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## **Dissolution of a Global Alliance: War or Peace**

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# Dissolution of a Global Alliance: War or Peace

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*This work investigates the effect of the dissolution of a global alliance in a collective of individual countries where the alliance, together with its antagonist counterpart, has previously generated stable coalitions. The model rests on the global alliance model of coalition forming inspired from Statistical Physics. Instabilities are a consequence of primary bond based interactions among rational actors and the stabilization is due to new interactions produced by the opposing global alliances. The stability consequences of the dissolution of one of them keeping the other one active are formally investigated within the confines of the model. Two landmark historical cases—the collapse of the Soviet Union and recent Syrian internal conflict—are reviewed. The results shed a new light on the understanding of the complex phenomenon of fragmentation, which may follow the dissolution of a stabilizing alliance.*

*Keywords: Social models, Statistical Physics, Coalition Forming, Coalition Stabilization, Political Instability.*

## 1 Introduction

**T**his work investigates the effect of the dissolution of a global alliance in the case where two opposing alliances were coexisting producing a stable configuration in a collective of individual countries. The focus is on the effect of fragmentation and instability among the countries in the coalition that have been previously sustained by the dissolved alliance. While the presentation addresses the coalition forming and its eventual fragmentation in an aggregate of countries, the discussion and the results can be applied to any type of political, social, or economic collectives.

We rely on the model developed by Vinogradova and Galam (2013) to describe coalition forming driven by global alliances among countries as rational actors. Countries are coupled with short range in-

teractions that form coalitions under the influence of external fields produced by the global alliances. The conditions for the stabilization of the coalition forming under both unique and multiple factors of influences on their interactions have been singled out.

Coalitions are formed from the attraction or repulsion forces acting between the countries. The latter are determined by the superposition of both the countries' spontaneous interactions, motivated by the static primary bilateral propensities of historical origins and the globally induced exchanges based on a planned profit. Each country chooses the coalition aimed to increase its individual benefit from the interactions with the linked neighbors. Contradictory associations into coalitions due to independent evolution of the primary historical propensities result in instability of the coalitions. The endeavor of the coun-

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tries to avoid cooperation or conflict, which contravenes their natural tendencies, leads to frequent changes and fragmentation of the coalitions.

The global alliance model rests on the model of coalition forming inspired from the Statistical Physics' model of Spin Glasses, through which the system of countries is compared to a collection of spins—tiny magnetic dipoles that interact with each other and align themselves in a way to attain the most "comfortable" position, the one that minimizes their energies.

The nominal model formally resembles the Ising model of Spin Glasses at zero temperature, where the Hamiltonian—the function that determines the physical properties of the spin system—is precisely concerned with minimization of the system's energy. This physical analogy allows one to address the bilateral propensities between the countries as a means of maximization of the countries' individual gain (minimization of their energy) and as the principal guide in the coalition forming.

A major difference between the model of spins and the model of rational countries is the long horizon rationality of the countries in contrast to the spins. While the spins are able to foresee only the immediate effect of their shifts, the countries have the ability to maximize their individual benefits through a series of planned changes assuming possible losses in the intermediate steps.

Global alliance modeling of coalition forming based on Statistical Physics started from the work of Galam (2002). The global alliance model was later investigated by Vinogradova and Galam (2013) to study the stabilizing role of global alliances in the coalition forming within the long horizon rationality of actors. In general, the coalition as a form of aggregation among a set of actors (countries, groups, and individuals)

has been studied using concepts from the theory of Spin Glasses (Axelrod and Bennett 1993; Florian and Galam 2000; Galam 1996, 1998; Hatamian 2005; Matthews 2000) with various social applications suggested in Galam (2002), Gerardo et al (2007) and Vinogradova and Galam (2012).

In this work, we address the problem of dissolution of one of the two opposing global alliances in the system—the external incentives that sustained the stability of the coalitions. In addition to the formal implementation of the dissolution, we study the fragmentation and instability of the coalitions as a result of dissolution within the contexts of uni-factor and multi-factor influences on stabilizations of the coalitions. Based on the new formulation, we provide an analysis of two remarkable historical cases of dissolution—the collapse of the Soviet State at the end of 1980s (Kotkin 2003) and the recent internal conflict in Syria (Fisher 2013; Hitti 2002).

The results shed a new light on the understanding of the complex phenomena of fragmentation of the coalition as a result of dissolution of the engendering global alliance and on the prospect of historical events.

## 2 Global Alliance Model Overview

Here, we recall the main components of the global alliance model of coalition forming among rational actors, describing the specifications of the instability and the stabilization of the coalition forming (Vinogradova and Galam 2013).

### 2.1 Background—Natural Model and Instability

The spin glasses based model of coalition forming among rational actors can

be defined as follows. It considers a system of  $N$  individual actors whose historical interactions have defined propensity bonds between them, which are either positive or negative. Each actor  $I$ , ranging from 1 to  $N$  is associated with its state variables  $S_i$  which can assume one of the two values  $S_i=+1$  or  $S_i=-1$ . The values correspond to the actor's choice between the two possible coalitions. The same choice allies two actors to the same coalition, while different choices separate them into the opposite coalitions.

The configuration of states of all the actors  $S=\{S_1, S_2, S_3, \dots, S_N\}$  defines an allocation of coalitions, where by symmetry both configuration  $S$  and its inverse  $-S$  define the same coalitions.

Bilateral propensities  $J_{ij}$  emerged from the actors  $i$  and  $j$ 's mutual historical experience measure the amplitude and the direction of the exchange between the two actors. The propensity is symmetric with  $J_{ij} = J_{ji}$  and is zero when there are no direct exchanges between the actors.

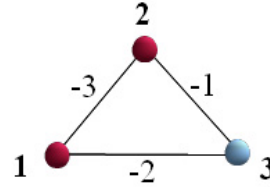
The product  $J_{ij}S_iS_j$  measures the benefit from interactions between both actors as a function of the actors' choices. Aimed to maximize their benefit, the actors seek to ally to the same coalition when  $J_{ij}$  is positive and to the opposing ones, otherwise. Thus, depending on the direction of the primary propensity, the conflict can be beneficial to the same extent as the cooperation.

The sum of the benefits from all the interactions of actor  $I$  for a configuration  $S$  makes up the net gain of the actor:

$$H_i(S) = S_i \sum_{j \neq i} J_{ij} S_j \quad (1)$$

Thus, the configuration  $S$ , which maximizes the gain function defines the actor's most beneficial coalition setting.

We depict the system of actors through a weighted connected graph with actors at the nodes and bilateral propensities as the weights of their respective edges (see Figure 1). We take red (dark) color for the  $+1$  choice and blue (light) color for the  $-1$  choice.



**Figure 1:** Triangle of three conflicting actors 1, 2, 3 with negative mutual bonds and different amplitudes.

Within the confines of gain maximization, the two cases of limited and complete rationality of actors must be distinguished. Actors with limited rationality, for example one-step actors such as spins, are able to foresee either the immediate improvements only (spin-like actors) or the improvements in very limited amount of intermediate steps. Actors with complete rationality, in contrast, possess the complete-step visibility to foresee a worth case of improvement in intermediate steps.

When the most beneficial coalition configurations of different actors do not coincide, the maximization of individual gains induces competitions for the beneficial associations. Among the actors with complete rationality, those competing interactions cause endless instability in the system. However, the system may remain stable when some actors have limited rationality—not being aware of attainability of a better configuration, they are satisfied having reached a local maximum.

Below is an example of rational instability—instability in the system of actors with complete rationality (Figure 2). The actual gain and the maximal gain of each ac-

tor separated by "/" are given in the square brackets. The example thus illustrates a series of transitions suggesting an infinite cycling as follows.

The figure illustrates a possible branch of configuration transitions (from the left to the right) suggesting an infinite cycling, as follows. In the first configuration, where actor 1 has the maximal gain (+5), the unsatisfied actor 3 makes a change expecting for its maximal gain in a later step. As a result, 1 loses its maximum down at (+1) and 2 gains its own (+4). Prospecting to get back its maximal gain, actor 5 makes a change. This new configuration is the one that yields the expected maximum (+3) for actor 3. At this configuration, actor 2 makes a change to gain an immediate improvement bringing the system back to the initial state with its symmetrical reversal equivalent (the reverse state-colors in the figure). It is interesting to observe that in the case of limited one-step rationality actors, the above system is stable in the third configuration: no actor can observe an immediate improvement of its gain.

Theoretically, the instability of the system of rational actors is defined as the situation when in any configuration of the actors' states there is an actor which is able to forecast an improvement of its gain. The well-defined geometrical terms of the instabilities read as follows. Denote a circle of actors by  $C$  and the actors composing the circle by  $1, 2, \dots, k$ .

*If there is a closed circle of actors on which the product of total propensities is negative,*

$$\prod_{i,j \in C} \Omega \quad p_{ij} < 0 \quad (2)$$

*then the system is unstable.*

The negative product on a circle implies an unpaired negative coupling where two neighbors are found to be connected

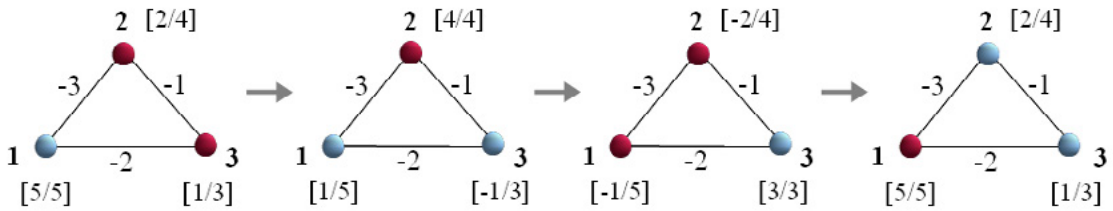
both through positive and negative branches in the circle. This fact creates an everlasting competition between the neighbors for the exclusive arrangement to ally with the positive branch. The actors thereby continuously shift their respective choices producing the instability.

## 2.2 Global Alliance Model of the Coalition Forming

The global alliance model starts from a global concept, which represents an external field polarizing the interests of the countries. This leads to the emergence of two opposing global alliances. The countries attach themselves to one or to the other based on their pragmatic interests with respect to the global principle. The new interactions, while favoring either cooperation or conflict, stimulate contributions to the countries' mutual propensities. The new prospects unify or separate the countries based on the pragmatic motivations, which in combination with the historical concerns allow other distributions of coalitions.

We denote the two global opposing alliances by  $M$  and  $C$ , where  $M$  unifies the countries that support the global concept and  $C$  unifies its opponents. Actor  $I$ 's individual disposition to the alliances, which is determined by the countries' cultural and historical experiences, is represented by the rational actor's parameter of natural belonging  $\varepsilon_i$ , where  $\varepsilon_i = +1$  if the actor has natural attraction toward alliance  $M$  and  $\varepsilon_i = -1$  for  $C$ .

By making a choice among the two possible state values  $S_i = +1$  and  $S_i = -1$ , actor  $i$  chooses to belong to either alliance  $M$  or  $C$ . Countries  $i$  and  $j$ 's choices of one or the other alliance creates new exchanges that define additional propensity between the countries. The propensity is determined by the amplitude  $G_{ij}$  of the exchanges in the



**Figure 2:** A branch of transitions in an unstable system of three conflicting rational actors. The actual gain and the maximal gains of each actor separated by “/” are given in the square brackets. The example illustrates a series of transitions suggesting an infinite cycling as follows. The unsatisfied actor 3 makes the change expecting for its maximal gain in a later step which makes 1 to lose its maximum and 2 gains its own. Prospecting to get back its maximal gain, actor 1 makes a change which yields to 3 the expected maximum. Then, actor 2 makes a change to gain an immediate improvement which brings the system back to the initial state, though in its reverse symmetrical setting.

direction  $\varepsilon_i \varepsilon_j$  and favors either cooperation or conflict.

The overall propensities between the countries, including both the historical inclinations and the new globally induced propensities, are determined as follows:

$$p_{ij} = J_{ij} + \varepsilon_i \varepsilon_j G_{ij} \quad (3)$$

Respectively, the net gain of actor  $i$  is

$$H_i = S_i \sum_{j \neq i} (J_{ij} + \varepsilon_i \varepsilon_j G_{ij}) S_j \quad (4)$$

In the presence of external incentives of the global alliances, the countries' associations into coalitions are adjusting with regard to the new propensities, bringing in a planned feature into the coupling with respect to the spontaneous interactions based on the primary historical propensities.

### 2.3 Stabilization by Factors of Interest

When referring to the system of countries, a precise factor of countries' interest produces particular dispositions to the present global alliances. Those dispositions determine the countries belonging to the alliances and encourage the new exchanges aligned with that factor. The appropriate amplitudes of the exchanges produce a uni-factor stabilization of coalitions among the countries.

Given two opposite global alliances  $M$  and  $C$  and the active factor of countries interests  $G$  that produce the countries' belonging parameters  $\{\varepsilon\}_i^N$ , the globally induced propensities are  $p_{ij}^{total} = J_{ij} + \varepsilon_i \varepsilon_j G_{ij}$ .

In real cases, several factors of countries' interests can be active to the global concept—along with religious concerns; the concept may impact economical, ecological, moral, political, and other interests. Accordingly, distinct interests

simultaneously influence the interactions between the countries in different ways by inducing specific interactions. The appropriate amplitudes of the exchanges produce the multi-factor stabilization of coalitions among the countries.

Given two active factors of countries' interests  $G$  and  $K$  producing the respective belonging parameters  $\{\varepsilon_i\}_i^N$  and  $\{\beta_i\}_i^N$  globally induced propensities are generated as follows:

$$\begin{aligned} p_{ij}^{total} &= J_{ij} + \varepsilon_i \varepsilon_j G_{ij} + \beta_i \beta_j K_{ij} \\ &= J_{ij} + p_{ij}^G + p_{ij}^K \end{aligned} \quad (6)$$

where

$$\begin{aligned} \varepsilon_i \varepsilon_j G_{ij} &\equiv p_{ij}^G \\ \text{and } \beta_i \beta_j K_{ij} &\equiv p_{ij}^K \end{aligned}$$

The general multi-factor case can be represented, with no restriction on the generality, through the two-factor form: one of the factors unifies the amplitudes of all the positive new coupling and the other unifies those of all the negative ones. According to Equation (2), the stability terms read as follows:

*A system is stable if and only if for any circle  $\Omega$  in the system,*

$$\prod_{i,j \in \Omega} p_{ij}^{total} \geq 0 \quad (7)$$

Stability space is defined to be a set of all the globally induced interactions  $\{(G_{ij}, K_{ij})\}_{i,j}$  such that the effective propensities  $p_{ij}^{G,K}$  satisfy the above stability condition.

### 3 Dissolution of a Global Alliance

Produced by the polarization of countries' interests through their natural belongings, the global alliances lead to emergence of new propensities between the countries, which generate stability for particular amplitudes. Once the stability is achieved, the system remains stable for some time—in reality, political, economic, or other interests and motivations are not static, they are subject to evolutionary changes.

When those propensities change, completely or partially, they may exhaust the incentive effect of a global alliance putting the respective countries, for which the stability prevailed during the existence of the alliance, back to their primary geographic-ethnic bonds. Depending on the distribution of the attraction to the global alliance and the amplitudes of the globally induced interactions, the associated coalition exhibits different effective resistance to the dissolution—the robustness of the stability that prevailed during the existence of the alliance.

Formally, the weakening of a global alliance is the weakening of the respective natural belonging parameters of countries by some multiplier  $\alpha \in [0, 1]$ . The total dissolution takes place when  $\alpha = 0$ , which sets the natural belonging parameters to zero.

The weakening of global alliance, being generally a dynamic process, should be expressed in terms of dynamic weakening parameter  $\alpha(t)$ , which is a continuous or discontinuous function of time. The weakening introduces a dynamical aspect into the initially unchanged model in which changes of the primary propensities are negligible.

**Definition 1 (Weakening of a Global Alliance).** *Given two actors  $i, j$  and global alliance  $M$  that descends, assume without loss*

*of generality that actor  $i$  naturally belongs to the global alliance  $M$ . Then, the weakening of the alliance is expressed through the following change of the actors' mutual propensity:*

$$p_{ij}^{total}(t) = J_{ij} + \varepsilon_i \varepsilon_j G_{ij} \alpha^i(t) \quad (8)$$

The robustness of the stability is naturally determined by the proximity of the new interaction amplitudes to the boundaries of the stability space. We can conclude from Formula (8) that while stability depends on the sign of the total propensity, its robustness depends on the value of the additional, externally induced propensity  $G_{ij}$ .

It can be observed from Formula (8) that, taken for all the pair of countries, leaving the closed area of the stability space is always abrupt. This fact explains that in reality, dissolution tends to be followed by unexpected and brutal bursts of conflict.

In this work, we consider the system to be at a moment  $t$  of the weakening process of the alliance where the system is out of its stability space—the alliance dissolves when the competitive (negative) circles re-appear in the system. On the way, before the system reaches the dissolution, transitional stable coalitions are possible while the system is still in the stability space.

### 4 Two Cases of Dissolution

We focus here on the dissolution of a global alliance that has previously created stability. When the dissolution occurs, the incentive effect of the initial global concept vanishes for this particular alliance. This makes the negative circuits of the primary propensities between the respective countries to be again instrumental in their respective search for optimization.

Two different effects of the dissolution can be distinguished: (1) the instability



involving all the countries; (2) the instability affecting only part of the system—the countries of the dissolved coalition leading to semi-stability. We illustrate below the two cases with historical examples.

#### **4.1 Dissolution of the Global Alliances in Syria—An Unstable System**

Syria includes many different ethnic and religious communities unified under one government by the French mandate. While Sunnis, Druzes, Alawites (a branch of Shia), Shiits, and Christians are the largest religious communities of Syria, the Alawite minority has occupied most of the key government and military positions. The politics is exclusively based on cronyism, which is characteristic of the entire East, so that the Alawite community and their allies get a good part of the political and economic benefits.

The religious composition of Syria is schematically illustrated in Figure 3a showing the original propensities as they appeared in the beginning of the twentieth century. Several conflicting (negative) circles are present in the system, so that the system does not have a rational stability, a stable optimal configuration.

Today's conflict in Syria exhibits a sharpest split between the ruling Alawite minority and the country's poor religious periphery—Sunni majority mostly aligned with the opposition where the prosperous part of the Syrian people for whom religion is not of an absolute vital importance passes from one side to another.

As stated in several historical sources (Fisher 2013; Escobar 2012), the problem is rooted in socio-economic dimensions, rather than in the religious context. Those different religious communities find themselves united under conditions of extreme poverty with neither economic nor social

safety prospect, as opposed to the prosperity of the governing class. Such a discrepancy has fueled the civil uprising.

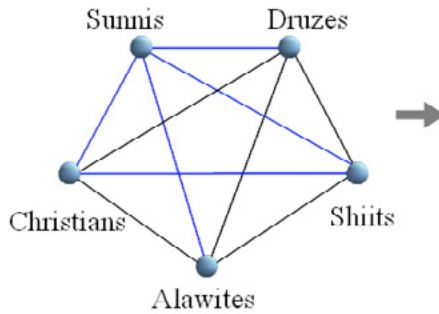
It is worth underlining that in the second half of the twentieth century, the Syrian stability has been settled by the materialization of a global alliance calling against a common enemy, the newly created state of Israel. The global alliance, denoted by *I*, has unified the frustrated population of Syria. The alliance has neutralized all the antagonistic communities, in contrast to the Israeli success in unification of its different ethnic and religious branches, were not able to come up with their own autonomy. The alliance *I* is shown in Figure 3b.

In the beginning of the twenty-first century, Egypt, Tunisia, and Libya came up with a public protest against their present regimes. The uprising against the government in Egypt and Tunisia was quick and decisive. In Libya the protest led to a short civil war that induced the overthrow of the government. Those examples inspired the resistance and rebellion of the unfavored Syrian population, which has been suffering from social and economic inequalities.

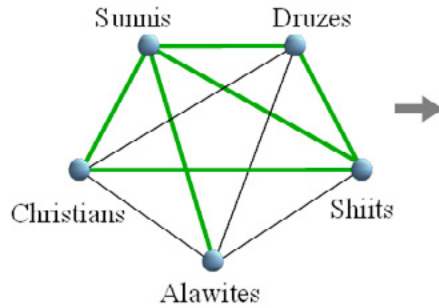
The social awakening led to the dissolution of the anti-Israel global alliance, freeing the powerful instabilities of the internal conflicts. A new global alliance, denoted by *B*, has installed immediately in opposition to the government of Bashar al-Assad with the simultaneous forming of the opposite alliance, which supported the regime (see Figure 3c). The opposition has attracted together most of the Sunnis and a large part of the Druze community. The global alliance *B* splits the population into two parts so that the system is stabilized, as shown in the figure (all the circles are positive).

However, division of Syria into two opposite alliances could not produce a stable configuration. As soon as the current

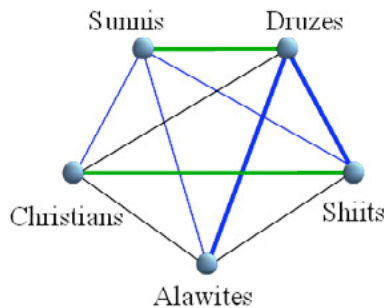
Figure 3: Dissolution of the global alliances in Syria



(a) The figure shows schematically the original system of Syria's largest religious communities in the beginning of the twentieth century. Here, the primary negative propensities are highlighted with blue while the positive propensities are marked with black. As we can see, there are several conflicting (negative) circles in the system. The system does not have a rational stability, a stable optimal configuration.



(b) A system of Syrian religious communities in the 1970s under the anti-Israel state global *I*. The antagonistic communities, which have not come up with their own autonomy, were unified into a stable coalition based on the ethical considerations. The new cooperative propensities are highlighted with bold green.



(c) A system of Syrian communities since 2010. The new conflicting propensities are highlighted with bold blue. The opposition's global alliance *B* has attracted, together with most of the Sunnis, a part of the Druze community. All the circles in the system are positive, so the global alliance splits the population into two religious stable parts.

conflict will be resolved, the alliance  $B$  will naturally dissolve and the original ethnics and religious frustrations will be again active, thus fueling new instabilities.

It should be noted that in reality the Syrian system is larger and more complex accommodating many minor religious communities and some large communities made up of several different ethnic groups that often disfavor each other. An example can be Kurds and native Syrian Arabs who belong to the Sunnis community. Nevertheless, the system of religious communities presented in the above example provides a simplified picture, which already exhibits the main instabilities and the complexity of the Syrian conflict.

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#### **4.2 Dissolution of The Soviet Global Alliance—A Semi-Stable System**

The case of a semi-stable system, a system where one of the coalitions remains stable while the other fluctuates due to the dissolution of the corresponding global alliance, can be illustrated with the collapse of the Soviet alliance.

In the middle of the last century, the Eastern alliance represented by the Warsaw Pact and the Western alliance represented by NATO were the leading opposing global alliances in Europe. In the seventh decade of

its existence, the Soviet Union, which held the Warsaw Pact nations together, mainly by the military-political factor, collapsed after the Warsaw Pact was dissolved. This event led to the dissolution of the entire Eastern alliance and, as a result, to the fragmentation of the Soviet coalition, dropping back the formerly unified countries into their respective primary ethnic hostility. In contrast to the Eastern sector, the coalition of NATO remained stable.

Figure 4 illustrates schematically the main features of the systems made up of Soviet and NATO countries with the collapse of the Soviet global alliance. In both sides negative triangles can be identified as for instance Georgia–Armenia–Russia on the Soviet side and Germany–Italy–France on the NATO side.

To highlight the associated phenomena we present the case of three countries on each side denoted respectively by  $\{1_S, 2_S, 3_S\}$  for both the Soviet part and the Far East countries and by  $\{4_N, 5_N, 6_N\}$  for the Western Europe part. Intermediary countries of Eastern Europe such as Yugoslavia and Bosnia are denoted by  $\{7_I\}$ .

Primarily, before the Soviet concept has been implemented in the region, the system of countries  $\{1_S, 2_S, 3_S, 4_N, 5_N, 6_N, 7_I\}$  formed two independent groups each having negative circuits of propensities, as shown in Figure 4a. Then, the Soviet global alliance  $S$  and the opposing NATO global alliance  $N$  were established.

In our illustration, the countries' natural belongings were distributed as follows. Countries  $\{1_S, 2_S, 3_S\}$  as well as  $7_I$  belonged to  $S$ , while  $\{4_N, 5_N, 6_N\}$  belonged to  $N$ . The resulting externally induced interactions are shown in Figure 4b in bold font. The associated additional propensities stabilize the originally unstable systems into two opposing coalitions  $\{1_S, 2_S, 3_S, 7_I\}$  and  $\{4_N, 5_N, 6_N\}$ .

Note that country  $7_I$  having no significant impact on the  $i_s$  -countries initially happens to belong naturally to the Soviet global alliance  $S$ . Due to the new interactions,  $7_I$  is detached from the  $N$  countries with which it was associated initially through a positive mutual bond and as such is attached to the  $S$ -coalition.

Here, the  $S$ -coalition holds the intermediary country  $7_I$  only due to the attraction of the global alliance  $S$ . As soon as the Soviet alliance collapses, the country joined the  $N$  -coalition adjusting to its best configuration as shown in Figure 4c. The countries of the former Soviet coalition turn back to their respective initial negative propensities. However, the fluctuations of those countries do not affect the stable  $N$ -coalition for which the cooperative character of the interactions has persisted prevailing its stability. The overall system is thus semi-stable.

The intermediary countries are those disconnected or weakly connected to the Soviet Union. Those countries served as "isolators" between the two opponent coalitions, which impeded the instability of the Eastern side to propagate to the Western one. Among those countries were Hungary, Czech Republic, Poland, Yugoslavia, Czechoslovakia, Bosnia, and other countries of Northern and Eastern Europe. In 1999, the first three of them were invited to join NATO. Membership has been expanded later to several Northern and Eastern European countries which then gained a new stability. In contrast, the Caucasian region on the Eastern side till today shows high instability.

#### **4.3 Remarks on the Modeling of Dissolution**

It is worth remarking that within the context of rational instability where the

countries as fully rational actors can assume possible losses at maximization; the semi-stability is only possible when the system consists of two disconnected (or weakly connected, i.e., connected by negligible bond values) parts.

Modeling of the Soviet global alliance dissolution has already been discussed in Galam (2002) by connecting the decent of the global alliance exchanges to a change in the value of the countries' natural belonging parameter. Subsequent affiliation to NATO by some Eastern Europe countries was explained by reversing their natural disposition.

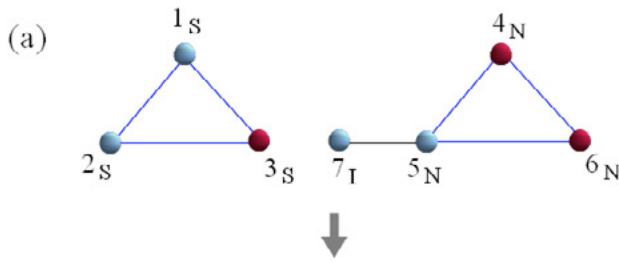
Although such a scenario provides an explanation for both the instability driven by the dissolution and the renewed stability in some specific part of the Eastern Europe, it contradicts the fact that the countries' natural dispositions are the result of a long historical process and cannot be modified at the will of a government. Instead, considering new well-designed global alliances seems to be more appropriate. In addition it could allow bringing in novel stable coalitions among the problematic regions such as Caucasus.

The above illustrations are typical examples of dissolution where a unique factor of interest allows each country to interact on the associated single dimension of the respective global alliance. It is a uni-factor stability process.

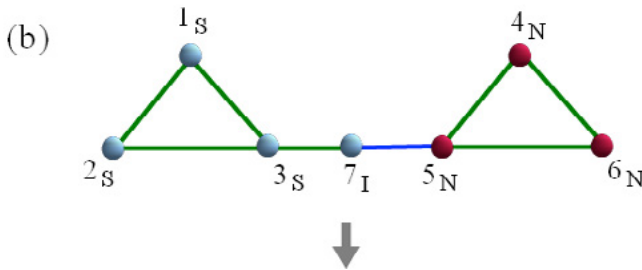
In contrast, the multi-factor stability process implies an equiprobable influence of both opposing global alliances on the countries. As we can see in Formula (6) for the total propensity in multi-factor form, both global alliances concurrently contribute to the new interactions between the countries and, thereby, to the stability of the coalitions.

Since the weakening of global alliance  $M$ , with any country  $i$  naturally be-

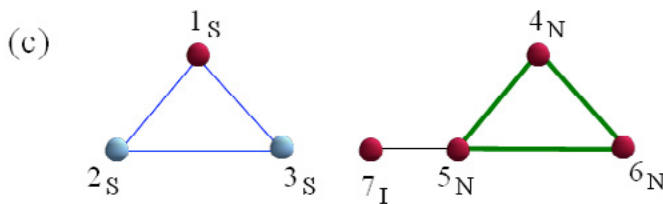
Figure 4: Dissolution of the Soviet global alliance



(a) Initial system prior to the formation of global alliances with  $1_S, 2_S, 3_S$  and for the Soviet part and the Far East countries,  $4_N, 5_N, 6_N$  for Western Europe countries and  $7_I$  for the intermediary countries of Eastern Europe. All bonds are the historical ones. The negative propensities are highlighted with bright blue.



(b) The Soviet S and the opposing NATO N global alliances have induced interactions that stabilized the system into two opposing coalitions  $\{1_S, 2_S, 3_S, 7_I\}$  and  $\{4_N, 5_N, 6_N\}$ . The globally induced interactions are highlighted in green bold font.



(c) As a result of the Soviet alliance's dissolution, the countries of the former Soviet coalition turn back to the initial negative propensities. Intermediary countries served as "isolators" between the two former opponent coalitions. Later, the country gradually joined the N-coalition adjusting to their best configuration. The fluctuations of the former Soviet countries do not affect the stable N-coalition where the cooperative character of the interactions has persisted. The outcome is a semi-stable system.

longing to it, is determined through the following change in the  $i$ 's propensities:

$$p_{ij}^{total}(t) = J_{ij} + \alpha^i(t) p_{ij}^G + p_{ij}^K \quad (9)$$

the dissolution of a global alliance in the multi-factor stability will have a weaker effect on the stable coalitions than the dissolution in the uni-factor case.

This effect comes from the fact that when contributions from one global alliance dismiss, coalitions may remain stable due to contributions from the opposing stable alliance. The co-existence of attraction to the opposing alliances concurrently on multiple factors may thus dramatically improve the robustness of the stability.

It can be noted that the multi-factor setting in coalition forming corresponds to countries with democratic form of government. The stability in those settings is a priori more robust and resistant to the dissolution. In contrast, the uni-factor stability appears to be linked to authoritarian form of government where one of the opposing groups solely dictates over the country's interest. For this reason, the authoritarian structures tend to collapse suddenly, bringing thereby extensive instability followed by a burst of ongoing conflicts.

In this frame, the dissolution of the Soviet side is a dramatic example. Soviet alliance represented an authoritarian regime where the communist countries, on any factors of their interest, were focused on the Soviet ideology. The political dictatorship was reinforced by a centralized economic support. When the alliance dismissed, the coalition collapsed at once with the simultaneous loss of the influence that the ideology has held over all the Eastern Europe including the Caucasian region.

Comparing the stability conditions (5) and (6) for the uni-factor and the

multi-factor stabilization correspondingly, it appears that in the first case the condition must be satisfied for the amplitudes from a unique factor and in the second one, it must be satisfied for several independent factors simultaneously. Therefore the stability is easier to attain within the authoritarian than within the democratic settings. At the same time, as we have seen, once the stability is reached, it is more solid within the democratic settings. This conclusion is coherent with several historical events from the past and also from the recent times (Linz and Alfred 2011; Rutherford 2013).

## 5 Conclusion

**D**ue to the evolutionary changes in the system's environment, a global alliance which has sustained a stable coexistence with an opposing alliance may dissolve. Such changes produce an attenuation of the interactions between the countries previously motivated by this alliance and reveal the primary propensities between the countries. When the circuits of bonds are negative the dissolution produces an instability.

For actors with limited rationality—the ones that are unable to foresee improvements beyond a limited number of intermediate steps, such negative circuit may produce no changes with regard to the stability of the coalitions. However, for countries which are fully rational, the dissolution may result in one of two utter cases of instability.

The first one is when the instability propagates to the stable coalition and the entire system goes into instability. The second one is when the unstable part disconnects as a result of the dissolution from the stable one, and the system is divided into stable and unstable parts. Various historical cases illustrate the situation, some of which

are the recent conflicts in Syria and the collapse of the Soviet Union.

In the frame of the global alliance model, re-stabilization of the resulting unstable system can be achieved by emergence of new global alliances able to bring in effective interactions to yield new stable coalitions. For countries of the former Soviet alliance, those may be global alliances that incite and put the focus on economical interactions. Some efforts in this direction are being made today by the former Soviet countries.

For Syria, the key of governing may be shifted from the traditional ethnic-religious key to the Statehood key, which refers to the process of constructing a national identity focusing on social safety and prosperity, as it has been achieved in some Eastern countries.

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