Power distribution among groups and fractions
in Russian parliament (1994 -2003)

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The problem of evaluation and analysis of power distribution in the Russian Parliament from 1994 to 2003 is studied. The Banzhaf index is calculated for simple majority rule under different assumptions about admissible coalitions.

1. Introduction

In Legislative bodies decision are made by voting. The decision accepted if the number of votes for it exceeds some quota, which is defined by the voting procedure. For instance, in the Russian parliament for federal laws the quota is equal to 226 votes (50% +1vote). If a parliament

consists of three or more parties, there is a possibility that none of them possesses the votes which exceeds a quota, so to make a decision the parties should coalesce. The coalition which guarantees the necessary number of votes are special importance.

Roughly speaking, the power of a party in the parliament is proportional to the number of winning coalitions which the party belong to. The evaluations of such power of a party is made using power indices which are well studied in political sciences. [1]

We study the problem of power distribution over time of groups and fractions Russian parliament (Duma) using Banzhaf index.

The analysis is made under two main assumptions about coalitions formations. First, we consider the case when all coalitions are admissible, and after we study several scenarios of coalitions formation. To evaluate the possibility of two groups to coalesce we use the index of consistency of positions of two groups which is based on the similarity of voters in one act of voting. We study several qualitative scenarios of coalition formation one of which being considered as real.

This paper gives a short description of a study on a distribution of power in Russian parliament during 1994-2003. The complete version can be found in www.hse.ru, www.ipu.ru/rcpp in Russian (about 180 pages with graphs and tables) and www.indem.ru. It contains complete analysis of power distributions for each electoral period (1994-1995, 1996-1999, 2000-2003) and for two decision rules (simple majority for federal laws and qualified majority (300 out of 450) for constitutional laws) using two power indices – the Banzhaf and Shapley-Shubik indices.

In Section 2 we give a definition of the Banzhaf index, and in Section 3 we define the of consistency of positions of two groups (briefly, the consistency index). Section 4 contains the analysis of Russian parliament.

2. The Banzhaf power index

Consider a parliament with n parties. A party i in a winning coalition is called pivotal if without party i the coalition is not anymore winning. The Banzhaf index [4] $\beta(i)$ evaluates the share of coalitions in which the party i is pivotal, i.e.

$$\beta(i) = \frac{b_i}{\sum_j b_j},$$

where b_i is the number of coalitions in which i is pivotal.

Consider the parliament with 100 seats in which three parties A, B and C are represented with the distributions of seats among them being 50, 49, 1, respectively. Let the decision making

rule is simple majority. Then the winning coalitions are A+B, B+C, A+B+C. The party A is pivotal in all three coalitions, B is pivotal only in the coalition A+B, and C is pivotal in A+C. Then

$$\beta(A) = \frac{3}{3+1+1} = \frac{3}{5},$$

$$\beta(B) = \beta(C) = \frac{1}{3+1+1} = \frac{1}{5}.$$

3. The consistency index

Consider the example above with three parties A, B and C. Assume that by some reason the parties A and b do not coalesce. Then

$$\beta(A) = \frac{2}{2+1} = \frac{2}{3};$$

$$\beta(B) = 0;$$

$$\beta(C) = \frac{1}{2+1} = \frac{1}{3}.$$

Now, the power of C increases almost twice while the power of B is equal to 0. Naturally it is worth studying when two parties can coalesce. The relation between two groups of MPs are naturally reflected on the results of voting. Groups with similar political positions having common political interests initiate consistent bills and support them in voting. On the contrary, the groups with opposite interests in the majority of polar problems vote in a different way. This point of view is supported by the observation of voting behavior in Russian parliament which shows that main political forces and MPs express their political position and attitude to colleagues by voting. If there are not enough problems presented for voting, such problems are immediately presented on the floor.

Let q_1 and q_2 be the share of "ay" votes in two groups in MPs.

Then consistency index is calculated as

$$c(q_1, q_2) = 1 - \frac{|q_1 - q_2|}{\max(q_1, 1 - q_1, q_2, 1 - q_2)}.$$

In this definition of consistency index the common position is taken to be the position of the group i which possesses more determined position, i.e., for which the distance $\left| q_i - \frac{1}{2} \right|$ is greater.

The properties of the consistency index are as follows

1. The value of index is distributed between 0 and 1, i.e.

$$c(q_1, q_2) \in [0,1];$$

2. Symmetry

$$c(q_1, q_2) = c(q_2, q_1);$$

3. Threshold value

$$c\left(1, \frac{1}{2}\right) = \frac{1}{2};$$

4. Symmetry with respect to threshold value

$$c\left(q_1, \frac{1}{2}\right) = c\left(1 - q_1, \frac{1}{2}\right).$$

In our study we use the mean value of consistency index taken from m monthly observations, i.e.

$$\bar{c} = \frac{1}{m} \sum_{i=1}^{m} c(q_{1i}, q_{2i}).$$

To evaluate that mean value we select votings on the basis of several criteria which express different information about voting and division among fractions and MPs. Since the abstention of MP means usually her disagreement with the bill, it is worth considering the votes for the bill rather then voter against it. In general, the selection of the result of voting is made in two stages. First, we select those results in which even with very few votes against a bill one can obtain the essential difference of votes for and against in at least two fractions. For each voting result we calculate the difference between maximal and minimal over fractions share of "ay" votes, and then choose those results for which this measure exceeds some predetermined threshold. For the first parliament (1994-1995) this threshold had been chosen greater or equal to 0.5, for the second parliament (1996-1999) – as greater or equal to 0.6 and for the third parliament (2000-2003) – as greater or equal to 0.7.

Then from the list of results the "non-importance" votings are excluded, for instance those for which the bill is supported by no less than 30 votes or by at least 320 votes "ay". Finally, those results are excluded from the consideration for which the difference in voting among fractions is caused by some technical reasons, and further such bills are voted anew.

4. The analysis of power distribution in Russian parliament (1994-2003)

This analysis has been made using Banzhaf power index under different assumptions about coalition formation taking into account relations among groups measured by the consistency index.

The data. The Russian parliament consists of 450 members one half of them being elected by majority voting and other half by party lists. Fraction are created by electoral blocks which passes by proportional representation scheme. Moreover, there is a possibility to create MPs groups with no less than 35 members (until 2004). Decision making rules are simple majority (226 votes) for federal law and 2/3 (300) votes for constitutional laws.

We have considered the structure of fractions and groups on 16th of each month (for third parliament groups was formed on date of last voting of each months) separately for each of three parliaments (1994-1995, 1996-1999, 2000-2003). For each MP who did not belong to some fraction or group we study to which fraction she will belong after that or sometimes she had belonged before, her political interests.

Using this structure we have calculated the Banzhaf index in two versions – for federal and constitutional law, respectively. This evaluations have first been made under the assumption that all coalitions are equally feasible, and then after excluding unfeasible coalitions. In the latter case all non-excluding coalitions have been considered as equally feasible.

As the source of data the database has been used of the foundation INDEM (http://www.indem.ru/indemstat/index.htm) [6] the aim of which is the study of political positions of MPs on the basis of their personal voting.

The analysis when all coalitions are feasible. In this case the changes in power distribution will be observed only due to the transfers of MPs from one group or fraction to the other. Moreover, essential changes will be observed at the moments of huge transfers of MPs which are connected usually with the formation, sometimes, unsuccessful, of new fractions or groups. For each parliament we have considered "key" moments at transfers. For instance, for the first parliament such event was a formation at the spring 1995 the "Russia" and "Stability" (on Fig. 1 it is seen as decline of power of Liberal-Democrats).

For the second and third parliament we have studied the following scheme to distribute independent MPs to fractions and groups: we distribute them to those fractions to which they will transfer afterwards. In fact, we evaluated power index for independent MPs separately. The difference between two approaches led to the difference of power indices less than 1%.

Let us now discuss the results. In all three parliaments the following three parties were represented

- Agrarians (Agrarian Group of Russia)
- Communists (Communist Party of Russian Federation)
- Liberal-Democrats (Liberal-Democratic Party of Russia)
- Yabloko.

Additionally, in the second and third parliaments the group "Regions of Russia" was represented.

The changes in power distribution are represented on Fig.1.

Communists as well as Yabloko had the maximal of their power in the second parliament, however, the power of Communists had been decreasing from the end of second parliament through the third parliament. Agrarians in general had the power about 9 3%. Liberal-Democrats had been loosing their power during all those years. In the first parliament it is one of the most powerful parties, while in the third parliaments it is one of weakest parties. The group Region of Russia had been having almost stable power about 10%.

As for the power of groups and the share of their votes, these valued for the first and third parliament were homogeneous, i.e., there were many fractions and groups with almost equal power.

Another picture can be seen in the second parliament, in which there had been one strong fraction (Communists) and 6 small groups. In average the power of Communists exceed its share of votes on 26%, and had the maximum at the beginning of the work of the second parliament when this difference was 30%. Others had power comparing with their share of votes. Thus, for Our Home – Russia this difference was in average 33%, Liberal-Democrats – 19%, for Yabloko –15%, etc. In other words, in the second Duma for comparing with that first and third, the distribution of power did not correspond to the distribution of seats.

The analysis of the parliament when not all coalitions are feasible. The assumption that all coalitions are feasible is too strong. For instance, in the first parliament the coalition between choice of Russia (main pro-presidential party) and Communists is hardly possible. Obviously, the real power distribution was not stable in all three parliaments in the light of many changes that had been happening during all those years. At that time many bills were approved dealing with most important changes in the country, from constitutional reforms to the reforms of natural monopolists. There were a lot of changes in the world, such as August 2000, September 11, 2001 or March 2003. However, none of this events were expressed in power distribution changes when the assumption that all coalitions are feasible is used.

To construct a power distribution more adequate to real situation, it is necessary to measure the probability of coalition formation depending on the relations among groups of MPs. We construct the model of coalition formation depending of a threshold of consistency index.

At the beginning by the introduction of different threshold values of consistency index the impossible coalition are excluded. The consistency index introduced above had been calculated for all pairs of groups and fractions in the parliament from 1994 to 2003 for all results of voting described above. According to the approach used in the paper, a coalition is considered to be

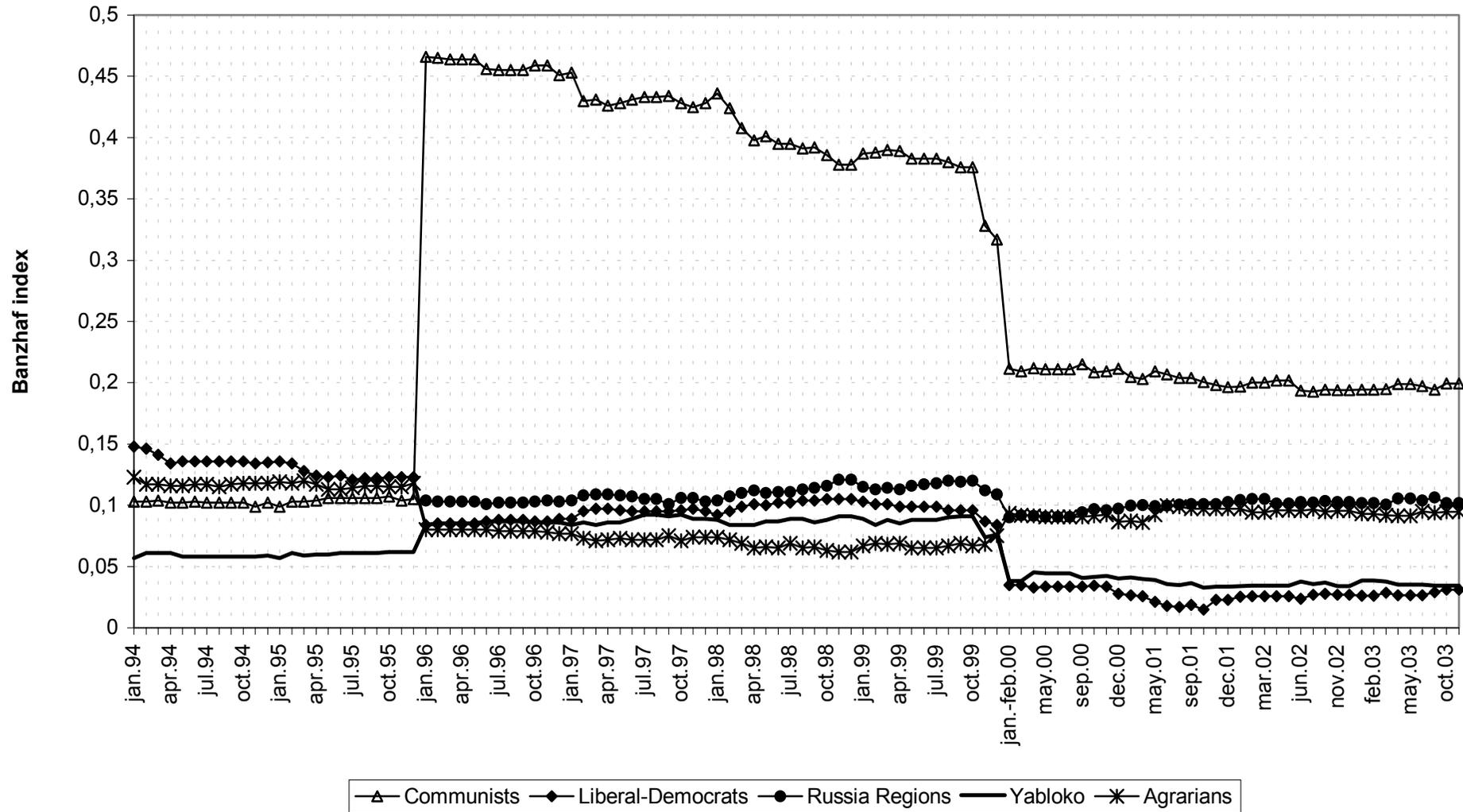Power distribution of some parties in Russian parliament (1994-2003)

Fig.1.

impossible if the value consistency index for two groups in the coalition exceeds the threshold value of that index.

It is assumed that under some threshold level the evaluated power index should be close the its real value.

We consider three values of threshold for consistency index and, thus, three different distributions of power index. Those three values for threshold are

- $c \geq 0.4$,
- $c \geq 0.5$,
- $c \geq 0.6$.

We consider that these three thresholds are suitable to monitor qualitative changes. Let us explain why we choose these thresholds. The choice of the threshold 0.5 is obvious and does not need any additional explanations; the choice of other levels needs some explanation. The evaluation of consistency index for explicit ideological contestants shows that for this case the value of c does not exceed 0.4. The value of consistency index between 0.5 and 0.7 corresponds to the relations from potential allies relations to fully allies relations. The threshold value 0.6 gives from one point of view a minimal level of allies relations, and, from the other point of view preserves enough possibilities for coalition formation.

So, the key question is: which value of consistency index generates power distribution reflecting real power distribution in Russian parliament? The answer to this question has been given on the basis of scenario approach applying to coalition formation mechanisms.

To construct scenarios the scale was suggested for evaluation of relations among groups and fractions in the parliament. This scale includes for grades: explicit "contestants", potential contestants, potential allies, and explicit allies. Using these grades three scenarios were constructed:

- "mild" scenario (coalition are excluded with explicit contestants);
- "average" scenario (coalition are excluded with explicit and potential contestants);
- "rigid" scenario (only coalition with closest allies are allowed).

We can say that the "scenario" when all coalitions are admissible can called as null-scenario.

Mild scenario is by definition a real one. Indeed, the strategy when in a coalition potential contestants can be included seems to be optimal in some sense. In leaves enough freedom for coalition formation but excludes "uncompensated losses", which a party could meet if she coalesce with explicit contestant unforgiven from the point of view of the electorate. One may expect that experienced politicians managing political fractions and groups in the Russian parliament follow this optimal strategy.

The average scenario is interesting in that it allows to evaluate the abilities of the participants of political process. For heavy players which fill the extreme position it is an ability to attract the

majority of voters; for the players at center of political field it is an ability to participate in winning coalitions.

For rigid scenario situations are of special importance in which coalition are formed only with closest allies.

The change in consistency index for pair of party fractions over time for the third parliament is given on Fig.2.

As it is obviously seen, Communists and Agrarians are the closest allies, their consistency index is about 0.85. On the contrary, the relation between Communists and Edinstvo are worsening over time achieving the level about 0.1. It is important to note that the minimum of the index for this pair is seen at the moments when the most crucial decisions are made in July 2001 it is Predial Code, in march 2002 – the interruption of agreement among parties concerning the management of committees in the parliament, in February 2003 – the voting about the reform of one of the main monopolists – that of RAO EES.

The dynamics of consistency index for Edinstvo and OVR reflects the process of organization of the largest party in the parliament - Edinaya Rossiya. After January 2002 both parties are most closest allies, their consistency index is greater than 0.8.

We show the dynamics of power indices for large parties on Fig.3. below for the scenario with $c=0.4$.

The share of votes for the fraction of CPRF is in average 18% while her value of Banzhaf index is readily smaller and from July 2001 it does not exceed 3%. The centrist fractions Edinstvo and Narodnyi Deputat have the power greater than their share of votes.

In general, the following conclusions can be derived from obtained results:

In scenario $c=0.4$ the centrist fractions increases their power since they do not have explicit contestants. Thus, they possess the same possibilities as in the null-scenario (all coalitions are admissible). On the contrary, groups expressing extreme positions and having large contestants should expect serious losses.

In scenario $c=0.5$ maximal losses should expect those fractions which coalesce with potential contestant; the groups which can create majority using explicit and potential allies preserve or even increase their power.

In scenario $c=0.6$ those groups can preserve their power which can create majority leaning only to explicit allies.

The most close to real power distribution is the distribution observed for the scenario $c=0.4$

We conclude the paper with the remark.

<u>Remark.</u> The suggested approach is valid when the following assumption holds. First, fractions vote homogeneously. This assumption seems to be true for the French parliament, but not for the

The dynamics of the consistency index for the "key" pairs of fractions in the third parliament
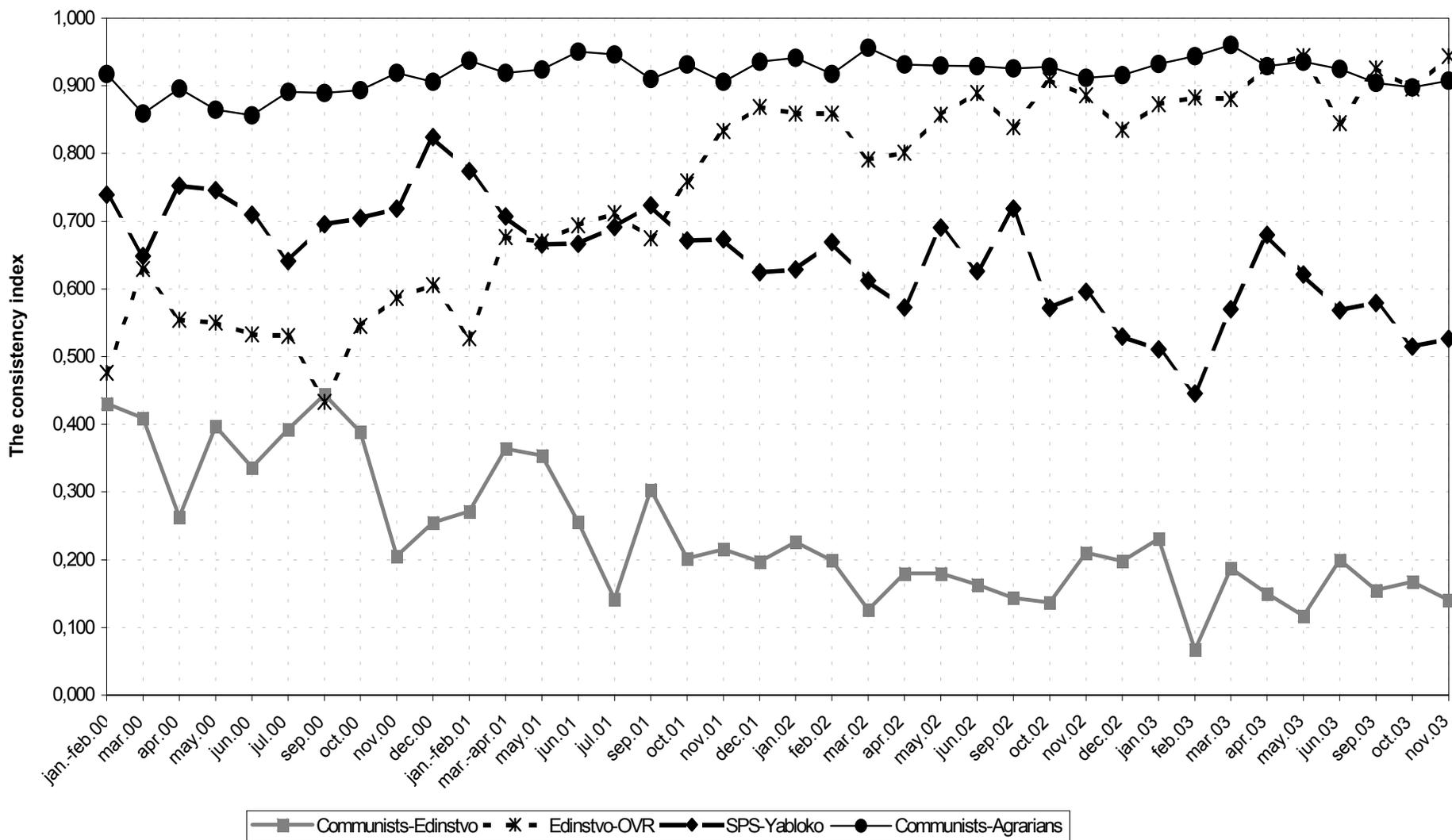
Fig.2.

Power distribution of large fractions (Communists, Edinstvo, Narodnyi Deputat - scenario 0.4)
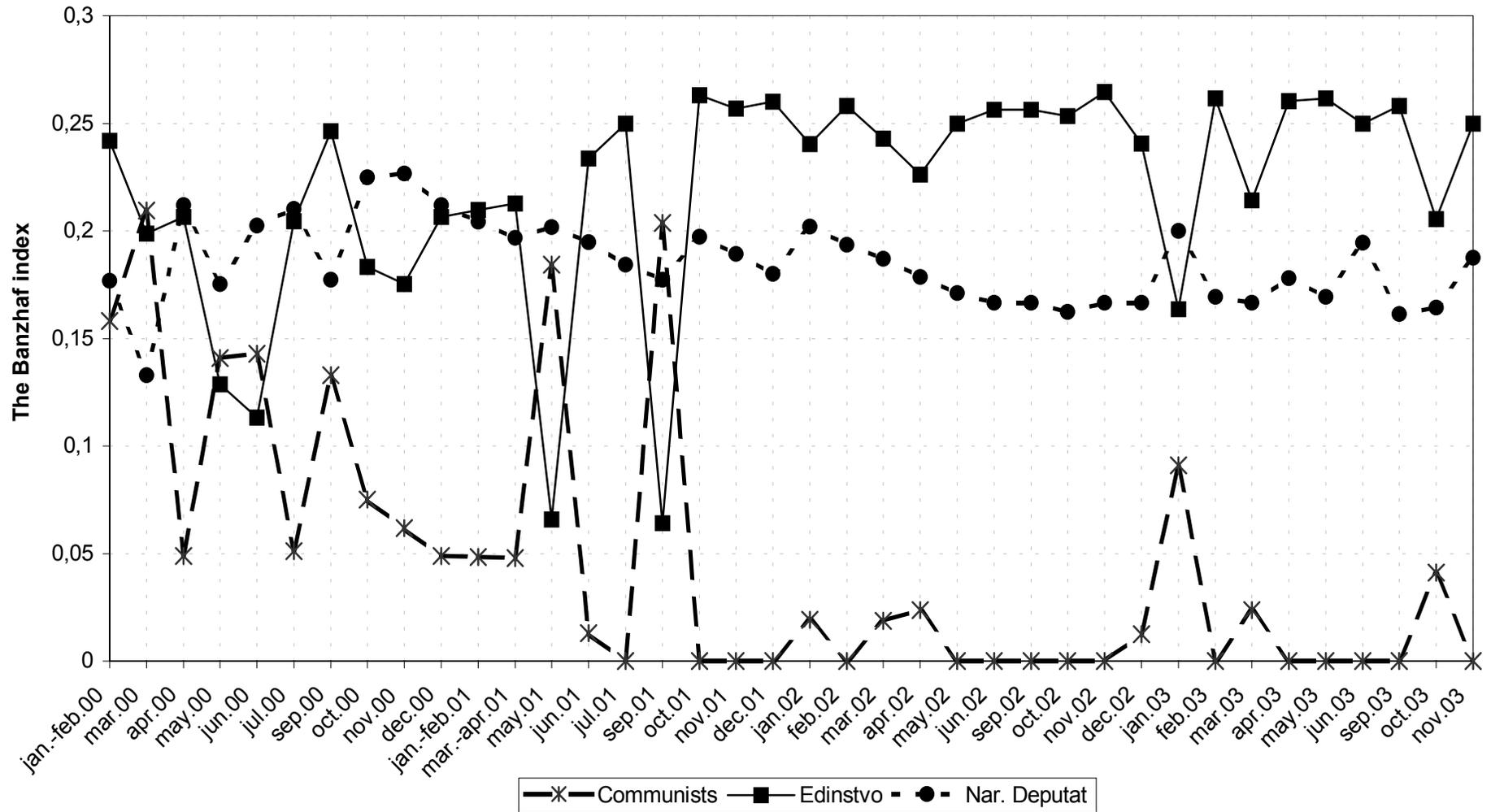
Fig.3.

Russian one. Then the assumption above should be substituted by another assumption – the deviation of fraction discipline is same in all fractions with respect to the member of MPs in each fraction. This assumption seems to be strong as well.

Then our assumption can be re-formulated as follows: the deviation of homogeneous behavior in each fraction is small, contingent and independent from fractions and votings. Then the balance of power among opposing coalitions will be stable in average over time.

One can expect that this latter case is most close to real behavior of parties. On the other hand, obtained results can be used as indirect proof of this assumption.

APPENDIX. The list of parties in the third parliament
1. Communists (CPRF; leader – G. Zyuganov)
2. Edinstvo (B. Gryzlov)
3. Narodnyi Deputat (G. Raykov)
4. OVR (Otechestvo – Vsya Rossiya; Yu. Luzhkov)
5. Agrariants (APG; N. Kharitonov)
6. Regions of Russia (O. Morozov)
7. SPS (Soyuz Pravyh Sil; B. Nemtsov)
8. Liberal-Democrats (LDPR, V. Jirinovski)
9. Yabloko (G. Yavlinski)

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