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### IMPLEMENTATION OF J. DAVIES' MODIFIED MODEL FOR SIMULATION OF SHORT-TERM PROTEST ACTIVITY

*The paper assesses suitability of J. Davies' model for simulation of short-term protest activity. The authors make an attempt to show proximity of J. Davies' model and synergetic paradigm of the order parameter. The authors' modification of J. Davies' model was given to display dissipative formation of short-term protest activity. Special role of current expectations and beliefs of population in formation of a protest was noted. In proposed modification of J. Davies' model we offer to consider ratio of negative expectations and related political reality. The model is verified by materials of Ukrainian political process of the last two decades. In this article we show fundamental consistency between retro-prediction of the model and real course of protest activity processes in Ukraine.*

**Key words:** *model of J. Davies, synergetic simulation, protest activity, simulation of formation of protest activity.*

The one of sufficiently urgent problems in modern world is consideration of fluctuations of socio-political activity, which last in time period from several months to a year. From the viewpoint of long time intervals these fluctuations are considered "sudden" and usually skipped by researchers because of its *a priori* "unpredictability". An important part of social and political activity is, undoubtedly, protest activity, which may be defined as non-professional political activity, political opposition to the ruling government. For example, with certain fluctuations manifestations of such activity occurred in independent Ukraine often enough to be recognized as a phenomenon of political life. However, due to the abovementioned reasons patterns of deployment and attenuation of "sudden" protest activity have not been determined yet.

It is obvious that in the absence of clearly proven regularities of socio-political process, the researcher is forced to build searching simulation model, which will enable to test accuracy of certain hypotheses and reproduce, with some limitations, course of studied process.

Based on precisely convincing arguments of I. Prigogine and other supporters of synergetic interpretation of social and political processes, we may expect that at the moment of "sudden" formation of a protest an action of certain order parameter comes into being. At the same time quite promising example for constructing a model that could adequately reflect the processes of protest activity's formation, is represented by J. Davies' theory, devoted to research reasons of social revolutions [2, p.5 - 19].

Thus, the purpose of this article is to construct a modified "model of revolutions" by J. Davies based on the synergetic interpretation of protest activity's formation and its verification by materials of Ukrainian political process for independence period.

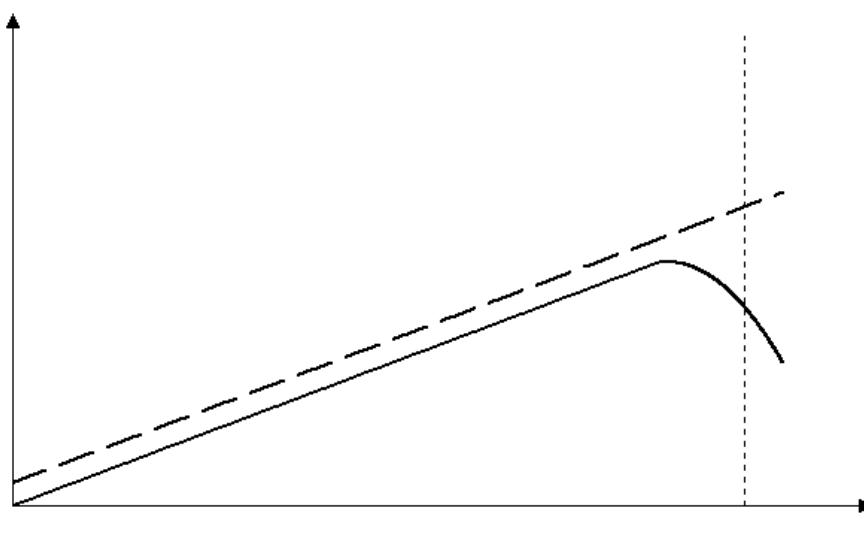
We recall that J. Davies defines revolution as "an armed uprising of civil population, which leads to power a new ruling group, which has wider support of masses". According to J. Davies, from the viewpoint of history revolution is a relatively new phenomenon [2, p. 6]. It should be noted, that in fact J. Davies defines as a revolution that phenomenon, which in Ukrainian political science tradition is usually classified as coup (For comparison: [7, p. 326 - 330] and [9, p. 635]). There is quite a rich tradition to study the phenomenon of revolution, in terms of which J. Davies' understanding of revolution is a bit simplified, but comprehensive review of definitions of revolution goes beyond this work, because our task is more local – to construct synergetic model of protest activity's formation. The work of J. Davies gives us one of the convenient basic tools to research this issue.

Let's consider the nature of J. Davies' model. The starting point of his reasoning was inspired by views of A. de Tocqueville and K. Marx on the phenomenon of revolution. According to J. Davies, A. de Tocqueville was the first theorist who believed that revolution occurs after a long period of

economic growth; K. Marx, by contrast, put forward the theory that a revolution is caused by objective reasons such as economic crisis and recession. Proposed by J. Davies model, in some measure, combines descriptions of these theories concerning onset of a revolution.

J. Davies believed that his theory was the best to consider "progressive" revolutions or, as he called them, revolutions intended to achieve maximum equality and freedom. As an example, he gave a 1917 revolution in Russia, the revolution in Egypt in 1952 and the uprising T. Dorr in the US in 1840-1842. J. Davies doubted that his theory may be applicable to revolutions which he called "reactionary" such as the victory of Nazism in Germany or the rebellion of the southern states in 1861 in the US. Moreover, he argued that for establishing of the alleged universality of this theory researches of several unsuccessful revolutionary movements should be conducted, such as the sepoy revolt in India in 1857 or the "Boxer Rebellion" in China in 1900, and also reasons why the "Great Depression" has not led eventually to a revolution in the US should be identified [2, p. 7 - 12]. Obviously, J. Davies was interested not in that particular riots or unrests, but in events that turned or could turn into a revolution.

According to J. Davies, revolutions often occur when people experience a sudden worsening of living standards after years of improvement. Basis of J. Davies' theory is unexpected economic regression that comes sooner or later and is not accompanied by appropriate adjustments in the downward growth rates and expectations of people. Thus, according to J. Davies, "... revolutions with the greatest probability occur when a long period of real economic and social development is altered by a short period of sharp decline ... The real condition of socio-economic development herewith is less important than general expectations about recent progress that stopped, but can and should continue in the future" [2, p. 5]. To illustrate his theory J. Davies offered a simple drawing (draw. 1).



Draw. 1. Model of social "revolutions" by J. Davies.

The line of a real situation is marked by a solid line; the expectations' line is dashed.

As we see at the Draw. 1, the whole life of a larger or smaller community or an individual is accompanied by certain state of economic security and certain expectations of future economic situation. The solid line at the Drawing shows the dynamics of economic development in a certain period of time and the dashed line shows the dynamics of expectations from economic condition. Usually, the line of expectations of future economic fate is higher than the line of current economic situation, since it is the hope of a better future forcing people to resort to certain activities. Indeed, the hypothetical intersection of these two lines and exceeding of economic condition of the expectations' line would mean at least disheartening of a person or social community in life and most likely suicidal intensions. Over a certain period of time, according to J. Davies, expectations continue to grow, based on the previous trend of social development. The decisive factor in this case J. Davies saw in well known inertia of individual and public consciousness. A slight excess of the expectations'

line over the line of actual economic situation does not bother anyone and does not cause fears, as far as real economic growth "catches up" these expectations very soon. During economic crisis, which may be based on any reason or combination of reasons – from fundamental cyclical reasons like Kondratiev's cycles to local speculative reasons – there is a sharp decline in economic growth. When the gap between expected and actual levels of development reaches a certain limit, a revolution ignites. Thus, the theory J. Davies combines psychosocial and economic perspective, and psychological characteristics act as intermediate variables.

So, when there is too big gap between expectations and real sense of reality disappointment comes, which leads to frustration and aggression, which, in turn, lead to revolution.

According to P. Selle, J. Davies' concept is a variant of the theory of aggression by G. Dollard, applied to political sphere. As you know, G. Dollard argued that frustration always leads to aggression, and the latter is a kind of blockage, that prevents purposeful action. So, in the theory of G. Dollard we may find a hidden reference to the fact that behavior of revolutionary-minded masses has very strong irrational features [12, p. 373 - 374].

We'll note that from the point of J. Davies, poverty itself is not a sufficient reason for a revolution. In many poor countries people spend their physical and mental energy only for survival; that means that they are unable to engage in any activity not related to survival. In less extreme conditions we see more initiatives at local level – limited political activity or what J. Davies called direct social activities in small groups. According to J. Davies, this scheme was typical for the US during most of their history [2, p. 13].

The prerequisite for revolution, in J. Davies' terminology, is the appearance of material and psychological "excess". Thus, if there are socio-psychological conditions, any revolution may be started by relatively poor and by relatively rich. J. Davies also stressed that in order to start a revolution, rebels, whose social origin and economic condition may be quite different, should unite. However, he does not clearly define conditions necessary for successful organization of the united opposition. J. Davies absolutely logically notes that a revolution could fail because of organizational and structural mistakes. If the ruling strata is united enough to exercise resistance, it will be easy for them to suppress a revolt of poor. J. Davies also argued that gradual effective reforms may reduce social tensions to such an extent that in social structure, formed as a result of those reforms, revolts will become practically impossible.

J. Davies' theory was criticized in considerable literature that was generalized by P. Selle [12, p. 376 - 384]. In our view, much of the criticism of J. Davies' theory [12, p. 376 - 384] is primarily connected with too large-scale political transformations, which the author tried to describe in his theory. This claim forced the author of the theory and his critics to refer to rather infrequent events, which the true revolutions are. Indeed, revolutions occur rarely and are accompanied by such a number of related phenomena and processes in various spheres of political life, that to prove the crucial role of non-compliance between reality and expectations is extremely difficult. If we add to this historicity, and, therefore, certain mystery concerning particular facts of most real revolutions, we can see that there is a broad field of assumptions and fantasies both for supporters of J. Davies' theory, and for his opponents.

In our opinion, the J. Davies' model has greater prospects in a bit narrower sense, mainly in understanding of the theory of protest activity at a fairly short time periods. One of J. Davies' critics, in order to adequately simulate the appearance of Russian Revolution of 1917, asked absolutely rightly what exactly period (from 1860, or 1905, or 1914) should be taken into account to consider the ratio between expectations and economic growth in the Russian Empire? [12, p. 380 - 381]. Obvious absence of a single answer this critic connected with a solid disrepair of a model as such. In our view, this flaw only shows J. Davies' model disrepair for simulation of real, extremely complex and large-scale revolutions. We may add that a slow synergetic order parameter that determines long-term political stability, described in [4, p. 2014], is much better applicable as a synergistic basis for such revolutionary events.

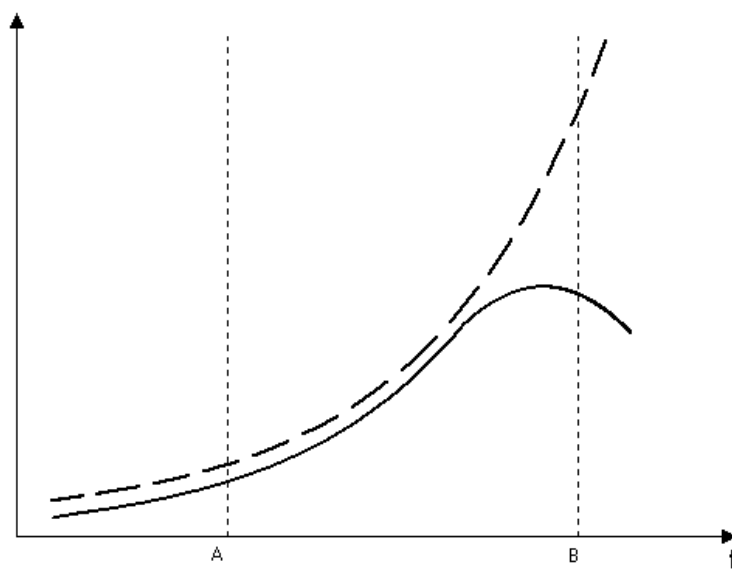
It should be noted that by essence J. Davies' model, based on one compiled index – in fact, an order parameter – may be attributed to the synergy models. Characteristically, J. Davies' model

appeals to a kind of "micro-factorial" approach, as the views and expectations of individuals collectively lead to significant social and political changes, which are also inherent to synergetic interpretation of processes. Obviously, at the time of its creation this terminology was not a part of the scientific discourse yet.

We'll outline outgoing principles of offered model of "sudden" protest activity. Note that in J. Davies' model a linear function is used to depict the beginning of economic growth and expectations of all relevant trends. It seems more correct to use the exponential function to determine prolonged trend for change of both expectations and certain defects of real politics. The fact is, as proven by psychologists, a habit decreases pain (in a narrow and in a broad sense) barrier of a person. Thus, *ceteris paribus*, a habit for certain negative phenomena in socio-political sphere, on the one hand, gradually includes them in general background of political life, and, on the other, causes further increase of corresponding negativity due to lack of sharp public reaction on it. So, through a feedback mechanism gradual adaptation to negative socio-political phenomena adds new impetus to the development of these phenomena, what, in turn, adds new impetus for adaptation and so on. This situation in future leads to the need of more serious disturbances to "trigger" a mechanism for protest activity; this promotes the growth of socially acceptable injustice of power towards people (in everyday language – the increase of "power impudence"). The most revealing is an example which, however, goes beyond purely political sphere; it is a dynamic of Ukrainian population's attitude to corruption for almost last 20 years. Its gradual spread, in our opinion, is associated with a kind of custom – unrequired "lagniappe" to officials turns into almost mandatory and not just "lagniappe", but after the fact (after 20 years of addiction) created "justification": "it was always accepted", "everybody take it" and so on.

Thus, a human habit gives exponential nature to dynamics of expectations as well as to the real change in political sphere. The correctness of this approach is supported by the fact that one of the basic functional dependencies for modern logistics is exponential function as well. It should be noted that, as will be shown below, for political life of modern Ukraine last two decades have been characterized by mostly negative dynamics, which creates the possibility to construct a model of protest activity. At the same time, we should not reject capabilities of positive dynamics (such as economic growth in J. Davies' model) and the need to change the structure of our model with preserving of exponential dynamics. Based on the abovementioned considerations, we believe that more adequate reflection of J. Davies' model is its modification shown at Draw. 2.

However, it should be recalled that at the relatively small intervals exponential function tends to be linear (may be approximated as linear).

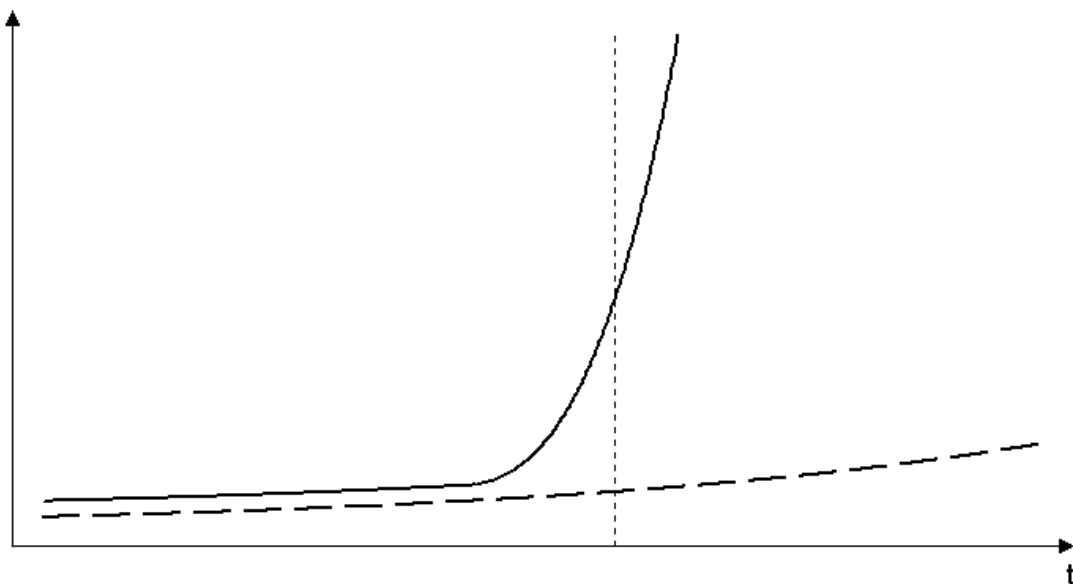


Draw. 2. The modified model of J. Davies with the use of exponential function. The line of a real situation is marked by a solid line; the expectations' line is dashed.

In our opinion, it is a totally fair assumption about existence of certain connection between the process of formation of protest activity and the relationship between expectations and reality in the life of society. However, it should be recalled that J. Davies' model critics pointed out, among other things, the difference in economic condition of various social strata in normal growth conditions and within sudden economic downturn, and the inability to figure out this difference with practically suitable accuracy. Critics of J. Davies also absolutely fairly drawn attention to the fact that on his theory different social strata should unite during the crisis (it is a compulsory condition for revolution by J. Davies), and pointed on objective difficulties, facing a researcher clarifying the possibilities of this association, because of different perceptions and different degree of differences in expectations and reality. Indeed, the differences in perception of a crisis at the moment at point A or point B in Draw. 2 will be different. For those who are at point B, the differences in expectations are critical and create frustration with further association to fight against the government; for those who are at point A, the difference of expectations and actual reality is not critical and do not cause strong feelings able to bring these, apparently poorer, segments of population to the active joint anti-government actions.

So, differences in socio-economic situation of different groups of population make impossible or extremely rare a situation in which there is a possibility of merging several segments of population in order to protest against current government. However, this inability makes possible to assume that in the basis for association of various segments of population in political protest should not be an economic factor. As we stated in [10, p. 190 - 217], synergetic interpretation of political process does not contradict the assumption about decisive role of worldview and perception of politics by individual and public opinion. Actually, such an interpretation in some way supports the theory of J. Davies. But it seems right to assume that in order to form a political protest activity a stimulating and unifying factor for a diverse population should become public perception of political reality and their own expectations from it.

This ratio – between the perception of current political reality and tactical expectations from it – is, in our opinion, a synergetic order parameter that determines the formation, expansion or, conversely, narrowing, of protest activity in modern political process. The dynamics of this order parameter determines the content of protest activity's model we've created. Draw. 3 shows the synergetic dynamics of this order parameter, which for greater clarity is split similar to the model of J. Davies to the line of expectations from political reality and real state of affairs in politics.



Draw. 3. Dynamics of the synergetic order parameter, which determines formation of a protest activity.

On the vertical axis (y) deposited the degree of negativity of expectations and the situation in a particular political process.

The line of a real situation with some negative phenomenon is marked by a solid line; the line of negative expectations is dashed.

Note, that in the case of expectations from politics in our model, as in the model of J. Davies, we consider current, so to say, tactical people's expectations from politics. An important element of these expectations is the rationality of expectation subjects, which detailed examination was carried out in [10, p. 111 - 132]. This implies that an ordinary person does not expect from politics an instant change "for better", and understands as the general state of affairs in politics, so a certain slowness of political changes (such as changes associated with complex multiple formation which is state before the individual). A common person also understands own benefit (or more often lack thereof) from certain actions of political power.

Should be noted that understanding of politics by population, in our view, is logically guided by wisdom principles, set out by Robert Axelrod on the results of theoretical analysis of the game "prisoner's dilemma" [1]. These principles, among other things, implies the requirement of a certain "short-sightedness" – usually only coming consequences is thought over, that, in practice, for example allows to be elected a mayor of a big city for a man who declared many promises only before elections and handed out a little buckwheat for elderly persons.

Regarding the second element of the proposed order parameter we should note the following. Based on the known phenomenon of perception of imagination as a true reflection of reality [10, p. 190 - 217], should be clarified that under a real state of affairs in politics, perceived by an individual, we understand only information about current political events known to this individual, which she/he for some reasons took for granted. In detail, the problem was considered by Jean Baudrillard [6]. The point is that in case of non-professional political activity, with which we are dealing within the problem of protest activity, an individual has no opportunity to spend a lot of time to check information about politics she/he receives (often there is no even physical capabilities to do so).

Thus, formation of certain correlation between course of "rational" and tactical expectations of individual from politics and information about political events taken by this individual for granted determines, in our opinion, the deployment of protest activity. It should be noted that a reason for deployment of protest activity in modern Ukraine is negatively colored phenomena and processes. So, it is about expectation and perception of information concerning negative aspects of certain political phenomena and processes. At Draw. 3 on the vertical axis (y) deposited the degree of negativity of expectations and the situation in a particular political process.

An important difference between our model and J. Davies' model is postulation of fundamental variability of expectations' subject in political field, which corresponds to the natural changing of political priorities in a country: during election campaign attention is given to the elections; during tax or pension reform – to political decision in the relevant field and so on. We remind that scientifically proven limitation in number of items which a person may analyze simultaneously [3, p. 90 - 92; 5, p. 162] confirms our assumption.

Another important point is validity of the model. As far as we speak about tactical wisdom, it is expected that proposed model is able to reflect the formation of protest activity in a country which scale is comparable with Ukraine, through the time interval comparable with 1 - 4 months. At the end of this term significant changes in current political situation should be expected (in perception of population), that leads to emergence of new factors-priorities.

Let's verify proposed model hypothesis on some of the most characteristic events of a political process of Ukraine's independence era.

One of the brightest and undoubtful events in terms of raising the level of protest activity is considered to be events of "Orange Revolution". Avoiding failure of this term, we'll actually consider events at the beginning of the "revolution" and those that preceded it. The main subject for public consideration, obviously, was the presidential elections in Ukraine. Due to certain reasons and under certain influence of main rivals' party forces, opinion of population regarding the nature of political action sharpened on the question of possible deals with counting of votes. Moreover, population, having experience of previous 1999 presidential elections, elections to local authorities and to the

Verkhovna Rada at least in 1998 and in 2002, was potentially ready for some information about possible shortcomings of the vote counting – within "usual" 3-4 percent.

It should be noted, that in formation of this expectation the most "educational" role, in our opinion, belonged to local elections, because in these elections was much easier, for the needs of certain forces, to manipulate by data (in a result of a bit weakened control on the "background" of Parliament race) and the results were clearly seen to the public. So, "taught" population rather calmly and without suspicions estimated closed results of the main candidates in the first round of voting. Almost immediately after voting in the second round in November 21, 2004, rumors about massive falsification in counting began to spread. Note, that it was a question of 15 - 30% falsification; that information transmitted through the media, whom trusted a certain part of population, such as through the "5th Channel" and the site "Ukrainian Truth" (<http://www.pravda.com.ua/>). We should also note that real 100% evidence of falsification was not brought against. It was not even necessary to trigger the mechanism of activation of protest activity, as the trust to opposition media and communication was sufficient for getting this information for faith by significant part of population. So, the main question at that political moment was concentrated on scope of election falsifications, that got into a condition when, on the one hand, "usual" 3-4 percent of "error in calculations" were expected, for which, again, people get accustomed; and, on the other hand, political realities (in the sense of perception consciousness, which has been described) showed 15-30 percent "error" that was quickly identified as falsification. In our opinion, this discrepancy was enough to cause frustration of politically active citizens, who would massively go to Maidan or start hot discussion at their places of residence [8, p. 54]. So, described in our model mechanism of formation of protest activity, which effect added the influence of variable factor of political stability, described in the works [10, p. 217 - 244; 4].

Pay attention that protest activity began to decline in two weeks after the start of the Maidan, as frustration about the results of counting discrepancies with expectations was overcome exactly by protest activity and time. The rest of the events, related to the curtailment of the Maidan, litigation, packet voting in Parliament, are aloof from unprofessional protest activity, so obviously are not covered by this model.

Another example to verify our model is provided by events around drafting and adoption of the Tax Code in the second half of 2010. It is known that at the very start of legislative registration of tax reforms it was clear that the government will try to limit small and medium businesses. Thus, people's expectations from the draft Tax Code were filled with certain negativity.

Negative expectations knocked against published governmental proposals in the form of the Tax Code Draft. Actually, in view of the fact that the volume of both the Draft and adopted as a result the Tax Code is about 43 printed pages, i.e. about 700 pages of printed text, there were doubts whether all representatives of business were able to read this project physically. But the basic, most annoying, provisions of the proposed project were quickly spread through the media.

As a result of strong differences between expectations and proposed by the Draft reality, according to our model, which was confirmed by the practice, a serious frustration emerged among middle and, most important, small business and bare initial trend for the "Tax Maidan". Thus, the beginning of the "Tax Maidan" is also embedded in the proposed model of protest activity.

We should immediately note the difference between Tax Maidan and Maidan of 2004. In the first case interested parties were only small and medium businesses, in the second – almost the entire population of Ukraine. Concerning the Tax Maidan we note that even a cursory analysis shows that the change in the tax system to the state "hits", in the end, public consumers of small business products through forced price increases. But it should be recognized that the average dimension of people in Ukraine (it may be expected that any people could make the same) appeared wise in sense of R. Axelrod, i.e. contemplated only one step forward and decided that taxes for business do not concern people, or concern, but not enough to rise to protests. So, protest activity that emerged in full compliance with our model covered only certain stratum of society.

Tax Maidan, thus, confirming both the adequacy of our model and one of the initial hypotheses – the basis of politically significant protest activity should consist of general political preferences,

which may not be significant from a historical, long-term perspective, but are seemed meaningful and vital important for the present existence of a person "here and now". Additional confirmation of this thesis are the events of the first half of 2011 in North Africa and the Middle East: with the weakness of flowing synergetic factors of political instability [11, p. 16 - 27] sudden comprehension (rather "quasi-awareness") of extreme injustice of own political regimes, some of which were so over decades, made it the number one problem for a large number of people, which overthrew those regimes.

Finally, events of 2013 related to the beginning and deployment of Euromaidan in Ukraine, also fit into the proposed model: after meetings on Maidan in November 21, 2013, even harder rivals of V. Yanukovich's regime understood the extreme weakness and dispersion of that protest, that is why almost everybody were ready for certain negative scenario of gradual displacement of protesters from Maidan. It should be noted that the weakness of the protest was based on the same life wisdom by Axelrod: almost nobody saw a direct connection between their lives and signing or not signing of association agreement between Ukraine and the EU. However, almost the entire country, or at least half-Kyiv (which is enough for serious protest actions) was frustrated by unusual and apparently unjustified violence during displacement (actually overlocking) of protesters from Maidan on the night of November 30, 2013. This was exactly that element of appearance of sudden gap between negative expectations and negative reality. After that many more people have imagined connection between their own lives and preservation or curb of existing political regime, what coincided with acceptance or rejection of Yanukovich's failure to sign an Association Agreement with the EU. Actually, these people formed the basis Euromaidan.

Concerning the course of Euromaidan should be noted that although real motives of relations between V. Yanukovich's regime and Euromaidan for nearly three months so far conceived not clear, but it is possible to notice that every next crossing of the limits of expected and accustomed violence (from the viewpoint of population) against protest (demonstrative attempts of overlocking, kidnapping and torture of activists, adoption of "dictatorial" laws of January 16, the first shootings on the Hrushevskiyi street, etc.) heated protest activity, adding new pretexts for frustration of protesters and their supporters throughout the country.

Thus, we could argue that proposed by us model of protest activity is verified and suitable for study of relevant short-term political processes. Note that this model reflects only the situation of protest activity's formation and may be limitedly used to describe further development of cooperation, such as the protesters and government.

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**Польовий М. А., Гаджиєва Д. В.** Застосування модифікованої моделі Д.Девіса для моделювання короткотермінової протестної активності

*У статті оцінюється придатність моделі Д. Девіса для моделювання короткочасних протестних дій. Автори роблять спробу показати близькість моделі Д. Девіса та синергетичної парадигми параметра порядку. Авторська модифікація моделі Д. Девіса покликана показати дисипативне формування короткочасної протестної активності. Відзначено особливу роль поточних очікувань населення у формуванні протесту. У запропонованій модифікації моделі Д. Девіса автори пропонують розглядати співвідношення негативних очікувань та відповідної політичної реальності. Модель верифікована на матеріалах українського політичного процесу останніх двох десятиліть. У статті показано принципову узгодженість між ретропрогнозом моделі і реальним станом короткострокової протестної активності в Україні.*

**Ключові слова:** модель Д. Девіса, синергетичне моделювання, протестна активність, моделювання формування протестної активності.

**Полевой Н.А., Гаджиева Д.В.** Применение модифицированной модели Д.Девиса для моделирования краткосрочной протестной активности.

*В статье оценивается пригодность модели Д.Девиса для моделирования кратковременных протестных действий. Авторы предпринимают попытку показать близость модели Д.Девиса и синергетической парадигмы параметра порядка. Авторская модификация модели Д.Девиса призвана показать диссипативное формирование кратковременной протестной активности. Отмечена особая роль текущих ожиданий населения в образовании протеста. В предложенной модификации модели Д.Девиса авторы предлагают рассматривать соотношение негативных ожиданий и соответствующей политической реальности. Модель верифицирована на материалах украинского политического процесса последних двух десятилетий. В статье показана принципиальная согласованность между ретропрогнозом модели и реальным состоянием краткосрочной протестной активности в Украине.*

**Ключевые слова:** модель Д.Девиса, синергетическое моделирование, протестная активность, моделирование формирования протестной активности.