Aegean Territorial Waters Conflict: An Evolutionary Narrative[†]

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Abstract Conflicts over the delimitation of territorial waters are abundant around the globe. Greece and Turkey, two NATO allies, are no exceptions. The delimitation of territorial waters and continental shelf, the status of islands, islets, and flight control zones and corridors in the Aegean Sea constitute constant sources of friction between them. We offer an evolutionary game model to explore for directions their relations can take including chances of new crises and the revision of the status quo. We find that crises constitute a norm in bilateral relations of the two littoral states. The crisis equilibrium indicates routinized practices involving first displaying then falling back. Hence aggressive behavior can be periodically observed but the current status quo will persist. A revised status quo becomes a likely prospect only if both countries were posited as single unitary actors maximizing their expected utilities.

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Introduction

Unresolved conflicts among states over the delimitation of territorial waters are common as oceans and seas cover most of our planet surface. Disputes between Colombia and Venezuela in the Gulf of Venezuela, Indonesia and Vietnam in the South China Sea, Turkey and Greece in the Aegean Sea, Japan and South Korea in the Sea of Japan, Eritrea and Yemen in the Red Sea are few examples (Smith & Thomas, 1998: 79-80).

The delimitation of territorial waters, continental shelf, and flight control zones in the Aegean Sea constitute constant sources of interest conflict between Greece and Turkey. While Greece insists that territorial waters can be extended to twelve nautical miles (hereafter simply referred to as miles), Turkey considers that such a Greek move constitutes *casus belli*. Regular crises and their intensity indicate that a military confrontation between the two NATO allies cannot be excluded.

Periodic crises indicate a pattern in the bilateral relationship that can evolve in different directions. Should we expect new crises? Why did no war occur? What are the conditions for a revised status quo in the Aegean Sea? We construct an evolutionary game to investigate these questions. We look at a particular system, that is, Greek-Turkish relations, as a continuing process (Boulding, 1991: 9). Answers should be illuminating and useful in assessing abrupt developments, détente periods, and crises in Greek-Turkish relations. Descriptive and legal accounts of Greek-Turkish territorial waters dispute are abundant. Ahnish (1993) Bahcheli (1990), Clogg (1983), Constas (1991), Coufoudakis (1985), Couloumbis (1983), Kollias (1996), Larrabee (1992), and Papacosma (1994) constitute few of them. These works do not provide general explanations for recurrent crises between the two countries or predict future conflict paths.

Evolutionary framework used implies that Greece and Turkey are not assumed to be unitary and rational players. Turkish and Greek governments do not make conscious choices mutually affecting them as if they were capable of perfect computation and anticipation of respective moves (Kandori, Mailath & Rob, 1993: 29). Instead, there exist a large number of individuals in the process. Government officials, key foreign-policy decision makers, leaders, diplomats, parliament members make up Greek and Turkish populations. These are individuals with different backgrounds that embed different strategies and worldviews into them. They mainly learn from experience.

The relaxation of rationality assumption does not imply that strategies bringing low benefits are selected. Evolutionary processes select fitter strategies. Even if a strategy is not optimal, its fitness excess is sufficient for its being chosen in the next period (Fudenberg & Levine, 1998: 71). Population members choose those actions bringing more reward and higher returns more frequently. Success is imitated in the game. Such an inheritance of successful strategies result from cultural education, social background, rules of thumb based upon past experiences in a political context unlike genetic codes as in biology. The result is an aggregate behavior, rather than conscious and calculated moves.

Hawks and doves are assumed to form both populations. We define Greek hawks as those individuals pursuing an active policy of extending Greek territorial waters to twelve miles. Greek doves are not as active as Greek hawks while they also favor an extension of Greek territorial waters to twelve miles. Similarly, Turkish hawks are defined as those who support to respond militarily if Greece extends its territorial waters. Turkish doves differ from Turkish hawks only by their acquiescence. They are inactive. Hence, hawks and doves in both populations are equivalent to active and passive behavior patterns (phenotypes)

respectively. Pairs of individuals from respective populations are repeatedly selected to interact.

The fitness of hawks and doves quantitatively measures these types' success. The fitness of a Turkish hawk, for example, is defined as its aggregate or average payoff in its matching with Greek hawks and doves. The fitness of Turkish hawks and doves depends upon the prevailing traits in the Greek population and the fitness of Greek hawks and doves depends upon the prevailing traits in the Turkish population. The members of a population better suited on average against all the phenotypes they might encounter will have a greater evolutionary success. Our questions therefore become: "Where does this selective process of evolution lead to? Will there be an evolutionary-stable outcome so that hawk/dove proportions will settle down in Turkish and Greek populations? If it does, what hawk-dove fractions will such an outcome entail?

We find that hawks and doves do never fully die out in Turkish and Greek populations. They have a spectacular reproductive success. If a weighted likelihood of Turkish victory is sufficiently above Turkish war costs, there will only be recurrent crises followed by détente periods. The selection process does not result in a stable state. No single behavioral trait will predominate both populations. Starting from any hawk/dove mixture, the number of hawks and doves will continuously fluctuate. Therefore, there is no evolutionary-stable strategy implied by the model under this condition. Nevertheless, an evolutionary stable state is not ruled out if the weighted likelihood of Turkish victory in case of war remains below Turkish war costs. Greek population will then entirely consist of hawks but doves will finally make up the entire Turkish population. The conflict will evolve into a peaceful revision of the status quo in the Aegean Sea with both countries adopting twelve miles as the norm ultimately.

No war is expected to occur in both cases. The empirical observation of acute crises almost every ten years however confirms the prediction that, either Turkish or Greek, hawks and doves will not be extinct. Recurrent crises corroborate with one class of evolutionary explanations implied by the model: more crises loom in the horizon each followed by détente periods.

The next section briefly introduces the issue and the position of conflicting parties. Subsequently, the model including evolutionary stability and hypotheses are presented. Empirical assessments and interpretations make up the third section. The final section concludes by summarizing insights and results and indicates possible extensions of the framework.

Issue and Positions

Greece and Turkey are the only littoral states in the Aegean. More than three thousand islands, islets, and rocks cover the sea. Excluding İmroz (Imyros), Bozcaada (Tenedos), and Tavşan (Rabbit) islands, the rest belongs to Greece with some rocks and islets forming contested sovereignty zones. Greece and Turkey currently maintain six-miles of territorial sea. This delimitation produces, approximately, Greek territorial waters of %43.68, Turkish territorial waters of % 7.46, and high seas up to %48.85 in the Aegean. These percentages respectively become %71.53, %8.76, and %19.71 under twelve-miles breadth of territorial waters (Ahnish, 1993: 267-8, Wilson, 1984: 94).

The treaty of Lausanne in 1923 fixed the extension of the littoral states' territorial waters as three miles. Greece unilaterally extended its territorial waters to six miles in 1936. Turkey accepted six-mile limit in 1964, and the current status quo formed. According to the UN Convention on the Law of the Sea (UNCLOS) signed in 1982 and entered into force in

1994, signatory states, including Greece, have the right of establishing their territorial waters up to twelve miles. Greece considers the determination of the breadth of territorial waters as its sovereignty right. It claims it will extend its territorial waters to twelve miles in the future. Turkey did not sign the treaty.

Either claiming twelve-miles territorial waters or continental shelf finally amounts to the same sovereignty demand. The issues of continental shelf and territorial waters are inextricably linked: "While most Aegean quarreling has centered on the continental shelf, the territorial sea issue is the one that is most vital for Turkey. The two issues are not unrelated, since all of the shelf claimed by Greece would accrue to it automatically, were it able to implement a twelve-mile territorial claim" (Bahcheli, 2000: 134). A revised status quo in case of both littoral states' extension of their territorial waters to twelve miles implies the resolution of the continental shelf issue in favor of Greece and the undersea connection of the Greek mainland with thousands of islands scattered around the Aegean. This constitutes a considerable continental shelf gain (Ahnish, 1993: 269-270). While Greece defends the rule of territorial integrity, insisting that the islands and the mainland form an unbreakable whole and cannot be separated from the mainland, Turkey views that the continental shelf delimitation should be drawn by an equidistant line between the Greek and Turkish continental land masses. Turkey also claims that Greek islands clustering against the Turkish coast cannot have their own continental shelves.

Following the ratification of the UNCLOS by the Greek parliament in June 1st, 1994, Turkish parliament authorized the government by a resolution to use all measures to protect the rights of Turkey should the need arises. Turkish position stems from the Article 300 of the UNCLOS according to which: "Parties shall fulfill in good faith the obligations assumed under this Convention and shall exercise the rights, jurisdiction and freedoms recognized in

this Convention in a manner which would not constitute an abuse of right." The Aegean, according to Turkey, is a semi-enclosed sea and requires the application of particular rules. Turkey insists that a Greek extension of its territorial waters to twelve miles will imply that even the maritime transport between Turkish ports would require Greek permission. This is an abuse of right for Turkey. Greece defends exactly the opposite thesis, that is, the Aegean is not a semi-enclosed sea, and claims that the Turkish position of *casus belli* is illegal according to the UN Charter, article 2, paragraph 4, as its territorial integrity is under threat. The continental shelf issue is the only one that Greece considers as negotiable over the Aegean Sea.

Hence, in a nutshell, Greece insists that it can extend its territorial seas to twelve miles anytime, sticks to the territorial integrity thesis, claims that the Aegean is not a semi-enclosed sea, and the Turkish position of *casus belli* is against the UN charter. Turkey maintains that there is no rule applicable in all seas, specific rules should be applied like "the right of geographically disadvantaged states" according to the Article 70 of the UNCLOS, and that no unilateral actions but coordination of actions should be permitted in semi-enclosed seas as the Article 123 of the UNCLOS recommends.

The Model

In the current status quo of six-miles of territorial waters, %43.68 of the Aegean Sea surface is Greek, %7.46 Turkish, %48.85 international waters. Rounding, Greece has an excess of %36 relative to Turkey under six-mile limit. If the twelve-mile limit is adopted, these percentages respectively become: %71.53, %8.76, and %19.71. Greece obtains an excess of %63. Normalizing status quo shares of both countries as (0, 0) and computing other shares with respect to the status quo, Turkish relative loss under twelve-mile limit becomes %27.

This constitutes the Greek gain. Turkey makes a relative gain of only %1 at the expense of Greece if it extends its territorial waters to twelve-miles while Greece remains at six-mile limits.

Hawks and doves are broadly assumed as equivalent to active and passive patterns of behavior. In fact, no Turkish population member accepts the extension of territorial waters to twelve miles. Likewise, no member of Greek population would accept that Greece has no right to extend Greek territorial waters. Hence, positions are rigid. Consequently, they would imply the inexistence of doves in respective populations. Nevertheless, policies and attitudes can differ. Greek hawks follow active policies of territorial waters extension challenging the current status quo. In contrast, Greek doves are assumed as being not as active as their hawkish counterparts. They do not challenge the status quo and maintain six-miles of territorial waters. Similarly, Turkish doves are inactive. Turkish dove policies are assumed to imply a consentience with the Greek position on the breadth of territorial waters. Turkish hawks, however, are active. They do not act as if they would accept an extension without a fight. They respond against challenges.

When a Turkish hawk meets a Greek dove, then status quo is unchanged in the Aegean. Turkish hawks insist on six miles and reject twelve miles of territorial waters by fighting and Greek doves remain at six miles. They all obtain a payoff of 0. In encounters between Turkish doves and Greek hawks, the status quo is revised peacefully in favor of Greece. Turkish doves remain passive given Greek challenges. The payoffs accruing to Greek hawks and Turkish doves are respectively 0.27 and – 0.27.

In dove-dove encounters, the acquiescence of Turkish doves implies an acceptance of twelve miles and the Greek doves do not challenge the status quo remaining at six miles. Turkish doves then obtain a tiny fitness improvement of %1 in territorial waters area while

Greek doves suffer a relative reduction of %1, with both sides suffering no war costs. Their fitnesses become 0.01 and – 0.01, respectively.

In hawk-hawk encounters, Greek hawks challenge the status quo and Turkish hawks respond. These interactions lead to war. Turkish hawks prevail with probability p, $p > 0$, and the status quo shares are restored. They suffer the costs of war denoted by w_T. It is also possible that Turkish hawks lose %27 with $(1 - p)$ probability in addition to war costs. The fitness of Turkish hawks in their encounters of Greek hawks is therefore: $p(- w_T + 0) + (1 - p)(- w_T - 0.27) = - 0.27 - w_T + 27p$. Greek hawks, in turn, obtain a relative gain of %27 with a success probability of $(1 - p)$ under war costs denoted by w_G and gain nothing but only suffer war costs with probability p. The fitness of Greek hawks pitted against Turkish hawks is therefore: $p(- w_G + 0) + (1 - p)(- w_G + 0.27)$. Assuming that $w_T > 0$, $w_G > 0$, $w_T + w_G = 1$, the fitness of Greek hawks pitted against Turkish hawks becomes $- 0.73 + w_T - 0.27p$. These assumptions imply the following game:

(Figure 1 around here)

The game matrix tabulates payoffs accruing to each interaction, that is, Greek hawk versus Turkish hawk, Greek dove versus Turkish dove, Greek dove versus Turkish hawk, and Greek hawk versus Turkish dove. The costs of war for Turkey and the likelihood of Turkish victory (these also imply Greek war costs and likelihood of victory) are elements of aggregate payoffs. They determine, together with territorial gains, fitnesses of hawks and doves. They are not elements of a process of conscious calculations of optimization. A Greek hawk can be successful against a Turkish dove but not against a Turkish hawk, but this does not imply that, in aggregate, its fitness is necessarily lower than the one of a Greek dove. Greek hawks can still expand in the population.

Evolutionary Stability

We let X be the proportion of Turkish hawks and Y the proportion of Greek hawks in the respective populations. A Greek hawk encounters a Turkish hawk X proportion of the time and obtains $-0.73 + w_T - 0.27p$ and meets a Turkish dove $(1 - X)$ proportion of the time and obtains 0.27. The fitness of a Greek hawk is therefore $X(-0.73 + w_T - 0.27p) + (1 - X)(0.27)$. A Greek dove encounters a Turkish dove $(1 - X)$ proportion of the time and obtains -0.01. It obtains 0 in encounters with Turkish hawks X proportion of the time. The fitness of a Greek dove is $(1 - X)(-0.01)$.

Similarly, A Turkish hawk encounters a Greek hawk Y proportion of the time and gets $(-0.27 - w_T + 0.27p)$, and meets a Greek dove $(1 - Y)$ proportion of the time and obtains 0. The fitness of a Turkish hawk is therefore $Y(-0.27 - w_T + 0.27p)$. A Turkish dove encounters a Greek dove $(1 - Y)$ proportion of the time obtaining 0.01, and -0.27 in encounters with Greek hawks Y proportion of the time. The fitness of a Turkish dove is $Y(-0.27) + (1 - Y)(0.01)$.

Depending upon parameters of Turkish likelihood of prevailing in war, p, and, Turkish costs of war, w_T, two cases below exhaust all evolutionary trajectories.

First case: $0.27p > w_T$

In the Greek population the hawk fitness is greater when $X(-0.73 + w_T - 0.27p) + (1 - X)(0.27) > (1 - X)(-0.01)$. This implies that $X < 0.28/(1.01 - w_T + 0.27p)$. Hence, if the Turkish hawk population satisfies this condition, the Greek hawk population Y will expand. Otherwise, if $X > 0.28/(1.01 - w_T + 0.27p)$, then Greek doves will multiply.

In the Turkish population the hawk fitness is greater when $Y(-0.27 - w_T + 0.27p) > Y(-0.27) + (1 - Y)(0.01)$. This implies that $Y > 0.01/(0.01 - w_T + 0.27p)$. If the Greek

hawk population satisfies this condition, Turkish hawks expand. Otherwise, if $Y < 0.01/(0.01 - w_T + 0.27p)$, Turkish doves will multiply.

Let α and β respectively denote $0.01/(0.01 - w_T + 0.27p)$ and $0.28/(1.01 - w_T + 0.27p)$. Both thresholds are positive and smaller than one. They indicate population mixtures. Their intersection indicates specific hawk and dove proportions in respective populations constituting an (polymorphic) equilibrium. In addition, α is greater than β. As α is greater than β, Greek hawks expand when Turkish hawks constitute quite a lesser proportion of the Turkish population. A relatively large proportion of Greek hawks in turn trigger the expansion of Turkish hawks.

We have the following phase matrix:

(Figure 2 around here)

Second case $0.27p \leq w_T$

The hawk fitness condition in the Greek population again implies that $X < 0.28/(1.01 - w_T + 0.27p)$. There is no change in the inequality sign as $1.01 - w_T + 0.27p > 0$ under the assumption on Turkish costs of war and the likelihood of Turkish victory. Hence, as in the first case, Greek hawks multiply if Turkish-hawk population fraction satisfies the above inequality. Otherwise, Greek doves will proliferate.

In the Turkish population, the hawk fitness is greater when $Y(-0.27 - w_T + 0.27p) > Y(-0.27) + (1 - Y)(0.01)$. If $w_T = 0.27p$, then Y must strictly exceed 1 for the proliferation of Turkish hawks. However, this condition cannot hold. Therefore, Turkish-dove population expands. Similarly, if $w_T > 0.27p$, then Y must be smaller than a negative value. This is also impossible. Therefore, Turkish doves will always proliferate, and Turkish hawks will ultimately die out.

There is no α but only the threshold of β in the second case. The phase matrix becomes:

(Figure 3 around here)

Thus, no evolutionary stability is reached in the first case. Endless cycles occur in hawk-dove proportions in respective populations. In the second case, there is an evolutionary stable outcome: hawks will finally dominate the Greek population and Greek doves will be extinct. An opposite evolution occurs in Turkey. This is the peaceful revision of the status quo in the Aegean in favor of Greece.

Evolutionary Hypotheses

Conflict attains its highest tension and war becomes a genuine possibility during crises (Fearon 1994; Nalebuff, 1986; Snyder & Diesing, 1977). How can we interpret crises in an evolutionary context? An answer lies in high hawk fractions in both populations. If hawk-hawk interactions progressively become more frequent, then those individuals in the Greek population favoring extension to twelve miles and those considering such an act as a cause of war in the Turkish population become dominant. Such an evolution is accompanied with a high risk of war. This movement can be assessed in the upper-left cell of the first phase diagram where hawks are on the rise in both populations.

Take a point in the lower-right cell in the first phase diagram. The point starts an evolution characterized by the growth of doves in both populations. Hence, passive behavior progressively gets the upper hand in Greek and Turkish populations given such an initial condition. The movement changes direction once the number of Turkish hawks drops below a certain level (threshold β). Greek hawks obtain a greater fitness and they propagate in the

Greek population with fewer Turkish hawks to interact with. Challenging the status quo becomes fruitful. This development has its repercussions in the Turkish population as well. Turkish doves interact with a greater number of Greek hawks and obtain lesser fitness than Turkish hawks. To be acquiescent given Greek challenges does not pay off. However, there is still no abrupt change; Turkish doves still proliferate. Turkish hawk population start to increase along with the growth of hawks in the Greek population once the threshold α is crossed. Turkish hawks are then imitated, as they are more successful. This development brings the possibility of an armed conflict with itself, therefore a crisis.

The evolution does not stop given that hawks get the upper hand in Greek and Turkish populations. Once the hawk fraction in Turkish population exceeds the threshold β, Greek hawks obtain lesser fitness. Greek doves then propagate. The trajectory leads to the quadrant where the initial point situated. The cycle restarts. Hence, Greek or Turkish, hawks and doves cannot calculate how their individual attitudes and actions will affect the course of the rivalry over the Aegean Sea. Simply put, crises are not consciously produced.

The dynamic process bridging upper-left and upper-right cells in the first case evokes brinkmanship crises where one party folds back once conflict reaches a high-tension level and the prospect of war becomes imminent (Dixit & Nalebuff, 1993; Powell, 1990; Schelling, 1960). In this context, Greek and Turkish hawk interactions become more frequent, followed by more interactions between Greek doves and Turkish hawks. Evolutionary interpretation revises the concept of brinkmanship crisis in two respects. First, brinkmanship is a conscious strategy including calculation of risks of a costly outcome and deliberate moves to push an adversary to the brink of war. Fearon (1994: 577) defines crises as "political attrition contests where a state can choose to attack, to back down, or escalate further." Evolutionary games lack such calculations, deliberate thinking, and purposes. Hence, brinkmanship can be

obtained in interactions among individuals who do not calculate every move, who are boundedly rational, who move by the help of routines, rules of thumb, who simply imitate the successful ones in the population. Second, the game points out where exactly the brink lies (the β threshold) unlike classical brinkmanship: "…just where was the brink in the Cuban missile crisis? …The answer, of course, is that there was no such precise point, only a gradually increasing risk of uncontrollable future escalation." (Dixit & Nalebuff, 1993: 207). The difference is that the evolutionary game exposes a brink in terms of population traits.

It follows that the first case implies the following hypothesis to assess empirically:

Hypothesis 1: If Turkish costs are sufficiently below as compared to a weighted Turkish likelihood of prevailing in a war, then hawks and doves on both sides do not get extinct, and, recurrent crises are bound to occur over the Aegean sea conflict.

The first case also implies that no hawk and dove proportions in Greek and Turkish populations will be equally fit when pitted against each other. It is impossible for a fixed number of hawks and doves to coexist in interactions between the two populations. This leads to the second hypothesis:

Hypothesis 2: It is impossible to observe that the size of hawks and doves in Greek and Turkish populations remain constant.

The game implies that a peaceful revision of the status quo is plausible. Turkish war costs must exceed a weighted Turkish probability of victory for such an outcome to become evolutionarily stable. Turkish doves will steadily increase as they obtain a greater fitness than

Turkish hawks in their interactions with any member of the Greek population. They will therefore be imitated by various mechanisms. This process will continue until no Turkish hawk remains. When there are sufficiently many Turkish hawks in the Turkish population (right to the β threshold), the number of Greek hawks first shrinks. However as Turkish doves proliferate, Greek individuals encounter more Turkish doves and Greek hawks start to obtain a greater fitness. Greek hawks get an upper hand in the Greek population. Hence, relatively high Turkish war costs do not necessarily prevent an increment in the number of Greek doves given that there are enough Turkish hawks.

An alternative evolutionary path also exists. Take a point in the left portion of the square in the second phase diagram. If Turkish hawks already form a proportion smaller than β, there would be no increment in Greek doves. The evolutionary dynamics imply the evolutionary stable outcome of the extinction of Turkish hawks and Greek doves. The hypothesis below summarizes these implications:

Hypothesis 3: If Turkish costs are sufficiently above as compared to a weighted Turkish likelihood of prevailing in a war, then Turkish hawks and Greek doves get extinct. Turkish population will consist entirely of doves and the Greek population will entirely consist of hawks.

Empirical Assessment and Illustrations

The balance of military capabilities is an important indicator of probability of prevailing in a conflict and war costs. Huth & Russett (1993: 65) take the balance of active manpower as an indicator of the balance. According to Smith, Sola & Spagnolo (2000: 741) the balance of military capability indicates the probability of prevailing in a conflict. Huth, Bennett & Gelpi

(1993: 613) maintain that the country enjoying superiority in balance of conventional capabilities has a higher probability of victory and also would suffer lesser war costs.

Turkey possesses the second largest army in NATO surpassed only by the United States. Turkey's population and size of total armed forces constantly surpass those of Greece by a wide margin.[1] As the balance of forces favors Turkey, it can be assumed that Turkish probability of prevailing in a conflict is high and Turkish war costs are low. The table below shows, for a limited number of values, the relationship between the probability of Turkish prevailing, Turkish war costs, and thresholds of population mixtures in first case.

(Table 2 around here)

Data sets on international crises and territorial conflicts do not indicate the sizes of hawk and dove fractions in conflictive populations (Wilkenfeld & Brecher, 1997; Huth, 1998). Instead, the table below presents Greek and Turkish governments since 1972. The interacting parties can be pinpointed. Both countries lived acute crises and seriously considered the option of war in 1976, 1987, and 1996.

(Table 3 around here)

Second case serves as a counterfactual for the first case (Fearon, 1994). If the condition on Turkish war costs and likelihood of prevailing a conflict is not satisfied, then Turkish population would progressively become acquiescent while Greek population will finally consist of hawks only. This is the only evolutionarily stable outcome the model implies. A rational analysis of the game points out that in second case, Turkey, viewed as a single player, has a dominant strategy: accept twelve miles. Once Turkish option of insisting on six miles is eliminated, to extend becomes a dominant strategy for Greece. The equilibrium is then found by the iterated elimination of dominated strategies. With both states

accepting twelve miles, a new status quo is reached. Hence, the assumption of rationality implies a fundamentally different world than the observed one infested by regular crises.

In fact, Greece granted oil exploration licences in 1970; oil was discovered constituting about %10 of Greek oil requirements in 1972 (Papacosma, 1996: 81). Greece claimed it was granting these licences for oil exploration on its own continental shelf. The claim indicates that the proportion of hawks in the Greek population was on the rise and perhaps exceeded threshold α. Hawks must for the most part be of military origin, as a military dictatorship governed Greece between 1967-1974. The colonels forming the Greek junta were extreme right-wingers and obviously preferred though policies against Turkey (Veremis, 1984: 18). Turkish hawks later evolved in a similar direction as well: "..having failed to challenge the Greeks in the Aegean for more than a decade (until 1973), the Turks wanted to avoid the appearance of acquiescence" (Bahcheli, 1990: 134). Wilson (1984: 112) also remarks that there was "no Turkish reaction" to Greek claims for three years. Thus, Greek hawks mainly encountered Turkish doves for a brief period given that there was no equivalent Turkish reaction, and, as a result, they continued to expand in the Greek population at the expense of Greek doves. As to Turkish doves, they proliferated as long as Greek hawks remained below α. The size of Turkish hawks then started to grow given a lesser number of Greek doves in the Greek population. Hence, the size of those consentient Turkish members reduced interacting mostly with Greek challengers. Turkish government under the premiership of Talu permitted Turkish national oil company for drills in high seas in November 1973. This event indicates the rise of hawks in the Turkish population.

These dynamics can be assessed in the first phase diagram: as the proportion of Turkish hawks remains below threshold β, Greek hawk-Turkish dove interactions get more frequent. Turkish doves and Greek hawks continue to expand until threshold α. When the

proportion of Greek hawks exceed α, Turkish hawks start to get imitated as they obtain higher fitness. Turkish doves, those Turkish individuals giving "the appearance of acquiescence," are less successful than Turkish hawks in encounters with Greek hawks. Therefore, Greek and Turkish hawks were growing as of 1973.

Evolutionary dynamics did not stall. Brigadier Ioannidis overthrew Papadopoulos in November 1973, the chief engineer of the 1967 military coup. He was one of those extreme hardliners of the Greek junta (Clogg, 1992: 167). Greek-Turkish relations reached a level of high conflict after Ioannidis and his supporters came to power. The proportions of hawks in respective populations continued to increase later in May 1974. A government by Ecevit, a moderate left, populist leader, known for his nationalistic stance, replaced the government of Talu in January 1974. Key Turkish bureaucrats were more favorable for a firmer and a more active position against Greek actions in the Aegean. The state of the evolution in Greek-Turkish relations was closing the threshold (threshold β) after which Greek hawks start to lose hand in Greek population as they encounter mainly with Turkish hawks instead of Turkish doves. Indeed, in May 1974, a Turkish ship escorted by warships conducted seismic search in disputed areas. Turkey argued that these areas are on the extension of the Anatolian peninsula and form Turkish continental shelf. Greece protested. Greek and Turkish troops were put on the alert. The crisis remained insignificant next to the developments in Cyprus and the Turkish military intervention in the island in July 1974 (Bahcheli, 1990: 131). Greece militarized eastern Aegean islands and Turkey established the fourth army (also known as the army of the Aegean) in 1975.

Karamanlis, a moderate-right leader, formed the government in July 1974 after the military junta was ousted in Greece. Greek search for oil in disputed areas and claims continued under the leadership of Karamanlis as well. Hence, country's passage from

military rule to democracy did not influence the rise of hawks. By that time, Demirel, also a moderate-right leader, was the Turkish premier. Ecevit, now in the opposition, criticized Demirel government's previous acceptance to bring the continental shelf issue to the International Court of Justice. Wilson (1984: 108) notes: "…Mr Ecevit's record in opposition, where he had frequently spurred Turkish governments, such as Demirel's in 1976, to take a harder line then they had intended." Demirel government deviated from the idea of adjudication of the conflict following heavy criticism. An acute crisis resulted in August 1976 after Sismik I, a Turkish exploration ship, started to conduct seismic research. PASOK leader Papandreou asked the Greek government to sink the Turkish ship, and a hot conflict again seemed imminent. Given Greek reaction and claims, Turkish government declared any move by Greece to extend its territorial waters constitutes a *casus belli*. The proportions of hawks on both sides reached their peak in August 1976 with a greater number of Greek challengers of the status quo on the one hand and those active Turkish individuals with a belligerent attitude on the other.

The positions of Papandreou and Ecevit demonstrate the power of hawkish elites in respective populations. Bahcheli (1990: 134) maintains that "domestic pressures were instrumental" in the outbreak of the 1976 crisis. Why those pressures were getting stronger in Greece and Turkey? In Greece, these pressures should indeed get stronger as Greek policy makers found out that a hawkish stand is more beneficial in opposing and challenging Turkey in the Aegean. It made no difference whether a democratic government or the military ruled Greece. Similarly, Demirel and other members of the Turkish population had to adopt an active policy providing a greater fitness than being acquiescent and not countering Greeks. The sending of Sismik 1 is the indication that Turkish hawk population continued to grow

including the opposition. In other words, the change in the Turkish attitude does not necessarily depend upon different personalities of leaders.

Karamanlis government did not order the sinking of Sismik 1 but used peaceful means. It submitted the case to the UN and the International Court of Justice. The UN Security Council issued a resolution and the International Court of Justice denied Greek request of interim protection later the same year. Sinking the ship would almost certainly lead to war and indicate that hawks were still proliferating in the Greek population. Yet, it was not the case. The tension later eased and both sides agreed in Bern in November 1976 to inform each other on exploration activities and to respect the status quo. This development is in conformity with model predictions. The state of Greek-Turkish relations entered first the upper and then the lower-right cells after the fraction of Turkish hawks crossed the threshold β. Karamanlis's recourse to international organizations rather than military force simply indicated that there were more Turkish hawks to interact with, and, to be a dove rather than a hawk started to be rewarding in Greek population.

PASOK won 1981 elections in Greece and the PASOK leader Papandreou formed the government. Bern agreement did not survive this development: "Bilateral relations resumed in earnest after Berne, and although no settlement emerged, neither side questioned their usefulness until Andreas Papandreou's PASOK government came to power in Greece in 1981" (Bahcheli, 1990: 137). PASOK had indeed a hardline stand regarding the Aegean issue (Wilson, 1984: 115). While no crisis occurred right away, there was a change in Greek policy of complying with the Bern agreement. PASOK government qualified Turkey as the sole threat to Greece (Papacosma, 1996: 91). Greek position progressively hardened.

An explanation of the inflection of Greek foreign policy towards Turkey by the presence of a PASOK government is not an evolutionary argument. Instead, the game implies

that any victorious party in Greek elections would form a government progressively becoming more hostile in the Aegean issue. Any new population in Greece would become more hawkish as being dovish was less rewarding vis-à-vis a Turkish population where hawks gradually reduced following Bern agreement. The second crisis did not occur right away in 1981 or 1982 either. It broke out six years after PASOK's electoral victory. This implies that Greek hawks simply continued to expand interacting mostly with Turkish doves.

The crisis in 1987 occurred almost in the same fashion as the previous crisis in 1976. Greece restarted to grant licences for seismic research aimed at oil exploration and regarded the Bern agreement as inoperative. Turkey reacted by sending an exploration ship in high seas. A former Turkish ambassador to Athens recalls this policy shift: "At the end of February 1987 a consortium of companies called the Northern Aegean Petroleum Company announced that it would start drilling for oil on the continental shelf 10 miles off the island of Thasos… the Turkish government still expected Greece to abide by the rules of Bern agreement… Mr. Kapsis retorted that the Greek government considered Bern Agreement as 'inoperative', therefore it would decide to drill when and wherever it likes in the Aegean" (Akıman, 2000: 4-5).[2] The two countries' forces were mobilized and war seemed as imminent during late March.

Akıman (2000: 3) also hints at the presence of hawks and their positions in both populations: "…the rather swift reaction of the Turkish naval authorities at a time when both the Prime Minister and the Foreign Minister were absent made me suspect that *some hardliners in Ankara* might have other plans,… Mr. Papandreou then explained 'Look Mr. Akıman' he said, 'you have been a government official for years and you know how it is. Some of the *associates around me are over-patriotic*. I cannot control them as I wished to.'" These accounts provide evidence for mainly hawk-hawk interactions during the crisis.

The tension eased within days and the Prime Ministers Papandreou and Özal met in Davos and reached an understanding. Pridham (1991: 82) claims that "Papandreou's sudden transformation into a peacemaker, in contrast to his previous line towards Turkey, contained a good degree of political opportunism." Such an explanation relying on domestic politics is radically different from symmetrical positions the rules of the game imply for Karamanlis and Papandreou in the aftermath of crises. Similar to Karamanlis, Papandreou became a "peacemaker" not because of his domestic-political concerns but because Turkish population contained far more hawks during the crisis than the initial years of PASOK rule in Greece. It was again rewarding to be a dove than to be a hawk. In addition, Papandreou mistrusted "conservative diplomatic corps as well as tensions and rivalries within his own party…Yannis Kapsis who was in charge of Greek-Turkish relations was not invited to attend Davos meetings" (Coufoudakis, 1993: 173).

In fact, PASOK rule in Greece does not automatically imply a continuous hawkish Greek policy towards Turkey. The first serious crisis over the Aegean erupted when PASOK was not in government. The period of colonels, in fact, extreme-right wingers in Athens, did not witness a crisis of that sort either. As to Turkey, similar considerations hold. Greece, following the Cyprus war in 1974, decided to leave NATO's military operations. The Turkish military junta let Greece back into the military wing of NATO in 1980 lifting Turkish veto against such a return. Therefore, being right-wing or military does not suffice to be a hawk. The military do not constitute a group distinct from civilians: they are equally concerned with national objectives (Veremis, 1984: 28). It does not matter whether civilian or the military populations make foreign policy; what matters is the specific hawk/dove mixture of interacting populations.

Ironically, commenting on the 1987 tensions, the Turkish Prime Minister Özal wished that "such a crisis should never be repeated" (Pridham, 1991: 80). The two countries yet reached another crisis in 1996, this time over Imia/Kardak rocks. These are inhabited islets 3.8 miles off the Turkish coast and 5.3 miles from the Greek island Kalymnos. After a Turkish bulk carrier ship ran aground on one of these rocks and the captain of the ship refused Greek help, the tension rose in few days. Both countries claimed the islets. Greek civilians hoisted Greek flag on one of the rocks, Turks reacted likewise. The conflict reached a military escalation level later on. Greece sent troops and Turkey reciprocated. There was a pervasive expectation of a Greek-Turkish war with the rise of hawks in both populations. The crisis again phased out similar to previous ones.

Following the crisis, Greek Prime Minister Simitis (PASOK) and the Turkish President Demirel, issued the Madrid Communiqué in 1997 at the NATO summit stressing the importance of cooperation and peaceful bilateral relations. Nowadays there is a PASOK government under the leadership of Simitis in Greece and a coalition of extreme-right, moderate-right and moderate-left parties rules Turkey. Two countries still live a détente period containing genuine rapprochement attempts. These facts only convey an image of a déjà vu. We should now expect a rise of hawks in Greece followed up by a similar evolution in Turkish population.

Summing up, Greek and Turkish populations are not fixed. Military and civil bureaucrats, key decision makers, top-ranking officials come and go. Newcomers comparing those exiting members of the population imitate them if those individuals leaving the system fared well in the past. This is called inheritance (Fudenberg & Levine, 1998: 88; Selten, 1991: 9-11). Kazamias (1997: 80) remarks: "Especially over its aspects which deal with the Cyprus issue and relations with Turkey, the concessions made to the nationalists have gone so

far as to steer Simitis into an even more hard-line policy of containment against Turkey than Papandreou's for fear of being criticized as a 'defeatist.'" Kazamias (1997: 72-73) continues: "…Simitis's new foreign policy seen in the light of the highly nationalistic and isolationist political legacy which he inherited from its predecessors in the premiership, Andreas Papandreou and Konstantin Mitsotakis…On regular occasions, Simitis and his foreign minister Thodoros Pangalos have indicated that, far from breaking with the nationalist practices of their party's founder, Papandreou, their 'New PASOK' is seeking to maintain continuity with his legacy and that is why they frequently refer to the traditional so-called 'patriotic' approach of old PASOK to foreign policy." The problem is that the inherited action itself can be inherited from rounds of past generations and can be qualified as it "fared well," simply because it led to a fitness above average. Such an aggregate behavior does not change too abruptly, and inherited actions do not guarantee success in encounters with both Turkish doves and hawks. Therefore, those exiting individuals' high fitness does not guarantee an overall adequacy of past policies. Active and passive patterns of behavior will continue to fluctuate in both populations.

Summary and Conclusions

Turkish military supremacy over Greece can help to explain the current status quo punctured by crises in the Aegean (Blainey, 1988). Alternatively, one would explain the status quo as it represents benefits to Turkey and Greece concordant with the distribution of power across them (Powell, 1999: 85). If Greece and Turkey were portrayed as single unitary actors trying to maximize their expected utility, the game would imply a new status quo. The evolutionary arguments produce alternative explanations of no occurrence of war but periodic crises over the Aegean than those relying on domestic politics or on the assumptions of realism and

rationality. The evolutionary model does not need rationality assumptions and offers possibilities of dynamic interpretations. It explains the status quo and the string of crises instead of taking each crisis as a separate and independent event. The first and the second hypotheses find support. The model does not imply an equilibrium indicating a constant mixture of hawks and doves in respective populations.

Bahcheli (2000: 147) maintains that strong governments and leaders can realize bold choices such as Davos or Bern. We argue instead that détente periods are not due to individual choices of charismatic leaders but follow crises. Smith, Sola & Spagnolo (2000: 749) find that there is quite a weak support for an action-reaction type of arms race between the two countries but rather for internal explanations like "political or bureaucratic inertia." The model demonstrates how internal structures (Greek and Turkish populations) relate to external relations (Greek-Turkish relations as a system). It offers an alternative explanation for crises than the diversion hypothesis according to which crises serve to divert public attention from serious domestic problems. Moreover, the same simple game clarifies conditions under which crises may arise and their eventual outcomes (Huth & Russett, 1993).

A extension of the model (while mathematically difficult) would include not only one evolutionary game played between two distinct populations but also two evolutionary games that could be qualified as "domestic" evolutionary games each played within the same population. For example, one game would search out for the conditions of the rise of hawks and doves in Greece, another one in Turkey. Subsequently, interactions between rising behavioral traits and attitudes in two distinct populations can be studied in an "international" evolutionary game. This would be generalized as a two-stage evolutionary game model. The model can however be easily reformulated using Malthusian and linear dynamics (Friedman, 1991). Nevertheless, such a reformulation requires intricate learning assumptions such as

nonlinear growth rates or linear rates of changes in hawk and dove proportions in populations. These are assumptions more difficult to justify than the dynamics based upon aggregate payoffs. The dynamics assumption of the present model, in other words, is simpler than Malthusian and linear variants.

The approach taken can be called as an analytic narrative as it combines analytic tools with the narrative form paying close attention to accounts and contexts (Bates et al., 1998: 10). The evolutionary framework implies a narrative of crises as constituting a string instead of fragmented events (Büthe, 2002: 486-7). We are not interested in the decision of a particular leader or a government, rather in the distribution of behavior in Greek and Turkish populations. The current peace over the Aegean Sea is a point in the lower-right cell of the first phase diagram in terms of our evolutionary narrative. This is a static description of a system at a particular time (Selten, 1991: 7) and implies that we should now be ready for a new crisis over the Aegean.

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Figure 1: The Game

		Greece	
		Hawk	*Dove*
Turkey	*Hawk*	$-0.27 - w_T + 0.27p, -0.73 + w_T - 0.27p$	0, 0
	Dove	$-0.27, 0.27$	$0.01, -0.01$

Figure 2: First phase diagram

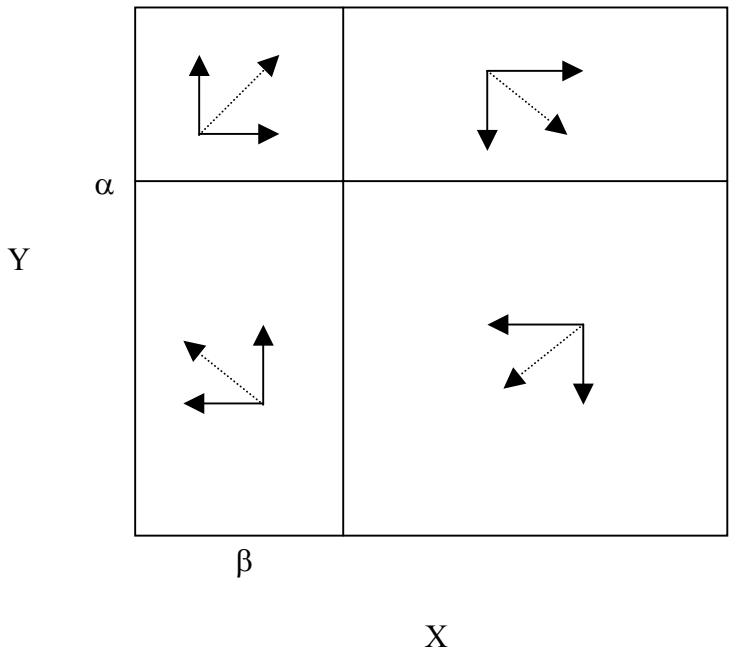

Figure 3: Second phase diagram

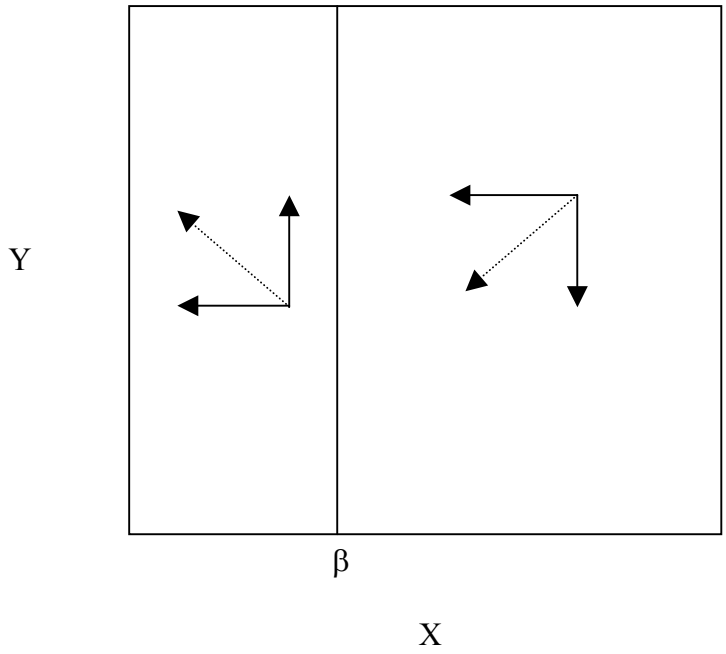

Table 1: Population thresholds under the condition $0.27p > w_T$

p	w_T	α	β
1.0	0.26	0.5	0.274
0.9	0.23	0.435	0.274
0.8	0.2	0.385	0.273
0.7	0.17	0.345	0.272
0.6	0.14	0.313	0.271

Table 2: Greek and Turkish Governments, 1972-2002 (Legend: M: Markezinis, T: Tzannetakis, G: Grivas, P: Papandreou; E: Ecevit, D: Demirel, Y: Yılmaz, İ: İnönü, Ç: Çiller.)

	1972			1973		1974		1975	
Greece	Papadopoulos				M	Androutsopoulos		Karamanlis	
Turkey	Erim	Melen		Talu		Ecevit		Irmak	Demirel

	1976 *Crisis 1*	1977		1978		1979
Greece	Karamanlis					
Turkey	Demirel	E	D	Ecevit		D

	1980		1981		1982	1983	
Greece	Karamanlis	Rallis			Papandreou		
Turkey	Demirel	Ulusu					Ö
	1984		1985		1986	1987 *Crisis 2*	
Greece	Papandreou						
Turkey	Özal						

	1988			1989		1990		1991	
Greece	Papandreou				T	G	Zolotas	Mitsotakis	
Turkey	Özal					Akbulut		Y	D

	1992		1993		1994	1995
Greece	Mitsotakis				Papandreou	
Turkey	Demirel			İ	Çiller	

	1996 *Crisis 3*			1997		1998	1999
Greece	P	Simitis					
Turkey	Ç	Y	Erbakan		Yılmaz		Ecevit

	2000	2001	2002
Greece	Simitis		
Turkey	Ecevit		

[1] For example Greece and Turkey has population figures of 10.692.00 and 66.130.000 for 2000-2001, respectively. These figures are 8.750.000 and 34.000.000 for 1969-1970. In 1969-1970 the sizes of Greek and Turkish armed forces (active on duty) were respectively 159.000 and 483.000. In 2000-2001 they became 159.170 and 609.700 (The source: *The Military Balance*, Institute of for Strategic Studies, London).
[2] Emphasis added.