CENTRE OF PLANNING AND ECONOMIC RESEARCH

No 51

The Greek Military Sector and Macroeconomic Effects of Military Spending in Greece

by

A. BALFOUSSIAS
V. STAVRINOS

February 1996

Athanassios Balfoussias
Research Fellow
Centre of Planning
and Economic Research

Vassilios Stavrinos
Harokopion University of Athens

The Greek Military Sector and Macroeconomic Effects of Military Spending in Greece

CENTRE OF PLANNING AND ECONOMIC RESEARCH

The Centre of Planning and Economic Research (KEPE) was established as a research unit, under the title "Centre of Economic Research", in 1959. Its primary aims were the scientific study of the problems of the Greek economy, encouragement of economic research and cooperation with other scientific institutions.

In 1964, the Centre acquired its present name and organizational structure, with the following additional objectives: (a) The preparation of short, medium and long-term development plans, including plans for regional and territorial development and also public investment plans, in accordance with guidelines laid down by the Government. (b) The analysis of current developments in the Greek economy along with appropriate short-term and medium-term forecasts; also, the formulation of proposals for appropriate stabilization and development measures. (c) The further education of young economists, particularly in the fields of planning and economic development.

The Centre has been and is very active in all of the above fields, and carries out systematic basic research in the problems of the Greek economy, formulates draft development plans, analyses and forecasts short-term and medium-term developments, grants scholarships for post-graduate studies in economics and planning and organizes lectures and seminars.

In the context of these activities KEPE produces series of publications under the title of "Studies" and "Statistical Series" which are the result of research by its staff as well as "Reports" which in the majority of cases are the outcome of collective work by working parties set up for the elaboration of development programmes. "Discussion Papers" by invited speakers or by KEPE staff are also published.

The Centre is in continuous contact with similar scientific institutions abroad and exchanges publications, views and information on current economic topics and methods of economic research, thus further contributing to the advancement of the science of economics in the country.

DISCUSSION PAPER SERIES

This series of Discussion Papers is designed to speed up the dissemination of research work prepared by the staff of KEPE and by its external collaborators with a view to subsequent publication. Timely comment and criticism for its improvement is appreciated.

ACKNOWLEDGEMENTS

This paper is going to be published in *The Peace Dividend*, N. P. Gleditsch, O. Bjerkholt and A. Cappelen (eds.), in the series *Contributions to Economic Analysis*, North-Holland, 1996.

The financial support by the Centre of Planning and Economic Research is gratefully acknowledged. We are also grateful to five anonymous referees and particularly to N.P. Gleditsch for comments on an earlier draft. The usual disclaimer applies.

A. BALFOUSSIAS
V. STAVRINOS

January 1996

CONTENTS

ABSTRACT

Experiencing pressing economic needs, high rates of defence spending, and yet no visible prospects for a peace dividend, Greece is looking into the challenges of the structural changes in the ideological, ethnic, and power balances in the Balkans. This chapter deals with certain aspects of the strategic environment within which Greece's defence policy is formulated, investigates the main interconnections of military spending with fiscal policy and macroeconomic performance, and assesses the macroeconomic effects of three alternative disarmament scenarios. The relationship between defence spending, budgetary policy, and macroeconomic performance appears to be a simultaneous one with a complex dynamic structure. The disaggregated components of military expenditure show different associations with fiscal policy and macroeconomic variables, and real military spending appears to favour real economic activity and employment. The macroeconomic effects of the alternative disarmament scenarios are, in general, on the low scale. The economic implications of the investment scenario appears to be better than those of the consumption scenario in terms of gross domestic product and the performance of the external sector, whereas the consumption scenario performs better in reducing unemployment. The balanced milex-tax cuts scenario has also positive repercussions and not very distant in magnitude from those of the other two scenarios.

1. A NEW INTERNATIONAL SETTING

Within the new international setting, Greece presents an example of a country with a very high rate of military spending and of little short- or medium-term prospects for winning a peace dividend. The nationalist and minority awakenings connected with the geographical and security rearrangements in the former Yugoslavia, combined with the ongoing discord regarding the balance in the area of South-Eastern Mediterranean, are factors likely to sustain the local arms races and insecurity. On the other hand, the need to pursue the tight macroeconomic and structural adjustment policies required for the participation to the European Monetary Union, and the increasingly pressing public and private needs, put immense pressure for a reduction in the vast mobilisation of peacetime resources for military purposes. The related issues are crucial not only because they refer to the use of scarce resources, but because they also have, in many respects, direct consequences on matters of foreign policy and the international relations of the country.

Although military spending represents a principal component of Greece's economic burden, its macroeconomic impact relative to its direct and indirect opportunity costs, remains largely unexplored. This chapter attempts to provide empirical quantitative evidence in order to assess the role of military spending within a broader context of economic and military balance.

The chapter has two main objectives: (a) to present an overview of the strategic environment and the Greek military sector and (b) to examine the macroeconomic effects of military spending and to assess the implications of alternative disarmament scenarios on the major macroeconomic aggregates.

The chapter is organized as follows. Section 2 provides a brief discussion of certain aspects of the strategic environment within which Greece's defence policy is formulated. It also presents information on certain indicators which are related to the military and industrial base of the Greek defence sector. Section 3 investigates the main interconnections between military spending, fiscal policy and macroeconomic performance by means of a small dynamic

econometric model. In this model, military expenditure is disaggregated into personnel, and procurement and construction expenditures as these two spending components are expected to have different behavioural patterns and different adjustment parameters. Section 4 assesses a number of disarmament scenarios by simulating them within the context of a large-scale macroeconomic model. The main characteristics of the model are given and the simulation results concerning the macroeconomic effects of the alternative disarmament scenarios, with respect to a reference scenario, are presented and discussed. In the final section, a number of caveats and the main conclusions of this work are drawn together.

2. THE STRATEGIC ENVIRONMENT AND THE GREEK MILITARY SECTOR

Long called 'the powder keg of Europe', the Balkans continued for almost two centuries to be characterized by restlessness and instability. Greece was the first of the occupied nations to fight its way clear of Ottoman rule and in 1930 rejoined the community of Western civilization. The other Balkan states also gradually asserted their nationality and independence and, much later, on the eve of the First World War, established themselves as free members of the international community.

Disputes, conflicts, and wars in the Balkans lasted until the end of the Second World War, the results of which are still here and even more deeply embedded in the tensions of Balkan politics than the East-West confrontation climaxed in 1945. The final settlement and the brutal division of Europe between the Soviet Union and the Western democracies in 1944 resulted in a rather temporary simplification of the highly complicated political situation in the Balkans, which, nevertheless, maintained the balance and the status quo until the early 1990s.

Greece joined the NATO alliance in 1952 and concluded a military agreement with the USA in 1953, providing the framework within which Greece's politics has functioned in the post-war era. Besides the aid received in times of desperate need, the main advantage was that the tying-in to the US military power for defence purposes provided increased security and stability which has made possible economic recovery. A drawback, on the other hand, was that for a long period of time Greek politics were subordinated to the global politics and security priorities of the USA in the Eastern Mediterranean, which were not always in line with Greece's national interests and concerns.[1]

Greece's unique situation in NATO is that it faces a threat from one of its own allies. In practical terms this means that the country would be protected, at least until recently, against the less likely threat from the north, but could not be protected against the more likely threat from the east. This renders Greece both insecure and dependent, since the USA and NATO have not been willing, to provide formal guarantees to defend one country in case of military attack from another country within the alliance.[2]

The perception by the Greek strategic analysts is that, especially since 1974, Turkey has undertaken a wholesale attempt to overturn the power balance in the area of South-eastern Mediterranean through the invasion and occupation of the northern part of Cyprus and revisionist claims against the post-war status quo in the Aegean. The means used range from the use of military force (in Cyprus) or the threat of the use of force by concentrating troops on the Aegean coast, making references to a *casus belli*, and the display of force through infringements and violations of Greece's air space (Rozakis, 1989; Kollias, 1995; and Lazaretou & Kappopoulos, 1993).

The military effort which has followed these developments has raised military spending in Greece to the highest levels by international standards (see Figures 2.1 to 2.4). More recently, the wars in Bosnia-Herzegovina, the creation of the Former Yugoslavic Republic of Macedonia, the awakening of nationalist movements in former Yugoslavia, Albania and Bulgaria and the involvement of high politics in the area, create a new political environment which is characterized once again by restlessness and instability. It is therefore interesting to examine the Greek military sector in comparison to the military sectors of the other Balkan states.

There is no universal agreement on the best way of measuring the defense burden for comparative purposes, mainly because it depends on the opportunity cost of military expenditure in terms of national security for each particular country. National security, in turn, critically depends on the strategic environment in the neighbouring countries.

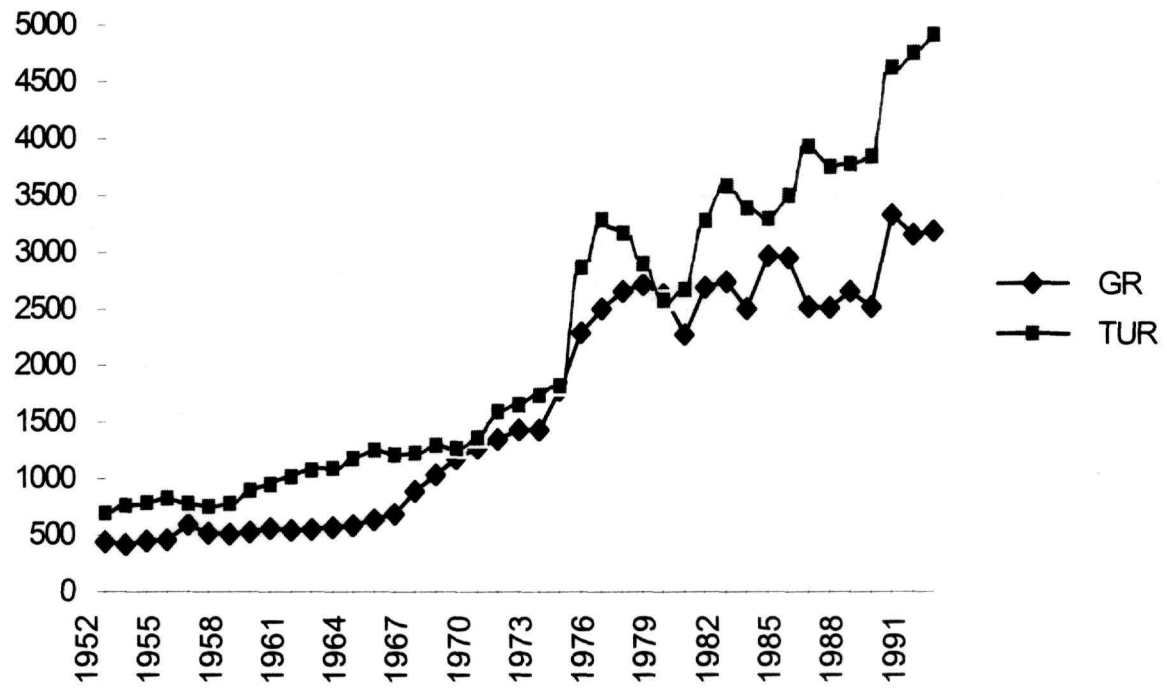
Data on military spending and economic performance for the Balkan countries is limited after 1991. Table 2.1 presents the more recent information on certain indicators relating to the military sectors of those countries. During the 1980s Greece allocated an average of 6.5% of

GDP to defence (5.5% in 1990s) which constitutes the largest burden in Europe and one of the largest in the world. Although Turkey has allocated a smaller percentage of GDP to defence - 4.6% on average in the 1980s and 4% in the 1990s - nevertheless, these percentages represent much larger allocations in absolute terms. Comparative absolute figures in constant 1980 US dollars, are given in the fourth column of Table 2.1. Figures 2.1 and 2.2 present the evolution of military spending of Greece and Turkey during the post-war period. These burdens are even higher compared to those of certain other NATO or European countries which use volunteers, paid at the market wage, to maintain their armed forces.

Figure 2.1

Real Military Expenditure of Greece (GR) and Turkey (TUR)

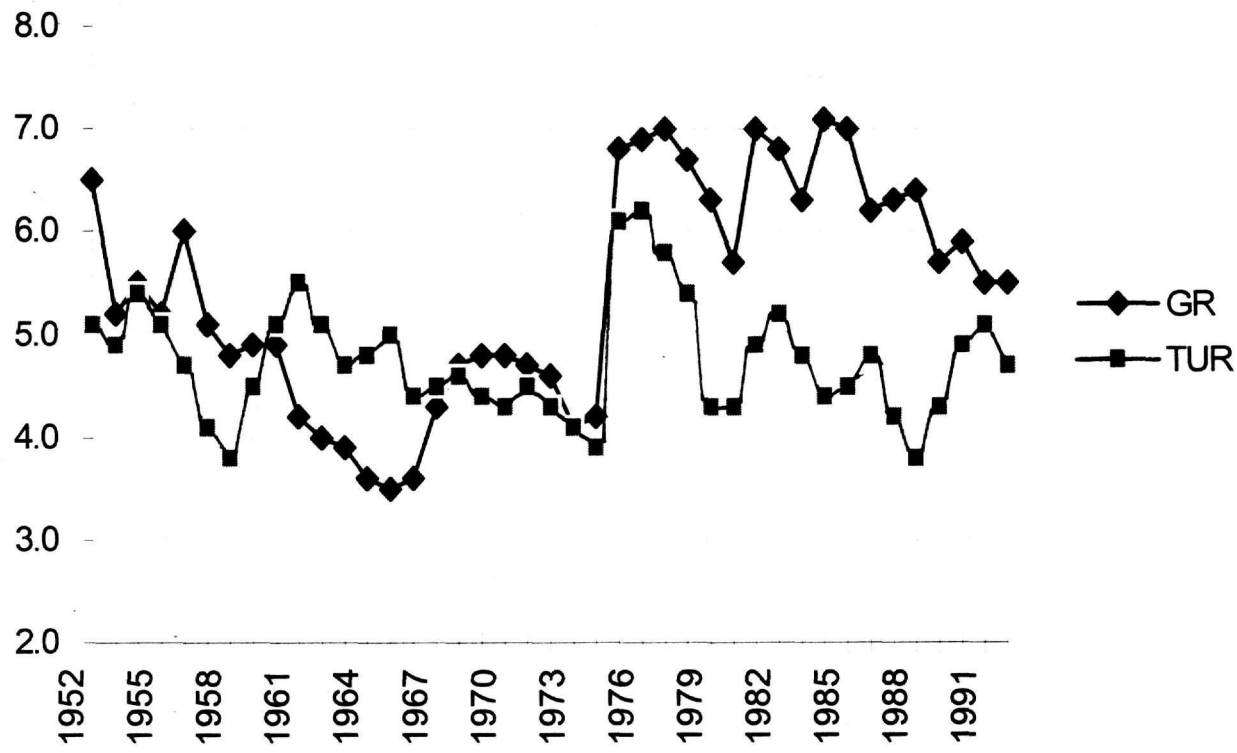
(USD million, at 1980 prices and exchange rates)



Source: National Income Accounts of Greece and SIPRI (several years).

Figure 2.2

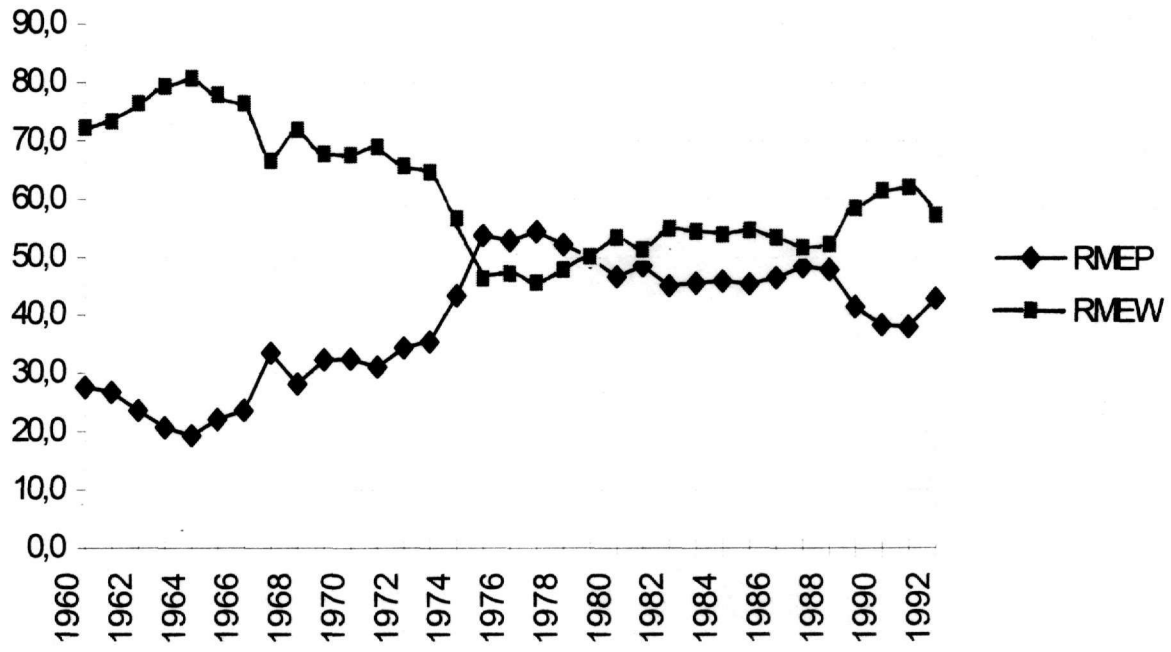
Military Expenditure of Greece (GR) and Turkey (TUR) (% of GDP, 1952-92)



Source: As in Figure 2.1.

Figure 2.3

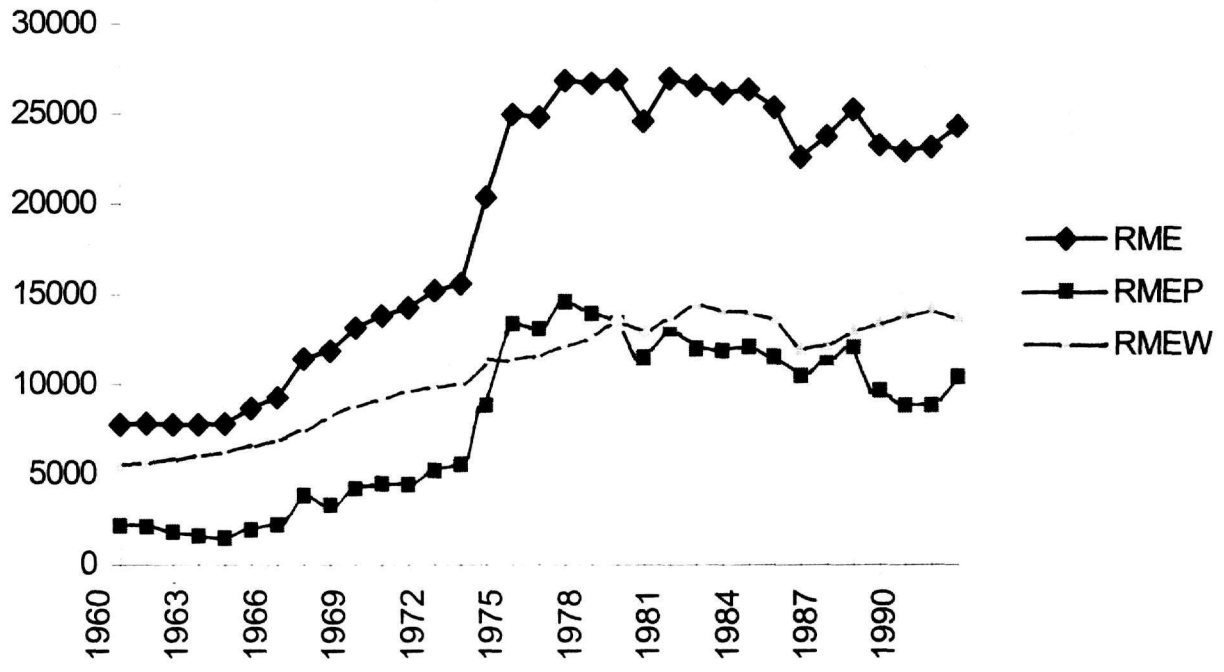
Shares of Personnel Wages & Salaries (RMEW), and Procurement & Construction (RMEP) in Real Military Expenditure (%)



Source: As in Figure 2.1.

Figure 2.4

Real Military Expenditure (RME), Personnel Wages & Salaries (RMEW),
and Procurement & Construction (RMEP) (DRS million, 1970 prices)



Source: As in Figure 2.1.

Table 2.1

Main Defence Indicators of the Balkan Countries

Country	1992 Population (million)	1992 Labour Force (million)	Average 1981-90 Military Expenditure (% of GDP)	Average 1981-90 Military Expenditure[3]	1990 Armed Forces per 1000 people	1991 Military and Civilian Personnel (% of Labour Force)	1991 Military Expenditure per Capita[3]
Albania	3.2[2]	-	4.8[5]	163	3.0	-	-
Bulgaria	8.5	4.49	3.6	1,439	8.2	-	-
Greece	10.3	3.87	6.5	2,740	20.1	5.8	202
Romania	22.7	12.00	1.3	1,142	5.6	-	-
Turkey	58.5	24.69	4.6	3,705	11.5	4.0	64
Yugoslavia[1]	23.8	-	3.7	2,655	-	-	-

Source: UN (1994), SIPRI (several years), and NATO (1992).

1. Former Yugoslavia.
2. The size of population of Albania is much less at the present. It is calculated that more than 500.000 people left the country during the last three years.
3. USD, 1980 prices and exchange rates.
4. USD, 1985 prices and exchange rates.
5. Average, for the years 1990-1991.

In Greece as well as Turkey the personnel cost is kept down at artificially low levels by using conscripts so that the defence burden does not reflect the true cost to the countries. Deger & Sen (1990, Table 2.2, p.16) estimated the true burden for the year 1985 at 8.5% of GDP for Greece and to 5.9% for Turkey. The next two columns of Table 2.1 measure the cost of the military sector in terms of human resources. It is evident that this cost is much higher for Greece than for any other Balkan country, and is particularly high given the profound and unfavourable demographic changes in Greece.[3] It is also indicative that in recent years military expenditure in real per capita terms in Greece, exceeds more than three times the corresponding figure for Turkey.

Table 2.2

Cumulative Figures of USA Post-War Aid to Greece and Turkey up to 1988 (USD million)

Country	ESF	MAP	FMS	
			T[1]	C[2]
Greece	0,0	1674.5	3059.5	1383.1
Turkey	1781.5	4844.2	3225.3	995.0

Source: Greek Ministry of Defense.

1. Treasury loans
2. Concessionary loans.

The military spending figures given in Table 2.1 represent payments actually made by the Balkan countries during the course of the respective fiscal years. They are based on the SIPRI (and NATO) definition of military expenditure which does not include the value of military assistance received from abroad.

Greece however has received substantial military assistance from its major allies, especially the USA. Throughout the post-war period, the four major assistance programmes

through which the USA provides weapons, training and other defence related services to Greece (and Turkey) are the Foreign Military Sales Program (FMS), the Economic Support Fund (ESF), The International Military Assistance Program (MAP) and the International Military Education and Training Program (IMET).[4]

Table 2.2 shows the total sums of the US aid to Greece and Turkey up to 1988 from the ESF, MAP and FMS programmes. The FMS program provides two categories of credits for the purchase of US military articles and services: loans on free marked terms (Treasury loans), and loans at a reduced interest rate, the so-called concessionary loans.

The Treasury loans have a 30-year repayment schedule, a 10-year grace period and must be absorbed within three (extendible to five) years. The interest rate on concessionary loans is usually half the going market rate, but they have a shorter repayment scheme of 12 years, a grace period of 5 years and the same absorption period of three to five years.

Although the repayment schedules are quite long, the interest rates on most of Greece's FMS contracts are on the high scale[5] and this places a heavy burden on Greece's defence budget today.

In Table 2.3 we present Greece's obligations for FMS repayments until 1996. Moreover, a careful examination of the 'Letters of Offer and Acceptance', signed by the two sides, shows that the general terms for the provision of these loans were rather unfavourable for Greece.[6]

Table 2.3

FMS Repayment Obligations of Greece, 1987-96 (USD thousand)

Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Principal	52,250	41,309	24,480	30,354	63,889	98,168	111,826	130850	148,949	156,888
Interest	162,356	179,669	183,188	182,988	179,930	175,046	169,348	161,531	152,080	141,641
Total	214,606	220,978	208,199	213,342	243,819	273,214	281,174	292,381	301,029	298,529

Source: Congressional Presentation for Security Assistance Program, Fiscal Year 1988, USGPO publication no. 174-295-1987, p. 137.

Military aid is also provided to Greece (and Turkey) from Germany on a grant basis in the context of the NATO alliance under the following schemes:

i. 18-month duration allowances (shares), consisting of 80% new German military products and 20% used material of the German armed forces. During 1963-1991, Greece has received 10 such shares amounting to 617 million DM.[7]

ii. 3-year lump-sum grants consisting of used military material. Greece has received 2 such grants amounting to 240 mil. DM and Turkey 3 grants of total value of 1460 million DM.

iii. Free consulting services to the Greek ministry for the purchase of German military products under national funding.

Finally, amounts ranging between 10 to 35 million of USD per year during the last decade, represent direct NATO funding for military constructions which serve common needs of both NATO and the Greek armed forces.

Greece has only recently started to develop its domestic defence industries in order to meet some of its basic requirements in military material and equipment. The creation of the Defence Industries Directorate within the Ministry of National Defence, in 1977, was the first step towards organizing Greece's defence industry. Today the state owned companies in the military sector include the Greek Powder and Cartridge Company (PYRKAL), the Hellenic Aerospace Industry (EAB) established in 1975, the Hellenic Arms Industry (EBO) established in 1977, the Hellenic Vehicle Industry (ELBO) established in 1972, and the Hellenic Shipyards S.A. established in 1956. Two other important state-owned shipyards, Elefsis and Neorion have been sold to the private sector.

However, the government effort to create a sound military industrial base in Greece cannot be considered as an economically successful experiment. Accumulated losses over the years now exceed 100 billion drachmas (1 USD = 240 DRS) for PYRKAL, EBO and EAB alone, not to mention the even greater operational losses of the shipyards. Table 2.4 provides the economic data for 1993, concerning the four key military industries of Greece. However,

the unsatisfactory performance of the state owned defence industries is mainly the result of bad management, and extensive overmanning. The present Greek government has decided that in view of its vital importance, the debt-ridden defence industry will remain for the time being under state control, except for the shipyards which are to be sold to the private sector.

Table 2.4

Economic Data on Greece's Four Key Defense Industries for 1993 (DRS, billion)

Industry	Turnover	Profit (Loss)	Personnel
PYRKAL	5.6	(10.0)	1400
EAB	24.1	2.6	3150
EBO	5.1	(11.5)	1200
ELBO	16.6	0.3	850

Source: *Greek Defense Directory*, 1994.

Besides the large state-owned military suppliers, there are also some 200 small and medium sized companies with anything from 20% to 80% of their capacity dedicated to military production. These companies are grouped under the auspices of the Association of Greek Producers of Defence Materials (SEKPY). The government efforts to expand the defence production sector are extended to the private sector, which has been invited to participate in the armed forces procurement program and also to invest in new facilities.

SEKPY was founded in 1982 by 20 companies with experience in the area of defence, and employing about 2000 people. Currently the members of SEKPY are almost one hundred, totalling a 20,000 full-time workforce. SEKPY member companies are organized, operated and managed in accordance with modern standards and practices and have been successfully evaluated by foreign organizations and manufacturers who undertake defence work. It is worth noting that the Greek defence industry, despite its rather modest size, produces a great

variety of equipment of the highest standards. Under the support of the Ministry of Defence, the military industry is becoming flexible, financially sound and internationally competitive. SEKPY maintains close contacts with NATO, NAMSA, WEAG, EU and other international organizations. It also assists foreign procurement agencies, foreign government departments and industries to locate Greek defence manufacturers and to provide relevant information. SEKPY also assists international defence contractors to locate suitable subcontractors in Greece for the implementation of any contractual obligations as regards offsets and industrial co-operation.[8]

3. MILITARY SPENDING AND MACROECONOMIC LINKAGES

Defence is a public good par excellence and inevitably almost all of military expenditure comes from the government budget.[9] At a national level any negative economic consequences of military spending must be balanced against positive effects in terms of fulfilling national security needs. Also, long-term growth rates are sensitive to budgetary imbalances and persistently high rates of military spending may contribute significantly to such a disequilibrium.

Since the pioneering contribution of Benoit (1973), there has been a growing interest in the relation between military spending and economic growth, not only in the developing but also in the developed countries. A number of researchers, using a variety of data sets, have pointed out, one way or another, the interconnections or trade-offs between military spending and the ingredients of economic growth and development.[10]

Two types of macro-statistical approaches have been used to evaluate the economic effects of military spending. Cross-section or pooled data studies which look at the differences or common characteristics of groups of nations on the one hand, and time series studies which examine the associations of military spending within one country over time on the other. Cross-section coefficients may provide more general conclusions on long-term effects, whereas time-series coefficients are more relevant in investigating short-term effects for policy purposes and decision making in a national setting.

From an econometric point of view, time-series single equation estimates of the relation between growth and defence, explain only the balanced direct effects or spin-offs, positive or negative. The main effects, however, are the indirect ones which operate through the feedback that military expenditure can have on the mobilization of physical and human resources, the availability of investment funds, the search for technological innovation, the balance of payments, inflation, employment, public deficits, the distribution of income etc., which combined with the direct effects will give the proper multiplier of military spending. Consequently the impact of military spending is better investigated within the context of a broader macroeconometric model.

Increased military spending can potentially have a direct positive effect on economic growth through increased capacity utilization, production and employment caused by Keynesian-type demand effects. On the supply side, however, the growth theory perspective postulates a trade-off between resources allocated to defence and other uses. If increased defence is at the cost of consumption - 'guns versus butter' - then the negative growth effect may be insignificant, although the short-term impact on consumer welfare will be greater. Extremely relevant to the demand, as well as to the supply side effects, are the externalities of military expenditure for the civilian economy. Such externalities can be positive or negative and must be properly accounted for, when attempting the net assessment of direct and indirect effects of military spending.

As it was mentioned earlier, military spending in Greece during the post war period was mainly determined by external threat and spillovers. Consequently, total budgeting, as well as the allocation of military expenditure, were not based on a growth accelerating perspective. However, planned defence and non-military spending equals expected government revenue plus the expected government deficit, and although we may consider that military spending is formulated independently of the fiscal policy and the macroeconomic performance, nevertheless, it is more likely that they are all interdependent.

In this section we look into the links of military spending with fiscal policy and macroeconomic performance by means of a small dynamic econometric model, along the lines suggested by Majeski (1992). The endogenous fiscal variables are real military expenditure (RME), real non-military expenditure (RNME), and the government deficit (DEF). As indicators of macroeconomic performance we use the real gross domestic product (RGDP), the inflation rate represented by the GDP deflator (PGDP), the general unemployment rate (UNR), and the real money supply (RM3).

However, the estimation of military expenditure on highly aggregated data raises considerable issues, resulting from the diversity of expenditures within the broad military establishment, which may have different spending priorities, different adjustment costs, and considerable variation in their impact on macroeconomic and welfare planning. For example,

allocations of expenditures to procurement of sophisticated weapons and military equipment, goes, to a large extent, to imports, at the expense of investment or current government expenditure. In contrast, military personnel expenditure goes directly to finance the pay, allowances, subsistence, insurance etc., of the employed military and civilian personnel, which may alleviate the demand for welfare programs. Moreover, the cost of imported weapons and military equipment is to the detriment of lower income groups and an inegalitarian taking from the worst-off sections of the population, contrary to personnel expenditures which help equalize the distribution of welfare benefits. Therefore, it is expected that the estimation of military expenditure at a disaggregated level will eliminate probable misspecification errors due to aggregation of military expenditures with different behavioural patterns, different adjustment parameters, and probably a different set of explanatory variables.

Separate equations are estimated for the following two components of military expenditure which are listed in the National Accounts of Greece:

i. Personnel expenditures : Wages and Salaries of military and civilian personnel.
ii. Procurement and Construction: Expenditure for acquisition and maintenance of weapons and military equipment, for construction and maintenance of the Department of Defence plant and equipment, and for fuel and supplies as well.

Data for the 1960-1992 period show that the share of personnel expenditures in total military expenditure exceeded by far the share of Procurement and Construction until 1973 (Figures 2.3 and 2.4, above). The situation was reversed from 1974 to 1979, but during the 1980s the share of wages and salaries started rising again.

As a first step, we estimated individual equations for all the endogenous variables of the following general ADL (m,n:k) form, using the general-to-specific methodology (Hendry, 1986):

$$M_t = a + \sum_{i=1}^{m} \lambda_i M_{t-i} + \sum_{i=1}^{k} \sum_{j=0}^{m} b_{ij} x_{i(t-j)} + \gamma.t + e_t$$

The estimation period is from 1960 to 1992. Unfortunately, although aggregate data on military expenditure are available since 1950, there are no disaggregated data before 1960. Due to sample size limitations, two lags have been initially introduced in each of the dependent and the explanatory variables which enter the individual equations. Non-significant lags were excluded on the basis of the F- and LR-tests for the validity of exclusion restrictions. After an efficient specification search, the more parsimonious representations were selected.

The estimated equations fitted the sample data well by standard criteria, and survived the usual battery of within-sample diagnostic tests, i.e. the LM-test for serial correlation, the Engle (1982) ARCH test for autoregressive conditional heteroskedasticity, the Jarque-Bera (1980) test for normality, the White (1980) test for heteroskedasticity, and the Ramsey (1969) RESET test for functional form. Table 3.1 summarizes the results of the diagnostic tests for each one of the estimated equations. Due to the small size of our sample, it was not feasible to evaluate properly the post-sample performance of the estimated equations.

As a second step, the individual equations were re-estimated within the context of a simultaneous equation system, using the estimation method of 3SLS. The significant gains in efficiency indicated the existence of correlation among the errors of the individual equations. Table 3.2 reports the final 3SLS estimates after the exclusion of certain lags which became insignificant when the individual equations were re-estimated as a system.

Real military spending on procurement and construction (RMEP) was considered as a function of external threat, spillovers, real gross domestic product (RGDP), and public deficits (DEF). As threat variable we introduced the military expenditure of Turkey (TURK) in constant dollars, and as spillovers the military expenditure of the NATO European countries, excluding Greece and Turkey , also in constant dollars. Both the threat and spillover variables, entered equation (1) in Table 3.2, in a contemporaneous way only. All lags were found insignificant. These effects may be explained by the fact that Greece and Turkey are both

members of NATO, and they have direct access to the same information, concerning procurement of weapons and military equipment. Consequently, they are expected to have a contemporaneous reaction. The negative sign of spillovers may be explained in the context of free riding, which of course is partially true, because Greece is, long ago, the heaviest defence spender among all members of the alliance in terms of shares in GDP. The real gross domestic product and the government deficit in the previous year are both significant explanatory variables and they have the expected signs.

Table 3.1
Equation Diagnostics

	Equations							
Diagnostic Tests	RMEP (1)	RMEW (2)	RNME (3)	DEF (4)	RGDP (5)	RGDP (6)	RM3 (7)	UNR (8)
R^2	0.953	0.979	0.994	0.989	0.995	0.999	0.998	0.957
DW	2.01	1.98	1.86	1.99	1.83	2.19	2.36	2.12
AR(1)&(2) (F)	1.24 (0.30)	0.85 (0.43)	0.76 (0.47)	0.07 (0.92)	0.02 (0.97)	0.41 (0.66)	2.35 (0.12)	0.83 (0.44)
ARCH-1 (F)	5.31* (0.03)	0.20 (0.65)	0.18 (0.67)	0.58 (0.45)	1.05 (0.31)	1.30 (0.26)	1.77 (0.20)	1.08 (0.30)
Normality (X^2)	2.21 (0.33)	2.22 (0.33)	1.30 (0.52)	2.97 (0.22)	0.32 (0.84)	2.28 (0.31)	1.19 (0.55)	5.21 (0.07)
Heteroscedasticity (F)	2.16 (0.09)	0.85 (0.59)	1.45 (0.24)	1.93 0.14	0.72 (0.69)	4.02** (0.009)	1.10 (0.46)	0.82 (0.61)
Functional Form (F)	0.22 (0.63)	3.56 (0.07)	0.34 (0.56)	4.66* (0.04)	0.81 (0.36)	0.31 (0.58)	0.36 (0.55)	0.75 (0.37)

Note: Numbers in parentheses indicate the probability of the null hypothesis. The names of the variables are summarized in the Appendix.

* The null hypothesis is rejected at the 0.05 level.
** The null hypothesis is rejected at the 0.01 level.

Table 3.2
3SLS, System Estimates, 1960 - 1992

(1) $RMEP_t$=	7099.4 (3.02)**	+	0.28 $RMEP_{t-1}$ (2.86)**	+	3.61 $TURK_t$ (6.22)**	-	0.19 $NATO_t$ (-4.23)**	+	0.03 $RGDP_t$ (4.19)**	+	0.01 DEF_{t-1} (7.25)**	.....	R^2=-0.960
(2) $RMEW_t$=	1519.2 (3.54)**	+	0.84 $RMEW_{t-1}$ (15.50)**	+	1412.4 $PGDP_t$ (2.67)**	-	1147.2 $PGDP_{t-1}$ (-2.14)*	-	244.9 UNR_t (-3.83)**	+	0.005 DEF_{t-1} (3.41**	.....	R^2=0.978
(3) $RNME_t$=	-1563.3 (-1.59)	+	0.92 $RNME_{t-1}$ (9.63)**	+	0.04 $RGDP_t$ (2.54)**	-	1140.6 $PGDP_t$ (-2.65)**	+	0.013 DEF_t (2.76)**			.....	R^2=0.993
(4) DEF_t=	-190700 (-3.65)**	+	1.19 DEF_{t-1} (8.02)**	-	0.38 DEF_{t-2} (-2.35)*	+	2.40 $RM3_t$ (5.28)**	+	6.7 RME_t (3.80)**	+	4.27 $RNME_t$ (2.36)*	.....	R^2=0.989
(5) $RGDP_t$=	23039.0 (3.43)**	+	0.76 $RGDP_{t-1}$ (7.95)**	+	0.28 $RM3_t$ (3.93)**	+	0.65 $RMEW_{t-1}$ (2.77)**	+	1.71 $RNME_{t-1}$ (3.52)**	+	0.82 $RMEP_{t-1}$ (2.06)*	.....	R^2=0.996
(6) UNR_t=	-0.05 (-2.00)*	+	0.86 UNR_{t-1} (9.23)**	-	2.8×10^{-4} $RMEW_t$ (-2.53)*	-	9.1×10^{-5} $RMEP_t$ (-1.38)	-	3.1×10^{-4} $RNME_t$ (-3.22)**	+	2.3 x 10-^{5} $RM3_t$ (3.94)**	.....	R^2=0.965
(7) $PGDP_t$=	0.054 (1.14)	+	0.58 $PGDP_{t-1}$ (7.21)**	+	0.05 UNR_t (5.17)**	-	7.78×10^{-6} $RM3_t$ (-6.13)**	+	9.94×10^{-6} $RM3_{t-1}$ (7.47)**	+	3.54×10^{-6} CG_t (6.27)**	.....	R^2=0.999
(8) $RM3_t$=	-31458 (-2.31)*	+	0.83 $RM3_{t-1}$ (6.39)**	+	7642.0 $PGDP_t$ (3.45)**	+	0.06 DEF_t (5.01)**	+	1158.0 RIR_t (2.68)*			.....	R^2=0.998

Note: Numbers in parentheses are the estimated values of the t-statistics.
The names of the variables are summarized in the Appendix.
* significant at the 0.05 level
** significant at the 0.01 level

Real military expenditure on personnel wages and salaries (RMEW) was considered as a function of only budgetary and macroeconomic variables, because the military in Greece operates under conscription and changes in wages and salaries of the military and civilian personnel are determined, at large, by the performance of the economy, the dynamics of inflation, and the government deficit. According to the results in equation (2) in Table 3.2, real spending on wages and salaries in the military sector follows the partial adjustment mechanism with a high adjustment parameter of 0.83. The positive long-run association of the dependent variable with price increases (1,487.3 - 1,211.9) it is not surprising, and reflects the significant gains of the military in terms of wages and salaries during the period considered. Because of the insignificant inflation until the mid-seventies, nominal increases were turned into real, and the more so during the years of dictatorship, when the military enjoyed higher increases than those in the civilian sector. During the eighties the policy of the socialistic governments towards real increases of wages in the public sector favoured further the positive association between RMEW and PGDP, while minor loses over the remaining shorter periods covered by our sample did not offset their positive relationship. The government deficits(surpluses until 1979), exercised a small influence on real wage policies and this is reflected in the estimated coefficient of DEF. Real GDP and the unemployment rate, both have the expected signs and they are statistically significant.

According to equation (3) in Table 3.2, real non-military expenditure is inelastic, and is significantly affected by real GDP, the inflation rate, and the public deficit. The signs of the explanatory variables are all in line with economic theory.

Real military expenditure (RME), has a comparatively higher effect on government deficits than real non-military expenditure (RNME), and this may be due to the procurement & construction component, which is import intensive. The negative coefficient of DEF_{t-2} is unexpected, and probably reflects some complexity in the dynamics of public deficits, which is not captured completely by the two lags introduced in the equation.

Real military spending on procurement & construction had an insignificant effect on real GDP and the unemployment rate during the period considered, contrary to the wages and

salaries component, which exhibited ,approximately, the same significant effect with real non-military expenditure on both aggregates. In general, the positive impact of real military spending on real economic activity reflects the fact that moderate increases in real milex during the sixties and seventies were coupled with high rates of real GDP growth(and almost zero unemployment), resulting thus to a strong positive association between the two aggregates, which has not been reversed by their negative association in the eighties.

Finally, one can not spot surprises in the remaining equations, except the positive effect of unemployment on inflation, which, nevertheless, reflects the persistent stagflation which prevailed in the economy after the second oil crisis. In general there is evidence of direct association between defence spending fiscal policy and economic performance whereas there are also indirect effects through the dynamics of the model and the money supply which is the crucial intervening variable. It seems though that the real dynamic interplay between defence spending, fiscal policy, and economic performance, obeys a much richer dynamic structure than the one expressed by the present model.

4. ECONOMIC EFFECTS OF DISARMAMENT

4.1. The General Framework

This section focuses on the investigation of the effects of alternative defence policies for a gradual disarmament on the main macroeconomic aggregates. More specifically, the macroeconomic impact of alternative disarmament scenarios is estimated within the framework of a large-scale macroeconomic model. The model employed here is the current version of the macroeconometric model (MYKL) which is used by the Centre of Planning and Economic Research for policy evaluation and forecasting purposes including the preparation of the LINK forecasts.

MYKL is an annual demand driven macroeconomic model of the Greek economy following the Keynesian tradition (Karadeloglou and Koutsouvelis, 1991). In its present form, it consists of ninety stochastic equations and about 250 identities. MYKL includes only the real and nominal sectors of the economy while the monetary sector is considered exogenous. Nevertheless, the main channels through which the monetary sector influences the former two sectors of the economy are incorporated into the equations concerning consumption, investment and prices.[11]

The objective is to analyze the economic implications of alternative uses of resources currently employed by the military sector. In the light of the results of the previous section, we treat defence spending as exogenous. Military spending is introduced into the model as part of government consumption. Government consumption is disaggregated into two sectors, that is, the civilian sector and the military sector. The civilian sector is subdivided into two smaller categories; civilian wages and salaries on the one hand, and goods and services on the other. The latter, that is military expenditure, is also divided into two categories; one is

expenditure on wages and salaries and the other is expenditure on military equipment and construction.

The two categories of military spending have certain characteristics which can affect not only the economic effects of changes in total military expenditure but also the effects of changes in the cost structure of the military sector (Gleditsch et al., 1994). The most significant characteristic relates to the different import content of each spending category. Military equipment is to a large extent imported since Greece has no significant defence industrial production, whereas military expenditure on wages and salaries has no import content. As a result, changes in each of these expenditure categories will have considerably different implications because of their import content. Changes in expenditure for wages and salaries will only have an indirect effect on imports, through their impact on consumer demand, just like its civilian counterpart.

Apart from the imports mechanism, changes in military expenditure are also expected to affect the level of macroeconomic aggregates through their impact on labour demand. The shares of wages and salaries in government spending are quite different in the defence and the civilian sectors, the latter being considerably greater. Thus, replacing military by civilian expenditure will have a direct impact on demand for labour and on the level employment even though the overall government spending may remain unchanged.

Coming to the significance of these mechanisms for the Greek economy, one must emphasize that data for military expenditure spent on imports are not published by Greek National Accounts. According to SIPRI figures, imports represent about 25% of military expenditure on equipment and construction, whereas unpublished data of the Bank of Greece indicate an average of about 50% for the import share. In what follows, our scenarios are based on the data of the Bank of Greece which approximate closer to the actual figures. With regard to the wage content of military and non-military spending, it suffices to mention that, on average, about 50% of military spending is directed toward wages and salaries in the military sector, while its counterpart for the civilian sector is about 70%. Thus, spending in these two sectors has different implications for employment.

Having defined the general framework, the next section is devoted to the formulation of specific scenarios for disarmament.

4.2. Alternative Disarmament Scenarios

The macroeconomic consequences of three alternative disarmament scenarios are investigated in terms of deviations from a basic or reference scenario. The simulation period covers the years up to 2000. In the reference scenario, total military expenditure is assumed to remain approximately unchanged in real terms, as its nominal counterpart grows roughly in line with the public consumption deflator.

Both in the reference and the disarmament scenarios, employment in the military sector is assumed to remain unchanged at the current 1994 levels. Although this assumption may be regarded as questionable, given lack of data and also of estimates on the technical substitution possibilities between capital and labour inputs in the defence sector any other assumption may be arbitrary.

The disarmament scenarios assume that the growth rate of the nominal military expenditure is reduced by five percentage points annually during the simulation period 1995-2000. Furthermore, disarmament, in all the three scenarios, is assumed to take place by reducing only one of the two available categories of military expenditure, that is, the one concerning construction and procurement of equipment.

Given the above general assumptions we define the following three scenarios: (a) a public consumption scenario, (b) a public investment scenario and (c) a taxation scenario. According to the former two scenarios, the resources freed by the reductions in military spending in real terms are replaced by increased spending either in civilian public consumption which the government may regard as being a high social priority, or in

government investment in order to improve the economic infrastructure and the potential output of the economy. The third scenario is designed to indicate what happens when military expenditure is accompanied by an equal reduction in tax revenue. This reduction is assumed to take place in the form of lower personal income taxes. Such a tax cut is equivalent to a downward shift in the corresponding tax function. This, of course, does not affect the personal income tax rates which are of special importance since personal taxes are levied according to the individual and family characteristics of each taxpayer. This assumption is made only for simplification purposes.

Based on the characteristics of military expenditure set out in the previous section, substituting civilian government consumption for military expenditure (the consumption scenario) is accompanied by an exogenous reduction in imports by 50% of the amount of disarmament, and also an increase in employment since the civilian government product is more labour intensive. In the case of the other two scenarios, military spending cuts are accompanied only by a reduction in imports.

In none of the disarmament scenarios, will there be any direct effects on the budget balance. This is because, in the case of the first two scenarios, there is only a reallocation of total government expenditure between different categories while, in the tax scenario, there takes places a contemporaneous reduction in both taxes and expenditure. Of course, there may be some indirect effects since consumption and investment expenditure have different effects on the economy from those of military spending, with the result that the final impact on budget deficit will not be zero.

4.3. Simulation Results

The disarmament scenarios described above are incorporated into the macroeconomic model in order to study their effects on the main macroeconomic variables. Empirical results

are presented in Tables 4.1 to 4.4. Table 4.1 presents forecasts according to the reference scenario and Tables 4.2 to 4.4 show the effects of the three disarmament scenarios on a number of macroeconomic indicators in the form of percentage deviations from the basic scenario.

The reduction in real military spending by the year 2000, is about 28% with respect to the reference scenario, in all cases. As a general comment one could point out that the disarmament effects seem to be of the expected order of magnitude, bearing in mind the fact that Greece is a very open economy, and as a result multipliers are relatively small (Karadeloglou & Koutsouvelis, 1991). The shift in demand in the year 2000 is nearly one percentage point of GDP since the share of military spending in GDP falls from 4.8% in 1994 to about 4% in the year 2000.

The consumption scenario leads to an increase in non-military government consumption which rises constantly throughout the simulation period (Table 4.2). This effect comes from two factors. One is the resulting increase in the purchases of goods and services in the government sector and the other is the reduction in the rate of unemployment due to the direct impact of this scenario on demand for labour by the civilian sector of the government. In the external sector, there is a reduction in imports resulting from expenditure cuts in military equipment which is largely imported. As a consequence, there is an improvement in the balance of goods and services since exports present only marginal changes. The rising level of employment affects household incomes which have a positive impact on private consumption. The developments in the balance of payments and employment lead to increases in the gross domestic product. Through the Phillips curve, the declining rate of unemployment exerts a positive influence on wages which increase with respect to the reference scenario. The higher level of aggregate demand which is mainly brought about by net exports seems to have a small but positive effect on the private consumption deflator. However, the effect on prices is smaller than that on wages, leading to a lower competitiveness due to real wage increases. This, in turn, has a small negative influence on exports and also on private investment because of reduced profit margins.

Table 4.1

Developments under the Reference Scenario, 1994-2000

	Constant prices DRS million	Percentage changes					
	1994	1995	1996	1997	1998	1999	2000
Gross Domestic Product	511,324	1.6	2.1	2.2	2.4	3.1	3.8
Private Consumption	426,894	1.7	1.9	2.0	1.1	1.4	1.3
Civilian Government Consumption	24,311	0.8	1.2	-0.1	0.5	-0.1	0.8
Military Government Consumption	71,151	0	0.1	0.4	0.3	0	-0.3
Private Investment	62,170	3.3	4.8	6.3	4.8	3.7	6.1
Government Investment	31,806	7.5	9.0	11.2	12.5	13.5	8.0
Exports	171,998	4.4	5.6	6.0	5.7	5.4	5.7
Imports	242,973	3.9	5.2	4.6	4.5	3.4	3.6
Unemployment Rate (%)	9.9	3.1	1.5	3.5	2.6	-3.6	-0.1
VARIABLES IN CURRENT PRICES							
Deflator of Private Consumption		7.8	5.7	3.7	3.6	3.2	3.3
Wage Rate (DRS)	3,794	9.0	6.4	4.8	5.8	4.7	5.3
Balance of Goods and Services	-1,770,994	7.1	5.5	9.1	5.2	5.1	0.5

Table 4.2

Macroeconomic Effects of Disarmament: The Consumption Scenario, 1995-2000

	Percentage deviations from reference scenario					
	1995	1996	1997	1998	1999	2000
VARIABLES IN CONSTANT PRICES:						
Gross Domestic Product	0.0	0.1	0.2	0.3	0.4	0.5
Private Consumption	0.1	0.2	0.2	0.2	0.2	0.3
Civilian Government Consumption	1.6	3.2	4.8	6.4	8.0	9.6
Military Government Consumption	-4.6	-9.1	-13.4	-17.6	-21.5	-25.3
Private Investment	-0.1	-0.4	-0.5	-0.6	-0.5	-0.4
Government Investment	0.0	0.0	0.0	0.0	0.0	0.0
Exports	0.0	0.0	0.0	-0.1	-0.1	-0.2
Imports	-0.3	-0.7	-1.1	-1.4	-1.7	-2.1
Unemployment Rate	-1.8	-4.1	-6.1	-8.3	-11.1	-13.2
VARIABLES IN CURRENT PRICES:						
Deflator of Private Consumption	0.2	0.5	0.8	1.1	1.5	2.0
Wage Rate	0.3	0.7	0.9	1.3	1.7	2.1
Balance of Goods and Services	-0.6	-1.5	-2.4	-3.0	-3.4	-3.7

Table 4.3

Macroeconomic effects of Disarmament: The Investment Scenario, 1995-2000

	Percentage deviations from reference scenario					
	1995	1996	1997	1998	1999	2000
VARIABLES IN CONSTANT PRICES:						
Gross Domestic Product	0.1	0.27	0.46	0.65	0.82	0.96
Private Consumption	0.0	0.1	0.1	0.1	0.2	0.2
Civilian Government Consumption	-0.2	-0.4	-0.5	-0.5	-0.5	-0.4
Military Government Consumption	-4.6	-9.1	-13.4	-17.6	-21.5	-25.3
Private Investment	0.0	0.1	0.2	0.4	0.7	0.9
Government Investment	3.3	5.9	7.9	9.2	10.0	10.9
Exports	0.0	0.0	0.0	0.0	0.0	-0.1
Imports	-0.2	-0.5	-0.9	-1.1	-1.4	-1.7
Unemployment Rate	-0.7	-1.7	-2.8	-3.9	-5.2	-6.2
VARIABLES IN CURRENT PRICES:						
Deflator of Private Consumption	0.0	0.0	0.1	0.2	0.4	0.7
Wage Rate	0.0	0.0	0.1	0.2	0.4	0.7
Balance of Goods and Services	-0.9	-1.9	-2.9	-3.8	-4.6	-5.3

Table 4.4

Macroeconomic Effects of Disarmament:: The Tax-Cut Scenario, 1995-2000

	Percentage deviations from reference scenario					
	1995	1996	1997	1998	1999	2000
VARIABLES IN CONSTANT PRICES:						
Gross Domestic Product	0.0	0.1	0.3	0.6	0.8	1.0
Private Consumption	0.1	0.3	0.5	0.9	1.2	1.5
Civilian Government Consumption	-0.7	-0.1	0.1	0.1	0.2	0.3
Military Government Consumption	-4.6	-9.1	-13.4	-17.6	-21.5	-25.3
Private Gross Investment	0.0	-0.1	0.1	0.4	0.8	1.3
Government Investment	0.0	0.0	0.0	0.0	0.0	0.0
Exports	0.0	0.0	0.0	0.0	0.0	0.0
Imports	-0.3	-0.7	-1.0	-1.3	-1.5	-1.7
Unemployment Rate	0.2	-0.6	-1.8	-3.3	-5.1	-6.6
VARIABLES IN CURRENT PRICES:						
Deflator of Private Consumption	0.0	0.1	0.1	0.2	0.4	0.7
Wage Rate	0.0	0.1	0.1	0.2	0.4	0.8
Balance of Goods and Services	-1.2	-2.5	-3.6	-4.4	-4.9	-5.1

In the investment scenario, disarmament is accompanied by an equal increment in public investment. The dual role of investment, both as a component of aggregate demand and as a determinant of potential output, has a positive impact on the economy (Table 4.3). The increases in investment, via the multiplier, have a positive impact on economic activity which, in turn, leads to a higher level of employment . Then, lower unemployment rates have a marginal effect on wage rates. The balance of goods and services is positively affected by a significant increase in imports which, in this scenario is the result of both higher economic activity as well as the reduction of spending on military equipment which has a high import content.

In the tax scenario, private consumption is increased because of the reduction in personal income taxes which raises disposable incomes (Table 4.4). This has a positive impact on economic activity and GDP which, in turn, has a positive influence on the level of employment. Higher wage rates are the result of lower rates of unemployment. The decline in the level of imports leads to improvements in the balance of goods and services. Finally, higher wage rates and employment increase the pressure of demand, pulling prices upward.

5. CONCLUSIONS

In this paper we first presented certain aspects of the strategic environment within which the Greek defence policies are formulated, second, we investigated the interrelations of defence spending with fiscal policy and economic performance, and, finally, we made an effort to assess the macroeconomic effects of some alternative disarmament scenarios.

The relationship between defence spending, budgetary policy and macroeconomic performance appears to be a simultaneous one with a rather complex dynamic structure. The disaggregation of military expenditure in two components - procurement & construction and personnel wages & salaries - is essential since the two spending categories have different behavioural patterns, and, hence, different associations with fiscal policy and macroeconomic performance. Expenditure for procurement of weapons and military equipment depends on budgetary policy, macroeconomic performance, threat and spillovers, whereas expenditure on wages and salaries is mainly determined by fiscal policy, the business conditions and the dynamics of inflation.

Real military spending exerts a favourable effect on real economic activity and unemployment through the wages and salaries component. Procurement & construction has also a positive but insignificant effect.

In the fourth section we make a further attempt to investigate the macroeconomic implications of three alternative disarmament scenarios, using a large-scale macroeconomic model. Apart from recent international changes towards peace and disarmament, such an empirical exercise is even more interesting for the Greek case because the continuous efforts of Greece to keep up with the military build-up of Turkey have contributed to the slowdown that Greek economy has experienced during the last twenty years, which is in sharp contrast to its previous economic performance.

The macroeconomic effects of alternative uses of economic resources currently employed in the military sector are positive, although not very large. More specifically,

reallocating government resources from the military sector toward civilian purposes leads to a greater employment level, a higher domestic output and an improvement in the balance of payments. The economic implications of the investment scenario for gross domestic product and the external sector are significantly better than those of the consumption scenario. On the contrary, in terms of the rate of unemployment, it is the latter scenario that performs better. When the reduction in military spending is accompanied by equivalent tax cuts, the economic consequences are generally positive, and not very different from those of the other scenarios.

The economic implications of all the disarmament scenarios considered in this work tend to be relatively small. This is so mainly because the magnitude of multipliers is rather small since Greece is a very open economy. The direct impact of the three disarmament scenarios on the budget balance is zero since the respective changes in the civilian government expenditure and taxation were designed to be equal to those in the military expenditure. The indirect impact on budget deficit, though non-zero, it appears to be marginal in all cases.

Due to the Keynesian characteristics of the econometric model, the supply-side effects of the above simulations are not taken into account. In consequence, the macroeconomic effects of the investment scenario tend to be underestimated, while those of the taxation scenario may be overestimated. Of course, the simulation results are also affected by all the other limitations which the macroeconomic model is subject to and, therefore, the results presented here should only be considered as a first approximation.

6. APPENDIX

(Variables and Data Sources)

RMEP Real Military Expenditure on Procurement & Construction

RMEW Real Expenditure on Personnel Wages & Salaries in the Defence Sector

RME RMEP + RMEW

RNME Real Non-Military Expenditure

RGDP Real Gross Domestic Product

PGDP Gross Domestic Product Deflator

CG Current Government Expenditure

Source: National Accounts of Greece, 1958-1975, and various years

DEF Government Deficit (negative figures indicate deficits and positive figures surpluses)

UNR General Unemployment Rate

RM3 Real Money Supply (M3)

RIR Real Interest Rate in Commercial Banks

Source: Bank of Greece, yearly data, 1958-1992

7. REFERENCES

Benoit, Emile, 1973. *Defense and Economic Growth in Developing Countries*, Boston, D.C. Heath: Lexington Books, Heath.

Bischak, Gregory, A, ed., 1991. Towards a Peace Economy in the United States : Essays on Military Industry, Disarmament and Economic Conversion, London, etc.: Macmillan.

Bremen, Stuart & Barry B. Hughes, 1990. *Disarmament and Development: A Design for the Future*? Englewood Cliffs, NJ: Prentice Hall.

Brun, Anke; Luutz Baehr and Hans J. Karpe, eds, 1992. *Conversion: Opportunities for Development and Environment*, Berlin: Springer.

Cappelen, Adne; Nils Petter Gleditsch & Olav Bjerkhold, 1984. 'Military Spending and Economic Growth in the OECD Countries', *Journal of Peace Research*, vol. 21, no. 4, November, pp. 361-373.

Chan, Steve, 1985. 'The Impact of Military Spending on Economic Performance: A Survey of Evidence and Problems', *Orbis*, vol. 29, no. 2, pp. 403-434.

Chan, Steve, 1987. 'Military Expenditure and Economic Performance', in *World Military Expenditures and Arms Transfers*, 1986, Washington, DC: US Government Printing Office, for ACDA, pp. 29-37.

Chan, Steve, 1992. 'Defense, Welfare and Growth', pp. 1-20, in Chan and Mintz, eds.

Chan Steve & Alex Mintz, eds, 1992. *Defense, Welfare and Growth*, London: Routledge.

Chaterji, Manas & J. Brauer, eds, 1991. *Economic Issues of Disarmament*, New York: New York University Press.

Chatterji, Manas & L. R. Forcey, eds, 1992. *Disarmament, Economic Conversion, and Management of Peace*, New York: Preager.

Deger, Saadet, 1986. Military Expenditure in Third World Countries: The Economic Effects, London, etc.: Routledge & Kegan Paul.

Deger, Saadet, 1990. 'The Economic Costs and Benefits of U.S.-Turkey Military Relations', Chapter 13, pp. 243-267, in Jane M.O., Sharp, ed. *Europe After an American Withdrawal: Economic and Military Issues*. Oxford: Oxford University Press for SIPRI.

Deger, Saadet & Somnath Sen, 1984. *On the Publicness of Defense in Developing Countries*. Mimeo: University of Birmingham.

Deger, Saadet & Somnath Sen, 1990. *Military Expenditure: The Political Economy of International Security*, New York: Oxford University Press for SIPRI.

Doornik, Jurgen, A. and David F. Hendry, 1994. *P.C. Give Professional 8.0 : an Interactive Econometric Modelling System.* London: International Thomson Publishing.

Eichenberg, Richard, C., 1992. 'Do We Yet Know Who Pays for Defense?', Chapter 13, in Chan & Mintz, eds.

Engle, Robert, F., 1982. 'Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of United Kingdom Inflation', *Econometrica*, vol. 50, no. 4, July, pp. 987-1007.

Gleditsch, Nils Petter, 1992. 'The Future of Nordic Military Spending', Special Issue of *Cooperation and Conflict*, vol. 27, no. 4, December.

Gleditsch, Nils Petter; Hakan Wiberg and Dan Smith, 1992. 'The Nordic Countries : Peace Dividend or Security Dilemma?', *Cooperation and Conflict*, vol. 27, no. 4, December.

Gleditsch, Nils Petter; Adne Cappelen and Olav Bjerkholt, 1994. *The Wages of Peace: Disarmament in a Small Industrialized Economy*, London, etc.: SAGE.

Gonzalez, R. & S. Mehay, 1990. 'Publicness, Scale, and Spillover Effects in Military spending', *Public Finance Quarterly*, vol. 18, no 3: pp. 273-290.

Greek Defence Directory, 1994. Athens : Delos Communications.

Hartley, Keith & Nicholas Hooper, 1990. *The Economics of Defense, Disarmament, and Peace: An Annotated Bibliography*, Aldershot & Brookfield, VT: Elgar.

Hartley, Keith & Todd Sandler, eds, 1990. *The Economics of Defence Spending*. London: Routledge.

Hendry, David, F., 1986. Empirical Modelling in Dynamic Econometrics', Applied Economics Discussion Paper no. 1, University of Oxford.

Isaard, Walter and Charles H. Anderton, 1992a. 'Survey of the Peace Economies Literature', Chapter 1, pp. 1-55 in Isaard & Anderton, eds.

Isaard, Walter and Charles H. Anderton, eds, 1992b. *Economics of Arms Reduction and the Peace Process: Contributions from Peace Economics and Peace Science*, Amsterdam, etc.: Elsevier/North Holland.

Jarque, Carlos M. & Anil K. Bera, 1980. 'Efficient Tests for Normality, Heteroscedasticity and Serial Independence of Regression Residuals', *Economics Letters*, vol. 6, no. 3, pp. 255-259.

Karadeloglou Pavlos & Panagiotis Koutsouvelis, 1991. *Macroeconometric Model KEPE - LINK*, Athens: Centre of Planning and Economic Research.

Kennedy, Gavin, 1983, *Defense Economics*. New York: St. Martin's.

Klein, Lawrence. & Warwick McKibbin, eds, 1995. *Arms Reduction and Economic Development in the Post Cold War Era*, -----: United Nations University Press.

Kollias, Christos, 1995. Country Survey VII: 'Military spending in Greece', *Defence and Peace Economics*.

Lazaretou, Sofia & Panagiotis Kappopoulos, 1993. 'Modelling the Demand for Greek Defence Expenditure : an Error Collection Approach', *Cyprus Journal of Economics*, vol. 6, no. 1, pp. 73-86.

Lindgren, Goran, 1988. 'Armaments and Economic Performance', Chapter 8, pp. 169-197 in Wallensteen, ed.

Looney, Robert, E., 1986. *The Political Economy of Latin American Military Expenditures*. Lexington, MA: Lexington Books, Heath.

Majeski, Stephen, J., 1992. 'Defense Budgeting, Fiscal Policy and Economic Performance', pp. 217-237 in Mintz ed.

McGuire, Martin, C., 1983. *Foreign Assistance, Investment, and Defense: A Methodological Study with an Application to Israel, 1960-70*. Paper presented at the Seventh World Congress of the International Economic Association, Madrid, September.

Mckinlay, R. D., 1989. *Third World Military Expenditure*. London: Pinter.

Mintz, Alex, ed. 1992. The Political Economy of Military Spending in the United States, London: Routledge.

Mintz, Alex & Chi Huang, 1990, 'Defence Expenditures Economic Growth and the Peace Dividend', *American Political Review*, vol. 84, pp. 1283-1293.

Mosley, Hugh, G., 1985. The Arms Race: *Economic and Social Consequences*. Lexington, MA: Heath.

NATO, 1992. *NATO Review*, Brussels.

Platias, Athanassios, G., 1990. 'Costs and Benefits of the US Military Bases in Greece', Chapter 12 in Jane M.O., Sharp, ed. *Europe After an American Withdrawal : Economic and Military Issues,* Oxford: Oxford University Press for SIPRI.

Ramsey, J. B., 1969, 'Tests for Specification Errors in Classical Linear Least-squares Regression Analysis', *Journal for Royal Statistical Society*, Series B, vol. 31, pp. 350-371.

Rozakis, Christos, 1989. 'An Analysis of the Legal Problems in Greek-Turkish Relations, 1973-1988', pp. 193-251, in *Hellenic Foundation for Defense and Foreign Policy, Yearbook 1989*,.

Schmidt, Christian & Frank Blackaby, eds, 1987. *Peace, Defense and Economic Analysis*, Basingstoke: Macmillan.

Smith, R., 1989. 'Models of Military Expenditure', *Journal of Applied Econometrics*, vol. 4. no. 4, October-December, pp. 345-349.

Stathis, Theodoros, C., *Η Εθνική Αμυνα* (i.e. The National Defense sector), Athens: Νέα Σύνορα.

Stavrinos, Vassilios, G., 1992. 'Defence Expenditures in Arms Competition : Modelling and Causality Analysis', *Greek Economic Review*, vol. 14, no. 1, pp. 115-128.

UNIDIR, 1993. *Economic Aspects of Disarmament: Disarmament as an Investment Process,* UNIDIR/92/94, U.N. publication No. A/47/150, New York: U.N. for United Nations Institute for Disarmament Research.

United Nations, 1994. *Human Development Report*, New York.

Wallensteen, Petter, ed, 1988. *Peace Research, Achievements and Challenges*, London: Westview.

White, H., 1980. 'A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity', *Econometrica*, vol. 48, no. 4, May, pp. 817-838.

BIOGRAPHICAL NOTE

ATHANASSIOS BALFOUSSIAS, b. 1947, Ph.D. (University of York, UK); Research Fellow, Department of Economic Modelling, Centre of Planning and Economic Research (Athens). Most recent book: *Fiscal Developments in Greece during the 80's* (KEPE, 1993).

VASSILIOS G. STAVRINOS, Associate Professor, Quantitative Economics, Harokopion University of Athens. Current research interests: Defense Economics, and Employment, Real Wages and Welfare Patterns over the Business Cycle.

NOTES

1. See Platias (1990) for an evaluation of the costs and benefits of the US presence in Greece and Deger (1990) for an analogous evaluation on the part of Turkey.

2. The Agreement on Defence and Economic Co-operation (DECA) - signed in 1983 as a result of hard negotiations on the future and the status of the US military bases in Greece - states that the USA undertake a contractual obligation to preserve the balance of military power in the region. It has also been agreed that by end of 1989 the US bases in the greater Athens area - i.e. those at Hellinikon and Nea Makri - will be closed. Thus, since 1990, the only US base in operation is the one at Souda Bay in Crete.

3. The population of Turkey, for example, is already six times the population of Greece. Moreover, the population of Turkey was growing at a rate of 2.3% per year in the 1980s, with 35% of its population under 15 years, in comparison to the annual growth rate of 0.5% for Greece and a percentage of only 20% of its population under 15 years.

4. The FMS program helps to finance foreign governments' purchase of US defence articles and services. The ESF program provides assistance to countries of special military, political and economic significance. MAP provides grant funding for defence articles and services and IMEP provides instruction in US doctrine to foreign military personnel also on a grant basis.

5. Some of these interest rates are higher than 11%, whereas, today, the free market lending rate is around 5%.

6. For a more detailed accounting of the economic, military and political repercussions of the FMS programmes to Greece, see Platias (1990, pp. 231-37) and Stathis (1992, ch. 3).

7. Turkey received 15 such shares valued at 1450 million DM during the same period.

8. For a more comprehensive reference concerning the Greek defence industry, see *Greek Defence Directory* (1994).

9. See Kennedy (1983) & Eichenberg (1992) for theoretical reasoning and McGuire (1983), Deger & Sen (1984) and Gonzalez & Mehay (1990) for empirical tests on the issue.

10. For comprehensive bibliographies in English see Klein and McKibbin (1995), Gleditsch et al. (1994), and Hartley & Hooper (1990). General surveys for the effects of military expenditure on growth and development are given in Cappelen et al. (1984), Chan (1985, 1987, 1992), Mosley (1985), Lindgren (1988), Smith (1989), Isaard & Anderton (1992), and UNIDIR (1993). A number of books provide also theoretical reasoning and comprehensive descriptions of the existing empirical studies of military expenditure: Deger (1986), Looney (1986), McKinlay (1989), and Bremer & Hughes (1990). Recent collections of articles include Schmidt & Blackaby (1987), Wallensteen (1988), Hartley & Sandler (1990), Bischak (1991), Chatterji & Brauer (1991), Chan & Mintz (1992), Chatterji & Forcey (1992), Isaard & Anderton (1992a), Mintz (1992) and Brun et al. (1992).

11. In the real sector, the short-run equilibrium is determined via the Keynesian multiplier, while the accelerator principle determines the medium term dynamics of the model. Private consumption is determined by disposable income, prices and interest rate. Private investment, excluding dwellings, is mainly influenced by GDP, capacity utilization and the profit rate. The growth rates of GDP and import prices determine changes in inventories. Imports are affected by domestic demand and relative prices, while exports by foreign demand and competitiveness. Employment is determined by GDP growth. Real sector equilibrium is obtained by starting from aggregate demand via which the model determines the national value added. The latter, in turn, determines employment, productivity and disposable incomes which, then, affect consumption and investment, thus determining the new level of aggregate demand. In the nominal sector, the wage rate equation is an augmented Phillips curve. A mark-up equation based on effective cost is used for the GDP deflator, using an error correction mechanism. Foreign trade prices are based on the assumption that Greece is neither a price-taker nor a price-setter, so that they are affected both by domestic and international prices.

IN THE SAME SERIES

No 1 G. Alogoskoufis, Competitiveness, Wage Rate Adjustment and Macroeconomic Policy in Greece. Athens, 1990 (in Greek).

No 2 L. Athanassiou, Adjustments to the Gini Coefficient for Measuring Economic Inequality. Athens, 1990.

No 3 J. Dutta and H. Polemarchakis, Credit Constraints and Investment Finance: Evidence from Greece. Athens, 1990.

No 4 C. Kanellopoulos, The Underground Economy in Greece: What Official Data Show. Athens (in Greek 1990 - in English 1992).

No 5 N. Antonakis and D. Karavidas, Defense Expenditure and Growth in LDCs - The Case of Greece, 1950-1985. Athens, 1990.

No 6 J. Geanakoplos and H. Polemarchakis, Observability and Constrained Optima. Athens, 1992.

No 7 L. Athanassiou, Distribution Output Prices and Expenditure. Athens, 1992.

No 8 N. Christodoulakis, Certain Macroeconomic Consequences of the European Integration. Athens, 1992 (in Greek).

No 9 V. Rapanos, Technological Progress, Income Distribution and Unemployment in the less Developed Countries. Athens, 1992.

No 10 V. Rapanos, Joint Production and Taxation. Athens, 1992.

No 11 D. Maroulis, Economic Analysis of the Macroeconomic Policy of Greece during the Period 1960-1990. Athens, 1992 (in Greek).

No 12 C. Kanellopoulos, Incomes and Poverty of the Greek Elderly. Athens, 1992.

No 13 G. Agapitos and P. Koutsouvelis, The VAT Harmonization within EEC: Single Market and its Impacts on Greece's Private Consumption and Vat Revenue. Athens, 1992.

No 14 C. Carabatsou-Pachaki, Elaboration Principles/Evaluation Criteria for Programmes. Athens, 1992 (in Greek).

No 15 C. Carabatsou-Pachaki, Reforming Common Agricultural Policy and Prospects for Greece. Athens, 1992 (in Greek).

No 16 P. Paraskevaides, Effective Protection, Domestic Resource Cost and Capital Structure of the Cattle Breeding Industry. Athens, 1992 (in Greek).

No 17 Cl. Efstratoglou, Export Trading Companies: International Experience and the Case of Greece. Athens, 1992 (in Greek).

No 18 C. Carabatsou-Pachaki, Rural Problems and Policy in Greece. Athens, 1993.

No 19 St. Balfoussias, Ordering Equilibria by Output or Technology in a Non-linear Pricing Context. Athens, 1993.

No 20 St. Balfoussias, Demand for Electric Energy in the Presence of a two-block Declining Price Schedule. Athens, 1993.

No 21 P. Paraskevaides, Regional Typology of Farms. Athens, 1993 (in Greek).

No 22 P. Paraskevaides, Evaluation of Regional Development Plans in the East Macedonia-Thrace's and Crete's Agricultural Sector. Athens, 1993 (in Greek).

No 23 C. Eberwein and Tr. Kollintzas, A Dynamic Model of Bargaining in a Unionized Firm with Irreversible Investment. Athens, 1993.

No 24 P. Paraskevaides, Income Inequalities and Regional Distribution of the Labour Force Age Group 20-29. Athens, 1993 (in Greek).

No 25 A. Gana, Th. Zervou and A. Kotsi, Poverty in the Regions of Greece in the late 80's. Athens, 1993 (in Greek).

No 26 Z. Georganta, The Effect of a Free Market Price Mechanism on Total Factor Productivity: The Case of the Agricultural Crop Industry in Greece. Athens, 1993.

No 27 H. Dellas, Recessions and Ability Discrimination. Athens, 1993.

No 28 Z. Georganta, Accession in the EC and its Effect on Total Factor Productivity Growth of Greek Agriculture. Athens, 1993.

No 29 H. Dellas, Stabilization Policy and Long Term Growth: Are they Related? Athens, 1993.

No 30 Z. Georganta, Technical (In)Efficiency in the U.S. Manufacturing Sector, 1977-1982. Athens, 1993.

No 31 P. Paraskevaidis, The Economic Function of Agricultural Cooperative Firms. Athens, 1993 (in Greek).

No 32 Z. Georganta, Measurement Errors and the Indirect Effects of R & D on Productivity Growth: The U.S. Manufacturing Sector. Athens, 1993.

No 33 C. Carabatsou-Pachaki, The Quality Strategy: A Viable Alternative for Small Mediterranean Agricultures. Athens, 1994.

No 34 E. Petrakis and A. Xepapadeas, Environmental Consciousness and Moral Hazard in International Agreements to Protect the Environment. Athens, 1994.

No 35 Z. Georganta, K. Kotsis and Emm. Kounaris, Measurement of Total Factor Productivity in the Manufacturing Sector of Greece 1980-1991. Athens, 1994.

No 36 C. Kanellopoulos, Public-Private Wage Differentials in Greece. Athens, 1994.

No 37 C. Vergopoulos, Public Debt and its Effects. Athens, 1994 (in Greek).

No 38 M. Panopoulou, Greek Merchant Navy, Technological Change and Domestic Shipbuilding Industry from 1850 to 1914. Athens, 1995.

No 39 V. Rapanos, Technical Change in a Model with Fair Wages and Unemployment. Athens, 1995.

No 40 V. Rapanos, The Effects of Environmental Taxes on Income Distribution. Athens, 1995.

No 41 St. Balfoussias, Cost and Productivity in Electricity Generation in Greece. Athens, 1995.

No 42 V. Rapanos, Trade Unions and the Incidence of the Corporation Income Tax. Athens, 1995.

No 43 V. Rapanos, Economies of Scale and the Incidence of the Minimun Wage in the less Developed Countries. Athens, 1995.

No 44 P. Mourdoukoutas, Japanese Investment in Greece. Athens, 1995 (in Greek).

No 45 St. Thomadakis, and V. Droucopoulos, Dynamic Effects in Greek Manufacturing: The Changing Shares of SMEs, 1983-1990. Athens, 1995.

No 46 N. Christodoulakis and S. Kalyvitis, Likely Effects of CSF 1994-1999 on the Greek Economy: An ex ante Assessment Using an Annual Four-Sector Macroeconometric Model. Athens, 1995.

No 47 S. Makrydakis, E. Tzavalis, A. Balfoussias, Policy Regime Changes and the Long-Run Sustainability of Fiscal Policy: An Application to Greece. Athens, 1995.

No 48 G. Kouretas, L. Zarangas, A Cointegration Analysis of the Official and Parallel Foreign Exchange Markets for Dollars in Greece. Athens, 1995.

No 49 C. Kanellopoulos, G. Psacharopoulos, Private Education Expenditure in a "Free Education" Country: The Case of Greece. Athens, 1995.

No 50 J. Henley, Restructuring Large Scale State Enterprises in the Republics of Azerbaijan, Kazakhstan, the Kyrgyz Republic and Uzbekistan: The Challenge for Technical Assistance. Athens, 1995.