

Distribution of Deputy Mandates: Analysis of Proportional Representation in the Context of a Mixed Electoral System

Natalia Vasilyevna Volkova¹, Alexey Igorevich Dudochnikov¹, Alina Ajdarovna Kamalova¹, Anton Vladimirovich Naurskov¹ & Sima Feruzovna Gaffarova¹

¹ Kazan Federal University, Russia

Correspondence: Alexey Igorevich Dudochnikov, Kazan Federal University, Russia. E-mail: dudochnikov@yandex.ru

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Abstract

Elections are a socio-political institution, during which holding it is determined what the nature of the reforms will be in the next few years. It is important that the legitimacy of the electoral process is high and that key reforms are determined by competent government officials. The basic element of elections is a high level of competition, which should exist not only between various political entities that exercise eligibility to vote and right to be elected but also within such structures fighting for power.

The paper contains an analysis concerning the issue on the functioning of the proportional vote distribution institute. According to the election results, it is necessary to determine how many seats will go to a certain party, which, according to the proportional system, has overcome the percentage barrier. In world practice, there is a whole range of proportional distribution methods that form two large groups: the largest remainder methods and the dividers methods. There are discussions on this parameter, and each country has adopted its own methodology. In Russia, with a proportional distribution of seats, one of the largest remainder methods is used, namely, the Hare method. The study will reflect the analysis of the functioning of proportional distribution systems in Russia and in the world.

Keywords: elections, the Hare method, the Droop method, the Hagenbach-Bischoff method, the Imperiale method, the Sainte-Lague method, the D'Hondt method, election ratio

1. Introduction

If parliamentary elections are held according to a proportional or mixed electoral system, then it becomes necessary to distribute seats between parties based on the results of the voting. In this case, we are talking about how to proportionally distribute deputy seats. World practice shows that there are many ways to do this, and each of the methods has tactical considerations when adopting it. In order to understand this issue, we will further consider a system of proportional distribution methods. At a theoretical level, a clear example of distribution with conditional results of individual parliamentary elections is given for better understanding of the issue.

2. Methods

Proportional distribution methods are divided into two types:

- Largest remainder methods;
- Quota methods.

Each type includes 4 methods of proportional distribution of votes.

We consider the group of the largest remainder methods.

1. Hare's method. This method was developed by Thomas Hare, a British politician who dealt with law and the electoral process.

The first step is to calculate the Hare quota:

$$\frac{n}{k} = \text{Hare quota} \quad (1)$$

Where n is the sum of votes for all parties that have overcome the electoral threshold;
 k is the total number of seats to be distributed between parties.

At the second stage, it is calculated how many seats each party will receive:

$$\frac{n_i}{\text{Hare quota}} = \text{election ratio} \quad (2)$$

Where n_i - the number of votes for the party "i";

2. Droop's method. This method was developed by Henry Droop, a British mathematician in the mid-19th century. Unlike the politician Hare, the mathematician Droop complicated the proportional distribution formula in favour of medium and large political forces. The Droop method is as follows.

The first stage calculates the Droop quota:

$$\frac{n}{k+1} + 1 = \text{Droop quota} \quad (3)$$

Where n is the sum of votes for all parties that have overcome the electoral threshold;

k is the total number of seats to be distributed between parties.

At the second stage, it is calculated how many seats each party will receive:

$$\frac{n_i}{\text{Droop quota}} = \text{election ratio} \quad (4)$$

where n_i - the number of votes for the party "i";

3. The Hagenbach-Bischoff Method. This method was developed by the Swiss mathematician Eduard Hagenbach-Bischoff in the middle of the 19th century. The first step is to calculate the Hagenbach-Bischoff quota:

$$\frac{n}{k+1} = \text{Hagenbach - Bischoff quota} \quad (5)$$

Where n is the sum of votes for all parties that have overcome the electoral threshold;

k is the total number of seats to be distributed between parties.

At the second stage, it is calculated how many seats each party will receive:

$$\frac{n_i}{\text{Hagenbach-Bischoff quota}} = \text{election ratio} \quad (6)$$

where n_i - the number of votes for the party "i";

4. Quota of Imperiale.

The first stage calculates the quota of Imperiale:

$$\frac{n}{k+2} = \text{Quota of Imperiale} \quad (7)$$

where n is the sum of votes for all parties that have overcome the electoral threshold;

k is the total number of seats to be distributed between parties.

At the second stage, it is calculated how many seats each party will receive:

$$\frac{n_i}{\text{Quota of Imperiale}} = \text{election ratio} \quad (8)$$

Where n_i - the number of votes for the party "i";

The methods for proportional distribution of the largest remainder were considered above. Now we need to consider quotas. They have such a name since at each settlement step the quota of distributed mandates is determined, that is, one mandate is distributed at a separate stage in accordance with the formula, where one of the factors is the quota of a certain already distributed batch of mandates.

1. Sainte-Laguë method. This method was developed by a French mathematician and was first recorded in 1910. This method is as follows.

At the first and subsequent stages for each batch, the Saint-Lague quota is calculated as follows:

$$\frac{V}{2s+1} = \text{Saint - Lague quota} \quad (9)$$

Where V is the sum of the votes for a particular party;

s is the number of distributed seats for a particular step.

When the calculation at a certain step is carried out, one seat is allocated in the parliament of the party that has the largest settlement quota. Then, the next step is executed and similarly, the highest value is selected. The number of steps equals the number of seats in parliament for proportional representation.

2. D'Hondt Method. This method was developed by the Belgian mathematician Victor D'Hondt and was first proposed in 1882. This method is as follows.

At the first and subsequent stages for each batch, the D'Hondt quota is calculated:

$$\frac{V}{s+1} = \text{D'Hondt quota} \quad (10)$$

Where V is the sum of the votes for a particular party;

s is the number of distributed seats for a particular step.

When the calculation at a certain step is carried out, one seat is allocated in the parliament of the party that has the largest settlement quota. Next, the next step - and similarly, select the highest value. The number of steps equals the number of seats in parliament for proportional representation.

3. Results and Discussion

In order to determine the number of seats that the party will get according to the results of the parliamentary company in Russia, the Hare proportional distribution method is used (see table 1). Since all the calculation formulas and the detailed stages of the calculations were demonstrated in the first chapter, only the final results of the practical analysis will be shown in the subparagraph.

Table 1. Hare's method - distribution of deputy mandates in Russia

Party	Number of votes	% of votes	Election ratio	Main distribution	Add. distribution	Total seats received
"Yedinaya Rossiya (United Russia)"	28527828	54,2	140.33	140	0	140
Communist Party	7019752	13.34	34.53	34	1	35
LDPR	6917063	13.14	34.03	34	0	34
"Spravedlivaya Rossiya (Fair Russia)"	3275053	6.22	16.11	16	0	16
<i>Total</i>	<i>45739696</i>	<i>86.9</i>	<i>225</i>	<i>224</i>	<i>1</i>	<i>225</i>
<i>Hare Quota</i>	<i>203287,54</i>	-	-	-	-	-

Next, it will be examined how the results would change if other methods of distribution of votes were used in Russia. In the theoretical chapter, the calculations were shown in detail; therefore only final values are shown at this stage.

1. Droop method (see table 2).

Table 2. Droop method - distribution of deputy seats in Russia (model)

Party	Number of votes	% of votes	Election ratio	Main distribution	Add. distribution	Total seats received
"Yedinaya Rossiya (United Russia)"	28527828	54,2	140,955	140	1	141
Communist Party	7019752	13.34	34,684	34	0	34
LDPR	6917063	13.14	34,177	34	0	34
"Spravedlivaya Rossiya (Fair Russia)"	3275053	6.22	16,182	16	0	16
<i>Total</i>	<i>45739696</i>	<i>86.9</i>	<i>225,999</i>	<i>224</i>	<i>1</i>	<i>225</i>
<i>Droop Quota</i>	<i>202389.04</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>

It can be noted that in comparison with the Hare quota, the representation of the leading party is increased by one mandate due to the additional distribution of votes. This confirms the theoretical assertions about the least democratic form of the Droop quota.

2. Hagenbach-Bischoff Method (see table 3).

Table 3. Hagenbach-Bischoff Method - distribution of deputy seats in Russia (model)

Party	Number of votes	% of votes	Election ratio	Main distribution	Add. distribution	Total seats received
"Yedinaya Rossiya (United Russia)"	28527828	54,2	140,956	140	1	141
Communist Party	7019752	13.34	34,685	34	0	34
LDPR	6917063	13.14	34,177	34	0	34
"Spravedlivaya Rossiya (Fair Russia)"	3275053	6.22	16,182	16	0	16
<i>Total</i>	<i>45739696</i>	<i>86.9</i>	<i>226</i>	<i>224</i>	<i>1</i>	<i>225</i>
<i>Hagenbach-Bischoff Quota</i>	<i>202388.04</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>

In this case, the representation remained unchanged, while the share for strong parties increased slightly. On the democratic scale, the methods of Droop and Hagenbach-Bischoff can be compared at the same level.

3. The Imperiale Method (see table 4).

Table 4. Imperiale method - distribution of deputy seats in Russia (model)

Party	Number of votes	% of votes	Election ratio	Main distribution	Add. distribution	Total seats received
"Yedinaya Rossiya (United Russia)"	28527828	54,2	141,580	141	0	141
Communist Party	7019752	13.34	34,838	34	0	34
LDPR	6917063	13.14	34,328	34	0	34
"Spravedlivaya Rossiya (Fair Russia)"	3275053	6.22	16,254	16	0	16
<i>Total</i>	<i>45739696</i>	<i>86.9</i>	<i>227</i>	<i>225</i>	<i>0</i>	<i>225</i>
<i>Imperiale Quota</i>	<i>201496.46</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>

The Imperiale method did not change the balance of power compared with the quotas of Droop and Hagenbach-Bischoff but significantly strengthened the strong parties. Yedinaya Rossiya (United Russia) receives a seat even without additional distribution. The shares of the Communist Party and the Liberal Democratic Party increased much more than that of Spravedlivaya Rossiya.

4. Imperiale Method (Enhanced Quota) (see table 5)

Table 5. The Imperiale method (enhanced) - distribution of deputy mandates in Russia (model)

Party	Number of votes	% of votes	Election ratio	Main distribution	Add. distribution	Total seats received
"Yedinaya Rossiya (United Russia)"	28527828	54,2	142.20	141	0	141
Communist Party	7019752	13.34	34,99	34	0	34
LDPR	6917063	13.14	34.48	34	0	34
"Spravedlivaya Rossiya (Fair Russia)"	3275053	6.22	16.33	16	0	16
<i>Total</i>	<i>45739696</i>	<i>86.9</i>	<i>228</i>	<i>225</i>	<i>0</i>	<i>225</i>
<i>Imperiale Quota (Enhanced)</i>	<i>200612,70</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>

This method reflects even greater bias in the proportional distribution. "Yedinaya Rossiya (United Russia)" is gaining the number of seats in which representation in parliament exceeds 225 seats.

Further, quota methods and the result of the election when using them are considered.

1. Sainte-Laguë method (see. Table 6)

Table 6. Sainte-Lague method - distribution of deputy mandates in Russia (model)

Party	"Yedinaya Rossiya (United Russia)"	Communist Party	LDPR	"Spravedlivaya Rossiya (Fair Russia)"
Seats	28527828	7019752	6917063	3275053
1	28,527,828	7 019 752	6 917 063	3,275,053
2	9 509 276	7 019 752	6 917 063	3,275,053
3	5 705 566	7 019 752	6 917 063	3,275,053
4	5 705 566	2,339,917	6 917 063	3,275,053
5	5 705 566	2,339,917	2 305 688	3,275,053
6	4,075,404	2,339,917	2 305 688	3,275,053
7	3 169 759	2,339,917	2 305 688	3,275,053
8	3 169 759	2,339,917	2 305 688	1 091 684
9	2 593 439	2,339,917	2 305 688	1 091 684
10	2 194 448	2,339,917	2 305 688	1 091 684
11	2 194 448	1,403,950	2 305 688	1 091 684
12	2 194 448	1,403,950	1,383,413	1 091 684
13	1 901 855	1,403,950	1,383,413	1 091 684
14	1 678 108	1,403,950	1,383,413	1 091 684
15	1,501,465	1,403,950	1,383,413	1 091 684
16	1,358,468	1,403,950	1,383,413	1 091 684
17	1,358,468	1 002 822	1,383,413	1 091 684
18	1,358,468	1 002 822	988 152	1 091 684
19	1,240,340	1 002 822	988 152	1 091 684
20	1 141 113	1 002 822	988 152	1 091 684
***	***	***	***	***
<i>Total</i>	<i>140</i>	<i>35</i>	<i>34</i>	<i>16</i>

The method gives preference in the same way as it was according to the Hare method, that is, it is confirmed that Sainte-Lague is the most democratic method of quoting

2. D'Hondt Method (see table 7)

Table 7. D'Hondt's method - distribution of deputy mandates in Russia (model)

Party	"Yedinaya Rossiya (United Russia)"	Communist Party	LDPR	"Spravedlivaya Rossiya (Fair Russia)"
Seats	28527828	7019752	6917063	3275053
1	28,527,828	7 019 752	6 917 063	3,275,053
2	14 263 914	7 019 752	6 917 063	3,275,053
3	9 509 276	7 019 752	6 917 063	3,275,053
4	7 131 957	7 019 752	6 917 063	3,275,053
5	5 705 566	7 019 752	6 917 063	3,275,053
6	5 705 566	3 509 876	6 917 063	3,275,053
7	5 705 566	3 509 876	3 458 532	3,275,053
8	4,754,638	3 509 876	3 458 532	3,275,053
9	4,075,404	3 509 876	3 458 532	3,275,053
10	3,565,979	3 509 876	3 458 532	3,275,053
11	3 169 759	3 509 876	3 458 532	3,275,053
12	3 169 759	2,339,917	3 458 532	3,275,053
13	3 169 759	2,339,917	2 305 688	3,275,053
14	3 169 759	2,339,917	2 305 688	1 637 527
15	2 852 783	2,339,917	2 305 688	1 637 527
16	2 593 439	2,339,917	2 305 688	1 637 527
17	2 377 319	2,339,917	2 305 688	1 637 527
18	2 194 448	2,339,917	2 305 688	1 637 527
19	2 194 448	1,754,938	2 305 688	1 637 527
20	2 194 448	1,754,938	1,729,266	1 637 527
***	***	***	***	***
Total	141	34	34	16

It can be noted that the method prefers the most popular party, as it was in the demo.

3. The Imperiale Method (see table 8).

Table 8. Imperiale method - distribution of deputy seats in Russia (model)

Party	"Yedinaya Rossiya (United Russia)"	Rossiya (United Communist Party	LDPR	"Spravedlivaya Rossiya (Fair Russia)"
Seats	28527828	7019752	6917063	3275053
1	14 263 914	3 509 876	3 458 532	1 637 527
2	9 509 276	2,339,917	2 305 688	1 091 684
3	7 131 957	1,754,938	1,729,266	818 763
4	5 705 566	1,403,950	1,383,413	655 011
5	4,754,638	1,169,959	1,152,844	545,842
6	4,075,404	1 002 822	988 152	467,865
7	3,565,979	877 469	864 633	409,382
8	3 169 759	779 972	768 563	363,895
9	2 852 783	701 975	691,706	327 505
***	***	***	***	***
143	198 110	48,748	48,035	22,743
<i>Total</i>	<i>143</i>	<i>34</i>	<i>33</i>	<i>15</i>

The Imperiale method again demonstrates its undemocracy. "Yedinaya Rossiya (United Russia)" pulls on itself 1 vote of the LDPR and "Spravedlivaya Rossiya (Fair Russia)".

4. Danish method (see table 9).

Table 9. Danish method - distribution of deputy seats in Russia (model)

Party	"Yedinaya Rossiya (United Russia)"	Rossiya (United Communist Party	LDPR	"Spravedlivaya Rossiya (Fair Russia)"
Seats	28527828	7019752	6917063	3275053
1	28,527,828	7 019 752	6 917 063	3,275,053
2	7 131 957	1,754,938	1,729,266	818 763
3	4,075,404	1 002 822	988 152	467,865
4	2 852 783	701 975	691,706	327 505
5	2 194 448	539 981	532,082	251 927
6	1 782 989	438 735	432,316	204 691
7	1,501,465	369 461	364 056	172,371
8	1,296,719	319,080	314,412	148 866
9	1 141 113	280,790	276 683	131 002
140	68 248	16,794	16,548	7 835
<i>Total</i>	<i>140</i>	<i>35</i>	<i>34</i>	<i>16</i>

The Danish method did not turn out to be the most democratic in the Russian context of the distribution of votes but brought closer the situation in which Spravedlivaya Rossiya could get one more seat.

As a result, the study has considered all generally accepted methods of proportional distribution of votes following the results of the parliamentary elections in Russia in 2016. In accordance with the demo, we will compile a final table of distribution results from the most democratic to the least democratic (see table 28).

Table 10. Results for the division of seats by parties

Party	Danish	Hare	Sainte Lague	Hagenbach-Bischof	Droop	Imperiale	Imperiale (reinforced)	D'Hondt	Imperiale (quota)
1	140	140	140	141	141	141	141	141	143
2	35	35	35	34	34	34	34	34	34
3	34	34	34	34	34	34	34	34	33
four	16	16	16	16	16	16	16	16	15
Total places	225	225	225	225	225	225	225	225	225

(State Duma Elections 2016)

Thus, we can conclude that one of the most democratic methods of proportional distribution of votes is used in Russia.

Below, it is shown which position is occupied by Russia relative to other countries (see table 11).

Table 11. Foreign methods of proportional representation

Danish	Hare	Sainte Lague	Hagenbach-Bischoff	Droop	Imperiale	Imperiale (enhanced)	D'Hondt	Imperiale (quota)
	Lithuania; Russia, Ukraine; Switzerland	Sweden; Norway; Denmark Latvia; Germany, Bosnia and Herzegovina	Slovakia	Ireland			Finland; Iceland; Estonia, Moldova; Romania; Bulgaria, Hungary; Czech; Poland, Netherlands; Belgium; Luxembourg, Austria; Spain; Portugal, Italy; San Marino Slovenia, Macedonia Albania; Serbia, Montenegro Croatia	

It can be noted that the Hare method is used only in Russia, Ukraine, Lithuania and Switzerland. Also, the most favourable for small parties, the Sainte-Lague method is used in Germany and Bosnia, as well as in some northern European states. In other countries, the D'Hondt method is popular, which most often distributes the additional seat between the most popular parties.

Now we analyse how proportional representation is maintained in a mixed system.

If in 2016 State Duma elections were held according to the proportional system, then according to the Hare quota, the result would be as follows (see table 12).

Table 12. Distribution of seats in a proportional election system in Russia

Party	Number of votes	% of votes	Election ratio	Main distribution	Add. distribution	Total seats received
"Yedinaya Rossiya (United Russia)"	28527828	54,2	280,665	280	1	281
Communist Party	7019752	13.34	69,062	69		69
LDPR	6917063	13.14	68,052	68	0	68
"Spravedlivaya Rossiya (Fair Russia)"	3275053	6.22	32,221	32	0	32
<i>Total</i>	<i>45739696</i>	<i>86.9</i>	<i>450</i>	<i>449</i>	<i>1</i>	<i>450</i>
<i>Hare Quota</i>	<i>101,643.77</i>	-	-	-	-	-

(State Duma Elections 2016)

Next, we need to compare the final distribution of seats for the current mixed and calculated proportional system (table 13).

Table 13. The final distribution of seats in the State Duma elections 2016

Party	Total seats in the proportional system	Total places in the mixed system
"Yedinaya Rossiya (United Russia)"	281	343
Communist Party	69	42
LDPR	68	39
"Spravedlivaya Rossiya (Fair Russia)"	32	23
<i>Total places</i>	<i>450</i>	<i>450</i>

Based on the table, it can be seen that the proportional distribution is completely distorted by the result in one-candidate constituencies. "Yedinaya Rossiya (United Russia)" in the aggregate pulls an additional 62 seats. The remaining parties lose about 20 seats. This is due to the fact that Russia has an unrelated mixed system, in which the results under the lists and single-seat constituencies are independent of each other

4. Summary

Thus, we can conclude that the democratic method of proportional distribution of votes (the Hare method) is distorted by the mixed Russian system, and at times, which is unacceptable. In Germany, in order to avoid such a problem, a related mixed system was adopted in which the party cannot gain seats more than its own proportional representation. In Russia, the related system does not have broad support, while the opposition claims that the electoral system has changed from proportional to mixed form, precisely because the party in power has received more votes. The 2016 elections were held in a tense political atmosphere, the turnout was the smallest in history, so the majority party was afraid of losing seats in parliament.

5. Conclusions

In the process of studying election campaigns in Russia, it was revealed that for proportional distribution of seats, the law provides for the Hare method. This is one of the most democratic methods, at which preference is given to those parties that gain a small number of votes. Such parties receive at least one more seat in parliament. At the same time, the problem of disproportionality between the result of elections by the proportional system and the distribution of seats in parliament was highlighted.

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