CENTRE OF PLANNING AND ECONOMIC RESEARCH

No 62
Government Spending and Growth in Greece 1958-1993 : Some Preliminary Empirical Results

by

M. CHLETSOS

March 1997

Michael Chletsos
Research Fellow
Centre of Planning
and Economic Research

Government Spending and Growth in Greece 1958-1993 : Some Preliminary Empirical Results

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 organisational 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 and medium-term forecasts; also, the formulation of proposals for appropriate stabilisation 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 organises 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 its external collaborators with the view to subsequent publication. Timely comment and criticism for its improvement is appreciated.

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

The issue of the economic effects of government spending on economic growth has attracted considerable theoretical and empirical work. This paper using disaggregated data on government expenditures tests the impact of government spending on the growth rates of the Greek economy for the period 1958-1993. This issue is explored using an error correction approach and it is a preliminary empirical investigation into the economic effects of government spending in Greece.

I. INTRODUCTION

The question of the economic effects of government spending is a controversial one and has attracted a considerable amount of theoretical work and empirical research. The impact of government spending on growth has been the subject of numerous empirical studies. On the one hand government activity may indirectly increase the total output of a country through its interaction with the private sector. In developing countries, policymakers have argued that deficit financing could be an effective tool in promoting economic growth given the large amount of unemployed and underemployed manpower and other resources that typically exist in such countries. On the other hand, however, there exists a substantial body of empirical work suggesting that there are negative effects on growth induced by government's revenue raising and transfer mechanisms. Government taxation may produce a misallocation of resource as well as disincentives. Furthermore, government may not provide public goods efficiently (Tullock, 1959; Olson, 1982).

In Greece, government spending has increased throughout the period in question. The ratio of government spending to GDP has increased from 34.3% in 1980 to 39.7% in 1981 and to 48% in 1993. Data on government expenditures shows that spending for government consumption has continuously risen while public investment has fallen slightly. More specifically at the beginning of the period under i.e. 1960 the ratio of government consumption to GDP was 13% while that of public investment to GDP was 8%. By 1993 these ratios were 22% and 7% respectively. Similarly, the transfer payments GDP ratio increases from 5.1% in 1960 to 19.32% in 1993. According to Vavouras (1993) by distinguishing of government expenditures to productive and unproductive[1] it can be seen that, in the case of Greece, unproductive expenditures have increased faster than productive. In 1960, the ratio of productive/unproductive expenditures was 3.35, and has fallen to 2.03, 1.58 and 0.93 in 1970, 1980 and 1990 respectively. The growth of government spending and specifically of unproductive government expenditures may be attributed to a number of factors such as the late development of the welfare state in Greece (after 1974), to the use of government consumption as a tool of economic policy and the increase of interest payments on public debt during the last years caused by a sharp rise in government deficits and public debt.

This paper investigates the existence of a long-run relationship between disaggregated government spending and GDP in Greece for the period 1958-1993 using the econometric technique of cointegration (Engle and Granger, 1987; Holden and Thompson, 1992). The use of disaggregated variables offers a better insight of the role of each component in the process of economic growth. The paper is organised as follows. In the next section a brief literature survey on the economic effects of government expenditures on growth is presented, while in Section III, the applied methodology is analysed and the empirical findings are reported and discussed. Section IV concludes the paper.

---

[1]. Productive expenditures consist of government consumption and public investment while unproductive government expenditures consist of transfer payments and interest on public debt.

II. AN OVERVIEW OF THE LITERATURE

Economic theory offers a number of theoretical and empirical analyses of the effects of government spending on economic growth. According to neo-classical theory, government expenditures have no impact on the growth of national output - in the long run, they affect only the level of output (Engen and Skinner, 1991). Rubinson (1977) found that government spending has positively contributed to economic growth. Grier and Tullock (1987) found a significantly negative relationship between the growth of real GDP and the growth of the government expenditures share of GDP. Similarly Barth and Brady (1987) found a negative relationship between the growth rate of real GDP and the share of government consumption spending for 16 OECD countries for the period 1971-1983.

Landrau (1986) using data for 96 LDCs for the period 1961-1973 suggests that there exists a negative relationship between the share of government consumption expenditure in GDP and the growth of per capita GDP. Nelson and Singh (1994) have empirically investigated the effect of fiscal deficits on economic growth using data for approximately 70 developing countries during the seventies and the eighties. Their empirical findings support that : (a) holding other variables constant, the budget deficit variable appeared to have consistently exercised little or no impact of any statistical significance on economic growth in LDCs during both the seventies and the eighties, (b) defence expenditures overall exercised a positive effect on growth rates for both of the time periods under analysis, although the impact of this variable was statistically much stronger during the seventies and (c) the findings concerning public investment appeared mixed; for the seventies this variable appeared to be not significant at all, while for the eighties the result showed a highly significant positive effect on LDCs' growth -in fact, as strong as that of private domestic investment.

Barro in recent studies (1990, 1991a and 1991b) has empirically estimated equations for testing the impact of government consumption and taxation on economic growth. Barro argues that expenditures on education and defence are more likely public investment than public consumption. He found a negative and statistically significant relationship of the non-productive government service spending on the average annual growth rate of real per capita GDP.

Ram (1986, 1989) using data from 115 countries during the period 1960-1980 found a positive and significant effect of government spending on economic growth. Finally, Lin (1994) has empirically tested his theoretical model and found that government size (measured with the rate of changes in the share of government consumption spending in GDP) has a positive impact on economic growth in the short run. In the intermediate run (25 years in this study) , which is less subject to the effect of the business cycle, changes in government size do not have a significant impact on economic growth.

In the case of Greece, the analysis of the impact of government expenditures on economic growth is of particular interest. In Greece, public deficits and public debt have increased faster than in any other EU country. According to Economou (1992) the expansion of the public sector appears to be the main factor that has caused the slow down of GDP growth rates. This effect is attributed to the lower productivity of the public sector in comparison to the private (Baumol, 1967; Baumol and Oates, 1975; Baumol, Blackman and Wolf, 1985, and Niskanen, 1971) in conjunction with the crowding out effect on investment (Buiter, 1977; Tobin and Buiter, 1976). Economou (1992) and Provopoulos

(1982) found, that the increase of public and government deficits, due to the growth of government expenditures, have caused crowding out effects but its inflationary effect remains uncertain (Dalamagas, 1987). In a recent work Dalamagas (1995), analysing the role of the public sector in the process of economic growth, pointed out that the size of public capital formation and the real intertemporal allocation of public sector may be important for determining manufacturing costs and profits but public deficits are likely to be comparable or even dominating importance in determining manufacturing output.

It should also be noticed that Greece has regularly ranked as the country with the highest defence burden (military expenditure as a share of GDP) in NATO and in Europe allocating an average 6% of GDP to defence yearly (Kollias, 1995). The question of the economic effects of military expenditure is a controversial one and has attracted a considerable amount of theoretical work and empirical research (Lim, 1983; Faini et al., 1984; Lindgren, 1984 and Deger, 1981). Military spending in Greece appears to have stimulative effects on consumption which on the other hand appear to be at least partially offset by crowding out of investment (Chletsos and Kollias, 1995). In another study Kollias (1995) using an error-correction approach, found that military expenditures have a positive impact on Greek GDP.

Given the above brief outline of the theoretical issues involved, this study investigates the effects of total government expenditures on GDP using disaggregated data. More specifically, in this paper the impacts of total government expenditures, civilian government expenditures, government consumption and transfer payments on GDP are analysed and discussed.

III. PRELIMINARY EMPIRICAL RESULTS

On the basis of the forgone discussion in the previous section, the long-run effects of government spending on economic growth can be modelled as follows:

$$GDP_t = \alpha_0 + \alpha_1 Gexp_t + \alpha_2 Pinv_t + \alpha 3 Unef_t + u_t \quad (1)$$

where all the variables are expressed in their natural logarithms and at constant prices and GDP_t is the gross domestic product, $Gexp_t$ is government expenditures which are broken-up into $GEXT_t$ (total government spending), $GCON_t$ (government consumption), $GEXCI_t$ (civilian government expenditures) and TRP_t (transfer payments), $PINV_t$ is the private investment and UNEF is the unemployment rate. According to the work of Granger (1986) and Engle and Granger (1987), if two variable X_t and Y_t are integrated of the same order I(1), then any linear combination of these two series $u_t = X_t - \alpha Y_t$ may be I(0). It becomes apparent that u_t is in (1) the "equilibrium error" that measures the deviations from the equilibrium and may itself be stationary. The error correction variable in a short-run dynamic relationship measures the proportion of the disequilibrium from one period that is corrected in the next. The assumption being that the disequilibrium errors are inclined to move towards their mean value which in turn implies that GDP does not permanently drift away from what is determined by its long run determinants as they specified in Equation (1). Testing for the stability of the relationship involves testing for stationarity of the residuals of the cointegrating regression. Before this is done we must, however, establish that the variables involved are themselves stationary. This is accomplished by testing the hypothesis of a unit root in each of the variables of the equations both in levels and in first differences (Table 1).

TABLE 1
Unit Root Tests

	Without trend				With trend			
Variable(x)	Unit Root in x		Unit Root in Δx		Unit Root in x		Unit Root in Δx	
	DF	ADF	DF	ADF	DF	ADF	DF	ADF
GDP	-3.85	-3.62	-4.08	-2.14	0.11	-0.07	-6.18	-4.48
GEXT	-3.82	-3.07	-4.02	-2.78	0.29	0.38	-5.57	-4.89
GCON	-1.69	-1.77	-4.98	-3.59	-0.48	-0.49	-5.40	-4.24
TRP	-2.38	-2.15	-4.04	-3.22	-0.68	-1.38	-4.62	-4.20
GEXCI	-3.13	-2.29	-2.75	-2.28	1.20	0.47	-3.65	-3.52
PINV	-2.06	-2.15	-3.83	-3.16	-1.25	-1.83	-4.07	-3.41
UNEF	-0.88	-1.53	-3.45	-2.51	-1.06	-1.65	-3.59	-2.74

The tests reveal that the hypothesis of a unit root in GDP, GEXT, GCON, GEXCI, TRP, PINV and UNEF cannot be rejected while the hypothesis of a unit root in ΔGDP, ΔEXT, ΔGCON, ΔGEXCI, ΔTRP, ΔPINV and ΔUNEF is rejected at least at the 5% level of confidence, indicating that all the variables in question are I(1). The results from fitting the cointegrating regression to annual data for the period 1960-1993 are shown in Table 2, where the coefficients and t-statistics (in parentheses) have been rounded to two decimal points and S.E. is the standard error of regression. SC is the F version of Lagrange Multiplier test of residual serial correlation, FF is Ramsey's test for functional form, N is a skewness-Kurtosis test for normality and H is the F version of a test for heteroscedasticity.

TABLE 2
Results for Cointegrating Regression

Dependent Variable: GDP

	Explanatory variables		
Constant	GEXT	PINV	UNEF
4.46	0.64	0.07	-0.10
(31.37)	(28.30)	(2.13)	(6.10)
Statistics			
R-Bar-Squared = 0.99	S.E. = 0.02	SC:F (1, 26) = 0.33	
FF:F (1, 26) = 0.33	N:χ^2 (2)= 1.56	H:F (1, 29) = 0.43	
CRDW* =1.75	ADF** = -4.01		

Dependent Variable: GDP

	Explanatory variables		
Constant	GCON	PINV	UNEF
4.89	0.49	0.23	-0.17
(20.42)	(17.93)	(5.37)	(0.82)
Statistics			
R-Bar-Squared = 0.99	S.E. = 0.03	SC:F (1, 26) = 14.07	
FF:F (1, 26) = 5.87	N:χ^2 (2) = 0.97	H:F (1, 29) = 0.57	
CRDW* = 0.86	ADF** =-3.59		

Dependent Variable: GDP

	Explanatory variables		
Constant	TRP	PINV	UNEF
6.92	0.57	0.01	-0.18
(16.46)	(14.03)	(0.17)	(5.00)
Statistics			
R-Bar-Squared = 0.99	S.E. = 0.04	SC:F (1, 26) = 13.84	
FF:F (1, 26) = 0.93	N:χ^2 (2)= 0.31	H:F (1, 29)= 0.74	
CRDW* = 1.02	ADF** =-3.46		

Dependent Variable: GDP

	Explanatory variables		
Constant	GEXCI	PINV	UNEF
5.11	0.56	0.17	-0.09
(18.97)	(16.49)	(3.27)	(3.46)
Statistics			
R-Bar-Squared = 0.99	S.E. = 0.04	SC:F (1, 26) = 18.36	
FF:F (1, 26) = 7.18	N:χ^2 (2) = 0.87	H:F (1, 29) = 1.58	
CRDW* = 0.75	ADF**=-3.56		

Notes : (*) The null hypothesis is DW=0. Critical values for two variable case are 0.511, 0.386, 0.322 (Engle and Granger, 1987, p.267) and for three variable case 0.488, 0.367, 0.308 (Hall, 1986, p.233) at 1%, 5% and 10% respectively. (**) Critical values for two variable case are -3.77, -3.17 and -2.84 (Engle and Granger, 1987, p.267) and for three variable case -3.89, -3.13 and -2.82 (Hall, 1986, p.233) at 1%, 5% and 10% respectively.

The coefficients of the explanatory variables have the expected sign and they are almost significant. The positive and significant coefficient of all disaggregated government expenditures suggest positive economic effects on economic growth. To test for the existence of "equilibrium forces" two tests are used. The CRDW which is cointegrating regression Durbin-Watson statistic and the ADF test statistic, which is the augmented Dickey-Fuller test. As it can be seen from Table 2 both of tests used reject the null hypothesis of non-cointegration in favour of cointegration from which it can be deduced that there appears to exist a long-run relationship between the dependent variable GDP and its explanatory variables as they are specified in (1).

According to the Engle and Granger theorem, if a vector of variables is cointegrated then there exists a valid error-correction specification of a dynamic model which is not subject toy the "spurious regression" problem (Granger and Newbold, 1974). The dynamic relationship is based on the long-run one and it includes the lagged value of the residuals (RES_{t-1}) from the cointegrating regression. The results are shown in Table 3.

TABLE 3
Dynamic Short-Run Effects of Military Expenditures

Explanatory variables	Dependent variable: GDP			
	(1)	(2)	(3)	(4)
Constant	0.01	0.03	0.04	0.03
	(2.08)	(2.72)	(4.49)	(2.47)
DGEXT	0.48	-------	------	------
	(5.20)			
DGCON	-----	0.25	------	------
		(2.28)		
DTRP	-----	-------	0.15	------
			(1.88)	
DGEXCI	-----	-------	------	0.21
				(1.39)
DPINV	0.003	0.06	-0.02	0.03
	(0.09)	(1.27)	(0.44)	(0.67)
DUNEF	-0.07	-0.09	-0.10	-0.09
	(3.26)	(2.95)	(3.35)	(3.01)
RES_{t-1}	-0.97	-0.50	-0.45	-0.44
	(5.22)	(3.32)	(3.22)	(2.90)
Summary statistics				
R-bar-squared	0.70	0.50	0.48	0.48
D.W.	1.78	2.14	2.18	2.09
S.E.	0.02	0.02	0.02	0.02
F-statistic	18.13	8.04	7.51	7.73
Diagnostics				
SC:F(1, 24)	1.17	0.77	0.46	0.71
FF:F(1, 24)	0.01	0.36	0.09	1.51
N:$\chi^2(2)$	1.82	1.00	6.87	0.01
H:F(1, 28)	0.01	0.62	0.44	4.13

The obtained results, where the summary statistics are as before, are in line with the expectations and appear to be satisfactory on the usual criteria. The diagnostics do not detect any significant deviation from classical properties. The coefficients of disaggregated government spending are consistent with theoretical explanations, entering the equations with a positive sign. Total government expenditures and government consumption affect positively economic growth rates while the civilian government expenditures and transfer payments are positively related to economic growth but their coefficients are not statistically significant. Turning to the role of private investment coefficient we note that in all cases it is positive but not statistically important. This implies that the short-run dynamics results suggest that the private investment does not affect GDP. As it concerns the coefficient of unemployment it can be noticed that in all cases unemployment has a negative impact on Greek GDP.

IV. CONCLUSION

This paper has investigated the impact of government spending on GDP growth in Greece for the period 1960-1993 using disaggregated data. The empirical findings suggest that government expenditures have positively affected economic growth. More specifically, total government spending and government consumption have a positive impact in long-run as well as in short-run, while civilian government expenditures and transfer payments have positive effects only in long-run.

REFERENCES

Barro, R. J. (1990), "Government spending in a simple model of endogenous growth", Journal of Political Economy, 98, 5108-25.

---------- (1991a), "Economic growth in a cross-section of countries", Quarterly Journal of Economics, 104, 407-44.

---------- (1991b), "A cross-country study of growth, saving and government", in B.D. Bernheim and J. Shoven (eds), National Saving and Economic Performance, University of Chicago Press and NBER, Chicago.

Barth, J. and Brady, M. (1987), "The impact of government spending on economic activity (manuscript), George Washington University, Washington, D.C.

Baumol, W.J. (1970), "Macroeconomics of unbalanced growth. The anatomy of urban crisis", American Economic Review, Vol. 57, 415-26.

Baumol, W.J. and Oates, W.E. (1975), The Theory of Environmental Policy, Prentice-Hall, New Jersey.

Baumol, W.J., Blackman, S.A.B. and Wolf, E.N. (1985), "Unbalanced growth revised: Asymptotic stagnancy and new evidence", American Economic Review, Vol. 75, No 4, 806-17.

Buiter, W.H. (1977), "Crowding out and the effectiveness of fiscal policy", Journal of Public Economics, 31-41.

Chletsos, M. and Kollias, C. (1995), "Defence spending and growth in Greece 1974-1990: Some preliminary econometric results", Applied Economics, 27, 883-890.

Dalamagas, B. (1987), "A flow of funds analysis of crowding out effect: Some international evidence", Southern Economic Journal, 39, 457-476.

---------- (1995), "A Reconsideration of the Public Sector's Contribution to Growth", Empirical Economics, Vol. 20, 385-414.

Deger, S. (1981), "Investment, defence and growth in less developed countries",Birkbeck College, Discussion Paper No 105.

Economou, E.G. (1992), The Greek economy in the perspective of 1992, IOBE, Athens (in Greek).

Engen, E. and Skinner, J. (1991), "Fiscal policy and economic growth", paper presented at NBER Conference on Taxation, Cambridge, M.A.

Engle,R.F. and Granger, C.W. (1987), "Co-integration and error correction: representation, estimation and testing", Econometrica, 55, 251-76.

Faini, R., Annez, P. and Taylor, L. (1984), "Defence spending and economic growth: evidence among countries and over time", Economic Development and Cultural Change, 487-98.

Grier, K.B. and Tullock, G. (1987), "An empirical analysis of cross-national economic growth, 1950-80" (manuscript), California Institute of Technology, Passadena, CA.

Holden, K. and Tompson, J. (1992), "Cointegration: An introductory survey", British Review of Economic Issues, Vol. 14, No 3.

Kollias, C. (1995), "Preliminary findings on the economic effects of Greek military expenditure", Applied Economic Letters, 2, 16-18.

Landrau, D. (1983), "Government expenditure and economic growth: a cross-country study", Southern Economic Journal, 49, 783-92.

Lim, D. (1983), "Another look at growth and defence in less developed countries", Economic Development and Cultural Change, 377-84.

Lin, A.Y.S. (1994), "Government spending and economic growth", Applied Economics, 26, 83-94.

Lindgren, G. (1984), "Armaments and economic performance in industrialised market economies", Journal of Peace Research, Vol. 21, No 4.

Nelson, A. M. and Singh, D. R. (1994), "The deficit-growth connection: some recent evidence from developing countries", Economic Development and Cultural Change, Vol. 43, No 1, 167-191.

Niskanen, W.A. (1971), Bureaucracy: servant or master?, Institute of Economic Affairs, London.

Olson, M. (1982), The Rise and Decline of Nations: Economic Growth, Stagflation and Social Rigidities, Yale University Press, New Haven, CT.

Provopoulos, G.A. (1982), "Public spending and deficits: the Greek experience", Public Finances/Finances Publiques, Vol. 37, 422-27.

Ram, R. (1986), "Government size and economic growth: a new framework and some evidence from cross-section and time-series data", American Economic Review,76, 191-203.

--------- (1989), "Government size and economic growth: a new framework and some evidence from cross-section and time-series data: reply", American Economic Review, 79(1), 281-84.

Rubinson, R. (1977), "Dependency, government revenue and economic growth 1955-1970", Studies in Comparative International Development, 12, 3-28.

Tobin, J. and Buiter, W.H. (1976), "Long run effects of fiscal and monetary policy on aggregate demand", in Stein J.L. Monetarism, North-Holland, 273-309.

Tullock, G. (1959), "Some problems with majority voting", Journal of Political Economy, 67, 571-79.

Vavouras, J. (1993), Public debt: theory and empirical research, Papazissis, Athens (in Greek).

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.

No 51 A. Balfoussias, V. Stavrinos, The Greek Military Sector and Macroeconomic Effects of Military Spending in Greece. Athens, 1996.

No 52 V. Stavrinos,V. Droucopoulos, Output Expectations Productivity Trends and Employment: The Case of Greek Manufacturing. Athens, 1996.

No 53 N. Glytsos, Remitting Behavior of "Temporary"and "Permanent" Migrants: The Case of Greeks in Germany and Australia. Athens, 1996.

No 54 N. Glytsos, Demographic Changes, Retirement, Job Creation and Labour Shortages in Greece: An Occupational and Regional Outlook. Athens, 1996.

No 55 D. Dogas, Thoughts on the Apropriate Stabilization and Development Policy and the Role of the Bank of Greece in the Context of the Economic and Monetary Union (EMU). Athens, 1996.

No 56 Th. Katsanevas, The Evolution of Employment and Industrial Relations in Greece (from the Decade of 1970 up to the Present). Athens, 1996.

No 57 Chr. Kollias and A. Refenes, Modelling the Effects of Defence Spending Reductions on Investment Using Neural Networks in the Case of Greece. Athens, 1996.

No 58 Chr. Kollias and St. Makrydakis, The Causal Relationship Between Tax Revenues and Government Spending in Greece: 1950-1990. Athens, 1996.

No 59 St. Makrydakis, Testing the Intertemporal Approach to Current Account Determination: Evidence from Greece. Athens, 1996.

No 60 Chr. Kollias and St. Makrydakis, Is there a Greek-Turkish Arms Race?: Evidence from Cointegration and Causality Tests. Athens, 1996.

No 61 M. Karamessini, Labour Flexibility and Segmentation of the Greek Labour Market in the Eighties: Sectoral Analysis and Typology. Athens, 1996.