

# ASSESSING ECONOMIC VULNERABILITY IN THE EUROPEAN UNION

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**Abstract:** *Globalization is a multivalent phenomenon with controversial effects on the economic, social and political spheres. The aim of this paper is to study the relationship between the KOF globalization index and the economic growth, in order to prove that countries with a low globalization indexes tend to be more vulnerable during crisis. In line with previous literature, we employ panel data analysis on an extended sample of European countries, covering a time span of 11 years, from 1999 to 2010. The results indicate the existence of a bidirectional relationship between the globalization index and a sustainable economic growth rate. Future research directions will include an emphasis on the relationship between the KOF globalization index and the political and social dimensions.*

**Keywords:** globalization; economic growth; KOF index; panel data

## INTRODUCTION

In 2004 David Held and Anthony McGrew stated firmly that the time for globalization has come. Today, more than ever, this idea is valid. The impact of globalization has on the economic, politic and social environment is a force to be reckoned with, especially during periods of economic crisis.

Globalization has been portrayed by the international literature in contradictory perspectives. Nevertheless, a key issue researchers agree upon is the fact that the process of globalization can only be measured indirectly, using variables that assess its impact on the economy and the welfare state. Caselli (2008), as well as Dreher (2006), consider two possible ways of addressing the issue. The first one would be to use proxies, or empirically measurable variables, in order to estimate the dynamics of globalization. The most frequently employed is the GDP or the GPD per capita, (Darvas and Szapáry, 2004; Fidrmuc and Korhonen, 2010), along with other macroeconomic indicators, such as trade flows (Frankel and Romer, 1996; Frankel and Rose, 1998), foreign direct investments (Artis, 2003; Enea and Palasca, 2013), trade openness (Dollar, 1992), restrictions on the capital account (Alesina, Grilli and Milesi-Ferretti, 1994; Chanda, 2001), etc.

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The use of different macroeconomic variables for analyzing a multidimensional process such as globalization has been often criticized, due to the fact that it does not fully depict the overall influence on economic growth and social welfare. Thus, the alternative analysis method is to develop and implement an aggregated index, based on a set of distinctive economic, politic and social indicators.

There are a number of such indexes, including the World Market Research Center Index (WMRC), the A.T. Kearney/Foreign Policy Globalization Index (ATK/FP), the Maastricht Globalization Index (MGI), the CSGR Globalization Index, as well as the KOF Index. One of the reasons behind the development of these composite variables is to bridge the gap between theoretical and empirical studies (Dreher *et al.*, 2009), as well as to better understand and describe the impact of globalization on the society in general.

The indexes that have gained acceptance are the Maastricht Globalization Index (Martens and Zywietz, 2006; Martens and Raza, 2009), which is based on a cross-section of 117 national states, and the KOF Index of Globalization (Dreher, 2006), constructed by employing panel data analysis on a sample of 122 countries, covering a time span of 33 years, from 1970 to 2002. The difference between them concerns the methodological approach. The most important advantage these two indexes have over other composite variables is the longer time span for analysis.

In most cases the impact of globalization has been analyzed in close connection with national or regional economic growth. Dreher (2006), proving the robustness of the KOF Index, states that, in general, the process of globalization promotes development. On average, high ranks, in terms of the index, can imply the chance of higher economic growth rates. Nevertheless, it is foolish to consider that only by achieving a high globalization score the national economy will grow and poverty will be reduced.

Following the same analysis pattern, Salvatore (2010) estimates a Spearman rank correlation coefficient between the Competitiveness Index and the KOF Index, as well as the average growth rate of the GDP, and highlights the fact that countries that are more globalized are more competitive on the international markets, thus they tend to register higher growth rates. But this is confirmed only for large, developed economies, while developing states rely more on endogenous development determinants.

Another issue addressed by academic research is the correlation between globalization and vulnerability in times economic crisis. Martens and Amelung (2010) test the hypothesis that European countries that are more globalized depict the same vulnerability in times of crisis, as the less globalized ones. They consider that countries with a low index score report higher economic growth rates, a decrease of unemployment and inflation rates and increased investment flows. Interestingly, the new members of the European Union and the aspiring countries are present in this cluster of low globalization scores.

Their concluding remark is that a rising level of globalization amplifies the vulnerability to the economic crisis, but more importantly, it offers the opportunities and methods to better deal with a crisis.



As regards to the relations between globalization and the labor market, Dreher and Gaston (2008) stress out the fact that the economic dimension, and less robustly, political integration, have intensified wage inequality in developed countries, while, for developing ones, the impact is minor. In contrast, Majumder (2008) underlines the fact that globalization generates positive labor dynamics in strong economies and negative dynamics in emerging states. Moreover, Lee and Vivarelli (2004), based on the ideas of Basu and Weil (1998), consider that the impact of globalization on the labor market and the unemployment is country and sector specific.

Starting from these opposing results depicted by the international literature, the present article aims to study the relation between the GDP growth rate, the KOF index and the unemployment rate, in order to estimate the impact of globalization on economic and social welfare.

The remaining part of the article is structured as follows. The next section present the empirical approach used in study, in term of data, variables and methodology, while section 3 illustrates the most significant result and a set of needed clarifications. The last part of the paper comprises the authors' conclusion and the future study directions.

## 1. EMPIRICAL APPROACH

### 1.1. Data

This study focuses on 31 European countries, out of which 25 are members of the EU (Croatia, Malta, Luxembourg were excluded due to different economic conditions) and the other 6 are candidate and aspiring states (Turkey, Moldova, Ukraine), neutral (Switzerland and Norway) and the Russian Federation. The time span investigated is between 1999 and 2010, in order to capture at least one complete business cycle as reference for the outcomes of the crisis period. The year 1999 was selected as a starting point due to the introduction of the Euro currency, which led to closer economic relations and a higher degree of financial integration, a prerequisite of economic globalization, while the selection of 2010 as the final year was dictated by the availability of data, namely the KOF Index of Globalization.

This index is the key variable employed in this analysis as it strives to capture different measures of globalization. The KOF Index of Globalization was introduced in 2002 (Dreher, 2006) and its construction details can be found in further studies (Dreher, Gaston and Martens, 2008). The overall index covers the economic, social and political dimensions of globalization. More specifically, the three dimensions of the KOF index are defined as:

- economic globalization, characterized as long distance flows of goods, capital and services, as well as information and perceptions that accompany market exchanges;
- political globalization, characterized by a diffusion of government policies; and
- social globalization, expressed as the spread of ideas, information, images and people.

In line with the purpose of the present paper, only the economic index was retrieved from the ETH Database (ETH Zurich, 2014), in order to determine the nature of the relationship between this proxy of globalization and macro-economic variables, which account for economic growth (GDP) and social inequality (Unemployment). The latter were retrieved from the World Bank Database (World Bank). The GDP was considered in nominal values (current US\$), while the unemployment rate was considered as percentage of total labor force.

## 1.2. Econometric Methods

Studies measuring the impact of globalization usually include an array of different countries over a certain timeline, thus the method of choice which emerges is the panel data analysis, as can be seen in some studies (Lipsmeyer and Zhu, 2011; Rodrik, 1997), also implemented by Dreher in his researches using the KOF Index (Dreher, 2006; Dreher, Sturm and Ursprung, 2008).

Other methods used in connection to the impact of globalization on the economic outcomes include factor analysis (Andersen and Herbertsson, 2003) and correlations (Salvatore, 2010). Since the KOF index is a ranking tool, it is advisable to use the Spearman rho as a measure of correlation instead of the Pearson coefficient, as previous studies point out (Marginean and Orastean, 2011).

The motivation behind using panel data can be found in the work of Hsiao (2005) and includes the increased capacity to model complex economic behavior, compared to simple cross-section or time series analysis. This is related to the increased degrees of freedom and including in the model the interaction between the variables, which gives it a dynamic profile.

Panel data analysis is employed to study the heterogeneity of the subjects or the lack thereof.

Transversal analysis employs models which include individual characteristics in the error term

$$y_{it} = \alpha + x_{it}\beta + \varepsilon_{it}$$

while longitudinal models offer the possibility to assess these differences through the parameters  $\alpha_i$ , which describe each entity. The equation in this case is:

$$E(y_{it}) = \alpha_i + x_{it}\beta, t = \overline{1, T}, i = \overline{1, n}$$

There are two different ways of highlighting the differences between entities, denoted by  $\alpha_i$ . The first one, the "fixed effects model" considers that  $\alpha_i$  are unknown, fixed parameters which will be estimated. The second approach, the "random effects model" considers that  $\alpha_i$  are the outcomes of a random variable, such as the last equation can be re-written as:

$$E(y_{it}|\alpha_i) = \alpha_i + x_{it}\beta$$

The cross-section fixed effects model has the equation

$$y_{i,t} = \alpha + \beta x_{i,t} + \mu_i + \nu_{i,t},$$

while the period fixed effects model is:

$$y_{i,t} = \alpha + \beta x_{i,t} + \delta_t + \nu_{i,t}$$

While  $\mu_i/\delta_t$  is the specific effect of each entity / period,  $v_{i,t}$  is the remaining error, which includes the random component of  $y_{i,t}$ .

The cross-section random effects model has the equation

$$y_{i,t} = \alpha + \beta x_{i,t} + \omega_{i,t} \quad \omega_{i,t} = \epsilon_i + v_{i,t}, \text{ where } \omega_{i,t} = \epsilon_i + v_{i,t}.$$

The term  $\epsilon_i$  represents the random bias of each entity from the common global constant,  $\alpha$ .

The statistical hypotheses for this model are (Frees, 2004, pp. 74-76):

H1.  $x_{i,t}$  are non-stochastically variables;

H2.  $y_{i,t}$  are the outcomes of independent, normally distributed random variables;

H3.  $\epsilon_i$  are the outcomes of independent, normally distributed random variables;

H4.  $E(\epsilon_i) = 0; V(\epsilon_i) = \sigma^2_\epsilon;$

H5.  $V(y_{i,t}|\epsilon_i) = \sigma^2$ .

The condition implied by hypothesis H4 and H5 is that of stationarity, for which unit-root tests are performed. In case the series is non-stationary, applying transformations such as differentiation or natural logarithm are necessary.

The selection between a fixed effects and a random effects model is done by applying the Hausman test (Hausman, 1978). This test compares the fixed effects under the null hypothesis that the individual random effects are uncorrelated with the other regressors of the model. If correlated (null hypothesis rejected), a random effects model will produce biased estimators so a fixed effects model is preferred.

In order to assess the impact of globalization on social outcomes we can use the correlation between the KOF economic globalization index and macro-variables such as unemployment, inflation. Since the KOF index is a rank, it works better under the Spearman rank correlation, which assesses how well the relationship between two variables can be described using a monotonic function.

The possible limitations of the proposed method include the small number of variables, which is easily overcome by the fact that both the KOF index and GDP are aggregate variables, thus comprise numerous other embedded influences, and the limited time range.

### 1.3. Empiric results

The GDP series was tested for common unit root processes using the Lin Levin Chu test in Eviews 7. This test was chosen as individual unit root tests, like ADF, have limited power.

**Table 1 - Unit-roots test results**

Variable	Method	Statistic
GDP	Levin, Lin & Chu t	0.2732 (0.6077)
ln(GDP)	Levin, Lin & Chu t	-8.6192 (0.0000)

Source: author's computation in Eviews 7.0

The previous table proves that the GDP series has unit roots, thus a natural-log transformation was applied, rendering the series stationary. The other two variables are not subject to unit-roots.

The panel data model was applied thus to the variables  $\ln(\text{GDP})$  ( $\ln gdp$ ), KOF index ( $kof$ ) and unemployment rate ( $u$ ) and the resulting equation was:

$$\ln gdp_{i,t} = c + \alpha_1 kof_{i,t} + \alpha_2 u_{i,t} + \delta_t + \mu_i + \nu_{i,t}$$

since the model selected was a cross-section fixed effects model with fixed period effects. The estimates of the parameters can be found in Table 2.

The values of the fixed effect for cross-sections and time periods can be found in Annex 1.

The model is valid since the  $R^2$  value is 0.99, which means that the error is almost insignificant. A graphical representation of the actual values, fitted model estimates and residuals can be found in Figure 1, while a histogram proving the normality of the errors is represented in Figure 2.

**Table 2 - Panel data analysis parameters estimation**

Variable	Coefficient	t-statistic	Prob
c	25.094	163.17	0.000
$\alpha_1$	0.011	6.151	0.000
$\alpha_2$	-0.019	-5.33	0.000

Source: author's computation in Eviews 7.0

Hence, the equation is

$$\ln gdp_{i,t} = 25.094 + 0.011 kof_{i,t} - 0.019 u_{i,t} + \delta_t + \mu_i + \nu_{i,t}$$

which becomes

$$gdp_{i,t} = \exp(25.094 + 0.011 kof_{i,t} - 0.019 u_{i,t} + \delta_t + \mu_i + \nu_{i,t})$$

Since  $e^{0.011} \approx 1.011$  it follows that an increase of the KOF Economic globalization index by 1 point leads to an increase in the nominal GDP by 1,1%.

Analogously, since  $e^{-0.01} \approx 0.9811$ , it means that an increase of the unemployment rate by 1% leads to a decrease of the GDP by 1,89%.

It is important to evaluate the relationship between the globalization index and the unemployment rate in order to have a basis to assess the nature of globalization's influence on economic and social outcomes. In this regard we use the Spearman rank correlation (rho). The computed value is:

$$\rho = -0.403 (0.000)$$

which means a significant negative correlation between globalization and the unemployment rate.

To summarize the empiric results, it has been proved that globalization sets the favorable conditions for economic growth, having a positive influence on the overall economic activity measured through GDP and a negative influence on one of the main imbalances, the unemployment. However, this result should be further discussed as a proof against the detractors of globalization not as stating that globalization automatically leads to economic growth.

## 2. DISCUSSION

The relationship between economic growth and globalization remains controversial, as some researchers (Dreher, 2006) advocate the existence of a positive relationship between a higher globalization index and economic growth, while practitioners tend to claim the opposite (Soros, 2008).

We aim to prove that a higher globalization index helps in attaining better economic results and acts as a safety net against negative social outcomes such as unemployment, which have a direct economic impact (Dreher, Gaston and Martens, 2008). Yet it is noteworthy to mention that the converse statement does not hold true, namely a high globalization index of a country does not guarantee economic growth, it only sets the favorable conditions.

Before explaining the main results of the study, it is important to make two clarifications, both of them being related to the fixed cross-section effects coefficient. The first one is that the calculations for  $\mu_i$  represent an average for the entire period of analysis, thus they engulf the effects of the current economic crisis.

As regards to the second one, as it can be seen from Table 3, the fixed cross-section effects coefficient has divided the countries comprising the sample in two categories, as follows:

- $\mu_i > 0$
- $\mu_i < 0$

The positive values describe countries, which generally have experienced economic growth above the average of the sample, during the analyzed time span, while the negative values imply a GDP below the mean. Further discussion will focus on the amplitude, causes and outcomes of the growth, in relation to globalization.

A quick glance at the results presents in Table 3 shows a clear separation between the already developed countries and the economies currently under development. The first group includes a set of countries which represent the backbone of the European economy, such as Germany, France, Italy, Spain, the United Kingdom, and Russia etc. The fixed cross-section effects mean that, on average, these countries have experienced economic growth rates which are multiple times higher than the sample's average, over the entire analysis period. Case in point, the German economy, which has registered a GDP growth rate 16 times higher than the European average. This is a very normal situation, if we consider the fact the Germany represents the foremost economy of E.U., with a surging industrial output, competitive products and reliant on exports and foreign direct investment outflows for economic growth. If we link these values with the average of the KOF index for Germany (74.99), the paradox that arises is the fact that a sustainable economic growth does not automatically imply a high level of globalization, but it requires other additional factors, such as the stability of the political environment, a strong legal framework, a transparent institutional system etc.

This situation is also true for some of the other countries that are included in this cluster. France (72.42), Italy (76.64), Russia (52.23), the United Kingdom

(78.64), all have registered less outstanding ranks in terms of the KOF Globalization Index. These results come to support opinions from the international literature which state that countries with lower index scores experience higher economic growth rates, reduction of unemployment and inflation and increase investment flows (Martens and Amelung, 2010).

The two interesting cases found in this cluster are the Russian Federation and Turkey. Russia, which has undergone a severe crisis at the end of the 1990s, has regained its strengths and remains one of the most important economies of Europe, mainly due to its very large consumer market, its strategic geo-economic position and also its vast natural resources (i.e. natural gas and oil), which represent one of the key pillars for a sustainable development.

Turkey, on the other hand, has enacted a set of reforms in the last years, the most important one being the reform to control inflation from 2001. These measures were taken in order to comply with the *acquis communautaire*, as regards to Turkey's future E.U. membership.

As regards to the second group, it consists mostly of the countries which have represented the last enlargement waves of the E.U., such as the Baltic states, Slovenia, Hungary, Poland, Romania, Bulgaria etc., or neighboring states of the Union, like the Republic of Moldova or Ukraine. The implications of the results are somewhat converse, namely that national economies which have achieved high globalization scores, have also register average or low rates for the GDP. The explanation regarding this situation can be found in the composition of the economic dimension for the KOF Index, which consists of trade flows (% of the GDP), FDI stocks (% of the GDP), portfolio investments and income payments, each with various weights. This implies that most of these countries are highly dependent on external economic relations, mainly in terms of commercial and financial flows, and with a certain lag, technological spillovers. In other words, even though most of them are well integrated in the European economic mechanism, they are dependent on the leading economies of the Union.

Given the fact that this second group is not homogenous, in terms of member entities, we consider that a few remarks are in order. Most of the countries included within this cluster are considered developing economies, but all depict different economic backgrounds. Ireland, for example, was considered to be one of the emerging economies of the European Union, with a good annual growth rate (3.90%, on average) and a high globalization index average (94.21). But it was highly reliant on foreign direct investment inflows and other economic linkages with well-developed countries (the United States, Germany, France, Italy, the U.K., etc.), reason why the present economic recession has left it in a severe crisis.

Poland on the other hand, albeit it recorded a low KOF score (65.80), is considered to be one of the few Union countries (if not the single one) that has emerged victorious from the present economic crisis. This is mainly due to its well-developed industrial and agricultural sectors, its competitive products and an educated internal market, in terms of consumers. Furthermore, Poland has been consistent in implementing E.U. policies.

Last but not least, we take a quick glance at Romania. It represents a very good example of a lagging European economy, greatly dependent of foreign economic relations. Before the current economic crisis, the Romanian consumer market was based almost 90% on imports of manufactured products, while exports consisted mostly of raw materials, thus producing an “artificial” economic growth.

These findings are in line with some of the ideas underlined by the international literature, namely the fact that globalization alone does not lead to economic sustainable development and a reduction of poverty and inequality (Dreher, 2006), and that growth depends on internal factors, especially in emerging countries (Salvatore, 2010).

The results concerning the time effects are included in Table 4 and although contradictory at a first glance, they highlight two important consequences: the secular trend which is a growing one and the impact of the economic crisis.

The secular trend is explained by the growing rates, which, if we want an accurate result should be deflated correspondingly, but this is beyond the scope of this article.

The impact of the economic crisis appears clearly if we compare the values from 2008 and 2009. A difference of 0.14 emerges, which means that, on average, the GDP of the selected sample has experienced a 14% decrease during the recession period. Nevertheless, in 2010 a 5% recovery was recorded, also on average.

## CONCLUSIONS

The purpose of the present article was to study the relation between the GDP growth rate, the KOF index and the unemployment rate. For this we have retrieved data only for the economic index, in order to determine the nature of the relationship between this proxy of globalization and macro-economic variables, which account for economic growth and social inequality. To be more precise, the study wanted to provide evidence supporting the idea that a high globalization index helps in achieving better economic results and offers protection against negative social outcomes, especially during times of economic crisis.

The results of the study have brought forward a number of interesting results, as related to the connections between globalization and sustainable economic development. The computed results of the model have showed that in average there is a 1-1 direct positive relationship between the KOF economic globalization index and the economic growth, measured by the nominal GDP. In contrast, the unemployment rate has been proved to have a negative influence on the GDP, almost double in magnitude compared to the one of the globalization, a fact further enforced by the Spearman rank correlation between the two. This underlines the idea that globalization sets the scene for economic development but it is unable to trigger it without the help of other economic and social factors.

The second major finding is based on the fixed cross-section effects, which has separated the entities comprised in the sample in two large groups, namely developed and developing countries. As regards to the first group, the main idea is

that, on average, these countries have experienced economic growth rates, which are multiple times higher than the sample's average, over the entire analysis period. This, alongside the average KOF Index scores achieved, comes to uphold the opinion that countries with lower index scores experience higher economic development and reduction of negative social effects, such as unemployment.

In contrast, the second group has registered average or low rates for the GDP growth rate, but these countries had achieved high globalization scores. This situation emphasized the idea that, generally speaking, developing countries are highly dependent of external economic relations, in terms of trade and financial flows. Furthermore, the result underline the fact that globalization on its own does not bring forth economic sustainable development up and reduces poverty and social disparity.

Finally, the fixed time effects of the model have highlighted two important outcomes: a growing secular trend and, more importantly, the impact of the current economic crisis. The latter is very clearly highlighted for the years 2008 and 2009, when the average GDP growth rate for the selected sample has experienced a 14% decrease.

The relevance of the present is clearly supported by the its findings, which confirm ideas provided by the international literature, namely the fact that, on average, globalization promotes economic growth, but additional, country-specific determinants are needed in order to produce good results. Furthermore, given its complex nature, globalization cannot be analyzed from a singular perspective, be it dimension, country or sector.

The limitations of the study are derived from the data employed in the study, the number of entities comprising the sample and the time span. That is the main reason why the future research directions will include an emphasis on the relationship between the KOF globalization index and the political and social dimensions, an enlarged sample and longer analysis period.

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**ANNEX 1****Table 3 - Fixed cross-section effects**

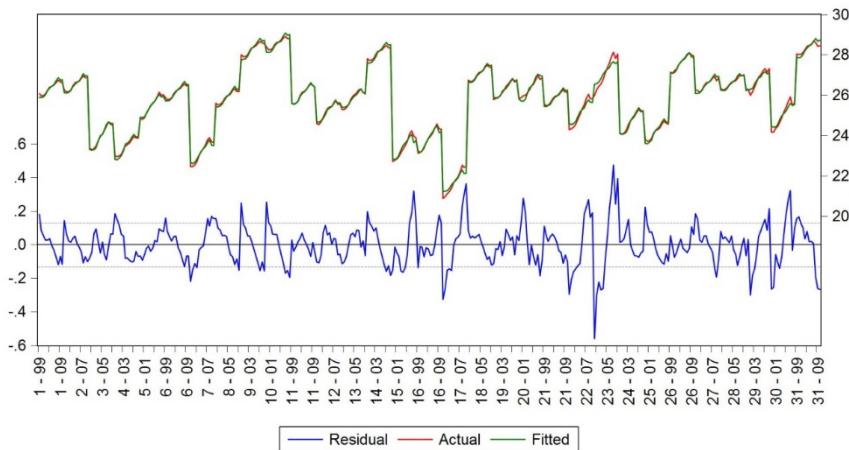
<b>Country</b>	$\mu_i$	<b>Effect</b>	<b>Country</b>	$\mu_i$	<b>Effect</b>
Austria	0.376828	1.458	Moldova	-3.98618	0.019
Belgium	0.572969	1.774	Netherlands	1.012481	2.752
Bulgaria	-1.66118	0.190	Norway	0.421551	1.524
Cyprus	-2.43235	0.088	Poland	0.807021	2.241
Czech R.	-0.41155	0.663	Portugal	-0.01131	0.989
Denmark	0.182153	1.200	Romania	-0.47643	0.621
Estonia	-2.70727	0.067	Russian F.	1.645489	5.184
Finland	0.013585	1.014	Slovak R.	-0.96668	0.380
France	2.564084	12.989	Slovenia	-1.5761	0.207
Germany	2.817477	16.735	Spain	1.865352	6.458
Greece	0.342082	1.408	Sweden	0.587795	1.800
Hungary	-0.6961	0.499	Switzerland	0.672788	1.960
Ireland	-0.19596	0.822	Turkey	1.170847	3.225
Italy	2.317157	10.147	Ukraine	-0.56412	0.569
Latvia	-2.27806	0.102	UK	2.465781	11.773
Lithuania	-1.87216	0.154			

Source: author's computation in Eviews 7.0

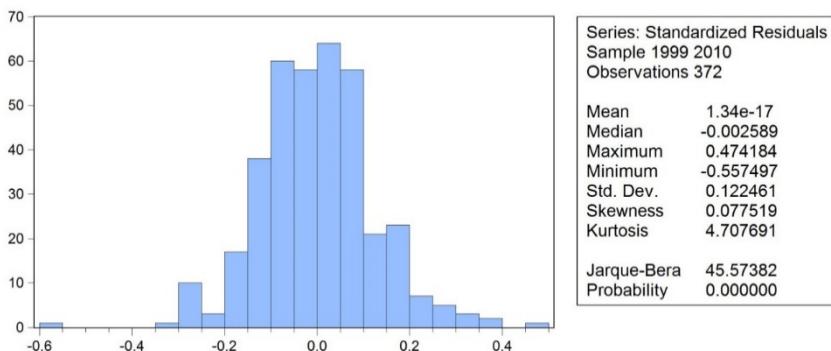
**Table 4 - Period fixed effects**

<b>Period</b>	$\delta_t$	<b>Effect</b>
1/1/1999	-0.45	0.637
1/1/2000	-0.50	0.602
1/1/2001	-0.46	0.625
1/1/2002	-0.34	0.705
1/1/2003	-0.15	0.864
1/1/2004	0	1.000
1/1/2005	0.10	1.101
1/1/2006	0.18	1.199
1/1/2007	0.33	1.397
1/1/2008	0.49	1.625
1/1/2009	0.40	1.488
1/1/2010	0.43	1.536

Source: author's computation in Eviews 7.0

**Figure 1 - Actual, fitted and residuals of the model**

Source: author's computation in Eviews 7.0

**Figure 2 - Histogram of errors**

Source: author's computation in Eviews 7.0