scores,
# let us plot the scores without it

# Calibrate the raw scores
STAB <- NA #empty vector
STAB[DT1$STAB_raw <= 20000] <- 1
STAB[DT1$STAB_raw > 20000] <- 0
STAB

# Add the new calibrated set to the data frame:
DT1$STAB <- STAB

# for Batdyev KC
DT[15, 1:7]
DT[15, 7] <- 0
DT[15, 1:7]

# for Ilyumzhinov KL
# Visualize the crisp set scores using a histogram:
```r
hist(DT1$STAB,
     xlab = "STAB",
     main = paste("Histogram of the crisp set STAB scores"))
```

# Finally, plot the raw data against the crisp set scores:
```r
plot(DT1$STAB_raw, DT1$STAB)
```

# EFF #

# Check the distribution of the raw data:
```r
hist(DT$EFF_raw,
     xlab = "EFF\_raw",
     main = paste("Histogram of the raw EFF scores"))
```

# Calibrate the raw data:
```r
EFF <- NA #empty vector
EFF[DT$EFF\_raw<=40]<-1
EFF[DT$EFF\_raw>40]<-0
EFF
```

# Add the new calibrated sets to the data frame:
```r
DT$EFF <- EFF
```

# Check the distribution of the crisp set scores:
```r
hist(DT$EFF,
     xlab = "EFF",
     main = paste("Histogram of the crisp set EFF scores"))
```

# Plot the raw data against the crisp set scores:
```r
plot(DT$EFF\_raw, DT$EFF)
```

# POPUL #

# Check the distribution of the raw data:
```r
hist(DT$POPUL\_raw,
     xlab = "POPUL\_raw",
     main = paste("Histogram of the raw POPUL scores"))
```

# Calibrate the raw data:
```r
POPUL <- calibrate(DT$POPUL\_raw, type = "crisp", thresholds = 40)
POPUL
```

# Add the calibrated set to the data frame:
# Check the distribution of the crisp set scores:

```r
hist(DT$POPUL, 
     xlab = "POPUL", 
     main = paste("Histogram of the crisp set POPUL scores"))
```

# Plot the raw data against the crisp set scores:

```r
plot(DT$POPUL_raw, DT$POPUL)
```

head(DT)

# OUT #

# Check the distribution of the raw data:

```r
hist(DT$OUT_raw, 
     xlab = "OUT_raw", 
     main = paste("Histogram of the raw OUT scores"))
```

# Calibrate the raw data:

```r
OUT <- DT$OUT_raw
```

# Add to the data frame:

```r
DT$OUT <- OUT
```

# Check the distribution of the crisp set scores:

```r
hist(DT$OUT, 
     xlab = "OUT", 
     main = paste("Histogram of the crisp set OUT scores"))
```

# Plot the raw data against the crisp set scores:

```r
plot(DT$OUT_raw, DT$OUT)
```

# Remove columns with the raw data:

```r
DT <- DT[, -c(1:5)]
```

# Examine skewness of the data:

```r
skew.check(DT)
```

# Save calibrated data set as a csv file

```r
write.csv(DT, "calibrated.csv")
```

# Outcome: reappointment ———

# Analysis of necessity ———

```r
rm(list=ls())
```

```r
DT <- read.csv("calibrated.csv", row.names = 1, sep="",""
```

head(DT)
QCAfit(DT[, 1:4], DT$OUT, names(DT[, 1:4]), necessity = TRUE)

# VOT has consistency of 1.000, but low relevance of 0.182,
# it is more likely to be a trivial necessary condition

# Let us plot it:
xy.plot("VOT",
"OUT",
data = DT,
xlab="VOT",
ylab="OUT",
necessity=TRUE,
jitter = TRUE)

# No deviant cases, yet clearly trivial necessary condition

# Let us also check for SUIN conditions
SUIN.y <- superSubset(data = DT,
outcome = "OUT",
conditions = c("VOT", "STAB", "EFF",
"POPUL"),
relation = "necessity",
incl.cut = 0.90,
cov.cut = 0.5,
ron.cut = 0.5,
depth = 2)

# No

# Analysis of sufficiency ——

# Create a truth table setting a cut-off at 1.00
TT <- truthTable(DT, outcome = "OUT",
conditions = c("VOT", "STAB", "EFF",
"POPUL"),
incl.cut1 = 1.00,
complete = TRUE,
show.cases = TRUE,
PRI = TRUE,
sort.by = c("OUT","incl","n"))

# Conservative solution
sol_c <- minimize(TT, details = TRUE,
show.cases = TRUE,
use.tilde=FALSE)
sol_c

## Typical cases

cases.suf.typ(results = sol_c, outcome = "OUT")

## Deviant cases

cases.suf.dcn(results = sol_c, outcome = "OUT")

# Let us examine conservative solution with pimplot:
pimplot(data = DT,
        results = sol_c,
        outcome = "OUT",
        all_labels = TRUE,
        jitter = TRUE)

## VOT*STAB are present in both solution terms

# Let us check if they are necessary together
INTERSECTION <- DT$VOT*DT$STAB
DT$INTERSECTION <- INTERSECTION

QCAfit(DT[, 6], DT$OUT, names(DT[, 6]), necessity = TRUE)

## low consistency of 0.714, RoN of 0.933

## Let us create an XY plot
xy.plot("INTERSECTION");
"OUT",
        data = DT,
        xlab="VOT*STAB",
        ylab="OUT",
        necessity = TRUE,
        jitter = TRUE)

## four deviant cases,
## should not be interpreted as necessary,
## but definitely an important INUS condition

## Most parsimonious solution

## Exclude simplifying assumption 2
## VOT STAB EFF POPUL
## 0 0 0 1
## as at least two conditions are expected to be present
## to produce the outcome reappointment

sol_p <- minimize(TT, details = TRUE,
       include = "?",
       show_cases = TRUE,
       exclude = "2")
sol_p

# model ambiguity

# Check simplifying assumptions
sol_p$SA

# Typical cases
cases.suf.typ(results = sol_p, outcome = "OUT", 1)
cases.suf.typ(results = sol_p, outcome = "OUT", 2)

# Deviant cases
cases.suf.dcn(results = sol_p, outcome = "OUT", 1)
# no
cases.suf.dcn(results = sol_p, outcome = "OUT", 2)
# no

# Intermediate solution
# directions expectations: all conditions are expected
to contribute to the outcome in their presence

 sol_i <- minimize(TT, details = TRUE, include = "?",
                      show.cases = TRUE,
                      dir.exp = c(1, 1, 1, 1))

sol_i

# same as conservative

# Check easy counterfactuals
sol_i$s_i.sol$sC1P1$EC
# no

# Outcome: dismissal ——

# Analysis of necessity ——
QCAfit(DT[, 1:4], DT$OUT, names(DT[, 1:4]),
  necessity = TRUE, neg.out = TRUE)

# popul has consistency of 0.909
# and relevance of 0.600

# Let us examine it with XY plot
xy.plot("~POPUL",
  ~"OUT",
  data = DT,
  xlab="~POPUL",
  ylab="OUT",
  necessity=TRUE,
  jitter = TRUE)

# one deviant case — Rossel_SVE
# Let us also check SUIN conditions
SUIN.ny <- superSubset(data = DT,
outcome = "~OUT",
conditions = c("VOT", "STAB", "EFF",
"POPUL"),
relation = "necessity",
incl.cut = 0.90,
ron.cut = 0.5,
cov.cut = 0.6,
depth = 2)

SUIN.ny

# popul
# vot+stab
# none stands for any higher order concept

# Analysis of sufficiency ---

# Create a truth table setting a cut-off at 0.75
TT.n <- truthTable(DT, outcome = "~OUT",
conditions = c("VOT", "STAB", "EFF",
"POPUL"),
incl.cut1 = 0.75,
complete = TRUE,
show.cases = TRUE,
sort.by = c("OUT","incl","n")

TT.n

# Conservative solution
sol.c.n <- minimize(TT.n,
details = TRUE,
show.cases = TRUE)
sol.c.n

# Typical cases
cases.suf.typ(results = sol.c.n, outcome = "~OUT")

# Deviant cases
cases.suf.dcn(results = sol.c.n, outcome = "~OUT")

# Let us examine the solution with pimplot
pimplot(data = DT,
results = sol.c.n,
outcome = "~OUT",
all_labels = TRUE,
jitter = TRUE)

# Most parsimonious solution
# Exclude rows "4", "8", and "10"
# as they include two or more conditions in their presence
sol.p.n <- minimize(TT_n,
  details = TRUE,
  include = "?",
  show.cases = TRUE,
  exclude = c("4", "8", "10"))

sol.p.n

# Typical cases
cases.suf.typ(results = sol.p.n, outcome = "OUT")

# Deviant cases
cases.suf.dcn(results = sol.p.n, outcome = "OUT")

# Check simplifying assumptions
sol.p.n$SA

# Intermediate solution
sol.i.n <- minimize(TT_n, details = TRUE, include = "?",
  show.cases = TRUE,
  dir.exp = c(0, 0, 0, 0))

sol.i.n
# same as parsimonious

# Check easy counterfactuals
sol.i.n$i.so$l$C1P1$EC
# same as simplifying assumptions

# Check for simultaneous subset relations
SSR <- intersect(rownames(TT$tt)[TT$tt$OUT==1],
  rownames(TT_n$tt)[TT_n$tt$OUT==1])
SSR
# no

# Check for any contradictory simplifying assumptions
CSA <- intersect(rownames(sol.p$i.so$l$sol_p$C1P1$SA),
  rownames(sol.p$n$i.so$l$C1P1$sol_p.n$SA))
CSA
# no

# Check for any contradictory easy counterfactuals
CEC <- intersect(rownames(sol.i$i.so$l$C1P1$EC),
  # no
rownames(sol_i$n sol$c1p1$EC))

# Theory evaluation ----

# Intersect theory with the conservative solution
TH <- theory.evaluation(theory = "VOT*STAB + EFF*POPUL",
                          empirics = sol_c,
                          outcome = "OUT",
                          sol=1,
                          print.fit=FALSE,
                          print.data=FALSE,
                          use.tilde = TRUE)

TH

# Obtain just the parameters of fit for each intersection
TH$fit

# Obtain just the names of cases for each intersection
TH$cases

# Robustness ----

# Test 1 ----
# Alternative calibration strategy 1: theoretical or 'indirect' calibration:
# 0, 0.33, 0.67, and 1
rm(list=ls())
DT <- read.csv("raw_data.csv", row.names = 1, sep="", )
head(DT)

# VOT #
# To calibrate the set VOT
# I use the following threshold values:
# less than or equal to 40 percent = 0;
# more than 40 but less than 50 = 0.33;
# more than 50 but less than 65 = 0.67;
# more than 65 percent = 1.

VOT <- NA
VOT[DT$VOT_raw<=40]<-0
VOT[DT$VOT_raw>40 & DT$VOT_raw<=50]<-0.33
VOT[DT$VOT_raw>50 & DT$VOT_raw<=65]<-0.67
VOT[DT$VOT_raw>65 & DT$VOT_raw<=100]<-1
VOT

# To add the new calibrated set to the data frame:
DT$VOT<-VOT
head(DT)
# To visualize the raw data using a histogram:
\texttt{hist(DTSVOT\_raw)}

# To visualize the fuzzy set scores using a histogram:
\texttt{hist(DTSVOT)}

# To plot the raw data against the fuzzy set scores:
\texttt{plot(DTSVOT\_raw, DTSVOT)}

\texttt{DT}

# for Tkachev\_KDA – 2011 State Duma elections
\texttt{DT[14, 1:6]}
\texttt{DT[14, 6] <- 1}
\texttt{DT[14, 1:6]}

# STAB #
# To calibrate the set STAB
# I use the following threshold values:
# more than 30,000 – 0;
# more than 20,000 but less than 30,000 – 0.33;
# more than 10,000 but less than 20,000 – 0.67;
# less than or equal to 10,000 – 1.
\texttt{STAB <- NA}
\texttt{STAB[DT$STAB\_raw <= 10000] <- 1}
\texttt{STAB[DT$STAB\_raw > 10000 & DT$STAB\_raw <= 20000] <- 0.67}
\texttt{STAB[DT$STAB\_raw > 20000 & DT$STAB\_raw <= 30000] <- 0.33}
\texttt{STAB[DT$STAB\_raw > 30000 & DT$STAB\_raw <= 250000] <- 0}
\texttt{STAB}

# To add the new calibrated set to the data frame:
\texttt{DT$STAB <- STAB}
\texttt{head(DT)}

# To visualize the raw data using a histogram:
\texttt{hist(DT$STAB\_raw)}

# To visualize the fuzzy set scores using a histogram:
\texttt{hist(DT$STAB)}

# To plot the raw data against the fuzzy set scores:
\texttt{plot(DT$STAB\_raw, DT$STAB)}

\texttt{DT}

# for Batdyev\_KC
\texttt{DT[15, 1:7]}
\texttt{DT[15, 7] <- 0.33}
\texttt{DT[15, 1:7]}

60
# for Ilyumzhinov KL
DT[20, 1:7]
DT[20, 7] <- 0.33
DT[20, 1:7]

# EFF #
# To calibrate the set EFF
# I use the following threshold values:
# more than 60 - 0;
# more than 40 but less than 60 - 0.33;
# more than 20 but less than 40 - 0.67;
# less than or equal to 20 - 1.
EFF <- NA
EFF[DT$EFF_raw <= 20] <- 1
EFF[DT$EFF_raw > 20 & DT$EFF_raw <= 40] <- 0.67
EFF[DT$EFF_raw > 40 & DT$EFF_raw <= 60] <- 0.33
EFF[DT$EFF_raw > 60 & DT$EFF_raw <= 83] <- 0
EFF
# To add the new calibrated set to the data frame:
DT$EFF <- EFF
calib_data(EFF)

# To visualize the raw data using a histogram:
hist(DT$EFF_raw)

# To visualize the fuzzy set scores using a histogram:
hist(DT$EFF)

# To plot the raw data against the fuzzy set scores:
plot(DT$EFF_raw, DT$EFF)

# POPUL #
# To calibrate the set POPUL
# I use the following threshold values:
# less than or equal to 30 percent - 0;
# more than 30 but less than or equal to 40 - 0.33;
# more than 40 but less than or equal to 50 - 0.67;
# more than 50 and less than or equal to 100 - 1.
POPUL <- NA
POPUL[DT$POPUL_raw <= 30] <- 0
POPUL[DT$POPUL_raw > 30 & DT$POPUL_raw <= 40] <- 0.33
POPUL[DT$POPUL_raw > 40 & DT$POPUL_raw <= 50] <- 0.67
POPUL[DT$POPUL_raw > 50 & DT$POPUL_raw <= 100] <- 1
POPUL

# To add the new calibrated set to the data frame:
DT$POPUL <- POPUL
head(DT)
# To visualize the raw data using a histogram:

```r
hist(DT$POPUL_raw)
```

# To visualize the fuzzy set scores using a histogram:

```r
hist(DT$POPUL)
```

# To plot the raw data against the fuzzy set scores:

```r
plot(DT$POPUL_raw, DT$POPUL)
```

# OUT #

```r
OUT <- DT$OUT_raw
```

# Remove columns with the raw data:

```r
DT <- DT[, -c(1:5)]
```

# Examine skewness of the calibrated data:

```r
skew.check(DT)
```

# Save calibrated data set as a csv file

```r
write.csv(DT, "calibrated indirect.csv")
```

```rm(list=ls())
```

```r
DT <- read.csv("calibrated indirect.csv", row.names = 1, sep="",""
```

# Alternative analysis of sufficiency 1

# Outcome: reappointment

# To create a truth table

```r
TT1 <- truthTable(DT, outcome = "OUT",
      conditions = colnames(DT[,1:4]),
      incl.cut1 = 0.75,
      complete = TRUE,
      show.cases = TRUE,
      PRI = TRUE,
      sort.by = c("OUT","incl","n")
)

TT1
```

# Alternative conservative solution 1

```r
sol_c1 <- minimize(TT, details = TRUE,
      show.cases = TRUE,
      use.tilde=FALSE)
```

```r
sol_c1
```

# Typical cases
cases.suf.typ(results = sol_c1, outcome = "OUT")

# Deviant cases
cases.suf.dcn(results = sol_c1, outcome = "OUT")

# Let us produce XY-plot of the conservative solution formula
pimplot(data = DT,
        results = sol_c1,
        outcome = "OUT",
        all_labels = TRUE,
        jitter = TRUE)

# Alternative analysis of sufficiency 1
# Outcome: dismissal

# To create a truth table
TT_n1 <- truthTable(DT, outcome = "OUT", neg.out = TRUE,
                     conditions = colnames(DT[,1:4]),
                     incl.cut1 = 0.75,
                     complete = TRUE,
                     show.cases = TRUE,
                     sort.by = c("OUT","incl","n"))

# none of the truth table rows has consistency of higher than or equal to 0.75

# Test 2 ———
# Alternative calibration strategy 2: 'direct' calibration

# VOT_raw column needs to be duplicated,
# as the results of 2007 and 2011 State Duma elections
# calibrated differently

# Calibrate the results of State Duma elections in 2007
VOT <- calibrate(DT$VOT_raw1,
                 type = "fuzzy",
                 thresholds = c(48.00, 51.00, 65.00),
                 logistic = TRUE, idm = 0.95)

# Calibrate the results of State Duma elections in 2011
VOT2 <- calibrate(DT$VOT_raw2,
                 type = "fuzzy",
                 thresholds = c(29.00, 51.00, 55.00),
                 logistic = TRUE, idm = 0.95)

# Add the new calibrated sets to the data frame:
DT$VOT <- VOT
DT$VOT2 <- VOT2
DT$VOT2 <- VOT2

# Replace data in VOT using fuzzy-set membership scores
# from VOT2 for the following three cases:
# Kress_TOM, Polezhaev_OMS, Tkachev_KDA

# for Kress_TOM
DT[25, 1:7] <- 0.1411857
DT[25, 7] <- 0.1411857

# for Polezhaev_OMS
DT[24, 1:7] <- 0.1786157
DT[24, 7] <- 0.1786157

# for Tkachev_KDA
DT[14, 1:7] <- 0.9779245
DT[14, 7] <- 0.9779245

# Remove column VOT2
DT <- DT[, -8]
head(DT)

# Visualize the fuzzy set scores using a histogram:
hist(DT$VOT)

# Plot the raw data against the fuzzy set scores:
plot(DT$VOT$raw1, DT$VOT)

# STAB #

# Check the distribution of the raw data
hist(DT$STAB$raw)

# Calibrate the raw scores
STAB <- calibrate(DT$STAB$raw, type = "fuzzy",
                    thresholds = c(30000, 20000, 10000),
                    logistic = TRUE, idm = 0.95)

STAB

# Add the new calibrated set to the data frame:
DT$STAB <- STAB

# for Batdyev_KC
DT[15, 1:8] <- 0.33

# for Ilyumzhinov_KL
DT[20, 1:8]
DT[20, 8] <- 0.33
DT[20, 1:8]

# Plot the raw data against the fuzzy set scores:
plot(DT$STAB_raw, DT$STAB)

# Visualize the fuzzy set scores using a histogram:
hist(DT$STAB)

# EFF #

# Check the distribution of the raw data:
hist(DT$EFF_raw)

# Calibrate the raw data:
EFF <- calibrate(DT$EFF_raw, type = "fuzzy",
                 thresholds = c(70, 40, 20),
                 logistic = TRUE, idm = 0.95)

# Add the new calibrated sets to the data frame:
DT$EFF <- EFF

# Plot the raw data against the fuzzy set scores:
plot(DT$EFF_raw, DT$EFF)

# Check the distribution of the fuzzy set scores:
hist(DT$EFF)

head(DT)

# POPUL #

# Check the distribution of the raw data:
hist(DT$POPUL_raw)

# Calibrate the raw data:
POPUL <- calibrate(DT$POPUL_raw, type = "fuzzy",
                   thresholds = c(30, 40, 50),
                   logistic = TRUE, idm = 0.95)

# Add the calibrated set to the data frame:
DT$POPUL <- POPUL

# Plot the raw data against the fuzzy set scores:
plot(DT$POPUL_raw, DT$POPUL)

# Check the distribution of the fuzzy set scores:
hist(DT$POPUL)
# OUT #
OUT <- DT$OUTraw
DT$OUT<−OUT

# Remove columns with the raw data:
DT <- DT[, -c(1:6)]

# Round up to two digits:
DT <- round(DT, digits=2)

# Examine skewness of the calibrated data:
skew.check(DT)

# Save calibrated data set as a csv file
write.csv(DT, "calibrated_direct.csv")

rm(list=ls())
DT <- read.csv("calibrated_direct.csv", row.names = 1, sep="",")

# Alternative analysis of sufficiency 2
# Outcome: reappointment

# To create a truth table
TT2 <- truthTable(DT, outcome = "OUT", conditions = colnames(DT[,1:4]), incl.cut1 = 0.75, complete = TRUE, show.cases = TRUE, PRI = TRUE, sort.by = c("OUT","incl","n"))

TT2

# Alternative conservative solution 2
sol.c2 <- minimize(TT2, details = TRUE, show.cases = TRUE, use.tilde=FALSE)

sol.c2

# Typical cases
cases.suf.typ(results = sol.c2, outcome = "OUT")

# Deviant cases
cases.suf.dcn(results = sol.c2, outcome = "OUT")

# no
# Alternative analysis of sufficiency 2
# Outcome: dismissal
# To create a truth table

```r
tt_n2 <- truthTable(DT, outcome = "OUT", neg.out = TRUE,
                     conditions = colnames(DT[,1:4]),
                     incl.cut1 = 0.75,
                     complete = TRUE,
                     show.cases = TRUE,
                     sort.by = c("OUT","incl", "n"))
tt_n2
```

# Alternative conservative solution 2

```r
sol_c_n2 <- minimize(tt_n2,
                      details = TRUE,
                      show.cases = TRUE)
sol_c_n2
```

# Typical cases
cases.suf.typ(results = sol_c_n2, outcome = "OUT")

# Deviant cases
cases.suf.dcn(results = sol_c_n2, outcome = "OUT")

# XY-plot of the conservative solution formula
pimplot(data = DT,
        results = sol_c_n2,
        outcome = "OUT",
        all.labels = TRUE,
        jitter = TRUE)

# Test 3 ———
# Analysis of 22 cases
# Exclude Zhilkin_AST, Morozov_ULY, and Shaklein_KIR
rm(list=ls())

DT <- read.csv("calibrated.csv", row.names = 1, sep=";")
DT2 <- DT
DT2
# Remove these cases

# Zhilkin_AST
DT2[1,]
DT2 <- DT2[-1,]
# Morozov_ULY

DT2[12,]
DT2 DT2[−12,]

# Shaklein_KIR

DT2[14,]
DT2 DT2[−14,]

# Produce alternative conservative 3
# Outcome: reappointment

sol_c3 <- minimize(data = DT2,
                      outcome = "OUT",
                      conditions = c("VOT", "STAB", "EFF", "POPUL"),
                      incl.cut = 0.75,
                      details = TRUE, show.cases = TRUE)

# Typical cases

cases.suf.typ(results = sol_c3, outcome = "OUT")

# Produce alternative conservative 3
# Outcome: dismissal

sol_c_n3 <- minimize(data = DT2,
                      outcome = "OUT", neg.out = TRUE,
                      conditions = c("VOT", "STAB", "EFF", "POPUL"),
                      incl.cut = 0.75,
                      details = TRUE, show.cases = TRUE)

# Typical cases

cases.suf.typ(results = sol_c_n3, outcome = "˜OUT")

# Deviant cases

cases.suf.dcn(results = sol_c_n3, outcome = "˜OUT")

# Test 4 ———
# Use alternative indicator for EFF —
# the integral index of governors efficiency

DT4 <- read.csv("eff.alt.csv", row.names = 1, sep="","")

# Produce alternative conservative 4
# outcome: reappointment

sol_c4 <- minimize(data = DT4,
                    outcome = "OUT",
                    conditions = c("VOT", "STAB", "EFF", "POPUL"),
                    incl.cut = 0.75,
                    details = TRUE, show.cases = TRUE)
```
conditions = c("VOT", "STAB", "EFF",
  "POPUL"),
incl.cut = 0.75,
details = TRUE, show.cases = TRUE)
sol_c4

# Typical cases
cases.suf.typ(results = sol_c4, outcome = "OUT")

# Produce alternative conservative 4
# Outcome: dismissal
sol_c_n4 <- minimize(data = DT4,
  outcome = "OUT", neg.out = TRUE,
  conditions = c("VOT", "STAB", "EFF",
    "POPUL"),
incl.cut = 0.75,
details = TRUE, show.cases = TRUE)
sol_c_n4

# Typical cases
cases.suf.typ(results = sol_c_n4, outcome = ""OUT")

# Deviant cases
cases.suf.dcn(results = sol_c_n4, outcome = ""OUT")
```