The Oddity of 2012 Romanian Parliamentarian Elections: A Case Study and a Proposed Voting Algorithm

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Abstract: *Romania's 2012 national elections have brought the attention and indignation of both scholars and laymen especially from the perspective of total number of representatives. While in previous researches the over-exceeding number of Romanian parliament seats was explained on smaller scale, at district level, we have a national approach in this paper. The article explains this behaviour through empirical research based on computational simulation of the Romanian voting system. The author points out that the majoritarian vote in uninominal colleges mixed with d'Hondt algorithm to provide a quasi-proportional representation in parliament might lead to situations even worse than in 2012. A new voting algorithm, with several analyzed variations and important contribution on candidates' classification and non-discrimination of independents, is also provided.*

Keywords**:** computational simulations, legislative elections, d'Hondt method, voting system.

JEL Classification: C8, P48, Z18

1. Introduction

The December 9th, 2012 national elections in Romania propelled 588 parliamentarians in two legislative bodies, while the total initially allocated places had been 470 for both Chambers, which represented an increase of 25.11%. If we exclude 18 places constitutionally given for minorities that cannot succeed to send their representatives directly to parliament, Chamber of Deputies or 'Camera Deputaţilor' (CD), i.e. the inferior Chamber of Romanian Parliament, is supposed to have 315 members. The second and superior Chamber, called Senate or 'Senat' (SN), is given 137 initially places. The results of the 2012 Romanian electoral system led to 394 members for CD and 176 members for SN, which represent increases of 25.08% for the former and 28.47% for the latter.

This relative deviation of a quarter from normality is probably symptomatic for Romanian young democracy, but previous experience of its own or of countries that share a similar electoral system would not anticipate such relativity. Taking into account only the direct votes for a candidate in 2009 legislative elections in Germany, the number of 'overhang seats' in Bundestag were 24 (with eight more than in 2005) for 298 initial places (Parline Database, 2009). This less than 10% increase for direct places in Germany means actually half of it when it comes to a total number of parliamentarians, which increased from 598 up to 622 in 2009. This is because German electoral system is a mix of proportional and relative majoritarian vote, and the mix preserves a fair deviation from initial total number of representatives. Romania did try to adopt the German electoral system, but, in 2007, the directly elected president successfully contested it at the Romanian Constitutional Court (Gândul, 2007).

The 2012 Romanian electoral system was not a premiere for this country as it is similar with that of 2008, supporting a few changes, but different from that of 1990-2004. Due to the large number of 2012-2016 legislature parliamentarians, situation very new comparing to that of 2008-2012, the system of voting will probably face a new design in 2016. Studies on 2008 Romanian elections at district level (Marian and King, 2010) anticipated the supplementation of seats that would occur in next elections. New study on 2012 Romanian parliamentary elections (King and Marian, 2014) shows that having used a first-past-the-post system a one party quasi-total dominance would have occurred. The author of this paper, despite the negative impact of these too often changes of electoral system might have on Romania's democracy and rule of law, also believes that a new algorithm of allocating seats in both Chambers is needed. If we credit justice as the main pillar of democratic societies like ancient

(Aristotle, 1999) or modern (Mill, 2011; Tocqueville, 2002) scholars did, we must improve democracy through justice and rule of law. Still, this unpredictability on Romanian legislation proves some sort of inconsistency of its young democracy, even if we regard contemporary justice as a result of inclusion, participation and deliberation (Sen, 2009) and less as subject of a firmly righteous contract inspired by divinity as ultimate solution (Montesquieu, 2001; Rousseau, 2004) or the more human 'fairness' (Rawls, 1996). The thin or thick frontier that separates a deliberative approach from a 'contractualist' one, although a very important matter, is not subject of this research, and even if the author believes in the former that does not exclude at all the latter. Hence, a sort of stability is needed, especially when ruling or dominant parties seem to take advantage of their position in young democracies (Colomer, 2007). More, recent studies on defining and measuring the rule of law (Skaaning, 2010) prove that relative stability of laws through time is an important principle for most researchers. Moreover, what is the most important institution of representative democracy if not free elections? 'Free elections' means more than the facilitation of an act of voting and rather a substantial offer from the political system that should give citizens real opportunities to seize. Yet, the voting system is extremely important as it may distort in some consistent way the people will (Goodwin-Gill, 2006).

The goals of this paper are the following: to briefly discuss electoral systems and the 2012 Romanian one in Section 2; to develop some analysis based on statistical results of the Romanian legislative elections in 2012 using computational simulation in Section 3; to propose a voting algorithm that better fits Romanian democratic society in Section 4 and to extract important conclusions in final Section 5.

2. Classification of electoral systems and the Romanian electoral system

There are 12 main types of electoral systems identified by the late decade researches, and nine of them are grouped in three broad families, while the other three do not belong to any particular group (Reynolds et al., 2008):

- plurality/majority, which normally use single-member districts: First Past The Post (FPTP), Block Vote (BV), Party Block Vote (PBV), Alternative Vote (AV), and the Two-Round System (TRS)

FPTP is a single-member district system where relative majority (i.e. largest number of votes) directly elects a candidate (member of a party or independent). BV uses multi-member district, voters have as many options as candidates (choosing one, a few or all) and the winner obtains the largest number of votes. PBV is similar to BV, only for parties and not for candidates. AV uses single-member districts with preferential system where voters mark candidates with numbers. If no candidate obtains an absolute majority (50% + 1 votes) of first-preference, several virtual AV rounds will eliminate the last candidates while their votes are allocated to their second choice preference in that round. TRS is either a majority or a majority-plurality system where a second round is taken into consideration when no candidate obtains absolute majority on first round. In the first case only two top candidates reach the second round while, in the second case, all candidates that passes a given threshold go to second round and the winner may be elected without absolute majority.

- proportional representation (PR): Party Lists (PL) and Single Transferable Vote (STV); they are both multi-member district systems

PL is a system where candidates may receive voters' preferences on open party lists while votes can be given to parties only on closed lists. Seats are awarded in both cases based on national share of votes. STV is a preferential system where candidates are ranked by voters and are directly elected if they surpass a given quota (i.e. an election threshold given by a

mathematical formula). Several virtual rounds are taken into consideration in order to complete all seats by transferring votes from eliminated (i.e. worst positioned) candidates and redistributing over quota votes from successful candidates.

- mixed: Mixed Member Proportional (MMP) and Parallel Systems (PS)

MMP uses two different systems: plurality/majority in first round and PL in second virtual round in order to compensate disproportionate shares given by the former. PS also uses two different systems, but without connection between seats allocated in any of these systems.

- others: Single Non-Transferable Vote (SNTV), Limited Vote (LV) and Borda Count (BC); they are situated somewhere between PR and mixed systems

Unlike FPTP, SNTV is a multi-member system where votes are given to one candidate that is part of a list of candidates that run for more than one seat and winners are elected by higher numbers of votes. LV is also a multi-member district system where the winner is elected as in SNTV, only that voters may choose to elect one or a few candidates, but less then allocated seats for the district. BC sums preferences over candidates by given values, in a single- or multi-member district, and the winners are elected by highest score.

Romanian legislation that sanctioned the national elections of 2012 (Parliament, 2012) has its own saga, subject of several political and constitutional disputes. Hence, the outcome of these struggles deserved to be crowned with the election results that increased the number of parliamentarians without even assuring a fair proportionality. The Romanian system of voting that brought up these results is similar to an MMP system, where the PR seats compensate the disproportionate share given by the district seat results obtained with a FPTP subject to the constraint of absolute majority. Thus, in a unique round, a voter choose only one candidate in a college (i.e. uninominal candidature) and if a candidate obtains more than 50% of valid votes in their college this candidate is considered automatically elected in CD or SN. Then, in a virtual second round, the PR (virtually extracted from cumulating votes of uninominal candidatures of each party in all colleges and using d'Hondt algorithm) should award the share of each party at national level compensating for the seats deserved by proportionality but not directly obtained in colleges. The proportional award is given at district level separately for each of CD and SN, and only to parties that surpass the threshold of 5% at national level (for a coalition/alliance is: 8% for two parties, 9% for three parties and 10% for more than three parties) or win six constituency seats for CD and, respectively, three seats for SN. We refer in this paper to 'constituency seat' or 'closed college' as a place directly acquired by a candidate in a college (i.e. they obtained more than 50% of votes in their college).

It is worth mentioning that there are 43 electoral districts in Romania, each of them having at least four colleges for CD and two colleges for SN. Other than 42nd district (Bucharest, the capital city with 28 colleges for CD and 12 colleges for SN), the maximum number of colleges in one district is twelve for CD and five for SN. The 43rd district is not on Romanian territory and it is spread all over the world with four colleges for CD and two colleges for SN.

The legislation states clearly that colleges must respect a level of standard representation of 70.000 inhabitants for CD and, respectively, 160.000 for SN (Parliament, 2012). Using an emergency ordinance, Romanian Government (2008) interfered (as usually) in electoral law sanctioned by parliament and stipulated a 30% maximum difference between the number of inhabitants of any college, but only 'in a regular manner'. This ambiguous syntagma theoretically and practically allowed legislative malapportionment (i.e. unfairly apportioning of representatives to a legislative body) which raises serious questions if Romania intends to develop itself as a solid democracy. More, Romania did not face a substantial

malapportionment in the 1990s (Samuels and Snyder, 2001) but it now abides a legislation that withstands it, especially when it is promulgated by an emergency ordinance of the government and not by parliament, which may be seen as a sideslip from the rule of law too. Malapportionment is a feature of South American democracies and while it helps the transition from pre-democracy to democracy, it preserves the political and financial control of pre-democratic elites in the new societies (Bruhn et al., 2010). But even if Europe has not been yet terribly affected by malapportionment (Samuels and Snyder, 2001) new studies show that Germany uses it as a tool for legislative and financial bargaining and over-representation tends to increase in favoured regions (Pitlik et al., 2005). Malapportionment is a feature to be avoided if we believe in 'one person, one vote' and, while legislation and political bargaining may not do it, a system of vote may offer a solution (see Section 4**)**.

3. Preliminaries and computational simulation on Romania 2012 legislative elections

Two parties, one alliance and one coalition succeeded to pass the threshold of representation in 2012 legislative elections; they all pass the proportional threshold (i.e. from 5% for one party to 10% for a coalition of four parties), but only two of them also passes the constituency seats threshold. They are, in alphabetically order: 'Alianţa România Dreaptă' (ARD) an alliance of three parties, 'Partidul Poporului – Dan Diaconescu' (PPDD) a party, 'Uniunea Democrată a Maghiarilor din România' (UDMR) a party of Magyar minority and 'Uniunea Social Liberală' (USL) a coalition of four parties. From now on, to simplify the notation, we will use only the term of *party* for either party, alliance and/or coalition.

Data used in this research is provided by Central Electoral Bureau (BEC, 2012).

Table 1 shows the initial percents of the votes received at national level by each party in 2012 legislative elections:

Table 1. All parties percents in 2012 legislative elections

Chamber	ARD	PPDD	UDMR	USL	Other	Total
CD	16.50%	13.99%	5.13%	58.63%	5.75%	100%
SN	16.70%	14.65%	5.23%	60.10%	3.32%	100%

The four qualified parties (i.e. that passes the threshold) obtained most of votes, especially for SN where the 'other' parties did not registered as many candidates as for CD. It is worth mentioning that only one small party (an extremist party) succeeded in passing the psychological 1% threshold in either competition for CD or SN at national level. Some candidates, either independents or belonging to small parties obtained a few percents in their colleges, but no more than 5%. It seems that there is no peril that Romanian parliament will be highly divided and there is no fear, at a first glimpse, that wasted votes (i.e. votes that are not counted for seats allocation) will raise serious questions about representation. The 5% threshold does discriminate the small or extremist parties in Romania and this would be easily achieved even with a 2% threshold.

Table 2 presents the results of each qualified party after wasted votes are eliminated, and these are the numbers that we shall take into consideration when discussing the proportionality of final seats that were directly taken or awarded for parliament:

Table 2. Percents of the four qualified parties after elimination of wasted votes

Chamber	ARD	PPDD	UDMR	USL	Total
CD	17.51%	14.84%	5.45%	62.20%	100%
SN	17.28%	15.15%	5.42%	62.15%	100%

The 2008 legislative elections did not face the problem of unpredictable number of final seats, although it was highly criticized for two major aspects. Firstly, a party won more

legislative seats than the other did with fewer votes. Secondly, candidates that did not obtain the absolute majority but were positioned in the first place in their colleges were not awarded with a seat in parliament, but candidates on second or third position were (Porumbăcean, 2011). The latter problem still exists after 2012 elections, but the new one, the increased number of parliamentarians, was not an issue in 2008 because the distribution of votes for qualified parties was different (we will give a proof later).

Another important issue to discuss is the number of constituency seats won by each party and this illustrates the peculiar situation of 2012 legislative elections:

Table 3. Constituency seats per party expressed as absolute and relative to initially allocated seats values

Chamber	ARD	PPDD	UDMR	USL	Total	Initial
CD	2/0.63%	0/0%	12/3.81%	265/84.13%	279/88.57%	315/100%
SN	0/0.00%	0/0.00%	6/4.38%	117/85.40%	123/89.70%	137/100%

The victory of USL is over-crushing when it comes to constituency seats and it won almost 85% of the initially allocated seats for both CD and SN (i.e. 279 out of 315 seats for CD and, respectively, 123 out of 137 seats for SN). Almost 90% of the seats were taken directly by USL with some help from UDMR and insignificant from ARD. The latter actually took two seats in Diaspora's 43rd district that left only UDMR as a party that, besides USL, succeeded in directly winning their seats in parliament on Romanian territory. This is normal for UDMR because is mostly a regional party and their constituency seats (double than the threshold of 6 seats for CD and 3 seats for SN) prove that there were no danger that it might not enter the parliament, despite its low proportional share at national level (see Table 1).

Given the discrepancy between the national proportional share of each party from Table 2 and the constituency seats from Table 3, the virtual second round, based on d'Hondt algorithm, was meant to award seats for all the four parties so that to reduce the disproportion. Table 4 illustrates how this virtual second round managed to award the seats in parliament:

Table 4. Final seats for each party: constituency and awarded seats in absolute and relative values

Chamber	ARD	PPDD	UDMR	USL	Total
CD	56/14.21%	47/11.93%	18/4.57%	273/69.29%	394/100%
SN	24/13.64%	21/11.93%	9/5.11%	122/69.32%	176/100%

Table 5 illustrates the differences between national proportional share of votes of each party and their proportional share of allocated seats in parliament (i.e. the differences given by data from Table 2 and data from Table 4):

Table 5. Differences between national proportional share of votes and finally proportional share of seats

Chamber	ARD	PPDD	UDMR	USL	Total
CD	-3.30%	-2.91%	-0.88%	7.09%	0.00%
SN	-3.64%	-3.22%	-0.30%	7.17%	0.00%

The numbers of Table 5 represent percentage points and not a growth rate of each of the party final seats in parliament. Table 6 presents the actual loss or gain of each party after the virtual second round:

Table 6. Rates of growth for each party from first round to second round

Chamber	ARD	PPDD	UDMR	USL
CD	-18.84%	-19.63%	-16.17%	11.41%
SN	-21.08%	-21.26%	-5.60%	11.53%

The proportions of Table 6 represent the loss or gain for each party comparing with PR. D'Hondt algorithm proves once again (Reynolds et al., 2008) that it favours big parties in

quite a substantial way and, in addition, the loss of disadvantaged parties is even more substantial as a relative figure.

Before we conclude the presentation of real facts of 2012 legislative elections and moving to computational simulations, we must discuss the political importance of figures from Table 4, Table 5 and Table 6. The final results which bring almost 70% of seats to USL is, from a PR point of view, better than the almost 85% given by constituency seats of the first round. Nevertheless, from the same point of view, if we take into consideration the rounded 62% share of national votes this might be a terrible loss for Romanian democratic state subject to the rule of law. The greatest inner danger of democracy is tyranny of majority, and this is a real concern from antiquity (Aristotle, 1999) to modern era (Tocqueville, 2002; Mill, 2011) and not mentioning contemporary times (Rawls, 1996; Sen, 2009). The 70% of USL allows this party to change the Romanian constitution without validating its decision through a referendum, as the minimum required is more than 2/3 of the representatives easily achievable given the iron law of party organization (Michels, 1915). While it may be correct from a procedural justice's point of view, the author is not convinced that it is democratic. The rule of law is respected, no doubt, but justice is more than procedure, leaving enough room for deliberation and inclusion in democracy (Sen, 2009). More, the 70% of USL are given by some calculations and not by citizen's vote. We have already discussed the problem of malapportionment (see Section 2) and we have also presented the real percentage of people's will, which consecutively increased from around 60% (see Table 1) to 62% (see Table 2) and finally to nearly 70% (see Table 4). Although is not the main subject of this paper and the author admits that it is a vast domain which should be treated separately, it is worth pointing out that this final percent of USL theoretically leaves no room for real deliberations in changing the primordial law of the state subject of the rule of law. Moreover, this is a consequence of the results of the electoral system rather than people's choice.

We will presently discuss, based on computational simulations, some virtual results that might occur using the system of voting of 2008 and 2012. The Matlab code source that describes the steps needed to fulfil the tasks of six simulations is provided (Appendix A), along with some instructions for using the M files for one's own simulations and verifications. All the computational simulation are based on the real figures of 2012 legislative elections and the raw data and processed data are also provided (Appendix B).

Given the 41.76% participation of citizens to vote, all simulations are in a range that allows increasing or decreasing the number of voters in some or in all colleges. All of the simulations are mathematically possible, although some under a small probability. However, the point is to present some peculiar situations that might appear using existing Romanian electoral system. Moreover, let us not forget that the elections of 2008 did not anticipate the results of 2012 and this may be a reason to be always prepared for the worst.

Let us assign an index, in alphabetically order, to each of the party: ARD – 1, PPDD – 2, UDMR – 3 and USL – 4 and let us take into consideration for CD only the number of winning seats obtained through voting, without the 18 seats constitutionally and separately allocated to minorities.

Simulation I

Let us assume that each party, excepting UDMR, would close the remaining colleges, others than those from Table 3. We exclude UDMR because is mostly a regional party and the probability of closing all the other colleges are infinitesimal, if not zero. In order to succeed in this operation we equal the votes of each party taken into consideration with the total votes of all the other parties and we add 10 votes, too. Thus, we obtain a fragile but clear absolute

majority for each of the ARD, PPDD and USL in the remaining colleges, not closed in reality, as can be seen in Table 7.

Table 7. Final seats after closing all colleges

Chamber	Type	Index	ARD	PPDD	UDMR	USL	Total	Growth
CD	closed remaining colleges	1	76	45	15	268	404	2.54%
		2	52	73	15	268	408	3.55%
		4	56	46	17	301	420	6.60%
SN		1	31	20	6	120	177	0.57%
		2	24	31	6	118	179	1.70%
		4	23	21	9	132	185	5.11%

We notice that closing all colleges will increase the total number of parliamentarians in all three cases for both CD and SN. More, if an over-dominant party closes all remaining colleges the total number of parliamentarians will increase significantly; USL increases the total number of parliamentarians with 6.60% for CD and 5.11% for SN, comparing with the final number of seats given by electoral process (i.e. 394 seats for CD and 137 seats for SN).

Simulation II

Let us assume that in all colleges the number of voters is multiplied by some factor for all non-dominant parties (i.e. ARD, PPDD and UDMR), thus excluding USL.

Table 8. Multiplying the number of voters in all colleges for ARD, PPDD and UDMR

Chamber	Type	Index	ARD	PPDD	UDMR	USL	Total	Growth
CD	x 0.8	1,2,3	48	40	16	283	387	-1.78%
	x 1.2	1,2,3	62	53	19	254	388	-1.52%
	x 1.5	1,2,3	70	59	21	213	363	-7.87%
SN	x 0.8	1,2,3	20	18	7	123	168	-4.55%
	x 1.2	1,2,3	27	23	9	119	178	1.14%
	x 1.5	1,2,3	31	26	11	103	171	-2.84%

We observe in Table 8 that an increase or decrease with 20% for the numbers of voters for non-dominant parties (i.e. multiplied by 0.8 and 1.2) gives for CD almost the same decrease for total number of parliamentarians. It is not the same for SN, and this is because the number of votes is important, but so is the distribution of votes in colleges. We remind that the distribution of votes for CD and SN is different, see also Table 2 and the discussion about malapportionment in Section 2. On the other hand, by significantly increasing the number of votes (i.e. with 50%) for non-dominant parties the total number of seats decreases, especially for CD and not so substantially for SN. Once again, the difference between distribution of voters for CD and SN is important and this distribution is given by votes of the four qualified parties and by wasted votes, which are not as numerous for SN given the reduced number of candidates from the parties that did not pass the threshold.

There is no linear correlation between the factor of multiplication of votes of all non-dominant parties and the decrease of total number of parliamentarians. However, increasing or decreasing in block the votes of non-dominant parties lead only to decreasing of total seats comparing to real numbers of seats for both CD and SN, which means that the share of each party is also important for the final number of parliamentarians.

Simulation III

Let us assume that there is only one party that win all constituency seats by using the same method as in Simulation I, not counting UDMR once again (for the same reason as in Simulation I). We equal the number of votes of each of the ARD, PPDD and USL with the votes of the other three and add 10 votes to obtain a fragile absolute majority in all colleges

that are not already closed by the respective party. For colleges that are already closed by a party, we keep the same scores of the votes.

It is worth mentioning that UDMR will not enter the parliament in this case, either by passing the 5% threshold or by winning the minimum constituency seats (i.e. 6 for CD and 3 for SN). Let us take a new threshold of 3% only for this simulation, so that all four parties are subject to the experiment.

Table 9. Closed colleges by one of the ARD, PPDD and USL

Chamber	Type	Index	ARD	PPDD	UDMR	USL	Total	Growth
CD	one winner	1	315	28	9	114	466	18.27%
		2	31	315	10	111	467	18.53%
		4	69	61	12	315	457	15.99%
SN		1	137	9	4	51	201	14.20%
		2	12	137	4	49	202	14.77%
		4	31	27	7	137	202	14.77%

The figures of Table 9 prove that winning all constituencies by one party increases the total number of parliamentarians for both CD and SN, but not in similar proportions. Still, the rate of growth is substantial in all cases, comparing with the real number of seats and more than substantial comparing to initially allocated number of seats (more than 45% for both CD and SN, i.e. from 315 to 460 seats for CD and from 137 to 200 seats for SN). The results of 2012 may be seen as a relief if we notice simulated outcomes from Table 9, which are worse than the real ones. This situation is unlikely because of UDMR that has its own fief, otherwise it would be quite probable with a favourable distribution in colleges of real votes of dominant party (with 62% of votes is easy to overtake the votes of all the other parties in all colleges with favourable partitions).

Simulation IV

Let us assume that we multiply the participation of citizens to voting by keeping the same distribution in colleges (this is possible as the turn-out was 41.76%). We expect to have the same numbers of total seats by proportionally increasing and decreasing the number of voters for all the four parties (we do not take wasted votes into account).

Table 10. Proportionally increasing and decreasing the number of voters in all colleges

Chamber	Type	Index	ARD	PPDD	UDMR	USL	Total	Growth
CD	x 0.8	1,2,3,4	56	47	18	272	393	-0.25%
	x 1.2	1,2,3,4	56	47	18	273	394	0.00%
	x 1.5	1,2,3,4	56	47	18	274	395	0.25%
	x 1.8	1,2,3,4	56	47	18	275	396	0.51%
SN	x 0.8	1,2,3,4	24	21	9	122	176	0.00%
	x 1.2	1,2,3,4	24	21	9	122	176	0.00%
	x 1.5	1,2,3,4	24	21	9	122	176	0.00%
	x 1.8	1,2,3,4	24	21	9	122	176	0.00%

We notice in Table 10 that proportionally increasing or decreasing the number of voters will practically maintain the same results. Due to different distribution of votes in colleges, we only have insignificantly changes in case of CD for both decreasing and increasing of the number of voters. The figures of SN remain the same and it is not a surprise, as the vote was more compact with less wasted votes.

Simulation V

Let us verify the impact that one district can have on the total number of seats. We choose Cluj, the 13th electoral district, where there are only three colleges closed for CD and one for

SN. With a total number of ten colleges for CD and four for SN, it remains seven open colleges (i.e. that are not closed, the seat was not directly gained) for CD and, respectively, three open colleges for SN. This is a district with most open colleges and we observe in Table 3 that there are only 36 open colleges left for CD and 14 left for SN from 315 colleges for CD and, respectively, 137 for SN. This puts the 13th electoral district in a position highly above all the other 42 districts from the perspective of open colleges, for both CD and SN. The reason behind this particularity is the fact that ARD, PPDD and UDMR share almost the same number of voters with USL (i.e. 101.765 vs. 101.200).

Table 11. Multiplying votes in the 13th college

Chamber	Type	Index	ARD	PPDD	UDMR	USL	Total	Growth
CD	13: x 5	1	59	46	18	270	393	-0.25%
	13: x 15	2	54	52	18	270	394	0.00%
	13: x 10	3	55	46	23	270	394	0.00%
	13: x 1.5	4	56	47	18	276	397	0.76%
SN	13: x 4	1	26	21	9	121	177	0.57%
	13: x 10	2	23	23	8	121	175	-0.57%
	13: x 7	3	23	21	11	121	176	0.00%
	13: x 1.4	4	24	21	9	124	178	1.14%

Using the multiplying coefficients from Table 11, PPDD closes four colleges and the other three parties close six colleges out of seven for CD, while PPDD closes only one college and the other three parties close out all of the three remaining colleges for SN. Yet, the overall impact at national level is not significant, only but for USL. There is compensation at national level for the total number of seats if ARD, PPDD and UDMR win more colleges in one district than in reality. It is not the same for USL that, as dominant party and by closing more colleges, increases through proportional awarding the number of parliamentarians.

Simulation VI

Let us change the number of votes for more than one party at the same time, by keeping the same distribution in colleges in order to see how this affects the total number of seats.

Table 12. Multiplying the votes of more than one party

Chamber	Type	Index	ARD	PPDD	UDMR	USL	Total	Phase	Growth
CD	2 parties	1x1.8; 4x0.7	101/16	50/0	21/13	155/91	327	final	-17.01%
			30.89%	15.29%	6.42%	47.40%	1	final	
			33.06%	15.57%	5.72%	45.66%	1	initial	
	3 parties	1x1.4; 2x1.4; 4x0.5	94/10	80/4	19/13	121/12	314	final	-20.05%
			29.94%	25.48%	6.05%	38.54%	1	final	
			29.95%	25.39%	6.66%	38.00%	1	initial	
	4 parties	1x1.4;2x1.4; 3x0.6;4x0.5	101/14	94/6	19/8	100/2	314	final	-20.05%
			32.17%	29.94%	6.05%	31.85%	1	final	
			32.65%	30.19%	5.54%	31.62%	1	initial	
SN	2 parties	1x1.8; 4x0.7	46/7	20/0	8/7	74/49	148	final	8.03%
			31.08%	13.51%	5.41%	50.00%	1	final	
			32.68%	15.92%	5.69%	45.71%	1	initial	
	3 parties	1x1.4; 2x1.4; 4x0.5	44/6	36/2	7/7	53/6	140	final	2.19%
			31.43%	25.71%	5.00%	37.86%	1	final	
			29.54%	25.90%	6.61%	37.94%	1	initial	
	4 parties	1x1.4;2x1.4; 3x0.6;4x0.5	43/6	42/4	7/4	45/0	137	final	0.00%
			31.39%	30.66%	5.11%	32.85%	1	final	
			32.17%	30.78%	5.50%	31.56%	1	initial	

Table 12 presents the national share for all parties after multiplying votes in all colleges for some of the parties, with both first round (i.e. initial phase) and second virtual round (i.e. final phase), and also shows the number of total seats and constituency seats for each party (i.e. 101/16 for ARD in the first simulation).

Let us discuss the number of total seats for CD in case of simulations with two and three parties that have their votes multiplied. The method that allocates the seats for parties (Appendix A) does not take into account the procedure of distributing the places in parliament when two or more candidates share the same coefficient obtained with d'Hondt algorithm. The legislation states that, in this case, the number of votes is the second criterion and the position of candidates in college is the third criterion (Parliament, 2012). This is the reason the total number of seats is 314 for CD in simulations with two and three parties in Table 12. However, the decrease of total number of seats (i.e. -20.05%) is calculated for 315 virtual parliamentarians from the initially real number of 394.

Another conclusion that can be extracted from Table 12 is that the total number of seats decreases when the shares of parties' votes are not so unequal. However, one may also observe that for similar initial shares the outcome for CD is very different from SN (i.e. a decrease of 17.01% for CD and an increase of 8.03% for SN) in case of simulation with two parties, which proves once again that the distribution of votes in colleges is very important.

Yet, the most intriguing part is given by the results of simulation with four parties for SN where USL has zero closed colleges and ARD has six, but the final number of seats is 45 and, respectively, 43. More, the initial national proportional share of USL increases from 31.56% to 32.85% while the share of ARD decreases from 32.17% to 31.39%. This is an important issue in young Romanian democracy because the party that receives the largest number of seats is awarded with the privilege of nominating the prime minister and this has already arisen as a major problem in 2008, when a party that had more votes obtained fewer seats in parliament. Table 12 also shows that there are situations when small parties are favoured and situations when large parties benefit from the second virtual round. The third party seems to be unfavourably affected by d'Hondt algorithm in most of the experiments, with a feeble exception in case of the simulation with three parties for CD.

Taken into account the afore mentioned discrepancies between the national share of votes and the seats for each party, the unpredictability of total number of parliamentarians and the consequences on politics and rule of law, the author asserts that a new system of voting must be implementing starting with next legislative elections in Romania.

4. A new voting algorithm (ANVA)

ANVA is developed on legislative-constitutional and on inclusion-participation approaches. Firstly, after several legislative free elections starting with 1990 the Romanian citizens expressed their will for uninominal candidature in a referendum in 2007, as the PR system does not make parties responsible (Porumbăcean, 2011). Although the turnout was around 26%, the supporters of uninominal majoritarian system in two rounds were in a massive proportion of 81.36%. This gives, at least, a strong indication that voting on closed PL is not desirable anymore and uninominal approach is more appreciated by citizens. It is true that ANVA does not support a two rounds system, but only the uninominal system. On the other hand, it is worth mentioning that PL-PR system has notable supporters for its outcomes on consensual politics, although they differ from country to country (Lijphart, 1999) and strong criticism has been brought to uninominal approach compared to PR on grounds of corruption (Charron, 2010). Secondly, the Constitutional Court already rejected a German replica system (see Section 1) so that mixed elections on lists (50% of seats) and directly on uninominal

colleges (the other 50%) are not an option. Although ANVA supports elections on lists, on one of its version, it is different from rejected German formula because it applies the same rule to all candidates, being in accordance with the Constitutional Court's decision, see Section 1. Actually, the German system only prevents half of the supplementation of seats through party lists, while it supports the other half through uninominal lists. Thirdly, the author will try to prove that ANVA is suitable for Romanian democracy defending his choice on national and universal bases.

The most important issues of the 2008 and 2012 Romanian electoral system were discussed in Sections 2 and 3: the unpredictability of total number of parliamentarians, the problem of malapportionment reflected in erroneous representation and the optimum allocation of seats through PR given by national shares of parties.

ANVA takes into consideration PR as the unique form of fair inclusion and the vote for uninominal candidature as the solution to prevent control of parties over representatives. Parties are not, in a deliberative and participative democracy of inclusion, ends themselves, but instruments of people's will. The real political life has proven the contrary (Michels, 1915) and still proves that parties dominate the society by controlling the electoral system (Colomer, 2005). Nevertheless, political parties are important components of democratic society, although questions on this aspect have lately arisen, and this is clearly stated in Romanian Constitution (Adunarea Constituantă, 2003). Thus, on one hand, we have the uninominal candidature and on the other hand the proportional representation, so that we need to build a system that considers both, such as a better inclusion is accomplished through multipartyism (Sartori, 2003) despite plurality approach when effectively voting.

ANVA proposes a single-round vote on uninominal colleges with PR at national level, such as votes are given to a unique candidate but the seats are allocated on national ground. From the beginning, the author states that the algorithm has different versions that must be taken into consideration, but the decision for one choice should be subject of deliberation. The aim of this article as a whole is not to provide the absolute electoral system or the perfect system, but to point out important aspects that should be accountable for a democracy of participation, deliberation and inclusion. This is the reason there are several versions of ANVA that only differ on small but important details. While we only provide here the steps of the algorithm, the discussion on choices and versions of ANVA and a mathematical and computational formalization are in Appendix C.

ANVA 1) Voting.

This is the first and the unique voting round and we propose two options for it:

ANVA 1.1) Voting for a unique candidate in a college

ANVA 1.2) Voting for a unique candidate in a college and voting on separated PL for a party at national level. The separated PL does not contain any candidate, but a list of parties.

ANVA 2) First virtual round of calculating the seats allocated for each party that passes the threshold (if it exists).

We have two options to determine the seats of each party given by ANVA 1.1) and, respectively, by ANVA 1.2) to calculating the national share of each qualified party:

ANVA 2.1) Adding the votes of each candidate of a party in a college and dividing it at total number of votes of all candidates at national level.

ANVA 2.2) Extracting the national share of each party by adding PL votes of each party and dividing them to the total number of PL votes.

ANVA 3) Calculating the coefficient of each candidate (CC).

CC is obtained individually by dividing the number of votes of a candidate to the total number of electors (and not voters!) of the college (it will be presently explained why).

At this point we must say that this is one of the major contributions of ANVA, while the previous steps are somehow familiar to other electoral systems.

ANVA 4) Allocating seats for parties using shares of seats and sorting candidates by CC.

There are two options to allocate seats for parties:

ANVA 4.1) The whole country is one district

After sorting candidates by party, we group them in one national list (which finally contains as many components as total number of seats), sort this national list by CC once again and verify if independent candidates have a higher CC than the CC of party candidates on eligible positions.

ANVA 4.2) Allocation of seats in each electoral district

We may use national shares from ANVA 2) in districts or we rather calculate new shares for each district and we determine the number of seats for each party in a district.

We sort party candidates by CC in each district, we group them in sorted district lists (which contain as many components as number of seats per district) and we verify if independent candidates have a higher CC than the CC of party candidates on eligible positions.

ANVA 5) Allocation of seats for independent candidates using ANVA 4.1) or ANVA 4.2)

ANVA 5.1) Independent candidates with higher CC than members of eligible national list enter the parliament, while the latter are eliminated.

ANVA 5.2) Independent candidates with higher CC than members of eligible district list enter the parliament, while the latter are eliminated.

ANVA proposes the original approach of this step in order to eliminate the discrimination between independent and party candidates.

ANVA 6) Second virtual round of calculating the seats allocated for each party that passes the election threshold.

The number of independent candidates that entered the parliament in ANVA 5) is deducted from the total number of seats allocated to the parliament. We repeat ANVA 4) by calculating the number of seats of each party with respect to shares from ANVA 2), to CC from ANVA 3) and to number of remaining seats from ANVA 5).

Table 13 presents some results of simulation using ANVA on legislative elections of 2012. Matlab source code is also provided for all simulations of this section in Appendix C. In Table 13, CC is also expressed as percentage and, actually, the sum of all CCs in one college represents the turnout in that college. The first two observations belong to the smallest and, respectively, to the largest colleges in Romania, ironically both in 42nd district. The disproportion between their number of potential voters is that high so that it cannot be judged as an unintentional sideslip from the state administration. Taking into consideration the potential voters of colleges 2 and 19, the former should have sent at least twice as many representatives as the latter had done. However, even in our simulation illustrated in Table 13 the candidate of the dominant party (i.e. USL) from college 2 is on the list of potential parliamentarians, as the smallest CC belongs to the candidate of USL from college 2 in district 31, see last observation. The turnout in the latter college is higher than in the former,

but the share of votes is also important and we may see that the highest (overall, actually) CC is given by outstanding scores on both PR and turnout, see third observation from Table 13.

Table 13. Simulation of ANVA on 2012 elections for CD. C-college, D-district, PV-potential voters

Location	Variable	ARD	PPDD	UDMR	USL	Other	Total
C=2, D=42, PV=103455	Votes	4134	849	72	11776	1020	17851
	PR	23.16%	4.76%	0.40%	65.97%	5.71%	100.00%
	CC	10.90%	2.24%	0.19%	31.05%	2.69%	47.07%
C=19, D=42, PV=37924	Votes	5687	4185	95	24783	3120	37870
	PR	15.02%	11.05%	0.25%	65.44%	8.24%	100.00%
	CC	5.50%	4.05%	0.09%	23.96%	3.02%	36.61%
C=6, D=36, PV=40791	Votes	2008	1331	70	25154	133	28696
	PR	7.00%	4.64%	0.24%	87.66%	0.46%	100.00%
	CC	4.92%	3.26%	0.17%	61.67%	0.33%	70.35%
C=2, D=31, PV=61591	Votes	7266	3194	44	13694	1023	25221
	PR	28.81%	12.66%	0.17%	54.30%	4.06%	100.00%
	CC	11.80%	5.19%	0.07%	22.23%	1.66%	40.95%

The alternative offered in ANVA 4) for PR (but not for voting, on the contrary it must be stated) either endorses the idea of 'one country – one district' or makes concession to a multi-district choice. To support the former we bring into discussion the historical experience of Jewish people which has constantly been a community despite territorial problems and whose electoral system (Andersen and Yaish, 2003) is now based on such an approach proposed by ANVA 4.1). Yet, the district allocation of seats presented in ANVA 4.2) is complicated as it must take into account the operation of rounding seats in agreement with national shares of parties, without wasting or conceding votes (due to decimals) to any party. Nevertheless, we determined in ANVA 4) a list of potential parliamentarians, members of parties. This list is a joint of party lists, each party having its own list of members ordered by their coefficient obtained in ANVA 3) and counting a number of seats allocated in ANVA 2), see also Appendix C for more details.

Table 14 presents three simulations using ANVA with distribution of seats for the four parties. The first and third of them use data processed in Table 12 in the experiments with three parties and, respectively, two parties.

Table 14. Simulations for CD using ANVA. Allocation of seats. UC-uninominal candidature (with proportional distribution at national level). UCPD-UC with proportional distribution at district level. UCPD2-UC with proportional distribution at district level and rounding seats at national level

Type	PR and seats				PR and difference of seats from PR				Mean	Std
	ARD	PPDD	UDMR	USL	ARD	PPDD	UDMR	USL		
PR	32.65%	30.19%	5.54%	31.62%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
UC	103	95	17	100	0.05%	-0.03%	-0.14%	0.12%	0.09%	0.06%
UCPD	101	94	18	102	-0.59%	-0.35%	0.17%	0.76%	0.47%	0.26%
UCPD2	102	95	19	99	-0.27%	-0.03%	0.49%	-0.20%	0.25%	0.19%
PR	17.51%	14.84%	5.45%	62.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
UC	55	47	17	196	-0.05%	0.08%	-0.05%	0.03%	0.05%	0.02%
UCPD	58	49	18	190	0.90%	0.71%	0.26%	-1.88%	0.94%	0.68%
UCPD2	56	47	19	193	0.27%	0.08%	0.58%	-0.93%	0.46%	0.37%
PR	26.00%	22.04%	5.78%	46.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
UC	82	69	18	146	0.03%	-0.13%	-0.07%	0.17%	0.10%	0.06%
UCPD	80	70	18	147	-0.61%	0.18%	-0.07%	0.49%	0.34%	0.25%
UCPD2	82	69	20	144	0.03%	-0.13%	0.57%	-0.46%	0.30%	0.26%

The second simulation from Table 14 is, practically, the CD distribution of votes in 2012 legislative elections (see also Table 2). For all three simulations of Table 14, UC is actually the distribution of seats for PR (given by votes at national level), UCPD distributes the seats by proportional shares of votes in district. More, UCPD2 acts as UCPD but counts all decimals from rounding shares into seats and redistribute them at national level (it is not important how; conveniently it would be by sorted CCs). We observe that UC gives optimal results from a proportionality point of view judging by mean (calculated for absolute values) and standard deviation in Table 14, while UCPD and UCPD2 are not precise as the first. Yet, UCDP2 has better outcomes than UCPD, because it takes into consideration a different and more suitable approach for rounding seats from proportional shares. This may be important and if we see the first simulation of Table 14, we observe that UCPD changes the winner of the election, a sensible matter (see discussion in Section 2).

The admittance of independent candidates in parliament is a problem itself, as it may lead to a fragmentation of parliament, issue avoided for parties by imposition of an (inferior) election threshold. Still, the vote is on uninominal candidature because citizens' preference is for individuals and not for organizations. The 2008 and 2012 electoral system is discriminative when it comes to independent candidates and it clearly favours party candidates. An independent candidate must obtain an absolute majority in a college to entering the parliament, while in a second round (which is not available for independents) a party candidate with few votes is awarded with a seat. Once again, due to malapportionment, distributions of district votes or plain luck, the Romanian MMP system proves its own flaws. Both options of ANVA 5), either at national or at district level, offer a non-discriminative possibility for an independent candidate to enter parliament by verifying if the coefficient of any independent is higher than any of the potential parliamentarians determined in ANVA 4).

Although improbable, admittance of independent candidates in parliament will lead to another virtual round of seat redistribution for parties over (inferior) threshold. A loosely approach would be to eliminate from potential parliamentarians determined in ANVA 4) as many as independent candidates entered the parliament and to stop the algorithm. This will give us an unfair representation of seats, because the elimination of party candidates could be from only one party, and the proportional representation of parties would be erroneous, without respecting the shares calculated in ANVA 2). Still, one may argue that having potential parliamentarians with such low CC, this party loses its seats for independent candidates and the other parties should not be also affected by diminishing their number of seats in parliament. The author admits that situation is arguable, but he is not a supporter of letting only one party to diminish its number of seats. The good reason stands up also for another issue: the critique that a candidate with large number of votes or even with an absolute majority in college will not enter parliament due to a low CC. We have already discussed that number of votes are not as important as participation, as avoiding malapportionment or as uninominal candidature over party lists. Thus, if a candidate believes that their party would put them in a bad position they are free to run as independent as ANVA offer a non-discriminative approach in this case. The author states clearly that ANVA is designed for individual candidates and not for oligarchic organizations or candidates that would hide behind the latter, though parties are taken into considerations and given the appropriate respect. Voting for a person and not for a party increases the responsibility of both elector and elected, creating a psychological bond which is almost inexistent when voting for parties.

5. Conclusions

This article brought into attention some flaws of the Romanian electoral system: unpredictability of number of parliamentarians, the inequity of seats allocation given by malapportionment and the disproportionate shares of final seats with respect to shares obtained through people's vote.

Not only the author discussed the Romanian voting system oddities and made some proofs based on computational simulations, but it also proposed a new voting algorithm (i.e. ANVA) which offers a remedy for the afore mentioned imperfections. The improvements of ANVA to electoral system are the following: providing fair representation by proportionality but still keeping an uninominal candidature in college, contesting the malapportionment through system of voting and not by state administration, combating the discrimination between independent and party candidates and stimulating citizens involvement in a national competition between communities given by college turnout and number of votes. We also discussed several variations of ANVA as there is and there will be no perfect electoral system and all approaches (this one is no exception) are based on subjectivism. Yet, there is a perfect old procedure of achieving fair representation, but this is more appropriate for a society of participation, deliberation and inclusion and not for a party system democracy. While this is subject to a comprehensive different research, the author of this paper only mentions it, but fears that society is not ready for it: lot allocation of public offices (Turcoane, 2013).

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Appendices

Appendix A: http://turcoane.ro/sar/Article_EJIS_App_A.pdf
Appendix B: http://turcoane.ro/sar/Article_EJIS_App_B.pdf
Appendix C: http://turcoane.ro/sar/Article_EJIS_App_C.pdf