

Consumer Price Effects of Joining the European Economic and Monetary Union: Modeling the Post-accession Price Adjustment of Greece

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ABSTRACT

This study shows how the Consumer Price Index of Greece is affected by joining the European Economic and Monetary Union. The post-accession price adjustment of Greece is also modeled. The research design employed in the study consists of descriptive statistics, chi-square test and regression analysis. The accession of Greece to the European Economic and Monetary Union (EMU) in 2001 and the introduction of the euro in 2002 were followed by a sharp upward shift of the consumer price level. This increase in consumer price level has given birth to a widely held hypothesis that claims that the accession of Greece to the EMU has caused a structural increase in the consumer price level. In this study this hypothesis is tested and rejected. There was no substantial evidence of such an effect of the aftermath of joining the EMU. However, there was strong evidence of structural breaks in the Greek consumer price equilibrium and of the presence of a non-linear price adjustment model. This study addresses the adjustment behavior of the consumer price level, and finds that the shift in prices after the accession to EMU is normal equilibrium restoring adjustments.

Keywords: Consumer, Price adjustment, Economy, Monetary Union, Greece

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INTRODUCTION

The economic and monetary union of the European Union or the European Monetary Union (EMU) is the single currency-union for the countries who are European Union Members built on a single market and has adopted the euro as their sole form of legal tender (currency). The EMU came into effect with eleven full members in January 1999, and established the euro as their currency from 1 January 2002. Since then more members have joined and incorporated euro as their sole currency.

In 2001, Greece achieved accession to the European Economic and Monetary Union (EMU) and after one year in 2002 the single EU currency "euro" was physically introduced in the country, replacing its own currency "drachma". After the accession to EMU and the physical introduction of the euro, Greece experienced a sharp increase in its consumer price level which is theoretically represented as the Consumer Price Index (CPI) of a country. This experience, commonly known as the Greek experience, has marred the image of the EMU to countries that are waiting to be incorporated into the union. There is a widely held hypothesis about the issue that says, the accession of Greece into the European Economic and Monetary Union (EMU) and the physical introduction of the euro, has caused a structural increase in the level of consumer prices in Greece. The focus or objective of this paper is to test this hypothesis and conduct a study on the price equilibrium and non-linear price adjustment model from the perspective of Greece.

The reason behind the choice of Greece as the subject country lies in the implication of this study for other countries that are eagerly trying to achieve their membership into the EMU. Using Greece as a model has been considered suitable for the study, as there is a significant level of similarity with the economic condition of Greece and other new members of the European Union awaiting for their accession. The theoretical justification behind the hypothesis about the joining of EMU causing a structural shift in the price level has been argued to be due to occurrence of price transparency along with the effects of joining a single currency. Under general circumstances this property of a single currency union is theoretically considered to be an advantage, as the effect of this property is to usually increase price competition in the sector of trade, and to decrease differentials of price resulting from the difference in exchange rates between two trading countries, and also loosing of a firms options of implementing pricing-to-market policies. All these positive effects of joining a single currency has been thought to have a negative effect in the economy of a country like Greece, because it has been speculated that in the case of countries with large public and service sectors, non-traded components play a significant role behind the aggregate pricing level. In the case of countries like Greece, where the productivity and per capita income are not as high as the developed countries, the aggregate price level along with the price level of non-traded commodities are comparatively lower when expressed within the boundaries of a single currency (Arghyrou, 2007). It should be additionally mentioned that, well established scholars like Balassa (1964) has also presented a hypothesis arguing that the aggregate price level of less developed countries have tendency to increase when they achieve productivity gains.

BACKGROUND OF THE STUDY

The theoretical background of the study is based on the non-linearity model of price adjustment in countries which have a history of long persisting inflation and the presence of structural breaks in the inflation rate. Scholars argue that a non-linear approach is necessary to study the adjustment patterns of a country with long and variable lags in the inflation rate. There is strong empirical evidence that the behavioral pattern of inflation is non-linear in nature, as it has been observed over the periods that inflation models based on non-linearity consistently perform better than those based on linear models. Studies conducted through other models differ in this view as it cannot be proven that the asymmetry hypothesis is significant enough to draw a definitive conclusion about the behavior of inflation persistence. The widely used linear models are considered to be inadequate during unfavorable economic conditions, as the persistence level is lower during those times. From this it can be said that ignoring the variable lag while conducting

research on inflation rates can lead to severe errors while changing a country's monetary policy, especially when a country is going through economic recession.

LITERATURE REVIEW

The Treaty on European Union (TEU), which is more commonly known as the Maastricht Treaty (MT), led to the creation of the single European currency, the euro. The treaty was signed by the members of the European Community on 7th February 1992, with the exception of United Kingdom. The Maastricht Treaty details the conditions for participation in the European Monetary Union. The treaty has set the following criteria to be fulfilled upon which membership of EMU is conditional: (i) the inflation rate of a country cannot exceed the average inflation rate of the three best performing countries within the Union by more than 1.5 percentage points; (ii) the long-term interest rates on government bonds should not exceed the average long-term interest rates of the best performing three countries in terms of inflation rates by more than 2.0 percentage points; (iii) The depreciation of the national currency of the country should be within percentage allowed by the "normal band of fluctuation" set by the ERM mechanism; (iv) the government deficit of a country should be within 3.0 percentage points of its GDP, failing that, the deviation from the reference value should not be too high and of a temporary nature; and (v) the national public debt should be within 60% of its GDP, failing that, the trend of public debt should be of a declining order over the past few years. Moreover, qualification for the membership for EMU also depends on the countries adjustment of Central Bank legislation to make it compatible with the requirements of the Maastricht Treaty regarding the functioning of the European Central Bank and European System of Central Banks.

The conditions imposed by the Maastricht Treaty are set with the aim to achieve nominal convergence in Europe. These conditions have been considered essential by a number of scholarly articles on the subject (Winkler, 1996, Grahl, 1997). The conditions about the inflation rate are relevant for maintaining stable market conditions regarding costs that do not react and adjust instantly to sudden changes. If the inflation rates of a country going through accession to EMU are not within the safe boundaries, then it might face economic constraints due to deflationary policies during the early stages of accession. The cost of such adjustment will not be economically optimal under the rigid nature of exchange rate policies of the EMU.

The five nominal convergence conditions set by the Maastricht Treaty serves a three essential purposes: firstly, it enables the EMU to implement a mechanism through which it can ensure that authorities of individual countries will promote economic reforms with very little social reaction; secondly, it gives the EMU a screening mechanism which will distinguish low risk countries to be admitted in the Monetary Union and sustain a stability in the EMU, from high-risk countries who will continue to work harder to achieve accession benchmarks; and finally, it will ensure that countries admitted into the EMU have similar economic structures so that there is fewer possibilities of asymmetric shocks. According to Arghyrou (1997), the logic behind the Maastricht Treaty benchmarks is to make the European Monetary Union a minimum risk system for the countries whose inflation rates are low, and for the high-inflation rate countries it will work as a motivator to implement necessary structural changes and bring about the required economic homogeneity among the countries in the European Union. Winkler (1996) points out that the Maastricht Treaty criteria will promote the establishment of stable economies among the member countries of the European Monetary Union and will hence result into the successful implementation of the EMU.

STATE DEPENDENT PRICING MODELS

In the settings of dynamic general equilibrium, nominal rigidities play a very important role and this is supported by a large number of macroeconomic literatures. The study of these models reveals that the nominal price of consumer goods reacts slowly to deviation from the equilibrium. The arguments behind this claim mentions that the small fixed costs associated with the frequent change of prices makes adjustment of prices unprofitable for firms. In is very normal that the firms only decide to adjust prices when the benefit of changing price is greater than the associated fixed costs. It should also be noted that the state of the economy determines the flexibility of price in any given point in time; this also determines what fraction of firms take the option of adjusting their price. This argument suggests that the adjustment of the price level in reaction to changes in the economy is “state-dependent”. However, theoretical literature on the subject reveals that most studies conducted on price adjustment use “time-dependent” models. The disadvantage of time-dependent models is that, they do not consider the fact that price adjustment frequencies of a firm is not dependent on the cost conditions or the revenue earned in the period. These arguments are supported by the works conducted by Taylor (1980) and Calvo (1983). They argue that the fixed cost of price adjustment is higher than the profit expected from it. Therefore, it is noted that the quantitative importance of the variability observed in the rigidity of price is negligible for the analysis of monetary business cycle. As a result, most of the literature found about the subject matter analyzes the local, linear adjustment models in a steady state of economy. This implies that it is not possible to differentiate between what effects the business cycle shocks (small and large) have on the rate of inflation and manufacturing output levels, as well as the difference of effects among the positive and negative shocks.

State-dependent pricing models are adequately equipped to explain the nonlinearities of price adjustment and asymmetries of the monetary policy. Though, there is one significant hindrance in carrying out the analysis as there is great variation in the price plans of individual firms. Empirical research suggests that these models are generally used to analyse situation in controlled environments, which is not possible in the case of quantitative business cycle analysis (Ball and Romer, 1990; Caplin and Leahy, 1991; and Conlon and Liu, 1997). However, there is evidence of state-dependent pricing model being utilized in a dynamic general equilibrium environment in the study conducted by Dotsey et al. (1999). Though it should be noted that in cases of larger state space, local linearization is required, and it cannot be used in the study of non-linear adjustments of price indexes. Ball and Mankiw (1995) suggest assuming that price specification by firms is made in contracts that have a fixed duration.

NON-LINEAR INFLATIONARY DYNAMICS

The theoretical literature review on the subject of non-linearity reveals that there are strong arguments about the impact of monetary policy on inflation and Milton Friedman has said that it is subject to “long and variable lags”. In cases of long history of inflation we can observe the evidence of long lags and this fact is well established through modern macroeconomic literature. It is argued that the variable lags are caused by irregularity in the history of inflation persistence. To address the issue of variable lags, researchers have agreed that the well-established approach of linear adjustment of price levels is not adequate for the purpose. Arghyrou et al. (2005) points out that a non-linear approach of inflation persistence is required to explain the variable lags in the impact of monetary policy, that is, the price adjustment follows a non-linear or state dependent model to restore itself to the equilibrium level.

The study conducted in this paper attempts to identify the justification behind the popular hypothesis that joining the EMU lead to potential increase in the price level of a country due to the monetary policies implemented by the single currency union., by studying the specific experience of Greece's accession to EMU in 2002. The best research methodology to be used within the scope of this paper to analyze the price adjustment behavior is to conduct a quantitative study that will examine the relationship between the consumer price index of Greece with the unit labor cost in the manufacturing industry and the adjusted world price level. The model is also used to analyze the price adjustment behavior by examining the actual change in price level before and after the accession of Greece in the EMU. A quantitative research methodology was employed to accomplish the purpose: descriptive statistics was used to analyze the pattern of price adjustment in relation to the unit labor cost and world price level, and regression analysis was used to justify the hypothesis regarding the accession of Greece in to the EMU using a non-linear model suggested by Arghyrou (2007).

Benchmark models of equilibrium prices and price adjustment

In this study, following the analysis done by Arghyrou et al. (2005), the benchmark models for the equilibrium price level and price adjustment in Greece has been estimated, which can be described respectively by the following two equations below:

$$p_t = \alpha + \beta_1 ulc_t + \beta_2 pw_t + u_t \quad (1)$$

$$\Delta p_t = \sum_{i=1}^k \beta_i \Delta p_{t-i} + \sum_{i=0}^m \gamma_i \Delta p^*_{t-i} + \delta (p-p^*)_{t-1} + v_t \quad (2)$$

In the above equations, 1 and 2, the actual price level is denoted by p ; and the change in the actual price level through which the price adjustment has been measured is represented by $\Delta p_t = p_t - p_{t-1}$; unit labor cost is denoted by ulc ; the log of adjusted world consumer price index converted to local currency is denoted by pw ; the equilibrium level of price has been denoted by p^* ; and the white error noise terms have been represented by u and v . For the purpose of the study, the variables represented are all expressed in terms of logarithms. Taking logarithms of the represented variables on both sides moves the model to a linear model which is necessary for the ease of analysis of the model through linear regression analysis. Non-linear regression analysis uses linear approximation it is computation process which may give rise to interpretive error of the model. For this reason, a linear transformation of the non-linear model and analyzing it through linear regression is a much safer alternative approach. The equilibrium price level is estimated by putting in the values of Equation 1, and the resulting value is denoted by p^* . Substituting Equation 2, by this estimated equilibrium gives us Equation 3 below:

$$\Delta p_t = \sum_{i=1}^k \beta_i \Delta p_{t-i} + \sum_{i=0}^m \gamma_i \Delta p^*_{t-i} + \delta (p-p^*)_{t-1} + v_t \quad (3)$$

In this equation, the parameter δ represents the rate at which the actual price level p_t restores itself to the estimated equilibrium price level p^* .

Regression Analysis

Historical data about the economy of Greece and Global price level were used as variables in linear regression model to explain the price adjustment behavior of the Greek economy (Arghyrou, 2007). Using linear regression analysis, instead of performing a non-linear

regression analysis, reduces the chances of misinterpretation of the analysis and also adds to the easier understanding of the subject matter. As explained before, to transform the non-linear model for a linear regression analysis, logarithm values of the variables were taken, which gives the model a linear feature. The study conducted is to examine the relationship of price adjustment with the change in monetary policies that came into effect after the accession of Greece into the EMU, through a time based model. This enables the analysis of data on a time perspective, so that it can be measured were there were abnormal upward shift in pricing after the joining of Greece in the EMU.

Dependent and independent variables

In the price adjustment model of Greece, the dependent variable, the change in the actual observed price level based on a quarterly basis, is computed by the difference between the actual observed price levels from quarter to quarter. The independent variables are the unit labor cost of the manufacturing sector in Greece also computed on a quarterly basis, and the world price level based on the global consumer price index on a quarterly basis. All the data involved in the model are on a quarterly basis to ensure homogeneity of the collected data. All the data used in the analysis of the model are also transformed into their logarithmic values to achieve linearity for the purpose of conducting a linear regression analysis.

RESEARCH QUESTION

In a quantitative research study, it is important that the research question is constructed in a narrow and specific manner for the purpose of obtaining measurable and observable data about the variables that are being used for the study (Creswell, 2005). For the purpose of the study, the following research question has been developed:

To what extent does the joining of Greece into the European Economic and Monetary Union affected its consumer price level?

This research question covers the alleged claim that accession of Greece to the EMU and the introduction of euro as its currency has resulted into the increase in the Greek consumer price level and shifted it away from the equilibrium.

HYPOTHESIS

The alternative and null hypothesis tested in this paper is given below:

- Ha: The accession of Greece to EMU and the introduction of the euro have caused a structural increase in the consumer equilibrium price level of Greece.
- Ho: The accession of Greece to EMU and the introduction of the euro did not cause any structural increase in the consumer equilibrium price level of Greece.

POPULATION AND SAMPLING FRAME

The population of this quantitative study is very obvious as the study conducted concerns only the price effects of one country, Greece. The structural increase in equilibrium consumer price level was observed in Greece after its accession to the European Economic and Monetary Union, and the purpose of this study is to analyze the behavior of the price level during that period and to find out whether it was caused by the effects of joining the EMU.

Availability of data determined the sampling frame of the independent variables as the unit labor cost (ulc) in manufacturing sector was available since 1971 and but the

computation of the world price level limited the sample size of the data. The world price level, pw , had to be represented in terms of the domestic currency, since the collected data was represented in USD, it had to be converted by multiplying the index series of world consumer prices by the drachma/dollar exchange rate, and after the accession of Greece to the EMU, the world consumer price index was multiplied by the euro/dollar exchange rate and then multiplying the product by the irrevocable drachma/euro exchange rate, which is 340.75. The drachma/dollar exchange rate was only available since 1981, when the new drachma was introduced. Unavailability of the exchange rate beyond that period limited the period to be analyzed through the regression model. Thus the sample consists of data from 1981 till 2003, as any observations since 2003 is irrelevant to the study.

DATA ANALYSIS AND FINDINGS

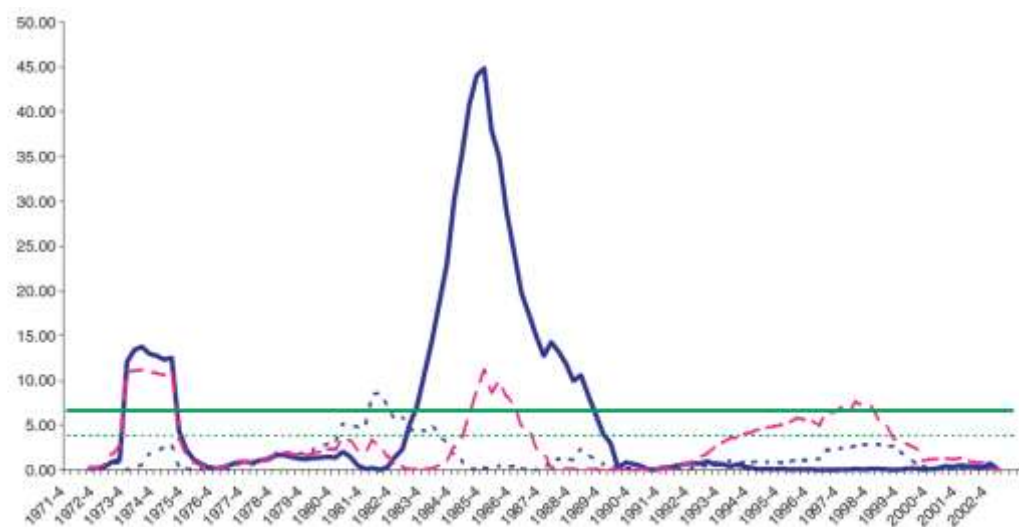
The descriptive quantitative study is conducted for the purpose of examining the effect of change in monetary policy brought about by the accession of Greece in the European and Economic Monetary Union, and the specific effects it caused on the price adjustment behavior of the consumer price level. The research design employed in the study consisted of descriptive statistics, chi-square test and regression analysis. Out of these methods of analyzing the data, the most suitable method for studying the sort of data is the linear regression analysis. The equilibrium price level and price adjustment models developed for this purpose can be efficiently explained through a linear regression analysis. The output results of a linear regression analysis give produces the value for the constant term in the model, as well as a value for the slope or gradient of the variables. The white noise term is defined by the error term, which is also produced as an output of the regression analysis. Putting the value of the variables for different time intervals will produce a value for the equilibrium price level and also the change in consumer price level can be measured form this. On the left hand side of the equations is the price change value and on the right hand side there are the independent variables effecting the adjustment of the price level.

The price adjustment model consists of two variables that have been chosen for the study. The influence behind this choice is the model is works done by Deveraux and Siu (2004) and Arghyrou et al. (2005). The unit labor cost of the manufacturing industry has been considered as an independent variable for the model because the cost of labor is a major determining factor of the price level. Though there are many other factors contributing to the price of a manufactured good, it was not necessary to consider all of them; the purpose was fulfilled with the unit labor cost as the motive of the study is not to establish relationship between unit labor cost or other variables, but to find out the price effect of joining the EMU. The worldwide price index is used as it can be used as a benchmark for measuring the deviation of the price level from its equilibrium point.

Descriptive statistics are used to describe the behavioral pattern of the variables, especially the price level denoted by p , in relation to time. The descriptive statistics portrays the overall picture of the change in price level, and it can be observed whether there was any abnormal structural shift of the consumer price level immediately after the accession was complete. The descriptive statistics also shows us the pattern of movement the independent variables, ucl and pw shows in relation to the shift in the consumer price level, during the sample time frame. The preliminary data analysis is based on descriptive statistical information on the dependent and independent variables. After the preliminary analysis, the research question and hypothesis are tested, results based on the research question and hypothesis is addressed.

CHI-SQUARE TESTS

With the assumption that there are structural breaks in the price equilibrium model, estimated Chi-square tests are run for all the coefficients present in equation 1. The small size of the data, due to unavailability of exchange rates beyond 1981 has a hindrance for this approach. To overcome this approach, materials from existing studies are used to estimate the Chi-square values of the price equilibrium model. Arghyrou (2007) has already worked extensively on this subject matter and has used the index of world consumer price in drachma value since 1971. Though the exact values of the drachma/dollar exchange rate could not be retrieved from the existing literature the more important pw values in drachma have been used in the study, to perform the estimated Chi-square tests. A dummy variable “D” has been incorporated in the model to account for the breaks observed in the model. The values for the Chi-Square tests for each individual coefficients present in the price equilibrium model (Equation 1) are plotted in Figure 1. The test results reveal that there is strong evidence of structural instability in the case of all coefficients. In case of the constant term α , it can be observed in the figure below that there are many incidences of instability during the early 1970s and throughout the 1980s. For the coefficient of the unit labor cost, β_1 , it has been observed in the figure that instability can be found in the early 1980s and in case of the coefficient of world price index, β_2 , there are strong signs of instability during the mid-1980s and 1990s. The use of the f -value to identify the highly significant values, it is observed that there is structural instability for α in 1974 and 1985; for β_1 in 1982 and in the case of β_2 in 1974, 1985, 1996 and 1998. Through this test it can be concluded that three significant structural breaks in the model used to determine the consumer price level, in 1974, 1985, and 1996. All these observed structural breaks can be contributed to external shocks faced by the Greek economy. The most important observation of this test is that, there has not been any structural shift during the 2001-2002 periods. Therefore it can be deduced that the accession of Greece to the European Economic and Monetary Union in the 2001-2002 period, has not set forth any structural shift in the equilibrium consumer price level of Greece. It can be confirmed from the results of this test that there is no valid evidence that has been observed, which supports the hypothesis that the joining of Greece in the EMU and the incorporation of euro as its currency had any role to cause a structural shift in the equilibrium price level of Greece.



(—)D, (---) ulc , (---) pw , (---) 95% confidence interval, (—) 99% confidence interval
 Figure 1: Chi-square test values for analyzing the structural stability of Equation 1

REGRESSION ANALYSIS

A regression analysis has been run for the non-linear price adjustment and price equilibrium model, by taking the logarithm values of all the variables involved in the structure to transform and give the non-linear model a linear feature, so that a linear regression analysis can be conducted for the study. The transformation of non-linear model to a linear one, through the process of taking logarithm values reduces the risk involved in interpreting the results and findings of a non-linear model, and also gives a researcher ease of handling with the SPSS regression analysis tool, as constructing a non-linear regression analysis requires a very high level of skill, which was beyond the scope of this paper. The results of the regression analysis run for the equilibrium price model are shown below in Table 1.

Model used for regression analysis: $p_t = \alpha + \beta_1 u_l c_t + \beta_2 p w_t + u_t$

Table 1: Regression analysis output for the equilibrium price model.

	Output value	Significance level
$\alpha = \text{constant}$	6.542	.000
β_1	-.099	.049
β_2	1.561	.000
R^2	.849	.000

It can be seen that the coefficient values for the equilibrium price model has been computed through the regression analysis. The R-square value of the regression model is highly satisfactory as it implies that 84.9% of the behavioral pattern of the equilibrium price level, p , can be described by the use of this model. At 95% confidence interval, the significance level of the regression is below .05, which implies that the regression analysis is significant enough to explain the equilibrium price model. Also the significance level of the constant and coefficient values are within the 5% critical value, which makes the values of the coefficients calculated through the regression analysis highly significant for the computation of the estimated equilibrium with respect to time.

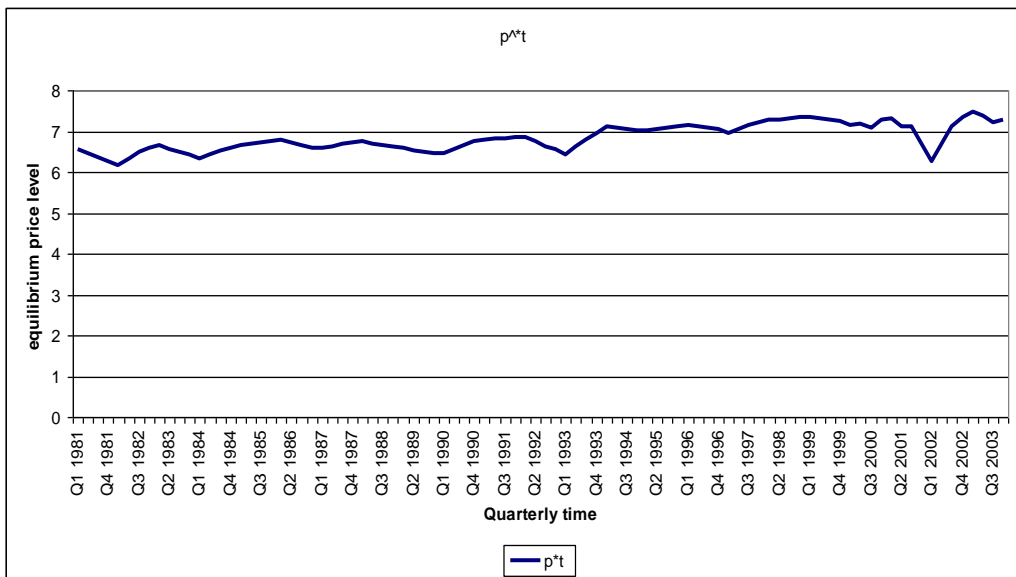


Figure 2: Illustration of the estimated equilibrium price level

The next step of the analysis is to compute the equilibrium price level for use in the price adjustment model with relation to time. To calculate the equilibrium price level in the Greek economy over the sample frame of time, the coefficients of each variable is put into the Equation 1 with the corresponding values of the Unit labor Cost and Index of World Consumer Prices. The quarterly time periods are quantified by assigning each quarter a specific number, with the quarter beginning at the start of 1981 as $t = 1$ and the quarter ending at 2003 as $t = 92$. In this way a table is constructed in Microsoft Excel Datasheet to compute the corresponding equilibrium price level. The line graph representing the estimated equilibrium price level is shown as Figure 2. From this graph it is clearly evident that there have been very few shifts of the equilibrium price level over the sample frame of time. Though at the critical point in the time series, there has been a sudden drop in the equilibrium price level.

The final step of the regression analysis is to use this estimated equilibrium price level to compute the value of Δp_t , the change in the price level, to be used to measure the adjustment of price level due to monetary shock that is represented by the price adjustment model in Equation 3. The value of Δp_t is computed in the same procedure used in the calculation of the estimated equilibrium price level, by fitting the values of each coefficient to be calculated by the another linear regression analysis for the specific purpose of computing the coefficient and constant values of Equation 3. The actual change in consumer price level is illustrated by the line-graph in Figure 3.

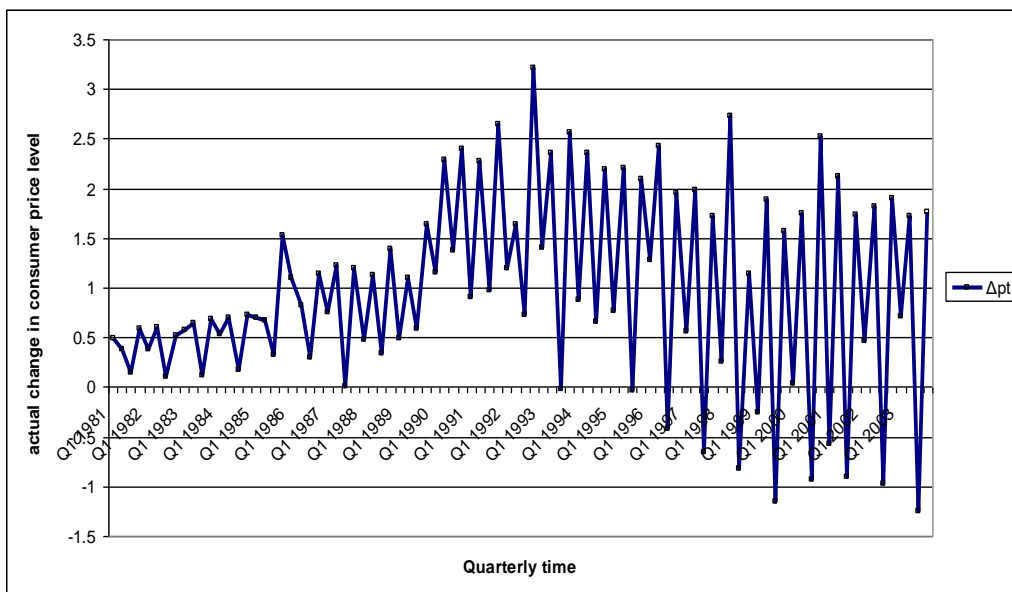


Figure 3: Illustration of the change in actual price level over the sample frame of time

From the figure above it is quite obviously evident that the actual change in consumer price level over the years have not followed any specific pattern. This is due to the numerous structural breaks and evidence of variable lags in the behavioral pattern of the adjustment of price. From the preliminary point of view, the price adjustment mechanism based on the actual change in consumer price level over the given time period seems to structurally instable. To have a thorough understanding of the subject matter, the estimated change in consumer price level have been calculated by determining the coefficient values in the price adjustment model represented in Equation 3.

$$\text{Model used for regression analysis: } \Delta p_t = \sum_{i=1}^k \beta_i \Delta p_{t-i} + \sum_{i=0}^m \gamma_i \Delta p_{t-i}^* + \delta(p-p^*)_{t-1} + v_t$$

Table 2: Regression analysis output for the price adjustment model

	Output value	Significance level
constant	1.399	.000
β_i	-.038	.022
γ_i	.027	.061
δ	.705	.000
R^2	.989	.000

The regression analysis performed on the price adjustment model provides the required values for the coefficients in each variable included in the price adjustment model. From the output of the regression analysis it can be seen that constant value is 1.399, however for this non-linear price adjustment model, the constant value of such a small magnitude is not considered. The reason behind the output of the constant value can be justified with the reasoning that the non-linear model was transformed in a linear model by taking the logarithm values of all the variables. Though the significance level of the constant value is well within the boundaries of the 5% confidence interval, there is no scope of incorporating this value into the price adjustment model. The coefficients of the other variables, such as β_i , have been found out to have a critical value of 2.2%, which proves it to be significant enough for the calculation of the price adjustment model. The coefficient γ_i , has a significance critical value of 6.1%, which is unfortunately beyond the limited amount of confidence interval of the model, but still as it is close to the 5% level, and other factors like the estimation of the equilibrium price may have caused this anomaly.

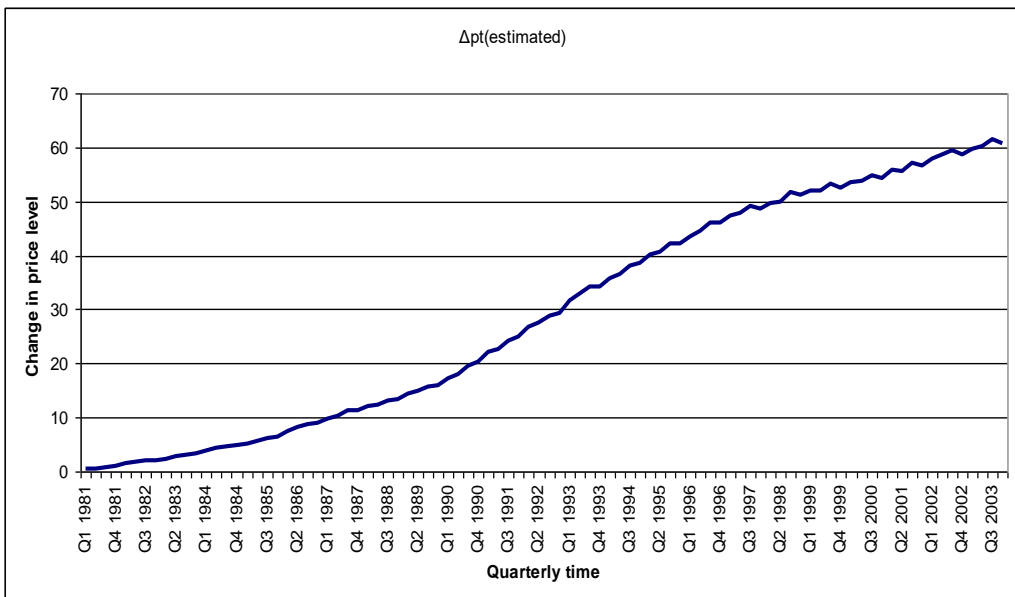


Figure 4: The estimated price adjustment of Greece during the sample time frame

The coefficient δ delta has a very high significant level with near to zero critical value. The white noise error function has been identified to be having a value of 0.084 and has been

included in the price adjustment equation. All the calculated value of coefficients are fitted into the price adjustment model and the resulting value of Δp_t has been plotted into a linear graph for the purpose of finding out the structural instabilities and breaks in the historic adjustment price. The graph has been illustrated in Figure 4.

It can be seen that over the years the adjustment behavior of consumer price level has been quite steady and there is no sign of any abnormal behavior near the end of the time series. It should be noted that the change in price level, which is the measure of price adjustment, has been steadily increasing throughout the whole time, during the 1980s at a lower rate, but after the early 1990s there has been rapid adjustment in the consumer price level. However, there is no indication of sudden price adjustment in the 2001-2002 periods, from which we can deduce that the accession of Greece to the EMU had no effect on the price adjustment behavior. As it has already been concluded that the hypothesis, that says joining the single currency union is the deciding factor behind the increase in Greek consumer prices right after the accession of Greece to the EMU, has been rejected through the regression analysis and Chi-square test of Equation 1, the result of this regression analysis is not surprising. It was expected that there will be no indication of rapid price adjustment during the accession of period of Greece.

DISCUSSION OF RESULTS: FINDINGS

In the data analysis part presented in the previous section the hypothesis of this paper H_a : The accession of Greece to EMU and the introduction of the euro have caused a structural increase in the consumer equilibrium price level of Greece has been rejected. Which means that the null hypothesis of the research, H_0 : The accession of Greece to EMU and the introduction of the euro did not cause any structural increase in the consumer equilibrium price level of Greece, has been accepted. The acceptance of the null hypothesis can be justified by the r-square value of the first regression model, in which the price equilibrium behavior of Greece was tested, and it has been found that the model described the price equilibrium pattern with 84.9% accuracy. The significance level for the regression was also within the chosen 5% critical value, which proves that the test was highly significant. In the next part, the reason behind the price increase of Greece is discussed.

During the 1998-2000 periods, when the accession process of Greece to the EMU started, the Greek price level was adjusted well below the equilibrium price level. This can be speculated to be due to the Greek government policies which took many price-restraining measures, as well as harshly controlling the price of public utilities. The Government also ended agreements with the Greek private firms, and imposed restraints on the privates sector's pricing policies. These measures were taken by the Greek government to meet the conditions about inflation rate set by the Maastricht Treaty to enable them to meet the requirements of joining the European Economic and Monetary Union in 2001. Greece was ultimately successful in meeting these requirements and was able to join the EMU, but the harsh fiscal and monetary policies that were implemented to achieve this result, caused the consumer price level to drop lower and lower below the equilibrium price level. After the accession of Greece to the EMU, these strong restraining policies were not required any more, and as the previously restrained price tried to adjust to the equilibrium, there was a sudden increase in the their rate of growth.

To summarize the discussion on the findings, it is suggested that during the starting years of the participation with the EMU, in the year 2001 and 2002, the consumer prices in Greece did not increase because of the incorporation of euro as their currency; the

acceleration was due to the strong policies of the Greek government to underprice the consumer sector of goods, to meet the requirements set by the Maastricht Treaty before they were qualified to join the EMU. Taking that point of view into consideration, the upward shifting behavior of the consumer price level is not surprising or unexpected. The movements shown by the Greek consumer price level represent normal equilibrium-restoring behavior. As it has been already proved that there was no abnormal movement in the price equilibrium level of Greece after they joined the EMU, it can be said that the underpricing might have been the reason behind the increase in price level.

CONCLUSION

The purpose of this paper was to find out the consumer price level effects of joining the European Economic and Monetary Union, for a country like Greece, which does not have a very strong economic history. The widely-held hypothesis, which claims that the accession of Greece to the EMU and the introduction of euro as the sole currency in 2001-2002, caused a structural increase in the consumer price level of Greece, is tested in this paper. It has been found through different hypothesis testing methods used in this paper, that the joining of Greece in the EMU and adopting a single currency had no effect on the shifting of consumer price level. Through the research done in this paper it has been found that there are evidences of multiple structural breaks in the behavioral pattern of the Greek equilibrium price level and more importantly the price adjustment process in Greece follows a non-linear model. The implication of a non-linear price level means that there are strong evidences of variation in the inflation persistence structure in the Greek economy. The findings of this study also attempts to provide potential explanations for the post-accession increase in the Greek consumer price level and suggests that the observed acceleration in price levels are normal, equilibrium restoring price shifting behavior.

As a concluding remark, it should be mentioned that the common perception of theorists about the price effects of joining the EMU, especially due to the Greek experience, is not based on any real findings. The findings of this study ensures that the joining of a country into the EMU or the introduction of the euro, has no direct effect on the consumer price level of a country, rather, it stabilizes the country's economy and sets into motion the adjustment procedures of the deviated economic and financial factors of the economic equilibrium.

REFERENCES

- Argyrou, M. C. (2007), "The price effects of joining the euro: modeling the Greek experience using non-linear price-adjustment models." *Applied Economics*, 39. pp. 493–503
- Argyrou, M. G., Martin, C. & Milas, C. (2005), "Non-linear inflationary dynamics: evidence from the UK." *Oxford Economic Papers*, 57. pp. 51–69.
- Argyrou, M.G. (1997), "Causal relationships between public expenditure, public receipts and Gross Domestic Product: the case of Greece." *Discussion Paper No 373*. Department of Economics. University of London, Queen Mary and Westfield College.
- Argyrou, M.G. (1997), "Greek Macroeconomic Policy in the 1990s." *The European Political Economy Series*. The LSE European Institute.
- Balassa, B. (1964), "The purchasing power parity doctrine: a reappraisal." *Journal of Political Economy*, 72. pp. 584–96.
- Ball, L, & D. Romer. (1990), Real Rigidities and the Non-neutrality of Money. *Review of Economic Studies*, 57. pp. 183–203.

- Ball, L. & Mankiw, G. (1995), Asymmetric price adjustment and economic fluctuations. *Economic Journal*, 105. pp. 247-261.
- Calvo, G. (1983), Staggered Prices in a Utility-Maximizing Framework. *Journal of Monetary Economics*, 12. pp. 383-98.
- Caplin, A. & Leahy, J. (1991), State-dependent Pricing and the Dynamics of Money and Output. *Quarterly Journal of Economics*, 106. pp. 683-708.
- Conlon, J. & Liu, C. (1997), Can More Frequent Price Changes Lead to Price Inertia? Nonneutralities in a State-Dependent Pricing Context. *International Economic Review*, 38. pp. 893-914.
- Creswell, J. W. (2005), "Educational research." Upper Saddle River: Prentice Hall.
- Deveraux, M. B. & Siu, H. E. (2004), "State dependent pricing and business cycles asymmetries." *Department of Economics, The University of British Columbia, Discussion Paper 04-13*.
- Dotsey, M., King, R. & Wolman, A. (1999), State-dependent Pricing and the General Equilibrium Dynamics of Money and Output. *Quarterly Journal of Economics*, 114. pp. 655-90.
- Grahl, J. (1997), "After Maastricht: a guide to European Monetary Union." London: Lawrence and Wishart.
- Taylor, J. (1980), Aggregate Dynamics and Staggered Contracts. *Journal of Political Economy*, 88. pp. 1-23.
- Winkler, B. (1996), Towards a Strategic View on EMU: A Critical Survey. *Journal of Public Policy*, 16. pp. 1-2.

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