Working Paper

INTERNATIONAL MONETARY FUND

IMF WORKING PAPER

WP/96/91

INTERNATIONAL MONETARY FUND

European I Department

Unemployment in Greece: A Survey of the Issues

Prepared by Dimitri G. Demekas and Zenon G. Kontolemis 1/

Authorized for distribution by Alessandro Leipold

August 1996

Abstract

The Greek unemployment rate rose from 2 percent in the 1960s to 9-10 percent in the 1990s. This reflected the increase in female participation rates, the slowdown in growth, the restructuring of production, and the increased mismatch between jobs and job seekers. But the most crucial factor was the persistence of real wage aspirations. The paper develops and tests a model that attributes this to the rapid expansion in the number of easy, life-time government jobs and the increase in the public/private wage differential during the 1980s.

JEL classification: D72; H31; J31; J45; J64

1/ European I Department and University of Manchester, respectively. This paper was presented at a conference on *Unemployment and Policies Towards It* at the European University Institute in Florence on April 12-13, 1996. The authors wish to thank, without implicating, the conference participants, as well as Maria Carkovic and Jimmy McHugh for useful comments; Sophia Bakalidou of the National Statistical Service and Isaac Sabethai of the Bank of Greece for help with data and institutional details of the Greek labor market; and Patricia Gillett-Lorusso for excellent research assistance. The views expressed in the paper are the authors' and do not necessarily reflect those of the International Monetary Fund.

Contents

Summary

During the 1980s and early 1990s, the performance of the Greek labor market deteriorated sharply. The unemployment rate increased from about 2 percent in the 1960s and early 1970s to an average of 8 percent in the 1980s and close to 10 percent in the 1990s. This development reflected fundamental changes in the supply and demand for labor. The female participation rate increased as production was restructured, releasing from the shrinking agricultural sector a large number of relatively low-skilled farm workers, many women. Aggregate output and employment growth slowed and the educational profile of the labor force improved rapidly, perhaps increasing the mismatch between jobs and workers. These factors, however, do not by themselves explain the rise in unemployment: a well-functioning labor market should have adjusted to the changing supply and demand conditions. This did not happen. Unemployment increased (despite discouraged worker effect), spells became longer (especially for younger, better-educated workers), and the Phillips curve shifted outward.

A formal analysis points the finger at the inflexibility of real wage aspirations of wage-setters and the slow adjustment of demand to shocks as factors behind the deterioration of labor-market performance during the last 15 years. Labor market institutions are partly responsible. Firing regulations are onerous, and other costs--such as state bureaucracy--may have discouraged job creation. But the main factor was the rapid expansion of the public sector during the 1980s. The paper develops and tests empirically a model that suggests that the expansion in the number of easy, life-time government jobs and the increase in the public/private relative wage during the 1980s depressed private sector employment and raised workers' effective reservation wages, thus contributing directly to the rise in unemployment.

This page intentionally left blank

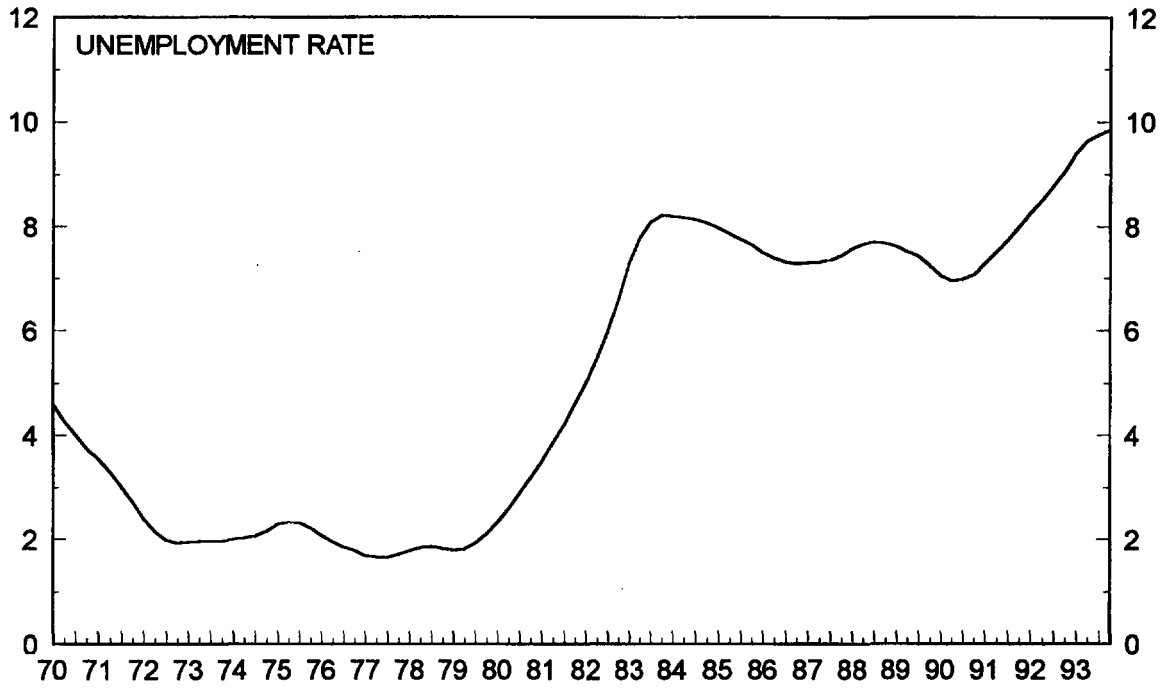
1. Introduction

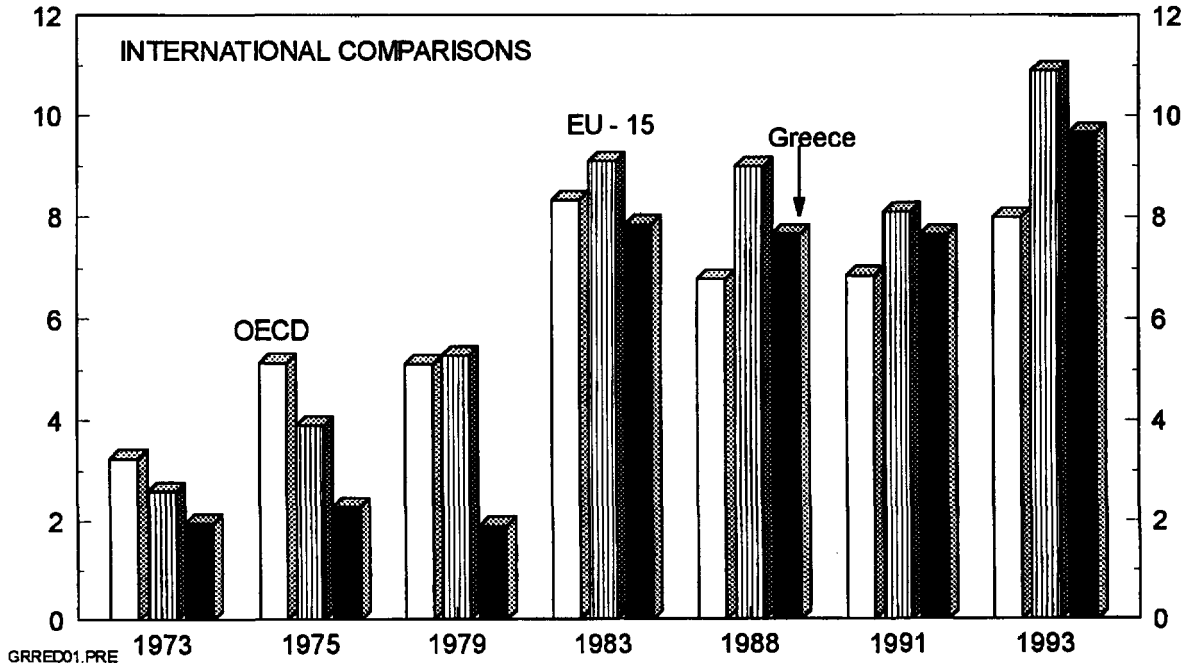
Unemployment in Greece rose dramatically in the first half of the 1980s and, after a pause, resumed an upward trend in the 1990s. This pattern was similar to that in the rest of the OECD. There were, however, some differences that set Greece apart. First, the extent of the increase in unemployment was larger: while in the early 1970s unemployment in Greece was about 2 percent of the labor force, compared with 3½ percent in the OECD area, by the early 1990s unemployment in Greece reached almost 10 percent, compared with an OECD average of 8 percent. Second, unemployment fluctuations in the 1980s were more subdued in Greece: while average OECD unemployment fell by about 1½ percentage point in the late 1980s to rise again later, in Greece the decline during the same period was somewhat smaller. In this, the Greek experience was very similar to that in the other European members of the OECD (Chart 1).

The evolution of unemployment during the last quarter-century was associated with fundamental changes in the Greek economy. First, there were three major shifts in the economic policy regime: in 1974, when the end of the military dictatorship engendered a strong political drive for redistribution and increased the influence of the trade unions; in 1981, when Greece acceded to the EC and--at the same time--left-leaning PASOK came to power, launching a policy of nationalizations and rapid state expansion, briefly interrupted during the 1985-86 stabilization program; and again in the early 1990s, when Greece turned into a policy of fiscal retrenchment and financial liberalization. Second (and directly related to the first), Greece's overall economic performance deteriorated sharply during this period: the average annual output growth rate fell from 5-6 percent in the early 1970s to 2 percent in the 1980s and 1 percent in the 1990s; employment growth followed the same pattern; and inflation accelerated from 3-4 percent annually in the 1960s and early 1970s to 18 percent in the late 1970s and 1980s. Last but not least, the economy underwent a significant structural transformation. The share of manufacturing in value added fell from 25 percent in the early 1970s to 17 percent in the early 1990s (that of agriculture followed a similar but much less pronounced pattern), while the share of services grew from less than 50 percent to more than 60 percent during the same period (Chart 2).

What explains the rise of unemployment in Greece in the last fifteen years? How is this rise related to the broader economic changes that took place during the same period? Until relatively recently, these questions were not central in the economic policy debate in Greece. This was probably due to the existence of "shock absorbers", such as the large black economy and the traditionally strong family ties in Greek society, which prevented unemployment from becoming a major social problem. In the last few years, however, policy-makers are becoming increasingly aware of the fact that unemployment is the only area in which Greece has achieved convergence with the rest of the European Union.

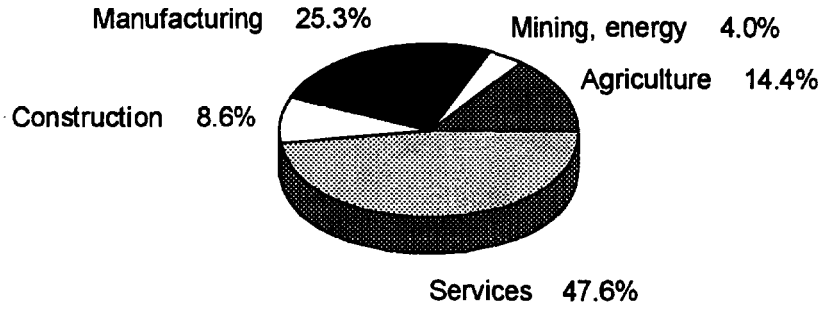
Chart 1
GREECE
Unemployment
(In percent of labor force)



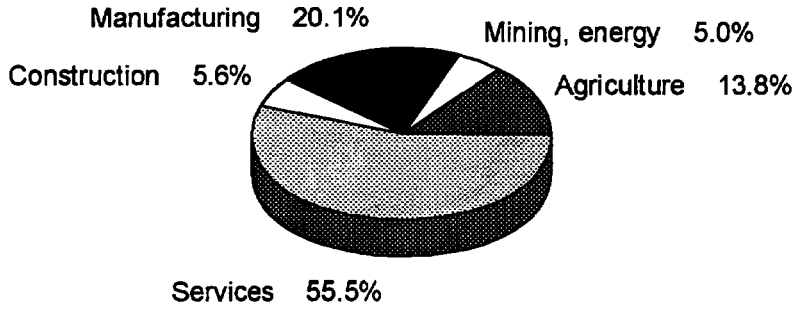


Source: OECD Labour Force Statistics; and European Economy No. 60, 1995.

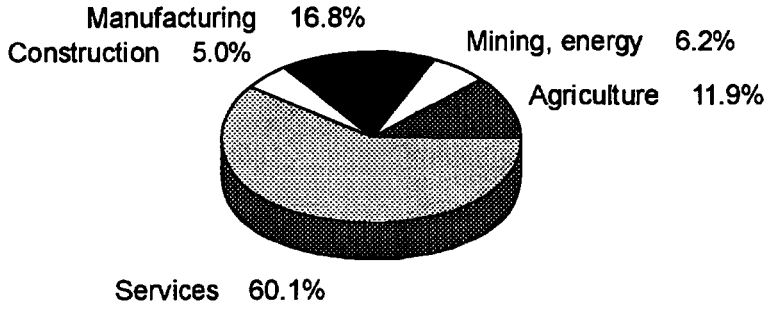
Chart 2
GREECE
Structure of Production
(In percent of GDP at factor cost)



1973



1983



1993

Source: Greek National Accounts.

In this paper, we try first to get the questions right by examining the characteristics and trends of unemployment--an analysis which has thus far been lacking--and comparing the situation in Greece with that in other countries. We then focus on the issue of unemployment persistence, and attempt to analyze its causes. Finally, we propose and test a hypothesis that, in our view, is very relevant in the case of Greece: that in addition to other factors, the steep rise and persistence of unemployment during the 1980s was also due directly to the increase in the share of the public sector in the labor market and the sharp rise in the public/private relative wage.

The paper is organized as follows. Section 2 presents the main facts: the size, evolution, and composition of the labor force, employment, and unemployment in Greece, and the relationship between unemployment and vacancies and unemployment and inflation. Section 3 analyzes the extent and causes of unemployment persistence. Section 4 discusses Greek labor market institutions. Section 5 examines the impact of the public sector wage and employment policies on the level and persistence of unemployment. And Section 6 summarizes the main findings.

2. Labor force, employment, and unemployment in Greece

The discussion of the trends and composition of the labor force, employment, and unemployment in Greece is hampered by serious data problems. Although long time series are available for the main aggregates, consistent data on the composition of these aggregates (by age, education, etc.) are harder to come by. We use for this purpose data collected by the National Statistical Service of Greece (NSSG) in its Annual Labor Force Surveys, which the NSSG has kindly made available to us. These questionnaire-based Surveys, however, became systematic only in the early 1980s, and their scope has expanded over time (which means that certain data became available only later). They are conducted during the second quarter of each year, 1/ and cover a sample of 1½ percent of the labor force (currently about 65 thousand individuals). One-quarter of the sample is renewed every year.

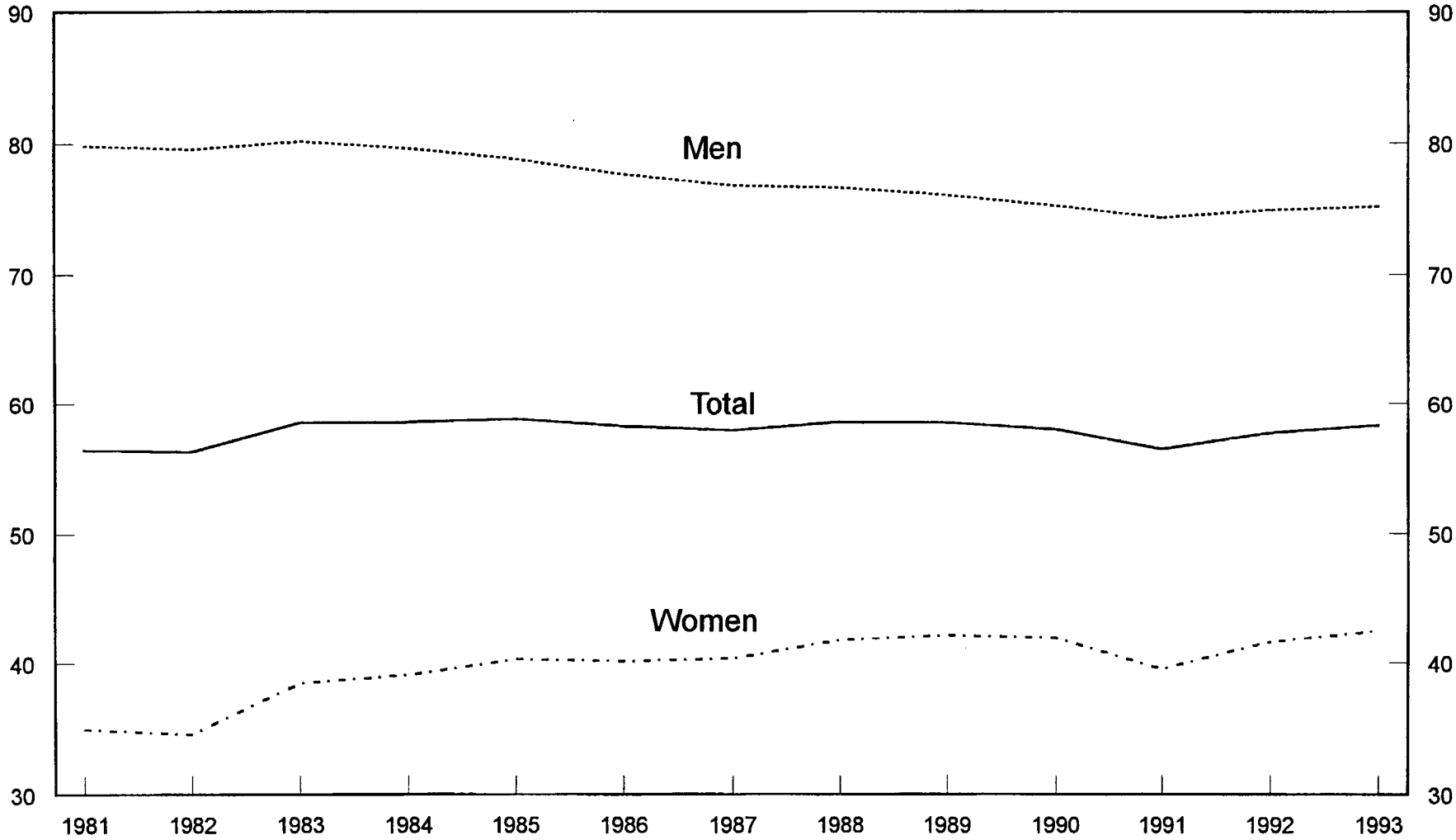
a. Participation rates and the composition of the labor force

The overall participation rate in Greece rose marginally from 56½ percent in 1980 to just over 58 percent in 1993. This is comparable to that in other Southern European countries but substantially below the OECD average (65-70 percent). 2/ Nonetheless, there were significant changes in the participation rates for women and men, which offset each other (Chart 3): rates for women increased, particularly for those between 20-34

1/ Except in 1983, when the Survey was conducted during the last quarter of the year. As a result, the Survey results for 1983 are not comparable to those from other years.

2/ Working age in the NSSG Surveys is defined as 14-64 years.

Chart 3
GREECE
Participation Rates



Source: NSSG Annual Labor Force Surveys.

years of age (Table 1), whose participation rates rose from 41 percent in 1981 to almost 60 per cent by 1993; rates for men, on the other hand, fell, especially for those under 19 and over 45 old.

The decline in participation rates for young men was due to the fact that teenagers tend to stay longer at school, and more of them continue with further education (a similar--albeit less marked--decline can also be observed in the participation rates for young women). The decline in participation rates for older men, however, was probably a reflection of "discouraged worker" effect. As Table 2 shows, the largest decline in male participation rates (for all age groups) during 1981-93 was observed for men with little or no schooling, while male participation rates in all other educational categories declined little or increased. It appears that a large number of older men with little or no education decided to leave the labor market during the 1980s, presumably because job opportunities for them declined. Table 2 also shows that the increase in female participation rates has been more pronounced for women with at least 9 years of education.

As a result of these developments, the profile of the labor force became more female, somewhat younger (despite a greying population), and substantially better educated during the 1980s and early 1990s: women were 37 percent of the labor force in 1993, compared with 31 percent in 1981; workers under 30 made up 27 percent of the labor force in 1993, as opposed to 23 percent in 1981 (Chart 4); and 45 percent of the labor force in 1993 had at least a secondary or professional education degree, as opposed to 25 percent in 1981 (Chart 5).

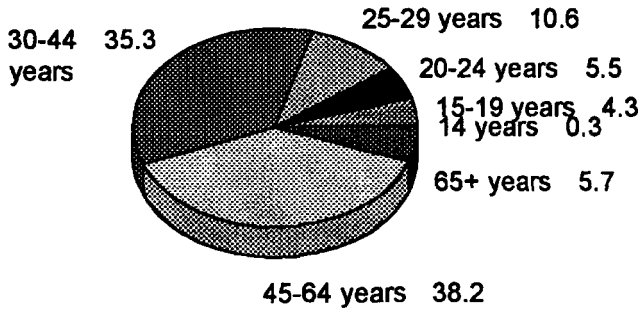
b. Employment

Employment rose from 3.5 million in 1981 to 3.7 million in 1993. Behind this modest increase was a large decline in agricultural employment (by almost 300 thousand, a 27 percent drop) and a smaller decline in manufacturing employment (by about 100 thousand, a 15 percent drop), which were more than offset by increases in employment in the service sector. It is interesting to note that the fall in manufacturing value added during the same period was relatively larger than the job losses in this sector, while the opposite is true for agriculture. This suggests that there have been productivity losses in manufacturing and gains in agriculture. The former were partly attributed to the policy of keeping ailing manufacturing firms alive with state support followed by the socialist governments during the 1980s. The fastest growing service sectors, on the other hand, were financial services (whose share, however, is small) and--to a lesser extent--commerce, tourism, and other services, including the government (Table 3).

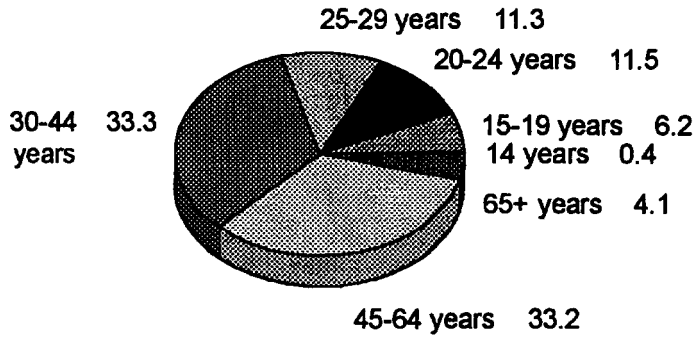
Women were the clear losers from the decline in agricultural employment. In 1981, 42 percent of all employed women worked in agriculture. Half of all agricultural jobs lost during 1981-93 were jobs for women. Despite this, the share of women in total employment increased during this period; indeed, the total number of employed men remained

Chart 4
GREECE
Age Profile of the Labor Force
(In percent)

1981

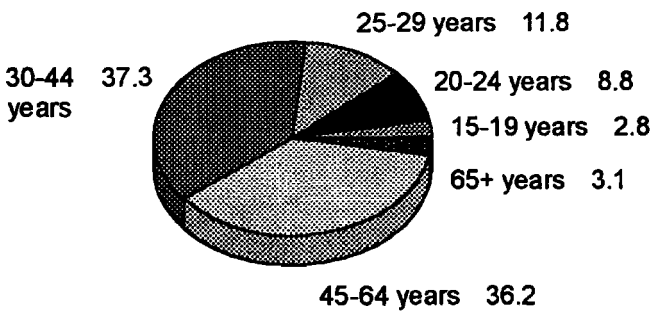


Men

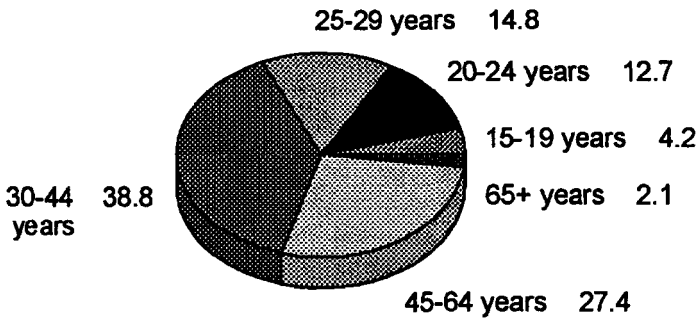


Women

1993



Men

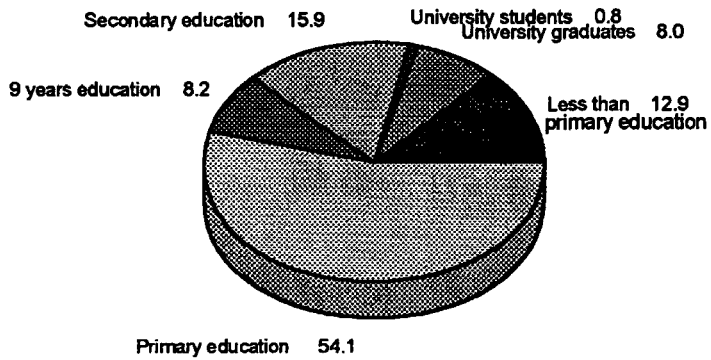


Women

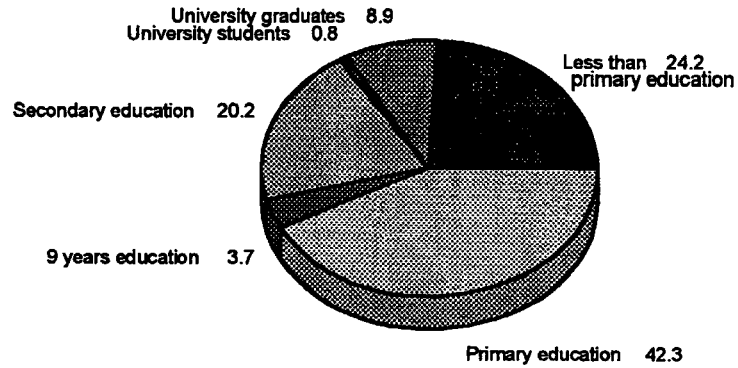
Source: NSSG Annual Labor Force Surveys.

Chart 5
GREECE
Educational Profile of the Labor Force
(In percent)

1981

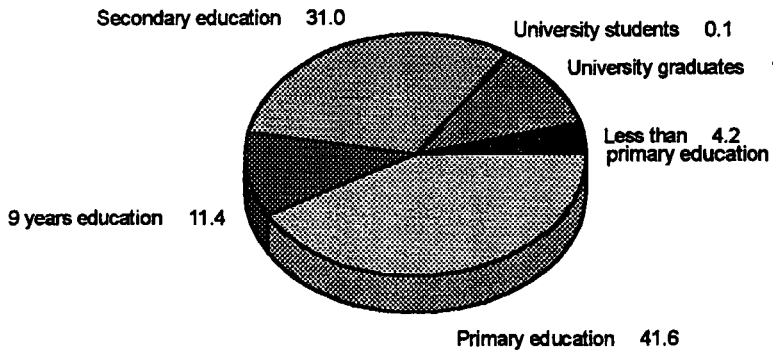


Men

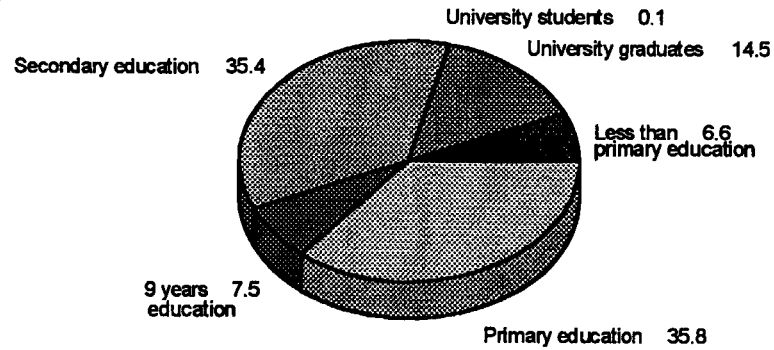


Women

1993



Men



Women

Source: NSSG Annual Labor Force Surveys.

unchanged during 1981-93, and the entire increase in employment reflected more jobs for women.

It is unfortunately not possible with the available data to establish whether the new jobs in the service sector went to workers released from the agricultural sector or to new entrants in the labor force. Data on the composition of employment by degree of educational achievement could provide some indication; however, these are available only after 1987. This limitation notwithstanding, the data strongly suggest that--as one might expect--the composition of employment has changed rapidly in favor of educated workers, particularly University graduates, to the detriment of relatively uneducated workers. As it is likely that workers leaving agriculture were probably less well educated than those entering the labor force, the tentative conclusion is that few of the workers who lost agricultural jobs were successful in finding jobs in the service sector; the rest either became unemployed or dropped out of the labor market.

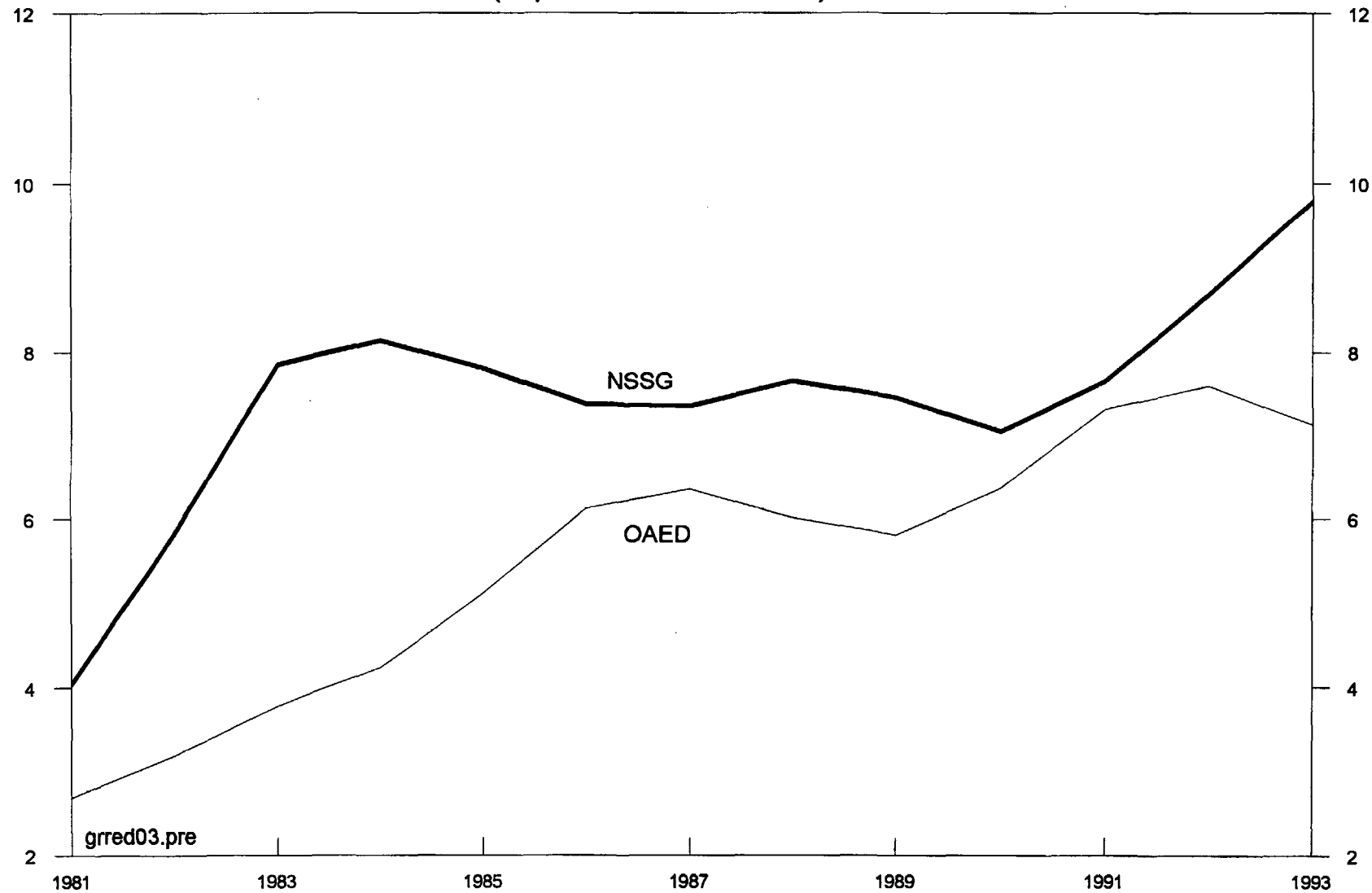
Finally, the sectoral restructuring had a significant impact on the professional composition of employment. As the bulk of agricultural employment was accounted for by self-employed or unpaid family members (these two categories added up to 90 percent of total agricultural employment throughout the period), the loss of agricultural jobs implied a decline in the share of these categories of workers in total employment. The share of the self-employed in total employment, in particular, fell from 31 percent in 1981 to 27 percent in 1993. To put this in some perspective, however, it should be noted that despite this decline, Greece still has by far the highest proportion of self-employed workers in the OECD, significantly higher in than Italy, Spain, and Portugal, and three to four times that in northern European countries (Table 4).

c. Size and composition of unemployment

There are two sources for unemployment data in Greece: the NSSG Annual Labor Force Surveys (which were discussed above), and the registrations of unemployed individuals at the local offices of the Manpower Employment Organization (OAED), the agency that administers unemployment benefits. Chart 6 compares the two series. As one would expect, the number of the registered unemployed is consistently lower than that reported in the Surveys, since registration makes sense only if the unemployed is eligible for benefits; therefore, most unemployed with no work experience (a requirement for being eligible for benefits) do not bother to register.

In addition to the limitations of these two data sources, it has been argued that the measurement of unemployment in an economy like Greece is problematic, because of the large number of self-employed people and the strong seasonality of certain types of employment, notably in tourism. More broadly, recent OECD studies have questioned the appropriateness of unemployment as a measure of labor market slack (OECD 1994). Therefore, before examining in more detail the data on unemployment, it is worth looking briefly at alternative measures of labor market slack.

Chart 6
GREECE
Unemployment Rate
(In percent of labor force)



The employment-to-population ratio, a commonly-used alternative measure, followed a path broadly similar to that of the unemployment rate in the 1980s, falling from 47 percent in 1981 to under 44 percent in 1993 (Chart 7). More sophisticated measures, like the number of discouraged workers (OECD 1994) are not available for Greece. Finally, although according to OECD data the number of involuntary part-time workers in Greece declined somewhat (from 3.3 percent of the labor force in 1983 to 2.5 percent in 1991), a much higher share of part-time workers are involuntary in Greece than in the rest of the OECD, suggesting a significant degree of labor market slack (Table 5).

Turning again to unemployment, the number of the unemployed in Greece more than doubled between 1981 and 1993 (from 148 thousand to 403 thousand, or from 4 percent to 10 percent of the labor force).

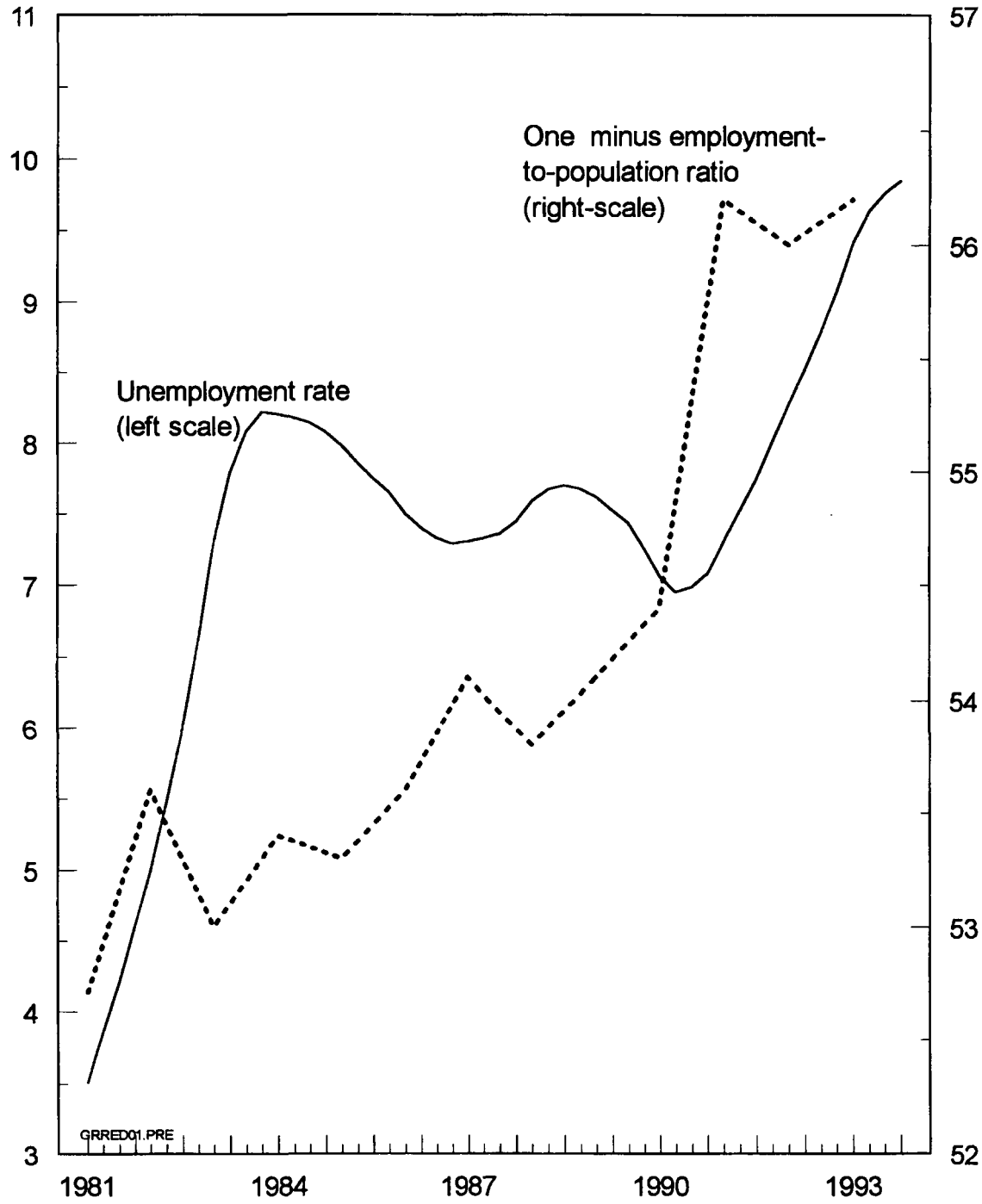
Who are the unemployed? Despite the substantial gains in employment made by women, the sizeable increase in female participation rates during the 1980s meant that most of the unemployed continued to be women. In fact, the differential between male and female unemployment rates widened during this period, with the rate for women reaching almost 16 percent in 1993 (Chart 8).

The age profile of the total unemployment pool appears to have changed relatively little: 40-45 percent of the unemployed were less than 30 years old throughout this period. However, there were significant changes in the age profiles of the male and female unemployed groups. In both groups, the share of 15-19 year-olds to total unemployment declined, as young people tended to stay longer at school. But while for men the largest increase in unemployment was registered in the 20-24 age bracket, for women the largest increase was in the 30-44 age bracket (Chart 9). It is likely that these are the women who were originally employed in agriculture as self-employed or unpaid family members and, with the decline of this sector, lost their jobs and were unable to find new employment.

Although older women displaced from agriculture probably accounted for a significant part of the increase in unemployment, the data suggest that there is also a considerable youth unemployment problem in Greece. Table 6 presents the ratio of youth to adult unemployment rates for a number of countries. The size of the problem in Greece is second only to that in Italy. Moreover, although the relative unemployment rates for teenagers and young adults declined in most of the countries, they remained relatively unchanged in Greece during this period.

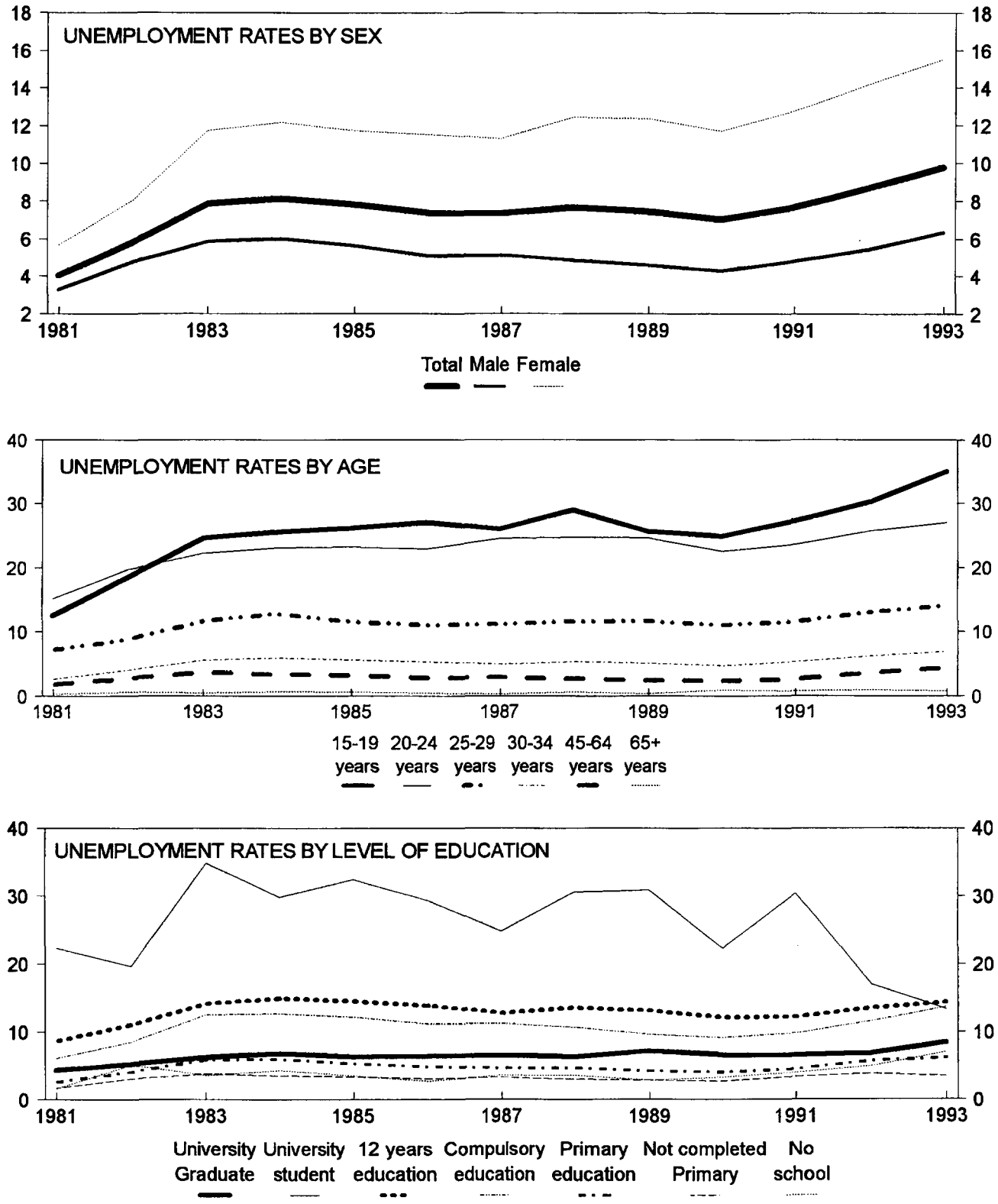
As regards the educational profile of the unemployed, Charts 8 and 10 show that unemployment is persistently higher among those with some education, and that the share of those with strong educational qualifications in total unemployment increased during the 1980s. Table 7 shows the composition of the unemployed by age and education for 1993. For both men and women, the majority of the unemployed in the age group 45-64 have relatively low qualifications (6 years of education), while those

Chart 7
GREECE
Measures of Labor Market Slack



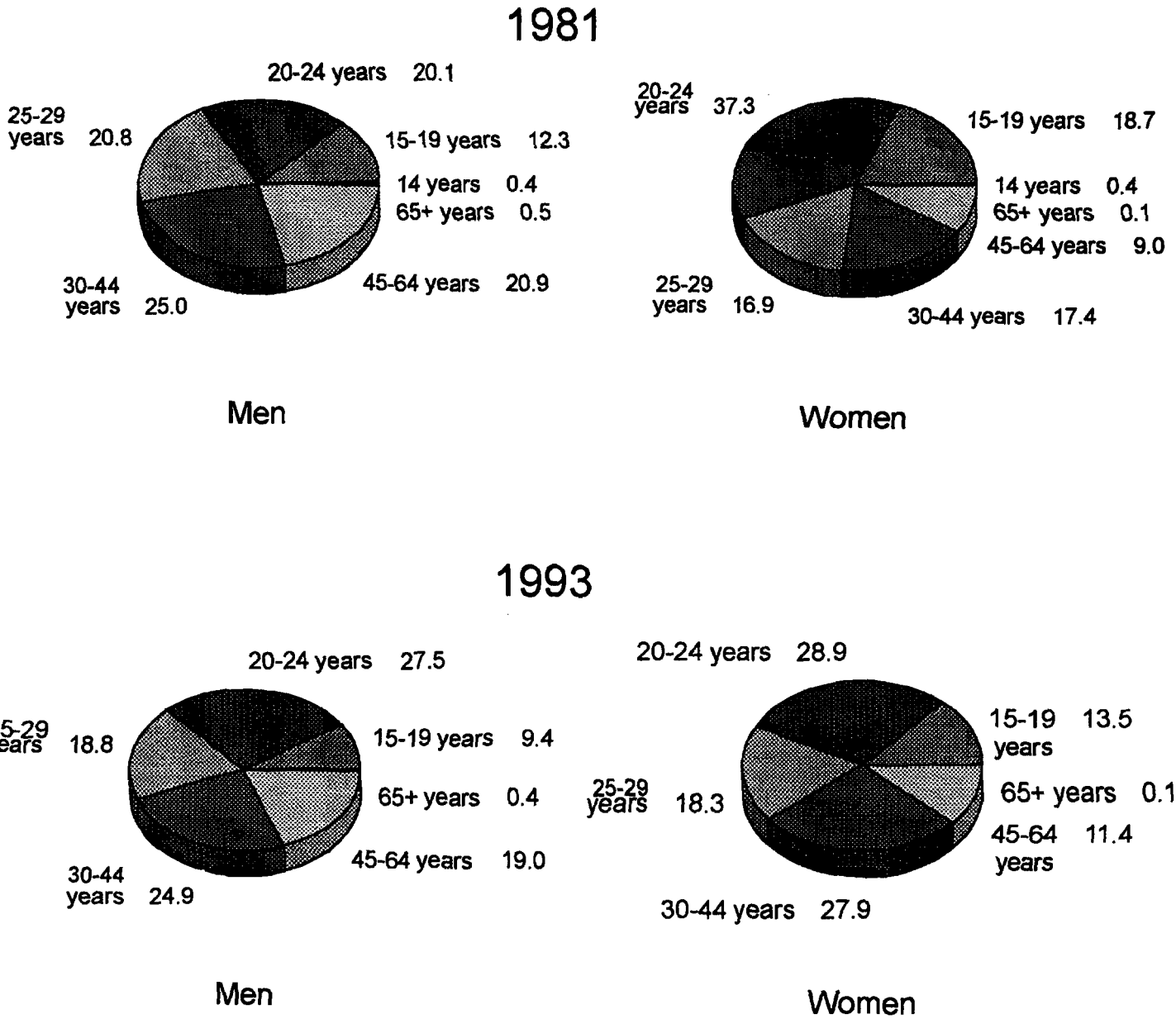
Source: NSSG Annual Labor Force Surveys.

Chart 8
GREECE
Composition of Unemployment
(In percent)



Source: NSSG Annual Labor Force Surveys.

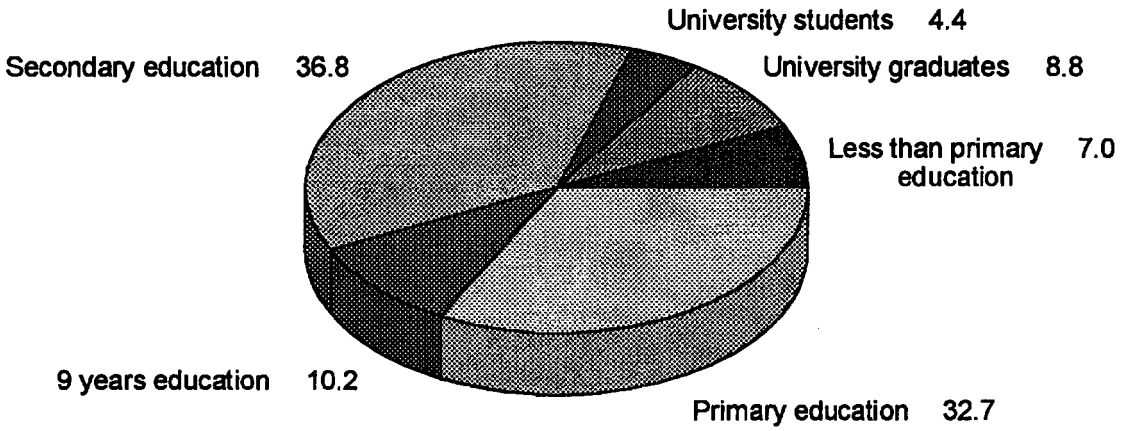
Chart 9
GREECE
Age Profile of the Unemployed
(In percent)



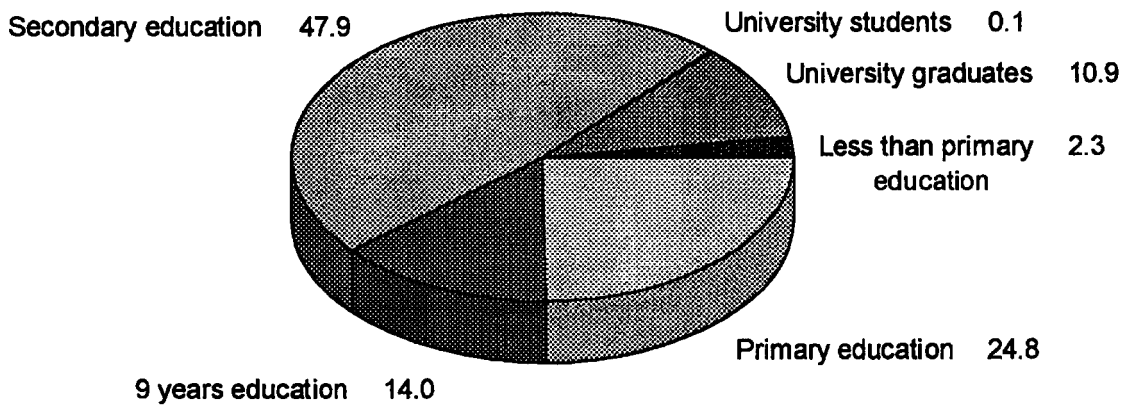
Source: NSSG Annual Labor Force Surveys.

Chart 10
GREECE
Educational Profile of the Unemployed
(In percent)

1981



1993



Source: NSSG Annual Labor Force Surveys.

unemployed between 20-29 have either completed 12 years of education or are University graduates.

The large number of young unemployed with strong educational qualifications is not a phenomenon unique to Greece. Table 8 compares unemployment rates of young people by educational attainment in a number of OECD countries in 1991. For both teenagers and young adults from the three countries with the highest unemployment rates--Italy, Spain, and Greece--higher unemployment rates are associated with higher educational attainment.

d. Duration and persistence of unemployment

The overall rise in unemployment in Greece in the 1980s and early 1990s has also been associated with an increase in long-term unemployment. During this period, there was a steady increase in the duration of unemployment. Chart 11 shows that the share of unemployed workers who have been out of work for less then a year declined from 57 percent in 1981 to 41 percent in 1993 while, at the same time, the share of those who have been unemployed for more than a year (the conventional definition of long-term unemployment) rose from 21 percent in 1981 to 50 percent in 1993.

Although the experience with long-term unemployment in Greece was not out of line with that in other OECD countries, women in Greece were particularly affected. Table 9 compares the long-term unemployment rates (unemployed for more than a year in percent of the labor force) in selected European countries. The rate for Greece is close to the average of the European OECD countries (4.7 percent). At 8.5 percent, however, the rate for women is more than three times that for men, and well above the European average. Furthermore, the incidence of long-term unemployment (the share of long-term unemployment out of total unemployment) was consistently higher for women than for men. This confirms the finding in OECD (1995) that in countries where unemployment rates are higher for women than for men, the incidence rate for women also tends to be significantly higher.

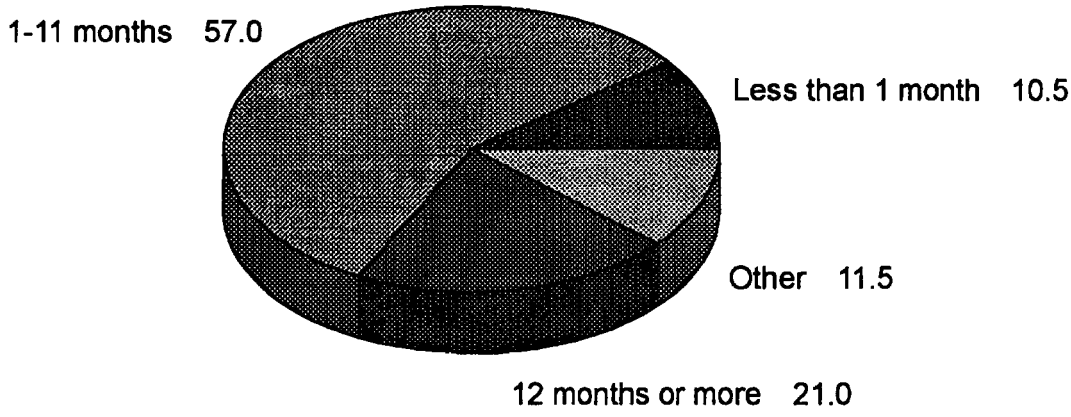
Incidence of Long-term Unemployment in Greece, by gender
(in percent)

Year	84	85	86	87	88	89	90	91	92	93
Men	28	35	32	34	37	41	41	37	38	41
Women	48	53	53	52	54	58	56	53	57	57

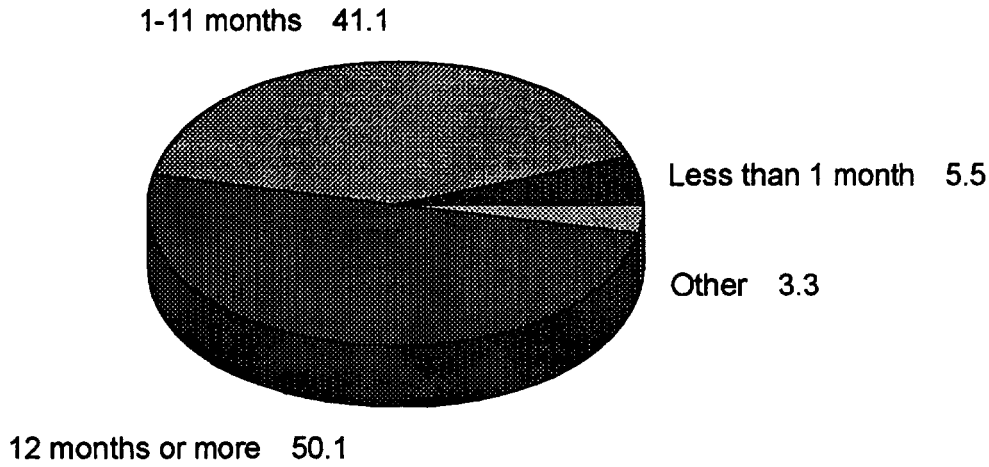
Another important fact is the exceptionally high long-term unemployment rate for young people in Greece: as Table 9 shows, this rate for the 15-24 age bracket was 13.6 percent, compared to an average of 8 percent in the European OECD countries. Greece experiences the highest long-term unemployment rates for this age group after Spain and Italy. In addition, Greece experiences high rates of incidence of long-term unemployment for

Chart 11
GREECE
Duration of Unemployment
(In percent)

1981



1993



Source: NSSG Annual Labor Force Surveys.

young people. As Table 10 shows, the incidence rates in Greece are among the highest in the OECD.

Finally, the data suggest that unemployment in Greece is persistent. Although a more formal discussion of unemployment persistence in Greece is provided in Section 2, data on flows into and out of unemployment provide some interesting *prima facie* evidence.

Table 11 shows OECD estimates for flows into and out of unemployment in 1993 (OECD 1995). 1/ The table shows that there are sizeable cross-country differences and significant divergence between inflow and outflow rates. For example, inflows into unemployment were the highest in Denmark and Finland, both of which had high unemployment rates in 1993 (12.2 and 17.9 per cent respectively), although in these two countries outflow rates were even higher; in the UK, there were also high inflows and outflows; and Portugal, which had the lowest unemployment rate in 1993 (5.5 percent), reported a very high outflow rate. These large differences make the data hard to interpret.

These reservations notwithstanding, it can be argued that a low outflow rate is an indication of unemployment persistence. Thus, ranking countries in Table 11 in terms of the inverse of the outflow rate, suggests that unemployment in Greece has the third highest degree of persistence, after Spain and France. This preliminary impression is borne out by a more rigorous analysis of persistence in Section 2.

e. Unemployment and vacancies

The standard analysis of the unemployment-vacancy relationship can be found in Pissarides (1985); Blanchard & Diamond (1989); and Jackman *et al.* (1990). According to this, at steady state there will be a negatively-sloped curve in the unemployment-vacancy (UV) space, known as the Beveridge curve: on the one hand, a higher rate of job vacancies would be associated with a lower unemployment rate, because job matching would become relatively easier; on the other hand, a higher unemployment rate would lead to lower wages, higher demand for labor and thus, at least initially, a higher number of vacancies. Shocks that affect the allocation of labor (or, more broadly, the structure and functioning of the labor market) would tend to shift the steady-state locus along the 45-degree line, while shocks that affect aggregate demand would tend to produce counter-clockwise loops around the steady-state locus. Things, of course, are more complicated in the case of an aggregate demand shock that also has an effect on the structure of the labor market that lasts long after the shock itself is finished, i.e., in the case of hysteresis.

1/ Inflows are proxied by stock data on those unemployed for one month or less, while outflows are calculated by an identity which links changes in the stock of unemployed to inflows and outflows.

Vacancy data in Greece are collected by the Manpower Employment Organization (OAED) and are of very poor quality. Data prior to 1984 are unreliable. Data for 1984-93 show a sharp increase in vacancies, especially after 1988: average monthly vacancies jump from about 3,000 in 1988 to about 27,000 in 1993. It is unclear whether this jump reflects an increase in the job separation rate as a result of an aggregate demand shock, a structural shock, or a mismatch shock; an increase in the methodology of registering vacancies; or improvements in the services provided by OAED offices, which prompted employers to report vacancies more faithfully. But in any event, the data should be interpreted with caution.

Given these reservations, Chart 12 plots the unemployment-vacancies (UV) locus for Greece for 1984-92. We can trace two distinct phases in the movement of the UV locus. This first is between 1984-88, when the locus appears to be moving along a conventional negatively-sloped Beveridge curve. Indeed, during this period Greece experienced an aggregate demand shock associated with the 1985-86 macroeconomic stabilization program (involving a devaluation, wage freeze, and some fiscal retrenchment) and the subsequent policy reversal in 1987-88. The behavior of the UV locus during this period therefore seems to be consistent with the predictions of the standard theory. In the second phase between 1988-92 the UV locus shifted outward. This movement--which has also been observed in most OECD countries--is more difficult to interpret. It could be explained by an increase in skill mismatch, or some form of hysteresis (for example the "stigmatization" effects of unemployment à la Pissarides 1992), or both. There is some indirect evidence supporting both hypotheses: on the one hand, the increase in the incidence of unemployment among highly-educated entrants in the labor market could be due to an increase in mismatch between the skills demanded in the market and those earned at school; on the other, the sharp rise in the number of long-term unemployed, especially in the late 1980s, is consistent with the hypothesis that long spells of unemployment reduce the efficacy of job search. But the available data do not allow us to distinguish between these two factors.

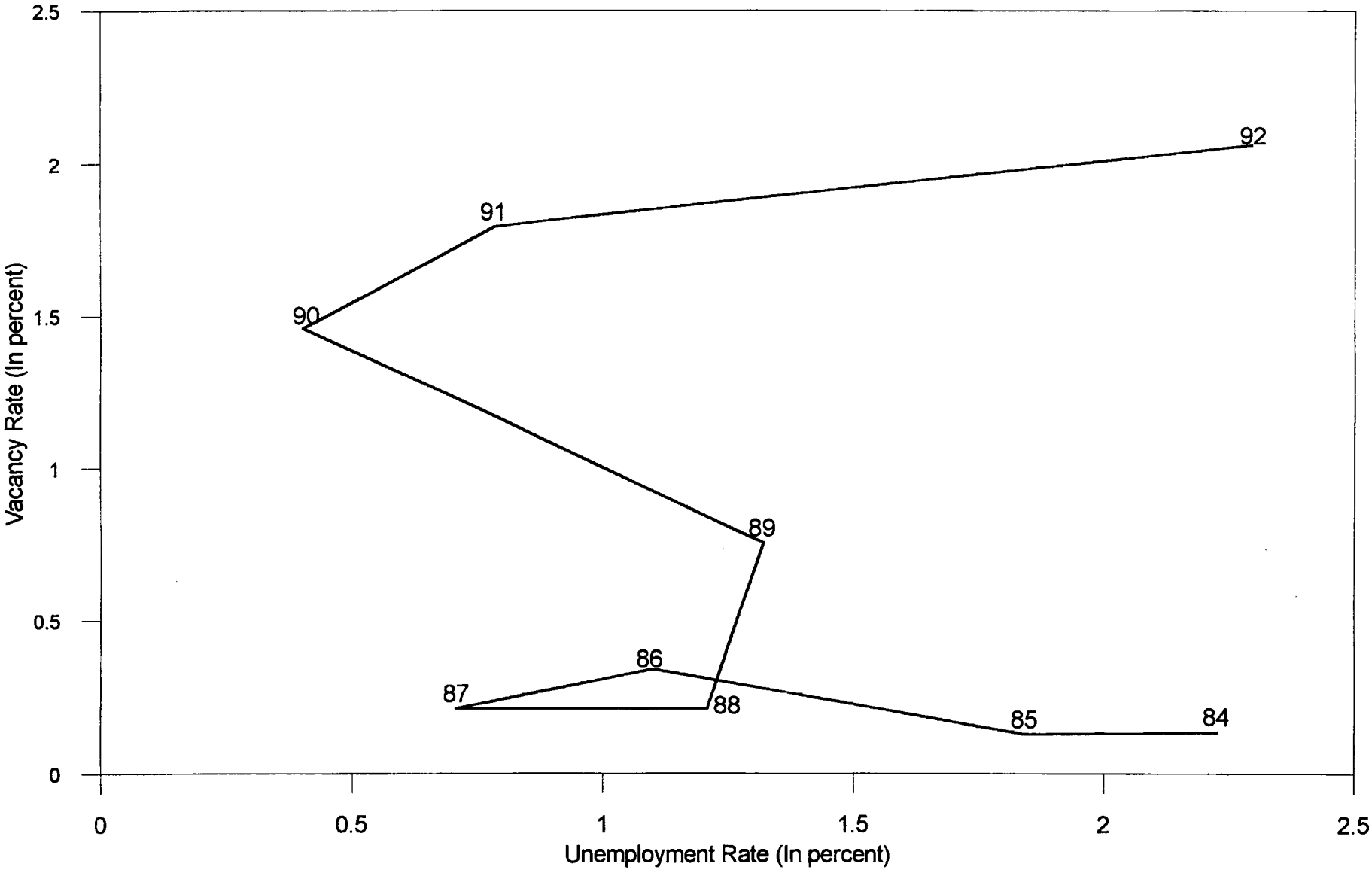
f. Unemployment, wages, and prices

The Table below shows annual averages of wage and price inflation, productivity growth, and unemployment. The steady worsening of Greece's overall growth performance during the last quarter century is reflected in productivity growth, which fell from 8½ percent in the 1960s to 4 percent in the 1970s and less than 1 percent in the 1980s and early 1990s. Wage and price inflation, on the other hand, was very low in the 1960s, although real wages were rising rapidly, spurred by increases in productivity. During those years, unemployment was low and falling. In the 1970s, unemployment declined somewhat, while wage inflation picked up and productivity growth decelerated, causing an increase in unit labor costs. Finally in the 1980s, price and wage inflation continued to rise rapidly and, at the same time, there was a massive increase in unemployment.

Chart 12

GREECE

Unemployment - Vacancy Curve



Wages, Prices, Unemployment, and Productivity

	1963-93	1963-70	1971-80	1981-93
Wage Inflation	15.5	8.6	18.6	17.3
Price Inflation	12.0	2.4	13.3	16.9
Real Wage Growth	3.5	6.2	5.3	0.4
Productivity Growth	3.7	8.6	3.9	0.6
Unemployment	5.1	4.9	2.3	7.4

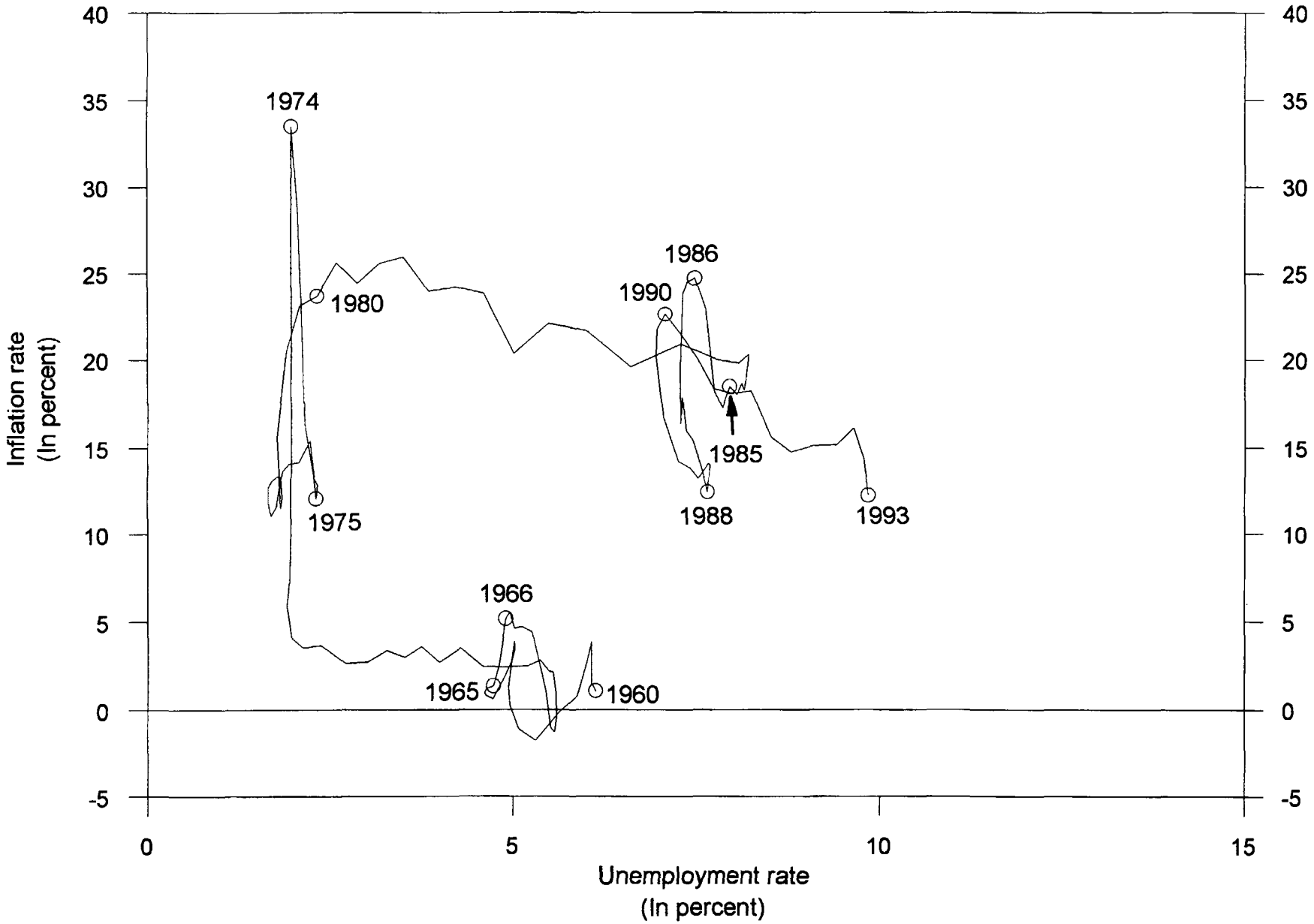
Chart 13 focusses on the relationship between inflation and unemployment. Apart from the sharp increases in inflation after the oil shocks, four distinct periods can be identified. In the 1960s up to the first oil shock, when unemployment declined while inflation remained low; in the first half of the 1980s, when inflation slowed down somewhat and unemployment increased; between 1986-90, when inflation was first brought down and then increased again (reflecting the 1985-86 stabilization program and the subsequent policy reversal), without any perceptible impact on unemployment; and in the early 1990s, when the inflation-unemployment locus appeared to be moving along a conventional negatively-sloped Phillips curve.

It is tempting to see in Chart 13 a negatively-sloped Phillips curve throughout the 1980s, with the exception of the stabilization episode; this, however, would be wrong. The modest slowdown in inflation in the early 1980s was not the result of tight financial policies (indeed, fiscal and monetary policies were expansionary during that period), and cannot explain the rise in unemployment. In the first years of 1990s, on the other hand, when some fiscal retrenchment took place and monetary policy was tightened, it is likely that we are indeed observing a conventional trade-off between inflation and unemployment. But clearly this Phillips curve is very much to the right of the one traced before the oil shocks.

* * *

What have we learnt so far? The large increase in unemployment in Greece during the 1980s was the reflection of major shifts in the structure of both the demand and the supply of labor. On the demand side, the relative decline of agriculture appears to have displaced a large number of relatively low-skilled farm workers, most of them women. At the same time, on the supply side, the increase in the female participation rate and the rapid improvement of the educational profile of the labor force brought into the labor market a large number of mostly young, well-qualified workers.

Chart 13
GREECE
The Inflation-Unemployment Curve



These developments took place at a time of a significant slowdown in the pace of economic growth and job creation in Greece and, as a result, unemployment increased. This increase would have been much greater had some workers--mostly older men--not decided to drop out of the labor market altogether.

But this mechanical interpretation opens more important questions. Why did the labor market fail to adjust to the new supply and demand conditions? Why did the new entrants in the labor market not drive wages down? Why did the Phillips curve shift to the right? It is possible that skill mismatch was a factor, especially as regards the older workers displaced from agriculture. But this cannot explain the increase in unemployment among young, well-educated workers, the lengthening of the duration of unemployment, and its persistence in the face of expansionary policies in the 1980s. These issues are the focus of the remainder of the paper.

3. A formal analysis of unemployment persistence in Greece

The data on flows into and out of unemployment presented in the previous Section suggest that unemployment in Greece shows a high degree of persistence. In this Section, we take up this issue and analyze unemployment persistence in a more rigorous fashion.

Our starting point is the simple framework set out in Alogoskoufis and Manning (1988a and 1988b), in which unions set the real wage and employers choose the level of employment to maximize profits (see Appendix I for a complete exposition). In this framework, there are three basic sources of unemployment persistence. The first reflects insider dynamics, in other words the tendency of trade unions to be "selfishly" concerned with the welfare of their employed members, the insiders. At the limit, the perfect insider union would set a wage that is consistent with full employment of its current members, which may be different than the market equilibrium rate. In such a case, unemployment will show a high degree of persistence. For example, if there is an unexpected demand shock and, as a result, a number of previously-employed workers lose their "insider" status, unemployment would stay at the new, higher level permanently. More realistically, however, outsiders are likely to have some influence on the union's wage demands, and hysteresis is temporary: in the previous example, unemployment would rise initially and then eventually decline towards its equilibrium level, with the speed of adjustment depending on the relative importance of the two groups, the insiders and the unemployed outsiders. The greater the influence of insiders, the more persistent unemployment will be. Following Alogoskoufis & Manning, we denote this factor by α. 1/

1/ It should be noted that a high value of α need not imply high unemployment persistence. If, for example, the union has some influence over not only the wage but also the level of employment, then even if $\alpha = 1$, there will be less than full hysteresis.

The second source of unemployment persistence is real wage rigidity: if wage setters demand real wages consistent with their own "target" real wage level irrespective of the prevailing economic conditions--what Alogoskoufis & Manning refer to as persistence of wage aspirations--a rise in unemployment will exert only a limited downward pressure on real wage demands. As a result, once it rises, unemployment will remain high, at least in the short run. We denote the degree of real wage rigidity by β, which measures the weight of past real wages in forming the "target" real wage of wage setters. The higher the value of β, the greater the degree of unemployment persistence. 1/

The last source of unemployment persistence arises on the demand side. If, due to costs of firing and hiring workers, firms react sluggishly to changes in conditions when making their employment decisions, then an unexpected expansionary shock will not reduce unemployment as quickly as might be expected. This factor is denoted by γ. It should be noted that a high value of γ would also generate employment persistence in the case of an unexpected contractionary shock, if the costs of adjusting the level of employment are symmetric. 2/

This analysis links past and current unemployment through three channels. First, high past unemployment may reduce the unions' employment target, and thus be positively correlated with current unemployment; this is the effect of insider dynamics. Second, increases in real wages in one period not only lead to lead to an increase in unemployment during the same period, but may also trigger a chain of higher wage demands and higher unemployment in the following periods--the real wage rigidity effect. Finally, a reduction in employment in one period may result in lasting unemployment through persistence in labor demand if firms are reluctant to re-employ labor under uncertainty. The persistence of unemployment will therefore depend on the three parameters α, β, and γ. The Table below summarizes the effect of these three channels. Moreover, persistence will be higher the less wage-elastic is labor demand (denote the elasticity by δ) and the wage-setting schedule (denote the elasticity by η, measuring the degree to which unions care about wages only, and not about the employment prospects of their members).

Unemployment persistence can be directly and compactly measured by the parameters ρ_1 and ρ_2 of a simple second-order autoregressive model for unemployment (see Appendix I). The closer $\rho_1 + \rho_2$ is to unity, the greater the degree of unemployment persistence. At the limit, if $\rho_1 = 1$ and $\rho_2 = 0$, current unemployment is always equal to past unemployment. Furthermore, the values of ρ_1 and ρ_2, combined with estimates of the parameters α, β, and γ

1/ As before, a high value of β does not necessarily lead to high persistence if the unions are willing to trade-off real wages for employment in the face of rising unemployment.

2/ For a full discussion, see Section 4.

of the structural model, would allow the identification of the factors contributing to unemployment persistence.

The effect of past unemployment on the current level of unemployment

Persistence Channel	U_{t-1}	U_{t-2}
Insider Membership	(+) employment target of union declines, fewer insiders	
Real Wage Rigidity	(+) higher real wage target as a result of higher target last period	(-) current wage target affected by past
Persistence of Labor Demand	(+) adjustment costs	(-) lower labor demand and lower wages in previous period

Our estimates of ρ_1 and ρ_2 for Greece (using data for 1965-1993) are shown below, with asymptotic standard errors in parentheses.

	Unemployment rate lagged once (ρ_1)	lagged twice (ρ_2)	$\rho_1 + \rho_2$	R^2	AR2-test*
U_t	1.583 (0.134)	-0.668 (0.127)	0.91	0.96	0.255

(*) p-value for second-order autocorrelation test.

The estimates suggest a very high degree of unemployment persistence, confirming the impression conveyed by the inflow-outflow data. Indeed, if these estimates are compared to those presented in Alogoskoufis & Manning (1988) for a number of other countries, Greece appears to have one of the highest degrees of unemployment persistence in Europe, similar to that in Belgium, Germany, Italy, and the UK.

To identify the sources of unemployment persistence in Greece, we estimate simple wage-setting and labor demand schedules and recover the parameters of the structural model. Estimation of the wage-setting schedule provides us with estimates for α (insider membership), β (persistence coefficient of wage aspirations), as well as η (elasticity of the wage setting schedule). 1/ Furthermore, as in Alogoskoufis & Manning (1988), we also include a term capturing the anticipated increases in inflation, with a parameter ϕ. The labor demand schedule, on the other hand, provides estimates for γ (persistence of labor demand), as well as δ (the standard elasticity of the labor demand schedule). The equations are derived and explained in Appendix I.

Table 12 presents our estimates of the parameters of the wage-setting schedule in Greece, together with the estimates for other countries produced by Alogoskoufis & Manning. The results show a moderate value for the strength of membership dynamics (α) in Greece (0.58), which is broadly in line with that estimated in France, Germany, Ireland, and the UK. At 0.91, on the other hand, real wage persistence (β) is rather high in Greece, as in some of the other European countries included in the sample. The coefficient capturing the responsiveness of real wages to anticipated expected inflation (ϕ) is small and not significantly different from zero, as in most other countries in the Table. This implies that there is strong *de facto* nominal indexation to anticipated inflation. Finally, the estimate for η, the elasticity of the wage-setting schedule, suggests that the responsiveness of wage-setters in Greece to unemployment is somewhat higher than in most other EU-12 countries (with the exception of the Netherlands), but lower than the estimates for the Scandinavian countries and Japan.

According to the model, the responsiveness of wages to unemployment can be interpreted as the ratio of the short-run elasticity of firms' demand for labor δ to the unions' preference for achieving a wage, rather than an employment objective θ ($\eta = \delta/\theta$). Knowing the values of δ and θ would allow us to infer whether the observed degree of real wage responsiveness to unemployment is attributed mostly to labor demand factors or to union behavior.

The results of the estimation of a simple labor demand function, which allows us to recover δ, and thus calculate θ, are presented in Table 13, together with the values of the same parameters estimated by Alogoskoufis & Manning (1988) for other countries. In the case of Greece, the estimated elasticity of the demand for labor is very small (0.0065) and, therefore,

---

1/ It is important to stress that the estimate for the elasticity of the wage-setting schedule η derived from the wage-setting schedule is not independent from labor demand decisions. Unions, after all, recognize the trade-off between real wages and employment imposed by the employers' behavior, and might well be willing to accept a wage cut if they realize that firms are clearly responding to wage changes when making their hiring/firing decisions (Alogoskoufis and Manning 1989).

the estimate for θ is also near zero, smaller than that in all other countries. This implies a very strong preference of wage-setters for employment over wages. This pattern is in line with--indeed somewhat stronger than--that established by Alogoskoufis & Manning for most European countries, as opposed to the US, where wage-setters appear to be very sensitive to the level of wages. The degree of labor demand persistence, on the other hand, is high compared to that in the US, but comparable to that in other European countries.

Finally, as a test of the consistency of our results, we can use the estimates of the structural parameters to calculate the unemployment persistence parameters ρ_1 and ρ_2 directly, and compare these values with those estimated independently from the second-order autoregressive model. As shown in Appendix I:

$$\rho_1 = (\alpha\delta\eta+\beta+\gamma)/(1+\delta\eta)$$

$$\rho_2 = -\beta\gamma/(1+\delta\eta)$$

These formulae yield $\rho_1 = 1.61$, $\rho_2 = -0.637$, and $\rho_1 + \rho_2 = 0.97$, all of which are indeed extremely close to the direct estimates provided above.

The results of this analysis suggest that unemployment in Greece displays a very high degree of persistence, even by the standards of most other European labor markets. There is some evidence of insider dynamics behind this, with the unions focussed on preserving employment of their members, rather than wages. But the major factors behind unemployment persistence appear to be the inflexibility of real wage aspirations of wage-setters and, to a lesser extent, the slow adjustment of demand to shocks.

So what explains labor demand persistence and inflexibility of wage aspirations in Greece? For the former, the usual suspect is labor market legislation, in particular high firing costs, which raise the costs of adjusting a firm's level of employment. The latter, on the other hand, could be due to a host of factors, such as: a generous unemployment benefit system that raises the workers' reservation wage; a preference for stable living standards; or the absence of consensus-building mechanisms that would ensure some real wage flexibility in the face of rising unemployment (such as a centralized bargaining system à la Calmfors & Driffil 1988).

In the following Section, we review briefly labor market institutions in Greece, including employment protection legislation, the unemployment benefit system, and the wage bargaining system. And in Section 5, we propose an additional mechanism which, in our view, has contributed significantly to persistence of real wage aspirations: the impact of the government's employment and wage decisions during the 1980s.

4. Labor market institutions in Greece

In this Section, we examine regulations on dismissal, the unemployment benefit system, and the wage determination system in Greece and compare them to those elsewhere, in order to assess whether these institutions are likely to have contributed to the observed persistence of unemployment.

a. Regulations on dismissals

Restrictions on or costs associated with firing may be seen as increasing the fixed cost of labor. In theory, this would result in smoother and less pronounced employment fluctuations than otherwise (in other words, the phenomenon of labor demand persistence discussed above). However, there is no consensus in the literature on the overall effects of these restrictions on the average level of employment or unemployment over the cycle. On the one hand, they need not have any effect at all if wage earners are willing to accept (and minimum wage laws do not prevent) wages that clear the market; indeed, it may be argued that standardization of the contractual rules across firms may reduce information and transaction costs, thus rendering the market more efficient. On the other hand, such restrictions may have indirect effects on the level of unemployment by increasing the incidence of long-term unemployment through reduced labor turnover, thus speeding up skill loss among the unemployed. 1/

The obligation to make a severance payment when dismissing individual workers is the most common firing cost. The Table below summarizes the existing legislation on severance payments in Greece.

For both blue-collar and white-collar workers, the benefits depend on years of service. For blue-collar workers, the last two categories were added in 1989; prior to that, any worker with service over 10 years was receiving a payment equivalent to 52-days' wages only. For white-collar workers with service over 10 years, in addition to the ceiling of 24 monthly salaries, there is also a ceiling on the amount of the severance pay (it cannot exceed 8 times the minimum daily wage times 30).

1/ There is some evidence supporting the view that adjustment costs have a symmetric effect during upturns and downturns (Bertola 1990). However, there is also evidence to the contrary (Lazear 1990; Heylen 1993; OECD 1993). Also, a number of models with non-linear or asymmetric adjustment costs are capable of generating--at least under certain conditions--effects on the level of unemployment (for a discussion, see Bean 1994).

Severance payments

Blue-Collar		White-Collar	
Service	Severance Pay	Service	Severance Pay
less than 1 year	5 days	less than 1 year	1 month
1-2 years	7 days	1-4 years	2 months
2-5 years	13 days	4-6 years	3 months
5-10 years	26 days	6-8 years	4 months
10-15 years	52 days	8-10 years	5 months
15-20 years (*)	78 days	10 years	6 months
over 20 years (*)	92 days	over 10 years	1 month's salary per year of service (up to 24 months)

(*) New category introduced in 1989.

In addition to severance payments, Greek legislation also restricts mass dismissals. Mass dismissals are defined as those that involve at least 5 workers for firms employing up to 50 workers; and 2 percent of the work force for firms with more than 50 workers. Mass dismissals require prior consultations between unions and the employers and, if these fail, arbitration by the Ministry of Labor.

b. The unemployment benefit system

The theoretical literature has pointed out that, aside from equity considerations, there are good efficiency arguments for providing some income support during unemployment. The lack of complete insurance markets means that the availability of a certain income during (unexpected) spells of unemployment, by minimizing disruption of the unemployed individual's life, facilitates job search. Seen as a subsidy on job search, unemployment benefits could improve job matches and increase productivity. Moreover, the provision of unemployment benefits, by increasing the mean and reducing the variance of expected permanent income, should encourage labor force participation (Layard *et al.* 1991; OECD 1991). At the same time, however, it is clear that unemployment benefits, just like any other non-labor income, tend to increase the reservation wage and thus weaken the incentive for job search and the willingness to accept job offers, and to strengthen the bargaining power of unions over wages. These two factors lead to downward wage rigidity and a higher equilibrium unemployment rate. This has

generally been confirmed by empirical studies (see the survey in Atkinson & Micklewright (1991). 1/

Unemployment benefits in Greece are administered by the Manpower Employment Organization (OAED), and financed by employers' and employees' contributions (3 percent and 1 percent of gross salary, respectively). Eligibility for the unemployment benefit depends on a number of conditions: the applicant must have been fired (quitting disqualifies the applicant), and must have worked at least 125 days at work during the 14 months prior to the termination of employment (separate regulations exist for seasonally employed persons). The duration of the unemployment benefit depends on the number of days the applicant has worked over the 14 months prior to dismissal, as well as on his/her age. Those who qualify with the minimum service (125 days in the last 14 months) receive the benefit for 5 months, while those who have worked 300 days or more during this period receive it for 12 months. 2/ Finally, the replacement rate is 50 percent for white-collar and 40 percent for blue-collar workers.

c. The wage determination system

Institutional arrangements for wage setting differ greatly between countries, varying from very centralized systems (e.g., Austria) to very decentralized ones (e.g., the U.S.). Bruno & Sachs (1984) first challenged the conventional view that more decentralized systems are better by constructing an index of the degree of centralization (or "corporatism") of the wage bargaining system and showing that more corporatist countries performed better in response to the first oil shock. Calmfors & Driffil (1988) ranked countries according to the degree of centralization of the wage bargaining system and found that "extremes work best", i.e., that both centralized and decentralized systems are associated with better labor market performance than intermediate ones. Calmfors (1993) provided some microeconomic foundations for this "hump-shaped" relation between centralization and performance, arguing that centralization in wage bargaining--defined as inter-union and inter-employer cooperation at the national level--helps internalize a number of negative externalities that arise in situations of imperfectly decentralized wage setting.

1/ Interestingly, studies with panel data have shown that unemployment benefits have small effects on the individual's willingness to leave unemployment and accept a job. Cross-country studies, on the other hand, have tended to come up with substantially higher estimates of effects of benefits on unemployment (Bean et al. 1986; Burda 1988; Nickell 1990; Layard et al. 1991). This is probably due to the fact that cross-country data capture the effects that benefits have on unemployment through increasing the bargaining power of unions and leading to higher average wages, which are not likely to be captured in panel data.

2/ For first-time claimants, the period is 24 months.

Several criticisms have been leveled against this model. First, the simple hump-shape model may not hold in cases of imperfect markets or economies that are substantially open to foreign competition; indeed, the more open the economy, the smaller some of the externalities and, thus, the gains from centralization. Second, it may be argued that what matters for labor market performance is not the degree of centralization *per se*, but the degree of social consensus and enforceability of agreements; McCallum (1983) found that the degree of consensus, as proxied by strike levels, was a good indicator of economic performance in the 1970s. Third, the benefits of centralized systems may decline quickly as the economy moves towards a "post-Fordist" production environment, since developments in production technology and work organization may increase the proportion of firms that find decentralized bargaining more profitable (Ramaswamy & Rowthorn 1993). Finally, this model disregards the compression of relative wages that would tend to arise in a centralized system, as the decision-making process in centralized unions would tend to favor the "median voter". As a result, there is little consensus in the literature on the desirable degree of centralization in a wage determination system.

In Greece, after the end of the military dictatorship in 1974, wage bargaining was established in the private sector, as well as the wider public sector (state-owned banks, state enterprises); in the government, wage-setting was part of budgetary policy.

Collective negotiations are centralized: the national-level negotiations take place between the General Confederation of Labor Unions on the one hand, and three employers' associations on the other (the most influential of which is the Industrialists' Association). These negotiations determine the annual increase in the level of the minimum wage, which then has *erga omnes* value. The duration of these agreements has traditionally been one year--although occasionally (most recently in 1991, 1993, and 1996) two-year agreements have been concluded. In addition to the national negotiations, there are in some cases sectoral agreements.

Union power varies from sector to sector and between the private and public sectors. Unions are more powerful in the wider public sector (public utilities, banks) compared to the private sector; in the former, unions are also able to employ more directly political pressure on the government.

In 1982, the socialist government legislated an automatic wage indexation mechanism (ATA). This was temporarily revoked during the 1985-86 stabilization program, when wages were frozen, and was finally abolished in 1990. Since then, most collective agreements have included some form of *ex post* indexation in the form of catch-up clauses (increases awarded after the fact if inflation exceeded a certain level foreseen in the agreement).

d. International comparisons and a preliminary assessment

Table 14 compares some key features of Greece's severance payment regulations and unemployment benefit system to those in other OECD countries. It is, of course, extremely difficult to summarize differences in complex national legislations into a simple Table; nevertheless, it is still possible to draw some broad conclusions.

It appears that rules on dismissals in Greece are quite tough. Severance payments are among the highest in the sample on Table 14, while rules on mass dismissals are also stricter than elsewhere. The limit beyond which mass dismissal rules apply (2 percent of the work force) is lower in Greece than in the relevant EU guideline. 1/ And the mandatory intervention of the Ministry of Labor in cases in which prior consultation fails to reach agreement may impart a "anti-dismissal" bias in the system, especially in cases where large firms are concerned. Although there has been no empirical work assessing the impact of these rules on employment in Greece, evidence from Italy--where dismissal rules are also strict--has shown that firing costs have been an important factor in slowing down adjustment of the work force (see the discussion in Demekas 1995).

In contrast, the unemployment benefit system in Greece is not generous: the benefits are low, last a short time and--more importantly--are relevant for a relatively small part of the unemployed.

Regarding the wage determination system, as noted above, theory does not provide a generally-accepted and practical rule for assessing its efficiency. The system in Greece is probably more centralized than most (a quick calculation of the Calmfors & Driffil "centralization index"--described in Appendix 1 of their paper--for Greece would place the Greek wage determination system at a level of centralization between those in Germany and the Scandinavian countries). However, some allowance has to be made for the fact that the wage determination system in Greece covers a much smaller proportion of the work force than in other countries, due to the relatively large number of self-employed workers. In addition, Jecchinis (1994) has argued that, at least in recent years, the wage determination system has become less conflict-prone and more cooperative.

Where does this leave us? Our analysis in Section 3 suggested that there was considerable persistence of real wage aspirations, as well as some hysteresis in the demand for labor. While the strict employment protection legislation in Greece can probably explain a good deal of the latter, it is less clear that labor market institutions are responsible for the former: unemployment benefits are low, and the verdict on the wage determination system is ambiguous. In the next Section, we examine another possibility.

1/ 20 workers for firms employing 20-100 workers; 10 percent for firms with 100-300 workers; and 30 workers for firms with more than 300 workers.

5. The impact of government wage and employment policies on unemployment

If labor market institutions cannot fully explain the rigidity of real wage aspirations of wage setters which, as we saw, is the single most important factor behind unemployment persistence, then what could be the cause? Surely factors outside the labor market, such as the large black economy and the traditionally strong family ties in Greek society, are important for maintaining workers' reservation wages at a high level despite the increase in unemployment. But the influence of both of these factors has most likely declined in the last two decades.

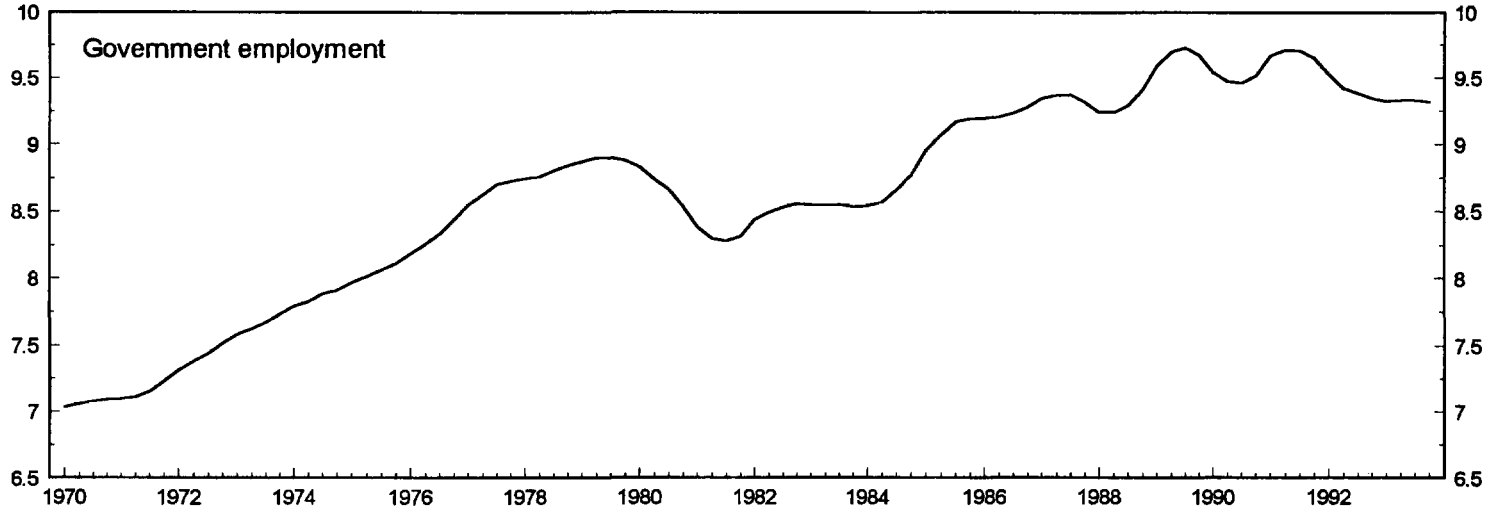
In this Section, we advance a hypothesis that, in our view, can help explain the rise and persistence of unemployment in Greece since the late 1970s: the sizeable increase in government employment and--particularly in the 1980s--in government wages, aside from their effect on the fiscal position and thus the overall macroeconomic conditions, had a direct impact on labor market performance through the labor market dynamics.

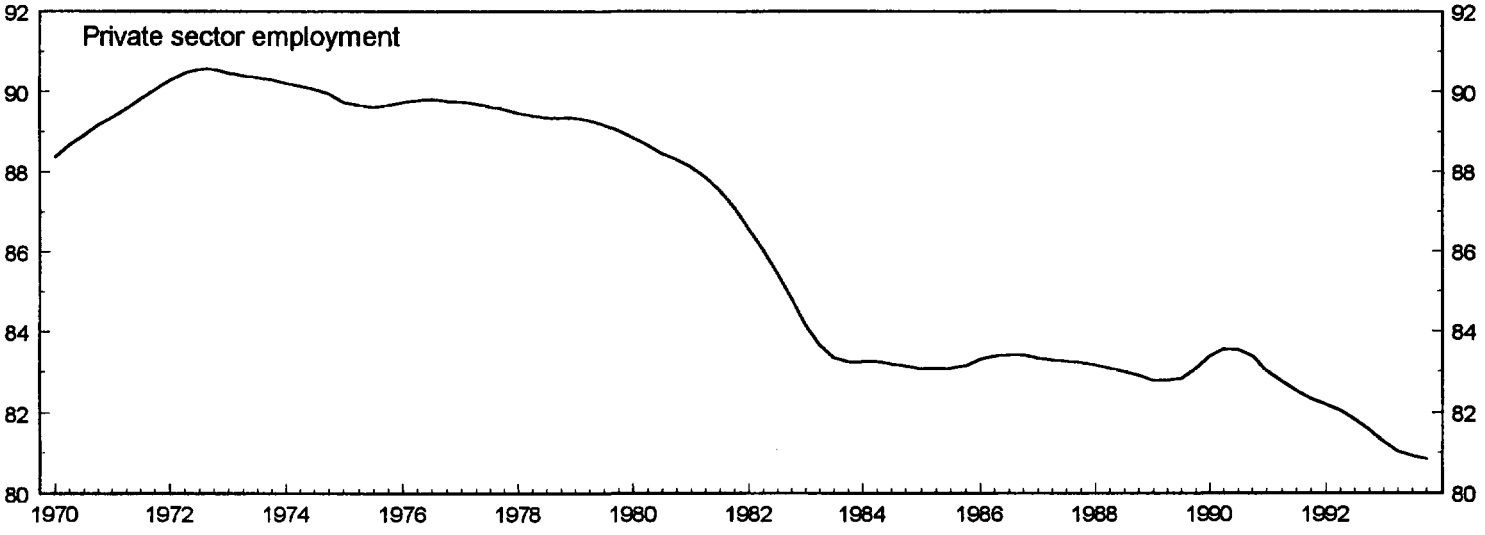
During this period, the size and influence of the government sector in the Greek labor market increased rapidly: the share of government employment in total labor force almost doubled from its level in the 1960s to reach 8-9 percent in the early 1990s (over 12 percent if public enterprises are included, and 13 percent if state-owned banks are included). This increase went hand-in-hand with the sharp increase in unemployment (Chart 14). Moreover, there are substantial and persistent differences in employment conditions between the private and the public sector: government employees enjoy constitutionally-guaranteed life employment, much more lax working conditions, and a generous pension system. For these reasons, government employment is very desirable, while many government employees also have second jobs. Finally, government wage policy in Greece has mirrored the fundamental policy shifts of the 1970s and 1980s. After the end of the seven-year military dictatorship in 1974, wages shot up in both the government and the private sector; growth in the latter initially surpassed that in the former, but in the 1980s this trend was reversed, to resume again in the early 1990s.

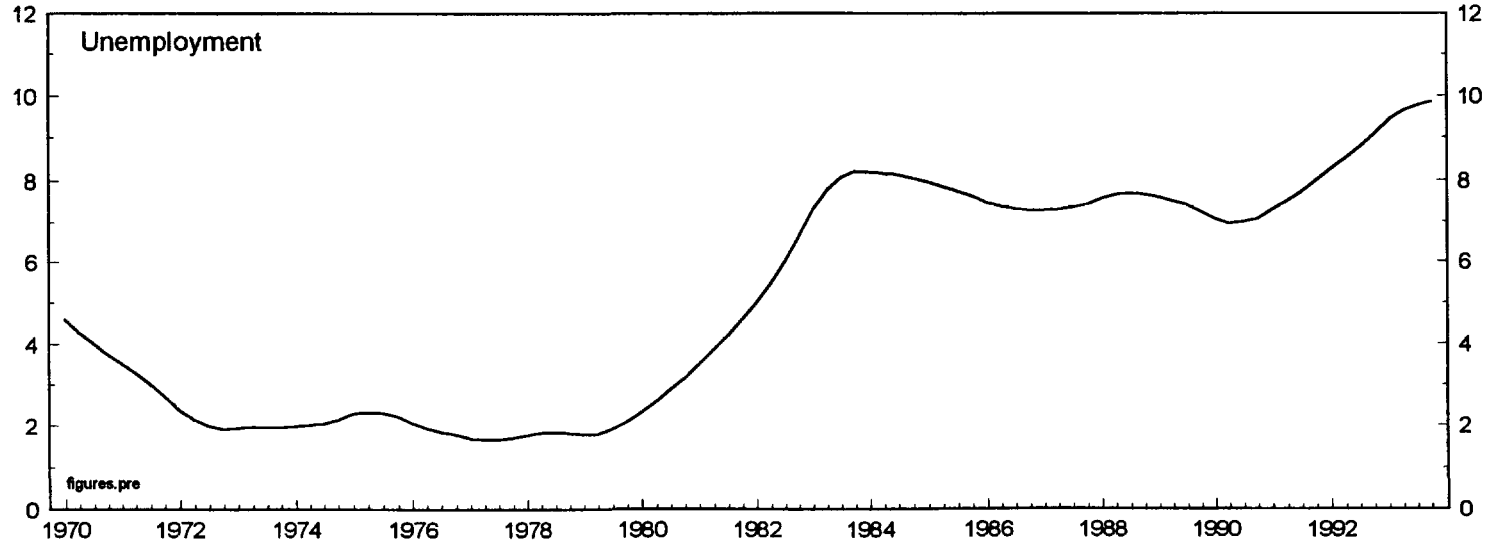
Although the recent literature on European unemployment has analyzed the impact of a number of government policies that contributed to this phenomenon, such as macroeconomic policies, taxation, unemployment benefit and training schemes, and labor market legislation, it has paid relatively little attention to the way the government acts as an employer, and its direct effect on labor market performance (see the survey in Bean 1994). This reflects the implicit assumption that the government's employment and wage decisions do not merit separate consideration, either because they are made on more or less the same grounds as those of private sector employers, or because they have no particular bearing on aggregate labor market performance.

Both of these postulates are questionable. On the one hand, public choice theory has argued that government actions--and particularly

Chart 14
GREECE
Employment and Unemployment
(In percent of the labor force)







Source: OECD.

government employment policy--are dictated by the interests of the bureaucracy and the need to provide political favors to interest groups in order to stay in office (Niskanen 1971; Buchanan 1977; Courant *et al.* 1979); 1/ Freeman (1986) has shown that wage determination through bargaining in the public sector leads to a different outcome than in the private sector, because of the public sector unions' ability to exploit the political process; 2/ and in their survey, Ehrenberg & Schwarz (1986) conclude that "labor market models based upon [...] profit maximization are clearly inappropriate for the government sector". On the other hand, there is strong empirical evidence that the size of the government has a negative impact on overall growth performance (see Barro 1990 and the references therein), and some evidence that it has positive effects on unemployment persistence (Barro 1988; Layard *et al.* 1991).

In this Section, we present and test a simple model with endogenous unemployment, in which government and private sector employers compete for the same workers but make employment and wage decisions on the basis of different objective functions, and workers are free to decide to which sector to apply for employment. Despite the simplicity of the analytical framework, the results suggest strongly that understanding labor markets in economies with a large public sector like Greece, requires taking explicitly into account the role of the government as an employer. The model is drawn from Demekas & Kontolemis (1996), and is described in detail in Appendix II.

a. The model

The government produces a public good (or service), which enters private sector production as an input, as in Barro (1990). In both sectors, labor enters the production with an effort function, which depends on the wage. This efficiency wage assumption generates endogenous involuntary unemployment at equilibrium and, at the same time, allows us to trace the effects of the government's wage policy on the productivity of civil servants. The production of the public good G is:

$$G = [\phi(W_g)L_g]^{\alpha}, \qquad \alpha \leq 1 \tag{3}$$

and that of the private good is:

$$Y = K[\psi(W_p)L_p]^{\beta} G^{1-\beta}, \qquad \beta \leq 1 \tag{4}$$

1/ Strong empirical evidence that governments engage in counter-cyclical hiring (Stevenson 1992; Kraay & Van Rijckeghem 1995) lend *prima facie* support to this hypothesis.

2/ This is different than the situation of wage leadership which may arise simply as a result of the government's relative size as an employer.

where L_i, W_i are employment and the wage in sector i = g (government) and p (private), respectively; K is a scale variable; and $\phi(W_g)$ and $\psi(W_p)$ are the effort functions in the two sectors.

In the labor market, identical workers maximize expected utility from income. Since at equilibrium there will be involuntary unemployment (assuming a sufficiently large labor force), workers have to weigh the wage in each sector with the respective probability of being employed there. In the private sector, where there is no job security, firms hire randomly from the pool of available identical workers. In the government sector, on the other hand, the government the probability of obtaining a job is a constant δ. Aside from its simplicity, this assumption is also consistent with the countercyclical hiring pattern of the government, a well-established stylized fact, 1/ and is the form used by Gelb *et al.* (1991) in their simulations of the impact of government employment on growth. In Demekas & Kontolemis (1996) we also explore alternative specifications for the probability of finding a government job. Thus, at equilibrium, the following arbitrage condition will hold:

$$\frac{L_p}{L_p+U} W_p = \delta W_g \quad \text{or} \quad W_p = \delta \frac{L_p+U}{L_p} W_g \tag{5}$$

Condition (5) is a key feature of the model. It establishes an equilibrium condition between wages in the two sectors with unemployment as the balancing factor. This condition is similar to that derived in the segmented labor market literature (see Corden & Findlay 1975; Mincer 1976; Demekas 1990).

Private firm optimization (assuming for simplicity an isoelastic effort function), combined with (5), yields a private sector wage equation of the general functional form:

$$W_p = W_p[(\bar{L}-L_g), L_g, W_g] \tag{6}$$

Turning now to the government's optimization problem, we assume that the government collects lump-sum taxes T in order to finance its wage bill W_gL_g, and maximizes a general objective function of total employment and private sector output net of taxes of the form:

$$\theta L_g + (1 - \theta)(Y - T), \quad \theta \leq 1 \tag{7}$$

1/ If the number of new hires depend on the size of unemployment (δU) and the government hires randomly from the available pool of identical unemployed workers, then the probability of finding a government job is $p = \delta U/U$, or $p = \delta$.

where θ can be thought of as a measure of the government's populist tendencies. This simple general formulation accommodates both a "benign" version of the government maximizing output and a more "populist" version, in which the government maximizes its own influence or tries to ensure worker support by minimizing unemployment. The solution of the government's maximization problem is given by

$$L_g = \left[\frac{1-\theta}{\beta\theta}\ \delta\bar{L}T\right]^{\frac{1}{2}} \tag{8}$$

$$W_g = \left[\frac{\beta\theta T}{(1-\theta)\delta L}\right]^{\frac{1}{2}} \tag{9}$$

Equation (8) is a demand for labor function in the government sector, and (9) a government wage equation equivalent to (6) for the private sector.

The simple model presented above has a number of testable implications that distinguish it from the standard labor market model, notably: (i) that there is an equilibrium relationship between the government/private wage differential and unemployment; (ii) that the government and the private sector make employment and wage decisions in a different way and, in particular, that the government at equilibrium determines its employment and wage level as described by (8) and (9), respectively; and (iii) that in the private sector, employment and wages are influenced by the level of government employment and wages.

b. Empirical results for Greece

Chart 15 plots the wage differential W_p/W_g against the unemployment rate. A positive correlation is strikingly apparent, as is predicted by our model. While this is not a formal test, it strongly suggests that our model may be relevant in explaining labor market aggregates in Greece. This is indeed corroborated by the results of more rigorous testing below.

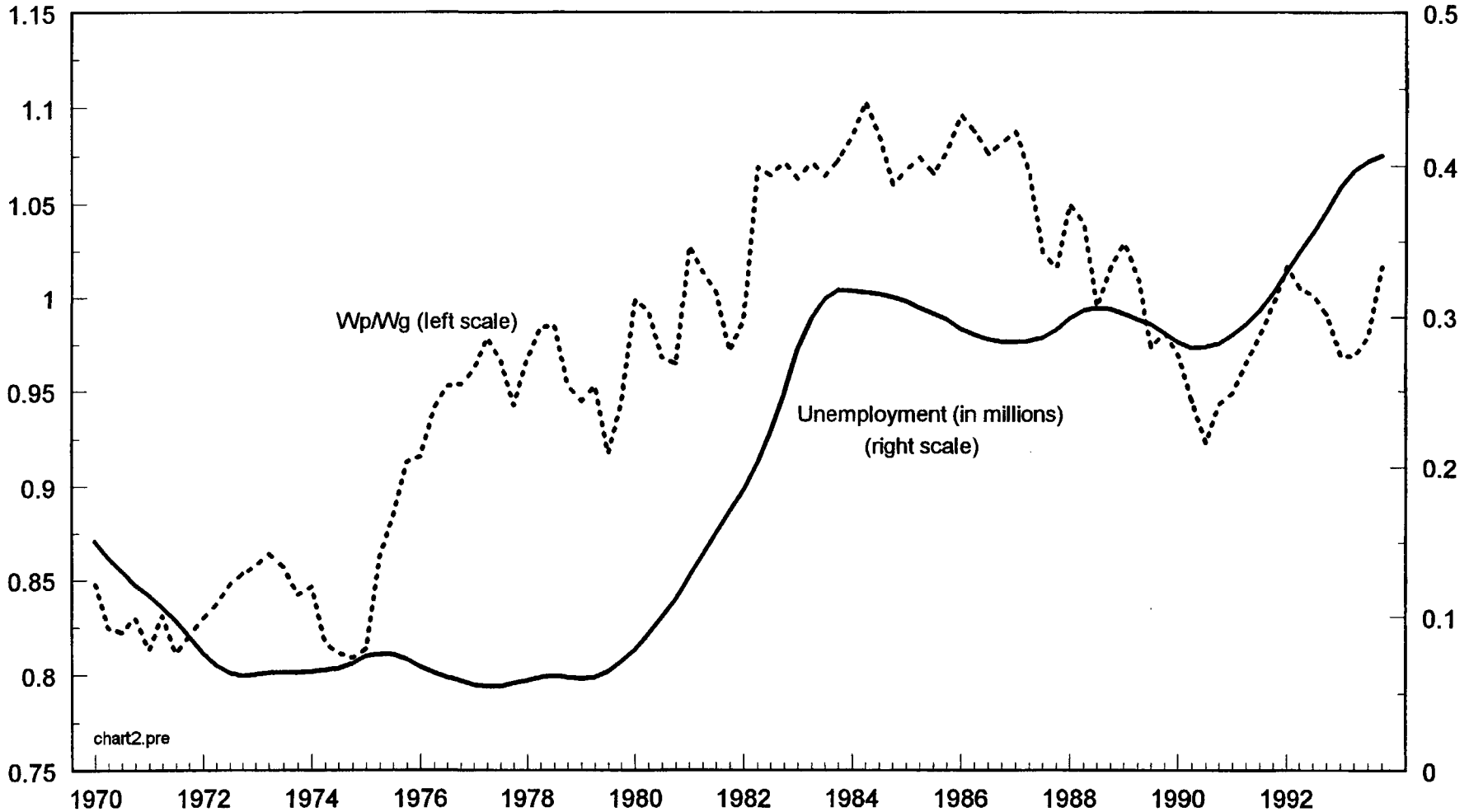
Because of the simplicity of the model--particularly the absence of explicit dynamics--we do not attempt to estimate precise functional relationships and to recover the model parameters. Instead, we use a vector auto-regression (VAR) technique and test for the existence of the long-term relationships and the restrictions implied by our model. The detailed empirical results are reported in Appendix II.

We first test for the existence of a long-term relationship between the wage differential and unemployment, as described in the labor market equilibrium condition (5) and suggested by the plot in Chart 15. Indeed, there exists one strong long-term relationship between the wage differential W_p/W_g on the one hand and unemployment in the form $(1 + U/L_p)$ on the other, of the form:

Chart 15

GREECE

Wage Differential and Unemployment



Source: OECD.

$$\frac{W_p}{W_g} = 1.29\left[1+\frac{U}{L_p}\right] + 0.41 \tag{10}$$

The existence of this positive one-to-one long-term relationship means that we can trace the effects of government policies on unemployment through their impact on the wage differential. We thus proceed to estimate wage equations for the government and the private sector, as implied by equations (9) and (6), respectively, in log-linear form.

The log-linear form of the government wage equation (9) is:

$$w_g = \frac{1}{2}[\ln\beta + \ln\theta - \ln(1-\theta)] + \frac{1}{2}t - \frac{1}{2}\ell \tag{11}$$

where the lower case denotes the logarithm of a variable. Note that (11) implies that the coefficients of the wage bill and total labor force are equal to plus and minus one-half, respectively.

The data suggest that there are two long-run relationships between the variables. The first takes the form:

$$w_g = 0.90t - 0.21 \tag{12}$$

which simply reflects the definition of the government wage bill $T = W_g L_g$ (in log terms: $w_g = t - \ell_g$); indeed, we cannot reject the hypothesis that the coefficient of t is one. The second long-run relationship is:

$$w_g = 0.52t - 0.47\ell + 0.73 \tag{13}$$

which is extremely close to the equilibrium solution (11) predicted by our model. Indeed, the restriction that the coefficients of the wage bill and the total labor force are equal to plus one-half and minus one-half, respectively, cannot be rejected. This finding provides strong empirical support for our model.

Finally, we estimate the private sector wage equation (6) in log-linear form, and find one long-run relationship between private sector wages and government wages and employment of the form:

$$w_p = 1.37w_g + 0.15\ell_g \tag{14}$$

The data suggest that there is strong feedback from $(w_p - 1.37w_g - 0.14\ell_g)$ onto Δw_p only, implying that government wages and employment are weakly

exogenous in the long-run private sector wage equation; this is confirmed by a formal test of weak exogeneity. This is an important result: it substantiates the prediction of our model that the wage and employment decisions that the government makes on policy grounds have a significant effect on labor market equilibrium.

The size of the coefficients of the long-run relationship (14) indicate that increases in government wages and employment tend to increase private sector wages, *ceteris paribus* leading to lower private sector employment. The size of the coefficient of w_g, in particular, implies that increases in government wages lead to relatively higher increases in private sector wages, thus raising the wage differential W_p/W_g, which is directly equivalent to an increase in the unemployment rate. Expanding government employment also leads to a (small) increase in private sector wages and, through this channel, an increase in the wage differential and in unemployment. The net effect on unemployment is, of course, ambiguous; but the results confirm that expanding government employment would not be as effective in reducing unemployment as it might appear at first.

6. Conclusions

During the 1980s and early 1990s, the Greek labor market performance deteriorated sharply: the unemployment rate increased from about 2 percent of the labor force in the 1960s and early 1970s to an average of 8 percent in the 1980s and close to 10 percent in the 1990s; the employment-to-population ratio showed a similar deterioration.

This development reflected fundamental changes in the supply and demand for labor. The increase in the female participation rate and the rapid improvement of the educational profile of the labor force brought into the labor market a large number of mostly young, well-qualified workers, and the restructuring of production released from the declining agricultural sector a large number of relatively low-skilled farm workers, most of them women. At the same time, the rate of growth and job creation slowed down sharply. These factors, however, do not by themselves explain the rise in unemployment: a well-functioning labor market should have adjusted to the changing supply and demand conditions. This did not happen: unemployment increased (and would have increased by more if some workers did not choose to drop out of the labor market altogether); spells became longer (especially for younger, better-educated workers); and the Phillips curve shifted outward. The labor market is perhaps the only part of the Greek economy that looks today a lot like Europe.

A formal analysis of unemployment persistence in Greece points the finger at the inflexibility of real wage aspirations of wage-setters and, to a lesser extent, the slow adjustment of demand to shocks as the major factors behind the deterioration of labor market performance during the last fifteen years. Are labor market institutions to blame? For the latter, probably yes: firing regulations are onerous in Greece, and other costs

that we have not discussed in this paper--such as state bureaucracy--may have also contributed to discouraging job creation (at least in the formal sector). But as regards the former, namely the rigidity of real wages in the face of rising unemployment, we think that the institutions do not tell the whole story. Instead, our analysis suggests that the rapid expansion in the number of easy, life-time government jobs, and the increase in the public/private relative wage during the 1980s may be directly responsible, by depressing private sector employment and, at the same time, raising workers' effective reservation wage.

The picture may have changed somewhat in the 1990s, when macroeconomic policies were tightened and the economy was liberalized, and there is some evidence of a negatively-sloping Phillips curve. In addition, two other factors that were not covered in this paper may have contributed to the most recent rise in unemployment. First, there has been an increase in nonwage labor costs: contributions to social security, health, and unemployment insurance rose from 23 percent of the wage in 1989 to almost 29 percent in January 1993. But given the sizeable informal sector in Greece, as well as the large share of self-employment (the highest in Europe), the effect of this increase is hard to assess. Second, in the 1990s, there has been an increase in (legal and illegal) foreign workers in Greece from the former eastern block countries. Although their number is still small (estimated at about 2 percent of the labor force), they may have had an impact on unemployment.

But even if the nature of unemployment in Greece started to change in the most recent years, designing a successful strategy against unemployment today still requires understanding and addressing the "original sin" behind the deterioration of the performance of the labor market in the 1980s.

Table 1. Greece: Participation Rates by Sex and Age

(In percent of population over 14 years old)

	Men		Women		Total	
	1981	1993	1981	1993	1981	1993
14 years	10.1	--	6.1	--	8.1	--
15-19	30.2	20.2	20.0	17.2	25.0	18.7
20-24	65.0	69.0	41.0	53.3	50.5	60.7
25-29	94.0	93.4	41.0	62.7	66.0	77.2
30-34	97.0	97.0	41.0	57.7	68.2	76.9
45-64	86.3	75.0	33.4	32.0	59.2	52.5
Over 65	25.0	11.0	6.9	3.7	15.0	7.0

Source: NSSG Annual Labor Force Surveys.

Table 2. Greece: Participation Rates by Sex and Level of Education, Selected Categories

(In percent of population over 14 years old)

	Men		Women		Total	
	1981	1993	1981	1993	1981	1993
University graduates	83.1	79.6	73.4	77.0	79.5	78.5
Secondary education (12 years) graduates	78.6	72.4	38.5	46.7	56.6	59.2
Completed 9 years of education	49.2	51.7	13.5	24.0	33.5	39.0
Completed primary (6 years) education	78.1	64.2	29.3	30.4	54.0	46.6
Not completed primary education	63.2	35.4	30.3	18.2	44.0	24.8
No schooling	41.5	27.0	20.6	11.6	25.0	15.4

Source: NSSG Annual Labor Force Surveys.

Table 3. Greece: Employment by Sector

(In percent of total (male/female) employment)

	1981	1985	1989	1993
Agriculture	30.7	28.9	25.3	21.3
Men	25.7	24.3	21.6	19.2
Women	41.6	37.9	32.3	25.4
Manufacturing	19.3	18.9	19.5	15.6
Men	20.0	20.5	20.9	16.4
Women	17.6	15.9	16.8	14.0
Commerce, hotels	15.0	15.9	17.0	21.3
Men	14.8	15.4	16.3	20.8
Women	15.2	14.4	18.3	22.1
Financial services	3.3	3.7	4.6	5.9
Men	3.2	3.5	4.3	5.5
Women	3.5	4.0	5.2	6.8
Other Services	14.3	17.2	18.9	20.6
Men	12.2	14.4	15.8	16.3
Women	19.1	22.6	24.8	28.4

Source: NSSG Annual Labor Force Surveys.

Table 4. Greece: Comparison of Nonagricultural Self-employment Shares

(In percent of total civilian employment)

	1983	1990
Belgium	12.8	12.9
Denmark	6.8	7.2
Finland	8.0	8.8
France	10.6	10.3
Germany	7.6	7.7
Greece	**27.7**	**27.2** 1/
Italy	21.7	22.3
Netherlands	7.9	7.8
Spain	18.7	17.1
Portugal	17.3	18.5
United Kingdom	10.7	11.6

Source: OECD (1992).

1/ Data for 1989.

Table 5. Greece: Comparison of Rates of Involuntary Part-time Employment, 1991

(In percent of total part-time workers)

	Part-time for economic reasons, usually work full-time	Part-time due to inability to find full-time job	Total
Belgium	0.8	27.1	27.9
Denmark	1.8	14.0	15.8
France	2.9	...	...
Germany	0.4	4.2	4.6
Greece	**41.7**	**28.6**	**70.3**
Italy	8.1	34.9	43.0
Netherlands	0.6	16.2	16.8
Spain	0.3	1.1	1.4
United Kingdom	3.1	1.7	4.8

Source: OECD (1994).

Table 6. Greece: Comparison of Relative Unemployment Rates of Teenagers and Young Adults

(Ratio to adults' unemployment rates)

	Ratio of teenage to adult unemployment rates 1/			Ratio of young adults to adult unemployment rates 1/		
	1983	1989	1993	1983	1989	1993
Finland	3.6	2.6	2.1	1.9	1.9	1.9
France	5.0	2.2	2.7	3.0	2.3	2.5
Germany	1.4	0.9	0.9 2/	1.7	1.1	1.0 2/
Greece	**3.5**	**4.0**	**4.0**	**3.2**	**3.9**	**3.3**
Italy	8.8	5.3	5.4 3/	5.6	4.0	3.9 3/
Portugal	3.6	3.0	2.8	3.5	3.0	2.2
Spain	4.1	2.4	2.6	2.8	2.3	2.1
United Kingdom	2.3	1.7	2.2	1.9	1.6	1.9
Average	4.0	2.8	2.8	2.9	2.5	2.4

Source: For Greece, NSSG Annual Labor Force Surveys; for other countries, OECD (1994).

1/ Teenagers refer to those aged 15-19 except Italy (14-19) and Spain, United Kingdom (16-19). Young adults are those aged 20-24. Adults are those aged 25-54 except Italy (25-59) and Greece (25-65).

2/ 1990.

3/ 1992.

Table 7. Greece: Unemployment Rates by Age and Education, 1993

(In percent)

	No schooling	Not completed primary education	Completed 6 years of education	Completed 9 years of education	Completed 12 years of education	Not completed higher education	University graduates
				Men			
Up to 14	--	--	--	--	--	--	--
15-19	0.6	0.6	29.2	31.8	37.7	--	--
20-24	0.9	0.4	11.1	18.0	65.6	0.2	3.8
25-29	0.3	--	13.6	10.7	50.2	0.3	24.3
30-44	0.7	1.5	36.1	13.3	34.6	0.2	13.6
45-64	2.6	5.1	59.9	7.1	21.5	0.3	3.5
65-	--	14.3	51.1	14.3	14.3	--	--
				Women			
Up to 14	--	--	--	--	--	--	--
15-19	0.9	0.6	14.0	23.0	61.2	--	--
20-24	0.1	0.1	6.8	10.9	69.7	--	12.3
25-29	0.9	0.9	10.3	8.4	52.3	--	27.2
30-44	1.4	0.6	37.8	10.2	39.2	0.2	10.7
45-64	2.3	6.9	60.6	5.6	19.9	--	4.6
65-	50.0	--	50.0	--	--	--	...

Source: NSSG Annual Labor Force Surveys.

Table 8. Greece: Comparison of Youth Unemployment Rates by Level of Educational Attainment, 1991

(In percent of total for each age group)

	15-19 years			20-24 years			
	Total	Less than upper secondary	Upper secondary and higher	Total	Less than upper secondary	Upper secondary	Post-secondary
Belgium	19.9	22.7	10.5	13.9	21.7	11.9	5.5
Denmark	3.7	3.1	4.8	15.9	27.2	13.2	12.1
Finland	16.5	16.3	17.3	12.3	18.1	11.2	8.8
France	23.3	23.5	21.9	18.4	26.0	15.3	9.1
Germany	6.8	6.6	8.3	6.6	10.1	5.5	5.9
Greece	**27.2**	**18.6**	**43.1**	**23.4**	**13.7**	**27.9**	**33.4**
Italy	35.9	32.8	62.5	28.9	22.7	34.8	47.7
Netherlands	15.2	15.7	12.3	8.2	10.2	7.0	8.5
Spain	35.5	33.8	38.6	29.9	29.9	27.8	37.6
Sweden	6.6	6.5	6.8	5.9	11.4	5.4	3.4
United Kingdom	15.4	24.8	11.7	13.1	25.4	10.6	8.3

Source: For Greece, NSSG Annual Labor Force Surveys; for other countries, OECD (1994).

Table 9. Greece: Comparison of Long-term Unemployment Rates

(In percent)

	Total	Men	Women	15-24	25-54	55+
Belgium	4.3	2.8	6.4	6.3	4.1	2.7
Denmark	2.7	2.4	3.0	1.8	2.8	3.4
Finland	5.4	6.6	4.0	4.9	5.2	6.8
France	3.8	2.9	4.8	4.5	3.6	4.1
Germany	3.1	2.4	4.0	1.8	3.0	5.1
Greece	**4.8**	**2.5**	**8.5**	**13.6**	**3.9**	**1.1**
Italy	6.0	4.3	8.8	17.9	4.0	0.8
Netherlands	2.9	2.4	3.6	2.6	3.0	2.3
Portugal	2.3	1.8	3.1	4.1	2.1	1.6
Spain	11.4	8.1	17.2	18.3	10.5	6.4
United Kingdom	4.4	5.8	2.5	5.6	3.9	5.0
OECD	2.3	2.2	2.5	3.4	2.1	2.0
OECD-Europe	4.7	4.1	5.6	8.0	4.2	4.3

Source: OECD (1995).

Table 10. Greece: Comparisons of Incidence of Long-term Unemployment by Age Group

(In percent)

	1983		1989		1991	
	15-24 1/	25-54 2/	15-24 1/	25-54 2/	15-24 1/	25-54 2/
Belgium	53.3	30.3	59.7	82.5	40.3	68.9
Denmark	24.3	38.0	11.9	30.4	11.9	30.4
France	32.8	42.7	25.4	46.3	18.4 3/	36.4 3/
Germany	29.7	43.1	28.5	51.0	23.1	45.0
Greece	**48.7**	**59.0**	**45.1**	**55.6**	**42.3**	**50.3**
Japan	7.4	11.6	7.9	17.7	5.4 3/	17.5 3/
Italy	57.4	58.9	71.3	69.7	67.1	68.0
Netherlands	41.4	56.1	26.9	59.6	18.0	52.1
Spain	53.0	52.7	55.6	60.7	42.3 3/	58.0 3/
Sweden	3.1	8.5	2.3	5.5	7.3 3/	10.9 3/
United Kingdom	41.5	50.0	26.9	43.4	17.8	30.0
United States	7.9	16.3	2.4	7.4	4.6 3/	14.0 3/

Sources: For Greece, NSSG Annual Labor Force Surveys; for other countries, OECD (1994).

1/ 16-24 for Spain and the United Kingdom and 14-24 for Italy and Belgium.
2/ 25-49 for France and 25-44 for Greece.
3/ Data for 1993.

Table 11. Greece: Comparisons of Monthly Flows Into and Out of Unemployment in 1993

	Inflows						Outflows					
	Total	Men	Women	15-24	25-54	55+	Total	Men	Women	15-24	25-54	55+
Belgium	0.42	0.43	0.41	0.93	0.53	0.02	8.6	9.2	8.0	11.7	7.7	3.3
Denmark	1.75	1.91	1.61	3.45	2.09	0.35	21.4	21.6	21.4	29.4	19.3	16.7
Finland	2.83	3.57	2.09	4.20	2.99	0.74	13.9	14.1	13.6	22.6	12.8	4.8
France	0.34	0.35	0.34	0.44	0.41	0.09	3.4	3.1	3.6	4.4	3.2	2.5
Germany	0.57	0.64	0.51	0.76	0.79	0.16	9.0	9.3	8.8	13.9	9.0	4.4
Greece	**0.30**	**0.30**	**0.30**	**0.95**	**0.31**	**0.02**	4.7	**5.6**	**4.0**	**6.1**	**3.8**	**2.3**
Italy	0.41	0.44	0.38	0.82	0.33	0.04	9.5	8.9	10.0	9.6	9.3	9.8
Netherlands	0.24	0.28	0.19	0.41	0.29	0.02	6.4	6.5	6.3	11.4	5.1	0.0
Portugal	0.34	0.37	0.31	0.63	0.31	0.05	15.3	18.3	12.6	19.2	13.8	7.8
Spain	0.56	0.71	0.42	1.07	0.52	0.12	1.8	2.0	1.5	2.8	1.2	1.2
United Kingdom	0.67	0.82	0.53	1.7	0.72	0.14	9.3	7.8	12.4	11.4	9.1	5.0

Source: OECD (1995).

Table 12. Greece: Comparison of Estimates of the Wage-setting Schedule 1/

	Membership persistence (α)	Real wage persistence (β)	Expected Inflation (ϕ)	Unemployment (η)
Greece	**0.58**	**0.91**	**-0.28**	**2.93**
Belgium	0.00	1.00	0.00	1.59
France	0.69	0.90	0.00	1.87
West Germany	0.47	0.77	0.00	2.12
Ireland	0.56	0.81	0.00	1.11
Italy	0.00	0.97	0.00	0.67
Netherlands	0.35	0.64	-0.35	2.84
Spain	0.00	0.64	0.00	0.71
Austria	0.41	0.84	-0.29	3.69
Finland	0.54	0.99	-0.16	4.40
Norway	0.54	0.83	-0.27	7.46
Sweden	0.77	0.85	-0.68	4.62
Switzerland	0.00	0.96	0.00	4.55
Japan	0.00	1.00	0.00	14.72
United Kingdom	0.74	0.77	0.00	1.05
United States	1.00	0.56	0.00	0.91

Sources: For Greece, own calculations; for other countries, Alogoskoufis and Manning (1988).

1/ Equation for Greece estimated using Two-Stage Least Squares for 1962-93. Instruments used in the estimation and other details are discussed in Appendix I.

Table 13. Greece: Comparison of Estimates of Real Wage Responsiveness 1/

	Wage elasticity of demand (δ)	Implied preference for wages (θ)	Labor demand persistence (γ)	Real wage rigidity (η)
Greece	**0.01**	--	**0.70**	**2.93**
Belgium	0.19	0.12	0.92	1.59
France	0.05	0.03	0.90	1.87
West Germany	0.26	0.12	0.88	2.12
Ireland	0.21	0.19	0.86	1.11
Italy	0.09	0.13	0.74	0.67
Netherlands	0.07	0.02	0.91	2.84
Spain	--	--	--	0.71
Austria	0.12	0.03	0.84	3.69
Finland	0.05	0.01	0.91	4.40
Norway	0.08	0.01	0.00	7.46
Sweden	0.30	0.07	0.78	4.62
Switzerland	0.58	0.13	0.83	4.59
Japan	0.15	0.01	0.83	14.72
United Kingdom	0.18	0.17	0.88	1.05
United States	0.63	0.70	0.10	0.91

Sources: For Greece, own calculations; for other countries, Alogoskoufis and Manning (1988).

1/ Equation estimated using Two-Stage Least Squares for 1962-93. Instruments used in the estimation and other details can be found in Appendix I. Parameter θ calculated as δ/η, given the estimates from the wage-setting and the labor demand equations.

Table 14. Greece: Comparison of Labor Market Legislation

	Severance pay in 1985, in months 3/	Replacement ratio in 1985 1/	Coverage of benefit in 1985 2/	Maximum duration of unemployment benefits in years
Greece	**6**	**1**	**50**	**17**
Belgium	1.24	1	60	85
France	5.24	4.2	57	41
West Germany	-- 4/	2.6	63	61
Ireland	--	1.25	50	67
Italy	9	2	80	21
Spain	13.56	0.5	80	35
United Kingdom	2.5 5/	1	36	73
United States	--	0.5	50	34

Sources: Own calculations; Demekas (1995); and Layard, Nickell and Jackman (1991).

1/ Gross benefits for a single person under 50 as a percent of the most relevant wage, normally gross wage.
2/ Percentage of unemployed receiving unemployment compensation.
3/ Number of months' salary given to workers with 10 years of service.
4/ No legislated severance pay, but the employer is obliged to pay to the employee his or her contributions to the pension fund.
5/ 40 per cent for blue-collar worker.

The Insider-Outsider Model and Empirical Results for Greece

1. The Model

The model described in this Appendix is the one presented in Alogoskoufis and Manning (1988a). It is a simple insider-outsider model of the labor market, in which insiders set wages at a level consistent with full employment of that group. Following the notation of Alogoskoufis & Manning, we can express the number of insiders as a weighted average of the labor force and last period's employment:

$$\ell^i_t = \alpha \ell_{t-1} + (1-\alpha)\bar{\ell}_t \qquad (I.1)$$

where ℓ^i refers to the log of number of insiders; $\bar{\ell}$ to the log of the effective labor force; and α measures the degree of influence of "old" insiders (it is assumed that old workers have disproportionate influence over the union vis-à-vis the newcomers). In each period, target real wages ω are determined by past real wages and steady state real wages:

$$\omega = \beta(w-p)_{t-1} + (1-\beta)\bar{\omega}_t \qquad (I.2)$$

where β determines the degree of persistence of real wage aspirations.

This is a monopoly union model, in which unions set wages and firms employment. Unions are assumed to choose wages so as to minimize a simple, one-period quadratic loss function, defined in terms of deviations of wages and employment from target:

$$\Phi = \frac{1}{2}(\ell_t - \ell^i_t)^2 + \frac{\theta}{2}[(w-p)_t - \omega_t]^2 \qquad (I.3)$$

where θ denotes the weight that wage-setters assign on achieving their real wage target relative to employment. The loss function Φ is minimized subject to a labor demand schedule

$$\ell_t = \gamma \ell_{t-1} - \delta(w-p)_t + v_t \qquad (I.4)$$

where γ is the degree of persistence of labor demand, δ is the short-run elasticity of labor demand, and v_t a shift factor.

The solution yields a real wage equation

$$(w-p)_t = \beta(w-p)_{t-1} + (1-\beta)\bar{\omega}_t^e + \frac{\delta}{\theta}[\ell_t^e - \alpha\ell_{t-1} - (1-\alpha)\bar{\ell}_t^e] - (p_t - p_t^e) \qquad (I.5)$$

where the superscript e denotes rational expectations conditional on information up to period (t-1).

Assuming for simplicity that the measured labor force (equal to the effective labor force plus natural unemployment) follows a random walk with drift, the wage equation can be re-written as

$$(w-p)_t = c(t) + \beta(w-p)_{t-1} - \eta(u_t - \alpha u_{t-1}) \qquad (I.6)$$

where $\eta = \delta/\theta$ and

$$c(t) = (1-\beta)\bar{\omega}_t + \frac{\delta(1-\alpha)}{\theta}\bar{u}(t) + \frac{\alpha\delta}{\theta}(g+\mu_t) \qquad (I.7)$$

where g is the mean rate of growth and μ_t the white noise component of the random walk process assumed for the labor force.

Combining I.6 with the labor demand schedule yields:

$$u_t = \gamma u_{t-1} + \delta(w-p)_t + (1-\gamma)\ell_{t-1} + \gamma + \mu_t - v_t \qquad (I.8)$$

which, as Alogoskoufis & Manning show, after normalization can be re-written

$$u_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + \delta\eta\epsilon_t - (v_t - \beta v_{t-1})$$
$$\text{with} \quad \rho_1 = (\alpha\delta\eta+\beta+\gamma)/(1+\delta\eta) \qquad (I.9)$$
$$\text{and} \quad \rho_2 = -\beta\gamma/(1+\delta\eta)$$

2. Empirical results

The wage setting equation was estimated using Two-Stage Least Squares for the period 1965-1993. For the wage variable, we used wages in manufacturing. Expected inflation was treated as endogenous and was instrumented. Additional instruments used were growth of GDP (ΔGDP_t, ΔGDP_{t-1}, and ΔGDP_{t-2}) and wage and price inflation lagged twice. Productivity growth (Δq) proved to be very significant, and was therefore included in the estimation of the wage-setting schedule. A time trend was also included initially, but excluded from the final equation as this proved to be insignificantly different than zero. The labor demand equation was estimated using Ordinary Least Squares and includes lagged unemployment rates and real wage growth. The equations, of course, are extremely simple. But they fit the data very well and pass all the statistical requirements and tests. After trying a number of alternative econometric specifications,

we have arrived at the estimates shown in the Table below. Standard errors are in parentheses.

The Wage-setting and Labor Demand Equations

Dependent variable	Wage-Setting equation (IV) w-p	Labor Demand equation (OLS) u
Δp	-0.288 (0.195)	
$(w-p)_{t-1}$	0.905 (0.051)	0.0065 (0.010)
Δq_{t-1}	-0.658 (0.214)	
Δq_{t-2}	-0.474 (0.229)	
u	-2.938 (1.165)	
u_{t-1}	5.067 (2.061)	0.703 (0.127)
u_{t-2}	-3.363 (1.200)	
Constant	0.147 (0.046)	-0.117 (0.052)
Standard error	0.028	0.007

Government Employment and Wages and Labor Market Performance

1. The Model

The model follows Demekas & Kontolemis (1996). The production functions are:

$$G = [\phi(W_g)L_g]^{\alpha}, \qquad \alpha \leq 1 \tag{II.1}$$

$$Y = K[\psi(W_p)L_p]^{\beta} G^{1-\beta}, \qquad \beta \leq 1 \tag{II.2}$$

where L_i, W_i are employment and the wage in sector i = g (government) and p (private), respectively; K is a scale variable; and $\phi(W_g)$ and $\psi(W_p)$ are the effort functions in the two sectors, with ϕ', $\psi' > 0$ and ϕ'', $\psi'' < 0$. The common isoelastic effort function is:

$$\phi(W_g) = \psi(W_p) = W_i^{\gamma}, \qquad i = g, p; \quad \gamma \leq 1 \tag{II.3}$$

In the labor market, identical workers maximize expected utility from income. Since at equilibrium there will be involuntary unemployment (assuming a sufficiently large labor force), workers have to weigh the wage in each sector with the respective probability of being employed there.

In the private sector, where there is no job security, firms hire randomly from the pool of available identical workers. The probability of obtaining a private sector job is:

$$q = \frac{L_p}{L_p + U} \tag{II.4}$$

where U is unemployment. In a multiple period model, we could assume more realistically a constant rate of turnover in the private sector, ξ. Thus, in each period ξL_p workers employed in the private sector would get replaced, and the probability to find a private sector job would be $\xi L_p/(\xi L_p + U)$. Equation (II.4) implicitly assumes that $\xi = 1$, i.e., that all private sector workers get replaced in each period.

Since in the government sector there is job security, the probability p depends on the way in which the government makes new hires, or the rate of expansion of the government sector. In a static framework, the simplest way to model this is to assume a constant probability of obtaining a (new) government job, $p = \delta$; this is also consistent with the countercyclical

hiring pattern of the government, a well-established stylized fact, 1/ and is the form used by Gelb *et al.* (1991) in their simulations of the impact of government employment on growth. In Demekas & Kontolemis (1996) we also explore alternative specifications for the probability of finding a government job. At equilibrium in the labor market:

$$\frac{L_p}{L_p+U} W_p = \delta W_g \quad \text{or} \quad W_p = \delta \frac{L_p+U}{L_p} W_g \tag{II.5}$$

Condition (II.5) is the arbitrage equilibrium condition between wages in the two sectors with unemployment as the balancing factor. Using

$$L_p + L_g + U = \bar{L} \tag{II.6}$$

with $\bar{L}$ the total labor force, (II.5) can be rewritten as:

$$W_p = \delta \frac{\bar{L}-L_g}{L_p} W_g \tag{II.7}$$

Private firm optimization (using the isoelastic effort function), combined with (II.7), yields the private sector equilibrium wage equation.

$$W_p = \left[\frac{\beta K}{\delta^{1-\beta}}\right]^{\frac{1}{\beta(1-y)}} (\bar{L}-L_g)^{-\frac{1-\beta}{\beta(1-y)}} L_g^{\frac{\alpha(1-\beta)}{\beta(1-y)}} W_g^{\frac{(1-\beta)(1-\alpha\delta)}{\beta(1-y)}} \tag{II.8}$$

Turning now to the government's optimization problem, we assume that the government collects lump-sum taxes T in order to finance its wage bill W_gL_g. We assume for simplicity that there are no collection costs. The model can be easily modified to allow for (non-distortionary) collection costs cT, in which case the budget constraint would be $W_gL_g = (1 - c)T$. The budget constraint then is:

$$W_g L_g = T \tag{II.9}$$

The government maximizes a general objective function of total employment and private sector output net of taxes

---

1/ If the number of new hires depend on the size of unemployment (δU) and the government hires randomly from the available pool of identical unemployed workers, then the probability of finding a government job is $p = \delta U/U$, or $p = \delta$.

$$\theta L_g + (1 - \theta)(Y - T), \qquad \theta \leq 1 \tag{II.10}$$

where θ can be thought of as a measure of the government's populist tendencies. Constrained maximization yields:

$$\frac{L_g}{W_g} = \frac{(1-\theta)\delta}{\beta\theta}\bar{L} \quad \text{or} \quad L_g = \frac{(1-\theta)}{\beta\theta}\delta\bar{L}W_g \tag{II.11}$$

Using (II.11) and the budget constraint (II.9), we obtain:

$$L_g = \left[\frac{1-\theta}{\beta\theta}\delta\bar{L}T\right]^{\frac{1}{2}} \tag{II.12}$$

$$W_g = \left[\frac{\beta\theta T}{(1-\theta)\delta L}\right]^{\frac{1}{2}} \tag{II.13}$$

2. Empirical Results

We use quarterly OECD data for Greece for the period 1970 to 1993. In order to capture various benefits paid to civil servants but not classified as wages, we calculate the government wage as the ratio of the government wage bill to government employment. We first test for the existence of a long-term relationship between the wage differential and unemployment, as described in the labor market equilibrium condition (II.5). We test for the order of integration of these series, and the results indicate that they are all difference-stationary and integrated of the same order. We then proceed with the estimation of the VAR. Table II.1 reports the tests for the rank of the P_o matrix, the standardized eigenvectors and loading matrix. The matrix is of rank one, suggesting the existence of one robust long-term relationship between the wage differential W_p/W_g on the one hand and unemployment in the form $(1 + U/L_p)$ on the other, as implied by (II.5). The relationship has the form:

$$\frac{W_p}{W_g} = 1.29\left[1+\frac{U}{L_p}\right] + 0.41 \tag{II.14}$$

We then proceed to estimate wage equations for the government and the private sector, as implied by equations (II.13) and (II.8), respectively, in log-linear form. The log-linear form of the government wage equation (II.13) is:

$$w_g = \frac{1}{2}[\ln\beta + \ln\theta - \ln(1 - \theta)] + \frac{1}{2}t - \frac{1}{2}\bar{\tau} \tag{II.15}$$

where the lower case denotes the logarithm of a variable. For T, we use data for the wage bill of the central government. Note that (II.15) implies that the coefficients of the wage bill and total labor force are equal to plus and minus one-half, respectively.

Having established that the series involved are difference-stationary and integrated of the same order, we report the results of the VAR in Table II.2 (the constant is concentrated in the likelihood function). 1/ As before, the Table reports the tests for the rank of the P_o matrix, the standardized eigenvectors (normalized on the diagonal), and the loading matrix.

There are two large eigenvalues, which implies that the rank of the long-run matrix P_o is two. There are thus two long-run relationships between the variables; they can be seen in the first two rows of standardized eigenvectors, which report the estimated cointegration vectors that span the cointegration space.

The first reveals a relationship between (the logarithms of) the government wage w_g and the real wage bill t. In this relationship, the total labor force enters with a very small coefficient. We test for the statistical significance of this variable in the cointegrating vector, and cannot reject the hypothesis that its coefficient is equal to zero (Restriction I in Table II.2). As a result, this long-run relationship takes the form:

$$w_g = 0.90t - 0.21 \qquad \text{(II.16)}$$

This relationship reflects the definition of the government wage bill (in log terms: $w_g = t - l_g$). Indeed, we test whether the coefficient of t is one, and cannot reject this hypothesis (Restriction II).

The second long-run relationship in the cointegration space is:

$$w_g = 0.52t - 0.47l + 0.73 \qquad \text{(II.17)}$$

The restriction that the coefficients of the wage bill and the total labor force are equal to plus one-half and minus one-half, respectively, cannot be rejected. We also test jointly for all four restrictions--the two implied by the definition of the wage bill in the first long-run relationship, and the two implied by (II.15) for the sign and size of the coefficients in the second--and again we cannot reject the hypothesis that they are satisfied (Restriction III in Table II.2).

1/ Due to the availability of longer time series for the variables involved, this VAR is estimated with quarterly data for the period 1962-93.

Finally, we estimate the private sector wage equation (II.8). Again, we estimate a VAR for the logarithmic version of (II.8) and report the results in Table II.3.

The results indicate one, or possibly two, significant eigenvalues at the 1 percent and 5 percent confidence levels, respectively, suggesting that the P_o matrix has rank one, or possibly two. Inspection of the plot of the second cointegrating relationship, however, reveals that it is far from stationary. We thus conclude that the P_o matrix has rank equal to one.

The cointegrating vector, shown in the first row of the standardized eigenvector matrix, indicates a long-run relationship between private sector wages and government wages and employment. We test and cannot reject the hypothesis that both the constant term and the coefficient of $\ln(\bar{L} - L_p)$ are zero. The resulting restricted model, also reported in Table II.3, implies a relationship of the form:

$$w_p = 1.37w_g + 0.15\bar{l}_g \qquad \text{(II.18)}$$

The coefficients of the α matrix reveal strong feedback from $(w_p - 1.37w_g - 0.14\bar{l}_g)$ onto Δw_p only, implying that government wages and employment are weakly exogenous in the long-run private sector wage equation. We also test formally for weak exogeneity, and the results confirm this conclusion. 1/

1/ See Johansen (1992), Banerjee *et al.* (1993), and Doornik & Hendry (1994).

Table II.1. Greece: Labor Market Equilibrium Condition
cointegration analysis 1970QI to 1993QIV

Ho:rank=p	-Tlog(1-μ)	Using T-nm	95%	-TΣlg(1-μ)	Using T-nm	95%
p = 0	34.66**	31.77**	15.7	36.19**	33.18**	20.0
p ≤ 1	1.529	1.401	9.2	1.529	1.401	9.2

*(** and * denote significance level of 99 percent and 95 percent, respectively)*

Standardized ß' eigenvectors

W_p/W_g	$1 + U/L_p$	Constant
1.0000	-1.2970	-0.4234
0.1460	1.0000	-1.2571

Standardized α coefficients

W_p/W_g	-0.3843	-0.0142
$1 + U/L_p$	-0.0002	-0.0012

Restricted equation

ß' eigenvector

W_p/W_g	$1 + U/L_p$	Constant
1.0010	-1.291	0.4152

α coefficients

W_p/W_g	-0.3865
$1 + U/L_p$	0.0000

Standardized ß' eigenvector

W_p/W_g	$1 + U/L_p$	Constant
1.0000	-1.290	0.4147

Standardized α coefficients

W_p/W_g	-0.3868
$1 + U/L_p$	-0.0000

Restriction test: LR-test, rank=1: Chi^2 = 0.04645 [0.8294]

Table II.2. Greece: Government Wage Equation
cointegration analysis 1962QI to 1993QIV 1/

H_0:rank=p	-Tlog(1-μ)	Using T-nm	95%	-TΣlg(1-μ)	Using T-nm	95%
p = 0	30.01**	27.20**	22.0	59.49**	53.92**	34.9
p ≤ 1	19.55*	17.71*	15.7	29.48**	26.72**	20.0
p ≤ 2	9.935	9.004	9.2	9.935	9.004	9.2

*(** and * denote significance level of 99 percent and 95 percent, respectively)*

Standardized β' eigenvectors

w_g	t	$\bar{l}$	Constant
1.0000	-0.9657	-0.0483	0.3228
-1.9170	1.0000	-0.9003	1.3911
0.9884	-0.6990	1.0000	-1.4710

Standardized α coefficients

w_g	0.0183	0.0370	-0.1312
t	0.0223	0.0362	-0.1155
$\bar{l}$	0.0003	-0.0051	-0.0094

Restrictions tests 2/

Restriction I: $\beta_{\bar{l}} = 0$ in the first cointegrating vector:
LR-test, rank=2: Chi² = 0.0004105 [1.0000]

Restriction II: $\beta_{\bar{l}} = 0$ and $\beta_t = -1$ in the first cointegrating vector:
LR-test, rank=2: Chi² = 0.0050463 [1.0000]

Restriction III: $\beta_{\bar{l}} = 0$ and $\beta_t = -1$ in the first cointegrating vector, and $\beta_{\bar{l}}/\beta_w = 0.5$ and $\beta_t/\beta_w = -0.5$ in the second cointegrating vector:
LR-test, rank=2: Chi² = 0.0038083 [0.9981]

1/ The VAR includes four lags of each variable and a constant trend which is entered restricted and therefore concentrated in the likelihood function prior to the estimation.

2/ For an explanation of the restrictions tested, see text.

Table II.3. Greece: Private Sector Wage Equation
cointegration analysis 1970QI to 1993QIV 1/

Ho:rank=p	$-T\log(1-\mu)$	Using T-nm	95%	$-T\Sigma\lg(1-\mu)$	Using T-nm	95%
p = 0	83**	69.17**	28.1	121.9**	101.6**	53.1
p ≤ 1	25.14*	20.95	22.0	38.88*	32.4	34.9
p ≤ 2	7.798	6.498	15.7	13.73	11.45	20.0
p ≤ 3	5.936	4.947	9.2	5.94	4.95	9.2

*(** and * denote significance level of 99 percent and 95 percent, respectively)*

Standardized β' eigenvectors

w_p	w_g	ℓ_g	$\ln(\bar{L} - L_g)$	Constant
1.0000	-1.4221	-0.1315	0.0025	0.0372
-0.2296	1.0000	-0.5816	-0.0510	-0.6802
-1.6673	-0.6189	1.0000	1.0092	0.4024
-0.0870	0.2395	-0.5122	1.0000	-1.8290

Standardized α coefficients

w_p	-0.3364	0.1229	0.0251	-0.1429
w_g	0.0715	-0.0149	0.0175	-0.1433
ℓ_g	0.0090	0.0127	0.0022	0.0100
$\ln(\bar{L} - L_g)$	-0.0002	0.0089	-0.0016	-0.0118

1/ The VAR includes four lags of each variable and a constant trend which is entered restricted and therefore concentrated in the likelihood function prior to the estimation.

Table II.3. Greece: Private Sector Wage Equation
cointegration analysis 1970QI to 1993QIV *(continued)*

Restricted w_p equation

ß′ eigenvector

w_p	w_g	ℓ_g	$\ln(\bar{L} - L_g)$	Constant
1.0151	-1.3920	-0.1502	0.0000	0.0000

α coefficients

w_p	-0.4525
w_g	0.0000
ℓ_g	0.0000
$\ln(\bar{L} - L_g)$	0.0000

Standardized ß′ eigenvector

w_p	w_g	ℓ_g	$\ln(\bar{L} - L_g)$	Constant
1.0000	-1.3711	-0.1479	0.0000	0.0000

Standardized α coefficients

w_p	-0.4595
w_g	0.0000
ℓ_g	0.0000
$\ln(\bar{L} - L_g)$	0.0000

Restriction test: LR-test, rank=1: $Chi^2 = 8.2883$ [0.1410]

References

Alogoskoufis, G.S. and A. Manning (1988a), "Unemployment Persistence", *Economic Policy* 7:428-69.

Alogoskoufis, G.S. and A. Manning (1988b), "Wage Setting and Unemployment Persistence in Europe, Japan, and the USA", *European Economic Review* 32 (2-3):698-706.

Atkinson, A.B. and J. Micklewright (1991), "Unemployment Compensation and Labor Market Transitions: A Critical Review", *Journal of Economic Literature* XXIX:1679-1727.

Banerjee, A., J. Dolado, J.W. Galbraith, and D.F. Hendry (1993), *Cointegration, Error-Correction, and the Econometric Analysis of Non-Stationary Data*, Oxford University Press.

Barro, R.J. (1990), "Government Spending in A Simple Model of Endogenous Growth", *Journal of Political Economy* 98(5):S103-S125.

Barro, R.J. (1988), "Output Effects of Government Purchases", *Journal of Political Economy* 89(6):1086-1121.

Bean, C.R. (1994), "European Unemployment: A Survey", *Journal of Economic Literature* XXXII:573-619.

Bean, C.R., R. Layard, and S. Nickell (1986), "The Rise in Unemployment: A Multi-Country Study", *Economica* 53(210):S1-S22.

Bertola, G. (1990), "Job Security, Employment, and Wages", *European Economic Review*, 34(2):851-86.

Blanchard, O.J. and P. Diamond (1989), "The Beveridge Curve", *Brookings Papers on Economic Activity* 1:1-76.

Bruno, M. and J.D. Sachs (1984), *Economics of Worldwide Stagflation*, Harvard University Press.

Buchanan, J. (1977), "Why Does Government Grow?" in: T.E. Borcherding (ed.), *Budgets and Bureaucrats: The Sources of Government Growth*, Duke University Press.

Burda, M. (1988), "Unemployment", *Economic Policy*, October:393-425.

Calmfors, L. (1993), "Centralization of Wage Bargaining and Macroeconomic Performance: A Survey", mimeo, OECD, Paris.

Calmfors, L. and J. Driffil (1988), "Bargaining Structure, Corporatism, and Macroeconomic Performance", *Economic Policy* 6:13-61.

Corden, W.M. and R. Findlay (1975), "Urban Unemployment, Intersectoral Capital Mobility and Development Policy", *Economica* 42:59-78.

Courant, P.N., E.M. Gramlich, and D.L. Rubinfeld (1979), "Public Employee Market Power and the Level of Government Spending", *American Economic Review* 69(4):806-817.

Demekas, D.G. and Z.G. Kontolemis (1996), "Government Employment and Wages and Labor Market Performance", mimeo, International Monetary Fund, Washington, DC.

Demekas, D.G. (1995), "Labor Market Institutions and Flexibility in Italy", *Labour* 9(1):3-43.

Demekas, D.G. (1990), "Labor Market Segmentation in a Two-Sector Model of an Open Economy", *International Monetary Fund Staff Papers* 37(4):849-64.

Doornik, J.A. and D.F. Hendry (1994), *PC Fiml 8.0--Interactive Econometric Modelling of Dynamic Systems*, International Thompson Publishers.

Ehrenberg, R.D. and J.L. Schwarz (1986), "Public-Sector Labor Markets" in: O. Ashenfelter and R. Layard (eds.), *Handbook of Labor Economics*, vol. II, North Holland.

Freeman, R.B. (1986), "Unionism Comes to the Public Sector", *Journal of Economic Literature* 24(1):41-86.

Gelb, A., J.B. Knight, and R.H. Sabot (1991), "Public Sector Employment, Rent Seeking and Economic Growth", *The Economic Journal* 101:1186-99.

Heylen, F. (1993), "Labour Market Structures, Labour Market Policy, and Wage Formation in the OECD", *Labour* 7(2):25-51.

Jackman, R., C. Pissarides, and S. Savouri (1990), "Labour Market Policies and Unemployment in the OECD", *Economic Policy* 11:449-90.

Jecchinis, C. (1994), "Recent Developments in Greek Industrial Relations: Statutory and Attitudinal Changes Towards Participation and Cooperation", *Labour* 8(3):547-66.

Johansen, S. (1992), "Testing Weak Exogeneity and the Order of Cointegration in UK Money Demand", *Journal of Policy Modelling* 14:313-34.

Kraay, A. and C. Van Rijckeghem (1995), "Employment and Wages in the Public Sector--A Cross-Country Study", International Monetary Fund Working Paper 95/70, Washington, DC.

Layard, R., S. Nickell, and R. Jackman (1991), *Unemployment: Macroeconomic Performance and the Labour Market*, Oxford University Press.

Lazear, E.P. (1990), "Job Security Provisions and Employment", *Quarterly Journal of Economics* 105(3):699-726.

McCallum, J. (1983), "Inflation and Social Consensus in the Seventies", *Economic Journal* 93:784-805.

Mincer, J. (1976), "Unemployment Effects of Minimum Wages", *Journal of Political Economy* 84:S87-S104.

Nickell, S. (1990), "Unemployment: A Survey", *Economic Journal* 100:391-439.

Niskanen, W.A. (1971), *Bureaucracy and Representative Government*, Aldine-Atherton Press.

OECD (various issues), *Employment Outlook*, OECD, Paris.

Pissarides, C.A. (1992), "Loss of Skill During Unemployment and the Persistence of Employment Shocks", *Quarterly Journal of Economics* 107(4):1371-91.

Pissarides, C.A. (1985), "Short-Run Equilibrium Dynamics of Unemployment, Vacancies, and Real Wages", *American Economic Review* 75:676-90.

Ramaswamy, R. and R. Rowthorn (1993), "Centralized Bargaining, Efficiency Wages and Flexibility", International Monetary Fund Working Paper 93/25, Washington, DC.

Stevenson, G. (1992), "How Public Sector Pay and Employment Policies Affect Labor Markets", World Bank Policy Research Working Paper WPS 944, Washington, DC.