FINANCIAL CRISIS IMPLICATIONS ON THE FISCAL AND MONETARY POLICY OF EU COUNTRIES WITH ECONOMETRIC MODELING SUPPORT

Marijana Ilieva[1]

Abstract

The financial crisis that hit Europe in 2008 affected many spheres of the EU members' economies. It had drastic effects on the countries' economic activity, consumer spending, banking system liquidity, as well as negative impacts on interest rates and budget balances of the EU member states. This paper will examine the reaction of the EU member counties to the financial crisis, specifically, the use of fiscal and monetary policy to deal with such negative shock, with greater emphasis on the econometric support and background of these practices. Although extensive research and conclusions can be made by analyzing the response and results of the policies to the financial crisis, this paper aims to provide concrete econometric support to some of the practices derived from the crisis. Econometric modeling will be carried out in order to give stronger support to previous statements concluded in the paper and test relationships between certain variables. All econometric analyzes were made using the EViews software package.

Keywords: Financial crisis, fiscal and monetary policy, transmission mechanism, budget balances, econometric background

JEL Classification: C10, C50, C58, G01, H12, O23

1. Introduction

Fiscal and monetary policy is impactful instrument used for regulating economic activities and steering the economy in the right direction depending on the current economic situation. The onset of the financial crisis in Europe in 2008 had drastic effects on many areas of the EU members' economies where the EU countries used the fiscal and monetary policy intensively as instruments for dealing with this negative impact. This paper will examine the reaction of the EU member countries to the financial crisis with greater accent given on the econometric modeling conclusion and

1 Sparkasse Bank Makedonija AD Skopje, Republic of North Macedonia.
  E-mail: ilieva.marijana@gmail.com

support to the practices resulted from the crisis.

The first section will show the implications of the financial crisis on the EU monetary policy. First, we will give a brief overview of the functioning of the EU monetary policy and its specifics and then we will begin with the European Central Bank's response to the financial crisis. The ECB's crisis management decisions and the effects of the crisis on certain financial markets and financial instruments will be further outlined. Finally, an econometric analysis of prior claims will be made and relationships between selected variables of the EU monetary policy will be analyzed in order to give concrete support to previously concluded statements or given assumptions.

The second part will show the implications of the financial crisis on the fiscal policy of the EU countries. First, we will give a brief overview of the functioning of fiscal policy of the EU member states and then look at the response to the financial crisis through the use of fiscal policy. We will also see the effect of the financial crisis on the member states' budget balances. Finally, an econometric analysis of certain prior claims will be made and links between selected variables of the fiscal policies of the EU members will be analyzed in order to give stronger support to the concluded statements in the paper.

2. Literature Review

Given the effects and consequences of the financial crisis which were of remarkable magnitude, it is highly important to have thorough research on this matter, to uncover the determinants of the cause of this phenomenon and to find lessons and conclusions which would allow effective prevention or management of future occurrence of such impactful shocks.

The literature on the financial crisis and its impact in Europe and on a global level as well, is highly extensive. Various researches have been made on this topic, thoroughly sublimating the causes, effects and consequences of the crisis and its significance. However, the econometric side of the research is not as expansive as the empirical point. Having in mind the caliber of the crisis, it sparks great interest in researchers for further econometric research on this subject.

Numerous publications and papers have been published on this subject. The European Central Bank is engaged in a wide range of economic research activities. ECB economists provide models, tools and analyses to support policy making and better communicate policy to markets and the public. ECB publishes various ranges of regular and ad hoc reports and research papers which offer a deeper insight into the ECB's activities and its decisions. Great number of publications and papers has been published on this subject by the ECB as one of the main decision makers regarding the monetary aspect during the crisis, as well as other authors and researchers from different institutions. This paper aims to provide explanations and analyses on this subject as well, giving more priority to the economic research of the matter.

The fact is that the financial crisis has implicated significant changes in the behavior of the EU countries and their common practices. The crisis has led to the need of introduction of non-standard measures of dealing with such occurrence, change in movement of key rates and variables, effects on the financial markets, as well as impactful disruptions on the budget balances of the EU and EMU members in the period of crisis and beyond. Such adaptation in practices implies that the EU countries have utilized their policies flexibly and effectively to deal with negative implications caused by the crisis.

3. Methodology and Data

The purpose of this paper is to examine the econometric backdrop of the implications and results of the financial crisis and the response of the EU countries to the crisis through their fiscal and monetary policy.

The data used for the analyses are extracted from the statistical office of the European Union - Eurostat (European Statistical Office). As a source, Eurostat offers a whole range of important and interesting data that governments, businesses, the education sector, journalists and the public can use for their work and daily life. This raw data collected acts as a base for further econometric modeling and testing throughout the paper in order to conclude the statements made. All econometric analyzes were performed using the EViews software package.

In terms of the first segment of the paper examining the monetary policy's reaction to the financial crisis, the data collected is focused on the interest rates, specifically the EONIA interest rate and ECB's key interest rates - Main refinancing operations, Marginal lending facility and Deposit facility. These data are further engaged in econometric modeling and testing to conclude certain statements given. Generally, the link between the MRO's and EONIA is tested in order to confirm their relationship and conclude the change in movement between the variables. This is done by applying the econometric tools such as the Johansen Co-integration Test, the Granger Causality Test and the T-GARCH extension. All conclusions are given and analyzed further in the paper.

Regarding the second segment of the paper examining the fiscal policy's reaction to the financial crisis, the data collected are focused on the budget balances of the EU and EMU member countries. This is done due to the fact that the fiscal policy is the only instrument for stress amortization in times of an ineffective common monetary policy. In this aspect, a structural econometric model approach is taken where the dependent variable is the budget deficit of the EU countries and as independent variables, which affect the budget deficit chosen are the expenditures, revenues, GDP growth rate and the unemployment rate in EU. The quantitative data and the significance and justification of the independent variables are presented further in the paper analysis, in the econometric modeling segment. Generally, the significance is based on the structural presence of some variablesand on the direct proportional or inverse effect of other of the variables on the budget deficit as well. The significance is

also confirmed in the regression analysis by the adjusted coefficient of determination (Adj. R^2) of ~99%. This is then a further basis for testing the presence of change in the budget balance due to the crisis emergence. This is done by applying the Chow Breakpoint Test to conclude the impact of the crisis on the budget deficits of the countries. Again, all conclusions are given and analyzed further in the paper.

The general conclusion of the econometric models performed is that they confirm the empirical practices of the crisis' implications and give stronger support to some statements initially obtained by other methods as well.

4. Financial Crisis Implications on Monetary Policy

Monetary Policy of the European Central Bank

The European Central Bank (ECB) is an official EU institution at the heart of the Eurosystem. It is reliable for the monetary policy of the Eurozone member states, while the monetary policy of the other European Union member states outside the EMU is run by the National Central Banks (NCBs).

The primary objective of the ECB's monetary policy is to maintain price stability. The ECB has defined price stability as a year-on-year increase in the Harmonized Index of Consumer Prices (HICP) for the euro area of below 2%. In the pursuit of price stability, the ECB aims at maintaining inflation rates below, but close to 2% over the medium term (ECB, 2020). In order to achieve its primary objective, the Euro system uses a set of monetary policy instruments and procedures. This set forms the operational framework to implement the single monetary policy.

ECB's Reaction to the Financial Crisis

In times of increasing uncertainty and stress, in response to the financial crisis the ECB took measures that are of an unprecedented nature and magnitude. They represent a remarkable response to exceptional circumstances in the context of unusually high uncertainty and volatility in the financial markets. In addition to lowering key interest rates to historically low levels, non-standard measures were adopted to preserve price stability, restore the monetary policy transmission mechanism and stabilize the financial situation.

Regarding the standard monetary policy behavior, the ECB in conjunction with other central banks, initially lowered the interest rates by 50 basis points on October 8, 2008 (ECB, 2013). However, given the declining economic activity, as well as the increased risk of deteriorating price stability in the medium term, the Governing Council continued to cut the key interest rates. As it can be concluded from Chart 1, the interest rate on the main refinancing operations was reduced by 325 basis points, from 4.25% to 1%, between October 2008 and May 2009.

Chart 1. ECB's Key Interest Rates
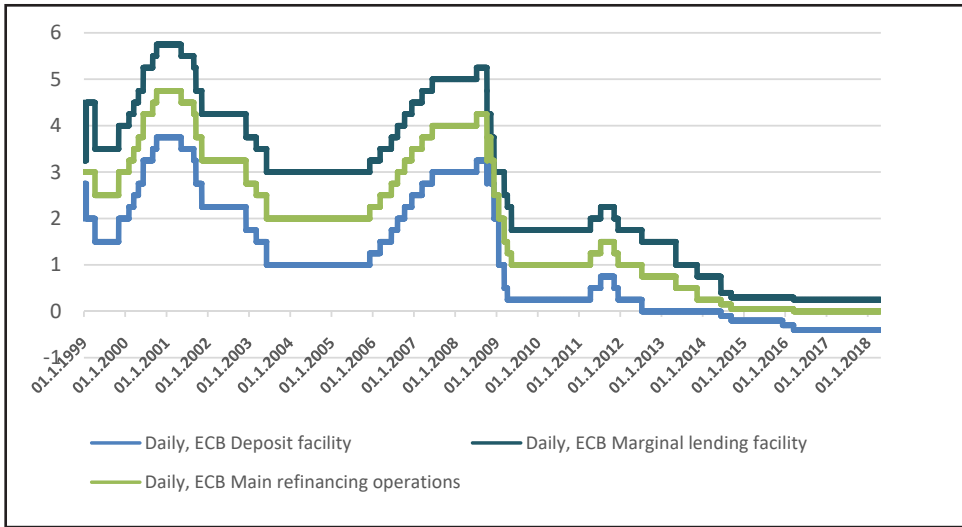
Source: Eurostat

At the same time, in line with the primary objective, the Governing Council adopted several temporary non-standard measures to support the financing conditions and credit flows, beyond what can be achieved by lowering interest rates.

Non-standard Measures Implemented by ECB

The financial crisis had disrupted the monetary policy transmission mechanism. In addition, the ECB could not revive the economy with the available instruments. The reduced interest rate in order to increase the ECB's liquidity failed to boost lending in the economy and revive it from recession. Generally, in times of crisis, due to increased uncertainty, banks refrain from increasing their lending. The banks were also heavily indebted at that time, so the new liquidity was perceived as a chance to settle that debt with the creditors. In order to restore the functionality of the transmission mechanism, as well as to stimulate the economy, the ECB introduced certain non-standard measures.

The ECB's operational framework had proved to be quite flexible in times of crisis. The non-standard measures were of a temporary nature and in line with the primary objective of price stability. These measures mainly targeted the banking sector, due to its important role in transmitting the monetary policy and financing the euro area economy. The non-standard measures consisted of the Enhanced Credit Support Program and the Securities Purchase Program. The ECB also introduced the Outright Monetary Transactions program, as well as Quantitative Easing (QA) - Expanded Asset Purchase Programme (EAPP) in order to optimally restore the transmission mechanism and the economy.

Effect on the Money Market

As a result of these non-standard measures, the relationship between the interest rate

on the main refinancing operations and the money market interest rate - EONIA (Euro OverNight Index Average) changed direction. Namely, the transmission mechanism has initial and direct effect on the money market. In normal conditions, these two interest rates have almost identical value and direction. The money market interest rate follows the interest rate movement of the main refinancing operations; however the high demand for central bank liquidity during the crisis had resulted in the EONIA rate to follow the overnight deposit interest rate movement. This can be concluded from Chart 2.

The Chart also shows the gap between the available standing facilities and the main refinancing operations. This range remained unchanged between April 1999 and October 2008, differing by +/- 1 percentage point. The width was temporarily adjusted by +/- 0.5 percentage points, but again expanded to +/- 0.75 percentage points in May 2009, after the Governing Council set the interest rate on main refinancing operations to 1%.

Chart 2. ECB's Key Interest Rates and EONIA Movement
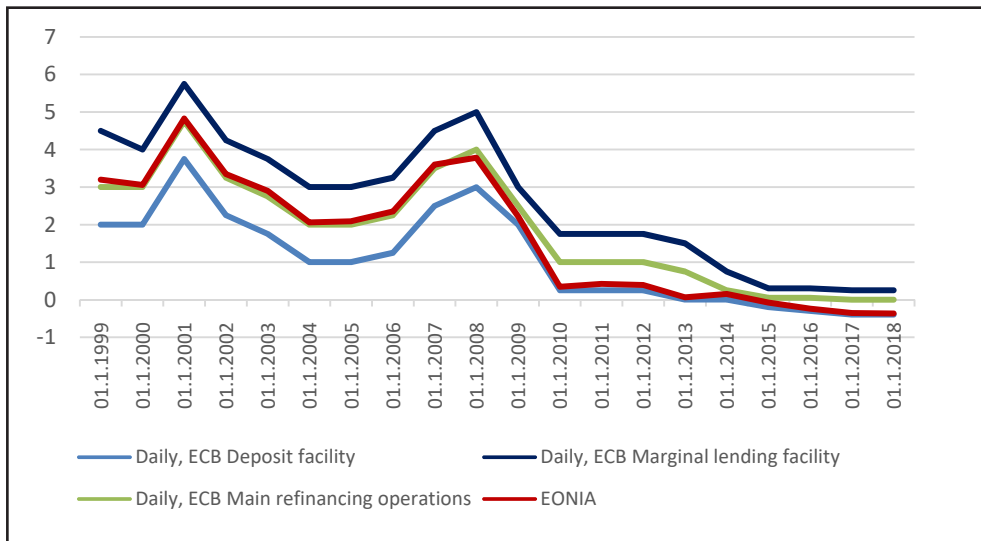
Source: Eurostat

Econometric Analysis

In order to conclude prior statements and test relations between certain variables, we will further use econometric modeling and testing.

Firstly, we will observe the link between the ECB's main refinancing operations (MROs) and the money market interest rate - EONIA. As mentioned, the transmission mechanism has initial and direct effect on the money market - under normal conditions these two interest rates have almost identical value and direction. However, as mentioned, because during the financial crisis the EONIA rate showed a tendency to follow the interest rates on the overnight deposits facility rather than on main refinancing operations, the time series of the two variables is taken for the period from 1999 to 2008, in order this fact not to interfere with the analysis of the relationship.

To test whether there is a long-term relationship between these two variables, i.e. to determine whether the variables are moving together regarding value in the long run, we apply the cointegration test, known as the Johansen Cointegration Test.

Prior condition for using this test is for the time series of the variables to be non-stationary in the level and integrated in the same order, although the non-stationary time series (original data) are used when implementing the test. This is the case with both time series, which means that the Johansen test for cointegration can be applied.[2]

Non-rejection of the null hypothesis (H_0) implies that there is cointegration between the observed variables, i.e. there is a proportional, balanced movement of the variables in the long run. The test consists of two individual tests: the Trace Test, which is considered stricter, and the Maximum Eigenvalue Test. The results are shown in Table 1. It can be seen that in both tests, with the p-value less than the significance level α = 0.05, the null hypothesis of no cointegrated relationship between the variables is rejected. Additionally, with the p-value greater than the significance level α = 0.05, the null hypothesis of the existence of (at most) one cointegration relation is not rejected. This is also confirmed by the fact that both tests indicate the existence of a cointegration relationship, which means that the long-term relationship of these two variables can be confirmed.

Table 1. Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.006387	18.12074	15.49471	0.0197
At most 1	0.000684	1.749465	3.841466	0.1859

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.006387	16.37127	14.26460	0.0229
At most 1	0.000684	1.749465	3.841466	0.1859

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's analysis

---

2 A single root test was used to determine the stationarity of the series, which proved to meet this time series criterion.

In order to check if there is causality between the ECB's Main Refinancing Operations and the Money Market Interest Rate - EONIA, the Granger Causality Test is conducted. This is done on stationary time series - on the differentiated time series of the variables.

The null hypothesis states that there is no causality between the series, while the alternative hypothesis states that there is causality between the time series of the variables. The results are shown in Table 2. It can be seen that the p-value of both variables is greater than the alpha significance level, which means that H_0 is not rejected, i.e. there is no causality between the variables. This means that one variable does not contain information from its historical values to predict the other variable, and vice versa (one does not Granger cause the other).

Table 2. Granger Causality Test

VAR Granger Causality/Block Exogeneity Wald Tests

Date: 05/31/18   Time: 19:49

Sample: 1/04/1999 12/31/2008

Included observations: 2557

Dependent variable: RMRO			
Excluded	Chi-sq	df	Prob.
REONIA	0.388588	2	0.8234
All	0.388588	2	0.8234
Dependent variable: REONIA			
Excluded	Chi-sq	df	Prob.
RMRO	0.511058	2	0.7745
All	0.511058	2	0.7745

Source: Author's analysis

Finally, in order to conclude if there is a leverage effect, or EONIA time series asymmetric volatility[3], we will use the GARCH extension called T-GARCH. The relevant variable containing the leverage effect is γ, i.e. RESID (-1) ^ 2 * (RESID (-1) <0). As can be concluded from Table 3 the γ variable has a positive value. The leverage effect is present in the series, which means that in periods of negative movements in the money market, the EONIA interest rate's volatility is more pronounced than in periods of positive movements.

---

3 The effect of leverage is asymmetry of volatility, that is, greater volatility of time series in periods of negative movement, and less in periods of positive movement.

Table 3. T-GARCH in EViews

Dependent Variable: DLEONIA

Method: ML - ARCH (Marquardt) - Normal distribution

Date: 05/31/18   Time: 20:23

Sample (adjusted): 1/05/1999 12/31/2008

Included observations: 2559 after adjustments

Convergence achieved after 55 iterations

Presample variance: backcast (parameter = 0.7)

GARCH = C(2) + C(3)*RESID(-1)^2 + C(4)*RESID(-1)^2*(RESID(-1)<0) +

    C(5)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.000642	9.40E-05	6.830870	0.0000
Variance Equation				
C	0.000139	1.93E-06	71.88591	0.0000
RESID(-1)^2	4.354537	0.154067	28.26393	0.0000
RESID(-1)^2*(RESID(-1)<0)	2.434607	0.295403	8.241652	0.0000
GARCH(-1)	0.081979	0.003164	25.91065	0.0000
R-squared	-0.000311	Mean dependent var		-0.000120
Adjusted R-squared	-0.000311	S.D. dependent var		0.043220
S.E. of regression	0.043226	Akaike info criterion		-4.344037
Sum squared resid	4.779648	Schwarz criterion		-4.332612
Log likelihood	5563.195	Hannan-Quinn criter.		-4.339894
Durbin-Watson stat	2.364052			

Source: Author's analysis

5. Financial Crisis Implications on Fiscal Policy

Fiscal Policy and the Financial Crisis

The National Governments are responsible for other policies in the EU, as well as in the EMU, beyond the monetary policy. This includes the fiscal policy regarding government budgets, taxation policies that determine the revenue, and structural policies that determine pension systems, as well as labor and capital market regulations (ECB, 2018).

The Economic and Monetary Union (EMU) is a monetary union, but not a fiscal union. The EMU does not have a single common fiscal policy, a single common tax system or a single Ministry of Finance. The fiscal policy in the EMU is carried out by the national governments. With entrance in the Union, the EMU member states abandoned their monetary policy and exchange rate, but retained their fiscal policy.

By joining the monetary union, the member states' fiscal policy plays a dual role. In general, fiscal and monetary policy are substitutable policies - one purpose (example: stimulating aggregate demand) can be achieved by fiscal and monetary policy - by increasing expenditure or reducing taxes, or by lowering interest rates and consequently raising lending, respectively. However, it cannot be said that the two policies are completely interchangeable. There is no perfect substitute between the two policies because of some qualitative differences (average longer lag delay of fiscal policy etc.). That is why the monetary policy loss cannot be 100% compensated by the fiscal policy. However, the fiscal policy is undoubtedly the only instrument the EMU member states possess to deal with asymmetric shocks. In such circumstances, the monetary policy becomes ineffective because it is a single, common policy of the EMU countries and cannot simultaneously affect the different economic cycles of the other EU countries. For this reason, the fiscal policy remains as the only instrument for tackling these problems.

Response to the Financial Crisis through Fiscal Policy

The use of fiscal policy to stimulate the economy during the financial crisis has resulted in an increase in budget deficits of the EU countries, thus increasing the budget deficits of EMU member states more than non-member countries, and consequently their public debt. This can be concluded from Charts 3 and 4. Namely, in the emergence of the crisis, EMU member countries used fiscal policy as a buffer for this external shock given the common monetary policy. However, following the crisis, from 2014 onwards, due to the need for fiscal consolidation, there is a trend of significant reduction of the budget deficit of the countries, thus returning in line with the Maastricht criteria.

Chart 3. Budget Deficit of EMU Countries
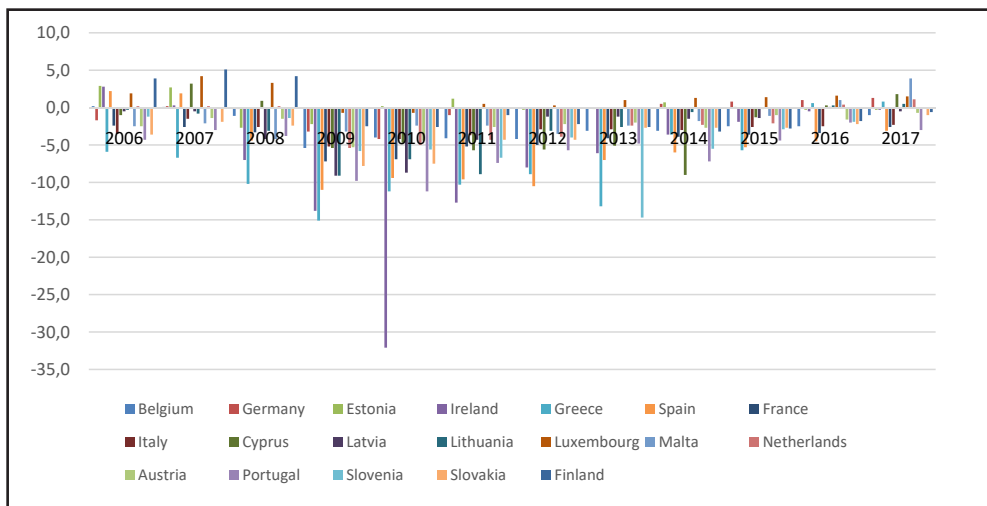
Source: Eurostat

The same conclusion can be reached for the non-EMU countries as well. The fiscal policy was used to stimulate the economy during the crisis, although the intensity of the budget deficit is lower compared to that of the EMU countries. After the crisis there is a trend of deficit reduction due to the need for fiscal consolidation as well.

Chart 4. Budget Deficit of the Countries outside EMU
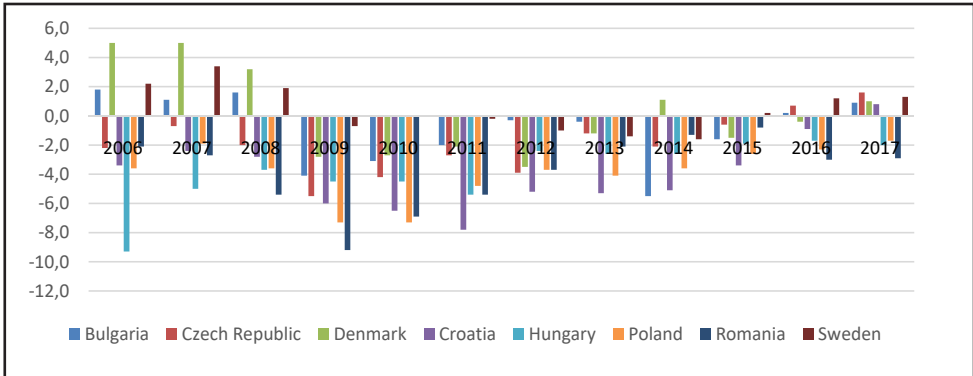
Source: Eurostat

Econometric Analysis

In order to test previous claims and relationships between certain variables, we will further use econometric modeling and testing.

Firstly, a structural model is conducted, where the budget deficit of the EU countries is taken as the dependent variable and as some of the most important independent variables chosen are the expenditures, revenues, GDP growth rate and the unemployment rate in EU. The data are presented in the Table below:

Table 5. Variables Data

Year	Budget Deficit	Expenditures	Revenues	GDP Rate	Unemployment Rate
2002	-2.6	45.5	43.5	1.2	9.0
2003	-3.2	46.1	42.9	1.5	9.2
2004	-2.8	45.7	42.9	2.3	9.3
2005	-2.5	45.8	43.3	2.1	9.0
2006	-1.6	45.2	43.6	3.3	8.2
2007	-0.9	44.6	43.7	3.0	7.2
2008	-2.5	46.2	43.7	0.4	7.0
2009	-6.6	50.0	43.4	-4.3	9.0
2010	-6.4	49.8	43.4	2.1	9.6
2011	-4.6	48.5	44.0	1.7	9.7
2012	-4.3	48.9	44.6	-0.4	10.5
2013	-3.3	48.6	45.3	0.3	10.9
2014	-2.9	48.0	45.0	1.8	10.2
2015	-2.3	47.0	44.6	2.3	9.4
2016	-1.6	46.3	44.7	1.9	8.6
2017	-1.0	45.9	44.9	2.4	7.7
2018	-0.7	45.8	45.1	2.0	6.7

Source: Eurostat

Expenditures. Government spending is one of the integral measures of fiscal policy that countries use to deal with in the economic cycles. The expenditures are a variable that directly and proportionally affects the budget deficit of a country, i.e. increase of the expenditures results in an increase of the budget deficit and vice versa.

Revenues. Revenues are another integral measure of fiscal policy where governments through collection of taxes and other duties provide sufficient resources to stimulate the economy. It is a variable that has an inverse effect on the budget deficit, i.e. the increase of the revenues results in a decrease of the budget deficit of a country.

GDP. Depending on the phase of the business cycle in the economy, governments coordinate the fiscal policy in a countercyclical direction. If the economy is expanding, a restrictive fiscal policy is pursued, thereby increasing the collection of public taxes and/or reducing government spending which results in a reduction of the deficit.

Unemployment. Long-term unemployment is a structural phenomenon in the EU. EU member states are facing high long-term unemployment rates of around 50% of the GDP which burden their governments' budgets for various fiscal expenditures on unemployment. Unemployment affects the budget deficits in a proportional manner.

Multiple Linear Regression Analysis

Regression analysis is a statistical technique that attempts to determine changes in one variable called a dependent variable, as a function of changes in a series of other variables called independent variables. In this case, a multiple regression analysis was performed where the budget deficit was taken as a dependent variable and the other previously mentioned variables as independent variables.

Table 6. Multiple Linear Regression in EViews

Dependent Variable: DEFICIT

Method: Least Squares

Date: 01/28/20   Time: 00:41

Sample: 2002 2018

Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.157201	2.886579	1.093752	0.2974
BDP	-0.037320	0.046738	-0.798485	0.4415
NEVRAB	0.006285	0.057962	0.108429	0.9156
PRIHODI	-1.048133	0.063126	-16.60390	0.0000
RASHODI	0.978983	0.035247	27.77455	0.0000
R-squared	0.992322	Mean dependent var		3.068750
Adjusted R-squared	0.989530	S.D. dependent var		1.680365
S.E. of regression	0.171939	Akaike info criterion		-0.433048
Sum squared resid	0.325193	Schwarz criterion		-0.191614
Log likelihood	8.464382	Hannan-Quinn criter.		-0.420684
F-statistic	355.4203	Durbin-Watson stat		1.446016
Prob(F-statistic)	0.000000			

Source: Author's analysis

A multiple linear regression analysis was performed on the EU-28 budget deficit data presented. From the results above, we can see that the F statistic coefficient has a very high value, and that the Prob (F-statistic) is lower than the significance level α of 0.05, which confirms that the model is statistically significant. In addition, the good construction of the model can be confirmed by the adjusted coefficient of determination (Adj. R^2), which is 0.989530, i.e. 98.9530% of the budget deficit variations are described by the variations of the other independent variables chosen in the model.

An interpretation of the coefficients obtained by the least squares method follows. The estimation of the GDP parameter equals -0.037320 which means that if the GDP rate increases by 1, the budget deficit of the EU countries will decrease by 0.037320 on average, ceteris paribus, which confirms the previously stated negative

relationship between the variables. The unemployment coefficient has a positive sign indicating a direct, positive dependence of the variables, and would be interpreted as, if unemployment increased by 1, the budget deficit of EU countries would on average increase by 0.021115, ceteris paribus. The same interpretation applies to the other coefficients as well. The symbols in front of the coefficients can also be observed as confirmation for the relationship between the independent variables and the dependent variable in terms of the direction of their movement, which is in line with the events in practice.

Chow Breakpoint Test

The Chow Breakpoint Test attempts to identify structural changes at some or more points in time. Generally, it is used to see if data from time series can be combined before and after a particular event. It can also be used to decide whether data from two different groups or locations can be combined.

As mentioned, the financial crisis that hit Europe in 2008 has affected many spheres in the economies of the EU member states, including the budget deficit, especially of those countries that are members of the EMU, due to the fact that they have fiscal policy as the only instrument to manage such external shocks given the ineffective common monetary policy. The Chow Breakpoint Test has been carried out to see if the crisis has led to structural changes in EU member states. We take 2008 as the breakpoint period in which we assume structural changes had been made.

Table 7. Chow Breakpoint Test

Chow Breakpoint Test: 2008

Null Hypothesis: No breaks at specified breakpoints

Varying regressors: All equation variables

Equation Sample: 2002 2018

F-statistic	7.388050	Prob. F(5,6)	0.0152
Log likelihood ratio	31.48880	Prob. Chi-Square(5)	0.0000
Wald Statistic	36.94025	Prob. Chi-Square(5)	0.0000

Source: Author's analysis

From the results obtained from the Chow Test, it can be seen that the F statistic has a p-value of 0.0152, which is less than the significance level α of 0.05, which means that the null hypothesis is rejected and can be confirmed that structural changes had been made in this point in time. This confirms the emergence in practice of structural increase in the budget deficit due to utilizing the fiscal policy as a shock buffer for the crisis.

6. Conclusion

The conclusion is that the EU members used the fiscal and monetary policy effectively to deal with the financial crisis.

Regarding the monetary policy, the European Central Bank lowered the key interest rates to historically lowest levels. In addition, non-standard measures were adopted to preserve price stability, restore the monetary policy transmission mechanism and stabilize the financial situation. Through implementation of various programs, ECB has managed to ensure the smooth functioning of the money markets and provide depth and liquidity to non-performing market segments. Several conclusions were drawn from the conducted econometric analyses. The Johansen Cointegration Test proved that there is a cointegration relationship between the interest rates on the main refinancing operations and the interest rates on the EONIA money market, thus confirming their pre-established relationship. The causality test between the same variables has shown that there is no causality between them, which is to be expected to some extent since causality is generally a strong term. Finally, the T-GARCH analysis on the EONIA money market interest rates has proven the existence of the leverage effect, i.e. the volatility is more pronounced in periods of negative movements.

From the fiscal policy point of view, the financial crisis had a major impact on the budget balances of the EU membes, especially on the EMU countries, due to the fact that the fiscal policy is the only instrument standing to deal with such external shocks.The budget deficits of EMU member countries increased more intensely than the budget deficits of other EU member states. Finally, by conducting the Chow Breakpoint test, the econometric analysis confirmed the impact of the financial crisis on the budget deficit of the EU member states.

In practice, the EU members utilized their policies optimally, managing to adapt them flexibly and successfully to surpass the financial crisis emergence and restore normal functioning of the economies.

References

Bucevska, V. (2016) *"Econometrics with application in EViews"*, Second edition. Faculty of Economics, Ss. Cyril and Methodius University in Skopje, North Macedonia

Cour-Thimann, P. and Winkler, B. (2013) "The ECB's non-standard monetary policy measures the role of institutional factors and financial structure", Working Paper Series No. 1528, April 2013, pp 19-22, available at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1528.pdf

Delivorias, A. (2015) "Monetary policy of the European Central Bank – Strategy, conduct and trends", February 2015 – PE 549,005, pp. 11-16, available at: http://www.europarl.europa.eu/EPRS/EPRS-IDA-549005-Monetary-policy-ECB-FINAL.pdf

European Central Bank (2011) "The Monetary policy of the ECB 2011", pp. 93-129, available at: https://www.ecb.europa.eu/pub/pdf/other/monetarypolicy2011en.pdf

European Central Bank (2020) Monetary policy of ECB, available at: https://www.ecb.europa.eu/mopo/intro/html/index.en.html

Eurostat database, available at: https://ec.europa.eu/eurostat/home?

Orphanides, A. (2017) "The Fiscal-Monetary Policy Mix in the Euro Area: Challenges at the Zero Lower Bound", discussion paper 060, july 2017, pp. 10-12, available at: https://ec.europa.eu/info/sites/info/files/dp_060_en.pdf

Trpeski, L. (2009) "Banking and banking operations", First edition, Skopje, Faculty of Economics, Ss. Cyril and Methodius University in Skopje, Republic of North Macedonia

Trpeski, L. (2010), "Monetary economy", First edition, Skopje, Faculty of Economics, Ss. Cyril and Methodius University in Skopje, Republic of North Macedonia