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THE IMPACT OF MINIMUM WAGE ON YOUTH AND TEENAGE EMPLOYMENT IN GREECE

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Abstract

The main purpose of this paper is to examine the way in which minimum wages influence teenage and youth employment in Greece. More specifically, it focuses on the estimation of the proportional change on teenage and youth employment, caused by the minimum wages using modern time series techniques. The coefficients are derived with different model specifications (linear and logarithmic) and are compared with coefficients found in other countries. Furthermore, this study presents a sufficient highlight of theoretical issues and an analysis of the result of the different effects of minimum wage changes on the two groups of young employees. As it was observed for youths, a minimum wage increase has a negative impact on employment, while for teenagers the impact is positive in most of the specifications (JEL: C22, C52, C87, J23, J30).

1. Introduction

Ways of integrating younger workers into the labour force, into meaningful employment relations, continue to be of foremost importance. This is particularly true at times when economies are struggling with increasing employment problems and the spectre of social exclusion. Various policies have been adopted in an attempt to identify the correct approach to introducing youths or teenagers into the labour market. One approach, which plays an essential role, is the institution of minimum wages.

There are numerous aspects of minimum wages which are of interest. On the one hand, minimum wages are seen to play a vital role in ensuring that "fair" wages are paid to 'low-paid' workers and in bolstering the incomes of younger people. On the other hand, high minimum wages can destroy jobs and tend to have adverse effects on employment (Stigler, 1946). This view has long been held by a majority of economists, with polls by Kearl et al. (1979) showing

that over 90 percent of specialized economists agree with the prediction of an adverse employment impact of a minimum wage.

However, new elements have been injected into this research by the studies of Card and Krueger (here after CK, 1995 and 1998), known as the "new economics of the minimum wage". They argue that a minimum wage increase can result in a neutral or even a positive effect on employment. In particular, CK believe that a reformulation of the set of the minimum wage theoretical models is needed, also taking into account other characteristics of the labour market, such as the spike in the wage distribution at the minimum wage, the frequent failure of employers to use the subminimum, and the variability of wages across firms. Moreover, they support that firms with some discretionary power over wages are prospectively able to "excuse" a broader range of reactions to an increase in the minimum wage. These modification and other extensions to the traditional model may prove useful to explain the fact that increases in the minimum wage do not necessarily lead to reductions in employment.

Since CK's studies the impact of minimum wages on teenage and youth employment continues to be a subject of intense research in the developed world. The bulk of empirical studies so far have been carried out in the USA and France. In Greece there has been little research on the effects of minimum wages on employment. This is surprising, since minimum wage legislation in Greece covers most private-sector workers, in contrast to the USA where minimum wage covers only certain industries (Koutsogeorgopoulou, 1994).

The fact that minimum wage's research in Greece is limited can be explained though by a conglomeration of problems encountered in Greek data. The most important of these are limited access to data and a lack of data analysis. The former refers to the complicated systems of public organizations (as the Manpower Employment Agency of Greece (OAED in Greek) and the Foundation of Social Security (IKA in Greek)) which hold part of the data, but is difficult to access it due to bureaucracy. The latter indicates that the data available is analyzed mostly for socioeconomic or educational purposes and not for scientific research. The limited minimum wage research could also be explained by the excessive association of employment to broader factors affecting it. The perception, for instance, which relates employment variations to public and private investments (how to find and where to dispose money) has become widely ingrained in people's thinking and is mainly cited in the halls of Parliament and academia in discussions on the employment.

2. The System of Minimum Wages in Greece

According to Law 2339, the National General Collective Convention (EGSSE in Greek) determines each year the level of minimum wages in Greece. This Convention includes employees in the private sector, employees in public sector organizations and non-permanent Civil Servants. The coverage of the minimum wage is almost complete. The government influences the minimum wage through the negotiation process rather than through statutory legislation, apart from the years 1941-1952 and 1969-1974, when minimum wages were set by statutory legislation (Koutsogeorgopoulou, 1994).

The national conventions on minimum wage levels make a distinction between non-manual and manual employees. The rate for the former is calculated on a monthly basis, while the latter are entitled to a daily minimum. The minimum wage for non-manual workers rises by 10 percent after each three years of service up to a maximum of nine years. The increase for manual workers is 5 percent. Married workers, whether in manual or non-manual professions, are entitled to a further 10 percent in addition to the rates mentioned above. Moreover, both manual and non-manual employees aged under 19 are entitled to the daily minimum for a trainee manual employee. Yet employees with highest level of education (university degree) are entitled to a further 18 percent increase. Given the same kind of work, the minimum wage is the same for men and women (Comparative Minimum Wage Study of Eurostat, 1997).

The relevant legislation on minimum wages was updated in 1982 with the addition of a paragraph providing for periodic and automatic adjustment (Automatic Pay Adjustments, ATA in Greek) of the minimum wages, linked ex-post to the Consumer Price Index, which were generally applied to the entire country. The purpose of this measure was to offset the wage inequality and the erosion of real wages which took place over the period 1979-1981. The ATA system was introduced so that those earning low incomes could obtain the highest increase, without adjusting the incomes of those with higher wages. While ATA reduced the differential gap among wage levels, the same system led to a great increase in unit labour costs, from 21 per cent in 1981 to 37 percent in 1982. The outcome of the ATA policy was an inflationary spiral up until 1985 (Koutsogeorgopoulou, 1994). In order to control the acceleration in inflation, the government modified the ATA system in line with the automatic Greek system for indexing government payments in 1983. After a period of political instability in 1989-1990, the newly elected Conservative government of 'New Democracy' abolished the ATA system in 1991. Since 1991 the system of

minimum wages has been updated according to government forecasts of inflation.

The real value of the minimum wage for youths and teenagers, deflated by the Consumer Price Index (1990 = 100), from 1974-2001 are depicted in Figure 1. Minimum wages increased between 1974 and 1984, with a particularly high increase in 1982, when the ATA indexation system was launched by the Socialist government (PASOK). After 1985, the real value of minimum wages fell until 1987 for youths and 1988 for teens (there was a 20 percent devaluation in the drachma in 1986), and then increased until 1991. Since 1991 there was a reduction until 1993 (in 1991 the ATA system was abolished), for both teens and youths, and then a small increasing trend until 2001.

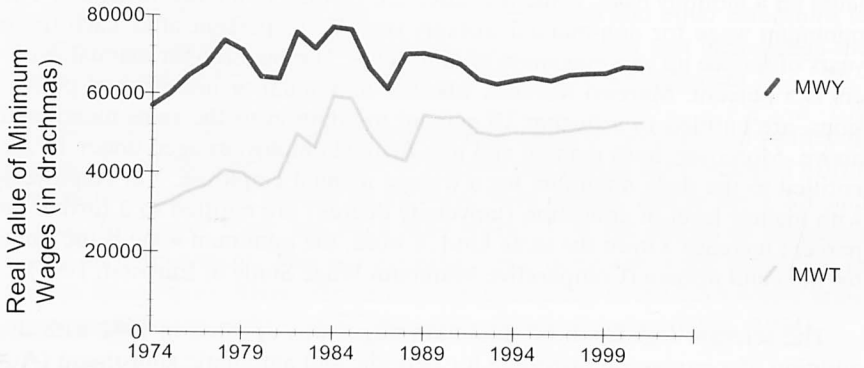

Figure 1: *Minimum Wages / Consumer Price Index*

Notes: Minimum wages for Youths (MWY) refer to unmarried manual, non- manual in their first job and Minimum wages for Teens (MWT) refer to "training" unmarried manual workers in their first job. Source: BANK OF GREECE, Eurostat and EGSSE.

Figure 2 displays the relationship between the real minimum wage of youths and teenagers as a percentage of the real average earnings of manufacturing workers. It is apparent from the figure that a steady reduction of minimum wages, both for youths and teens, relative to average manufacturing earnings occurred between 1974 and 1981. The ATA system in 1982 reversed the decline in the relative value of the minimum wages, maintaining an upward

trend until 1991 for teenagers and a stable movement for youths. From 1991 until 1997, the minimum wages of both age groups as a fraction manufacturing earnings were on a slightly downward trend. As it can be seen in the figure, the ratio of minimum wages to manufacturing average earnings has remained constant since 1997.

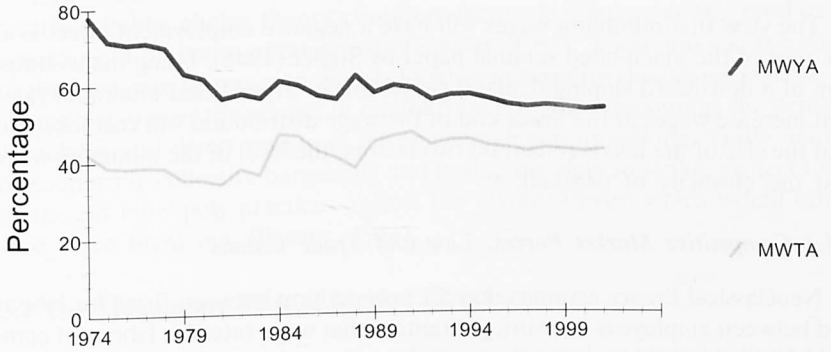

Figure 2: *Minimum Wage / Average Manufacturing Earnings*

Notes: Minimum wages for Youths (MWY) refer to unmarried manual, non- manual in their first job *and Minimum wages for Teens (MWT) refer to "training" unmarried manual workers in their first job.*
Sources: BANK OF GREECE, Eurostat, International Labour Organization (ILO) and EGSSE

Unfortunately, data on the number of workers earning the minimum wage in Greece are not available. Nevertheless, according to the estimates of the proportion of the population at or near minimum wages in 1995 given by Dolado et al. (1996) was around 20 percent of all wage and salary earners. In contrast, minimum wage workers accounted for only 4 percent of wage and salary earners in the USA in 1993. For other members of the European Union, such as France, Portugal and Spain, the respective proportions of minimum wage earners in 1993 were 12, 9 and 7 percent. Thus, it is reasonable to argue that the effects of minimum wages on the Greek labour market seem to be more significant than in other economies.

3. Debate over Minimum Wage Theories

An interesting approach to minimum wages theory would be to interpret labour economists' views over the structure of the labour market in which they are imposed.

3.1 The Competitive View of Market Structure

The view that minimum wages will have a negative employment effect is at the root of the much-cited seminal paper by Stigler (1946). Using the assumption of a downward sloping demand curve, Stigler argued that minimum rates that increase wages at the lower end of the wage distribution will cost jobs, but that the size of the loss is reliant on two factors: the level of the minimum wage and the elasticity of demand.

3.1.1 Competitive Market Forces, Law and Trade Unions

Neoclassical theory assumes that the competition between firms for labour and between employees for work guarantees that wage rates for labour of comparable productivity are roughly equal throughout the market. Furthermore it is outside the power of any individual economic agent to influence wages. The movement of the market towards equilibrium acts as an implicit controller of individual choices on whether to trade and at what price. Firms which try to pay below the market rate risk losing their employees (fully informed) to rivals, in the same way that employees who try to force up wages above the competitive level risk losing their jobs as firms at the margin substitute labour for capital or stop trading. (Deakin and Wilkinson, 1999)

However, empirical surveys and case studies of firms do not support the view that labour markets exhibit the previously mentioned competitive characteristics. Firms do not modify wages automatically when changes in the demand for labour take place (Manning, 2003). Additionally, there is an essential divergence in the pay and conditions offered by different employers to employees doing similar tasks. This led to several revisionists beginning to question the validity of the neo-classical model (Nolan, 1983).

Neoclassical theorists attempted to explain these findings by the argument that freely competitive markets have a tendency towards equilibrium. Boundaries upon the flow of information and upon the mobility and the substitutability of factors of production are overcome in time by the releasing of competitive market forces. The market itself is seen as a dominant force for

equality: within the environment of perfect competition, equal pay for work of equal value would follow from the function of supply and demand. Where obvious variations in pay exist, they are viewed as the result of pre-market factors: dissimilarities among individuals in terms of endowment and capacity, dissimilarities in individuals' tastes for work, training or leisure, or dissimilarities in employers' tastes for favoritism (Becker, 1957).

Law is also seen as an exogenous cause of variation, preventing market clearing. Public choice theory considers labour legislation as the product of prearranged pressure-group activity (Rowley, 1985). Trade unions, according to this view, are labour monopolists looking to cartelise the labour market. By setting wages over the market or equilibrium rate, they discourage the demand for labour and divert resources into meaningless rent-seeking. Trade unions, by supporting collective bargaining and having the right to strike, protect these inefficient monopoly practices against the market forces, which would otherwise force them out (Posner, 1984).

3.2 The Monopsony View of Market Structure

The view that minimum wages will have a neutral or positive employment effect was examined, using a natural experiment, by Lester (1946). He used employment data from garment producers over the years 1937-1941 and he showed that the imposition and subsequent increase of the minimum wage actually fostered employment. In contrast to the competitive model that was popular in the 1970s and 1980s, the monopsony model gained support in the 1990s. There was a major development when the study by CK (1995) challenged the usual concept of minimum wages. As a result, over the last decade economic models that include the participation of firms in wage setting began to gain great popularity (Edwards and Gilman, 1999).

3.2.1 Dynamic Monopsony and Market Frictions and a General Theoretical Model

Several studies have found that a certain degree of monopsony may exist in any case where individual firms face an upward-sloping labour supply curve (Boal and Ransom, 1997). This takes place when information about available jobs is imperfect and/or job search and labour mobility are costly. Within this framework of insufficient information, the idea of dynamic monopsony has been put forward, where employers are able to develop monopsonistic power, offering wages to workers below their marginal productivity. According to this model, employers will hire more employees and the imposition of a minimum

wage below marginal productivity levels will avoid the unemployment problem (Burdett and Mortensen, 1989).

Dickens *et al.* (1994) developed a theoretical model known as labour market frictions. The authors argued that the labour supply to an individual firm will not be perfectly elastic, and so, firms have some monopsony power. Hence, in most labour markets employers that reduce wages do not immediately lose all of their workers. Furthermore they conclude that the optimal minimum wage that maximizes employment should vary from firm to firm and, in particular, it should fluctuate for different types of employees.

Finally, Dickens, Machin and Manning (1999), present a general theoretical model. In this model, employers have some degree of monopsony power, which allows the minimum wage to have the conformist negative impact on employment, but also allows for neutral or positive effects. They studied industry-based British Wages Councils between 1975-1992 and found that minimum wages do not have negative impact on employment.

3.2.2 Criticism and Further Extensions of the Monopsony Model

It is obvious, that the new approach to minimum wages and labour markets would lead to opposite reactions on the part of labour economists.

Saint-Paul (1996) criticizes the validity from which the empirical evidence in favour of monopsony is drawn. He observes that in the US fast food industry there are numerous competing firms in the same location, offering highly substitutable products and all employing a similar kind of low-skilled labour. Thus, the US fast food industry is one of the worst examples for monopsony and is characterized by enormously high competition.

Based on arguments like those above, Bhaskar and To (1999) provide a theoretical framework, or circle model, of monopsonistic competition. According to their model each employer competes effectively with his two direct neighbors and freely enters or exits in competition. In such a labour market structure, different jobs have different non-wage characteristics giving each firm market power in choosing the wage, even though it employs only a small portion of the labour force. They find that an increase in the minimum wage increases employment per firm and may increase or reduce employment in the industry.

However, Walsh (2003) corrects and clarifies the formulation in Bhaskar and To (1999) and shows that it is possible to modify the circle model, so that

the effect of a minimum wage increase on employment is unambiguously negative.

In the light of this result, Bhaskar and To (2002) developed a symmetric model of monopsonistic competition, where each employer competes equally with every other employer. The employees are assumed to have heterogonous choices over employer characteristics, where each of them only works for one employer. According to this model, the impact of a minimum wage on employment is used in free entry equilibrium. The employment impact depends on the degree of distortion in the labour market. In their analysis they note that "if fixed costs are high, so that the equilibrium number of firms is small, and the labor market is far from competitive, then a small minimum wage increases employment. On the other hand, if fixed costs are low, so that the labor market is relatively competitive, a minimum wage reduces employment" (pp. 1-2).

4. Methodological Considerations

This section discusses the most important empirical methodologies that have been used in minimum wage studies and presents the modern time-series econometric methods which will be applied in order to analyze the impact of minimum wage on youth and teenage employment in Greece.

4.1 Time-Series Studies

Much empirical work has led to the development of a time-series approach in which a measure of employment for a demographic group is thought to be affected by the minimum wage. A typical study relates the employment to population ratio of workers to the ratio of minimum to average wages, controlling for other relevant factors. The latter ratio, which is used as the minimum wage variable, is the so-called Kaitz-index and is defined as

$$MW_t = \Sigma_i \, f_{it}(m_t / w_t)c_t, \tag{1}$$

where m_t is the minimum wage in year t, w_t is the average wage in year t, and is often weighted by the fraction, c_t, of workers covered by minimum wage laws.

The canonical estimating equation in the literature is of the form:

$$Y_t = g\,(MW_t, X_{t1}, X_{t2}, \ldots X_{tk}) + \varepsilon_t, \tag{2}$$

where, Y_t represents a measure of employment or unemployment in year t, g is a function of explanatory variables such as the adult male unemployment rate (demand side effects) and the fraction of teenagers in training programs (supply side effects). The main explanatory variable is MW_t, which is a measure of the minimum wage in period t. ε_t is a stochastic error term. Usually the regression takes the form of a linear function of the explanatory variables, either in logarithms or in levels.

Time-series studies are summarized by Brown, Gilroy and Kohen (1982). Their prediction of 1 to 3 percent reduction in teenage employment for a 10 percent increase in minimum wage became widely ingrained in many economists' minds. In contrast, other conclusions of these researchers have received less attention. Such a conclusion is that the minimum wage has a smaller impact on the teenage unemployment rate than on the teenage employment rate. Secondly they concluded that the effect of the minimum wage on young adults is smaller than its effect on teenagers. Finally they asserted from their literature review that blacks are more adversely affected by the minimum wage, noting that such an assertion must rest on theoretical grounds. Regarding Greece, Koutsogeorgopoulou (1994) applied time-series methods in order to estimate the impact of minimum wage on adult industrial employment (both sexes). Using the three-step technique, following Bazen and Martin's procedure, she found that a 10 percent increase in the minimum wage reduces employment by about –0.6 percent (low estimate) to –1 percent (high estimate). These findings are roughly the same for both male and female employees.

Nevertheless Williams and Mills (2001) argue that previous time-series studies have essentially ignored many advances in modeling time-series. This study relies on this argument to use modern time-series techniques to investigate the impact of minimum wages on youth and teenage employment in Greece.

It is useful now to turn to the empirical models that will be estimated in this study. The models attempt to follow the preceding literature by Brown et al. (1982) and Wellington (1991). However, the data available in Greece is limited in comparison with that of the USA. Therefore slight changes have been made to the 'basic' model in order to establish a more coherent solution.

The two main models to be estimated are:

$$EMPT(Y)_t = \alpha_1 + \alpha_2 MWT(Y)A_t + \alpha_3 UPR_t + \alpha_4 POPT(Y)_t + \alpha_5 ENT(Y)_t + \alpha_6 T + \alpha_7 D + e_t, \quad (3)$$

$$\ln EMPT(Y)_t = \beta_1 + \beta_2 \ln MWT(Y)A_t + \beta_3 \ln UPR_t + \beta_4 \ln POPT(Y)_t + \beta_5 \ln ENT(Y)_t + \beta_6 T + \beta_7 D + e_t, \quad (4)$$

where,

EMPT(Y): the ratio of civilian employment to civilian population, for teenagers aged 15-19 (and for youths 20-24).

MWT(Y)A: the ratio of teenage (and youth) minimum wage to average manufacturing earnings.

UPR: the ratio of civilian unemployment to the civilian labor force, for males aged 25-64.

POPT(Y): the ratio of civilian population aged 15-19 (and for youths 20-24) to civilian population aged 15-64.

ENT(Y): the ratio of teenagers, aged 15-19, enrolled in secondary education to the teenage civilian population. For youths, this is taken as the ratio of total enrollment in tertiary education to young civilian population, aged 20-30.

T: linear time trend.

D: dummy variable to indicate the different measures taken by the government in favour of young workers (D takes the value of one, one year before and the year of elections and zero otherwise).

a_i, β_i: parameters to be estimated; e_t: error term ~ *iid* $(0,\sigma^2)$.

The stationarity of the series will be tested using the Dickey-Fuller and Augmented Dickey-Fuller (ADF) tests both with and without a linear deterministic trend. Both tests are based on a null hypothesis of a unit root (nonstationary) and those to form the tests recommended by MacKinnon (1991). Additionally, in the ADF test, Schwarz Bayesian Criterion (SBC), Hannan-Quinn (HQC) and Akaike Information Criterion (AIC) are used for selecting the order of augmentation. As far as cointegration is concerned, the stationarity of the residuals will be tested using the residual based ADF test. The null hypothesis is that residuals have a unit root against the alternative hy-

pothesis that they are stationary. The analysis will be conducted using the Microfit 4.1 program.

4.2 Pooled Cross-Section and Panel-Data Studies

Cross-section studies use the variation in the minimum wage at a point in time to identify the effect of the minimum wage. Panel data studies follow the experiences of states or individuals over time.

The employment equation that is estimated in panel or pooled cross sectional studies is of the form:

$$E_{it} = \alpha_o + MW_{it}\,\beta + X_{it}\,\gamma + T_t\,\tau + S_i\,\delta + \varepsilon_{it}, \qquad (5)$$

where: E_{it} is the employment rate in region i and year t,

MW_{it} is a minimum wage index,

X_{it} is a set of explanatory variables,

T_t is a set of year dummy variables,

S_i is a set of regional dummy variables and ε_{it} is the error term.

Economists oftener run OLS (Ordinary Least Squares) regressions to estimate the parameters of equation (5). The most important parameter is the coefficient on the minimum wage, β, which can be measured as a natural logarithm and denotes the elasticity of employment with respect to the minimum wage.

In their analysis, Neumark and Wascher (1992) used panel data on state minimum wage laws covering the years 1973-1989 to estimate the cross-state/region model. The school enrolment rate is included among the regressors and is calculated in such a way as to treat anyone who is enrolled in school and either working or seeking work as not in school. Their estimates for the employment-population rate of 16 to 19 year olds and of 16 to 24 year olds show, that an increase of 10 % in the minimum wage reduces employment, respectively, by 1-2 % and 1.5-2 %. These results are fairly similar to the earlier time series studies.

4.3 Natural Experiments

This approach compares employment changes for specific regions, individuals or firms that are affected by a change in the minimum wage with those in

similar regions, individuals or firms which are unaffected by the change. Both groups therefore experience similar conditions except that one (the treatment group) has a minimum wage change and the other (the control group) does not. The impact of the treatment is given by the difference between the two groups' outcomes.

The most famous and notable natural experiment is that of CK (1994) in the fast-food industry of New Jersey. In April 1992, a minimum wage increase from \$4.25 to \$5.05 per hour took place in New Jersey. This was a good chance for these progressive labour economists to evaluate the impact of the law on 401 fast-food stores in New Jersey and Pennsylvania, where in the latter the minimum wage was constant, providing simple estimates of the effect of the higher minimum wage. They also compared employment changes at restaurants in New Jersey that were initially paying high wages, above \$ 5,00 to the changes at lower-wage restaurants. The results of their experiment indicate no evidence that the increase in the minimum wage reduced employment.

The method they used was the "difference in differences" estimator (d^2):

$$d^2 = (Y_{t2} - Y_{c2}) - (Y_{t1} - Y_{c1}) \quad (6)$$

where, Y_t is employment of firms in the treatment group, Y_c is employment of firms in control group, 1 is the first wave of interviews conducted just before the rise in the minimum wage and 2 is the second wave conducted 7-8 months after. The null hypothesis (H_o) that the increase of the minimum wage had no impact on employment is accepted if d^2 is equal to zero.

5. Data

The data used in this study to estimate the impact of minimum wages on employment cover the period of 1974 to 2001 for youths and from 1981 until 2000 for teenagers.

The labour force data are available from the Labour Force Survey (LFS) conducted by National Statistical Service of Greece (NSSG). The civilian population data is available from the Statistical Yearbooks of NSSG and calculated for the middle of each year. The educational data for teenagers encompassing the period 1981-1996 is available from the website of the United Nations Educational Scientific and Cultural Organization (UNESCO) and for the period 1998-2000 the statistics are available from the website for education of the Organization for Economic Co-operation and Development (OECD). Due

to the fact that 1997 marks a break in the International Standard Classification System (ISCED), the number of enrolled students in this year is calculated as an average for the years 1996 and 1998. The educational data for youths for the periods 1974-1980 and 1997-2001 has been extracted from the Statistics of Education (NSSG) and for the period 1981-1996 from the website of UNESCO.

Data regarding the minimum wages of youth manual and non-manual workers for the period 1974-1980 was found in the annual report of CEO (Chief Executive Officer) of The Bank of Greece. The Comparative Minimum Wage study of Eurostat (1997) was used to collect data in accordance with the minimum monthly wages of non-manual workers for the period 1981-1997. Data for the rest of the period for non-manual workers were provided by EGSSE. The data for manual workers for the period 1982-2001 were also provided by EGSSE. For the year 1981 the minimum wage of youth manual workers was estimated as the overall average for the years 1980 and 1982. In this study the minimum wage of youths is calculated as the average minimum wage of non-manual and manual workers.

The minimum wages of teenagers[1] are obtained from the EGSSE, where some of them (1982, 1983, 1989) clearly define the teenage "trainee" manual minimum daily wage (according to Greek law monthly when multiplied by 25) and other EGSSE define it as 75% of the adult manual minimum daily wage. Nevertheless, in many Collective Conventions the "trainee" manual minimum daily wage is not clearly defined as the 75% of the adult manual minimum daily wage. This study adopts its percentage for the past years, unlike the EGSSE who did not show a systematic recognition of this throughout the years. The average manufacturing daily earnings and the consumer price index (1990=100) are found on the website of International Labour Organization. Both minimum wages and average manufacturing earnings are deflated by the consumer price index.

Considering the data used in this study, it encloses a number of advantages and disadvantages. Despite the fact that it derived from various sources, all the sources are recognized organizations that provide data to governmental and other international institutions in order to construct official rates. Going further, to the nature of the data, a positive feature is that it can be broken down by age and other demographic characteristics providing for deep and multifactor analysis. Moreover, under the perspective that the data is based on the aggregate official recorded population of the country (not on a random

sample of the population) and it includes all sectors of the economy, it provides for wider analysis and more representative results. However, the data sources provide a relatively short time series (28 and 20 observations for youths and teenagers respectively), available on an annual basis (i.e. not quarterly). The latter might suggest that the possibility of error would appear to be greater than in studies with larger samples and more observations.

As far as the continuity of the data is concerned, the NSSG presents average yearly employment and unemployment estimates for period 1974-1980 and not the exact rates per year, a fact that might have slightly altered the results (concerning youths). The application of Chow test for the periods 1974-1983 and 1984-2001, in the sample of youths, shows that the data for the two periods are systematically different. Regarding this difference, in a great extend it can be explained by the fact that 1981 was the year that Greece entered the European Economic Community (EEC) and non-ordinary changes in the fundamental indicators of the economy took place after 1981. Besides, 1981 was the year when the Socialist Party took over, thus it is reasonable for labour-friendly adjustments to be recorded. As mentioned above, interruption of data is also encountered for years 1997 (lack of the number of enrolled students) and 1981 (lack of the minimum wage amount of youth manual workers). For these years, the missing values are calculated as the average for the years 1996-1998 and 1980-1982 correspondingly.

6. Results

6.1 Unit Root Testing

Unit root tests[2] will be employed in order to examine whether the variables included in the models of teenagers and youths are stationary or non-stationary.

Based on the results presented in Table 1, the youth employment rate (EMPY) and the minimum wage to average manufacturing earnings (MWYA) seem both to be stationary. The DF and ADF statistics (with and without trend) for EMPY are greater (in absolute value) than the 5 percent critical value given at the table and thus the null hypothesis of a unit root is rejected. The same is also true for MWYA with trend, whereas for MWYA without trend the DF and ADF statistics are below the 5 percent critical value given at the table. As a further check, however, the first log-difference for both variables is examined. The evidence provided by the first log-difference clearly proves the stationarity of both the EMPY and MWYA variables (DF and ADF

statistics are for both variables greater in absolute value than the 5 percent critical value).

TABLE 1

Unit-Root Tests of Stationarity

Variable	ADF (1)	ADF (with trend) (2)	DF (3)	DF (with trend) (4)	Order of integration (5)
Youths					
EMPY	-3.7075	-3.8194	-3.7610	-3.6779	I (0)
MWYA	-1.0831	-5.2790	-2.0716	-4.1872	I (0) (trend)
UPR	-2.4862	-3.0502	-1.2365	-1.5278	I (1)
POPY	-.77771	-1.2751	-.03837	-.7970	I (2)
ENY	-2.7023	.46454	.47634	-2.0877	I (1)
5% C.Values	-3.0294	-3.6746	-3.0294	-3.6746	
Teenagers					
EMPT	2.1108	-3.9931	-.25551	-3.3817	I (1)
MWTA	-1.3023	-3.6262	-1.0970	-4.2113	I (1)
POPT	-.52938	-4.3826	-.56452	-1.3078	I (1)
ENT	-4.2110	-2.4291	-1.5897	-1.8860	I (2)
5% C.Values	-3.1803	-3.9272	-3.1803	-3.9272	

Notes: An intercept is included in all of the tests. Variables, except ENY and ENT, are in logs. Columns (1) and (3) do not include a deterministic trend while Columns (2) and (4) include a deterministic trend. Column (5) contains the view about the true process generating each of the series. Unit root tests for the variables of teenagers are employed for period 1981-2000. The Microfit 4.1 program provides the 5% critical values.

The stationarity of the other "youth" variables mentioned in the analysis was also tested[3] and the results are presented in Table 1. The proportion of young people (aged 20-30) enrolled in tertiary education and the adult male unemployment rate (same variable for teenagers) both contain a unit root. The DF and ADF statistics are below the 5 percent critical value and this implies that they are non-stationary. The population share of youths (POPY) appears to contain a unit root, but after examining the first and the second log-difference it is apparent that this series is likely to be I(2).

Regarding teenagers, it is evident from Table 1 that none of the variables included in the analysis are stationary. The DF and ADF statistics are in most

of the cases below their 5 percent critical value and this indicates that they are non-stationary. Tests for higher order of integration were also applied confirming that EMPT, MWTA and POPT variables are first differenced stationary time series processes. However, the ENT series has to be differenced twice before it becomes stationary, the original series is integrated of order 2, or I (2).

The above results regarding on youth and teenage employment in Greece are not surprising when considering the findings of Williams and Mills (2001) that US teenage employment related variables are integrated of different orders.

6.2 Empirical Results on Youth Employment

Therefore for youths, the variables are integrated of different orders. There is no long run relationship between EMPY and MWYA or the other explanatory variables. For the sake of completeness, cointegration between the variables that are I(1) was checked after the estimation of the OLS regression and no evidence of cointegration between them was found

Thus table 2 presents the estimates of the impact of the youth minimum wage with linear and log-log linear specifications for the period 1974-2001 using OLS.

First, with regard to the linear specification, the estimates for the effect of the increase in MWYA in EMPY lie between -0.15 and -0.25 indicating an increase in the minimum wage causes the employment of youths to fall. However none of the effects of minimum wages on youth employment are significant. Each of the other explanatory variables has a positive relationship with the dependent variable. For the supply side variables POPY and ENY the sign suggests that an increase in the population of youths and an increase in students in tertiary education leads to an increase in the employment of youths. As far as the cyclical variable (UPR) is concerned the employment of youths is also negatively related to cyclical conditions. An increase in the unemployment rate of males aged 25-64 leads to an increase in youth employment. Both POPY and UPR are statistical significant at the 5 percent level.

In the log specification, the estimated elasticities are -0.048, 1.47, 0.23 and 0.11 for the MWYA, POPY, UPR and ENY variables respectively. As in the linear specification the above estimates indicate that an increase in the minimum wage would lead to a decrease in youth employment, but this is not significant. Moreover an increase in the population of youths and in the number

of students' enrolled in tertiary education would cause an increase in the employment of youths. As above, an increase in the unemployment rate of males aged 25-64 would affects youth employment in a positive way.

When a time trend is added in column (2), the regression yields a more negative elasticity for the minimum wage, a lower elasticity for the population of youths and higher elasticities for unemployment rate of mature males and for students' enrollment in tertiary education. The negative coefficients of the time trend, in both linear and log linear specifications, are in accord once with the increasing employment obstacles which the Greek economy has faced. In column (3), the dummy variable included to account for the beneficial influence of government in favour of youth workers, one year before and during the year of elections, seems to influence youth employment in a positive way. It is important to note that youth workers hold an entitlement to vote. Neither the time trend nor the dummy variable are significant though. The estimates in column (4) confirm that the exclusion of the time trend from the regression is likely to produce a less negative elasticity for MWYA, a higher elasticity for POPY variables and lower elasticities for the UPR and ENY.

TABLE 2

OLS Estimates of the Factors Affecting Teenage Employment Rates 1974-2001

REGRESSOR	**(1)**	**(2)**	**(3)**	**(4)**
LINEAR				
INTP	-82.3738**	-114.8898**	-109.3239**	-76.9329**
	(-2.3995)	*(-2.5456)*	*(-2.3248)*	*(-2.1264)*
MWYA	-0.15004	-0.24131	-0.25614	-0.166554
	(-1.2127)	*(-1.6264)*	*(-1.6707)*	*(-1.2909)*
POPY	10.0882*	13.3768*	12.9559*	9.6860*
	(3.8528)	*(3.3777)*	*(3.1594)*	*(3.5178)*
UPR	2.4865*	2.7891*	2.7659*	2.4657*
	(5.3571)	*(5.1908)*	*(5.0484)*	*(5.2164)*
ENY	0.68557	0.47701	0.46373	0.59283
	(0.62758)	*(1.2358)*	*(1.1795)*	*(0.52069)*
T	-	-0.45967	-0.45473	-
	-	*(-1.1028)*	*(-1.0730)*	-
D	-	-	0.47409	0.49448
	-	-	*(0.53926)*	*(0.56058)*

(continues)

R^2	*0.90328*	*0.90835*	*0.90906*	*0.90464*
Adjusted R^2	*0.88646*	*0.88752*	*0.88377*	*0.88297*
DW	*1.5371*	*1.7574*	*1.7421*	*1.5172*
LOG				
INTP	-0.49142**	-0.220090	0.53317	-0.21992
	(-2.8280)	*(-0.10969)*	*(0.26369)*	*(-0.12690)*
MWYA	-0.047651	-0.065996	-0.11829	-0.085549
	(-0.19748)	*(-0.26580)*	*(-0.47874)*	*(-0.35546)*
POPY	1.4699*	1.2736	1.0293	1.3455*
	(2.0700)	*(1.5394)*	*(1.2353)*	*(1.8960)*
UPR	0.22959*	0.23438*	0.23307*	0.22614*
	(7.1308)	*(6.8554)*	*(6.9336)*	*(7.0729)*
ENY	0.10901*	0.12110*	0.12598*	0.10760*
	(2.8744)	*(2.6387)*	*(2.7845)*	*(2.8670)*
T	-	-0.001597	-0.00245	-
	-	*(-0.48608)*	*(-0.74464)*	-
D	-	-	0.02929	0.026122
	-	-	*(1.3363)*	*(1.2274)*
R^2	*0.94405*	*0.94465*	*0.94898*	*0.94764*
Adjusted R^2	0.93432	*0.93207*	*0.93441*	*0.93574*
DW	1.7994	1.8269	1.7544	1.7205

Notes: t-statistics in parentheses. Columns (1)–(4) contain estimates for the period 1974-2001. Column (1) does not include a time trend; Column (2) includes a time trend and not a dummy variable; the opposite takes place in Column (4). Column (3) includes both a time trend and a dummy variable. * and ** denote statistical significance at the 5% and 10% level respectively.

In the linear specification all DW statistics (at 1% level of significance[4]) lie between the inconclusive regions of d_L and d_U, except the DW statistic in column (2), which indicates no serial correlation. In the log-linear specification, in columns (1) and (2), the DW statistics indicate no serial correlation and in columns (3) and (4) lie between the inconclusive regions. Breusch-Godfrey LM tests for serial correlation in the residuals are insignificant for all equations in both specifications (which for the sake of space are not reported). Hence we do not reject the null hypothesis of no autocorrelation.

6.3 Empirical Results on Teenage Employment

As in the case of youths the teenage variables are integrated of different orders and no cointegration was found among I(1) variables. Table 3 presents the OLS estimates of the effect of minimum wages on teenage employment, using various specifications of the estimating equations.

According to the linear specification the coefficients of MWTA lie between -0.09 and 0.68. Therefore minimum wages do not have a negative effect on teenage employment rates when a time trend is included in the regression and a small negative effect is found when the time trend is excluded. However, all the coefficients are insignificant. The time trend seems also to have a significant effect on the other explanatory variables. The estimates of the supply side variables, POPT and ENT, are either negative, including the trend variable, or positive, excluding the trend. The population of teenagers, for instance, goes from positive and significant effect at 5 percent level in column (1), to negative and insignificant effect in column (2). Finally the unemployment rate of males aged 25-64 have a negative effect on youth employment in all linear specifications, but the coefficients are statistically significant when regressions do not include a time trend.

In contrast to the linear specification the minimum wage variable is positive in all log-linear specifications and is significant in a couple of them. This implies that an increase in the minimum wage leads teenage employment to increase. Regarding the population of teenagers and the students' enrollment in secondary education, their estimates are also positive in all log-linear specifications. The above indicate that an increase in the population of teenagers and in the students' enrolment would cause an increase in the employment of teenagers as well. Only the cyclical (UPR) estimates are all negative and in line with the linear specification. An increase of the unemployment rate of males aged 25-64 would indicate a reduction on teenage employment.

More specifically, when a time trend is added, the regression yields a less negative elasticity for the cyclical variable (UPR), and much lower elasticities for the population of teenagers and the number of students enrolled in secondary education but a higher elasticity for the minimum wage. This higher elasticity for the minimum wage is now significant at 5 percent level. The same is also true for the minimum wage elasticity when the dummy variable is added in column (3). The dummy variable, for the political influence one year before and during the year of elections, seems to have negative impact on teenage employment in both log-linear and linear specifications but this is not significant. Nonetheless, the negative impact on teenage employment, while teenagers do not hold the right to vote, is contrasted with the positive impact on youth employment, because youths do hold the right to vote. The estimates in column (4) verify that the exclusion of the trend from the regression yields lower positive elasticities for the minimum wage and the students' enrolment in second-

ary education, a more negative elasticity for the unemployment rate of males aged 25-64 and a higher elasticity for the population of teenagers.

TABLE 3

OLS Estimates of the Factors Affecting Teenage Employment Rates 1981-2000

REGRESSOR	(1)	(2)	(3)	(4)
LINEAR				
INTP	-67.7937	56.2049	56.2492	-66.2998
	(-1.7594)	*(1.9935)*	*(1.9220)*	*(-1.6558)*
MWTA	-0.10297	0.68373	0.68877	-0.096238
	(-0.92930)	*(1.0632)*	*(1.0227)*	*(-0.82707)*
POPT	6.6001*	-2.0147	-2.0162	6.5122*
	(3.1879)	*(-1.1558)*	*(-1.1146)*	*(3.0224)*
UPR	-2.3202*	-0.13855	-0.14080	-2.3259*
	(-5.7647)	*(-0.34257)*	*(-0.33394)*	*(-5.5963)*
ENT	0.51945	-0.16426	-0.16498	0.50619
	(1.4192)	*(-0.74364)*	*(-0.71865)*	*(1.3321)*
T	-	0.85894*	-0.85827*	-
		(-6.3333)	*(-6.0759)*	
D	-	-	-0.21887	-0.23054
			(-0.055194)	*(-0.30905)*
R^2	*0.90945*	*0.97657*	*0.97658*	*0.91006*
Adjusted R^2	*0.88530*	*0.96820*	*0.96577*	*0.87794*
DW	*1.3113*	*1.5573*	*1.5613*	*1.2765*
LOG				
INTP	-17.0542	1.6583	1.8262	-15.5405
	(-1.8439)	*(0.22342)*	*(0.2513)*	*(-1.7088)*
MWTA	0.21645	0.58749*	0.63242*	0.30941
	(0.62053)	*(2.3903)*	*(2.6104)*	*(0.89060)*
POPT	5.9948*	0.84362	0.88982	5.7179*
	(3.5280)	*(0.52398)*	*(0.056628)*	*(3.4224)*
UPR	-1.0029*	-0.40552*	-0.44472*	-1.0220*
	(-6.8977)	*(-2.4644)*	*(-2.7227)*	*(-7.1685)*
ENT	1.8192	0.22900	0.18089	1.6394
	(1.3503)	*(0.23812)*	*(0.19263)*	*(1.2407)*

(continues)

T	-	-0.49842*	-0.47625*	-
		(-4.4811)	(-4.3356)	
D	-	-	-0.45180	-0.68363
			(-1.3060)	(-1.3272)
R^2	*0.93076*	*0.97155*	*0.97485*	*0.93849*
Adjusted R^2	*0.91229*	*0.96140*	*0.96325*	*0.91653*
DW	*1.8180*	*1.7676*	*1.9235*	*1.7593*

Notes: t-statistics in parentheses. Columns (1)–(4) contain estimates for the period 1981-2000. Column (1) does not include a time trend; Column (2) includes a time trend and not a dummy variable; the opposite takes place in Column (4). Column (3) includes both a time trend and a dummy variable. * and ** denote statistical significance at the 5% and 10% level respectively

In all specifications of the linear regressions, DW statistics (at 1% level of significance[5]) lie in the inconclusive regions. The same is true for the log-linear specification, except for column (1), where DW statistic shows no positive serial correlation. As with the case of youths, Breusch-Godfrey's LM tests for 1st order serial correlation in the residuals are insignificant for all equations in both specifications (which for the sake of space are not reported). Thus we do not reject the null hypothesis of no autocorrelation.

6.4 Comparison and Evaluation of the Results

In this sub-section, the results of the present study will be evaluated in order to become more consistent and illustrative with respect to the Greek labour market. At the same time they will be compared[6] with results of other countries' studies with the aim of providing a more comprehensive view of the minimum wage effects in Greece.

From the preceding part of this analysis it is apparent that the findings regarding the effects of minimum wages on youth and teenage employment differ. The absolute magnitudes of youth elasticities are substantially lower than the teenage elasticities. Indeed, one would expect the disemployment effect for youths to be smaller than the employment effect of teenagers, since the great majority of teenagers are directly related to the minimum wage (none employer would pay more money for unskilled employees).

Concerning these absolute magnitudes, the two groups seem likely to be perfect substitutes for one another in the Greek labour market. In fact, the em-

ployment propensity for teenagers is lower than the employment propensity for youths over the samples period (i.e. the substantial increase in teenage enrolment levels explain the downward trend in relative teenage employment propensities, see Appendix: Figure 4). Moreover, compared to youths, teenagers are twice as likely to be employed in part time jobs and have lower insurance benefits (since they work fewer hours and theoretically have lower productivity). Therefore, following a minimum wage rise, employers primarily substitute youths -which by the rule are more expensive and skilled employees- for lower-paid teenage trainee workers. The motivation for higher profits leads employers to make human capital quality "discounts" for inferior quality work.

The estimates for youth employment are lower than those obtained in French studies, but closer to the estimates using US data. (See Bazen and Martin (1991), Benhayoun (1994), Brown et al. (1983), Wellington (1991)). Still, the elasticities for youths approximately replicate Koutsogeorgopoulou's (1994) elasticities for the impact of minimum wages on adult industrial employment (both sexes) in Greece. Taking into account that youth adult employees constitute part of the total of the adult employees, the similarity between the minimum wage coefficients of the two studies verifies the accuracy of the current study findings.

As far as the minimum wages findings for teenagers, they seem to differ from the majority of time series studies conducted in the US. These studies find either significant or insignificant negative results for the effects of minimum wage on teenage employment (See Brown et al. (1982), Wellington (1991), CK (1995)). Maloney (1995), however, similar to this study, in his study for New Zealand, finds a positive minimum wage elasticity for teenagers and a negative relative elasticity for youths. According to Maloney, these effects do not occur at the same time. Actually, employers may reduce youth employment before hiring the less expensive teenagers. This could accord with Greek reality, since OAED provides incentives to employers who particularly employ teenage trainee workers in certain periods of the year.

Regarding the explanatory variables POPY, POPT and UPR the predicted signs in the literature are significantly negative (Iden (1980), Maloney (1995), Bazen and Marimoutou (1997)). As far as the cyclical variable is concerned, Ragan (1977) argues that it is possible for the coefficients of UPR not to be identical for each demographic group. In addition, the results in Tables 2 and 3 provide evidence that the employment of teenagers is more responsive to cyclical conditions than the employment of youths. Employers, according to the

business cycle, might avoid hiring adult married workers and might prefer youth unmarried workers, since they would not have to pay higher wages for youths' work (maybe their first job, but they are higher skilled than teenagers) and because of youths' family status (probably unmarried and no children). Moreover, considering the downward wage rigidities, adults are more committed to the labour market than youths. It is either their work experience or their needs that will not allow them to reduce their high requirements regarding working conditions.

Moving on to the positive significant (in most specifications) coefficients of POPY and POPT these can be explained in the light of the combination of the demographical problem in Greece and the functioning of the Greek pension system. Due to the motives for early retirement that characterize the Greek pension system, more workers became retired. In 1998 the ratio of pensioners to active persons was 1:2.3, when a healthy ratio is 1:4, 21 percent of the total population of 10,300,000 were pensioners (NSSG). Figure 3, see Appendix, shows a rapid reduction in the population of teenagers, whereas a small negative movement is observed in the population of youths. Thus an increase in the minimum wage, which increases excess labour supply, would probably increase the employment of teenagers proportionately more than the employment of youths. The evidence is in favour of this view.

The estimates of the supply side variables, ENY and ENT, are in most specifications positive but not always compatible with other studies that use either school or job training enrolment ratios (Iden (1980), Maloney (1995)). The substantial increase in Greek enrolments levels (see Appendix: Figure 4) over the last decades seems to lead in reduction of labour supply of both age groups and increases their labour demand, ceteris paribus. Hence an increase in the minimum wage followed by a higher than proportional population decrease and higher than proportional educational enrolment for teenagers than youths would result in a higher probability of higher teenage employment than youth employment. The evidence again accords with this.

A further investigation of other factors that influence youth and teenage employment indicates that the Greek labour market is very unfavorable to young workers. This suggests that Greek policy-makers protect the demand side by lowering the relative wages of teenagers and youths, whereas many mechanisms control the supply side of the young labour market. More specifically the approximate enlistment[7] of 60.000 young men into the armed forces every year and the existence of many anti-employment obstacles in the Greek

educational system[8], protect the Greek economy from more high youth and teenage unemployment rates.

Finally, the considerations of Solon (1985) and CK (1995) of clear evidence of residual autocorrelation in a simple static model estimated by OLS are not valid in the case of teenagers and youths in Greece. The Durbin-Watson statistics in all cases were well above 1. Although some DW statistics are in the inconclusive range some other are above the higher limit (for the 0.01 significance level). The formal Breusch-Godfrey LM tests for serial correlation in the residuals are insignificant for all equations in both specifications for each age group.

7. Conclusions

The preceding analysis confirms that the link between the change in minimum wages and the employment of young people is not necessarily negative. In contrast to the traditional view, neither the recent debate over minimum wage theory nor the previous empirical evidence support such a prediction. The results in this study reveal a surprising positive employment impact of the minimum wage on teenage employees, therefore providing econometric support to the proposition that employers substitute more expensive young adult employees (obviously more skilled) for less expensive teenage trainee employees. The implicit conjecture is that teenagers, as a group find employment as the minimum wage rises, are taken as perfect substitutes for employers to the age group of young adults.

In conclusion, no minimum wage policy can be universally accepted if one considers the major differences that are encountered in countries' legislations, labour statutes, social statutes and all the other factors that affect the minimum wages. The minimum wage policy should be shaped in such a way that the employers', the employees' and social interests are served in the best possible way. Regarding the Greek labour market, there is still much research that can be done to shed more light in the controversial issue of the effects of minimum wages on a range of economic aspects. Researchers could compare different groups of employees, other than teenagers and youths, whose employment might be influenced by minimum wages changes. Such groups could be graduates and non-graduates or illegal immigrants and legal resident workers. Finally a very interesting aspect for future research would be whether the minimum wages harm small businesses, which dominate the Greek labour market.

Notes

1. As in the case of youths, for the sake of Figures 1 and 2 the data for the minimum wages of teenagers from 1974 to 1980 are obtained from the annual report of CEO of The Bank of Greece. For the year 2001 the data was found from the EGSSE. As far as Figures 3 and 4 in the Appendix is concerned, the data for the civilian population of teenagers to civilian population aged 15-64 from 1974 to 1980 and for the year 2001 are obtained from the statistical yearbooks of NSSG.

2. Unit roots tests and cointegration analysis are included in the paper for the sake of completeness and for the sake of evidence for the Greek labour market. It may be an issue to include in the same regression variables integrated of different orders. However, the different orders of integration of the variables should be considered more explicitly if there were more observations, e.g. if quarterly data were available.

3. Stationarity was tested for the variables for youths and teenagers in both levels and log form. The results were roughly the same, so due to space considerations only the results for the log form are reported (except ENY and ENT).

4. For n=28 and k'= 5, the critical d values are d_L= 0.832 and d_U = 1.618. For n=28 and k'=6 the critical d values are d_L= 0.764 and d_U = 1.729. For n=28 and k'= 7 the critical d values are d_L = 0.696 and d_U = 1.847 (Gujaraty, 1995).

5. For n=20 and k'= 5, the critical d values are d_L= 0.598 and d_U = 1.737. For n=20 and k'=6 the critical d values are d_L= 0.515 and d_U = 1.918. For n=20 and k'= 7 the critical d values are d_L = 0.436 and d_U = 2.110 (Gujaraty, 1995).

6. Since most of the studies from other countries estimate only the log-linear specification for the impact of minimum wages on teenage and youth employment, this study mainly uses the estimated elasticities in the comparisons with other studies.

7. The military office refused to provide data on the annual number of persons enlisted in the Greek armed forces.

8. On average approximately 2 years are required from students to entry in the university (hard exams) .The duration of studies for the 1st degree is 4 years (in Polytechnic and Medicine Schools is 5 and 6 years respectively). The duration of studies for the MSc is 2 years.

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Appendix: Figures

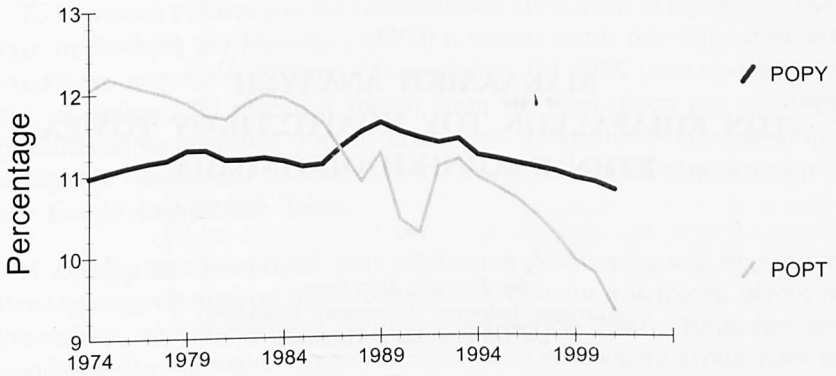

Figure 3: *Population of Youths (Teenagers) as a percentage of the Population aged 15-64*

Source: Statistical Yearbooks of NSSG

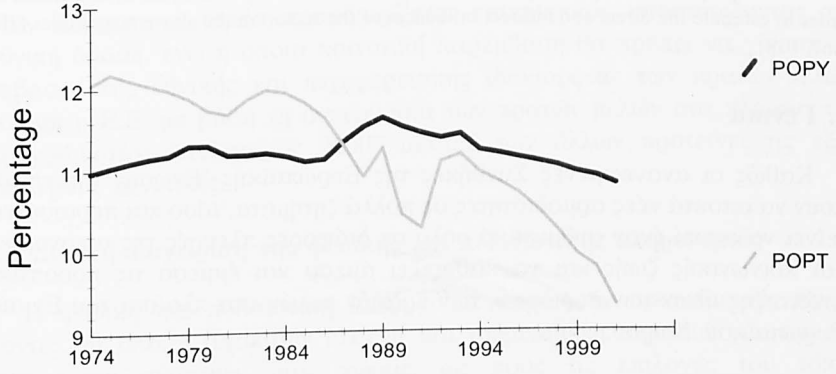

Figure 4: *Total enrollment in tertiary education as a percentage of the Population aged 20-30 and Teenagers' enrollment in Secondary education as a percentage of the Teenage Population*

Sources: Statistical Yearbooks of NSSG, UNESCO, OECD, and Statistics of Education (NSGG)