


A Sociophysical Approach To Relationship Between Politics and Economy: The Lagrange Model of The Crowds

Tolga Ulusoy¹ 

Kastamonu University, FEAS, Kastamonu, Turkey

Alper Tunga ŞEN 

Kastamonu University, FEAS, Kastamonu, Turkey

Article Type: Original Research Article

Vol 1 (Issue 1) 2019: 1-12

Doi:

Received: 31.10.2019

Revised: 27.11.2019

Accepted: 10.12.2019

To Cite This Article: Ulusoy, T , Şen, A . (2019). A Sociophysical Approach To Relationship Between Politics and Economy: The Lagrange Model of The Crowds. *Quantrade Journal of Complex Systems in Social Sciences* , 1 (1) , 1-12 . Retrieved from <https://dergipark.org.tr/tr/pub/quanttrade/issue/49567/640393>

Abstract

Individuals can be thought of as physical elements within the social system. When they are considered as the decision factors of society, in addition to showing differences as individuals, they can lose their individuality by displaying each other's characteristics under community behavior (if the nucleus of an atom were an individual, the electrons that revolve around it would be other individuals and society). Individuals that are called factors or agents that shape collective behavior and constitute the core of society also play a role in determining the mechanism of the political system in a country.

In this study, it was discussed whether the Lagrangian Approach, which maintains its place in the literature with its application to many areas, can be successful in modeling political developments and political decisions of communities. It was assumed that in political systems there is stability at the level where mutual satisfaction is maximum, the concept of social entropy and atomization and order and disorder between groups or individuals were modeled on the axis of political science and sociophysics, and it was observed that the basic macroeconomic variables (unemployment, income distribution, inflation, per capita income, gini coefficient, welfare, etc.) are influential in social entropy and atomization diffusion.

Keywords: Sociophysics, Lagrange Approach, Politics, Economy.

1. Sociophysics

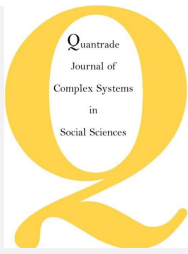
From past to present, scientists have tried to interpret and explain social phenomena with the help of physics rules and by benefiting from these rules. Adam Smith, one of the classical economists who was influenced by Newton and tried to explain economic phenomena with the help of physics, could be said to be the leading scientist in this field (Türkcan, 2015: 60). In addition to Adam Smith, Engels and Comte can also be mentioned among the scientists who attempted to explain the variability and social cycles by making use of physics.

Sociophysics (sociophysics) is a science that uses equations based on the laws of physics and tools based on its infrastructure to understand the behavior of communities. This branch of science, which deals with the behavior of communities in the social sense, has begun to open a new field of application with its commercial applications as capitalist systems spread to the world.

Sociophysics began to develop with Henri de Saint-Simon. (1803) *Lettres d'Eun Habitant de Geneve*). Later, he worked with Auguste Comte, who is accepted as the father of sociology and also a student of his, on projects that encompassed biology, physics and social phenomena.

In macro-sociophysics, communities in society were considered as elements. Later, in the micro-sociophysical dimension, the association of individuals in the relevant communities and their behaviors with the laws of physics began to emerge.

¹ Corresponding Author: tulusoy@kastamonu.edu.tr



Adolphe Quetelet (1835) put forward the necessity of reconsidering society using probability and social experiments in statistics.

Nowadays, Galam [6-13], Minoo [16-19] and Stauffer [23-27] have frequently studied the relationship between social communication, social phenomena and physics systems.

2. Relationship Between Social Entropy and Sociophysics

It is commonly accepted that the second law of thermodynamics states that all systems left to the natural conditions in the universe will evolve towards entropy, disorganization and disruption over time. It is evident that the transition from a regular, organized and planned structure of a social system to an irregular, disorganized and unplanned state will increase its *entropy*, and the increase in the irregularity of a system will lead to the increase in the entropy of that system at the same rate.

When we look at the world social structure and the system functioning in the social and political sub-groups in the countries, the common point is that they have almost the same basic dynamics. The compliance or resistance of any group in the system is based on publicly available information and rumors in the system and reflects the common agreement reached between *those who buy and sell* the information in the relevant system. When new data or information arrive in the environment, they are analyzed by recipients, transmitters, and people who are called agents (factors). Interpretations and common consensus points form a new common decision-making mechanism for new information in the relevant system. This information continues to exist until the next stage where it is considered, decision-making mechanisms work on it and new equilibrium decisions are formed. Here, social information and the players who are defined as individuals who buy and sell information in this social functioning should be considered as the main elements of *microscopic social environment*.

The organized state of a particular group with which a certain number of representatives communicate is considered as the micro-structure of the social system. The similarities or differences in the decision-making structures of decision-makers in the micro-structure and the similarities or differences in the interpretation of existing information, and even the learning and evaluation capacities of the groups are evaluated within this scope and emerge as variables.

Decisions made by the individuals in groups and the division of *social risks* and movements they have to put up with into time zones reveal the diversity of the movements within the micro-structure. This brings along such concepts as *temperature in social systems* and *social entropy*. When microscopic observations are made in the model, molecules are considered as *social energy explosion* in individuals or society, and the environments where basic sociophysical experiments are performed are thought of as *social container*.

Entropy, which is a measure of the irregularity of a system, is the most basic and the most important measure alongside temperature in the microscopic system. Entropy is such a physical concept in the internal system that separate definitions of entropy are made in the disciplines formed by social containers with different characteristics. For example, political entropy, etc. Any function that increases in parallel to the increase in the irregularity of the system can be an entropy function. For example, let's imagine that there are a number of decision-makers in the community in a container with the same common idea and that we instill a new observation/idea/thought into it and observe it and then try to imagine what is going on inside. The newly introduced variables will begin to disperse into the existing community after initially keeping together for a short period of time because they will be scattered in different directions by individual molecules striking them.

Consider that all possible situations can be counted. When we mention a state of the system, what we need to understand is a configuration in which the individual called a molecule, for example, has a certain coordinate and a certain velocity, and another molecule has another specific coordinate and velocity. In the case of the supplied molecules in the container, it is clear that the number of such states is very high, but a large part of them correspond to irregular, that is, high entropy states where the supplied molecules are randomly distributed in any direction within the container. All of these are homogeneous situations because, regardless of where the molecules are, looking at the mixture, it can be stated that the ideas supplied are distributed in the most probable state within the homogeneity of the social structure. In other words, an extraordinary number of different microscopic states correspond to a single macroscopic state, i.e. a homogeneous state.

In fact, this is why every time we drop new ideas/thoughts/events into the container, they are dispersed. The greater number of microscopic states corresponding to a homogeneous macroscopic state increases its probability. This is because the laws of statistical physics state that the probability of a macroscopic state is proportional to the corresponding microscopic states.

However, the probability that existing molecules may turn the new supply into a new drop again or perhaps gather it in a small corner is very close to zero, though not zero. This is possible only when the molecules have very specific

velocities and coordinates, and the number of such states is almost nonexistent, and in effective social conditions, though the probability that ideas gather together without scattering or the events not spreading is negligibly low, it does not seem likely.

In fact, the relationship between entropy and sociophysics can be defined as the explanation of the deterioration of a structure based on quantum physics. The concept of entropy can be explained as the deterioration in the structure of an organization, an institution, and a community. The deterioration in the structure of a community can also be expressed as an increase in the differentiation between the ideas of those belonging to that community.

When the concept of sociophysics is applied to a community, the following conclusions can be reached. The more certain a person's ideas and thoughts are over a certain period of time, the lower the uncertainty in his position. Accordingly, the uncertainty in his/her momentum is great as much. This basic principle can also be applied to people's thinking and decision-making processes (Şahin and Batu, 2017: 1-7). In fact, the basic principle of our study is to explain people's decision-making processes and their ability to stand behind their long-term decisions using a physics modeling.

3. Model

In political systems, there is political stability at the level where mutual happiness, prosperity and purchasing power are maximum. In political systems, let E represent individuals' or communities' "emotions" or "thoughts". As it is known, thoughts and decisions of different communities are an important constraint for the model to be studied. Entropy, which shows the differences of political thought in groups, is an important constraint. Social entropy being $S = \ln P$, individual conflicts within groups or conflicts between groups will lead to maximum entropy under irregularity. In the transition $[\ln P_{\text{maximum}} \rightarrow \ln P_{\text{minimum}}]$, the transition of differences created through conflict is called T tolerance. According to these variables,

$$L = E + \lambda \ln P \rightarrow \text{maximum}$$

equation is called *Lagrange Principle*. The principle, which finds application in many fields, especially in Engineering and Economics, is a model that basically tries to maximize a contribution by combining the constraint functions with a selected objective function. In the engineering applications of this model, the principle is that under E energy, λ temperature and $S = \ln P$ entropy, L will get the maximum value.

When the entropy of the differences of the groups is multiplied by the resistance or (1-Tolerance) degree of the groups against each other and the purchasing power of the relevant group (macroeconomic factors such as decrease in welfare-happiness-unemployment rates, etc. can be added) is added, L **social adjustment dynamics** can be calculated. In all communities, when L is maximum, the society can be said to be in political harmony.

The determinants of whether an audience has political opinion A or political opinion B have found an area of investigation by the researchers under the traditional normal distribution. The reason for the frequent use of the normal distribution is its superiority in explaining other statistical references. To elaborate, it can be formulated as N_A being the number of representatives in a group, N_B being the number of representatives in the other group

$$P(N_A; N_B) = \frac{N!}{N_A! N_B!} \cdot q^{N_A} (1 - q)^{N - N_A}$$

. For example, constraint variables can be more easily created on individuals or communities who are under community pressure and have only one vote choice on one side and thus who cannot evaluate alternatives, "groups without options". Variables related to the perception of communities can also be taken as a constraint function.

Individuals can be thought of as physical elements within the social system. When considered as the factors that make up the society, individuals may lose their individuality in close ties by putting aside their differences in the understanding of the community ($S = \ln P \rightarrow \text{min}$; entropy minimum). For example, when social awareness increases, as use of common slogans increases, the bonds that hold people together become stronger and the society converges towards individual behaviors.

Different groups being $[A B C, \dots]$ and the expectations that form the groups being (e) and behaviors being (a) , Community set can be grouped as $T = [A(e, a), B(e, a), C(e, a), \dots]$

A, B, C, ... The situation when groups or individuals lose their individuality as a result of coming together as groups is called **atomization**.

If the number of individuals in group A is N_A and the function of their distinguishing features is $f(A) = (e, a)$, intra-group common objectives E_A being a function, it is expressed as

$$f(A) = \begin{cases} \text{sıkıbirliktelikveortak hedefler, düzen} ; E_A > 0 ; \ln P_{\min} \\ E_A \neq 0 \\ \text{bireyselliklerin önplana çıkması, düzensizlik} ; E_A < 0 ; \ln P_{\max} \end{cases}$$

and Lagrange Parameter $\lambda_A = \frac{E_A}{N_A}$.

In the Lagrangian approach, the benefit function shown as E_A in the collective and harmonious form, and $S = \ln P$ entropy show the chaotic phase of the groups.

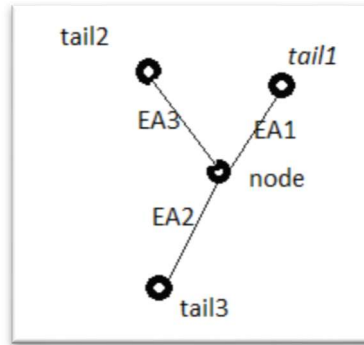


Fig 1. Two-dimensional network representation of group A

4. Application Example: Turkish Political System and Social Entropy

When the parties in the Turkish Political System after 2000 are examined, it is seen that 4 parties occupy a considerable place in politics. AK Parti, CHP, MHP, HDP share almost 90% of the total votes in the country. It is assumed that there are 4 different social groups within the social structure (unless we take into account the 2018 AK Parti - MHP alliance negotiations) which have formed their own internal governance/organization dynamics. Figure 2 shows the cumulative distribution of the votes obtained by the parties based on the data published in the Official Gazette with the approval of the Supreme Board of Elections in the elections that took place between 2002-2015.

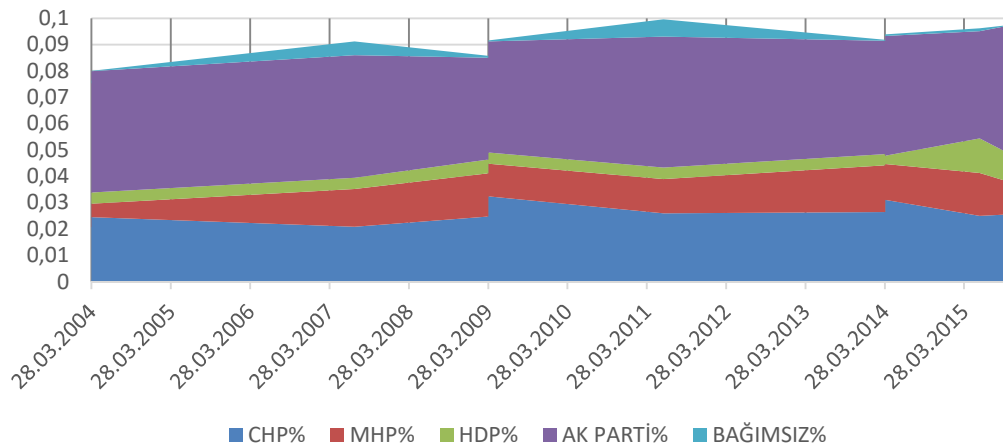


Fig 2. Vote Percentages of Four Big Parties Between 2002 and 2015 (Cumulative)

In the Republic of Turkey, which completed its integration from single-party era to multiparty political life, the path that the inclusive growth ideal for the period between 2002-2015 has taken move synchronously with the actions expected from the elections and realizations. It is observed that election declarations and promises also have a

determinative effect on percentage of votes. When these election declarations were subjected to content analysis, the parameters were seen to be based on 3 main principles. Depending on whether the priority policy areas in the election campaigns differ in the four parties with the most votes, their share of the pie may change..

. Table 1. Content Analysis of Election Declarations of Four Big Parties Between 2002-2015

Year	Content Parameters		Analysis	Party Names			
				AK PARTİ (94 Pages)	CHP (95 Pages)	MHP (129 Pages)	HDP
2002	Economic Parameters	<i>Welfare State</i>	11	10	16	-	
		<i>Stability</i>	34	21	38	-	
		<i>Income</i>	46	40	60	-	
		<i>Growth</i>	28	30	27	-	
	Welfare State Parameters	<i>Quality of Life</i>	14	79	10	-	
		<i>Foreign Affairs</i>	14	26	36	-	
		<i>Social Structure (Society)</i>	89	147	98	-	
	Political Parameters	<i>Freedom</i>	26	45	12	-	
		<i>Democracy</i>	21	51	12	-	
		<i>Political System (Government Regime)</i>	12	75	62	-	
				AK PARTİ (254 pages)	CHP (4 Pages)	MHP (130 pages)	HDP
	2007	Economic Parameters	<i>Welfare State</i>	25	0	14	-
<i>Stability</i>			48	0	25	-	
<i>Income</i>			74	1	46	-	
<i>Growth</i>			27	3	33	-	
Welfare State Parameters		<i>Quality of Life</i>	46	2	17	-	
		<i>Foreign Affairs</i>	25	3	28	-	
		<i>Social Structure (Society)</i>	125	3		-	
Political Parameters		<i>Freedom</i>	43	3	8	-	
		<i>Democracy</i>	28	2	10	-	
		<i>Political System (Government Regime)</i>	13	5	66	-	
			AK PARTİ (298 Pages)	CHP (70 Pages)	MHP (205 Pages)	HDP	

		Pages)				
2011	Economic Parameters	<i>Welfare State</i>	28	12	41	-
		<i>Stability</i>	46	23	42	-
		<i>Income</i>	97	40	66	-
		<i>Growth</i>	44	30	44	-
	Welfare State Parameters	<i>Quality of Life</i>	63	83	46	-
		<i>Foreign Affairs</i>	44	26	24	-
		<i>Social Structure (Society)</i>	163	145	162	-
	Political Parameters	<i>Freedom</i>	13	43	26	-
		<i>Democracy</i>	46	49	27	-
		<i>Political System (Government Regime)</i>	109	75	108	-
			AK PARTİ (380 pages)	CHP (203 pages)	MHP (269 pages)	HDP (28 pages)
2015	Economic Parameters	<i>Welfare State</i>	41	30	41	2
		<i>Stability</i>	90	27	49	0
		<i>Income</i>	106	51	89	6
		<i>Growth</i>	60	43	51	2
	Welfare State Parameters	<i>Quality of Life</i>	49	104	46	72
		<i>Foreign Affairs</i>	40	45	22	1
		<i>Social structure (Society)</i>	175	176	182	46
	Political Parameters	<i>Freedom</i>	49	46	26	21
		<i>Democracy</i>	52	65	39	14
		<i>Political System (Government Regime)</i>	176	137	124	35
			AK PARTİ (360 pages)	CHP (244 pages)	MHP (133 pages)	HDP (92 pages)
2018	Economic Parameters	<i>Welfare State</i>	52	22	35	1
		<i>Stability</i>	71	23	25	1
		<i>Income</i>	108	64	16	23
		<i>Growth</i>	66	39	14	2
	Welfare State	<i>Quality of Life</i>	103	68	25	53
		<i>Foreign Affairs</i>	25	29	20	0

	Parameters	<i>Social Structure (Society)</i>	156	86	93	34
	Political Parameters	<i>Freedom</i>	51	19	14	14
		<i>Democracy</i>	42	42	50	19
		<i>Political System (Government Regime)</i>	186	74	58	18

Source: Compiled from the election declarations retrieved from www.tbmm.gov.tr. (Access date: 14.08.2018)

As mentioned above, in the content analysis, firstly 3 basic parameters were put forward and then the related words were determined and attention was drawn to the number of usage of these words in the election declarations. The main principle of our study is to identify the issues that the voters pay attention to in their decision-making processes and to examine the relationship between these words and the stability of the votes received by the parties. Actually, the concept of entropy comes into play at this point. The reason is that the voters of the ruling party and MHP voters pay high attention to the same considerations and the fact that these two parties did not introduce many changes in the election declarations shows that the voters have not abandoned their parties.

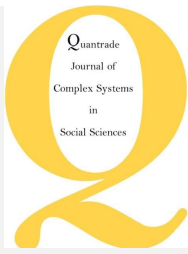
Based on the above table, basically 3 basic axes are examined. Firstly the issues that the voters pay attention to while performing voting behavior by considering the number of certain words in the parties' election declarations, secondly, the possibility of forecasting future choices of the voters by predicting their future voting behavior, and finally the issues that the parties give weight to were tried to be determined, and then the determination of the voters and changes in their decisions were attempted to be identified. Changes in the decisions of the voters, or in other words, the disruption in the voters of the parties were tried to be explain in terms of sociophysics. Changes in ideas in a community can be explained by the concept of entropy.

When the table above and the current ruling party is considered, the factor that directs the decision-making behavior of the voters stands out as the economic factor. When the economic parameters are taken into consideration, AK Parti, starting from the 2002 elections to the 2018 local elections, drew the attention of the voters to the economic growth of the country, the development rates and the incomes of the voters, and managed to keep the issues that the voters value on its agenda at a higher rate and succeeded in preventing the disruptions in the voter community. Considering the percentage of the votes received in that period, it was found that the majority of the voters voted in order to maximize their economic interests. As for CHP voters, it can be seen that they pay considerable attention to the concepts of freedom and democracy among the political parameters. The reason for partial variation in social disruption rates in MHP is the variation in the number of words included in the election declarations.

Basically, when the votes of the above parties are considered, another reason for the increasing votes of AK Parti is the increase in the number of voters shifting from the voters of the other parties to the ruling party and the participation of new voters in the elections. However, the great number of voters called as the persistent voters who conduct the voting behavior for the same party without changing their opinion is remarkable in AK Parti. One of the main reasons for this is the ability of the voter community to protect themselves against social disruptions. Of course, the shift of voters from other political parties shows that entropy or disruptions in these parties are in excess. Changes in vote percentages will help us understand the disruption within the electorate community, as will be discussed later.

Another issue that should be taken into consideration when content analysis is made is the number of pages of declarations prepared by the political parties. When the 5 election periods are examined, it is seen that the declarations with the highest total number of pages belong to AK Parti. According to Özer (1998), reiteration strategy is one of the most effective ways of learning and remembering information as it is. Based on scientific findings, the ruling party increases the number of pages in its declarations in order to draw the attention of the voter and ensures more permanence in the minds of the voters by finding the opportunity to repeat the issues that it wants to draw attention to.

The desire of scientists to predict future events is another issue that has been on the agenda since the existence of science. When many political scientists examine voter behavior, they try to get information about future voting behavior. Thanks to this modeling and considering the declarations, the political party that the electorate may prefer in the next elections can be more easily predicted. As long as the political parties do not radically change the issues they attach importance to and draw attention to, it is observed that there will not be a high level of disruption in the structure preferred by the electorate.



Basically we divided the parameters into 3, but each is divided into words in itself. Words referring to economic parameters are welfare, income, stability, growth, words that provide information about political content are freedom, democracy and political regime or administration, and words about the importance of social structure can be listed as society, quality of life, and foreign policy. These words were chosen randomly and they were accepted as providing information about the structure.

In competitive markets, firms will produce based on consumer demand, while in the field of politics, the parties will prefer positions that will appeal to the public and maximize their votes. In this framework, competitiveness in the election will be strengthened depending on the level of parties' response to voter demand and represent the potential of vote.

Election categories are grouped into seven main policy areas: "economy, welfare and quality of life, foreign relations, the structure of society and social groups, freedom and democracy, political system." Among these areas, economy, welfare and quality of life stand out as the most important areas highlighted in the election declarations in Turkey (Aytaç, 2017: 8-10). When the election declarations are examined, it is one of the main objectives of the parties to get the support of the people through these policy areas. While the economy was considered as an important area in the period of 2002-2015, it was considered as the most important topic in the general election works of June 7, 2015 compared to the previous elections. In particular, "inclusive growth" (an increase in both social and economic volume) constitutes the backbone of the election campaigns of the four major parties. It defines and encompasses an economic growth in a way that will benefit not only some segments of the society, but also the disadvantaged groups, especially the poor, as a result of economic growth (Gür, 2015: 1-4).

While the statements regarding the policy area of the economy, welfare and quality of life areas accounted for approximately 63% of the Ak Parti declarations in the November 2015 election declaration, this rate was 56%, 54% and 40% for CHP, MHP and DTP/BDP/HDP, respectively. In the content analysis as regards the number of pages, it is seen that each party gave the highest share to economic policies. In fact, Ak Parti reserved more space for economic elements in the areas of economy and welfare and quality of life. The frequency of statements for each of the remaining five policy areas is very close to one another and covers less than 10% of all statements. The policy areas of economy and welfare and quality of life are also a priority area in the main opposition party's (CHP) declaration statements during this period. It was the most important policy area (29% of all statements) in the 2011 election declaration. The third most frequently repeated policy area in CHP's election declarations were plotted as freedom and democracy (Aytaç, 2017: 8-10).

The most balanced party in terms of distribution of policy areas is MHP. In the seven areas categorized above, MHP declarations were relatively consistent with minimal changes from election to election. As in the other parties, the economy area is at the forefront compared to the six other policy areas in MHP's election declarations. There was a balanced distribution among the mentioned six areas (Aytaç, 2017:10-12). However, when we look at MHP's last general election declaration, it can be said that social structure and economic elements were emphasized at an almost equal rate.

While the economy and welfare and quality of life underlined in the election declarations constituted the core of the parties' election declarations, the economy was seen as the primary issue from the citizens' point of view. As a matter of fact, the "welfare state growth", which is an important topic in the parties' election declarations, can also play a role in improving public concerns about income inequality. Considering the broad electorate spectrum of the major parties, the right-wing parties, AK Parti and MHP, attached greater priority to economic growth and infrastructure investments, while in the left-wing parties, CHP and DTP / BDP / HDP, "welfare state growth" was the main agenda item, and equality and democracy topics occupied a place in the top ranks in the policy rankings (Aytaç, 2017: 14-16). Another factor that attracts attention in election declarations is the number of pages of the declarations. As can be seen in the table above, AK Parti's election declarations had a much higher number of pages in comparison to the other parties' election declarations. Thanks to this strategy, which allowed continuous mention and more frequent coverage of the subject matter, it can be interpreted that the voter was enabled to hear what s/he wanted at a much higher rate.



Fig 4.Content Analysis of Election Declarations of Four Big Parties Between 2002-2015

The atomization scale, as mentioned earlier, is a measure of the ability of communities to move together and is calculated as $S = \ln(x)$, which is called S social entropy. Here, low oscillation corresponds to low entropy, and the state where oscillation is the highest means higher entropy values. According to the calculations, the social entropy of AK Parti is $S(A) -0.18 < \ln(A) + 0.18$, which denotes the most united (the least disintegrated or disrupted) party. This is indicative of stability in terms of the voters. Social entropy factor of CHP $S(C)$ and the oscillation range is $0.22 < \ln(C) + 0.27$. Here, too, CHP is the second party where there is minimal oscillation. MHP $S(M)$ and HDP $S(H)$ social entropy values are $-0.68 < \ln(M) + 1.02$ and $-0.30 < \ln(H) + 1.44$, respectively. The adding up of the oscillation intervals with the absolute and the distance between the negative and positive entropies will give us the volatility of the relevant party's S entropy.

$$\begin{aligned} \text{Distance Range } S_{\text{distance}} &= |\ln_{\text{max}}| + |\ln_{\text{min}}| \\ S(A)_{\text{distance}} &= |\ln(A)_{\text{max}}| + |\ln(A)_{\text{min}}| = 0,18 + 0,18 = 0,36 \\ S(C)_{\text{distance}} &= |\ln(C)_{\text{max}}| + |\ln(C)_{\text{min}}| = 0,22 + 0,27 = 0,49 \\ S(M)_{\text{distance}} &= |\ln(M)_{\text{max}}| + |\ln(M)_{\text{min}}| = 0,68 + 1,02 = 1,70 \\ S(H)_{\text{distance}} &= |\ln(H)_{\text{max}}| + |\ln(H)_{\text{min}}| = 0,30 + 1,44 = 1,74 \end{aligned}$$

In essence, in elections, the strategies that take into account the economic improvements in both micro and macro senses increase the potential of votes. In terms of the entropy volatility obtained above, AK Parti's 0.36 entropy is followed by CHP. This is followed by MHP and finally HDP. In addition to voter behaviors, the image created by the parties on voters becomes kinetic. HDP's ranking in lower percentages can be attributed to the fact that voting for the party indicated by tribal leaders depending on the tribal culture located in the east of the country instead of using the individual right of voting focuses on a single party when solidarity becomes the common goal. On the other hand, the

social structure that is active in the city/region where the individuals live plays a central role in their political identities and preferences. The determination of the parties' social bases affects atomization over entropic relationships.

Table 1. Macroeconomic Variables

	GDP billion	(\$) (\$)	GDP per capita	GDP growth 3%	PI year- end	Foreign Trade Balance Billion	Unemployment Rate %
014		934	12112	3	.17	63.6	9.9
015		855	11019	6.1	.81	48.1	10.3
016		861	10883	3.2	.53	40.9	10.9
017		855	10688	7.3	1.92	55.6	10.3

When the basic macro variables are examined in the light of economic data, the positive effect of the ruling party, which had the most votes and the lowest entropy rate, on the macro determinants is seen in the table above. The importance of the economy, which occupies the most space in the election declarations of the four major parties, is emphasized once again here in numbers. AK Parti, which determines the attention of the electorate and promises in its declarations that it will determine the government policies in accordance with the electorate's wishes, also becomes the party where the voters are the least likely to break up with or give up the party. It can be argued that AK Parti, which shows its stability in the elections in the election declarations, has solved one of the problems experienced by many political parties in today's world in the long-term.

To sum up,

$$L = E + \lambda \ln P \rightarrow \text{maximum}$$

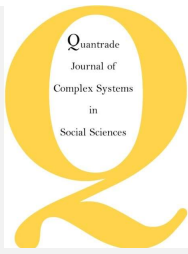
In the Lagrange principle, $\lambda_A = \frac{E_A}{N_A}$ being the Lagrange Parameter, λ_A is generally interpreted as a measure of economic inequality (Barggli, 2013). The Gini coefficient, a measure of economic inequality, will be used as the temperature value. Gini Coefficient is an economic variable calculated annually by TUIK (Turkey Statistical Institute). In the coefficient calculated using the Lorenz curve, the population is divided into certain percentage slices, and the share that these percentage slices generally take from the national income generated in a country is calculated. The Gini coefficient can never be an indication of the wealth of a country. The Gini coefficient should be seen as a measure of the degree of the fair distribution of income in society.

Table 2. TSI Income and Living Conditions Survey

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gini coefficient P80/P20 ratio	.428	.406	.405	.415	.402	.404	.402	.400	.391	.397	.404
	.6	.1	.1	.5	.9	.0	.0	.7	.4	.6	.7

E is taken as the life satisfaction level. The rate of life satisfaction level is the most comprehensive study conducted by Turkey Statistical Institution at the level of provinces in 2015 taking into account such variables as housing, work life, income, wealth, health, education, environment, safety, civic participation, access to infrastructure services, and social life (TUIK, 2015).

When the relevant statistics are examined, for example, in 2015 $P_{80/20}$ was found to be 7.6. According to Pareto Analysis, $P_{80/20}$ shows how many times the difference is between the income of the 20 percent group with the highest



share of income and the income of the 20 percent group with the lowest share. In the same year, the Gini coefficient was found to be 0.397. (TUIK, 2015)

In the equation $L = E + \lambda \ln P$, the life satisfaction percentage being the benefit function and the gini coefficient being the coefficient of entropy which is the constraint function as a measure of income inequality, for the year 2015

$$L = \text{Life Satisfaction Percentage} + \text{Gini Coefficient} * (\text{Social Entropy})$$

with Political Compliance Degree

$$L = 0.612 + 0.397 (0.18) = 0.68729$$

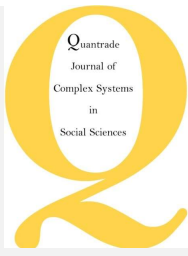
is obtained.

4. CONCLUSION

The social compliance of the individual who is a sociophysical entity and the choices that he/she can achieve this compliance affect his/her quality of life and welfare. The heterogeneous structure in the society which is considered as a social container may change in proportion to the preference of the individual. Life satisfaction and welfare of individuals who determine their preferences based on group differences, compliance and resistance constitute the mainstream mechanism. With the political compliance to this mechanism, expectations and behaviors (loss of individuality for groups or individuals) minimizing intra-group differences modeled by Lagrange multiplier were calculated statistically by atomization scale. The four major parties in Turkey were chosen as the sample, and these expectations and behaviors were shaped according to policy areas included in the parties' election declarations. When the seven main policy areas and their related parameters are evaluated, the top areas of economy, welfare and quality of life were effective in this shaping. While AK Parti, where the least entropy was observed, attributed the most importance to the economy, in HDP and CHP, where the most entropy was observed, mostly freedom and democracy were emphasized. At this point, it was concluded that the parties that allocated the highest share to the economic agenda which affects voter behavior and preference had low entropy. The life satisfaction level (in proportion to the gini coefficient) was also formulated as a welfare variable that moved in parallel with the degree of political compliance. Another observation made is that the degree of the goodness of political compliance, which eliminates intra- and inter-group differences, positively affects welfare.

References

- Schelling T.H.(1971) Journal of Mathematical Sociology 1 p.143-186
 Stauffer D. (2002) Artificial Societies and Social Simulation 5.
- Weidlich W. (2000) Sociodynamics, Harwood Academy Publ. Amsterdam
- Mimkes J. (2006) A Thermodynamic Formulation of Social Science, Econophysics: Trends Perspectives Bikos K.
- Chakrabarti, Anirban Chakraborti, Arnab Chatterjee (Eds.)
- Arnopoulos, P. (1993) Dialectics Politics Cybernetics - The Sociophysics Of Complex-Systems Cybernetica
- Galam, S. (2004) Sociophysics: a personal testimony Physica a-Statistical Mechanics and Its Applications
- (2008) Sociophysics: A review of Galam models International Journal of Modern Physics C
- (2012) Sociophysics: An Overview of Emblematic Founding Models
- (2012) Sociophysics: The Origins
-(2012) What is Sociophysics About?
-(2012) Sociophysics: a Physicist's Modeling of Psycho-Political Phenomena



-(2017)Geometric vulnerability of democratic institutions against lobbying: A sociophysics approach Mathematical Models & Methods in Applied Sciences
- ...- (2017) The Trump phenomenon: An explanation from sociophysics International Journal of Modern Physics B
- Green, A. E. S. (1970) Sociophysics - Should We Talk It Seriously bulletin of the American Physical Society
- Ishii, A. (2016) Analysis of Pokemon GO using sociophysics approach 2016 Ieee International Conference on Big Data
- Minoo, H. (2013) Education of Basic Principles Derived from Sociophysics Social Science and Education
- (2013) Human Culture based on Sociophysics Social Science and Education
- Comments and criticisms: Econophysics and sociophysics Econophysics of Markets and Business Networks, 2007
- (2013) Sociophysics and Threshold of Globalization Social Science and Education
- B. (2007) Econophysics and Sociophysics: Trends and Perspectives Jasss-the Journal of Artificial Societies and Social Simulation
- Interactive Particle-based Simulation of Sociophysics Models 2014 Ieee International Conference on Intelligent Computer Communication and Processing
- Schulze, C. (2005) Sociophysics simulations I: language competition Modeling Cooperative Behavior in the Social Sciences
- Stauffer, D. (2000) Generalization to square lattice of Sznajd sociophysics model International Journal of Modern Physics C
- (2002) Sociophysics: the Sznajd model and its applications Computer Physics Communication
- (2003) Sociophysics simulations Computing in Science & Engineering
- (2005) Sociophysics simulations II: opinion dynamics Modeling Cooperative Behavior in the Social Sciences
- (2013) A Biased Review of Sociophysics Journal of Statistical Physics
- Troitzsch, K. G. (2014) Sociophysics: An Introduction Jasss-the Journal of Artificial Societies and Social Simulation
- Bargigli L. & Andrea Lionetto & Stefano Viaggiu, (2013). "A Statistical Equilibrium Representation of Markets as Complex Networks," Working Papers - Economics wp2013_23.rdf, Universita' degli Studi di Firenze, Dipartimento di Scienze per l'Economia e l'Impres
- Gür, N. (2015), Türkiye'de Kapsayıcı Büyüme, Seta Perspektif, Sayı:2, Mayıs 2015, Ankara.
- Aytaç, S. E. (2017), Türkiye'de Siyasi Partilerin Seçim Beyannamelerindeki Politika Öncelikleri, 2002–2015. SİYASAL: Journal of Political Sciences, 26(2): 7–26
- Aytaç, A.R., (2018), Öğrenmede Etkili Yollar: Öğrenme Stratejileri ve Öğretimi, İlköğretim-Online, 4(1), 1-6 (<http://dergipark.gov.tr/download/article-file/91079>).
- Şahin, M. ve Batı, M. (2017), Fizik Biliminin Ekonomi ve Sosyal Bilimlere Yansıması, Takvim-i Bekayi, 5(2): 1–7.
- Türkcan, B. (2015), Disiplinlerarası Bir Alan: Ekonofizik ve Kuantum Ekonomisi, İktisat ve Toplum, 60: 40–43.
www.tbmm.gov.tr (Erişim tarihi: 14.08.2018)