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Analysis of the Economic Research Context after the Outbreak of the Economic Crisis of 2007-2009

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In this paper it, we have conducted a factor analysis which implied determining the international research directions that have characterized the period following the outbreak of the crisis in 2007 and 2008-2011. In this research, we used secondary data that were extracted from 342 articles, which were based on 665 individual researches. Following this research, we have identified three main research in the macroeconomic areas which explained 56% of all the analyzed research. Also, the results showed the trends in macroeconomic research after the start of the crisis in 2007.

***Keywords**: macroeconomics, meta-analysis, factor analysis, economic models, economic literature*

***JEL Classification**: E0, E1, E2, E3, E4, E5*

1. Introduction

Since 2007, the global economy has been going through an experience that showed the limits of prevailing economic models and that led to the destruction of the sense of confidence in the economic paradigm. From solving the models, there were several prescriptions that were obtained for the most of the economic downturns that have followed in the last century until the outbreak of the economic crisis of 2007-2009, which through its extent and magnitude has represented an event that cannot be compared to anything that has ever happened before, yet it contains all of them together, as Krugman previously stated (2008).

The new global economic mutations that occurred in 2007 after the outbreak of the crisis have had inevitable repercussions on the scientific activity in the macroeconomic study area. Starting from this aspect, we are interested in what the new trends of research in macroeconomics and how the scientific activity was influenced by the economic events of after 2007.

In this context, we use the factor analysis method to achieve the objectives that will be presented in the following section.

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Thus, in the first stage of this research, we will establish the main research questions, the purpose of the research, and its related objectives and hypotheses. Thus the main research question identified for this analysis is to provide detailed knowledge of the state of scientific research in the aftermath of the 2007-2008 crisis in macroeconomic theory.

2. Research Methodology

The purpose of research is to determine the research directions that have characterized the period following the crisis that broke in 2007, more specifically in the 2008-2011 timeframe. From this global purpose of the research the following objectives and their related hypotheses are derived:

Objective 1: Description of the research state based on descriptive statistics

Hypothesis 1: The core of the research state is concentrated mainly in the United States and Europe

Objective 2: Establishing a factor analysis of the research state in 2008-2011

Hypothesis 2: There are at least two main directions in terms of macroeconomic research in 2008-2011

Objective 3: Analysis of the main research directions resulted from factor analysis

Hypothesis 3: The main research directions resulted from the factor analysis are in a direct relationship with the events that followed the outbreak of the 2007-2008 crisis

In the next stage, we designed the study by identifying the necessary information sources and by establishing the methods used in compiling the information and the systematization of these information.

By identifying the sources of information for this research, we chose five international journals (American Economic Review, European Economic Review, Journal of Economic Theory, The Journal of Economic Literature and the Journal of Economic Perspectives). These sources of information were the basis of the information collection methods necessary to answer the research question, more precisely by to investigate of secondary sources from which we have extracted the studies that examined topics related to macroeconomic theory and monetary economics in the period 2008-2011.

***Table 1**. The secondary sources used in researching the theoretical context*

Journal	Volumes considered for *researching the* theoretical context
American Economic Review	Vol. 98 (2008) – Vol. 101 (2011)
European Economic Review	Vol. 52 (2008) – Vol. 55 (2011)
Journal of Economic Theory	Vol. 139 (2008) – Vol. 146 (2011)
The Journal of Economic Literature	Vol. 46 (2008) – Vol. 49 (2011)
The Journal of Economic Perspectives	Vol. 22 (2008) – Vol. 25 (2011)

In order to obtain importance factors, each journal was evaluated based on six criteria for evaluation and classification used by ISI Thomson:

C1 - Total Citations
C2 - 5-year Impact Factor
C3 - Immediacy Index
C4 - Number of articles
C5 - Eigenfactor score
C6 – Article Influence score

Thus, for the five journals under investigation, the following data were extracted:

***Table** 2. Classification criteria for journal importance*

Journal	**JCR Data**				**Eigenfactor Metrics**	
	Total Citations	**5-year Impact Factor**	**Immediacy Index**	**Number of articles**	**Eigenfactor score**	**Article Influence score**
Journal of Economic Theory	5.052	1.519	0.358	109	0.02628	2.421

European Economic Review	3.629	1.860	0.229	70	0.01212	1.774
American Economic Review	26.525	4.076	0.793	237	0.10039	5.662
Journal of Economic Literature	4.715	9.426	0.850	20	0.01696	9.820
Journal of Economic Perspectives	5.626	5.865	0.512	43	0.02773	6.799

For linearization, we calculated the relative values of the criteria based on the maximum identified amount for each criterion:

***Table 3**. Linearization of the journals' classification criteria*

Journal	Total Citations	5-year Impact Factor	Immediacy Index	Number of articles	Eigenfactor score	Article Influence score
Journal of Economic Theory	0.19	0.16	0.42	0.46	0.26	0.25
European Economic Review	0.14	0.2	0.27	0.3	0.12	0.18
American Economic Review	1	0.43	0.93	1	1	0.58
Journal of Economic Literature	0.18	1	1	0.08	0.17	1
Journal of Economic Perspectives	0.21	0.62	0.6	0.18	0.28	0.69

To obtain weighted coefficients related to each criterion we used the FRISCO formula:

$$\beta = \frac{p + \Delta p + m + 0{,}5}{-\Delta p' + \frac{Ncrt}{2}}$$

where: p = the sum of points obtained for each line by a certain criterion
Δp = the difference between the considered score criterion and the score of the last criterion
m = the number of criteria that have a lower number of points than the considered criterion
Ncrt = the number of considered criteria
Δp' = the difference between the considered score criterion and the score of the first criterion

Table 4 shows the weighted coefficients for each criterion, taking into consideration the importance of each criterion in relation to the other criteria. Thus, the C_1 (Total Citations) and C_2 (5-year Impact Factor) were considered to have a primary importance, whereas the other criteria have a secondary importance.

***Table 4**. Determining the coefficients related to the importance criteria of the journals*

Criteria	C_1	C_2	C_3	C_4	C_5	C_6	Points	Level	Weight
C_1	0.5	0.5	1	1	1	1	**5**	**1**	**5.0**
C_2	0.5	0.5	1	1	1	1	**5**	**1**	**5.0**
C_3	0	0	0.5	0.5	0.5	0.5	**2**	**3**	**0.5**
C_4	0	0	0.5	0.5	0.5	0.5	**2**	**3**	**0.5**
C_5	0	0	0.5	0.5	0.5	0.5	**2**	**3**	**0.5**
C_6	0	0	0.5	0.5	0.5	0.5	**2**	**3**	**0.5**

Considering the data presented in the previous table, the journals were compared based on the identified and linearized criteria from table 3.

***Table 5**. Journals' importance factors*

		Journal of Economic Theory		European Economic Review		American Economic Review		American Economic Literature		American Economic Perspectives	
Criterion	**Weight**	**Values**	**Weight x Values**	**Values**	**Weight x Values**	**Values**	**Weight x Values**	**Values**	**Weight x Values**	**Values**	**Weight x Values**
C_1	5.0	0.19	0.95	0.14	0.70	1	5,00	0,18	0,90	0,21	1,05
C_2	5.0	0.16	0.80	0.2	1.00	0,43	2,15	1	5,00	0,62	3,10
C_3	0.5	0.42	0.19	0.27	0.12	0,93	0,42	1	0,45	0,6	0,27
C_4	0.5	0.46	0.21	0.3	0.14	1	0,45	0,08	0,04	0,18	0,08
C_5	0.5	0.26	0.12	0.12	0.05	1	0,45	0,17	0,08	0,28	0,13
C_6	0.5	0.25	0.11	0.18	0.08	0,58	0,26	1	0,45	0,69	0,31
Importance factors		**2.4**		**2.1**		**8.7**		**6.9**		**4.9**	

In the previous table the importance factors for each journal were obtained and these factors were then used to rank the relevance and importance of each article, depending on the journal's origin.

Next, after the sources of information were identified, we established the methods of information extraction and systematization. Thus, in this research we used the following variables:

***Table 6**. Variables used in the research*

V1. Journal	➢ Journal of Economic Theory ➢ European Economic Review ➢ American Economic Review ➢ Journal of Economic Literature ➢ Journal of Economic Perspectives
V2. Article title	
V3. Article's authors	
V4. Article publication date	➢ Month of article publication in the 2008-2011 period ➢ Corresponding month period was numbered successively from January 2008 (month 1) and until December 2011 (month 48)
V5. Authors' affiliated institution	
V6. Type of authors' affiliated institution	➢ University ➢ Research institute ➢ Private ➢ Public ➢ Central bank ➢ BIS ➢ IMF ➢ World Bank
V7. Institution's region	➢ United States; ➢ European Union – for institutions from the European Union, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Italy, Netherlands, Poland, Portugal, Spain, Sweden, United Kingdom; ➢ International - for international financial institutions: Bank for International Settlements, International Monetary Fund, World Bank; ➢ Rest of the world - Australia, Chile, Israel, Switzerland, Turkey, Canada, China, Japan, Singapore.
V8. Institution's country	United States, European Union – for the EU's institutions, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Italy, Netherlands, Poland, Portugal, Spain, Sweden, United Kingdom; Bank for International Settlements, the International Monetary Fund, World Bank, Australia, Chile, Israel, Switzerland, Turkey, Canada, China, Japan, Singapore.
V9. Reference theme	E0 - General E1 - General Aggregative Models E2 - Macroeconomics: Consumption, Saving, Production, Employment, and Investment E3 - Prices, Business Fluctuations, and Cycles E4 - Money and Interest Rates E5 - Monetary Policy, Central Banking, and the Supply of Money and Credit E6 - Macroeconomic Policy, Macroeconomic Aspects of Public Finance, and General Outlook

V10. Scientific importance and relevance of article based journals' importance factors	Each article is classified in relation to its theme and receives an importance factor according to the following values: ➢ 0 – not referring to that topic/theme ➢ 2,1 – article published in *European Economic Review* ➢ 2,4 – article published in *Journal of Economic Theory* ➢ 4,9 – article published in *American Economic Perspectives* ➢ 6,9 – article published in *American Economic Literature* ➢ 8,7 – article published in *American Economic Review*

After data extraction, for the following stage, we considered the contribution of each author as an individual research before a collective research. Thus, each individual research was regarded as an observation in the analysis process, i.e. in the informational input.

Further, the secondary data of the research was extracted manually by analyzing the volumes published by the five international journals in 2008-2011. The extracted data represented the input information that has been transferred to a database further processed with statistical analysis software SPSS and Microsoft Excel to accomplish the purpose of research and its derived objectives and hypotheses.
For attaining the objectives and related hypotheses we followed this research methodology:

(i) Obtaining descriptive statistics:
- frequencies analysis of the studies based on the journal in which the article was published,
- frequencies analysis of the studies based on the region of the institutions,
- frequencies analysis of the studies based on the country of the institutions,
- correspondence analysis of the research based on the region of the institutions and the institution's type,
- frequencies analysis of the studies based on the theme of the research,

(ii) Factor analysis on the topic of the studies carried out in 2008-2011.
(iii) Analysis of the resulted components from the factor analysis.

3. Empirical Analysis and Results

3.1. Obtaining descriptive statistics

This first phase of the empirical analysis consisted in setting up the descriptive statistics based on the articles published in the macroeconomic field within the 5 international journals chosen for this study: American Economic Review, European Economic Review, Journal of Economic Theory, The Journal of Economic Literature, and The Journal of Economic Perspectives.

Thus, the table below shows the frequencies of the article publications in each journal:

***Table 7**. Frequencies analysis of the article publication for each journal*

Journal	Article frequency	Percentage (%)	Cumulative percentage (%)
American Economic Review	157	45.91%	45.91%
European Economic Review	68	19.88%	65.79%
Journal of Economic Theory	66	19.30%	85.09%
The Journal of Economic Literature	23	6.73%	91.81%
The Journal of Economic Perspectives	28	8.19%	100.00%
Total	**342**	**100.00%**	**-**

Further, Table 7 shows these journals from the perspective of the research frequencies published between 2008 and 2011.

***Table 8**. Descriptive statistics regarding the journals used in the analysis of the theoretical context*

Journal	Research frequency	Percentage (%)	Cumulative percentage (%)
American Economic Review	314	47,2	47,2
European Economic Review	143	21,5	68,7

Journal of Economic Theory	120	18,0	86,8
The Journal of Economic Literature	35	5,3	92,0
The Journal of Economic Perspectives	53	8,0	100,0
Total	**665**	**100,0**	

It is noted that 47.2% of the researches published between 2008 and 2011 were published in the American Economic Review. The distribution of the research published in journals included in the analysis can be seen in the following figure.

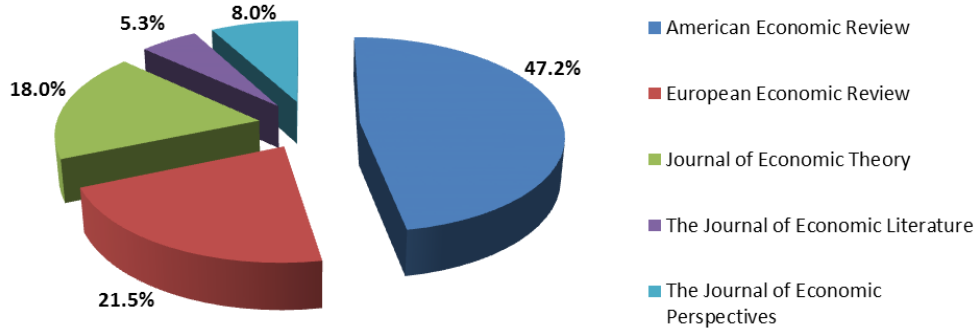

***Figure 1**. Research distribution according to the article's journal*

Table 9 and Figure 2 show to the regions of provenance of the 665 researches considered in the context of the analysis for the period 2008 - 2011. It is observed that 62.9% of these studies are from the United States of America, and 27.7% are from the European Union.

***Table 9**. Descriptive statistics for the institutions' regions of provenance*

Region	Research frequency	Percentage (%)	Cumulative percentage (%)
International	17	2.6	2.6
Rest of the world	45	6.8	9.3
European Union	185	27.8	37.1
United States	418	62.9	100.0
Total	**665**	**100.0**	

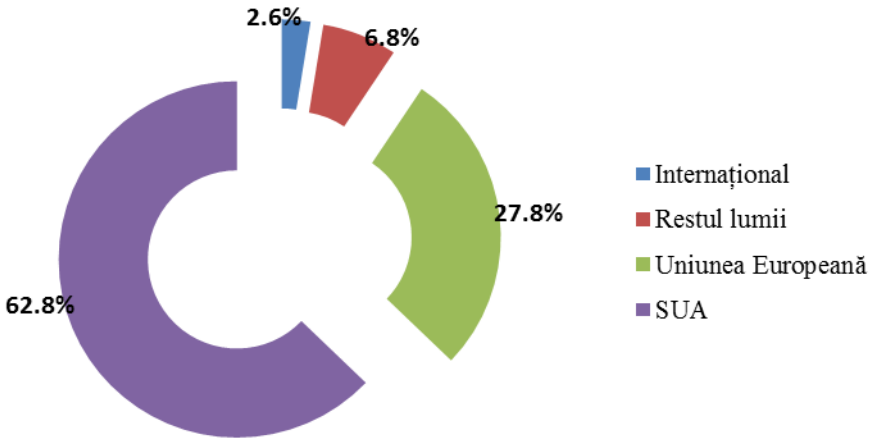

***Figure 2**. Distribution of research according to the region of provenance of the institutions*

Table 10 shows the distribution of research according to the institutions' countries of provenance where the scientific work included in this analysis was conducted.

***Table 10**. Descriptive statistics on the countries of origin of the institutions used in the analysis of the theoretical context*

Country	Research frequency	Percentage (%)	Cumulative percentage (%)
Australia	3	0.5	0.5
Austria	3	0.5	0.9
Belgium	4	0.6	1.5
Canada	18	2.7	4.2
Czech Republic	2	0.3	4.5
Chile	1	0.2	4.7
China	1	0.2	4.8
Denmark	4	0.6	5.4
Switzerland	11	1.7	7.1
Finland	4	0.6	7.7
France	16	2.4	10.1
Germania	13	2	12
International	17	2.6	14.6
Israel	4	0.6	15.2
Italia	25	3.8	18.9
Japan	3	0.5	19.4
The Netherlands	7	1.1	20.5
Poland	1	0.2	20.6
Portugal	4	0.6	21.2
Singapore	1	0.2	21.4
Spain	23	3.5	24.8
Sweden	7	1.1	25.9
Turkey	3	0.5	26.3
European Union	18	2.7	29
United Kingdom	54	8.1	37.1
US	418	62.9	100
Total	**665**	**100**	

***Table 11**. Descriptive statistics on the institution type of the researchers*

Institution type	Research frequency	Percentage (%)	Cumulative percentage (%)
Central Bank	89	13.4	13.4
BIS	3	0.5	13.8
IMF	13	2	15.8
Research institute	19	2.9	18.6
Private	2	0.3	18.9
Public	21	3.2	22.1
University	517	77.7	99.8
World Bank	1	0.2	100
Total	**665**	**100**	

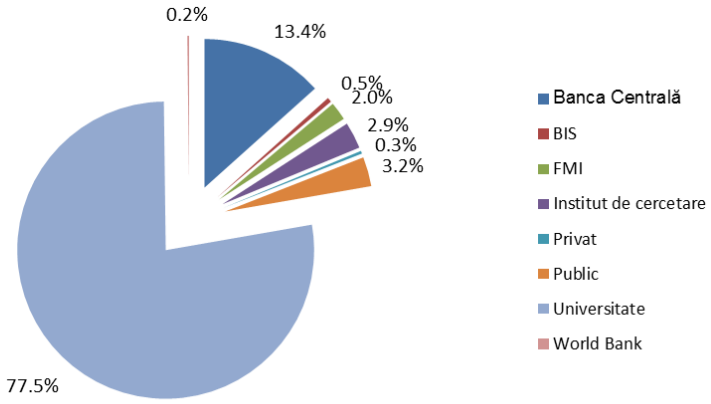

***Figure 3**. Distribution of studies based on the researchers' affiliation*

Next we examined an analysis of the correspondence shown in Table 12 between the institution's region of origin and the institution's type. Correspondence analysis is a descriptive and exploratory technique used in this case to determine the correlation between the type of organization and its region, for the scientific research conducted during 2008-2011.

***Table 12**. Correspondence analysis between the region and type of the institution*

Institution type	**Region**				
	US	**EU**	**International**	**Rest of the world**	**Total**
University	337	140	0	40	**517**
Research institute	9	9	0	1	**19**
Private	0	2	0	0	**2**
Public	17	4	0	0	**21**
Central Bank	55	30	0	4	**89**
BIS	0	0	3	0	**3**
IMF	0	0	13	0	**13**
World Bank	0	0	1	0	**1**
Total	**418**	**185**	**17**	**45**	**665**

From the previous table it is noted that 337 of the 665 studies (i.e. 50.68% of the total) were conducted by authors who come from United States academia. The second category, in terms of size, is represented by researchers from European Union academia, which totaled 140 scientific studies (i.e. 20.99% of the total), published as articles in the analyzed journals.

3.2. Factor Analysis on the Topic of the Studies Carried Out in 2008-2011

In this process, as a general linear model technique, factor analysis was used to reduce the number of variables of the research types conducted on the subject matter and the scientific importance of the studies, leading to obtain a limited number of main components, which represent the research directions that were addressed in the 2008-2011 framework.

Initially, a KMO test (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) was conducted to indicate the data adequacy to achieve the factor analysis. For the variables introduced in this analysis we obtained a value of 0.535 of the KMO test therefore factor analysis is relevant, because this value is higher than the 0.5 acceptable threshold.

***Table 13**. Communalities for each examined variable*

Variable	**Initial**	**Extraction**
E0	1.000	0.348
E1	1.000	0.429
E2	1.000	0.727
E3	1.000	0.533
E4	1.000	0.551
E5	1.000	0.588
E6	1.000	0.743

Table 13 shows the common variance of each variable analyzed (communalities) and presents the common level before and after the extraction of factors. Principal components analysis is based on the initial assumption that all variance is common, therefore, before extracting the factors, all variables have a variance factor equal to 1 (as seen in the column labeled Initial). All variance associated with a variable is accepted as common variance. The values in the Extraction column represent the extent to which a variable's variance is common to the variance of the extracted factor, more specifically of the newly created variable.

All values after factor extraction are high, indicating that all extracted components reflect the variables included in the factor analysis. Also, it is noted that variables E2 and E6 denote the highest variance (72.7% for E2 and 74.3% for E6) which are transposed onto the newly created factors that include these variables.

After establishing the variance transposed to the newly formed factors, factor analysis involves two stages: extraction of the factors (using principal components analysis method) and then rotation of the factors (using Varimax method) to assist in interpretation.

In Table 14, it is noted that the factor analysis developed three new variables or extracted factors, because this analysis was framed under the Kaiser criterion, which retains only factors with Eigenvalues greater than 1.

Table 14. *Total variance explained for the 3 extracted factors*

	Initial Eigenvalues			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.608	22.969	22.969	1.608	22.969	22.969	1.390	19.857	19.857
2	1.194	17.057	40.026	1.194	17.057	40.026	1.346	19.232	39.089
3	1.118	15.965	55.991	1.118	15.965	55.991	1.183	16.903	55.991
4	0.978	13.977	69.969						
5	0.809	11.559	81.528						
6	0.679	9.695	91.223						
7	0.614	8.777	100.000						

Table 13 shows the number of selected factors (in this case, three factors) and the variance in each new variable, before and after rotation.

In the first section of the table entitled 'Initial eigenvalues', the 'Total' column indicates the amount of variance of the original variables explained by each component. Thus, further, only the first three factors will be considered because they display Eigenvalues greater than 1. The second column of the first section (% Variance) presents the Eigenvalues in terms of the percentage of explained variance of the total variance of all the variables included in the analysis. Column 'Cumulative %' shows the cumulative percentage for the first *n* components of the factor analysis.

The second section of the table ('Extraction Sums of Squared Loadings') presents the extracted components that exhibit three factors that explain 55.99% of the variability of the seven original variables.

The third section of the table ('Rotation Sums of Squared Loadings') involves applying the Varimax rotation method, whereby the cumulative percentage of variance explained by the extracted components is maintained (55.99%), but the variance is propagated more equally on other components. Before rotation, the first factor explains 22.969% of the total variance, but after rotation (the final part of the table labeled 'Rotation Sums of Squared Loadings') the first factor explains 19.857% of the total variance. Therefore, the rotation has the effect of optimizing the factor's structure and the immediate consequence of this is the equivalence of the relative importance of the factors.

Table 'Matrix of rotated components' helps to determine the representativeness of the components by showing which variables have the highest influence on each of the three newly formed factors.

***Table 15**. Matrix of rotated components*

	Components		
	F1	F2	F3
E0	**-0.562**	0.118	0.133
E1	**0.557**	0.342	0.050
E2	0.302	**-0.792**	0.096
E3	**0.718**	0.000	0.133
E4	0.127	0.319	0.**658**
E5	0.364	**0.661**	0.137
E6	0.096	0.222	**-0.827**

Following the factor analysis conducted in this study, we obtained three principal components, namely three directions of research carried out in the 2008-2011 period:

F1 - the first research direction relates to the studies that approached the interaction of general aggregated models with economic fluctuations and prices and dealt less with general aspects of macroeconomics

F2 - second direction is characterized by the research that approached monetary policy and money supply and did not address real variables (consumption, savings, production, employment, and investment)

F3 - the third direction encompasses studies regarding currency and interest rates which did not address macroeconomic policies and macroeconomic aspects of public finances.

3.3. Analysis of the Resulted Components from the Factor Analysis

The first factor (F1) is formed by the following subdomains E0 – 'General', E1 – 'General Aggregative Models'and E3 – 'Prices, Business Fluctuations, and Cycles'. E3 denotes the highest score of 0.718 which appears in the development of the first factor, accounting for articles that address:

- general aspects regarding prices, business fluctuations, and cycles (E30);
- price level, inflation, deflation (E31);
- business fluctuations and cycles (E32);
- forecasting and simulation: models and applications (E37);
- other articles in this macroeconomics sphere (E39).

Variable E1 – 'General Aggregative Models' presents a score of 0.557 influencing in a positive way the first factor which consists of articles that approach:

- general theoretical and empirical studies about issues related to aggregative models (E10);
- aggregative models that cover the Marxian, Sraffian, Institutional, and Evolutionary schools (E11);
- research surrounding Keynes's general theory, Keynesian and post- Keynesian macroeconomics (E12);
- neoclassical models (E13);
- forecasting and simulation of aggregative models (E17);
- other articles in this topic of general aggregative models (E19).

The second factor (F2) consists of two variables E2 and E5, but the scores of these two variables indicate that scientific research mainly focused on issues related to monetary policy, central banks and money supply (E5 = 0.661), and they were less related to the real macroeconomic variables (consumption, saving, production, employment and investment), due to it negative registered score (E2 = -0.792). Thus, research in the 2008-2011 period addresses:

- general aspects of monetary policy, central banking, and the supply of money and credit (E50);
- money supply, credit, and money multipliers (E51);
- monetary policy (E52);
- central banks and their policies (E58);
- other related themes to this area (E59).

It should also be noted that in these studies, there were not included themes from the area of variable E2 (real macroeconomic variables: consumption, saving, production, employment and investment), such as:

- general aspects(E20);
- consumption, saving, wealth (E21);
- capital, investment (including inventories and capital), capacity (E22);
- production (E23);
- employment, unemployment, wages, intergenerational income distribution, aggregate human capital (E24);
- aggregate factor income distribution (E25);
- informal economy and underground economy (E26);
- forecasting and simulations of models and applications of this real environment (E27);
- other research in this category (E29).

The last factor (F3) presents the research context dealing with themes of currency and interest rates (E4 = 0.658), but lacks in studies that fall under the E6 variable (macroeconomic policy, macroeconomic issues of public finance, and general outlook). This lack of theoretical context is highlighted by a negative score of -0.827 for variable E6. In this category are also included articles that did not approach topics such as:

- general aspects of macroeconomic policy and public finance (E60);
- policy objectives, designs and projections of policies and their consistency in time, policy coordination (E61);
- fiscal policy, public expenditures, investment, finance and taxation (E62);
- comparative or joint analysis of fiscal and monetary policy, economic stabilization, treasury (E63);
- incomes Policy, price policy (E64);
- studies of particular macro- policy episodes (E65);
- general macroeconomic outlook and conditions (E66);
- other aspects of this field of research (E67).

However, the examined studies have made numerous references to the E4 theme, namely 'Money and Interest Rates', with the following subcategories:

- general aspects related to money and interest rates (E40);
- demand for money (E41);
- monetary systems, standards, regimes, government and the monetary system, payment systems (E42);
- determination of interest rates, term structure of interest rates (E43);
- financial markets and the macroeconomy (E44);
- forecasting and simulation of money demand and/or interest rates (E47);
- other topics related to money and interest rates (E49).

Table 16 shows the weights to be used in obtaining the factor scores by multiplying the coefficients from this table with the standardized variables of the analysis.

***Table 16**. Coefficient matrix of factor scores*

	Components		
	F1	F2	F3
E0	-0.438	0.141	0.152
E1	0.374	0.202	-0.012
E2	0.294	-0.634	0.088
E3	0.521	-0.075	0.059
E4	0.012	0.206	0.542
E5	0.193	0.461	0.066
E6	0.112	0.189	-0.723

The factors represent linear combinations of the original variables that can be calculated as follows:

$$F_i = W_{i1}X_0 + W_{i2}X_1 + W_{i3}X_2 + \ldots + W_{ik}X_k$$

$$F_1 = -0.438E_0 + 0.374E_1 + 0.294E_2 + 0.521E_3 + 0.012E_4 + 0.193E_5 + 0.112E_6$$

$$F_2 = 0.141E_0 + 0.202E_1 - 0.634E_2 - 0.075E_3 + 0.206E_4 + 0.461E_5 + 0.189E_6$$

$$F_3 = 0.152E_0 - 0.012E_1 + 0.088E_2 + 0.059E_3 + 0.542E_4 + 0.066E_5 - 0.723E_6$$

The results obtained by calculating factors based on the data used, according to the region and type of the institute are shown in Table 17.

***Table 17**. Factor values in relation to region and institution type*

		Region				
		US	**EE**	**International**	**Rest of the world**	
Institution type	**University**	0.178	-0.191	0.000	-0.188	F1
		-0.043	-0.043	0.000	-0.141	F2
		0.066	-0.191	0.000	0.095	F3
		24.92	24.06	0.00	23.67	Data
	Research institute	-0.111	-0.347	0.000	-0.748	F1
		-0.151	0.056	0.000	0.161	F2
		0.189	-0.091	0.000	0.274	F3
		30.56	24.22	0.00	40.00	Data
	Private	0.000	-0.340	0.000	0.000	F1
		0.000	-0.152	0.000	0.000	F2
		0.000	-0.897	0.000	0.000	F3
		0.00	32.00	0.00	0.00	Data
	Public	-1.399	-0.425	0.000	0.000	F1
		-0.058	0.120	0.000	0.000	F2
		-1.399	0.323	0.000	0.000	F3
		20.88	36.00	0.00	0.00	Data
	Central Bank	0.129	-0.135	0.000	0.067	F1
		0.148	0.591	0.000	0.433	F2
		0.215	-0.129	0.000	-0.724	F3
		25.80	16.00	0.00	19.00	Data
	BIS	0.000	0.000	0.313	0.000	F1
		0.000	0.000	-0.187	0.000	F2
		0.000	0.000	0.170	0.000	F3
		0.00	0.00	11.00	0.00	Data
	IMF	0.000	0.000	0.080	0.000	F1
		0.000	0.000	0.126	0.000	F2
		0.000	0.000	-0.824	0.000	F3
		0.00	0.00	29.54	0.00	Data
	World Bank	0.000	0.000	-0.018	0.000	F1
		0.000	0.000	-1.601	0.000	F2
		0.000	0.000	0.060	0.000	F3
		0.00	0.00	30.00	0.00	Data

Based on the table presented above, Figure 4 presents visually the evolution of the studies in relation to their topic, more specifically to the resulted components of the factor analysis:

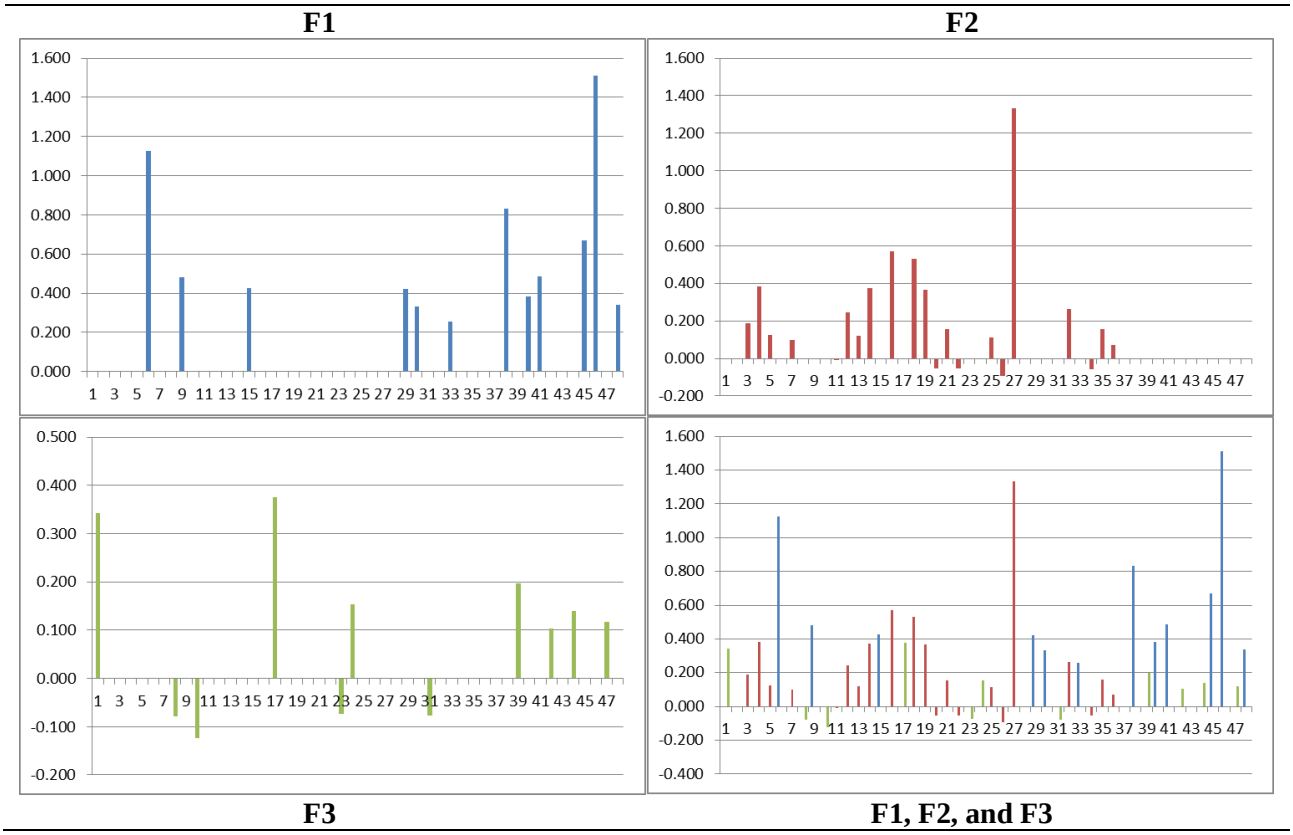

Figure 4. *Evolution of research in the 2008-2011 period, in relation the obtained components*

As seen in the first part of the analyzed period (2008-2009, months 1-24 of the analysis period) the F2's studies prevailed (which addressed monetary policy), and second examined period (2010-2011, months 25-48 of the analysis period) the F1's studies were the most predominant (which addressed economic fluctuations and macroeconomic models). Regarding the F3 component, these researches were intertwined with the other two components in the all the analyzed periods.

4. Conclusion

Through this secondary research, the present study sought to group, on research directions, state of scientific research in macroeconomic theory, in the period that followed the outbreak of the 2008-2009 crisis considering the research published between 2008 and 2011, taking into account five international journals (American Economic Review, European Economic Review, Journal of Economic Theory, The Journal of Economic Literature, and The Journal of Economic Perspectives).

The results of the study consist of the existence of three main directions in scientific research in 2008-2011.

The first direction refers to studies that addressed general aggregative models with economic fluctuations and prices, but did not encompass general macroeconomic aspects: Barnett and Bhattacharya (2008), Termin (2008), Justiniano and Primiceri (2008), Barillas, Hansen and Sargent (2009), Chetty et al. (2011).

The second direction is characterized by the researches that approached monetary policy and money supply, however these studies did not address the real variables of macroeconomics (consumption, savings, production, employment, and investment): Blinder and Morgan (2008), Besley, Meads and Surico (2008), Gaspar, Pérez Quirós and Rodríguez Mendizábal (2008), Benoît (2008), Buffie et al (2008), Ravenna and Walsh (2008), Berger, Ehrmann and Fratzscher (2008), Blinder et al (2008), Badinger (2009), Shleifer and Vishny (2010), Rose (2010), Blinder (2010), Feldstein (2010), Sanches and Williamson (2010), James and Lawler (2011), Engel (2011).

The third direction is characterized by studies that examined money and interest rates, but did not address macroeconomic policies and macroeconomic aspects of public finance: Caballero, Farhi and Gourinchas (2008), Favero and Giavazzi (2008), Kikuchi (2008), Ferraris and Watanabe (2008), Stulz (2009),

Lagos, Rocheteau and Weill (2009), Reinhart and Rogoff (2012), Hoffmann and MacDonald (2009), Kannan (2009), Koeppl and MacGee (2009), Martin (2009), Gollier (2009), Wright (2010), Engel and West (2010), Fleming, Hrung and Keane (2010), Greenwood and Vayanos (2010), Piazzesi and Schneider (2010), Ferraris (2010), Jouini, Marin and Napp (2010), Arellano and Heathcote (2010), Gomis-Porqueras and Peralta-Alva (2010), Shy and Wang (2011), Reinhart and Rogoff (2011), Chudik and Fratzscher (2011), Korinek (2011), Schmeling and Schrimpf (2011), Tirole (2011), Sanches (2011), Ferraris and Watanabe (2011), Krusell, Mukoyama and Smith Jr. (2011), Kamiya and Shimizu (2011).

The analyses conducted to accomplish the main purpose of the secondary research are relevant in the presented context, but there are some limitations and criticisms related to secondary research. The most important criticism concerns to the subjectivity of the research, particularly the inclusion and investigation of a limited number of economic scientific journals.

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