THE REPUBLIC OF CROATIA EMLPOYMENT STRUCTURE ANALYSIS FROM 2008 UNTIL 2013 AS AN MACROECONOMICAL CRISIS INDICATOR

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Abstract

Employment (unemployment) is one of the most observed macro-economic indicators with GNP and inflation (Ferenčak, 2003). Thus, it could easily be concluded that employment analysis would give us a transparent data of the economic situation of the Republic of Croatia and European Union. The paper puts forward the curve of employment which shows the fluctuations of the employment structure at the period of past ten years (from 2003 to 2013). Statistical analysis in programming language R have been used in order to give prospective on European Union and Croatian employment past trends, its correlation with GDP and its future predictions for period 2014 to 2016.

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INTRODUCTION

Macroeconomics is a branch of economics dealing with the performance, structure, behavior, and decision-making of an economy as a whole, rather than individual markets. This includes national, regional, and global economies (Sullivan, Sheffrin, 2003, 57). Ferenčak (2003, 241) points out three main indicators of macroeconomics: inflation, employment (unemployment) and GDP. Two of them, GDP and unemployment are analyzed in the paper. The same author defines unemployment as a state of a part of the population without job and searching for one. Also, he distinguishes four types of unemployment: frictional, cyclical, seasonal and structural, from which emphasize is on frictional since it is the only one where country must interfere. GDP is presented as the sum of final goods being produced by an economy.

The paper analyzes two macro-economic indicators, GDP and employment (unemployment) with data collected among Croatia and European Union from 2003 until 2013. Therefore, the paper analyzes the correlation between Croatian and European Union GDP and the unemployment rate with the aim of predicting trends of GDP and unemployment for next three years (2014-2016) in EU and Republic of Croatia. According to European Communication Commission, Europe Strategy 2020 puts forward three mutually reinforcing priorities: smart growth (developing an economy based on knowledge and innovation); sustainable growth (promoting a more efficient economy in terms of resource use, more ecological and competitive); inclusive growth (fostering an economy with a high rate of employment, to ensure social and territorial cohesion) (Iuga, Cioca, 2013, 71)

In conclusion, the paper is written with the aim to make a significant contribution on the general macro-economic analysis of the Republic of Croatia and European Union dealing with high unemployment rates. As it was mentioned previously, beside the analysis of past and current trends of unemployment rates and GDP in EU and Croatia aim of this paper is to predict its future trends for period 2014 to 2016.

1. UNEMPLOYMENT – GENERAL ISSUE OF NATIONAL ECONOMIES

As it was mentioned previously, Ferenčak (2003, 241) defines unemployment as a state of a part of the population without job and searching for one. Other authors have also put various definition of unemployment. Bejaković (2003, 659) defined unemployment as a state in which a capable of working part of society doesn't work or works under the standard working hours and with incomes under the minimum salary. Kerovec (1999, 259) defined unemployment as a structure consisting of three criteria: a person without a job, capable of working and searching for a job. An unemployed person is defined by Eurostat, according to the guidelines of the International Labor Organization, as:

 someone aged 15 to 74 (in Italy, Spain, the United Kingdom, Iceland, Norway: 16 to 74 years);

- without work during the reference week;
- available to start work within the next two weeks (or has already found a job to start within the next three months);
- actively having sought employment at some time during the last four weeks.

The classification of unemployment identifies four main types:

- 1. Frictional
- 2. Structural
- 3. Seasonal
- 4. Cyclical

According to Hughes, Perlman (1984, 27-30) both frictional and structural unemployment arise because the labor market is not perfect in matching the vast number of individual suppliers of labor services with a large number of employers who demand those services. This happens because in dynamic economy many suppliers will keep contracting their traditional lines of business while others will diversify their activities and therefore demand new operations. On the supply side some workers will withdraw from the labor market, other might return to it or enter for the first time. The net result is that the changes on the supply side will effect that some of the workers will have to quit jobs, some of them will be laid off and others will enter or re-enter. Cyclical unemployment occurs during the recession phase of a business cycle when investments and consumption expenditures begin to fall off and the economy is unable to generate the same number of jobs existing at the previous cyclical peak. According to Ferenčak (2003, 251) seasonal unemployment include all workers being left without a job at some period of year because of the seasonal characteristics of a job.

Unemployment is almost always expressed by the unemployment rate. Eurostat (2014) define the unemployment rate as a number of unemployed as a percentage of the labor force. The same formula will be used in unemployment analysis of Croatia and EU, as well in their comparison and correlation. The unemployment rate is an important indicator with both social and economic dimensions.

Rising unemployment results as: a loss of income for individuals, increased pressure to government to spend on social benefits and a reduction in tax revenue. From an economic perspective, unemployment may be viewed as unused labor capacity. The unemployment rate is considered to be a lagging indicator. When there is an economic downturn, it usually takes several months before the unemployment rate begins to rise. Once the economy starts to pick up again, employers usually remain cautious about hiring new staff and it may take several months before unemployment rates start to fall (Eurostat, 2014). Europe 2020 strategy and its two initiatives concerning unemployment issues, "*An agenda for new skills and jobs*" and "*Youth on the move*" put forward by European Commission unemployment rates will be targeted via by a range of policies, including proposals aimed at education and training institutions, or measures for the creation of an environment conducive to higher activity rates and higher labor productivity (Iuga, Cioca, 2013, 71; European Commission, 2014). As well as for the EU countries, Europe 2020 is implemented in Croatia and is expected to give positive results in the years.

Graph 1. Unemployment graph – Unemployment EU and Croatia comparison form 2003 to 2013



Source: Author calculation





On these graphs is presented comparison of unemployment between Croatia and EU as a whole and comparison between Croatia and EU countries separately in the period 2003-2013. Economic crisis in 2009 began to destroy the economic stability of Europe. Until 2009, Croatia was not able to get back to the previous year's level and unemployment is still rising. Since 2003 Croatia has been above EU's average in unemployment except in 2009, which was a year after crisis began. While Croatia's labor force is sinking some of the EU members have woken up and became a perfect example, like Poland and Slovakia. Unemployment in Croatia is breaking all the records and unfortunately, the prognoses are still poor for the Croatian economy. Since 2008 the unemployment rate has doubled from 8.6 % to 16.3 % in 2012, and most young people are affected. If Croatia is compared with its neighbors, Slovenia or Hungary with the unemployment rate of 9 % and 11%, Croatia is still deeply affected with economic crisis and its consequences.

2. GDP - REAL ECONOMIC STRENGTH MEASUREMENT FOR ANY COUNTRY

National accounts provide a comprehensive set of data about the economy, including the widely reported indicator gross domestic product (GDP). GDP, the most important concept of macroeconomics, refers to the total amount of goods and services a country produces. As well as being an indicator of the overall size of an

Source: Author calculation

economy, GDP is also used as a benchmark for other indicators to facilitate comparison between countries and regions or over certain period of time, and as a standard measure of economic progress. Useful for analysts, economists and investors, it is the most followed, discussed and digested indicator. Looking backwards in time it allows us to calculate economic growth. Truly economic growth is the change in the size of the economy and the level of output, and for that reason we calculate GDP figures. It is also a good way of assessing a quality and effectiveness of government policy that is trying to achieve economic growth. Only by measuring the economy we will know if these policies were successful or not. GDP has four components:

- private consumption (C)
- gross investments (I)
- government spending (G)
- net exports (X) imports (M)

GDP at market prices, which is used in this paper's analysis, is the final result of the production activity of resident producer units and it can be defined in three ways:

- GDP Production approach sum total of market value of final goods and services produced an a country during 1 year
- GDP Expenditure approach all expenditure incurred by individuals during 1 year
- GDP Income approach sum total of incomes of individuals living in a country during 1 year

GDP per capita is an approximation of the value of goods produced per person in the country, equal to the country's GDP divided by the total number of people in the country. Economic variables such as unemployment are important factor that influences the GDP and need to be controlled by the government to achieve the stabilization of economy. The correlation between GDP and unemployment which is analyzed in this paper can be seen as the higher unemployment rate will contribute to lower GDP because it indicates the slower growth of the economy by having too much jobless because of the unproductive economy. The effects of the crisis can be seen in constantly increasing rate of unemployment, the continual decline in GDP, and reduced share of exports to the EU and rest of the world (M.Vedriš, The Republic of Croatia before its entry into the EU: expectations and limits, zbornik radova sa Interdiscplinary Management Research). In 2012 GDP in Croatia stood at \in 43.9 billion equivalent to 0,3 % of the EU-28 total. Relative to the size of population, GDP in Croatia was \in 10.300 per capita, around 40 % of the $\in 25.600$ per capita average for the EU-27. It should be borne in mind that the cost of living in Croatia is below the EU average. GDP per capita in Croatia was around 61 % of the EU-27 average in 2011, above that of Latvia, Romania and Bulgaria. Prior to the financial, economic and public debt crisis annual GDP growth in Croatia exceeded that in the EU-27 but since 2009 this situation has reversed. (Eurostat, Stat Portrait Of Croatia2013, 76).

Croatia faces a major challenge in terms of strengthening public finances and promoting competitiveness. After five years of recession, the growth which is based on the creation of new jobs is a major challenge in the short term. Europe 2020 is a ten year strategy of growth of the EU. The goal is not only to overcome the crisis that still affects most of our economies, but also to fix shortcomings of current growth model and strategies and to create a different kind of growth that will be smarter, sustainable and inclusive. Five main objectives are defined that EU must achieve till the end of decade. These include employment, education, research and innovation, social inclusion and poverty reduction and climate change and energy (ec.europa.eu/europe2020/europe-2020-in-a-nutshell/index_hr.htm).

In 1962, Kuznets stated: "Distinctions must be kept in mind between quantity and quality of growth, between costs and returns, and between the short and long run. Goals for more growth should specify more growth of what and for what"(S. Kuznets, How to judge quality, The New Republic, 1962).



Graph 3. GDP - EU and Republic of Croatia comparison

Source: Author calculation Graph 4. GDP in 27 EU countries



Source: Author calculation

Graphs 3 and 4 show the change rates of GDP and GDP comparison between Croatian and EU and Croatia and the EU member states individually. It can be seen that in the period from 2003 until 2008 GDP grew, but the consequences of the economic crisis, both worldwide and in the EU led to a decline of GDP of up to 6.9% in 2009 and gradually stabilized on an annual basis. Expert's predictions are that GDP will achieve positive growth of 1 % in 2014. Peer countries such as Czech Republic, Hungary, Poland, Slovakia, Slovenia, Bulgaria and Romania have all managed to stabilize its own GDP.

3. GDP AND UNEMPLOYMENT ANALYSIS FOR EUROPEAN UNION AND REPUBLIC OF CROATIA

3.1. Analysis for European Union

In this chapter will be analyzed GDP and unemployment of European Union and Republic of Croatia. Main goal of this analysis is show GDP and EU and Republic of Croatia unemployment in the last 10 years, its correlation and to predict its future trends.

Analysis of correlation between GDP and unemployment shown in past ten years will be done by appliance of programming language R and its packages. All commands in R language are intuitive and there is no need of higher level computer programming knowledge to its understanding. All data for analysis, GDP and unemployment rates in past ten years are prepared in dataset form and stored in Excel worksheet.

Command <u>conn=odbcConnectExcel("C:\\MarkoAna\\euBN.xls"</u>) connects with data stored in Excel. In business intelligence system is usually to interpret data using three-dimensional visualization (in data cube form). In our example data cube is formed by data of unemployment, and GDP in EU and in Republic of Croatia for 10 years of time period, from 2003 until 2013.

Lines of commands in programming language R to create three-dimensional data cube:

```
> library(RODBC)
> library(scatterplot3d)
> conn = odbcConnectExcel("C:\\MarkoAna\\euBN.xls")
> data = sqlFetch(conn, "euBN")
> X<-data$Year
> Y<-data$Year
> Y<-data$Unemployment
> Z<-data$GDP
> scatterplot3d(X, Y, Z, pch=16, type="h", main="Data cube: GDP versus unem-
ployment in EU from year 2003 to 2012", xlab="Year", ylab=" Unemployment",
```

```
zlab = "GDP ".)
```



Picture 1. Data cube showing GDP versus unemployment in EU from 2003 until 2012

Source: Author calculation

Picture 1 shows the correlation between GDP and unemployment for the period from 2002 until 2012. Z-axis represents the amount of GDP in the EU in thousands of \in , Y-axis percentage of unemployment and axis-X represents years. The picture shows that the lowest unemployment rate was in 2003, and the highest unemployment rate was in the 2012 (Z axis). It is also evident that the increases of GDP and unemployment have the same trend for several years.

The Y-axis illustrates the changes in the unemployment rate in the EU, and the X-axis changes in GDP (in percentage), which is economically justified and logical, because unemployment is a function of GDP in every big economic system. In other words, it is assumed that any increase in GDP at the same time reduces unemployment (unemployment change is positive) and vice versa. Mathematically said reducing unemployment is a decreasing function of GDP growth.

Analyzing changes of unemployment and changes of GDP in the EU, there are visible periods for which is valid economic logic, but there are also other periods in which such economic logic is lost.





Source: Author calculation

Picture 2 shows correlation between unemployment rate change and GDP change in European Union during past 10 years (2003 to 2013).

There are two periods of unexpected changes in GDP and unemployment fluctuations (section of a graph in which function has a positive incline). Polynomial sixth grade (regression function), best adapts to the original data (best approximates them).

$Ur = 0,0004GDP^6 - 0,0128\;GDP^5 + 0,149\;GDP^4 - 0,8584\;GDP^3 + 2,5467\;GDP^2 - 3,6601\;GDP + 2,0485$

Ur is the change of unemployment rate and GDP is change in Gross Domestic Product in European Union. The coefficient of determination is $\mathbf{R}^2 = 0.99$. That means that the regression function explains 99% of the original data (changes of unemployment rate as a function of changes in GDP).

The original data of unemployment rate changes and changes in GDP for the period from 2003. to 2012. can be visualized again (picture 3). For visualization are used following sequence of commands of programming language R:

>library(RODBC) >library(scatterplot3d)

```
>conn = odbcConnectExcel("C:\\MarkoAna\\UnGDPc.xls")
>data = sqlFetch(conn, "List1")
>X<-data$Year
>Y<-data$Unc
>Z<-data$GDPc
>scatterplot3d (X, Y, Z, pch=16, type="h", main="Data cube: GDP change versus
unemployment change in EU from year 2003 to 2012", xlab="Year", ylab=" Un-
employment", zlab = " GDP ").
```

After establishing connection with data source (file UnGDPc.xls) from relation table next attributes are selected:

X<-data\$Year; Y<-data\$Unc and Z<-data\$GDPc

These vectors keep data about year, GDP changes rate and changes of unemployment rate respectively. In three dimensional data cube (picture 3.) are shown all points/records of relational table. Because one of three dimensions is time dimension in three dimensional systems is not clear relation between values of GDP changes and unemployment. These functional relations which are complement with economic logic are shown in picture 2.





Source: Author calculation

3.1.1. Prediction of trend of unemployment rate and GDP for EU in period 2014 to 2016

It would be very interesting if predictions about the unemployment rate changes in the EU, according to expected changes of GDP, would be implemented in the period 2014 to 2016. Such predictions follow all weaknesses that are due to the quality of the data and imperfections of predicting analytical instruments. Nowadays, in data analysis and predictions of variables future trends, methods of knowledge discovery in data are used. There are more methods which stream to avoid strictly mathematical functional dependence usually shown as regression. Implementation of those methods is a special part of the scientific research which is not part of the goals set in this paper. Those methods are called data mining and they are part of process of knowledge discovery in data. Those are applicable mostly on the large amount of data which detects hidden relations and connections between variables.

All data are specially prepared and filtered and are usually in form of dataset to be analyzed with some of data mining algorithm or method. The most common transformations of data in such system, also called the system of the business intelligence, are: inductive rules (ID3 and C4.5 algorithm), Support Vector Machines, multivariate methods (e.g. Principal Component Analysis), clustering methods (kmeans clustering, hierarchical and agglomerative clustering, fuzzy c-means clustering), neural networks, associative rules, Bayes algorithm etc.

Because there is fewer amount of data in process of analysis and prediction of unemployment rate changes as function of GDP amount it will be used trend line based on unemployment rate data in EU from period 2003 until 2012. Also, for the analysis, again it will be used simple commands in programming language R. Data are stored in file *C:\\MarkoAna\\euBN.xl.* After loading data it is enough to call function lm(Y-X) that adapts to original data.

- Result of calculation is trend function <u>Y=0.1733*X 339.0267</u>.
- > Unemployment prediction (2014 to 2016):
- > Unemployment_prediction=round (0.1733*(2014:2016) 339.0267,2).

Results of calculation in programing language R showed that the unemployment trend in period from 2014 to 2016 will be **10.00%** (2014); **10.17%** (2015) and **10.35%** (2016).

GDP trend:

> X<-data\$Year > Y<-data\$Unemployment > Z<-data\$GDP > trendGDP<-lm(Z~X) > abline(trendGDP) > trendGDP Call: lm(formula = Z ~ X) Coefficients: (Intercept) X -914280.0 467.3 Z=467.3*X-914280.0

```
Result of calculation is trend function <u>Z=467.3*X-914280.0.</u>
EU GDP prediction for 2014, 2015 and 2016:
> GDP_prediction=round (467.3*(2014:2016)-914280.0,2)
> GDP_prediction
[1] 26862.2 27329.5 27796.8
```

Results of calculation in programing language R showed that the GDP trend in period from 2014 to 2016 in EU will be 26.862,2€ (2014); 27.329,5€ (2015) and 27.796.8€ (2016).

Next regression function shows the functional relationship between unemployment and GDP in absolute values.



Picture 4. Correlation between unemployment rate and GDP in absolute

Source: Author calculation

Picture 4 shows correlation between unemployment rate and GDP in absolute amount in European Union during past 10 years (2003 to 2013).

Polynomial fourth grade (regression function), best adapts to the original data (best approximates them).

```
\underline{Ur} = 0,0043 \underline{GDP^{5}} - 0,1311 \underline{GDP^{4}} + 1,4642 \underline{GDP^{3}} - 7,2005 \underline{GDP^{2}} + 14,517 \underline{GDP}
```

Ur is the change of unemployment rate and GDP is change in Gross Domestic Product in European Union. The coefficient of determination is $R^2 = 0.8881$. That means that the regression function explains 88% of the original data (changes of unemployment rate as a function of changes in GDP).

3.2. Analysis for Republic of Croatia

The same methodology and procedure used in analysis for European Union is also used in analysis of unemployment rate and GDP past trends and its future predictions for Republic of Croatia.

Following the same methodology by analyzing relations between unemployment and GDP in Republic of Croatia there is significant similarity in the macro economical variable changes with those in the EU countries. In fact, the results showed the decrease of the unemployment rate in the periods of GDP growth. The difference exists in the coefficients of the regression equation but slope and direction of changes is very similar to what is seen in the previous diagrams related to European Union. > library(RODBC) > library(scatterplot3d) > conn=odbcConnectExcel("C:\\MarkoAna\\HRVGDP.xls") > data=sqlFetch(conn, "CroGdp") > X<-data\$Year > Y<-data\$Year > Y<-data\$Unemployment > Z<-data\$GDP > scatterplot3d(X, Y, Z, pch=16, type="h", main="Data cube: GDP versus unemployment in Croatia from year 2003 to 2012", xlab="Year", ylab=" Unemployment", zlab = " GDP ")

Picture 5. GDP versus unemployment rate in Republic of Croatia in 2002 to 2012

Source: Author calculation

Picture 5 shows the correlation between GDP and unemployment rate for the period from 2002 until 2012. Z-axis represents the amount of GDP in the Republic of Croatia in thousands of \in , Y-axis percentage of unemployment and axis-X represents years. The picture shows that the lowest unemployment rate was in 2003, and the highest unemployment rate was in the 2012 (Z axis). It is also evident that the increases of GDP and unemployment have the same trend for several years.

The Y-axis illustrates the changes in the unemployment rate in the Republic of Croatia, and the X-axis changes in GDP (in percentage), which is economically justified and logical, because unemployment is a function of GDP. In other words, it is assumed that any increase in GDP at the same time reduces unemployment (unemployment change is positive) and vice versa. Mathematically said reducing unemployment is a decreasing function of GDP growth.



Picture 6. Regression line of unemployment rate changes versus GDP changes

Source: Author calculation

Analyzing changes of unemployment and changes of GDP in the Republic of Croatia, there are visible periods for which is valid economic logic, but there are also other periods in which such economic logic is lost.

Picture 6 shows correlation between unemployment rate change and GDP change in Republic of Croatia during past 10 years (2003 to 2013).

There are two periods of unexpected changes in GDP and unemployment fluctuations (section of a graph in which function has a positive incline). Polynomial third grade (regression function), best adapts to the original data (best approximates them).

$$Ur = 0,0048GDP^3 - 0,0736GDP^2 + 0,2774GDP - 0,1289$$

Ur is the change of unemployment rate and GDP is change in Gross Domestic Product in Republic of Croatia. The coefficient of determination is $\mathbf{R}^2 = 0,89$. That means that the regression function explains 89% of the original data (changes of unemployment rate as a function of changes in GDP).

The original data of unemployment rate changes versus changes in GDP for the period from 2003. to 2012. can be visualized again (picture 7). For visualization are used following sequence of commands of programming language R:

> library(RODBC)

```
> library(scatterplot3d)
```

- > conn = odbcConnectExcel("C:\\MarkoAna\\UnGDPcCro.xls")
- > data = sqlFetch(conn, "List1")
- > X<-data\$Year
- > Y<-data\$Unc
- > Z<-data\$GDPc

> scatterplot3d(X, Y, Z, pch=16, type="h", main="Data cube: GDP change versus unemployment change in Croatia from year 2003 to 2012", xlab="Year", ylab=" Unemployment", zlab = "GDP")





Source: Author calculation 1

These vectors keep data about year, GDP changes rate and changes of unemployment rate respectively. In three dimensional data cube (picture 3.) are shown all points/records of relational table.

3.2.1. Prediction of trend of unemployment rate and GDP for Republic of Croatia in period 2014 to 2016

Prediction of unemployment rate and GDP future trends for Republic of Croatia will be done by the same methodology and procedures using programming language R as prediction for European Union in the paper. Sequence of commands in programming language R:

```
> library(RODBC)
> library(scatterplot3d)
> conn=odbcConnectExcel("C:\\MarkoAna\\HRVGDP.xls")
> data=sqlFetch(conn, "CroGdp")
> X<-data$Year
> Y<-data$Unemployment
> Z<-data$GDP
> trendUY<-lm(Y-X)
> abline(trendUY)
> trendUY
Call:
lm(formula = Y ~ X)
Coefficients:
(Intercept) X
```

19.320000 -0.003636

Unemployment trend function - <u>Y=-0.003636*X+19.320000</u>

> UnEmploy_prediction=round(-0.003636*(2014:2016)+19.320000,2)

> UnEmploy_prediction

[1] 12.00 11.99 11.99

Results of calculation in programing language R showed that the unemployment trend in period from 2014 to 2016 for Republic of Croatia will be **12.00%** (2014); **11.99%** (2015) and **11.99%** (2016).

GDP trend and prediction:

```
> library(RODBC)
```

- > library(scatterplot3d)
- > conn=odbcConnectExcel("C:\\MarkoAna\\HRVGDP.xls")
- > data=sqlFetch(conn, "CroGdp")

```
> X<-data$Year
```

> Y<-data\$Unemployment

```
> Z<-data$GDP
```

> trendGDP<-lm(Z~X)
> abline(trendGDP)
> trendGDP
Call:
lm(formula = Z ~ X)

Coefficients: (Intercept) X -784934.9 395.6

GDP trend function - <u>Z=395.6*X-784934.9</u>

> GDP_prediction=395.6*(2014:2016)-784934.9
> GDP_prediction
> [1] 11803.5 12199.1 12594.7

Results of calculation in programing language R showed that the GDP trend in period from 2014 to 2016 in Republic of Croatia will be **11.803,5**€ (2014); **12.199,1**€ (2015) and **12.594,7**€ (2016).

Picture 8. Regression line unemployment change versus GDP in absolute amount in Republic of Croatia for 2003 to 2013



Source: Author calculation

Picture 8 shows correlation between unemployment rate and GDP in absolute amount in Republic of Croatia during past 10 years (2003 to 2013).

Polynomial of sixth grade (regression function), best adapts to the original data (best approximates them).

$\frac{Ur = 0,0009GDP^{6} - 0,0316GDP^{5} + 0,4265 \ GDP^{4} - 2,6741GDP^{3} + 7,9267}{GDP^{2} + 11,2GDP + 19,88}$

Ur is the change of unemployment rate and GDP is change in Gross Domestic Product in European Union. The coefficient of determination is $R^2 = 0.9918$. That means that the regression function explains 99% of the original data (changes of unemployment rate as a function of changes in GDP).

4. CONCLUSION

GDP and unemployment as two economic indicators are used to measure economic growth and strength of any economy. Its analysis and attempts of predictions are very important for establishing economics policies in every country.

In this paper those two indicators, its past values and future trends for European Union and Republic of Croatia are presented.

Result of unemployment and GDP trend analysis for EU showed that the lowest unemployment rate was in 2003, and the highest unemployment rate was in the 2012. It is also evident that the increases of GDP and unemployment have the same trend for several years. It is assumed that any increase in GDP at the same time reduces unemployment (unemployment change is positive) and vice versa. Mathematically said reducing unemployment is a decreasing function of GDP growth.

Analyzing changes of unemployment and changes of GDP in the EU, there are visible periods for which is valid economic logic (lower unemployment rate with higher GDP), but there are also other periods in which such economic logic is lost.

Following the same methodology by analyzing relations between unemployment and GDP in Republic of Croatia there is significant similarity in the macro economical variable changes with those in the EU countries. In fact, the results showed the decrease of the unemployment rate in the periods of GDP growth. The difference exists in the coefficients of the regression equation but slope and direction of changes is very similar to what is seen in the previous diagrams related to European Union.

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