NEIGHBORS MAKE A DIFFERENCE: MIXED STRATEGIES FOR RESOLVING
CONFLICTS IN MIDDLE EAST AND NORTH AFRICA[1]

BY

E. Mine Cinar
Economics
School of Business Administration
Loyola University Chicago

Robert Lapointe
Graduate School and Research Services
Illinois Institute of Technology

Timothy C. Nelson
School of Business Administration
Loyola University Chicago

Abstract:

I. Introduction

The present day political conflicts in the Middle East and North Africa (MENA) region, such as in Israel and Palestine and in Iraq, obscure numerous other critical conflicts that face other countries in the area. This study addresses general issues relating to both political conflict and common resource use conflict and examines potential predictable outcomes. The political issues with contestable resources and the environment are plentiful, and some have been the subject of many studies (see for example, Lofgren, 2003). In situations where information is opaque, where externalities obscure signalling and where there are many accounted (and unaccounted) players, conflicts do not get resolved and there are many tragedies of common resources or prisoner's dilemmas.

This paper examines the general cases of political conflicts, common resource conflicts and possible coordination efforts. The next part discusses political conflicts and strategies; the third part examines resource use conflicts. Then specific cases in the MENA region are discussed. Last part gives conclusions.

II. Political Conflicts and Strategies

Add lit survey

What are the pure and mixed strategies in conflicts? Suppose two countries A and B of equal size and strength simultaneously threaten each other with war, and each party possesses imperfect information on the behaviour of its adversary. Further suppose the only options available to each side are either war or a serious concessions to the other party to avoid war. When both parties jointly opt for peace (i.e. , avoid war), let the payoffs be zero for both. Define the payoff (or costs of) of war as an aggregate value of **–W** [negative W]. Also suppose that the first country that backs down from war and offers a peace concession faces a payoff of value –C (or gives up C) where C is non-zero[2]. This becomes the other country's gain.[3] Also, note that:

$$C \leq W \qquad\qquad [1]$$

Where the 'concession price' for peace is less than the costs of war.

Given imperfect information, expected value of war or expected value of concessions (that is, backing down first to accept peace) is conditional on the behaviour of the other country. Let P stand for probability, then the expected values (EV) of each strategy (of war and peace) for Country A are:

$$EV_A(War) = P_B(War)(-W) + P_B(Peace)(+C) \qquad\qquad [2]$$

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[2] Concession costs could be generated by numerous sources. Concessions might include land, people, trade rights, fiscal revenue, natural resources and real and nominal subsidies. There may also be cultural and institutional concessions.

[3] For a one period game, we do not consider the present value of future benefits. Note that due to costs of war, the game constructed is a variable sum, not a zero sum game.

where Country A gains the value C if Country B makes the first peace concession and

$$EV_A(Peace) = P_B(War)(-C) + P_B(Peace)(0) \qquad [3]$$

if Country A makes the first peace concession.

With a jointly negotiated peace, the payoffs are zero for each party. In most situations, threats and the escalation to war are more realistic than a jointly and immediately negotiated peace between countries in conflict.

There are two pure strategy Nash Equilibriums to this game in which either Country A or Country B go to war as the other side gives concessions. Both these equilibriums result in losses for one of the parties and are not desirable from the point of peace and social welfare. The payoffs in equilibrium are asymmetric.

Is there no hope for peace? Thee is another outcome to this game if each party gets the same payoff in equilibrium, that is a third Nash Equilibrium in mixed strategies that rewards each country the same payoff. Since one of the fundamental conditions is the criterion that each pure strategy pays the same for each country under imperfect information, and since the only options are war or peace (hence the probabilities sum to each other), we can get this equilibrium by setting [2] and [3] equal to each other and by substituting for the peace term:

$$P_B(War)(-W+C) + (1- P_B(War))(C) = 0 \qquad [4]$$

Solving for probability of war, we get,

$$P_B(War) = C/W \qquad [5a]$$

and therefore

$$P_B(Peace) = 1 - (C/W) \qquad [5b]$$

Both 5a and 5b are important. They show that the ratios of costs of war and costs of backing down (or offering the first concessions for peace) are crucial in determining the probabilities of strategies for two countries which find themselves in these situations. Note that if the costs of concessions are relatively high (C is close to the value of W), there is a greater probability that the parties will choose war. Since cost structures are symmetric between two parties in this version, the probabilities of going to war will be the same for both countries.

When the C/W ratios are equal between parties, the region will actually experience war when both parties decide on war simultaneously, with a joint probability of:

$$P(War) = (C/W)^2 \qquad\qquad\qquad [6]$$

and will have peace with a probability of $(1 - (C/W)^2)$. This *case illustrates the importance of cost proportionality when negotiating for peace*, even when the cost structures are symmetric for each country in question (i.e., neither country has a cost advantage).

If we relax this assumption and accept that countries are of unequal strength, such that the *costs of war* (proportional to their GDP, for instance) are different and smaller for one party, then the 'war-efficient' country may exhibit more aggression than the higher-cost country[4].

This game will result in mixed strategy for the simplified world described above, where each country will choose war C/W percent of the time, and will withdraw from conflict situations $(1 – C/W)$ percent of the time.

NEIGHBORS AND THIRD PARTIES CAN CHANGE OUTCOMES

What about neutral neighbours? This neutrality may be a tautology, in that in cases of political conflict, no bordering neighbour remains unaffected. Flow of refugees, increase in the illegal informal workers (for example, the labor markets in Iran near the Afgan border), spread of social unrest, disruption of trade flows will affect many neighbours whose best interests lie in the resolution of such conflicts. In most cases, UN is called in as a third neutral party to stop and control conflict in contested areas.

Since the cost of war to cost of concessions is crucial to the conflict resolution in the region, other neighbours or UN who are neutral parties to the conflict can assist, either by making war very costly, (for example, by placing economic sanctions on the aggressor country), or by making concession strategies cheaper such as aiding the non-aggressor country.

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[4] Suppose war costs for country A are smaller than the war costs for country B. That is,

$$W_A < W_B; \qquad\qquad\qquad [7]$$

where

$$C \leq W_A,$$

And we assume that costs of concessions are symmetric between the two parties. Again, the two pure Nash Equilibriums show conflict as long as both war costs are more than peace concessions. If we again equate payoffs, the probabilities of each strategy for each country will be dependent on the adversary's cost of war. That is, the war threat of the other country becomes credible or empty, depending on their relative cost structures.

Equation 6 above reinforces the fact that neighbours who have a mutual benefit in keeping peace in the region have large vested interests in reducing the probability of war, and therefore they should strive to make war more costly for the conflicting parties[5].

This analysis can be extended to repeated games and first-mover games, and the basic principles remain the same. For the third mixed strategy equilibrium, cost of concession relative to the cost of war remains an integral part of conflict resolution. In first mover games, signalling with war or concessions can trigger different strategies for the other party whose best-response functions depend on observing the first-mover. In repeated games, costs of war or the size of the concessions may change over time, depending on the memory built into the system. In repeated games, one must also figure the present value of future credibility, since signals will eventually establish reputation. For parties with lower costs of war, high concessions costs will be advantageous in the sense of signalling the others that the probability of war is high. This will lead to the adversaries giving concessions and can resolve the conflict.

ARE ALL NEIGHBORS NEUTRAL? SOME MAY BENEFIT FROM CONFLICT.

When some neighbors actually benefit from the conflicts of Countries A and B and actually promote conflicts, games then become more complex due to more game players (even if they are spoilers), externalities and due to extra hidden cost and benefit functions.

In MENA, there are several countries who border Iraq who actually benefit from the war. Some assume the mantel of perpetual peace keepers in the region and get increased foreign transfers from various sources which helps their GDP growth. Some benefit from the increased trade and services purchased for the war effort. Some keep internal political stability and lackluster growth in the back burner by focusing internal media on Iraq war. Some of these neighbors who border Iraq have a vested interest in having the present political conflicts continue.

In such cases, transfer payments have to stop and neutral third parties have to expose these neighbors (who benefit from the continuation of conflicts) and also have to increase their costs of subversive conflict-promotions.

III. Is Peace Achievable? Actual War Costs

What exactly are the costs of war and how does one make it more costly for a country to go into war? While this is a specific area of research in itself, one can use proxies to figure out the relative costs of war for different countries in the ME area. Threats of trade boycotts are one way of making conflict costs high. Another proxy is to assess the defence stock of a country. Suppose we make a simple assumption that a larger standing

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[5] This is when these neutral third parties and neighbors have no vested interest in the conflict and would like to see peace and stability in the region.

army and a larger defence budget imply smaller costs of going into war (in other words, a credible threat). Table 1 gives an assessment of the size of defence spending in ME, the Mediterranean and the Black Sea (for purposes of comparison, France and the USA are also included in the table).

Table 1; 1990, 2000, and 2003 Military Expenditures of some countries in MENA, Mediterranean and the Black Sea

Country	1990 % GDP	2000 % GPD	2000 Military Expenditure in USD (in billions)	2000 Military Expenditure per capita, USD	2000 Military Expenditure per kilometre sq, USD	2003 % GPD	2003 military expenditure in USD (in billions)	2003 military expenditure per capita USD	2003 military expenditure per kilometre sq, USD
Saudi Arabia	12.8	11.6	20.1	990	10,253	8.7	18.68	829.28	9528.1
Turkey	3.5	4.9	9.79	147	12,549	4.9	11.78	166.55	15099.31
Israel	12.2	8	8.83	1,472	425,229	3.8	4.19	626.28	201663.5
Greece	4.7	4.9	5.52	521	41,818	4.1	7.06	639.93	53486.13
Iran	2.7	3.8	3.98	57	2,418	3.8	5.21	78.51	3165.15
Kuwait	48.5	8.2	3.1	1,631	173,939	9	3.75	1567.89	210578.41
Egypt	3.5	2.3	2.27	33	2,269	2.6	2.14	31.72	2141.46
Algeria	1.5	3.5	1.86	62	783	3.3	2.19	68.97	923.81
Oman	18.3	9.7	1.45	582	6,848	12.2	na	na	na
Morocco	4.1	4.2	1.39	47	1,963	4.2	1.84	60.98	2592.01
Ukraine	na	3.6	1.14	23	1,896	2.9	1.44	29.7	2387.46
Syria	6.9	5.5	0.93	58	5,049	7.1	1.53	87.83	8287.42
Jordan	11.1	9.5	0.78	161	8,838	8.9	0.88	165.36	9983.54
Romania	3.5	2.1	0.77	34	3,246	2.4	1.37	62.86	5766.92
Lebanon	5	3.6	0.59	170	57,115	4.3	0.82	181.63	79089.75
Bulgaria	4.2	3	0.36	46	3,246	2.6	0.52	66.01	4665.22
Tunisia	2	1.7	0.33	35	2,026	1.6	0.4	40.48	2455.76
Bahrain	5.1	4	0.32	533	na	5.1	na	na	na
Cyprus	5	3.2	0.27	309	30,097	1.5	0.17	221.79	19061.43
Yemen	1	1.3	0.11	6	209	7.1	0.77	40.12	1456.92
U.A.E.	na					3.1			
Qatar	na					na			
Libya	na					2			
USA	5.3	3.1	304.95	1076.83	33,269	3.8	417.41	1430.62	45538.11
France	5.5	6	77.65	1311.69	141,952	2.6	45.7	764.66	83539.8

Source: First two columns are from the Human Development Report, 2002, pp. 207-210, UNDP. Third and fourth columns are calculated from same source, pp. 190-192. Sixth column is from Human Development Report 2005, UNDP. Seventh and eighth columns are calculated from the same source.

Based on the numbers in this table, the size of total spending is largest in Saudi Arabia, which is then followed by Turkey, Israel, Iran and Kuwait. In terms of military spending per capita (given in the fourth column), biggest spenders are Kuwait, Israel, S. Arabia,

Greece, Oman and S. Cyprus. The usual caveats apply here on the reliability of reported statistics, however, the table above gives a ranking of credible threats in the area. In terms of spending per kilometre squared, the largest spenders come up to be Israel, Kuwait, Lebanon, Greece and Cyprus.

The values on this table are very imperfect proxies. The total amount of capital spending and the productivity of armies are not equal among nations. Military experts will actually count the numbers of capital defence goods (battle-ready planes, tanks, etc) of an enemy when planning potential engagements because it provides a better proxy of strength and efficiency. Also, some or all of this defence spending may be geared towards internal rather than external security issues. Number of neighbours, number of adversaries, and internal strife vary between countries. Unfortunately, no data were found on the partitioning of these expenditures between internal and external defence.

There are also issues where a guarantee of security can also make wars very costly to other parties. Guarantees of security, as given to Japan and Germany by the USA after the 2nd World War, or guarantees by NATO or EU for member states make the wars very costly for **non-member** states. All these factors act as deterrents for war.

Examining guerrilla warfare against standing armies can be another interesting application of game theory. The costs of guerrilla warfare, though enormous in a micro sense by individuals and their families (emotionally and otherwise) are actually much cheaper than wars engaged by standing armies. That is why we will see many more 'cheap wars' in emerging conflict areas. Simpson (1991) shows that a party (firm) with lower costs will always behaviour aggressively in a repeated Cournot game, while the higher cost party will play a mixed strategy. There are have numerous cases of mixed strategies playing out between guerrilla and conventional armies in the MENA region, as conventional armies often react differently to similar guerrilla attacks.

Wars are costly and one should not forget about the dynamic nature of the costs of war. While we have used proxies to estimate the costs of war, we have not been able to find any data on the actual costs of war for MENA region. For other regions, a 1995 estimate of the Peru/Ecuador border conflict is estimated to have cost 1% of Peruvian and 3 % of Ecuadorian GDP (Ryser, 1995). Milan (2001) cites that in 1993, Eritrea's GDP was growing at a rate of 7 %. With the conflict with Ethiopia, Eritrea's army has since then doubled in size, its inflation rate is now 20% and exports have declined to 1/5 their former value.

War costs also differ over time. Data are available for various wars engaged by the USA. Table 2 presents the per capita costs of war for the USA.

Table 2: Comparable Costs of Wars per Capita for the USA

	United States Per Capita Cost of War in 1990 Dollars
Revolutionary War	$343
War of 1812	$92
Mexican War	$52
Civil War	$1,294
Spanish-American War	$84
World War I	$1,911
World War II	$15,655
Korean War	$1,740
Vietnam War	$1,692
Gulf War I	$27

Source: United States Civil War Center, Louisiana State University

The data are adjusted for constant 1990 dollars and are comparable over time. The enormous costs of World War II, in comparison with other conflicts, are understandable given that the war was fought in many fronts, and capital requirements for the Allied cause were borne mostly by the USA. The large variability of costs per person over time for the USA underlines the importance of treating war costs and concession costs as dynamic problems.

III.   Conclusions

This study is written under the premise and hope that the MENA region resolves the present day political conflicts while preserving the resources and the environment for the future generations. Games of brinkmanship discussed in the paper point out to the fact that to resolve conflicts, neutral neighbors have to decrease costs of concessions and/or increase costs of war to adversaries,

In the case of political conflicts, such neighborly pressure has been missing or haphazard since there is no organization under which collective and mutual action can be taken. Most of the work in this area is done by internal or external non governmental organizations which may not have enough clout to make political change. More important is the presence of neighbors who actually benefit from the conflict in the neighboring states. This implies that political conflicts in the region in the future are still to be expected as predicted equilibriums.

In the case of resource conflicts, there is more hope since the countries in the last decade have realized the serious nature of the problem. One can hope for more mutually agreed upon conventions to help sustain renewable resources.

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