

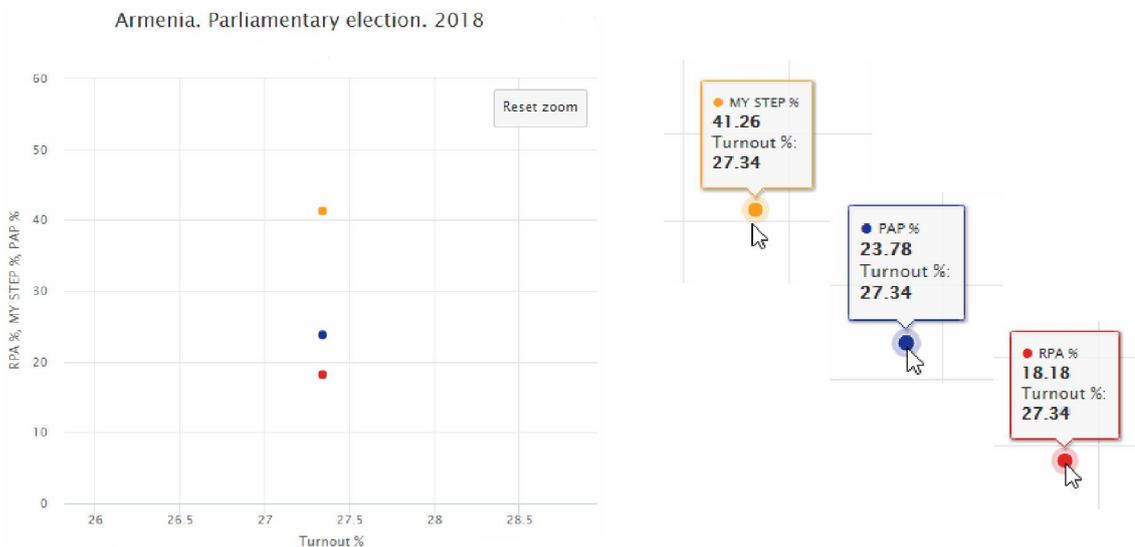
Statistical analysis of the official election results

Early Parliamentary Elections, Republic of Armenia, 9 December 2018

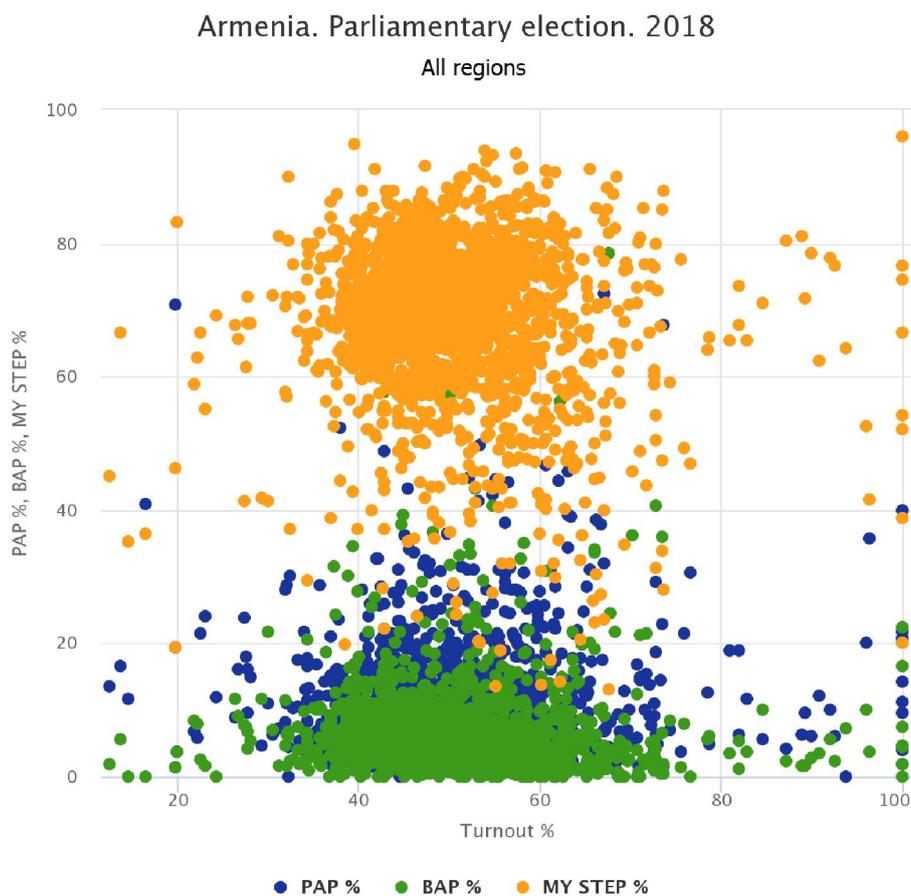
We have analyzed the official results from all polling stations published by the Central Election Commission (CEC) of Armenia. We have studied the number of the votes received by the contenders in relation to the turnout at each polling station. This method indicates potential irregularities which might be further investigated by reviewing of the video-recordings from the polling stations, evidences provided by election observers, recounting of ballots etc.

In most elections where irregularities have been reported by election observers on election day, they were in most cases related to the increased voter turnout. The most popular techniques to artificially increase the turnout are i.e. ballot stuffing, organized voting or carousel voting. In such cases, there is only one beneficiary from the high turnout – mostly the ruling party. At the same time, there were hardly any cases observed so far where irregularities are related to a decreased turnout.

In our scatter-plot graphs, each point visualizes a rating of one party related to the turnout at a polling station. Having analysed the results of the three main contenders there are three points per indicated polling station: red (Republican Party of Armenia, RPA), yellow (My Step), blue (Prosperous Armenia Party, PAP) at the same turnout level. As an example, below you will see the results of one polling station.

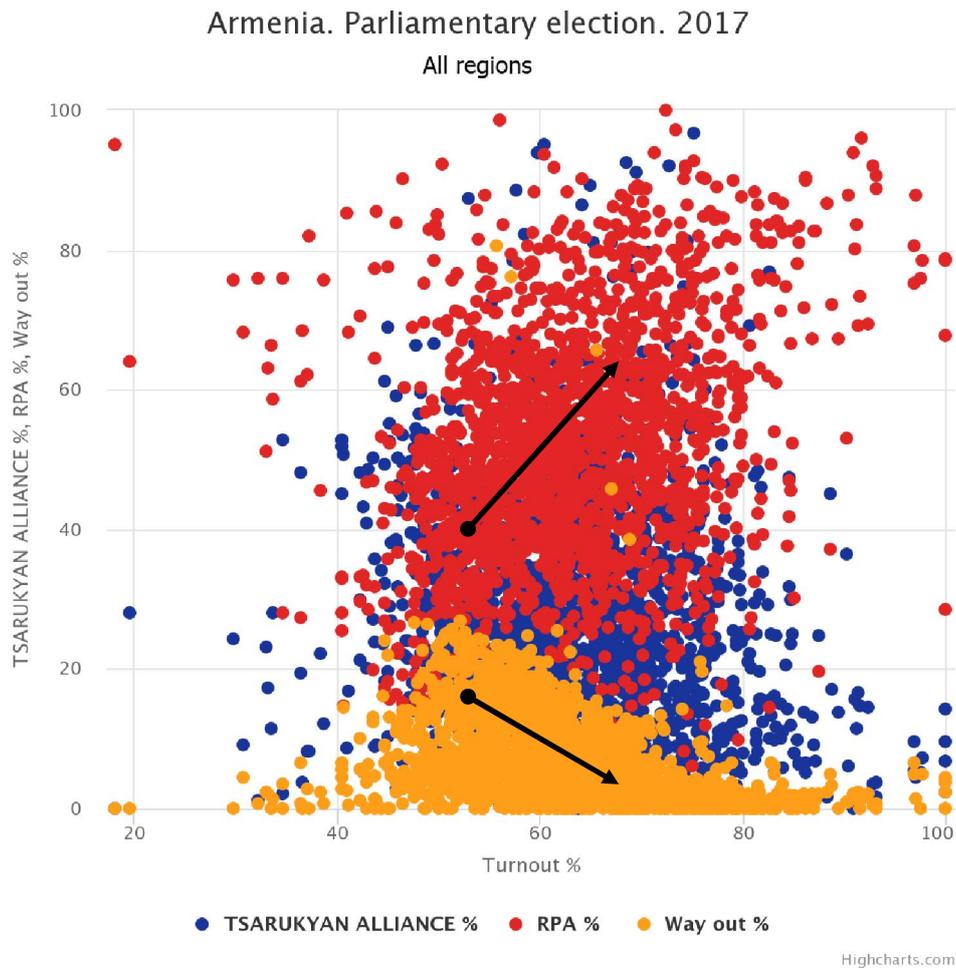


The graph below shows the overall results of the three above mentioned contenders (leaders) in all polling stations during the Early Parliamentary Elections on December 9:



The average turnout is around 50 %, the number of polling stations with a very high turnout and high rating of a particular contender (top right corner of the graph) is relatively small. Most of the polling stations are distributed around the average. The average result of the leader (My Step) is approx. 70%. There is no contender who would particularly benefit from the high turnout.

The previous parliamentary elections, held in 2017, looked quite different:

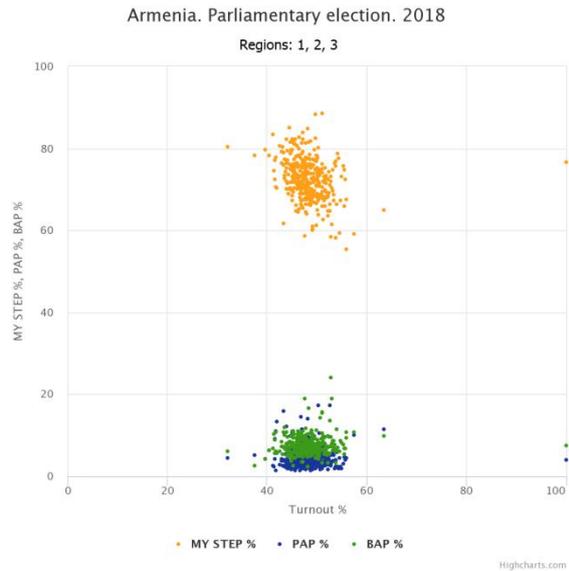
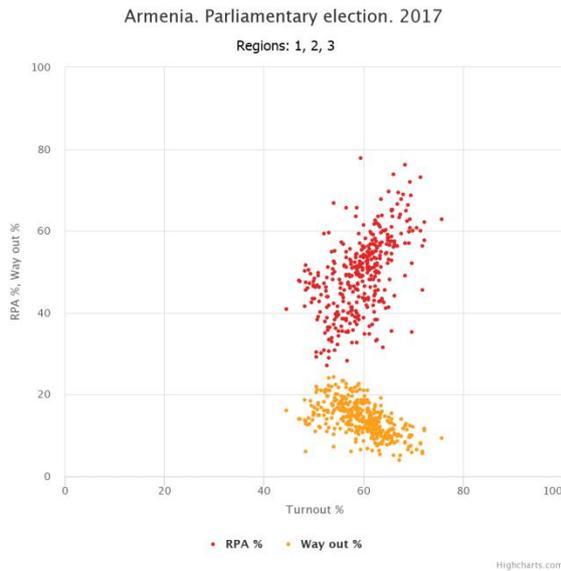


Three leaders of the poll are shown: RPA, Way Out and Tsarukyan Alliance.

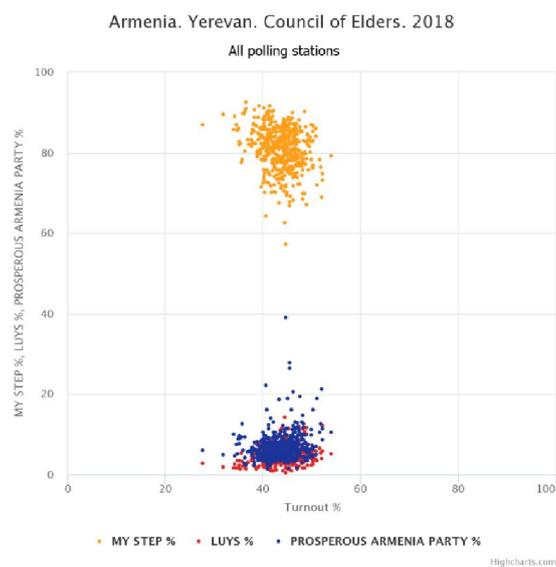
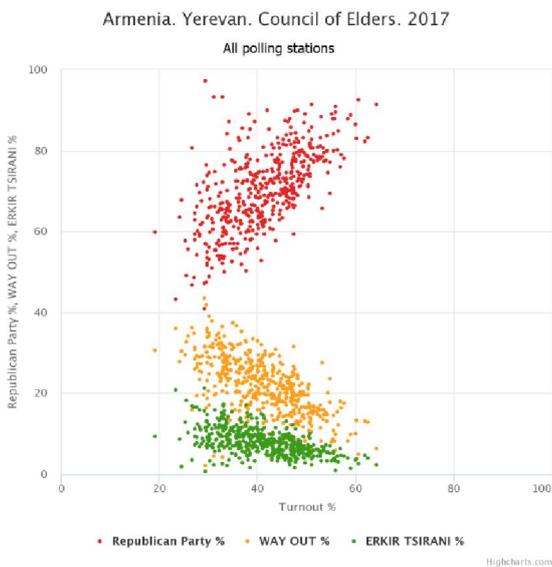
Along with the growing turnout, only one party – the ruling party – benefits, the other parties are losing votes.

Possible explanation: organized voting, ballot stuffing, vote buying etc., any method that increases the turnout in favour of a single contender.

Sample of three randomly selected regions – to simplify the picture



Comparison: Mayoral Elections Yerevan 2017 and 2018

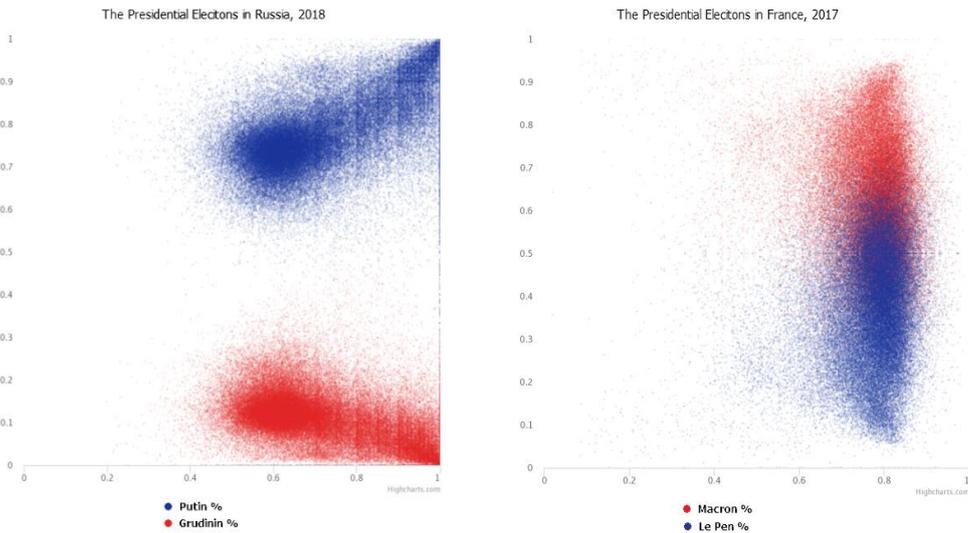


Comparing the Mayoral Elections in Yerevan in 2017 and 2018, we have seen a similar change in distribution of the votes .

On the left: ruling party benefits from the increasing turnout, all other contenders lose.

On the right: all parties get most votes when turnout average is achieved (around 40 %). Compactness of the clouds shows that there are no evidences of irregularities.

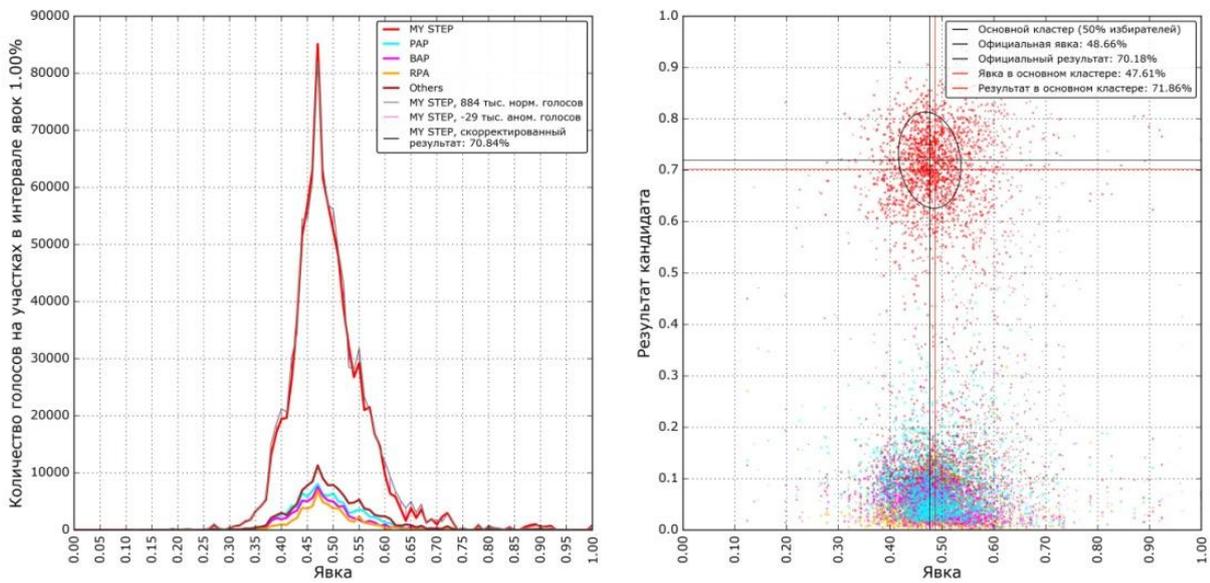
Comparison: Elections in Russia (left) and France (right) in the same axes:



On the left: only one candidate benefits when the turnout is growing. On the right: both candidates benefit in the same way from the growing turnout.

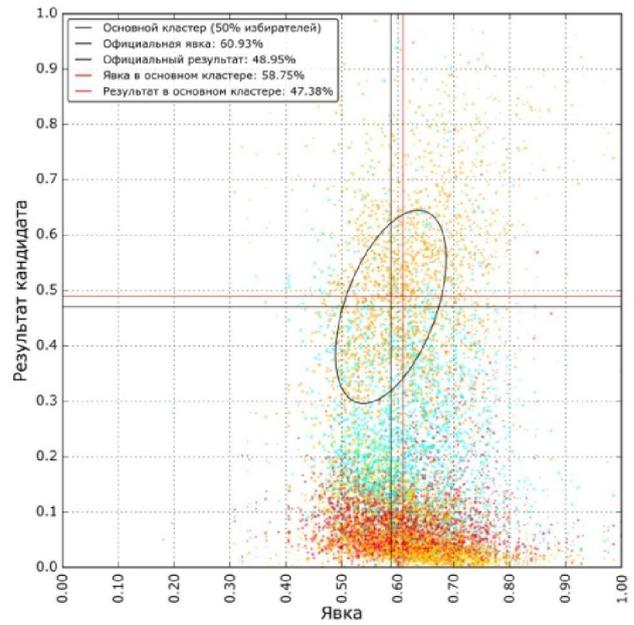
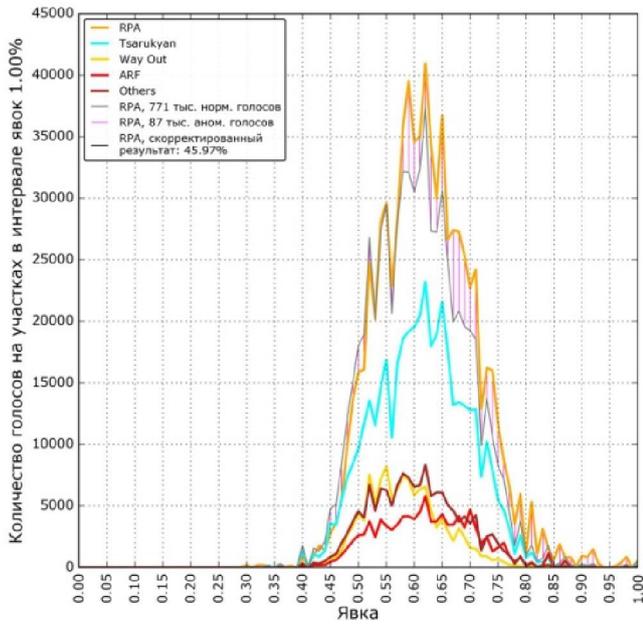
Analysis made by Sergey Shpilkin, a Russian electoral investigator, confirms the abovementioned observations

Armenia Parliament 2018



On the left: histograms of the number of votes in favour of each party aggregated by the turnout intervals of 1%. On the right: Scatter plot according the method described previously.

Armenia Parliament 2017



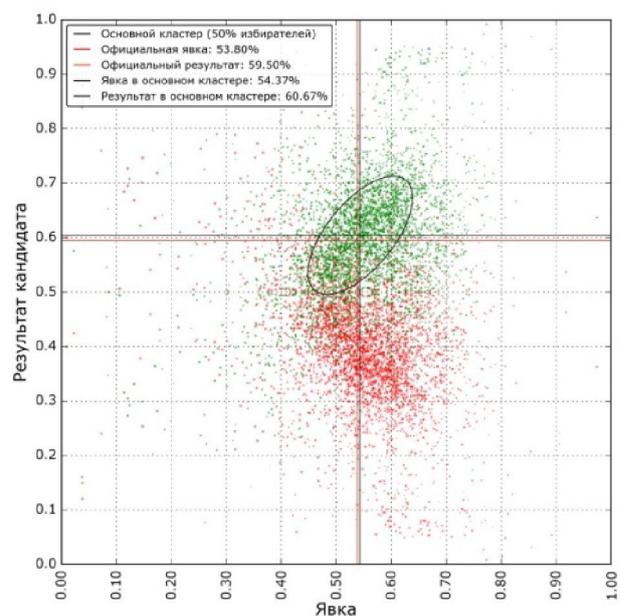
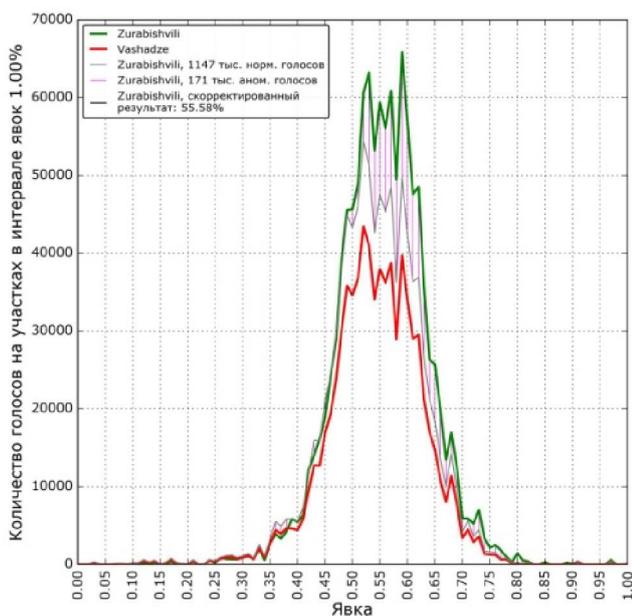
In 2018, results of the parties were proportional with the same coefficient at every interval of the turnout. In 2017, the proportion of the winner, the ruling RPA, is abnormally higher in intervals of higher-than-average turnout (striped region on histogram). The area of the striped region gives us the estimation of the number of abnormal votes (87 thousand).

Comparison with other elections: Using histogram and scatter-plot methods

According to the statistical analysis, the recent parliamentary elections in Armenia were less distorted than the recent Presidential elections in Georgia.

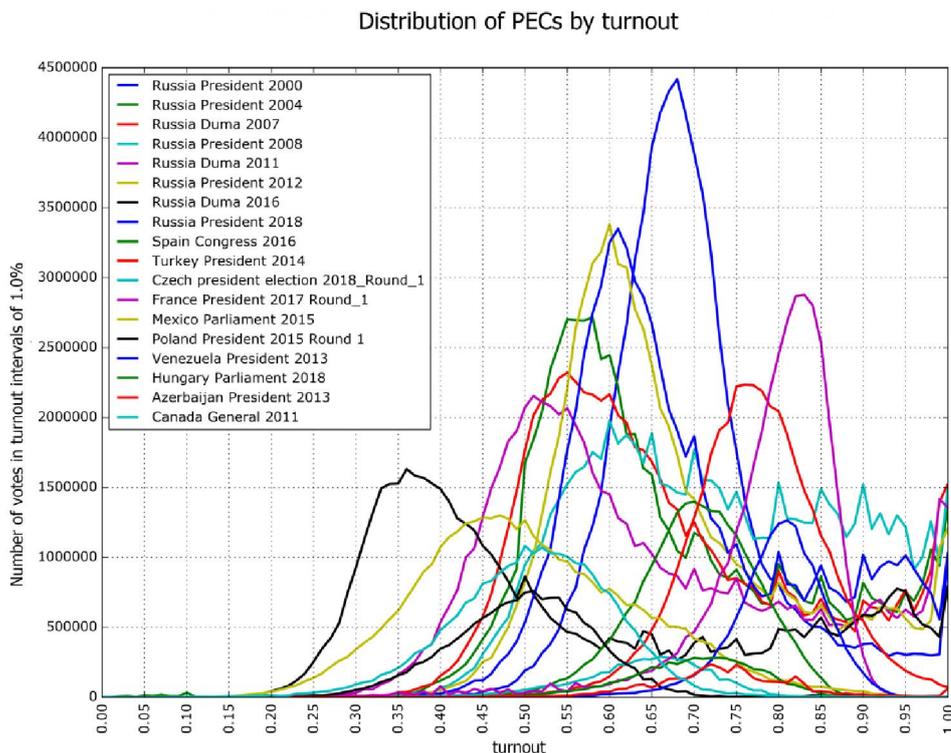
Presidential Elections in Georgia, Round II, 28 November 2018

Georgia President Election Round 2 2018



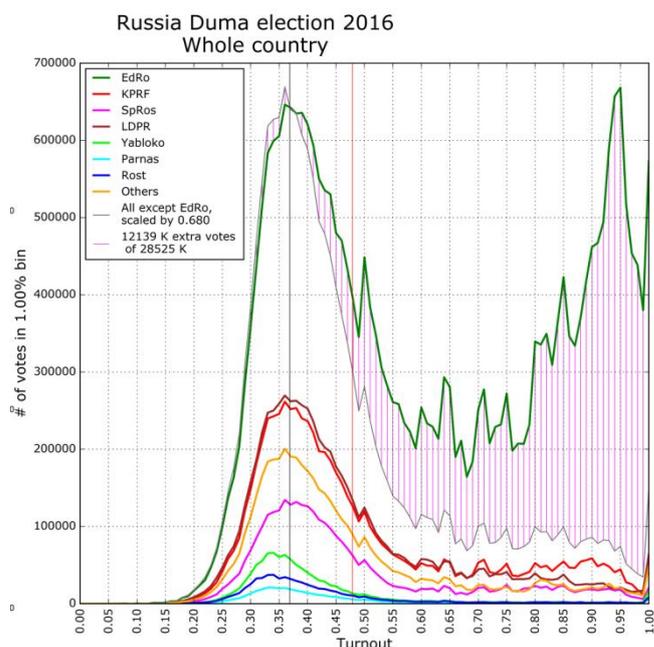
Both scatter plot (right) and histogram (left) show that only one candidate (Zurabishvili) benefits from high turnout.

On the histogram below you can compare data from different countries around the world. In established democracies “bell-shaped” curves indicate regular (not affected by fraud) distribution of votes (so called “Gaussian function”). Elections where massive fraud has been documented, the distribution of votes is distorted.



An extreme example of deformation of a distribution curve represent the 2016 parliamentary elections in Russia. The striped area in the graph indicates 12.000.000 abnormal votes in favour of the ruling party United Russia. There are already numerous evidences of ballot stuffing and carousel voting being provided by observers and monitors who have analysed the video recordings from the polling stations located in the striped area of the graph.

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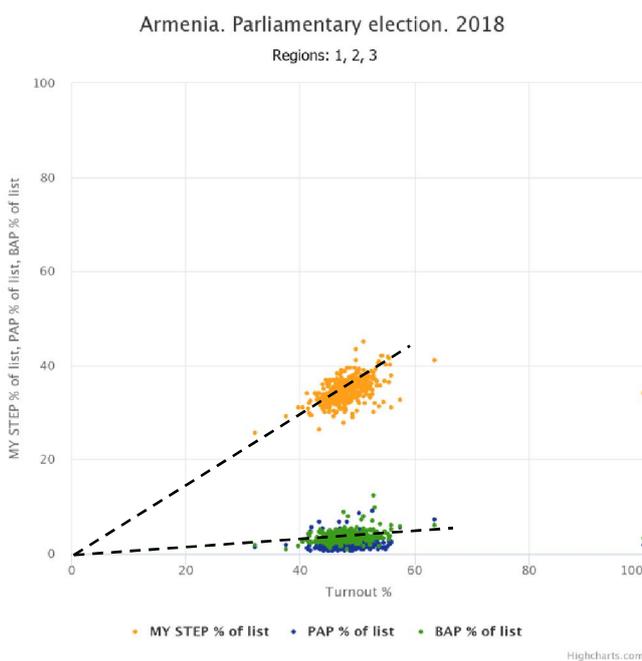
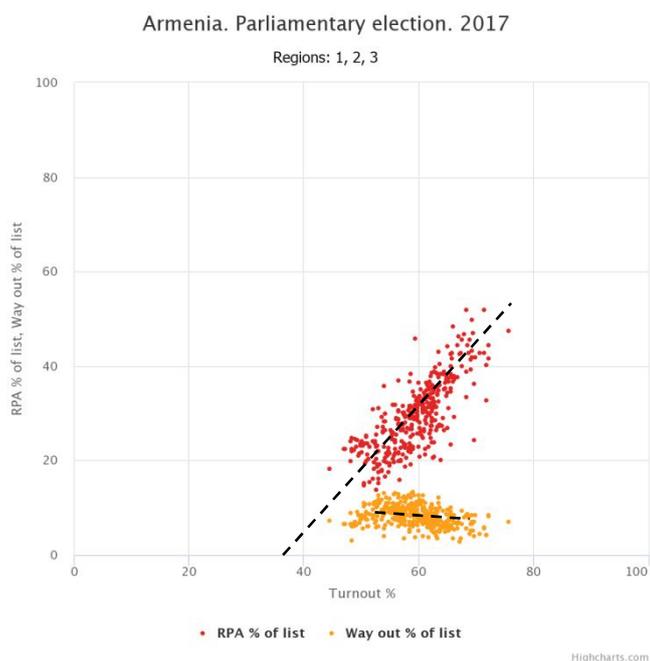


In a scatter-plot, the relation of the turnout versus the votes in favour of a particular contender has the same constant denominator, i.e. the number of registered voters. In these types of scatter-plots, any interference with the results of a single contender doesn't affect the result of others. Any additional vote adds the same value to the turnout and to the beneficiary, so the beneficiary's cloud is stretched in the direction of 45 degrees. No additional vote goes to the others, so their clouds are stretched horizontally.

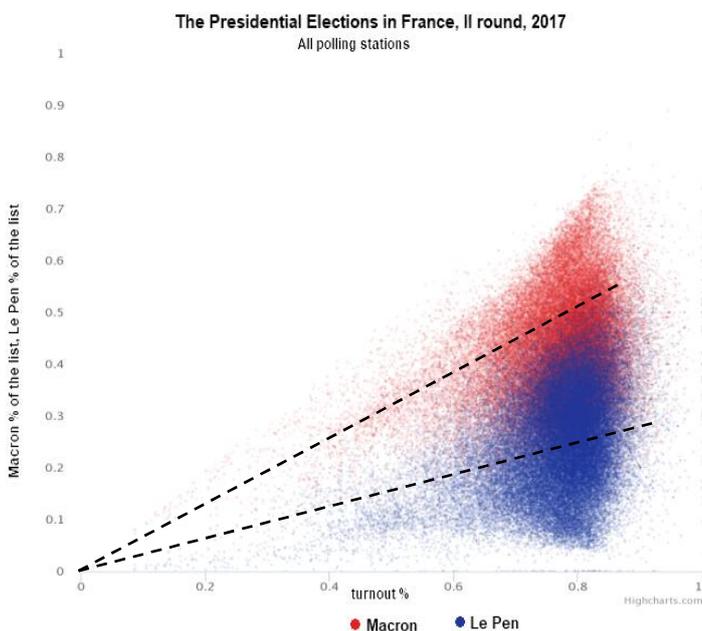
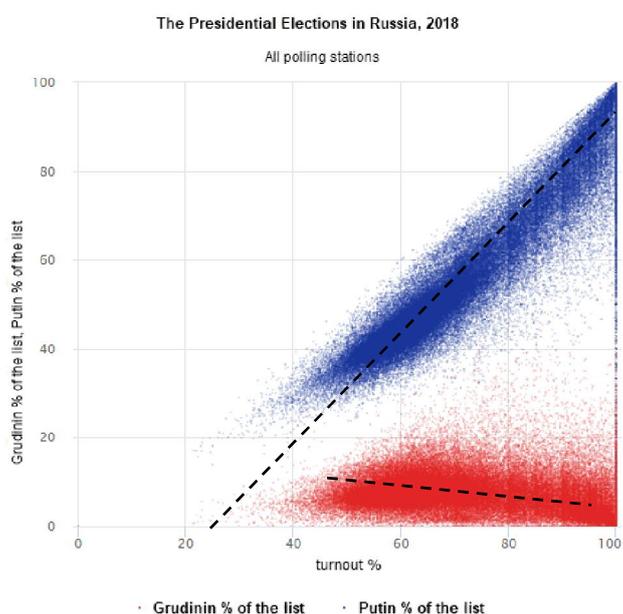
If the distribution has normal nature, the results do not depend on turnout; at any interval the results are proportional to the actual preferences of voters, so the direction of their clouds' stretch points to the start of axes.

If the votes are not only added to but stolen from other parties, the beneficiary's cloud goes up steeper than 45 degrees, and others' clouds go downwards.

The two last parliamentary elections in Armenia exemplify those observations:



Comparison: Elections in Russia (left) and France (right) in the same axes:

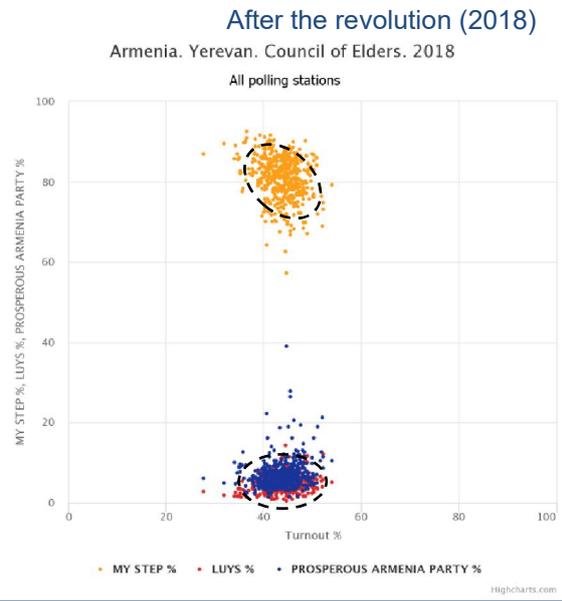
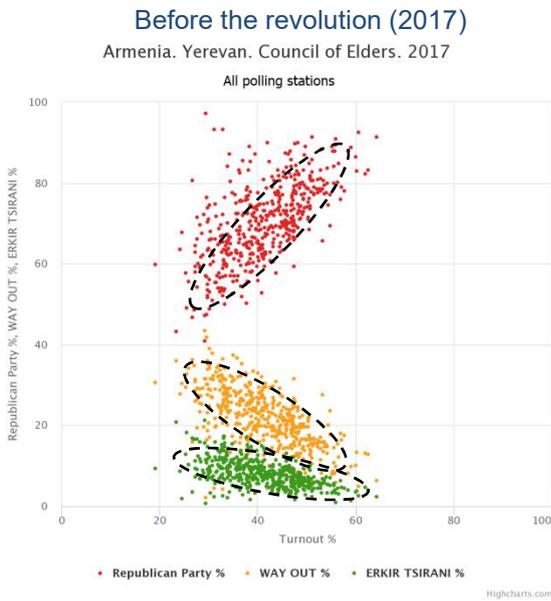


Back to the Armenian case: detailed assessment based on different methods

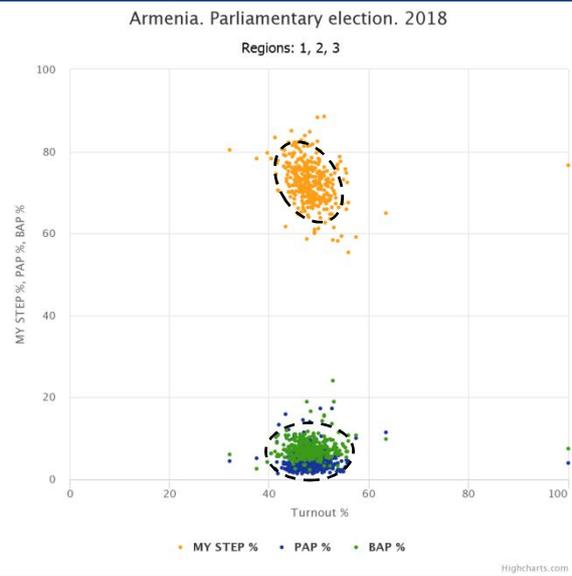
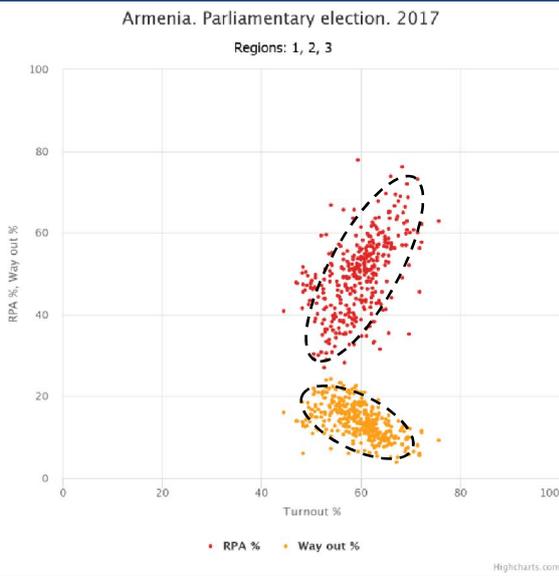
The revolution in Armenia provided us with a double opportunity to test our models. The following matrixes show the drastic change in the electoral data distributions.

Normal scatter-plot

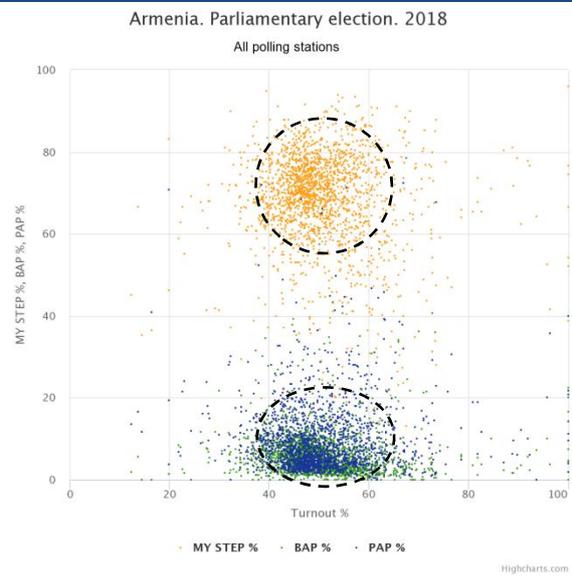
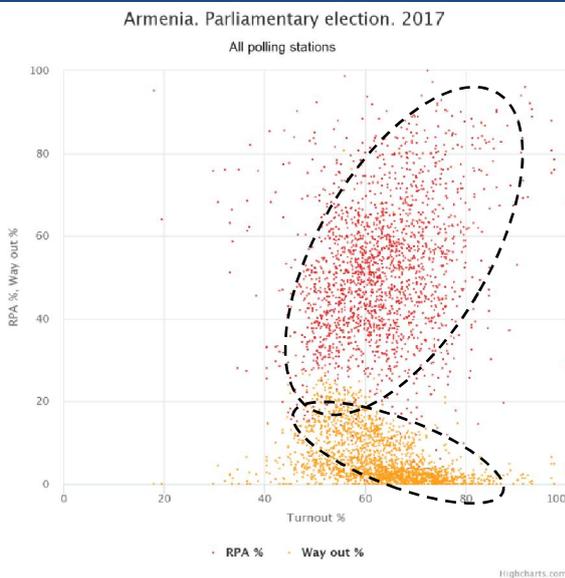
Elders' Council of Yerevan



The parliament of Armenia (region 1-3)



The parliament of Armenia (all regions)



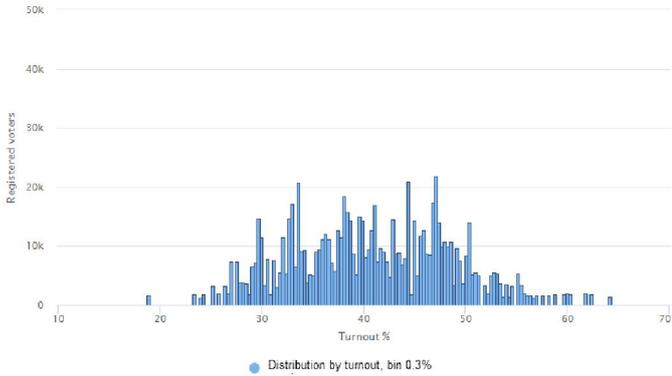
Histograms

Distribution by the turnout became 2018 more symmetrical, compact and normal.

Elders' Council of Yerevan

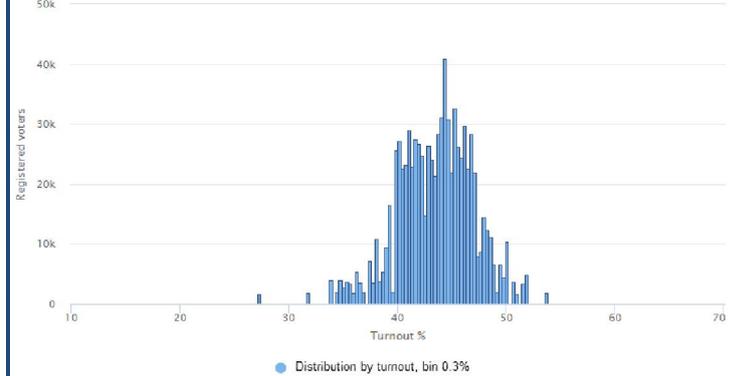
Before the revolution (2017)

Armenia, Yerevan. Council of Elders. 2017
All polling stations



After the revolution (2018)

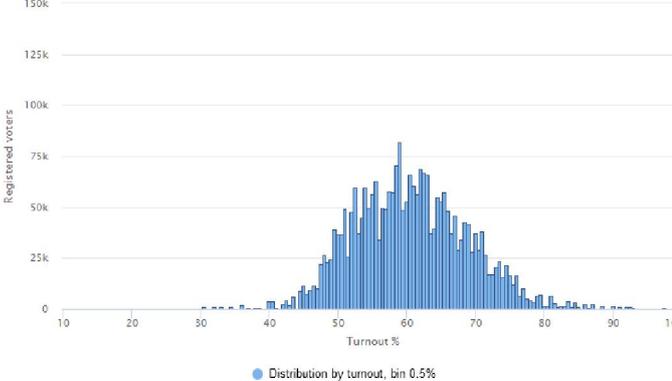
Armenia, Yerevan. Council of Elders. 2018
All polling stations



The parliament of Armenia

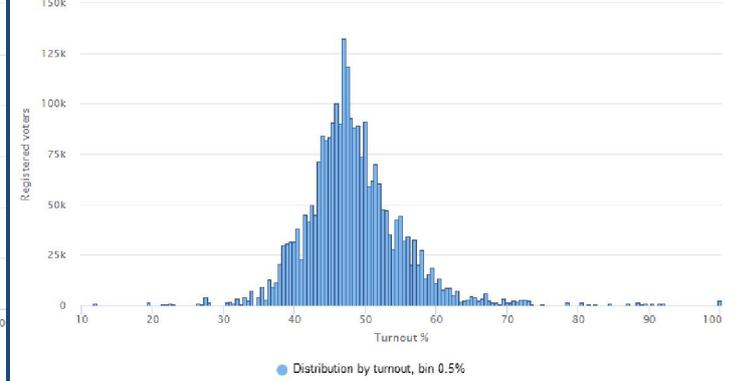
Armenia, Parliamentary Elections. 2017

All polling stations



Armenia, Parliamentary Elections. 2018

All polling stations

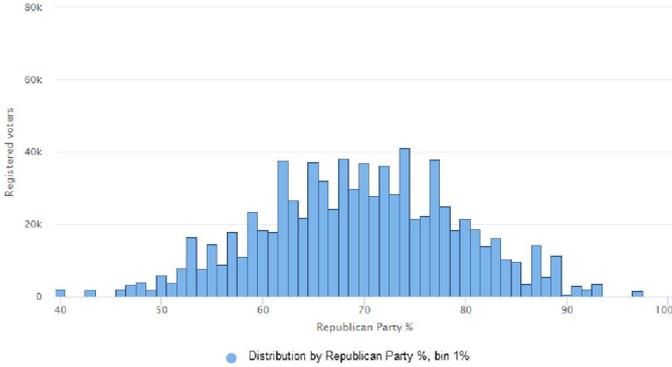


Distribution by the winner's results:

Elders' Council of Yerevan

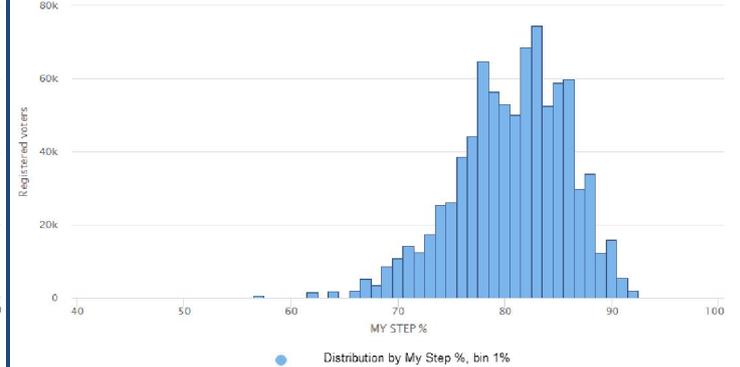
Before the revolution (2017)

Armenia, Yerevan. Council of Elders. 2017
All polling stations



After the revolution (2018)

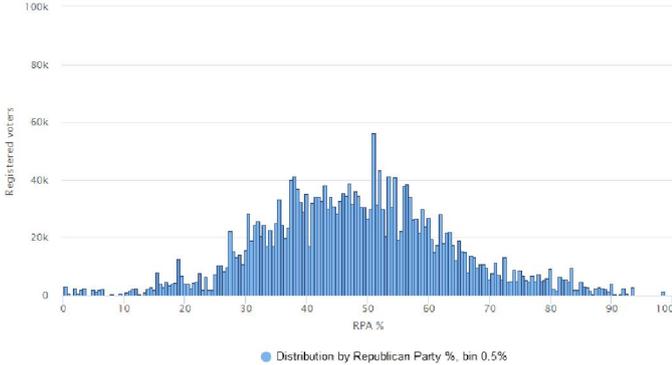
Armenia, Yerevan. Council of Elders. 2018
All polling stations



The parliament of Armenia

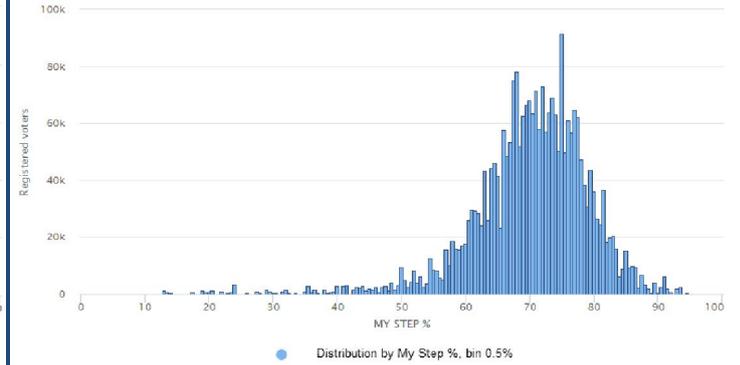
Armenia, Parliamentary Elections. 2017

All polling stations



Armenia, Parliamentary Elections. 2018

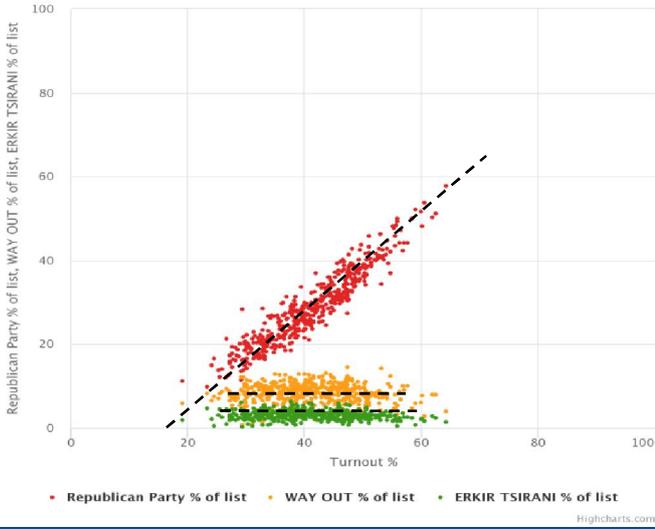
All polling stations



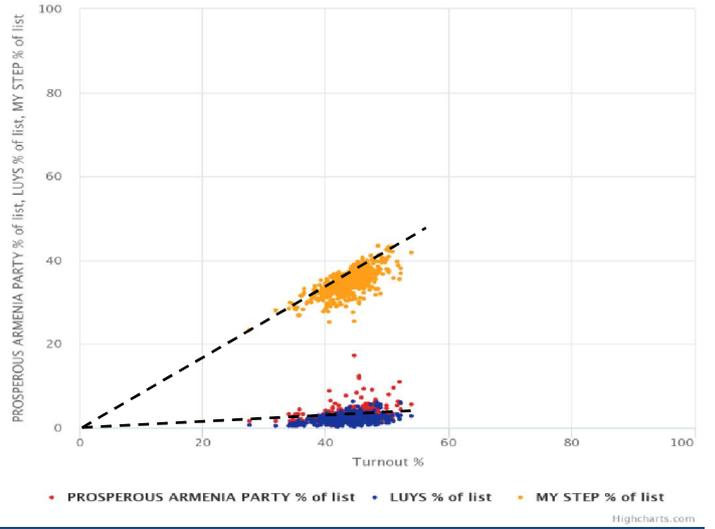
Scatter-plot with constant denominator

Elders' Council of Yerevan

Before the revolution (2017)
Armenia. Yerevan. Council of Elders. 2017
All polling stations

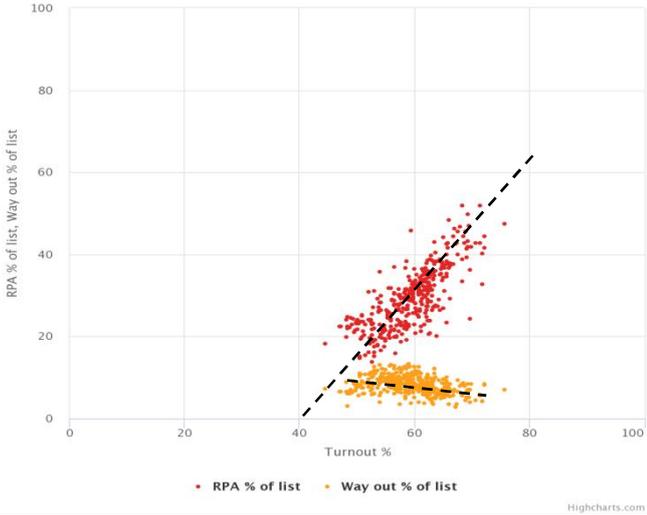


After the revolution (2018)
Armenia. Yerevan. Council of Elders. 2018
All polling stations

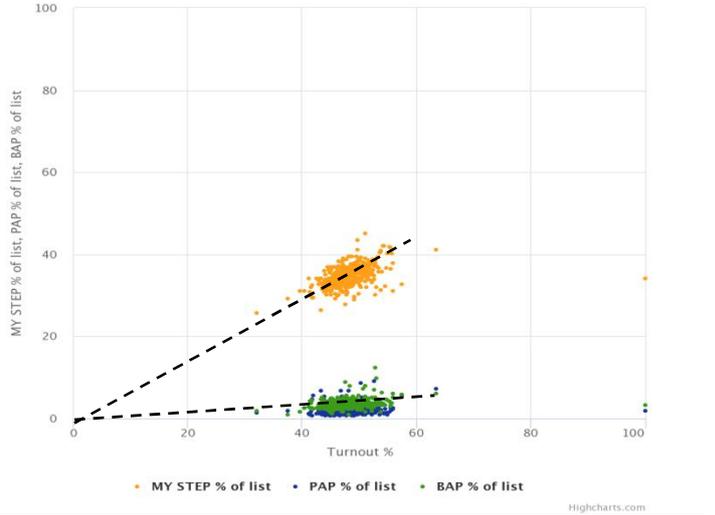


The parliament of Armenia (region 1-3)

Armenia. Parliamentary election. 2017
Regions: 1, 2, 3

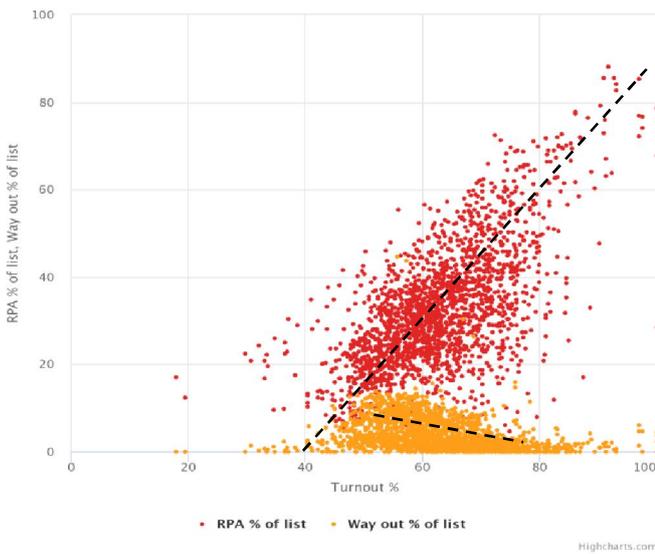


Armenia. Parliamentary election. 2018
Regions: 1, 2, 3

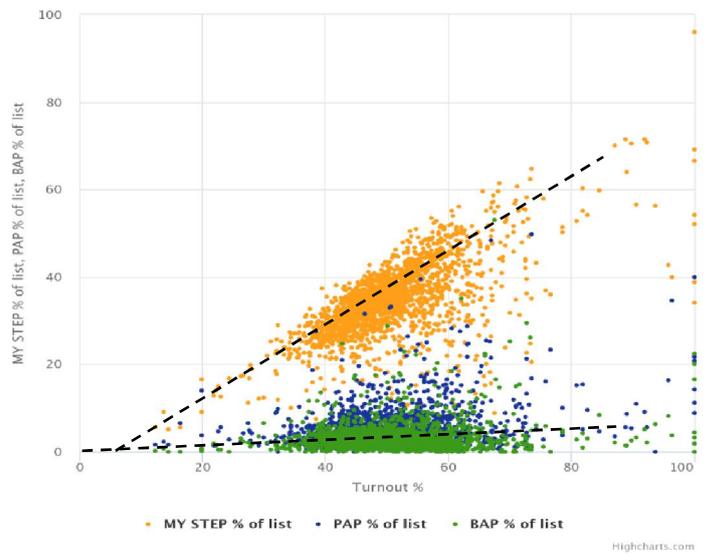


The parliament of Armenia (region 1-3)

Armenia. Parliamentary election. 2017
All polling stations



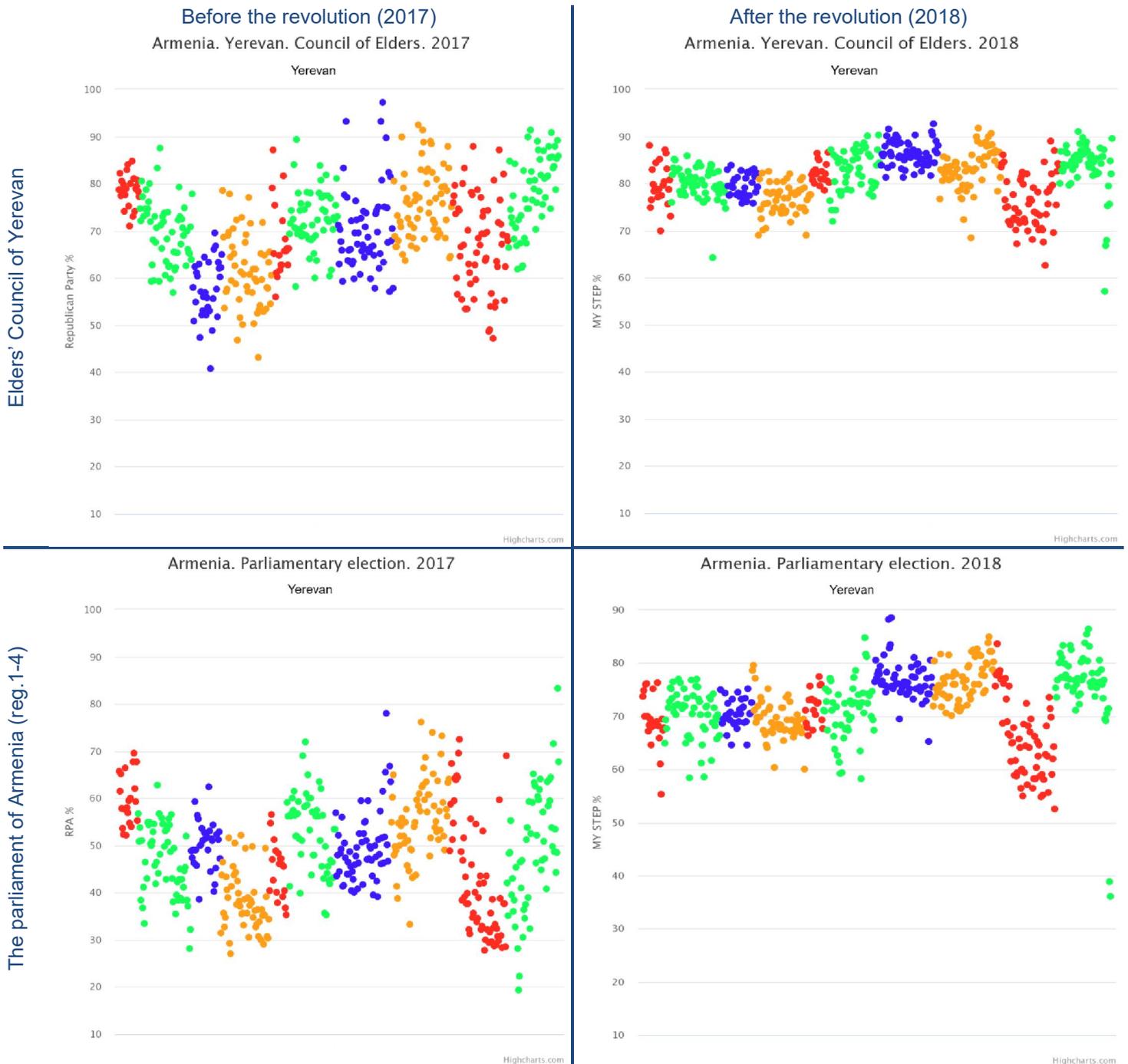
Armenia. Parliamentary election. 2018
All polling stations



Administrative-geographical distributions

Another useful scatter-plot shows distribution of votes for a particular contender in polling stations in different regions (different colours indicate different regions).

The data for the same Yerevan electorate, population of Yerevan, shows that in 2018 the preferences of the electorate were less different in different districts of the capital which can be explained by the absence of administrative control, external influence and manipulations on separate polling stations in different districts.



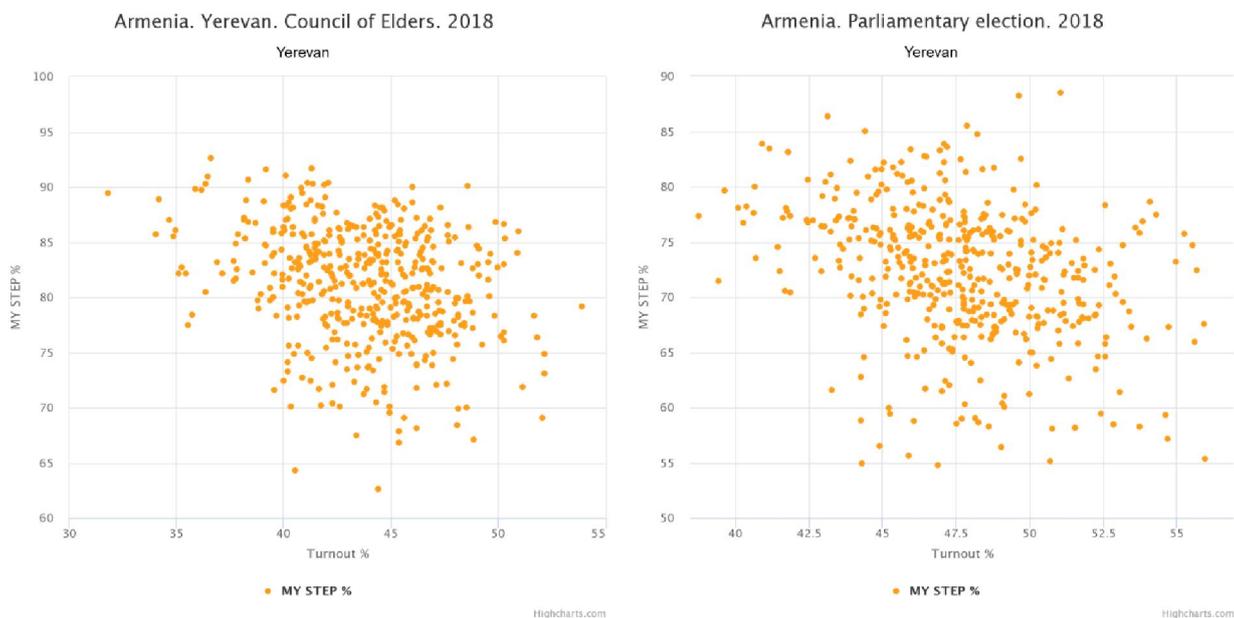
Two systems. Two patterns. The same country.

With the same population, regional differences and borders, political history and culture, economic and geopolitical situation, media landscape and law-enforcement agencies, the data looks stunningly different. The results don't correlate with the turnout, the administrative borders don't influence the outcome, the

dispersion is reduced, the distribution is more compact and symmetrical. The dramatic change in patterns of electoral data might be the result of the lack of control over the elections by the ruling party.

Old guard resistance

Some minor artefacts of the previous system are still observed. For example, in spite of being the dominant political force, the My Step Party's results suffered a slight negative trend in the interval of high turnouts.

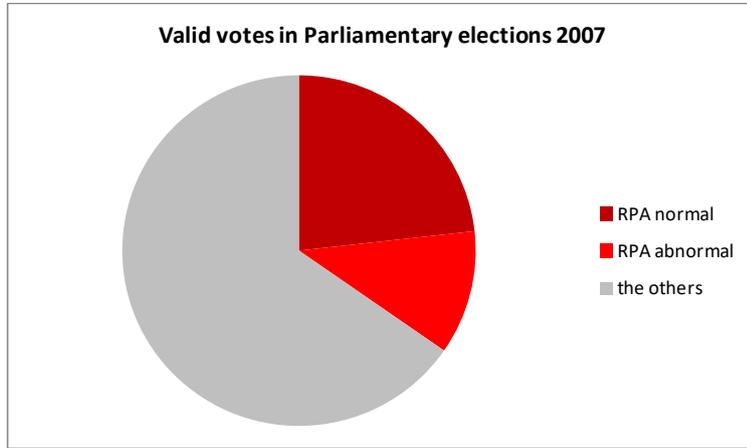
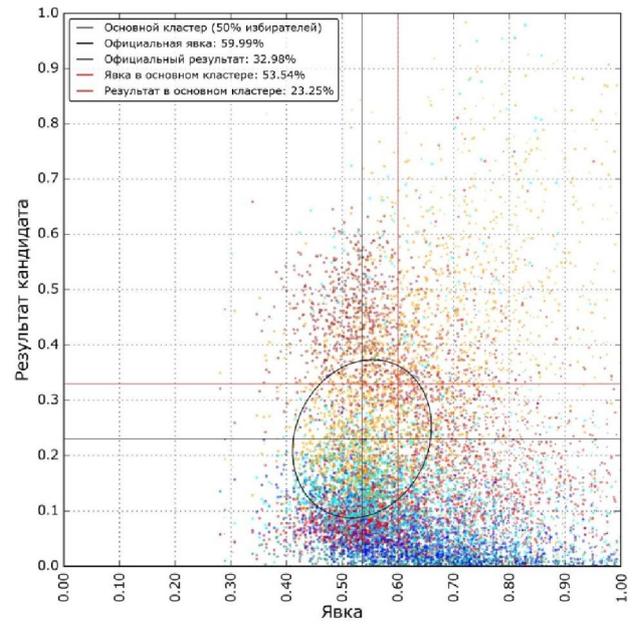
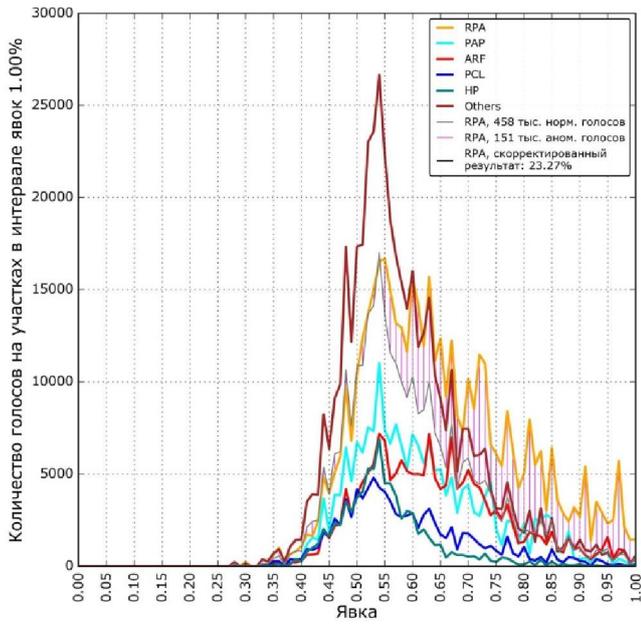


The same is shown by abovementioned Shpilkin's analysis, which revealed a deviation of 29 thousand votes from the perfect conformity with the statistical model. The deviation was caused by deficit of the said amount of votes in the result of the My Step Party countrywide, or, which is the same, by the surplus in the results of "other parties".

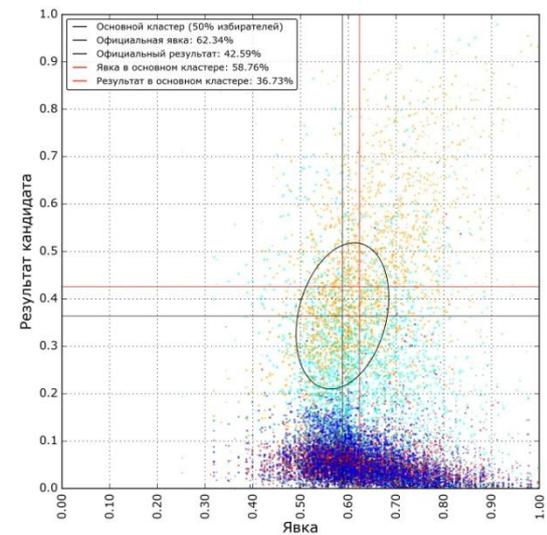
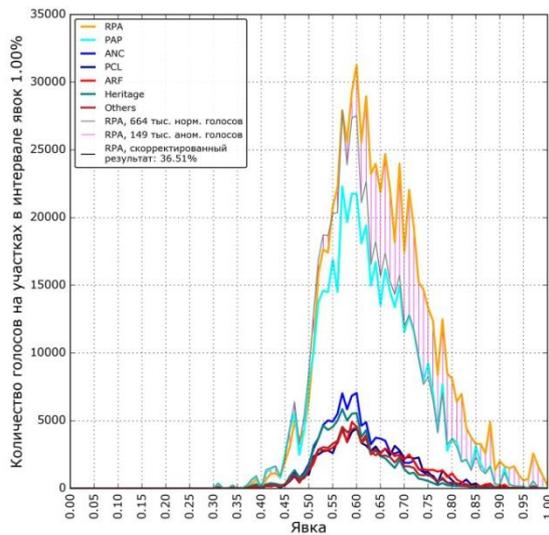
“Falsifications of deterrence” versus “falsifications of survival”

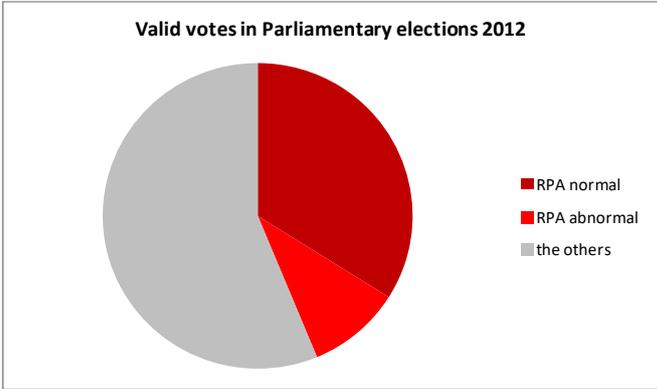
Assuming that the deviation from the statistical model was accounted for by the influence of the ruling party (Republican Party), it is possible to estimate quantitatively the scale of that influence and its evolution over years. The retrospect view is following:

Armenia Parliament 2007 proportional

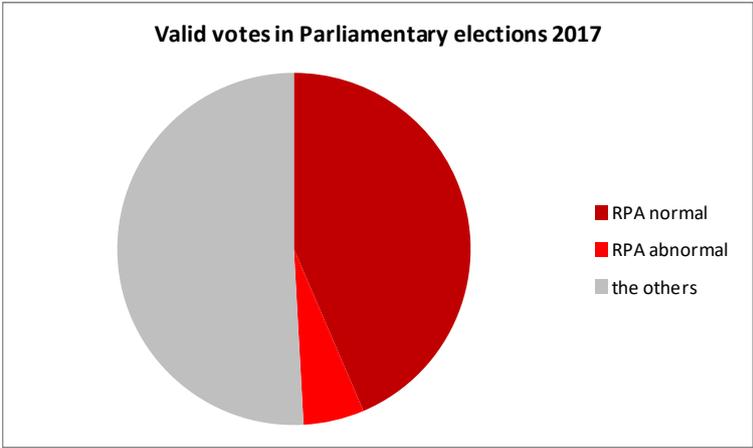
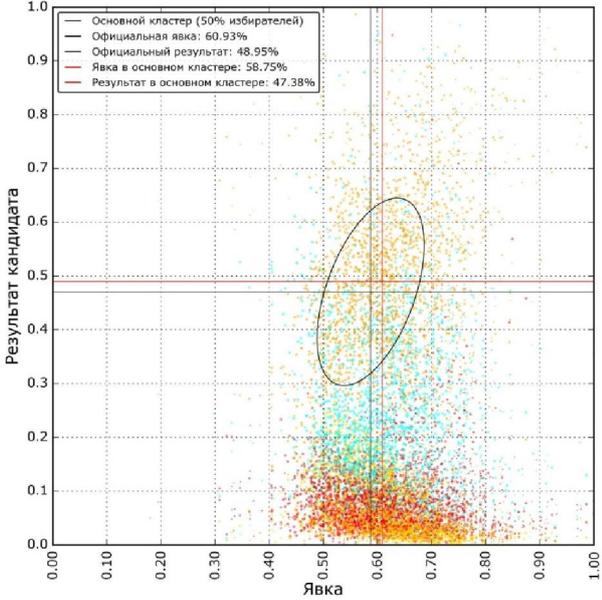
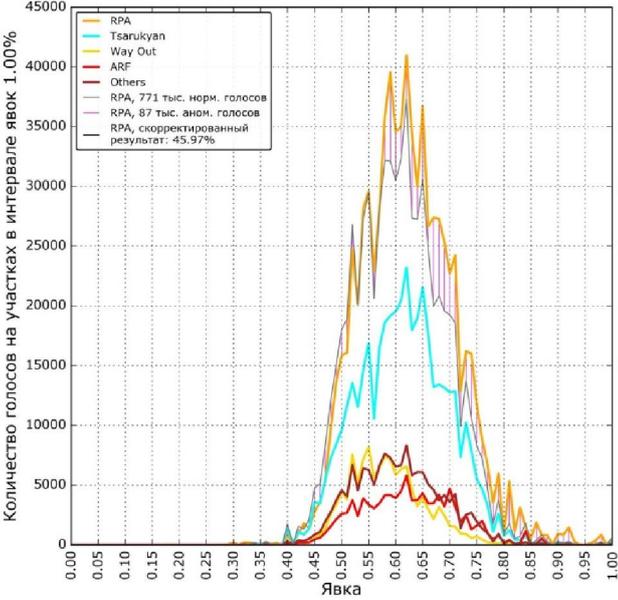


Armenia Parliament 2012

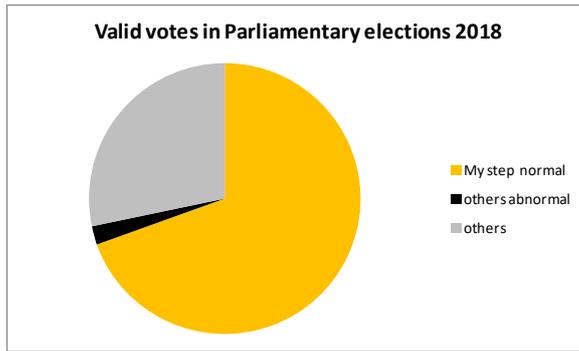
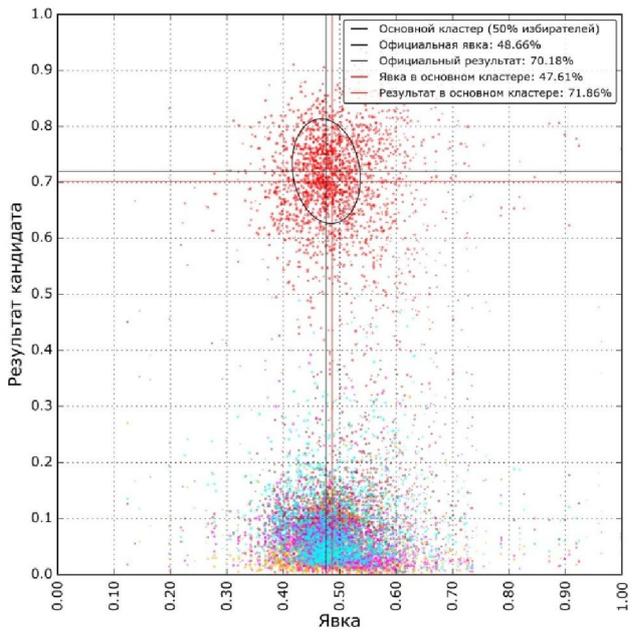
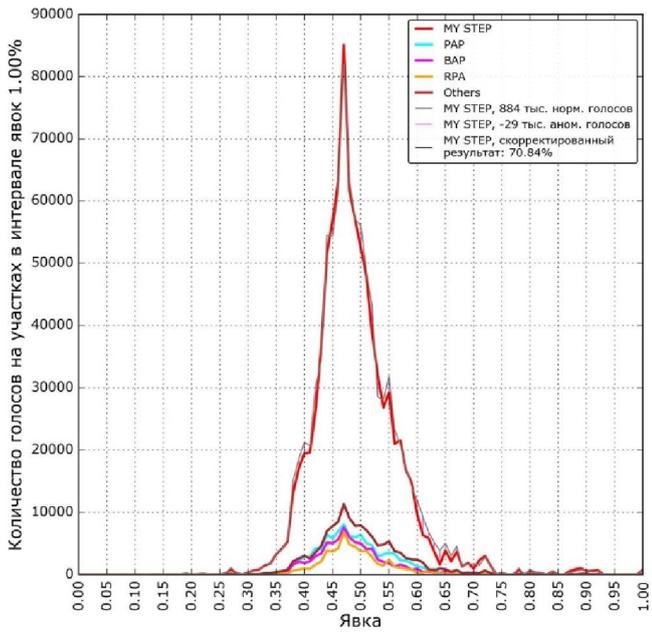




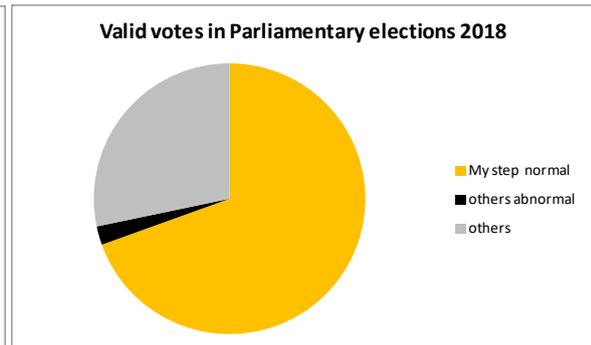
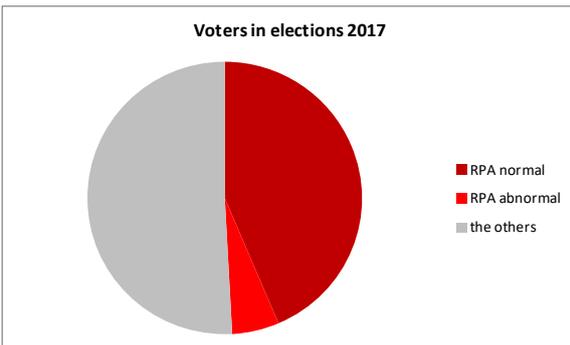
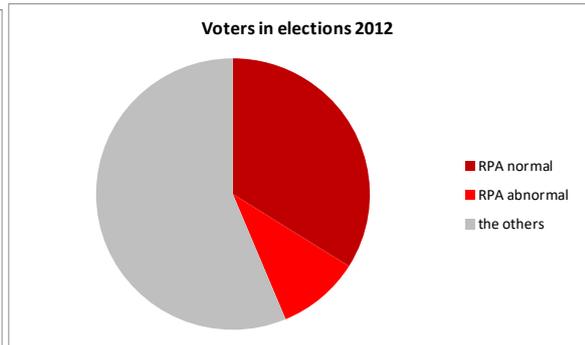
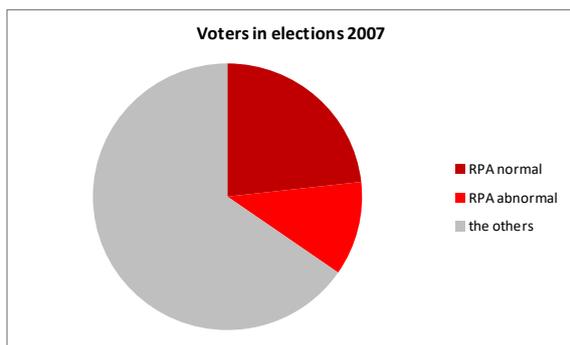
Armenia Parliament 2017



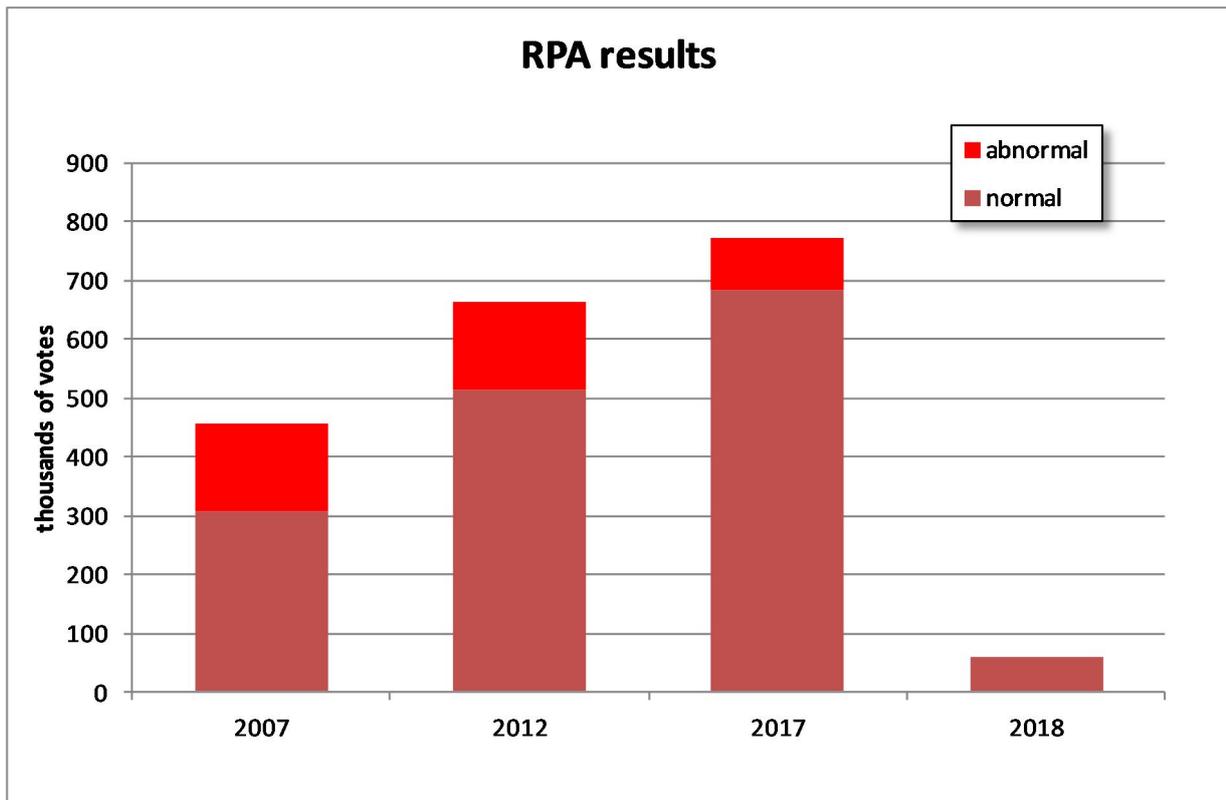
Armenia Parliament 2018



The results of the ruling party over years versus results of the leader of the recent elections can be shown in relative shares:



Or absolute numbers:



The picture looks paradoxical. As the formal number of votes in favour of the ruling party grew, the share of falsifications was gradually decreasing. It seemed that the true popular support was growing too. Then, suddenly, at the first free and competitive elections the support collapsed, so that the party did not pass the threshold.