# The EMU Effects on Greek Unemployment: A Preliminary Evaluation of the Inflation-Unemployment Trade-Off (2001 – 2003).

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**Abstract**

With the application of Ordinary Least Squares based on quarterly data of growth rates for inflation and unemployment for the period 2001 – 2003, the study concludes that a trade-off between inflation and unemployment does not exist in the Greek economy. Although the findings indicate that the EMU has no costs on the evolution of unemployment levels in Greece, the factors that generate the economic indicators on which the regression analysis is based point to the opposite direction. The utilization of the structural funds to date, the organization of the Olympic Games and the expansion of household debt are substitutes for the restrained government expenditure and have "temporary positive effects" on the level of aggregate demand. As long as Greece does not meet the expectations on competitiveness that were set as a standard for introducing the Euro, it will experience high levels of unemployment that it will probably not be able to cope with.

**Keywords**: EMU, Greece, inflation, unemployment

**JEL classification codes**: E24, E31, R11, R51

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## 1. Introduction

The evolution of the Greek economy in the Economic and Monetary Union continues to be positive and dynamic. The GDP growth rate carries on at approximately 4% per annum, while fiscal deficits and inflation are sustained at relatively low levels in accordance with the commitments to the European Union. In addition, private investment flows and structural changes continue to contribute to the strive of the economy to correspond with the competitive conditions that shape the international environment. It is believed that the existing policy mixture, along with the significant contribution of the third Community Support Framework and the organisation of the Olympic games, are able to secure the endurance of Greece's dynamic economic development until the next three or four years. In addition, the recovery of the economies of the Euro zone from the depression that signified the period 2000 – 2003 will also contribute towards this endeavour (Solbes, 2004).

However, in order to appreciate the economic indicators and determine to what extent the EMU is able to affect the levels of Greek unemployment, it is very important to consider the role of the Community Support Framework (CSF) as associated with the Stability and Growth Pact (SGP).

The CSF is a programme of structural economic development whose aim is to assist the expansion of production capabilities of an economy, as well as to promote the effective functioning of the markets within it. In essence, it is a programme of reforms aiming to improve the total productivity of an economy by boosting the existing "mechanisms" of endogenous development or accordingly, generating new ones whenever possible (Schoretsanitis, 2004). The absence of such mechanisms is one of the main problems of countries of the European periphery. Accordingly, the evaluation of CSF should not be based only on its direct effects on the levels of economic growth, but also to the extent that it generates an environment able to lead to initiatives capable of exploiting adequately the economy's potential.

The principal concern of the SGP is to enforce fiscal discipline as a permanent feature of EMU and to safeguard sound government finances as a means to strengthen the conditions for price stability and for strong and sustainable growth conducive to employment creation. The SGP has brought stable, low levels of inflation and imposed certain constraints on the fiscal tools of the Greek government (Andreou and Koutsiaras, 2004). For that reason, economic growth is expected to occur with an expansion of private investment spending that will be sufficient enough to cover the gap of

decreased government expenditure. As a result, the structural funds (CSF) have to be spend on increasing the productivity and competitiveness of the Greek labour market and economy respectively, so as to increase the levels of future private investment and sustain or decrease unemployment levels in the future – current levels of unemployment are considered reasonable given the EU average. Thus, in the case of Greece, the SGP has a negative impact on unemployment levels – since fiscal expenditure is restrained – and the structural funds are expected to level it out.

## 2. Theoretical Framework

Apart from several cultural and institutional differences, the members of the EMU also differ in their preferences for discretionary measures for inflation or alternatively, unemployment. Some members are less allergic to inflationary pressures than others and the particular is able to characterize the cost of the common currency. The importance of these different "needs" has been indicated by Corden (1972) and Giersch (1973). According to the inflation-unemployment trade-off analysis of De Grauwe (1975), the cost of joining the monetary union for a country with high inflation is that it has to accept more unemployment than it desired in exchange for less inflation. However, the cost of the monetary union – in terms of inflation and unemployment – under a stable Phillips curve has fallen victim to the "demise" of the Phillips curve, although its conclusions seems rational in the short-run. Following the criticisms of Friedman (1967) and Phelps (1968), it is generally accepted nowadays that the Phillips curve is not stable (i.e. it will shift upwards when expectations of inflation increase). Under this condition, the authorities have very little free choice between inflation and unemployment. The particular concept leads to the view that the Phillips curve is a vertical line in the long-run, with far-reaching consequences for the costs of a monetary union.

The core of the monetarist critique is that a country which chooses too high an inflation rate (and in the process is forced to let its currency depreciate) will find that its Phillips curve shift upwards. In this monetarist view of the world the Phillips curve is really a vertical line in the long run. There, however, remains the problem of the short-term costs of joining a monetary union. Although in the long-run, countries cannot really choose between inflation and unemployment, the short-run Phillips curve is still alive. Consequently, countries that want to reduce inflation will most probably be faced with a temporary increase in the unemployment rate (De Grauwe, 2003). The experiences of

the 1980s make this clear, where policies of disinflation led to significant increases in unemployment in major industrial countries (De Grauwe, 1990). As a result, according to the monetarist view, the cost of a monetary union lies between “zero” (no cost on unemployment) and a short-term transitory increase on unemployment.

The idea that when the government follows particular policies it plays a game with the private sector has taken over macroeconomic theory since the end of the 1970s – see Kydland and Prescott (1977) and Barro and Gordon (1983). The particular idea emphasizes the notion that economic agents follow optimal strategies in response to the strategies of the authorities and that these private sector responses have profound influences on the effectiveness of government policies. The concept of the literature in support of this notion demonstrates important implications regarding the costs of a monetary union. It leads to a fundamental criticism of the view that the exchange rate is a policy tool that governments have at their disposal to be used in a discretionary way. This criticism implies that the best alternative to lower the rates of inflation in countries with high inflation is to proceed to monetary integration with stronger economies. This suggestion derives from the application of the Barro-Gordon model to the choice of an open economy with too high an inflation rate of whether or not to join a monetary union (Melitz, 1985 and 1988). The Barro-Gordon model leads to the conclusion that there is a large potential gain for weak economies with high inflation when they join in a monetary union with strong – stable – economies: i) inflation decreases to an agreed rate and generally, ii) unemployment remains unaffected. In addition, there is no welfare loss for the stronger economy. The first two are the outcomes of credibility gained by the governing authorities of the country with the weaker economy from joining the monetary union.

Still, it must be clear that while the monetarist analysis agrees that the cost of a monetary union is zero, it also highlights that countries with high inflation, which join the monetary union, may face a transitory cost in terms of unemployment. The Barro-Gordon analysis indicates that a full monetary union establishes the required credibility for the economy with high inflation rates and thus, even the short-term transitory costs – in terms of unemployment – are eliminated. Drawing from the Barro-Gordon implication, a monetary union only leads to gains in terms of inflation and unemployment. The Barro-Gordon analysis is especially popular in Latin countries where there is significant distrust to the authorities – see Giavazzi and Pagano (1988).

### 3. Method

In order to investigate the existence of a trade-off between inflation and unemployment in the Greek economy, it is necessary to construct a causal model. For this paper the causal model is the outcome of examining the relationship between two variables with simple linear regression: i) the level of unemployment and ii) the rates of inflation. By constructing the equation, it is assumed that unemployment is dependent on inflation and therefore, the level of unemployment is the dependent variable, while the rate of inflation is the independent variable. The regression equation is calculated by minimizing the squared differences between the observations and the line – least squares method (Gujarati, 1988).

The regression line is calculated by using the typical mathematical formula of any straight line: $\pi = a_1 + a_2 u$ (**1**), where: u = unemployment (dependent variable), $\pi$ = inflation (independent variable), $a_1$ = the intercept and $a_2$ = the slope (gradient) of the line.

The formulas for working out $a_2$ and $a_1$ are respectively:

$$a_2 = \frac{n\sum \pi u - (\sum \pi)(\sum u)}{n\sum \pi^2 - (\sum \pi)^2} \quad \textbf{(2)}$$

$$a_1 = \frac{\sum u}{n} - \frac{a_2 \sum \pi}{n} \quad \textbf{(3)}$$

The relationship between the variables is tested with the technique of correlation. The value of the coefficient is necessary to be determined in order to meet one of the criteria and formulate an appropriate conclusion and lies between –1 and 1. The formula for the coefficient of correlation is:

$$R = \frac{n\sum \pi u - (\sum \pi)(\sum u)}{\sqrt{[n\sum \pi^2 - (\sum \pi)^2]\ [n\sum u^2 - (\sum u)^2]}} \quad \textbf{(4)}$$

Furthermore, in order to assess the degree of accuracy of the correlation coefficient, it is required to calculate the coefficient of determination, which is simply $R^2$. The coefficient of determination is able to indicate the percentage of the variations in unemployment levels explained by the changes of the inflation rate, leaving – in case of imperfect correlation – a percentage to be explained by other factors outside the analysis of the causal model.

The quantitative data used for the regression analysis of the study is collected by the Bank of Greece Statistical Bulletins. The data obtained is non-experimental in nature and thus, is not subject to the control of the researcher. The quarterly data on unemployment for the three-year period (2001 – 2003) is based on the quarterly percentage of unemployment as a proportion of employment. The quarterly data on inflation for the same period is based on the harmonized indices of consumer prices of EU Member States – monthly rate of change (%). As illustrated on Table 1, the data is in the form of a time series – demonstrated quarterly.

The study focuses on the possible effects of the EMU on Greek unemployment in the context of the alternative implications for inflation and unemployment discussed in the theoretical framework: the EMU effects on the levels of Greek unemployment are assessed only within the boundaries that the existence of an inflation-unemployment trade-off sets. The findings of the regression analysis are evaluated with the use of the following criteria, in order to judge which of the theoretical models is verified.

Primarily, if the slope of the regression line is negative and the coefficient of determination is of significant value (more than 0.9), then a trade-off exists and the implication for the widely accepted theoretical models of monetary integration – the monetarist view and the Barro-Gordon model – is that they do not endure in the case of the Greek economy. The occurrence of a trade-off with a negatively sloped regression line points to the implications of a stable Phillips curve model. In addition, if the unemployment cost is sustained during the three-year period in examination (2001 – 2003) and there are hints for its further continuance in the future then it cannot be regarded as a short-term transitory cost. In that case, monetary integration implies a lower inflation rate at the cost of maximizing unemployment.

On the other hand, if the coefficient of determination is of significant value and the slope of the regression line is positive, then a trade-off exists but leads to a different implication for the effects of the EMU on Greek unemployment levels. Lower inflation rates imply lower unemployment rates,

which is something that reinforces the credibility point of the Barro-Gordon model. Drawing from this outcome, the monetary union leads to gains in terms of the inflation and unemployment trade-off, since a low, stable inflation rate corresponds to a lower, stable unemployment rate. Thus, the implications of the Barro-Gordon model have to be accepted.

Finally, if there is no significant correlation or no correlation at all – the coefficient of determination to be lower than 0.9 – then no trade-off exists. An insignificant value for the coefficient of determination implies that only a small percentage of the variations in unemployment can be explained by the changes in inflation, thus leaving a considerable percentage of the former to be explained by other factors outside the trade-off. Such an outcome points to the implications of the monetarist view, which does not accept that a trade-off between inflation and unemployment exists and argues that an economy cannot really choose an optimal point on its Phillips curve that is able to last in the long-run. Accordingly, an insignificant correlation leaves unemployment to be explained by other factors outside the trade-off and the implication is that stable low rates of inflation do not have an effect on – or a relation with – unemployment. Therefore, in that case, the implications of the monetarist view have to be accepted.

## 4. Findings

The econometric function **(1)** hypothesizes that the dependent variable $\pi$ (inflation) is linearly related to the explanatory variable u (unemployment), but the relationship between the two is not exact; it is subject to individual variation. Table 2 illustrates the derivation process for each of the variables in the equation. The values for each deterministic factor of the equation are as follows:

**(2)** $a_2 = 0.1$, slope of the regression line

**(3)** $a_1 = 2.68$, intercept of the regression line

**(4)** $R = 0.2085$ and $R^2 = 0.043$

Therefore, the equation takes the form of $\pi = 2.68 + 0.1u$ and according to the value of the coefficient of determination ($R^2$): *4.3% of the variations in u (unemployment) can be explained by the changes in $\pi$ (inflation), leaving 64.54% to be explained by other factors outside the analysis.* What is more, if a lag (u responds to $\pi$ with a lapse of time) is used for the analysis in terms of "u of $Q_2$

corresponds to $\pi$ of $Q_1$ and so on," then the value of the coefficient of determination ($R^2$) is even smaller.

The slope of the regression line and the coefficient of determination signify two interactive implications, which both meet the expectations of previous Greek governments that the cost of monetary integration for Greek unemployment would range between "zero" and a limited short-term growth (Stergiou, 2002). According to the data provided for the period 2001 – 2003, there is a positive trade-off between inflation and unemployment: unemployment increases in proportion to the increase of inflation and correspondingly, decreases in proportion to the decrease of inflation. Thus, since EMU membership for Greece meant low, stable inflation rates, the positive trade-off implies proportionally lower, stable unemployment rates. The particular insinuation can be interpreted as an empirical representation of the Barro-Gordon model, where the cost on unemployment for countries with high inflation rates entering a monetary union, is considered to be "zero" due to restored credibility on the monetary authorities. Thereupon, the monetary union only leads to gains in terms of inflation and unemployment, since a low, stable inflation rate corresponds to a lower, stable unemployment rate and as a result, the credibility point of the Barro-Gordon model is verified.

However, the coefficient of determination implies that only an approximate twentieth of the variations in unemployment can be explained by the changes in inflation. That leaves the variations in unemployment to be explained by other factors outside the analysis. As a result, there is no significant correlation and thus, no trade-off actually exists, leaving the implications of the regression line to be inconclusive. The insignificant value of the coefficient of determination points to the theoretical considerations of the monetarist view, which does not accept that a trade-off between inflation and unemployment exists and moreover, argues that an economy cannot really choose an optimal point on its Phillips curve that is able to last in the long run. Correspondingly, the insignificant correlation leaves unemployment to be explained by other factors outside the trade-off and the implication is that stable low rates of inflation (EMU effect) do not have an effect on unemployment. In addition, since average unemployment rates in Greece for the years 2001 to 2003 have been continuously declining, the transitory cost of a short-term increase on unemployment is not verified. For that reason, the empirical investigation concludes on the fact that: the cost of monetary integration for Greek unemployment is "zero", since low, stable inflation rates do not affect it.

## 5. Discussion

The fast economic growth in Greece since the mid-1990s has not led to major unemployment gains. Unemployment rates in Greece had increased almost to 12% by 1999, before declining to about 9% by mid-2003. Although, unemployment rates in Greece have remained broadly unchanged for the last twenty years they are still well above the EU average (Vamvakidis, 2003). Lutz (2001) attributes the poor performance of the Greek labour market to the country's rigid labour market structure, with high minimum wages, strict employment protection legislation and shortcomings in the educational system. These factors have hindered adjustment to shocks such as declining agricultural sector employment, rising female participation rates, immigration and a halt to the rapid growth in public employment. Consequently, long-term unemployment increased, especially among the women and the young. Even though recent reforms have facilitated the use of flexible labour contracts, such as part-time employment and fixed-term contracts, bolder steps are required in order to improve the key structural weaknesses in the labour market.

Furthermore, the EC report on economic activity in Greece (25-26/03/04) has formally indicated that all basic economic indicators have gone worse for the year 2003. According to the report, Greece has not taken an advantage of high economic growth in order to confront its most basic problems, which are low levels of competitiveness and fiscal deficits (Bellos, 2004). Greece has the second worst performance in competitiveness after Portugal and the report regards as the basic reasons the total failure of the educational system and the reluctance of enterprises to invest due to the unsuitable structure of the labour market.

The attractiveness of foreign investment is vital for sustaining an annual GDP growth of 4% (present growth rate), because the flows of structural funds, which are the main factor that enhances growth, will start to lessen during the next years and stop at 2008 (Papantoniou, 2004). The lack of infrastructures and qualitative criteria such as the acceptance of enterprise by society, the structure of the labour market, efficiency, the eradication of corruption and the simplification of bureaucratic procedures are the areas in need of improvement and thus, it is where these funds must be utilised in order to convince foreign investors (Voutsadakis, 2004). The absence of necessary measures to date is highlighted in a report produced by the Greek Institute of Economic and Industrial Studies on 21/01/04 (Pafilas, 2004). According to the report, the levels of foreign direct investment will continue

to remain significantly low, as long as there is not a respectable improvement in levels of productivity and competitiveness. On top of that, there is danger that foreign investment will be mostly absorbed by the new EU entrants of central and eastern Europe – their annual foreign direct investment growth rate lies approximately at 25%.

In view of the above, it is important to take into account the commitment of Greece to the SGP, which entails low inflation (interest rates) and puts restrictions on government expenditure (percentage of GDP) in order to rely on private investment spending to achieve economic growth. Additionally, the main investor in the Greek economy has always been the government and such a fundamental change in attitude (and consequently expectations) is not likely to occur in the short-term. Due to the restrictions of the EMU on government expenditure, foreign direct investment is expected to play a critical role. As long as productivity and competitiveness levels remain low and do not alter according to expectations, unemployment will increase in the long run, when structural funds will cease.

Furthermore, in the report about the accomplishments of the $EU_{15}$, the European Commission is distressed for the reorganization of the labour markets. In respect to the slow economic growth of the $EU_{15}$ and the slow reconstruction of the labour markets, the European Commission anticipates higher unemployment rates for the $EU_{15}$ until 2005 (Christidis, 2004). Economic growth in the EMU is expected to accelerate again via expansion in private investment, after the solidarity in labour market structures is achieved. Nevertheless, the latter can take a lot more than expected and at least for now, growth will keep continuing with a “turtle’s pace” (Wolf, 2004). On that account, it is rational to expect small changes in Greece’s competitiveness and productivity, even with the utilisation of the structural funds.

Another factor to be taken into consideration is the rise of debt provision occurring from low interest rates. The Greek Chamber of Economics (17/01/04) reports that the annual growth rate of outstanding amounts of household debt expands with an approximate rate of 30% (Tsipouras, 2004). The extended demand in consumption loans and the continuous decline in household savings generate an “artificially” high demand in the economy. According to the Bank of Greece, the debt of households and enterprises has reached 75% of GDP at the end of 2003 (Anagnostou, 2004). Excess demand in Greece is a phenomenon fashioned by low interest rates and the willingness of regional banks to provide consumption loans for the first time in their trading history. This increase in

household debt will inevitably have appalling consequences on inflation in the short-term and moreover, on competitiveness and consequently investment spending, both in short and especially in the long-term (Charalambidis, 2004).

Without doubt, such implications indicate that lower interest rates have resulted on increasing the aggregate demand of the Greek economy in the short-term. The tighter fiscal policy imposed by the SGP is countered by the flow of the structural funds on its effort to restrain the increasing rate of aggregate demand caused by credit expansion. When aggregate demand will drop again to its natural point and in addition, when the flow of structural funds will cease, since there is no respectable increase in competitiveness and moreover, private investment, it is sensible for Greek analysts to express fears that unemployment will substantially increase. In addition, a less realistic but also feasible scenario can be stagflation, in case that an external shock (e.g. price of petrol) is combined with the effects of credit expansion on aggregate demand.

In addition, the influence of the Olympic Games can be visible on the sustaining growth of the Greek economy as they have a positive short-term impact on aggregate demand and investment spending. The immense effect of organizing the Olympic Games is 40,000 new employment opportunities for the period of 2002 – 2004. The Olympic Games have forced the unemployment rate to fall for the first time after ten years below 9% (Kartalis, 2003). On top of that Vaso Papandreou (2003) – minister for the Environment, Physical Planning and Public Works – is certain that Greek economic growth will continue after the Olympic Games completion with the aid of the structural funds flow. That is because after the Olympic Games, the Public Investment Fund will reach €3b. and the funds of the third CSF will continue to flow up to 2006. Nevertheless, concentration should primarily be on the competitiveness levels, because if they remain at current levels in the future, then structural funds will be nothing more than fiscal transfers.

## 6. Conclusion

The regression analysis indicates that there can be only a short-term transitory cost on unemployment and signifies that a trade-off between inflation and unemployment does not exist in the long run. However, in case of Greece, this implication will only hold under sufficient development on its levels of competitiveness and productivity. This is expected to occur with the aid of the

structural funds, so that future levels of private investment will replenish the decrease of government expenditure imposed by the SGP. Since the flow of structural funds has not developed up to now Greek competitiveness to the required levels and moreover, since it has adopted for that reason the form of temporary fiscal transfers that substitute the decreased government expenditure (SGP consequence), a different outcome waits ahead. This outcome could have been visible by now, but a boost in aggregate demand and investment spending by household debt and the organization of the Olympic Games, have delayed it effectively. Hence, while the findings of the causal model indicate no cost on Greek levels of unemployment by the lower inflation rate imposed by monetary integration, macroeconomic indicators contradict the possibility that this conclusion will hold in the long-term.

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**Tables**

**TABLE 1**

Quarterly harmonized indices (%) of consumer prices of EU Member States during the years 2001 and 2003. Quarterly proportion (%) of unemployment from the overall labour force during the years 2001 and 2003.

| PERIOD | $\pi$ (%) | u (%) |
|---|---|---|
| 2001 | | |
| $Q_1$ | 3.3 | 10.9 |
| $Q_2$ | 4 | 10.2 |
| $Q_3$ | 4.1 | 9.9 |
| $Q_4$ | 3.2 | 10.9 |
| 2002 | | |
| $Q_1$ | 4.3 | 11.1 |
| $Q_2$ | 3.8 | 9.6 |
| $Q_3$ | 3.7 | 9.5 |
| $Q_4$ | 3.8 | 9.8 |
| 2003 | | |
| $Q_1$ | 3.8 | 10 |
| $Q_2$ | 3.5 | 8.9 |
| $Q_3$ | 3.4 | 8.8 |
| $Q_4$ | 3.2 | 9.5 |

Source

For inflation: Bank of Greece, Monthly Statistical Bulletin, January – February 2004.

For unemployment: Bank of Greece, Bulletin of Conjunctural Indicators, Number 75, May 2004.

**TABLE 2**

SUMMARY OUTPUT

| Regression Statistics | |
|---|---|
| Multiple R | 0,208560644 |
| R Square | 0,043497542 |
| Adjusted R Square | -0,052152704 |
| Standard Error | 0,368866473 |
| Observations | 12 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 0,061875254 | 0,061875254 | 0,454756197 | 0,515371 |
| Residual | 10 | 1,360624746 | 0,136062475 | | |
| Total | 11 | 1,4225 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* |
|---|---|---|---|---|
| Intercept | 2,680486815 | 1,478598802 | 1,812856071 | 0,099935577 |
| X Variable 1 | 0,10020284 | 0,148590388 | 0,674356135 | 0,515371 |

| | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|
| Intercept | -0,614036609 | 5,975010239 | -0,614036609 | 5,975010239 |
| X Variable 1 | -0,230877175 | 0,431282855 | -0,230877175 | 0,431282855 |