# Business Administration and Business Economic

## Analysis of the Post-Crisis Economic
## Performances in the European Union

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**Abstract:** The effects of the economic crisis continue to impact the world economy even if the most difficult period of the crisis seems to have passed. In this context, the analysis of the economic performance becomes stringent in that it not only allows for the identification of the economic environment, but also due to the fact that it brings value by determining the automated correction of any decision or direction in the difficult economic context of today. The paper represents a study of some of the main macroeconomic performance indicators for the European Union countries, such as: economic growth, current account balance, labour productivity, employment and average net earnings. Based on a cluster analysis we identified the position of each E.U. member state via an economic performance view and a country level particularization was then achieved. After grouping the countries into two clusters based on their economic performances, we built two distinct equations using panel data models that could explain the economic growth variations for both the case of highly performing and less performing E.U. countries. The results of the analysis actually incorporate some main components that will help formulate economic growth measures, employment and labour productivity.

**Keywords:** economic performances; European Union; post-crisis analysis; cluster analysis; econometric modelling

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## 1 Introduction

As shown by the current economic crisis, macroeconomic instability, such as persistent current account and trade deficits can seriously undermine a country's tolerance to economic shocks. According to Orszaghova et al. (2013) and to Rahman (2008), maintaining and enhancing external competitiveness has thus become a must to all European Union (E.U.) member states.

The necessity to explore the differences in the European economies, when considering aspects of competitiveness, growth and sustainability is becoming more stringent and building effective economic growth models has become a true challenge in the recent years, because of the high economic instability and degree of uncertainty. The macroeconomic developments of the last years had drawn attention on the main competitiveness gaps between the European economies (see Spahn, 2013; Lazar et al., 2013; Holinski et al., 2012; Gros, 2012; Ailenei et al., 2012; and Jaumotte et al., 2010).

Important competitiveness gaps can also be detected within the European Union due to differences in productivity and labour market indicators, as highlighted by the recent crisis (Andreica et al. 2014; Matei et al. 2014; Davidescu, 2014; Aparaschivei, 2012; Ileanu et al., 2008).

Therefore, we decided to extend the empirical research in the field and drew on several macroeconomic performance indicators, such as: economic growth, current account balance and several labour market indicators consisting of labour productivity, employment rate and average net earnings in order to study the post-crisis economic performances in the European Union. Moreover, based on a Hierarchical Cluster Analysis we will try to identify the position of each of the European Union member states via an economic performance view, with country level particularization for the E.U. state members. The results will allow us to classify the 28 E.U. member states into two main clusters, one corresponding to highly performing countries and the second one to countries with lower economic performances.

Based on this classification, we will then distinctly model the robust dependencies between economic growth, current account balance, as well as labour market indicators for the two E.U. country clusters for the period 2000-2013 using panel data methodology. The econometric results are consistent to the economic theory and highlight several particularities corresponding to the two E.U. country clusters.

To summarize, the structure of the paper is the following: in Section 2 a comparative post-crisis analysis of the 28 E.U. member states based on economic growth and competitiveness grounds is presented, while Section 3 is dedicated to the econometric analysis. The conclusions are presented in the last section.

## 2. Comparative Post-Crisis Analysis Of The Economic Performances in the E.U. Countries

In our study we measured the economic performances of the 28 European Union member states for the year 2013, based on the following macroeconomic variables: GDP growth rate (%), current account balance (% GDP), labour productivity (calculated as a ratio between real GDP and the employed population), employment rate (%) and average real net earnings. The main data sources were the Eurostat databases.

The effects of the economic crisis continue to impact the world economy even if the most difficult period of the crisis seems to have passed. European countries have been heavily challenged during the last years and the differences among them are still visible in the post-crisis period. For instance in 2013 there are only 11 countries with economic growth below the 28 E.U. average (0.1%).

However, most of the E.U. countries registered only slight improvements in the GDP growth rate, as compared to the previous year, while Romania is one of the five countries that registered the highest growth among Latvia, Lithuania, Malta and Luxemburg. Although socking at a first glance, we should note that this annual GDP growth of about 3.5% for Romania is not based on sustainable economic grounds, but rather on a favorable agricultural year and increased exports.

Another possible explanation for the high economic growth in Romania can be drawn on consumption growth, especially since in 2013, the turnover of market services provided to enterprises increased by 8% as compared to 2012. Moreover, according to the central bank, direct investments of non-residents in Romania increased in 2013 by 26.8% compared to the previous year.

However, in Romania the economic growth is not properly perceived, since it mostly comes from a decrease of the deflator, due to lower demand deficit, while the nominal GDP still keeps a decreasing trend. Although 2013 was an excellent agricultural year for Romania marked by a higher production supply with positive effects on GDP in the most recent quarters, an economic growth of 3.5% should be viewed with caution since it is not based on sustainable economic grounds.

Moreover, based on the current account levels registered in the year 2013 the European Union countries can be separated in two main groups, as there are only ten E.U. member states that registered current account deficits, out of which United Kingdom is by far in the worst situation regarding this indicator, with a 4.4% current account deficit as percentage of GDP. Other European countries that register negative current account balance are: Cyprus (-1.9%), Belgium (-1.6%) and Czech Republic (-1.2%), while at the opposite pole are the Netherlands, with a 10.4% surplus of the current account, followed by Germany (7.5%), Denmark

(7.3%) and Ireland (6.6%).

When considering the labour market determinants, the main differences in 2013 are noted in labour productivity levels, as Spain, United Kingdom, Belgium, Italy, Sweden, Netherlands and France are above the E.U. 28 average in terms of labour productivity, while Luxemburg is by far the most productive country of the European Union, with a ratio of around 155, based on its high GDP level and low number of employed population. At the opposite pole are Bulgaria, Romania, Latvia and Poland with the lowest levels in the European Union, having in 2013 ratios of real GDP to employed population below 20.

These findings suggest that although all E.U. countries are steadily recovering from the recent economic crisis, some E.U. member states are by far more competitive and form a distinct cluster. Therefore, we applied a Hierarchical Cluster Analysis, in order to better count for the competitiveness gaps between the E.U. countries. For that we used an unsupervised learning method that assigns a set of observations into subsets (called clusters) based on their similarities.

The cluster technique was built on the Ward's method, whereas the intervals were calculated using the squared Euclidean distance. Based on labour productivity, current account balance and GDP growth rate levels, we were able to classify the E.U. member states into two main country clusters, based on their macroeconomic performances. According to the dendrogram presented in Fig. 1, the two main E.U. country clusters corresponding to either highly performing countries or to lower performing E.U. countries are the following:

- *The cluster of the highly performing countries:* Denmark, Sweden, Ireland, Spain, United Kingdom, Germany, Netherlands, Belgium, France, Austria, Finland, Italy and Luxemburg.

- *The cluster of the less performing countries:* Bulgaria, Romania, Latvia, Lithuania, Hungary, Poland, Croatia, Slovakia, Czech Republic, Estonia, Cyprus, Portugal, Greece Slovenia and Malta.
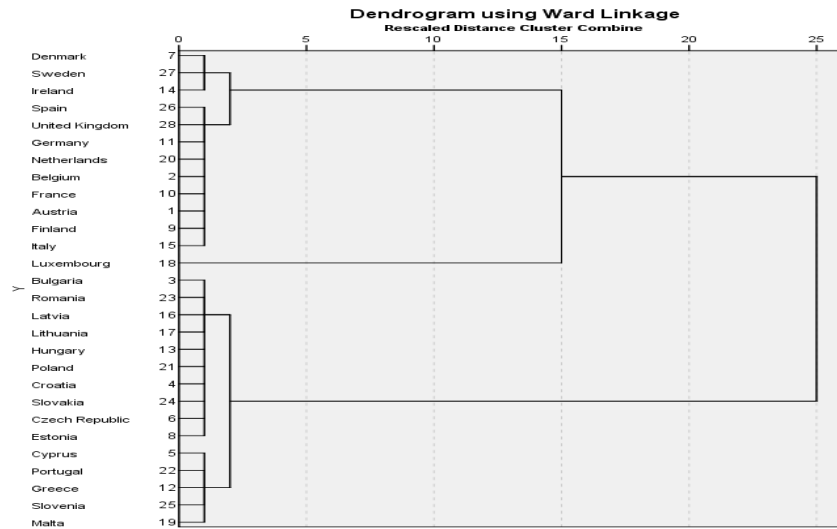
**Figure 1. Dendrogram of the 28 E.U. countries**

In order to check the accuracy of our classification of the E.U. countries between highly performing and less performing economies, we applied a t-test for equality of means that could indicate whether there are any mean differences between the main economic indicators of economic growth and competitiveness that were considered in the analysis. The results are presented in Table 1.

**Table 1. Mean differences for E.U. countries**

| | Mean | | Mean differences | |
|---|---|---|---|---|
| Variables | Highly performing E.U. countries | Less performing E.U. countries | t-test for Equality of Means | Sig. |
| GDP growth | 0.1 | 0.33 | -,282 | 0.78 |
| Current Account | 3.0 | 0.74 | 1.75 | 0.09 |
| Employment rate | 66.8 | 60.5 | 2.695 | 0.01 |
| Labour productivity | 72.5 | 24.3 | 6.55 | 0.00 |

*Source: author's own calculations*

We notice that there are relevant statistically significant differences with a 99% confidence level between the highly performing E.U. countries and the less performing ones in 2013, in terms of labour productivity and employment rate, while the mean differences in the current account balance are statistically significant at a 90% confidence level. Moreover, the tests also highlights an insignificant difference in mean for the GDP growth rates between highly versus less performing E.U. country groups, suggesting that the economic shocks affected all E.U. countries and their negative effects got propagated over the GDP growth rates as well. However, the unexpected surprise of a higher GDP growth in some of

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the European countries, such as Romania lead to a mean difference reduction in terms of economic growth between the two E.U. country groups, but one should note that this favourable static image of the year 2013 is not expected to last on long terms because of the lack of sustainable economic grounds.

## 3. Econometric Results

After grouping the E.U. countries into two clusters based on their economic performances registered in 2013, we decided to extend the period of analysis and to build two distinct equations that could explain the economic growth variations for both the case of highly performing and less performing E.U. countries. For that we used the macroeconomic data set for the period 2000 – 2013 and panel data methodology in order to model the robust dependencies between economic growth and competitiveness between the 28 E.U. countries. The following indicators were considered as explanatory variables: the current account balance, the labour productivity, the employment rate and the real net earnings.

The panel data estimation was made using the STATA software. According to Baum **(2001)** a Hausman test was first applied in order to check whether we are dealing with a fixed-effects model (FE) or a random-effects model (RE), where the individual effects are assumed to be no longer correlated with the explanatory variables as compared to the FE. The results of the Hausman tests confirmed in both cases of highly performing and less performing E.U. country clusters that the FE model is more appropriate than a random-effects model.

Further on, we checked the validity of the two panel data models, by controlling if the standard errors are independent and identically distributed, homoskedastic and not autocorrelated. Several tests were therefore used in order to check these assumptions. For instance, when checking the homoscedastic hypothesis, a modified Wald test, implemented in STATA by Baum (2001) was used for group wise heteroskedasticity in the FE model. Secondly a serial correlation test proposed by Drukker (2003) was applied in order to check the autocorrelation hypothesis. The results of both tests were similar for the cases of highly performing and less performing E.U. country clusters and indicated, however, that the errors were both autocorrelated and heteroskedastic. In order to overcome these problems, the regression models were then re-estimated based on robust fixed-effects (within) technique, using Driscoll and Kraay standard errors (Hoechle, 2007).

The results of the robust fixed-effects estimation describing the GDP growth rate equations for the two E.U. country groups are presented in table 2. Our results from the comparative econometric analysis of the two cluster equations indicate that the main similarities between the two country clusters consist in the positive impacts of both the employment rate and the labour productivity. These findings are consistent

with the economic theory, since an increase in productivity naturally stimulates economic growth, by inducing a growth in the autonomous supply of goods and services at an either unchanged or even lower level of inputs, such as capital, time and human resources. Moreover, an increase of the employment rate suggests an improvement of the labour market equilibrium and should normally stimulate the production of goods, contributing therefore to the economic growth.

**Table 2. Results of the robust estimations for the E.U. countries**

| GDP growth equation | Highly performing E.U. countries | | Less performing E.U. countries | |
|---|---|---|---|---|
| Explanatory variables | Coeff. | Driscoll and Kraay std. errors | Coeff. | Driscoll and Kraay std. errors |
| Constant | -26.79 | 9.29*** | 205.455 | 56.599*** |
| Current Account (t-1) | 0.246 | 0.095** | | |
| Employment rate (t) | 0.239 | 0.084*** | 0.353 | 0.115*** |
| Labour productivity (t) | 0.159 | 0.085* | 1.269 | 0.404*** |
| logEarnings (t) | | | -29.91 | 8.205*** |
| *No. obs.* | *169* | | *No. obs.* | *181* |
| *F statistic* | *10.07\*\*\** | | *F statistic* | *8.5\*\*\** |
| *Within $R^2$* | *0.146* | | *Within $R^2$* | *0.340* |

*Source: author's own calculations*

where *** stands for 1% significance level, ** stands for 5% significance and * stands for 10% significance level.

However, the relationship between labour productivity and economic growth seems to be more pronounced for the case of the less performing countries, were also the real net earnings fluctuations play a disincentive role, as an increase in earnings that is not properly correlated to the labour productivity could have negative effects on the economic growth. The relation between the two indicators can easily by understood by the situation of some European Union member states, as Greece, in which the although productivity had increased, the pace was surpassed by the higher increase in labour costs, that eventually resulted in low competitiveness and lower economic growth. The losses regarding cost competitiveness were an important factor for the decline in GDP growth rate.

Another aspect that could be drawn from the econometric results highlights the fact that the current account balance has a positive influence upon economic growth, but with a one year delay and only for the case of the highly performing E.U. country cluster, but turned out to be statistically insignificant for the case of the less performing countries. According to the statistical significant coefficient for the first cluster equation, we can state that the GDP growth rate will be expected to rise

with 2.46 percentages points in case the current account balance increases with 10% in the previous year, while keeping all the other variables constant.


## 4. Conclusion

The effects of the economic crisis continue to impact the world economy even if the most difficult period of the crisis seems to have passed. In this context, the analysis of the economic performance becomes stringent in that it not only allows for the identification of the economic environment, but can also bring value by determining the automated correction of any decision or direction in the difficult economic context of today.

The paper represents a study of some of the main macroeconomic performance indicators for the E.U. countries, such as: economic growth, current account balance, labour productivity, employment and average net earnings in the European Union. Based on a Hierarchical Cluster Analysis we identified the position of each of the European Union member states via an economic performance view and a country level particularization was achieved for the E.U. member states. The results suggested that based on labour productivity, current account balance and GDP growth rate, the 28 E.U. member states can be classified into two main clusters, one corresponding to high economic performing countries and the second one to countries with lower economic performances.

Based on this classification, we then distinctly modelled the robust dependencies between economic growth and current account balance as well as labour market indicators for the two E.U. country clusters using panel data methodology. The econometric results highlighted both some similarities as well as some specific differences between the two country clusters. More precisely, the analysis indicated the positive impact of both the employment rate and the labour productivity as a main similarity between the two countries clusters, although the relationship between labour productivity and economic growth seems to be more pronounced in the case of the less performing countries, were also the real net earnings fluctuations play a disincentive role, as compared to the case of the high performing countries, where it was statistically insignificant.

Secondly, the current account balance had a positive influence upon economic growth, but with a one year delay only for the case of the highly performing E.U. country cluster, but turned out to be statistically insignificant for the case of the less performing countries.

The results of the analysis incorporate some main components that will help formulate economic growth measures, employment and labour productivity. The limits of the research are connected to the number of indicators taken into consideration. The valid model obtained through this analysis explains the

dynamics of both groups of countries and further research should be conducting considering also other aspects related to economic performance that could have influenced the results obtained by the European Union member states. Moreover, the econometric models could further on be used in order to formulate scenarios regarding the future evolution of the EU economic performance space as a whole.

## 5. Acknowledgement

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