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Moradi, Davood and Rasoulinezhad, Ehsan

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Logical Forecasting of the Eurozone Crisis through ANP

Davood Moradi ¹, Ehsan Rasoulinezhad ²

¹ *PhD student in Economic Sociology and development, Islamic Azad University, Tehran, Iran*

Email: moradi333@gmail.com

² *PhD student in Economics, State University of Saint Petersburg, St.Petersburg, Russia*

Email: erasolinejad@gmail.com

Abstract. The Eurozone crisis is an ongoing financial problem that has made it difficult and impossible to some countries in the euro area to re-finance their government debt. This problem generates various inverse effects for many other nations in the world due to their capital markets's connections with the Eurozone markets. Hence, overcoming this crisis can be crucial for a high number of countries. This paper is an attempt to logically explore the best solutions in order to pass this crisis. For this purpose, a flexible and dynamic framework with the Analytic Network Process (ANP) is designed to forecast this crisis's solutions through some recognized clusters and factors. The results of this paper identified the best proactive solutions which can be considered as a tool to make the best way to overcome this crisis.

Keywords: Eurozone crisis; Analytic Network Process; Forecasting

1. Introduction

The Eurozone crisis developing by the global financial crisis in 2008-9, has made it difficult for countries in the euro area to re-finance their government debt without the assistance of third parties (Jamal Ibrahim;2012). Since late 2009, risk of the Eurozone crisis has been considered among investors as a result of the rising government debt levels around the world together with a wave of downgrading of government debt in European states. One the one hand, global commodities markets such as crude oil (Fig. 1) experienced a reduction in the demand side (European countries decreased their commodities demand) and led to a higher price fluctuations in these markets. One the other hand FDI in these counties encountered a higher risk level, which forced investors to reduce their investments. It is shown in Fig. 2 which illustrates the FDI trend in the Euro area over the period 2000-2013.

Fig 1. Brent oil prices, Jan 2007-Dec 2012 (\$/Barrel)

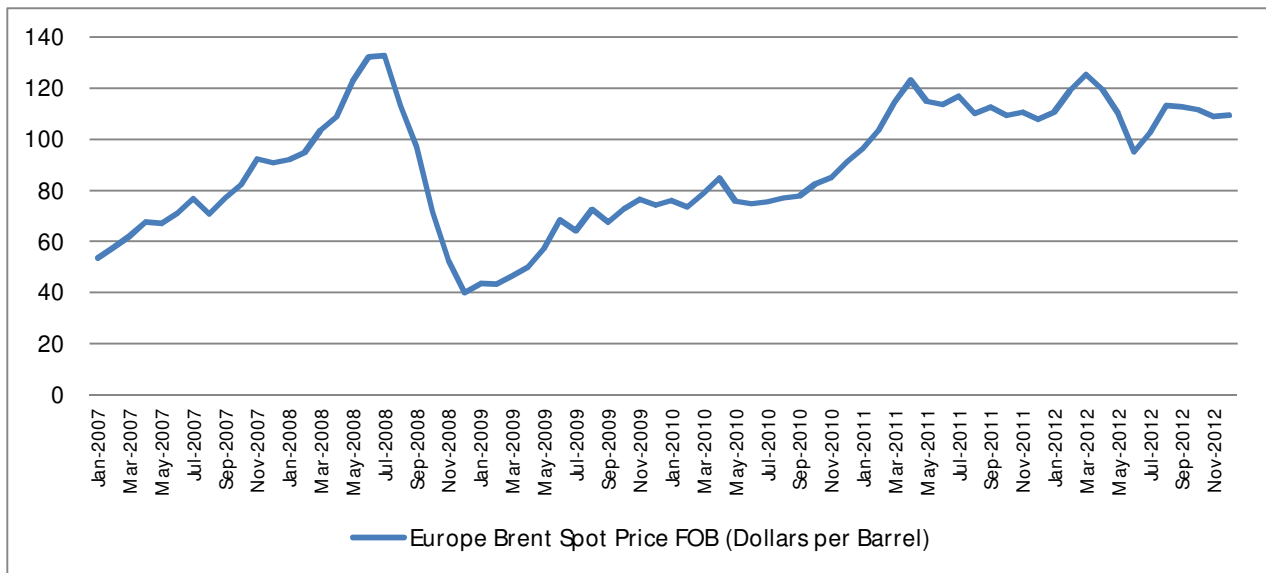
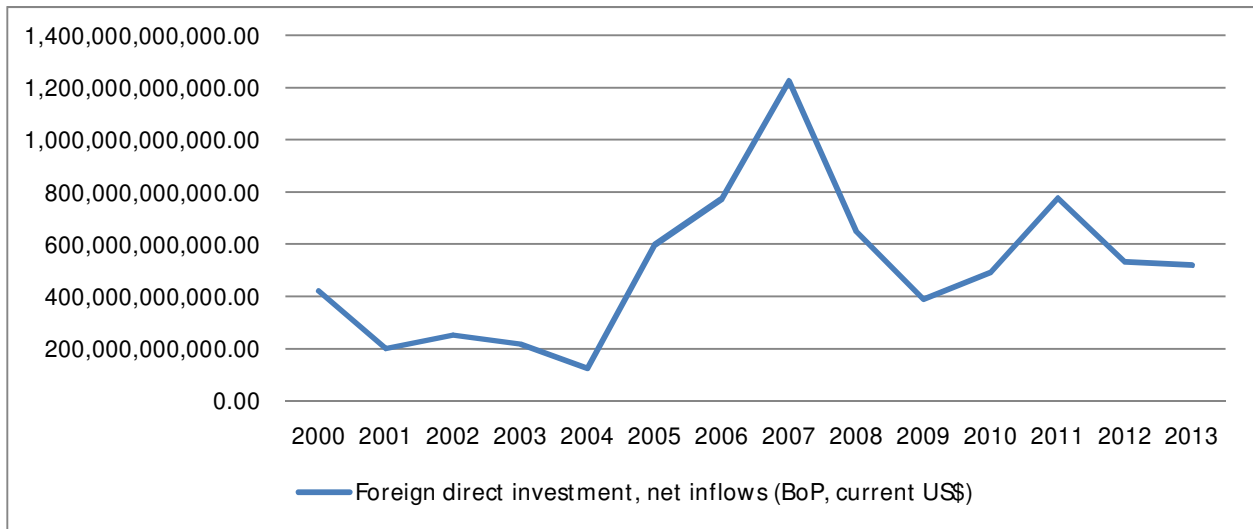


Fig 2. FDI in the Euro area, 2000-2013 (current \$)



Source: World bank database

To find the origin of the financial distress, researchers have conducted and analyzed financial records dated many years and possibly decades old. The most important reason of it was due to the way the European Union deals and makes their trade policies. In fact the European Union only takes action after the facts. They only address a situation when it has already become a problem. So the problem alerted to weakness and weakness changed to challenge and challenge reformed to a crisis. To solve this crisis, high number of researchers have presented various solutions partially. But up to now there has not been any wholly and integrated research to focus on this issue logically through a scientific method. In this research, we try to make a proactive framework for forecasting the best solutions in 6 clusters through an advanced decision making model entitled ANP which has used broadly in economics and management fields.

The rest of this paper is organized as follows: The second section expresses empirical researches. The next one, explains briefly the Eurozone crisis, logical forecasting and the ANP model. The methodology is discussed in the section 4. Results are presented in the next section and the last section concluded the paper.

2. Empirical Research

Since this crisis has not a long history, there is not any depth research about remarkable solutions to this crisis. But a number of studies have investigated partially the various aspects of this crisis. Markus Jorra (2012) studied the effect of IMF lending on the sovereign debt crisis. He found that IMF programs significantly increase the probability of subsequent sovereign defaults by approximately 1.5-2% points. Matherin and et al (2012) investigated the Eurozone crisis and monetary policy. They acclaimed the euro area monetary policy stands at a cross road. Moreover Missio and Watzka (2011) analyzed the contagious effects during the euro crisis. Welfens (2011) in his research compared the transatlantic banking crisis and the euro crisis. Especially the debt dynamics of governments are analyzed and the issue of whether there is a need for restructuring the debt of Greece.

3. Definitions

3.1. The Eurozone Crisis

The Eurozone crisis is a financial crisis or sovereign debt one that has made it difficult or impossible for some countries in the euro area to re-finance their government debt. Since late 2009, fears of a sovereign debt crisis developed among investors as a result of the rising government debt levels around the world with a wave of downgrading of government debt in some European states. It is noticeable that while sovereign debt has risen substantially in only a few Eurozone countries, it has become a perceived problem in the area as a whole.

3.2. Logical Forecasting

Forecasting is the process of making statements about events whose actual outcomes have not yet been observed. A commonplace example might be estimation for some variable of interest at some specified future date. Prediction is a similar, but more general term. Both might refer to formal statistical methods employing time series, cross-sectional or longitudinal data, or alternatively to less formal judgmental methods. Entirely we can distinct this process to two types, qualitative and quantitative. Qualitative

forecasting techniques are subjective, based on the opinion and judgment of consumers, experts; appropriate when past data is not available. It is always performed to intermediate-long range decisions. Quantitative forecasting models are used to estimate future demands as a function of past data; appropriate when past data are available. But Logical Forecasting (LF) is a blended method. We use both quantitative and qualitative ways in LF. So this kind of forecasting is better than the others.

3.3. Analytic Network Hierarchy (ANP)

Saaty (1996) developed the Analytic Network Process for network decision making and obtaining the best in systems with dependence and feedback. It involves all relations between clusters and factors to make decision dynamically. The elements of a cluster may influence some or all the elements of any other cluster. A network can be organized to include source clusters, intermediate clusters and sink clusters. Relationships in a network are represented by arcs, where the directions of arcs signify directional dependence (Chang and Huang, 2006). ANP's domain is so vast. We can use this method for doing logical forecasting (LF) especially through its super matrix. The main steps of this method are as follows:

- Pairwise comparisons on all elements (factors and clusters) and relative weight estimation
- Construction of the un-weighted matrix
- Designing the weighted matrix
- Forecasting with the super matrix (global priority weights)

4. Research Methodology

This paper tries to forecast logically the Eurozone crisis via a decision making model entitled analytic network process. The research framework in various sections is as follows:

- Achieving the existing data and trend about Eurozone crisis

- Choosing evaluation factors of Eurozone crisis
- The Delphi method is used to determine the coefficients of the evaluation criteria
- Data analysis

5. Forecasting Through ANP

As the first step, we should design the network framework using the related clusters and factors. According to Eurozone crisis and our expert leaders, we select 6 clusters and 30 factors as shown in Fig 3.

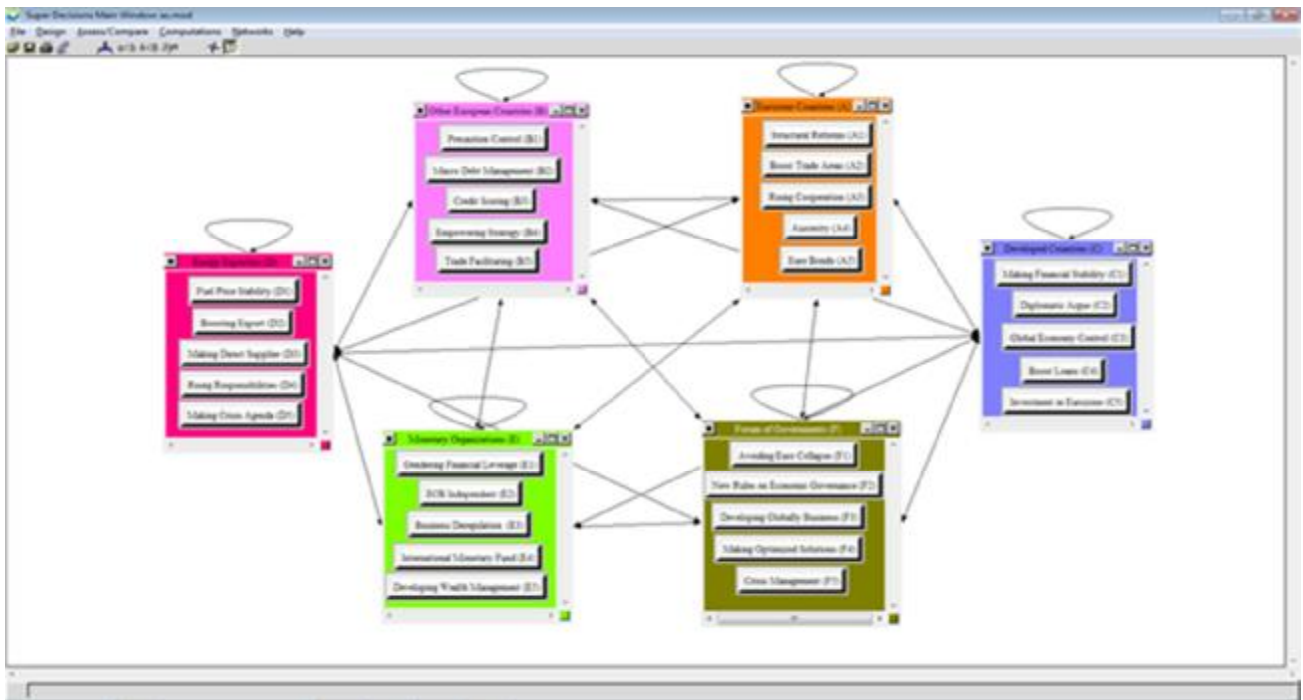


Fig. 3: Network Structure

As it can be seen from the above figure, the evaluated clusters are Eurozone Countries (A), Other European Countries (B), the Developed Countries (C), Energy Exporters (D),

Monetary Organizations (E) and Forum of Organizations (F). All the clusters contain 5 factors.

Once we have the network, we process to construct and make the component matrix based on the priorities obtained from the pairwise comparison matrices (Saaty, 2008).

Table 1. Clusters' pairwise comparison matrix with respect to the Eurozone Crisis

	A	B	C	D	E	F	Priorities
A	1	1	3	2	2	3	0.275
B		1	1	2	3	0.5	0.195
C			1	0.5	1	2	0.135
D				1	2	1	0.152
E					1	1	0.100
F						1	0.144

Inconsistency Rate: 0.09

This matrix shows the influences of the clusters on the Eurozone crisis. Table 1 represents that the Eurozone crisis has been influenced by Eurozone countries like Greece or Ireland. The priorities of each cluster, with respect to the Eurozone crisis, are on the right column of the matrix. These weights are the relative importance of the cluster in the row with respect to the cluster in the column (Saaty, 2008). With respect to the goal, the Other European Countries have an importance of 0.195, Developed countries 0.135, Energy Exporters (D) has 0.152, Monetary organizations (E) is 0.100 and Forums of Governments like G8 has importance of 0.144.

Next we proceed to analyze the factor's pairwise comparison matrices. An example of this part of matrix is shown below in Table 2. This matrix represents a pairwise comparison of the Cluster A with respect to the Eurozone Crisis.

Table 2. Pairwise comparison matrix of cluster A

A	A1	A2	A3	A4	A5	Priorities
A1	1	2	1	2	1	0.068
A2		1	2	1	0.5	0.048
A3			1	2	0.5	0.048
A4				1	1	0.041
A5					1	0.070

Inconsistency Rate: 0.07

As it can be seen in Table 2, the most important actor in the Cluster A for Eurozone Crisis is Euro Bonds (A5) and surprisingly Austerity (A4) is the less one.

Once we have completed all the pairwise comparison matrix's priorities, we proceed to construct 30*30 elements super matrix. First the unweighted matrix is constructed after weighting that matrix with the component matrix and finally we obtain the limit matrix (Saaty, 2008).

In order to forecast by this method, we have to look for steady state priorities from a limit super matrix. To obtain the limit we raise the matrix to powers. Each power of the matrix captures all transitivity of an order that is equal to that power. The limit of these powers, according to Cesaro summability, is equal to the limit of the sum of all the powers of the matrix. All order transivities are captured by this series of powers of the matrix.

The global weights of our clusters and factors in the ANP method are calculated as bellows:

Table 5. Forecasted Weight

Cluster	Factor	Forecasted weight	Cluster	Factor	Forecasted weight
A	A1	0.368	D	D1	0.344
	A2	0.154		D2	0.281
	A3	0.298		D3	0.312
	A4	0.102		D4	0.290
	A5	0.264		D5	0.178
B	B1	0.212	E	E1	0.344
	B2	0.198		E2	0.227
	B3	0.276		E3	0.211
	B4	0.214		E4	0.311
	B5	0.121		E5	0.239
C	C1	0.312	F	F1	0.330
	C2	0.354		F2	0.300
	C3	0.276		F3	0.241
	C4	0.359		F4	0.287
	C5	0.248		F5	0.177

6. Conclusions and Recommendations

According to the importance of the Eurozone crisis situation which threatens all nations, the final results of this paper are the identification of the best proactive solutions which we obtained a tool to make the best way to overcome this crisis. According to Table 3, the best solutions will be Structural Reforms (A1), Boost loans by some developed countries like USA or Japan (C4) and Diplomatic Argue (C2). Besides, the worst ones would be Austerity (A4), Trade facilitation by other European countries (B5) and Crisis management by the governments forums like the G8 (F5). Based on our results, some useful recommendations can be considered as bellows:

- According to our paper's results, the most important cluster in this situation is Eurozone countries. They need further integration. This process would drive forward, not by a few nations, but by all related Eurozone nations pursuing their self-interest.
- It would be better for Governments in Eurozone to avoid austerity strategy. It decreased welfare, employment and it would be lead inflation in society. It has negative effects on operating income and EPS or DPS of the banking industry.
- This crisis needs to remove any obstacles to investing in Europe and give hope for an upturn in the economy in order to bring back hesitant private investors who have lost confidence. The important task is therefore to create a comprehensive European investment program, which will increase the competitiveness of crisis countries, expand Europe's industrial infrastructure – particularly its energy networks – and promote research and development.
- The Eurozone should be more like the US in terms of strong federal politics and a strong central bank. What's left out of the comparison is that all of the US states (at least all that I'm aware of) are prohibited by their state constitutions from running a budget deficit.
- The researchers in these countries should use some methods like ANP to achieve comprehensive solutions. In the absence of a 'comprehensive solution', the crisis will persist and likely be punctuated by episodes of severe financial market volatility that is a particular source of risk to the sovereign governments of those countries with levels of public debt, contingent liabilities and fiscal and financial sector financing needs that are high relative to rating peers.

7. References

- [1] J., Markus. The Effect of IMF Lending on the Probability of Sovereign Debt Crisis. *Journal of International Money and Finance*. 2012, pp. 709-725.

- [2] J. Matheron and B. Mojon and J.G Sahuc. The Sovereign Debt Crisis and Monetary Policy. *Financial Stability Review. Banque de France*. 2012, **16**: 155-167.
- [3] P. Welfens. From the Transatlantic Banking Crisis to the Euro Crisis. *International Economics and Economic Policy*. 8(1),2011, pp: 15-29.
- [4] S. Missio and S.Witzka..Financial Contagion and the European Debt Crisis *Seminar for Macroeconomics: Ludwig Maximilian University of Munich*. 2011.
- [5] T.L, Saaty. Relative Measurement and its Generalization in Decision Making Why Pairwise Comparison are Central in Mathematics for the Measurement of Intangible Factors the AH/Np, *RACSAM*, 2008, 102 (2), pp: 251-318.