

A GAMES THEORY PERCEPTION ON INTERSTATE COOPERATION: TRADE INCENTIVES IN THE BLACK SEA REGION AND THE IMPLICATIONS FOR ROMANIA

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Abstract

The international economic and political environment is constantly influenced by a wide and dynamic set of factors which constrain and preoccupy policymakers. The various interdependencies that potentially exist between certain business activities and state decisions are difficult to assess in the complexity that characterizes the real world. Thus, great efforts have been made in trying to create models that reduce the variety and dynamic of certain observations in order to grasp the evolutions and connections between individual factors. The relation that exists between the activity of trade and the probability of engaging in a conflicting situation has long been addressed and accepted as consistent, though sometimes with paradoxical outcomes.

This article follows these previous notions and by using games theory principles and methods it illustrates the situation existing in the Black Sea region by trying to create a model or, in this case a game, that identifies the possible outcomes in relation to certain economic incentives.

Keywords: games theory, economic incentives, interstate conflict, static game, complete information game.

JEL classification: C70, F19

1. Introduction

Trade and business development can have an important impact on policymakers, creating incentives for adopting certain strategies for future conduct. While there are many opinions regarding the exact form of the relation that exists between foreign trade and interstate conflicting situations, it is generally accepted that to some extent, a growth of the value of trade serves as an incentive for cooperation and a barrier in the way of misconduct and the cessation of amiable relations.

The present article adopts principles and methods characteristic to the games theory methodology and creates a model or more appropriate to this construction, a game form,

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that describes the situations that can occur between nations. By resolving and analyzing the outcomes in the case of Romania and its Black Sea partners, comprehensive conclusions can be identified and, thus, an overview of the strategic positioning in the area can be constructed.

2. Literature review

Economic factors have always determined the outcome of policies and cooperation between communities. While theories that describe these interactions have only been proposed and accepted in the relative recent history, since ancient times peoples have interacted and have collided following specific interests from the gaining of territory and resources to bolstering personal and national prestige. Liberal theories, developed by Immanuel Kant have pointed out that since the appearance of democratic entities, cooperation has continuously grown and commerce has substituted war and occupation.

Studies that analyzed pairs of nations have indicated that the relation between trade and conflict is negative, meaning that the intensifying of one side reduces the occurrence of the other (Polachek, 1980). Mainstream thinking suggests that conflict between neighboring countries, more than in other instances, would be greater than observed if not for the mitigating effect of trade (Polachek, Robst, Chang, 1999).

In order to describe and assess the stability and profile of a geographical region certain aspects have to be taken into account, most important of these being external relations, economy, ethnicity and military factors (Gass, 1994).

The political and military factors have to be observed and interpreted correctly so as to be able to construct a realistic image of the business environment in the goal of bolstering trade and cooperation.

The level of democracy and the protection of rights are thought to be closely connected with economic cooperation over state boundaries. The studies have indicated results that democracies have a tendency to trade more intensely with each other as the flow of ideas are transmitted along with goods and services (Decker, Lim, 2008).

Edward D. Mansfield points out that while other previous studies have focused on the relation between trading and conflicts, they have not analyzed the implications generated at the institutional level by PTA (Preferential Trading Arrangements). PTA have represent extra incentives for cooperation by the creating the expectation of future economic growth (Mansfield, 1998). Preferential groupings have institutions that help mute the military tensions. The same author proposes the theory that an efficient open trade system at a global level can only be achieved in the presence of a hegemonic state or entity. Eroding the position of the hegemonic entity determines a systematic closure of foreign markets and creates the prerequisites for seeking stability at a regional level through a form of PTA (Mansfield, 1998).

Although it is sometimes assumed that being part of international economic institutions reduces the risk of conflicts, some studies have indicated that this is not necessarily true (Powers, 2006).

Contradictory findings have also indicated that even in situations in which trade increases welfare and war is Pareto dominated by peace, intensifying trade flows do not lead to more peaceful situations. This can be attributed partially to the fact that different entities view problems from different perspectives, each developing and maintaining a type of rationality. Such may be the case in conflicts in which at least one side has other agendas than lucrative, economic factors, varying from religion to political ideals. Recent researches have suggested that trade influences the state of conflict at country level only above or below certain values in the flow of goods (Hamid, Sheriff, 2007).

Intense bilateral trade between countries generates high opportunity costs and thus decreases the propensity for conflict. On the other hand, by signing multiple trading treaties, these costs, seen as risks can be diversified and in so doing making conflict with a particular entity more acceptable in economic terms (Bohmelt, 2011).

Other studies have indicated that the function created by the interdependency between trade and conflict appears in a curvilinear form, declining to a certain point and then suddenly beginning to rise (Barbieri, 1996). This is generated by the fact that trade up to a moderate quantity reduces the probability of conflict, yet, when an extreme dependency on certain goods and services arises between two parties open conflict is more probable, careful policies being needed in order to maintain the status quo.

Katherine Barbieri has emerged as a leading critic of liberal peace, the concept that implies that international trade reduces conflict. Although not contradicting the idea entirely, the author points out that while symmetric trade encourages understanding and cooperation, asymmetric trade, such as that existing between developed and developing countries leads to disequilibrium and thus to more tensions (Barbieri, 2002).

Though there is no absolute consensus on the matter of trade versus conflict, a fraction of the theory, that trade serves as an opportunity cost to conflict seems to be accepted by experts in this field. A stable and intense trade flow as well as other forms of economic cooperation gives a state the leverage it sometimes needs to achieve its goals.

While the asymmetric trade or the asymmetric position by military strength of trading partners can in some instances increase the probability of tensions, it does not mean that trade should be restricted or limited, but rather that the policies that accompany it should keep up the pace with the development of the situation.

3. Model definition

By adopting the principles of games theory into the process of decision making in foreign relations, if rationality is accepted and viewed by all sides in the same manner, every conflict in history can be placed in accordance to a single equilibrium formula between the world countries:

$$K^*(S+R+D) = T+R+D$$

Equation (1)

K – Relative strength of the nation, calculated as the ratio between the defense budget of the particular country and the overall defense budget of the two opposing countriesⁱ;

S – Stake for dispute or value gained if conflict is won;

R – Reputation of a country;

D – Infrastructure and investment in defense forces;

T – Value of trade between countries;

The equation could be expanded to take into consideration the value generated by tourism between the two countries, the foreign investment taking place in peace time, international aid and technological exchanges. The arguments of liberal theories are that democratic nations resolve their disputes in accordance with their rational interests and not through the manifestation of personal ambitions such as might be the case in autocratic systems of government (Ye, 2002).

While this relatively complex equation could prove difficult to calculate in any practical example without restricting some of the factors, it indicates the rational, lucrative way of deciding if conflict and its benefits are superior to the rewards of maintaining the peaceful relation which allows for trade, change of ideas and also preserves the existing defenses of a state and improves its international standing.

The type of game proposed for this analysis is that of static game in complete information. Considering the fact that the game is static, it means that a perfectly rational player, in this game a policymaker, would not be interested in the change of reputation, as the game will not repeat. Hence the value for reputation variation for all nations, regardless of the strategy adopted, will be zero.

Thus, the relation for general equilibrium becomes:

$$K^*(S+D) = T+D$$

Equation (2)

The analysis does not take into account the actions derived by the decisions of third parties which could also break relations and stop trading in the advent of open conflict.

The available strategies for each of the players are either to enter into a conflict or to try to engage in trade. The benefits of trade can only appear in situations in which both players choose to do so. If both players decide to enter into a conflict, the winnings will be represented by a portion (depending on the K value) of the stake for conflict cumulated with the existing defenseⁱⁱ. If one player chooses conflict and the other does not respond in the same way, the aggressor will gain the entire stake, retain its defense infrastructure and capability, and the other only gains the possibility to keep its defenses intact.

The following matrix is a normal form representation of a game in which players move simultaneously, without receiving information of the other's moves before making their own, and receive the payoffs as specified for the combinations of actions played:

Table no.1 - Normal form game for conflict to trade relation

	<i>Player 2 chooses conflict (C)</i>	<i>Player 2 chooses trade (T)</i>
<i>Player 1 chooses conflict (C)</i>	$K*(S+D1) , (1-K)*(S+D2)$	$S+D1 , D2$
<i>Player 1 chooses trade (T)</i>	$D1 , S+D2$	$T+D1, T+D2$

The outcome and interpretation of the mentioned game can only be achieved through a discussion based on the values attributed to the stake for conflict, defense budgets and trade flow ($S, D1, D2, T$)ⁱⁱⁱ.

Situation 1 – $S>T, S>D1, S>D2$

Table no.2 - Normal form game for conflict to trade relation under the restrictions $S>T, S>D1, S>D2$

	<i>Player 2 chooses conflict (C)</i>	<i>Player 2 chooses trade (T)</i>
<i>Player 1 chooses conflict (C)</i>	$\underline{K*(S+D1)} , \underline{(1-K)*(S+D2)}$	$\underline{S+D1} , D2$
<i>Player 1 chooses trade (T)</i>	$D1 , \underline{S+D2}$	$T+D1, T+D2$

If the stake for conflict is larger than the possible trade flow and both of the defense budgets, then the strategy of trade is dominated by the strategy for conflict meaning that in this game both players will always chose to engage in an aggressive dispute. The solution for the game would be (C, C).

Situation 2 – $S>T, S>D1, S<D2$

Table no.3 - Normal form game for conflict to trade relation under the restrictions $S>T, S>D1, S<D2$

	<i>Player 2 chooses conflict (C)</i>	<i>Player 2 chooses trade (T)</i>
<i>Player 1 chooses conflict (C)</i>	$K*(S+D1) , \underline{(1-K)*(S+D2)}$	$\underline{S+D1} , D2$
<i>Player 1 chooses trade (T)</i>	$\underline{D1} , \underline{S+D2}$	$T+D1, T+D2$

In this instance the stake for conflict is larger trade and larger than the defenses of the first player, but smaller than those of the second one, the solution for the game, by using the method of maximizing the relative gains, would be (T, C). This means that under such conditions, the first player will always choose to trade while the other will always prefer conflict.

Situation 3 – $S>T, S<D1, S>D2$

Table no.4 - Normal form game for conflict to trade relation under the restrictions $S>T, S<D1, S>D2$

	<i>Player 2 chooses conflict</i>	<i>Player 2 chooses trade (T)</i>
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	(C)	
Player 1 chooses conflict (C)	$K*(S+D1) , (1-K)*(S+D2)$	<u>S+D1</u> , <u>D2</u>
Player 1 chooses trade (T)	D1 , <u>S+D2</u>	T+D1, T+D2

This case is symmetrical to the previous one, the solution being (C, T). The first player will chose the strategy to engage in conflict and the latter will choose to trade.

Situation 4 – S>T, S<D1, S<D2

Table no.5 - Normal form game for conflict to trade relation under the restrictions S>T, S<D1, S<D2

	Player 2 chooses conflict (C)	Player 2 chooses trade (T)
Player 1 chooses conflict (C)	$K*(S+D1) , (1-K)*(S+D2)$	<u>S+D1</u> , <u>D2</u>
Player 1 chooses trade (T)	<u>D1</u> , <u>S+D2</u>	T+D1, T+D2

In this particular case there are two solutions in pure strategies, (C, T) and (T, C), meaning that another must exist in mixed strategies. Thus positive probabilities have to be associated to the above pure strategies in order to obtain a solution.

The equations that are formed are as follows:

$$Q1*K*(S+D1) + Q2*(S+D1) = Q1*D1+Q2*(T+D2) \quad \text{Equation (3)}$$

$$Q1 + Q2 = 1 \quad \text{Equation (4)}$$

$$P1* (1-K)*(S+D2) + P2*(S+D2) = P1* D2 + P2*(T+D2) \quad \text{Equation (5)}$$

$$P1 + P2 = 1 \quad \text{Equation (6)}$$

The solution for the above system is:

$$Q1 = (T-S)/(KS+D1K-D1+T-S)$$

$$Q2 = 1- (T-S)/(KS+KD1-D1+T-S)$$

$$P1 = (T-S)/(T-KS-KD2)$$

$$P2 = 1- (T-S)/(T-KS-KD2)$$

Situation 5 – S<T, S<D1, S<D2

Table no.6 - Normal form game for conflict to trade relation under the restrictions S<T, S<D1, S<D2

	Player 2 chooses conflict (C)	Player 2 chooses trade (T)
Player 1 chooses conflict (C)	$K*(S+D1) , (1-K)*(S+D2)$	S+D1 , <u>D2</u>
Player 1 chooses trade (T)	<u>D1</u> , S+D2	<u>T+D1</u> , <u>T+D2</u>

In this situation the stake for conflict is smaller than the trade flow and also smaller than both of the defense budgets, the strategy for conflict is dominated by the strategy for trade. Both players will always engage in trade, the solution being (T, T).

Situation 6 – $S < T, S < D1, S > D2$

Table no.7 - Normal form game for conflict to trade relation under the restrictions $S < T, S < D1, S > D2$

	<i>Player 2 chooses conflict (C)</i>	<i>Player 2 chooses trade (T)</i>
<i>Player 1 chooses conflict (C)</i>	$K*(S+D1), (1-K)*(S+D2)$	$S+D1, \underline{D2}$
<i>Player 1 chooses trade (T)</i>	$D1, S+D2$	$\underline{T+D1}, \underline{T+D2}$

When trade is larger than the stake for conflict and only the first defense budget is larger than the stake, then the solution determined through the maximum relative gains method is (T, T).

Situation 7– $S < T, S > D1, S < D2$

Table no.8 - Normal form game for conflict to trade relation under the restrictions $S < T, S > D1, S < D2$

	<i>Player 2 chooses conflict (C)</i>	<i>Player 2 chooses trade (T)</i>
<i>Player 1 chooses conflict (C)</i>	$K*(S+D1), (\underline{1-K})*(S+D2)$	$S+D1, D2$
<i>Player 1 chooses trade (T)</i>	$\underline{D1}, S+D2$	$\underline{T+D1}, \underline{T+D2}$

This situation is symmetrical to the latter and thus the solution is (T, T). Both players will engage in trade.

Situation 8 – $S < T, S > D1, S > D2$

Table no.9 - Normal form game for conflict to trade relation under the restrictions $S < T, S > D1, S > D2$

	<i>Player 2 chooses conflict (C)</i>	<i>Player 2 chooses trade (T)</i>
<i>Player 1 chooses conflict (C)</i>	$K*(S+D1), (\underline{1-K})*(S+D2)$	$S+D1, D2$
<i>Player 1 chooses trade (T)</i>	$D1, S+D2$	$\underline{T+D1}, \underline{T+D2}$

Once more, for this situation, the game admits two solutions in pure strategies in the form of (C,C) and (T,T). The solution in mixed strategies implies the utilization of the set of probabilities that resulted in situation number 4.

4. Results analysis

The above situations and their respective solutions can be applied to multiple pairs of countries in order to assess the inclination for trade or for conflict as suggested by the model. For this particular analysis in the purpose of establishing the situation for Romania, its data will be introduced in the game in relation to the data of the main Black Sea Countries. Trade will be considered as the value of the trade flow between the

countries in 2010, the defense budgets are calculated for all the countries in the same year^{iv} and the stake for conflict will be established from the start as 1 billion EURO.

Table no.10 - Game between Romania and Ukraine

(mil EUR)		Ukraine	
		C	T
Romania	C	1942, 926	<u>3177, 1383</u>
	T	<u>2177, 2383</u>	3012, 2219

The game is in the form proposed in situation number 4, the case in which there are two solutions in pure strategies and one in mixed strategies. By applying the above results, the probabilities are:

$$Q1 = 0.41; Q2 = 0.59; P1 = 0.26; P2 = 0.74$$

Table no.11 – Game between Romania and Moldova

(mil EUR)		Moldova	
		C	T
Romania	C	<u>3154, 7</u>	<u>3177, 15</u>
	T	2177, <u>1015</u>	2654, 493

This game falls under the restrictions of situation number 3 in which the first country will always choose the conflict strategy and the latter will choose the trade strategy. Because the gains of conflict are so small for Moldova, in this type of game it would prefer to maintain its defenses and not attack.

Table no.12 – Game between Romania and the Russian Federation

(mil EUR)		Russia	
		C	T
Romania	C	158, 40544	3177, <u>41663</u>
	T	<u>2177, 42663</u>	<u>4580, 44066</u>

The game fits into situation number 5, meaning that the solution is represented by (T,T). Both countries will choose the trade strategy.

Table no.13 - Game between Romania and Turkey

(mil EUR)		Turkey	
		C	T
Romania	C	230, 26857	3177, <u>27949</u>
	T	<u>2177, 28949</u>	<u>5659, 31432</u>

For both nations, the conflict strategy is strictly dominated by the trading strategy, meaning that the game falls under the restrictions of situation 5.

Table no.14 – Game between Romania and Bulgaria

(mil EUR)		Bulgaria	
		C	T
Romania	C	<u>2290, 515</u>	3177, <u>843</u>
	T	2177, 1843	<u>3377, 2043</u>

The game falls into the situation number 6 and the solution is (T, T). Both countries will engage in trade rather than adopting the conflict strategy.

5. Conclusions

Trade as well as other forms of economic cooperation represents a strong incentive for peace in any region. The model underlines the possible game situations in which countries can find themselves when deciding what strategy to adopt. The model is simplified mainly by the fact that it does not take into consideration the response that third party states can take in some cases and also the due to the fact that it does not portray an ongoing situation where the current strategy will determine latter responses and possible changes to the form of the game.

By establishing the stake for a possible conflict at 1000 million Euros (keeping in mind that the model could easily generate other correct situations by choosing a different incentive) and by applying a static game of complete information, Romania finds itself in a (Trade, Trade) solution with the Russian Federation, Turkey and Bulgaria while at the same time in a (Conflict, Trade) solution with Moldova and a mixed strategy solution with Ukraine in the form of: $((0.26, 0.74) (0.41, 0.59))$.

The model indicates the fact that a solution based on mutual trade and cooperation can only arise when the trade flow is larger than the stake for a dispute. The disparities in defense budgets and also those between the defense budgets and the stake of conflict are very important as they can dictate whether a country would choose to be aggressive or even accept the attack of others without retaliation.

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ⁱ Serving as example, the K value for Romania in relation to the Russian Federation is calculated as the ratio between Romania's defense budget and the sum between Romania's defense budget and that of the Russian Federation;

ⁱⁱ Depending on the K value, each player will win a portion of the stake and by engaging in conflict will also lose a portion of its military capabilities;

ⁱⁱⁱ D1 represents the defense budget of state no. 1 and D2 the defense budget of state no. 2;

^{iv} The last year available for all countries analyzed is 2006. In order for the data to be comparable the same year had to be chosen for all states.