

"ΣΠΟΥΔΑΙ", Τόμος 41, Τεύχος 1ο, Πανεπιστήμιο Πειραιώς  
"SPOUDAI", Vol. 41, No 1, University of Piraeus

## CREECE AND TURKEY: THE CASE STUDY OF AN ARMS RACE FROM THE GREEK PERSPECTIVE

By  
*Christos G. Kollias*  
Thames Polytechnic, London

### Abstract

This study suggests that as the dominant East - West conflict subsides, local disputes and frictions centered around past and/or new national and ethnic quarrels will slowly come to dominate the international scene. One such dispute is that between Greece and Turkey.

Using multiple regression analysis it tests whether the Richardson arms race model can help in explaining changes in Greek military expenditure in the context of her relation with her neighbour Turkey and the ongoing frictions between them. On the basis of the results obtained it is argued that because of its specifications the model can not capture the degree to which Greek military spending is influenced by the perceived threat to her national interests by Turkey. The model does not allow for the strategic environment and its dynamic changes which can influence the decisions of a given country and the principles on which such decisions are reached by military planners. Furthermore, the model does not adequately capture the degree of the perceived menace/threat to which countries are likely to react by adjusting accordingly not only the level but also the content of their defence spending. It is then shown that when appropriate variables are introduced it is possible to capture more fully the degree and way in which Greek military expenditure is influenced by the perceived Turkish threat to her national

interests. Such variables have to allow for the strategic environment within which decisions are made by Greek military planners. In this case it was found that due to the substantial differences in size and the resulting quantitative military disadvantage, Greece attempts to offset this by gaining a qualitative advantage over her larger adversary.

## **1. Introduction**

The momentous changes still underway in Eastern Europe have given rise to intensive discussions concerning the future security arrangements in Europe which are going to shape the political, economic and military map of the continent well into the next century. All sides express the desire for these far-reaching changes currently unfolding to take place in a controlled manner in order to secure, to the extent that this is possible, the peaceful transition to a new era in the European Continent. Planners and strategists are busy discussing and drawing the details of the various scenarios concerning the future security arrangements that are going to replace the old security structure of Europe that has been in existence since the end of the Second World War. The questions that are currently being addressed by Western analysts include: What type of security problems are going to be dominant in the last decade of this century and well into the first half of the next? What will be the source of any future threat's? What security and military arrangements are going to be needed to deal with any such threat? What conflicts are going to dominate coming years? What type of armed forces are needed to protect Western interests? But most important, how can these interests be defined? What do they constitute? Is there going to be a more or less uniformed view among the allies concerning the definition and protection of such interests? Clearly it is early to provide any concrete answers to many of the above questions. However, there are already indications as to what type of conflicts may emerge in coming years.

## **2. Old adversaries new conflicts**

Judging from recent events and developments, it would appear that as the dominant all enveloping East-West conflict subsides, local disputes and animosities are re-emerging into the limelight out of the deep-freeze that the Cold-War had placed them. It seems likely that the future conflicts will be centered around past unsettled and/or new national and ethnic quarrels and disputes on a local level. Thus, it has been suggested that the security structure

that will replace the present one in Europe will have to deal mostly with such conflicts in or around the European periphery<sup>1</sup>. Looking at the European periphery and excluding possible troubles in the southern republics of the Soviet Union then the only area where there is the potential for flare-ups is the Balkans and the immediate area. This is one area where the new international climate of detente and peaceful solutions to problems has yet to make substantial headway. The Balkans were never the quieter of places and in the past were seen as a cauldron which could spill over and devastate Europe. The area has traditionally been an international crossroads. The shots fired at Sarajevo in 1914 set off World War I. It was also in the Balkans that fighting first broke out in Europe in 1939. With the post-war division of Europe old anxieties about the Balkans were gradually forgotten. However, with the relaxing of tensions in central Europe old animosities have re-surfaced. The ingredients for troubles are already there. They include the continued problems within the various republics and nationalities in Yugoslavia; the problems between Bulgaria and Turkey over the muslim minority living in the former's southern region; and the problems between the two traditional adversaries in the area Greece and Turkey over a wide range of issues. These include the continued occupation of the northern part of Cyprus by Turkey since 1974, disagreements over the continental shelf of the Aegean as well as control of the airspace over it, and in recent months problems concerning the muslim minority in northern Greece.

Both countries are high military spenders as indicated by the share of their respective gross domestic products allocated to defence (Table 1). Furthermore, data shows that their respective military spending follow a very similar upward paths (Figures 1 and 2). Figure 2 in particular, being in five year averages, allows for the long term trend to be identified. It shows an almost identical long term path of the defence expenditures of both countries and this may be taken as a first indication of an arms race. Indeed, fluctuations in their spending can be attributed to changes in their relations. Thus the sudden pick of military expenditure after 1974 can be directly attributed to the invasion of Cyprus by Turkey.

The purpose of this study is to try to examine whether the existence of an arms race between the countries can be established empirically. Thus we will try to find to what extent and in what way Greek military spending is influenced by the perceived Turkish threat to her national interests.

I. This view was put forward by the ex-Foreign Minister of Great Britain D. Healy in a televised discussion on issues surrounding the future security arrangements in Europe (BBC-2, 8/2/1990).

# GREEK AND TURKISH MILITARY SPENDING

1949-1986

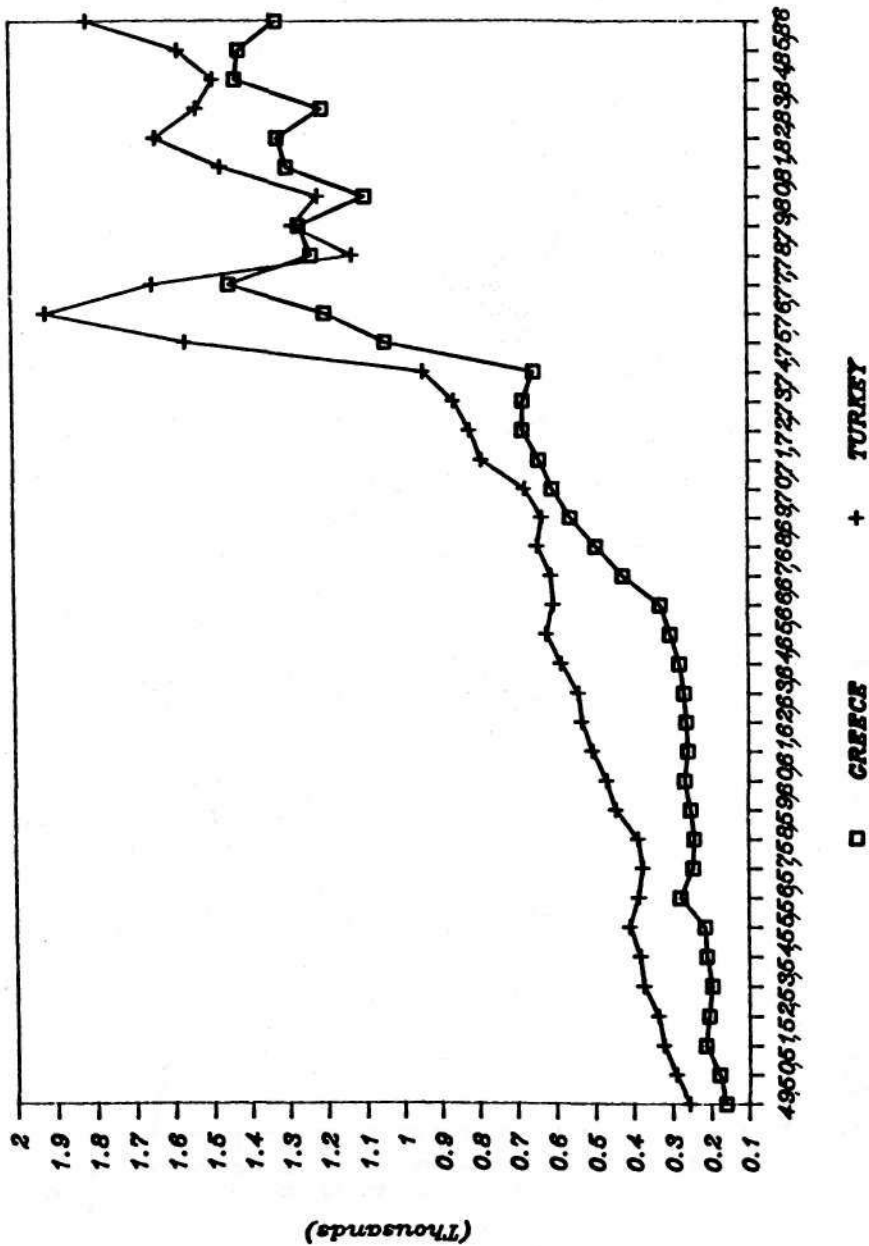


Figure 2

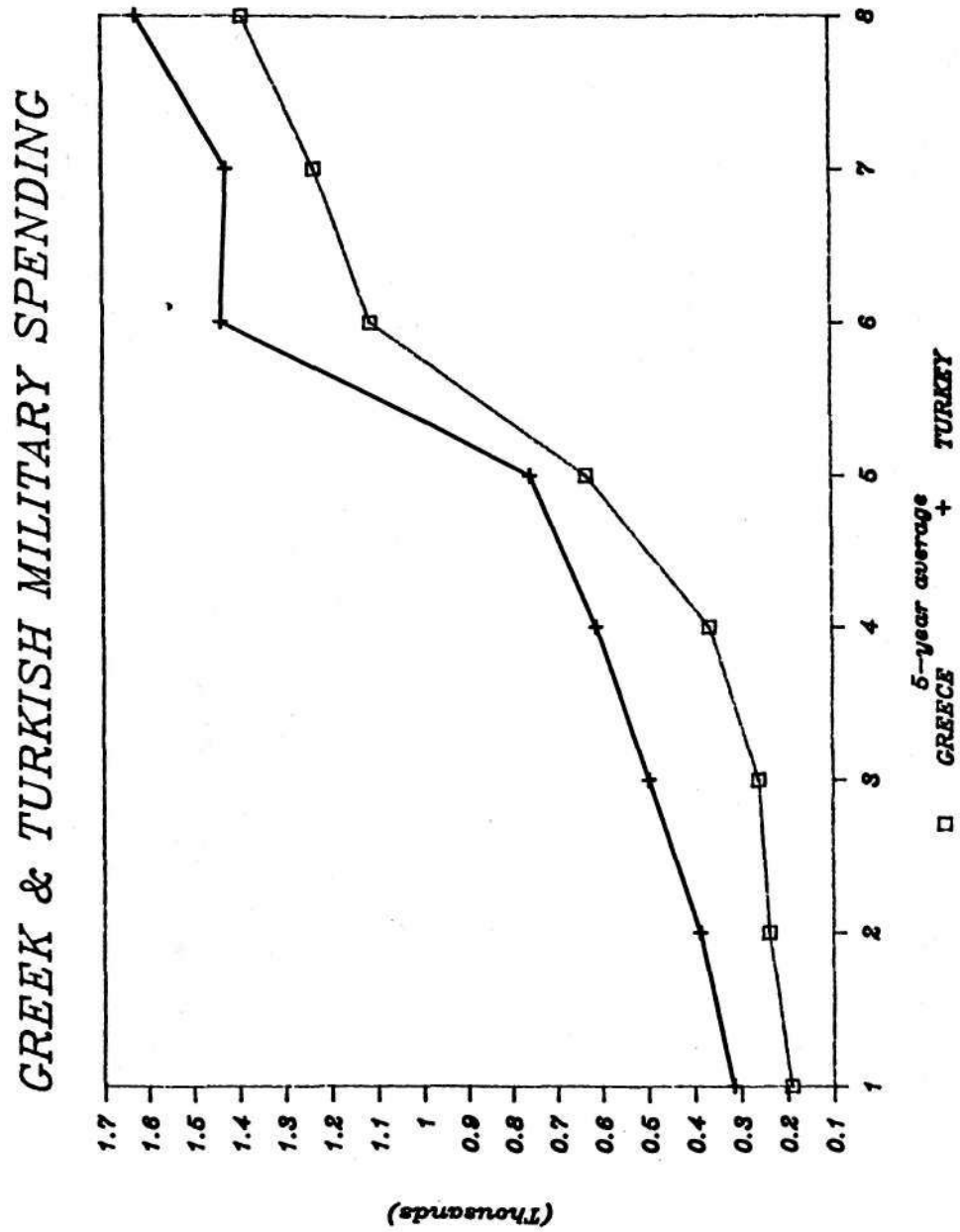


TABLE 1

ME as % of GDP in Greece and Turkey

Year	Greece	Turkey	Year	Greece	Turkey
1953	5.2	4.9	1971	4.9	4.5
1954	5.5	5.4	1972	4.7	4.3
1955	5.2	5.1	1973	4.2	4.1
1956	6.0	4.7	1974	4.3	3.9
1957	5.1	4.1	1975	6.8	6.1
1958	4.8	3.8	1976	6.9	6.8
1959	4.9	4.5	1977	7.0	5.9
1960	4.9	4.7	1978	6.7	5.4
1961	4.3	5.0	1979	6.3	4.5
1962	4.1	4.9	1980	5.7	4.9
1963	3.9	4.6	1981	7.0	5.0
1964	3.7	4.6	1982	6.8	5.6
1965	3.6	4.8	1983	6.8	5.2
1966	3.7	4.3	1984	7.1	4.9
1967	4.5	4.4	1985	7.0	4.9
1968	4.8	4.6	1986	6.2	5.2
1969	4.9	4.4	1987	6.3	4.7
1970	4.9	4.3	1988	6.4	4.6

Source: SIPRI Yearbooks

Clearly, the build up of armaments by any country is influenced by a combination of factors. These may include external and internal security considerations, ambitions of regional or even international domination, political and economic factors, the interests of the military, membership of an alliance etc. Here, however, we intend to concentrate only on the external security considerations that may influence Greek defence expenditure and this only in relation to her neighbour Turkey. This does not mean that relations with her northern neighbours or membership of NATO do not influence the level and content of Greece's military spending.

### 3. War and armaments

By far, the most apparent determinant of military expenditure in the minds of most people and the one that governments and politicians most often evoke in order to justify their armament programmes, is external security considerations

and the threat, or perceived threat, to the state's interests. Thus, war or the preparations for war are usually regarded as the result of ongoing frictions and confrontations between sovereign states. A state, therefore, is expected to take appropriate defence steps in order to protect some well defined national interests against the possibility of aggression from a known potential enemy. The creation of the appropriate military precautions against such an aggression will act as a deterrent against the potential enemy, will help preserve the peace by maintaining a balance of power and, in case this should fail, repel any aggression. Military expenditure is thus regarded as a necessary function of the state and it is a matter of calculating an optimum policy given certain information and a known objective. Implicit is the assumption that the state is a rational, class-neutral actor balancing opportunity costs and security benefits in order to maximise some well defined national interests to the benefit of all classes and social groups given the constraints and opportunity costs associated with the allocation of resources for defence purposes. However, this assumption of a class - neutral state is not going to be questioned here.

In his famous work «On War», Clausewitz argued that one of the primary objectives of the sovereign state is to increase its own power at the expense of others. The world is thus characterised by a continuous inter-state conflict and «war is a mere continuation of policy by other means»<sup>2</sup>. Warfare is the rational extension of international politics and it is waged in order to achieve a desired goal. War is seen not only as a means of achieving the objectives of a sovereign state but it is also endemic to the multistate world.

Others, such as Aron (1958) and Kahn (1960), have also argued that, in the contemporary world, conflicts do exist which cannot be resolved by normal politics and war occur when settlements by negotiation or compromise are impossible. Given the fact that war cannot be universally outlawed and that there is not a supranational enforcement agency that can enforce peace between nations, armed conflicts are inevitable.

Defence spending, therefore, can be at least partially understood in terms of one country's response to what she considers potential threats to her national security interests by another country. The Richardson arms race model has been the basis of a number of attempts to analyze the motives of states that lead them to increase or decrease their defence budgets in times of peace. For him such

2. Clausewitz, K. (1832): *On War*, Pelican edition (1968), edited by Rapoport, A. (p. 119).

motives may be «...revenge or dissatisfaction with the results of treaties; ...fear which moves each group to increase its armaments because of the existence of those of the opposing group;... rivalry which, more than fear, attends to the difference between the armaments of the two groups rather than to the magnitude of those of the other group; ...lastly there is always a tendency for each group to reduce its armaments in order to economise expenditure and effort<sup>3</sup>». His model examines the phenomenon of armaments build up between two states, A and B. In mathematical terms Richardson (1960, pp. 14-16) formulated his model as follows:

$$\begin{aligned} \text{country A: } dX/dt &= kY - aX + g \\ \text{country B: } dY/dt &= lX - bY + h \end{aligned}$$

where t: time

x: A's defence expenditure

y: B's defence expenditure

k & l: positive constants called by Richardson «defence coefficients»

a & b: «fatigue coefficients» representing the costs of maintaining defenses

g & h: «grievance coefficients» with positive signs

The model predicts that the armaments of each country will tend

- (i) to increase proportionately to the armament level of the other nation;
- (ii) to decrease proportionately to the economic burden corresponding to its own armaments; and
- (iii) to increase guided by its grievances and hatred towards the other nation.

Our intention here is to test whether Richardson's model can help explain changes in Greek defence expenditure in the context of her relations with her neighbour Turkey in the light of their ongoing disputes and frictions. This is done in the next section.

#### 4. Empirical application of Richardson's model

Greece and Turkey can be said to be the oldest adversaries in Europe. Despite the fact that both countries are members of the same alliance, NATO, they have a long history of hostile relations that date back many years well before World War II, which are themselves rooted in centuries of hatred. Although with the

3. Richardson, L. (1960): *Arms and Insecurity*, Atlantic Books, (p. 13).



end of the War they resumed friendly relations and both joined NATO suspicions concerning each other's long term strategic objectives never went away. The Turkish invasion of Cyprus in 1974 acted as the catalyst in their relations which have since then been based on mutual suspicion bordering to openly hostile. This led to a major reappraisal of Greece's defence priorities. The emphasis has since the mid - seventies been defence against Turkey. As a result, a major reorganisation of the country's armed forces has taken place in order to fall in line with the new defence objectives. In 1985 Greece officially announced defence against Turkey rather than Warsaw Pact Countries. Any threat by these countries was branded as being indirect and possible only in the context of a wider East-West conflict. The direct threat against Greece's legitimate national interests emanates from the Turkish expansionist aims. These are manifested not only in the deployment of Turkish forces which are concentrated in the Aegean coast of Turkey<sup>4</sup> but are also expressed through various political and diplomatic initiatives and statements by Turkish government officials. Furthermore, Greece could not rely on NATO to guarantee and/or protect her eastern borders and thus she had to increase the relative independence of her defence capabilities.

Greece appears to be a particularly interesting case to test whether the Richardson's arms race model can help explain changes in her military expenditure in relation to her disputes with Turkey. Using regression analysis four equations were estimated. In equation (1) yearly changes in Greek defence expenditure (DME) were made a function of the level of Greek military spending (GRME) which acts as the fatigue variable in Richardson's model, and Turkish military spending (TURME) which represents the defence variable in the model. A constant was also included which acts as the grievance term in the model. The equation covers the period 1950-86 which allows 37 observations. To allow for the declaration of the New Defence Doctrine by Greece and for the fact that Greek - Turkish relations have been particularly

4. The presence of the 4th Turkish Army, the so-called Army of the Aegean, in the coast opposite the Greek islands of the Aegean is a source of permanent worry to Greece. Turkey maintains that the 4th Army is primarily a training unit. This claim is not supported however by the fact that, among other units, the 4th Army includes elite units of the Turkish armed forces. It includes the Marine regiment, the Commando brigade and the Parachute brigade. These can hardly be described as training units, they are the best trained units of any army and their mission is primarily offensive, such as air and amphibious assaults. Another source of worry for Greece are the 114 landing crafts of Turkey. Of these 60 are permanently moored in Izmir harbour, 30 in the Sea of Marmara, and 24 in Mersin harbour opposite Cyprus. In Izmir the Turkish forces stationed there are in possession of 300-400 plastic landing boats, capable of carrying 10- 12 commandos to remote beaches of the Greek islands undetected. Thus, in the space of just a few hours, Turkey has the ability to land more than three thousand commandos on Greek islands near her coast.

strained after the latter's invasion of Cyprus the same relationship was estimated in equation (2) but only for the period 1974–86. To allow for the immediate effects of the Cyprus invasion equation (3) estimates the same relation for the period 1950–86 with the inclusion of a dummy variable (DUM). The variable takes a value of one for 1975, 76, 77 and zero elsewhere. In a fourth equation Turkish military spending is lagged by a year to allow time for reaction by Greece. Using multiple regression analysis the following results were obtained:

$$(1) \text{ DME} = -33.146 - 0.169 \text{ GRME} + 0.203 \text{ TURME}$$

$$(0.88) \quad (1.27) \quad (1.66)$$

$$R^2 = 0.106 \quad \text{s.e.} = 106.13 \quad \text{DW} = 2.51 \quad \text{F-stat} = 2.033$$

$$(2) \text{ DME} = -288.87 - 0.103 \text{ GRME} + 0.314 \text{ TURME}$$

$$(0.859) \quad (0.334) \quad (1.313)$$

$$R^2 = 0.168 \quad \text{s.e.} = 182.73 \quad \text{DW} = 2.44 \quad \text{F-stat} = 1.013$$

$$(3) \text{ DME} = +37.023 + 0.065 \text{ GRME} - 0.084 \text{ TURME} + 291.574 \text{ DUM}$$

$$(1.077) \quad (0.543) \quad (0.704) \quad (4.332)$$

$$R^2 = 0.430 \quad \text{s.e.} = 86.014 \quad \text{DW} = 2.44 \quad \text{F-stat} = 8.320$$

$$(4) \text{ DME} = +85.321 + 0.382 \text{ GRME} - 0.402 \text{ TURME}(-1) + 302.3 \text{ DUM}$$

$$(3.584) \quad (4.335) \quad (4.728) \quad (6.844)$$

$$R^2 = 0.655 \quad \text{s.e.} = 66.905 \quad \text{DW} = 1.86 \quad \text{F-stat} = 20.933$$

The results obtained are not at all satisfactory and do not appear to indicate that Greece is engaged in an arms race with Turkey. Equations (1) and (2) are not well defined and their explanatory power as expressed by the value of the R-squared statistic is extremely low. The variables, with the exception of the grievance term, enter the equation with the expected signs but their statistical importance (t-statistic in brackets) is quite low. On the other hand, their signs in equations (3) and (4) are the reverse of what would be expected. Thus, the fatigue variable has a positive sign whereas the defence/reaction variable is negative. Only the sign of the coefficient of the dummy variable is in line with what was expected and it is statistically significant. It would appear that the model with the current specifications does not help to explain changes in Greek defence expenditure in relation to her disputes with Turkey.

### 5. Weaknesses of Richardson's model

The reason(s) for the poor performance of the model may be traced to the way that it is specified. Thus, it could be argued that it approaches defence expenditures and the arms race from outside without allowing for the specific strategic environment nor for the way in which decisions are reached by military planners; and neither does it include variables that could take in consideration the principles on which each particular state may act. Moreover, it does not include a variable(s) that could act as a proxy for the degree of the conceived menace/threat to which countries are likely to react by adjusting their defence expenditure accordingly. It seems that using only the level of military expenditure is not a sufficient enough variable.

This may be particularly true in our case, since we are dealing with a country which considers itself to be in a military disadvantageous position compared to Turkey which, on the merits of her size alone (and therefore the size of her armed forces), finds herself in a very strong position of advantage. Indeed, this may mean that it is necessary for the equations to be altered to allow for this factor. If this is the case, then, the difference in Greek defence spending may not be the appropriate dependent variable.

To take an example in 1987 the total armed forces of Greece were 170,500 men compared with Turkey's 654,000 men. Furthermore, even if there was a parity of military strength, the military position of Greece would still be weaker if the geography of the possible area of conflict is taken into consideration. This area is made up from dozens of small islands, all possible targets for an amphibious landing by the Turkish army, a number of which lie «minutes» away from the Turkish mainland and are well within artillery firing range. The Greek mainland, on the other hand, is at least half a day's sailing away for reinforcements to arrive. Furthermore, in case of a conflict, it is almost certain that it will also be necessary for Greece to support militarily the Cyprus National Guard. However, Cyprus is within the range of the Turkish air force operating from the relative safety of southern Turkey but not within the striking range of many of the fighter planes in the inventory of the Greek Air force. Given, therefore, that Greece visualises her larger neighbour Turkey as a permanent source of direct danger to her national interests, it is not surprising to observe that her levels of defence expenditure are almost as high as those of Turkey and, occasionally, even higher despite the difference in size both in terms of the country as such and her armed forces.

TABLE 2

Greek and Turkish military expenditure 1953–1977

(\$ mil at 1973 prices)

Year	Greece	Turkey	Year	Greece	Turkey
1953	197	374	1966	327	603
1954	211	383	1967	422	608
1955	216	410	1968	492	643
1956	281	386	1969	557	631
1957	247	375	1970	603	675
1958	242	387	1971	638	790
1959	251	445	1972	680	821
1960	266	469	1973	679	862
1961	258	506	1974	650	943
1962	262	532	1975	1043	1563
1963	268	541	1976	1197	1916
1964	279	585	1977	1447	1647
1965	302	621			

Source: SIPRI Yearbooks

TABLE 3

Greek and Turkish military expenditure 1978–1987

(\$ mil at 1986 prices)

Year	Greece	Turkey	Year	Greece	Turkey
1978	2,602	2,159	1983	2,401	2,390
1979	2,521	1,902	1984	2,851	2,323
1980	2,181	1,884	1985	2,830	2,464
1981	2,581	2,200	1986	2,418	2,769
1982	2,632	2,555	1987	2,494	2,692

Source: SIPRI Yearbook (1988)

For example, as it can be seen from table 3, in 1978, 79, 80, 81, 82, 83, 84 and 85 the military expenditure of Greece was higher than that of Turkey that has about three times larger armed forces. Although this is a somewhat crude method of comparing the two countries' defence spending ability given the

different levels of development, it nevertheless is indicative of the situation. Greece has generally exhibited higher levels of military spending as percentage of GDP than Turkey. For example in the period 1975-84 her average (ME as % of GDP) was 6.6%, the highest in NATO, while Turkey's equivalent for the same period was 5%, the USA's 5.9% and the NATO average for the same period was 4.7%.

Thus, it could be said that Greece considers herself to be under threat from an enemy of much greater size and, therefore, strength and at the same time the geographical features of the area favour her enemy. This may explain to a certain extent why the Richardson arms race model, the way it is specified, does not seem to work in this case.

## 6. The introduction of case specific variables

It appears from the above that one needs to introduce different variables in order to capture the degree and the way in which Greek military spending is influenced by her relations with Turkey. Since Greece believes herself to be in a disadvantageous position to her larger neighbour then, it may be appropriate to introduce a variable that allows for this. The size of the Turkish armed forces is probably such an appropriate variable to introduce in our estimations. It can be used as a proxy showing the degree of the Turkish menace/threat as seen from the Greek point of view. Thus, Greek defence expenditure (GRME) was made as function of Turkish military spending (TURME) and also the size of the Turkish armed forces (AFTUR). On the basis of our discussion we would expect both variables to enter the equation with a positive sign. Using multiple regression analysis and data for the period 1961-85<sup>5</sup> the following results were obtained:

$$(5) \text{ GRME} = -753.55 + 1.860 \text{ AFTUR} + 0.414 \text{ TURME}$$

$$(6.387) \quad (6.127) \quad (4.633)$$

$$R^2 = 0.949 \quad s.e = 101.41 \quad DW = 1.60 \quad F\text{-stat} = 207.716$$

From the results it appears that the importance of the size of the Turkish armed forces and therefore the level of the Turkish menace/threat finds some modicum of empirical verification. The statistical importance of this variable (AFTUR) is high and in fact is even higher than the quantitative impact of the

---

5. Data on the size of the armed forces before 1961 was no available from the same source, in this case ACDA Yearbooks.

level of Turkish military spending (TURME) which is also statistically significant. The explanatory power of the equation between the size of the Turkish armed forces and the level of Greek military expenditure it was decided to investigate further.

It was decided to have as the dependent variable Greek military expenditure per soldier (MEps) rather than just the level of defence spending. If the size of the Turkish armed forces is such an important determining factor then, the size of its impact on military expenditure per soldier should be greater. This is so because military expenditure per soldier can be regarded as a proxy indicating the degree of modernity and sophistication of equipment used. If indeed Greece feels threatened by her larger neighbour then, due to the substantial difference in the size of their respective armed forces, it can safely be assumed that Greece will try to offset this disadvantage in size by arming her personnel with more advanced and, therefore, more expensive equipment. If she can have a relative advantage in the quality of weapons used then this can substantially offset the disadvantage in size<sup>6</sup>. More sophisticated equipment usually increases the «killing» capacity per soldier and thus offsets the imbalance in quantity. A well trained soldier armed with a modern assault rifle equipped with night vision equipment, wearing a flak jacket and a high - impact - resistant kevlar helmet is likely to be more effective and survive in battle than one with an outdated rifle and without any body protection<sup>7</sup>. Similarly, a modern but more expensive tank will probably be able to destroy many enemy tanks before it is itself destroyed. The same is true with modern fighter aircraft and naval vessels which not only are they better equipped and thus are likely to locate the enemy before he does and thus have the advantage of firing first, but they also offer greater protection to their crews. This means that, despite the smaller size of her armed forces, Greek military

6. Israel's army is probably the best example of trying to reduce a quantitative disadvantage by using better quality weapons. Israel is surrounded by potential enemies far superior in numbers. The Israeli Defence Forces however have on a number of occasions in the past demonstrated that a better equipped and trained army can take on and beat enemies of much larger size.

7. Once again Israel offers a good example of policies aiming to improve the survivability of army personnel when faced with an enemy of superior numbers. The Israeli designed and built «Merkava» MBT is like any other modern tank with a difference. Unlike all other types of tanks, its engine is mounted in the front rather than at the rear. This, in theory, offers extra protection to the crew against frontal hits by enemy tanks, anti-tank weapons and artillery. Experience suggests that, in battle, tanks are more likely to be hit in the front rather than anywhere else. Thus, although the tank may be destroyed after a direct frontal hit, it is possible, in theory at least, for the crew to literally walk away unharmed, board another tank and continue fighting; or substantially reduce the degree of their wounds.

expenditure is relatively higher than that of Turkey indicating her effort to have a qualitative advantage over her larger neighbour.

Thus, Greek military expenditure per soldier (GRMEps) was made a function of the size of the Turkish armed forces (AFTUR) and the level of Turkish military spending (METUR). In a second equation it was decided to make Greek military expenditure per soldier (GRMEps) a function of the Turkish armed forces (AFTUR) once again capturing the degree of the Turkish armed forces (AFTUR) once again capturing the degree of the Turkish threat/menace and the rate of change in Turkish military spending (METURr). Finally, in a third equation it was decided to use Turkish military spending per soldier (TURMEps) instead of the level of Turkish military expenditure. Using multiple regression analysis for the period 1961–85 the following were obtained:

$$(6) \text{ GRMEps} = -3346.35 + 9.841 \text{ AFTUR} + 1.580 \text{ METUR}$$

$$(3.760) \quad (4.295) \quad (2.343)$$

$$R^2 = 0.878 \quad \text{s.e} = 765.079 \quad \text{DW} = 2.03 \quad \text{F-stat} = 79.471$$

$$(7) \text{ GRMEps} = -5124.32 + 15.148 \text{ AFTUR} + 23.838 \text{ METURr}$$

$$(6.402) \quad (12.136) \quad (2.519)$$

$$R^2 = 0.875 \quad \text{s.e} = 763.396 \quad \text{DW} = 2.14 \quad \text{F-stat} = 73.888$$

$$(8) \text{ GRMEps} = -4911.97 + 12.115 \text{ AFTUR} + 1.109 \text{ TURMEps}$$

$$(6.855) \quad (8.589) \quad (2.758)$$

$$R^2 = 0.887 \quad \text{s.e} = 737.224 \quad \text{DW} = 2.04 \quad \text{F-stat} = 86.437$$

The regression results are in line with what was expected. All the equations perform well and the results are quite satisfactory. In all of them, the coefficients of the variables have the expected positive sign and are statistically significant. It appears that the quantitative importance of the impact of the AFTUR variable is quite large in all cases as it was expected. Noticeable is the fact that, in equation (7), the quantitative impact of the rate of change of Turkish military spending (METURr) appears to be greater than that of the size of the Turkish armed forces (AFTUR). It may be that this variable not only does it pick up changes in the size of the Turkish threat, such as increases in the number of tanks, fighter planes, naval vessels etc, but it may also be indicating improvements and modernisations in the weapons used by the Turkish forces. This in turn reduces any qualitative advantage Greece may have over Turkey upsetting the qualitative balance of power between the two countries and that is why it has a greater impact on the

dependent variable. Generally, on the basis of the above results it can be said that Greek military planners attach great importance to the size of the Turkish armed forces and that they try to offset the Greek quantitative disadvantage by having a qualitative advantage over Turkey. It can be said, therefore, that Greek military spending is substantially influenced by the size of the armed forces of her potential enemy. This can be tested further by using as one of the independent variables the ratio between Greek armed forces and the Turkish armed forces. The ratio can be taken to indicate the quantitative disadvantage of the Greek side and thus we would expect it to have a strong influence on Greek military spending. We would expect this variable to enter our equation with a negative sign. This would indicate that, as the ratio deteriorates in favour of Turkey, Greek military spending increases in order to offset the increasing disadvantage in size. Thus, Greek defence expenditure (MEGR) was made a function of the Greek and Turkish armed forces ratio (AFr) and Turkish military expenditure (METUR). In a second equation we used as the dependent variable Greek military expenditure per soldier (GRMEps) which was also made a function of the armed forces ratio (AFr) and Turkish military spending (METUR). On the basis of the forgone discussion we would expect the quantitative impact of AFr on GRMEps to be greater indicating that as the ratio deteriorates in favour of Turkey more importance is attached by Greek military planners in increasing in their favour any qualitative advantage, as this is reflected by military spending per soldier, and thus to offset the widening quantitative gap. Using multiple regression analysis for the period 1961-85 the following results were obtained:

$$(9) \text{ MEGR} = +847.31 \quad -2502.93 \text{ AFr} \quad +0.714 \text{ METUR}$$

$$(3.079) \quad (3.559) \quad (9.311)$$

$$R^2 = 0.913 \quad \text{s.e} = 132.90 \quad \text{DW} = 1.28 \quad \text{F-stat} = 116.356$$

$$(10) \text{ GRMEps} = +8108.01 \quad -21110.65 \text{ AFr} \quad +2.627 \text{ METUR}$$

$$(6.596) \quad (6.721) \quad (7.669)$$

$$R^2 = 0.926 \quad \text{s.e} = 593.71 \quad \text{DW} = 1.30 \quad \text{F-stat} = 139.233$$

The results obtained are once again in line with what was expected. In both cases the independent variables are statistically significant and the explanatory power of the equations is high. The quantitative importance of the armed forces ratio, as indicated by the value of its regression coefficient, is very high in equation (9) and it is even higher in equation (10), indicating the degree by which Greek military expenditure is influenced by changes in the ratio of the armed



forces of the two countries. As the disadvantage in numbers increases, Greek military planners try to offset this by increasing the quality of their forces. There is, however, evidence of some degree of autocorrelation in both equations as indicated by the value the Durbin – Watson statistic. This was appreciably reduced when Turkish military expenditure was lagged by one year:

$$(11) \text{MEGR} = +884.97 \quad -2513.07 \text{ AFr} \quad +0.709 \text{ METUR} \quad (-1) \\ (2.773) \quad (2.996) \quad (8.130)$$

$$R^2 = 0.889 \quad , \quad \text{s.e} = 148.34 \quad \text{DW} = 1.93 \quad \text{F-stat} = 84.446$$

$$(12) \text{GRMEps} = +9026.48 \quad -23118.96 \text{ AFr} \quad +2.415 \text{ METUR} \\ (5.756) \quad (5.608) \quad (5.633)$$

$$R^2 = 0.886 \quad \text{s.e} = 729.04 \quad \text{DW} = 1.64 \quad \text{F-stat} = 82.028$$

Military policies concerning improvements in the quality of the Greek Armed Forces also offer further evidence in support of our empirical results here. For example, it was recently announced by the Defence Minister that a fundamental reappraisal of Greek military policies was underway. The aim is to reduce military expenditures without compromising the country's defence capabilities. This is to be achieved by the procurement of advanced military hardware which will substantially offset the country's quantitative disadvantages by enhancing the quality of her Armed Forces. This includes advanced combat helicopters, modern naval units, and sophisticated electronic equipment as well as updating the structure use of volunteer i.e. professional personnel will be made. The target is to create semi-professional Armed Forces. This necessity derives from the fact that the modern, sophisticated and technologically advanced weapons systems require longer and more expensive training and become more effective when operated by experienced professional soldiers rather than conscripts. Extra costs, such as salaries, are offset by substantial savings in continuously re-occurring training costs associated with conscripts; reduction in damages to expensive equipment since it will be operated by professional soldiers; and generally improved standards in the Armed Forces since professionals are much more effective in battle than conscripts. Similarly the wider use of helicopter forces will increase the mobility and operational flexibility of the Army which reduces the need to constantly maintain large numbers of personnel under arms. Such measures are clearly designed to improve the quality of the Armed Forces and offer further evidence in support of our empirical results.

## 7. Conclusions

It was been shown here that in order to develop a dynamic arms race model there is a need to incorporate variables that take in consideration the level of the perceived threat/menace to the given state's interests. It is then that defence expenditure levels can be explained in terms of fluctuations in the degree of this threat. In this specific case study it was found that such a variable may be the size of the armed forces of better still the ratio of the armed forces of the two countries. It may also be possible to introduce other similar variables such as the ratio of main battle tanks, fighter planes, major surface units and/or submarines. Such variables may help to shed more light in the factors that influence decisions by military planners. This may not only be applicable to conflicts between countries but also in the case of the major alliances. For example, in the past NATO had maintained that the size of WTO forces made necessary the existence of nuclear weapons to offset the superiority in conventional forces enjoyed by Warsaw Pact forces. Similarly, it was also argued that this disadvantage in quantity can be partially offset by the possession of superior weapons systems and better personnel training. This was often part of the justification for the allocation of funds to research and development of new and more sophisticated weapons systems.

Clearly, the usefulness of such variables, as the ones used in this study, can be further tested by more empirical work in specific cases of arms races.

## REFERENCES

- ACDA*: Yearbook (various years), Washington DC.
- Aron, R.* (1958). *On War*, Secker & Warburg, London.
- Clausewitz, K.* (1832): *On War*, Pelican Edition, (1968).
- Kollias, C.* (1989): «Military Expenditure and Economic Development: The Case of Greece 1952-87», unpublished Ph. D. Thesis, Thames Polytechnic.
- Larraber, S.* (1977): «Balkan Security», Adelphi Paper No 135, International Institute for Strategic Studies, London.
- Leighton, M.* (1979): «Greco - Turkish Friction: Changing the Balance in the Eastern Mediterranean», *Conflict Studies* No 109, July 1979.
- Ligeros, S.* (1985): «The Turkish Army of the Aegean», *Anti* No 299, Athens.
- Richardson, L.F.* (1960): *Arms and Insecurity*, Atlantic Books, Stevens & Son LTD.
- SIPRI*: Yearbook (various years), Taylor & Francis, London.