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MODELING THE CAUSES OF INFLATION IN ROMANIA

Abstract: *In this paper, we analyze the main causes of inflation in Romania in the period 2007-2013. Determining the causes of inflation requires a thorough analysis to identify anti-inflationary measures and to assess possible future effects on prices as well. The proposed econometric methods analyze on one hand the impact and the extent to which prices are influenced by monetary factors and production, and by salaries and the exchange rate, on the other hand. We also analyze several models containing the main macroeconomic variables which have a direct impact on inflation and also within these models we find patterns in various economic interdependences. From the six estimated models, only two of them meet the criteria of the VAR method used in our study and the main lessons drawn from data modeling are: the money supply, the index of producer prices and the inflation CORE2 are the main sources of variation in industrial prices; after their own shocks, the monetary factors have a significant impact on prices, primarily on the production prices and later on the industry prices, whereas the salaries and exchange rate have little impact and do not account for the inflation in our country during the investigated period.*

Keywords: inflation, salaries, money, foreign exchange, VAR method.

JEL Classification: **E31, E37, C12, C19.**

1. Introduction

Analyzing and measuring the national inflation represents an approach known lately for determining price trends in the market. The major goal of The National Bank of Romania is the price stability and to achieve this, it is also important for this institution to know and analyze the causes that determine the inflation and the impact the inflationary factors have on prices of various goods and services consumed by the population.

The aim of this resarch is to analyze the major causes of inflation in Romania over a period of seven years (2007-2013) having as a starting point the

impact of monetary factors and production factors, the impact of salșaries and exchange rate through methods and econometric models adapted to this study. The importance of identifying the inflation factors is even greater as their identification can be useful for adjusting monetary instruments in the National Bank, and forecasting and adjusting anti-inflationary means.

This study uses the method VAR (Vector Auto-Regressive) through which it identifies the impact of consumer prices and production, money supply, nominal and real salaries and the exchange rate on the inflation rate in the mentioned period. We use this methodology thanks to its flexibility and ease of use. It also allows us to capture the dynamic structure of several variables simultaneously and the interdependencies between them.

2. Theoretical considerations

After 1990, Romania was faced with high inflation amid the transition to a market economy. Price stability is a prerequisite for successful transition. Identifying the causes of inflation is mainly aimed at the possibility of creating and implementing strategies for a monetary policy. This investigation also requires the classification of various causes for the prioritization of monetary policies and adjustement of intervention instruments.

This research aims to evaluate the factors which impacted inflation in our country, and also to analyze the interrelationships between the macroeconomic variables which are relevant in monetary policies. Modeling inflation is a sensitive task, mainly in countries with economies in transition due to the short time in which there were market determined prices, knowing the need of time periods for the relevance of such analysis. However, given the major structural changes that have occurred in the last ten years, the economic relations between prices, salaries and the exchange rate were susceptible to instability.

Studying the literature brings to the fore reasoned opinions and research studies undertaken by economists on the causes that can determine and influence inflation in a country. The following are some specific studies that have as main purpose to identify the causes impacting inflation in countries that have experienced a similar phenomenon to the one in our country.

Brada and Kutan undertook a similar study in 2002 that identified the causes of inflation in the Czech Republic, Hungary and Poland. They analyzed four macroeconomic variables with impact on prices, namely: money supply, nominal salaries, import prices and consumer prices, using the VAR method. The main conclusions drawn have found that on a short-term the effects of salaries and money supply on prices have no impact on the quantitative level, and that a significant impact on prices is blamed on import and consumer prices.

Similarly to Romania, even in Turkey there were periods of time when there have been high and variable inflation rates since 1970. An econometric

analysis performed on data from this country in the period 1970-1995 reveals that the monetary variables such as the money supply and the exchange rate play an important role in the inflation process and this analysis also proved that deficits from the public sector have an important effect on the evolution of inflation. (Papi, Lim, 1997).

Using cointegration and error correction models, Kim analyzed the data series in Poland for the period 1990-1999, the impact of monetary factors, the labor force and foreign sector on inflation. The main results revealed that the workforce and external sector are dominant in determining inflation in Poland. Also, the increase of salaries after 1994 resulted in high rates of inflation. Other relevant conclusions have been linked to excess money, which had no impact on rising inflation, implying that the monetary policy has been used to support other policies, for example, the exchange rate. (Kim, 2001).

Based on the circumstances identified in Mozambique related to high inflation rates since 1989, Ubide used three alternative approaches in an empirical analysis of inflation. These approaches led to the idea that the monetary expansion, together with exchange rate depreciation and unforeseeable events in the agricultural sector are highly responsible for the inflationary process in Mozambique in the period 1990-1996. (Ubide, 1997).

3. Research Methodology

To best capture the evolution and interrelationship between variables which impact at the macroeconomic level, the working method proposed in this study is the Vector Autoregressive (VAR). This is one of the principal means of measuring the interconnections between macroeconomic variables and their reciprocal causality.

We used the method VAR in this analysis to assess the causes of inflation in Romania in the period 2007-2013. In this regard, we analyzed the dynamic relationships between prices, industrial production, money supply, salaries and the exchange rate. The data sets analyzed have a monthly frequency for a detailed study and relevance of findings. The application of the VAR method gave three types of results, namely:

- Shock response function (SRF) - this type of result showed the effect of a variable innovation on other variables or even on its own over a period of time;
- Decomposition of variation (DV) - showed us the proportions from each variable due to their own innovations or to the innovations of other variables. In this case, the DV results were also given for a period of time;
- Granger Causality (CG) - showed us to what extent a variable contains the information needed to forecast other variables.

Evaluating the causes of inflation in our country will enable us to identify and implement adjustment and forecasting measures. In this analysis we started

from general aspects and then we focused on particular aspects, analyzing the industrial production index, the index of producer prices, inflation CORE2 (obtained by eliminating the influence of administered prices, and highly volatile components, such as vegetables, fruit, eggs and fuel prices), the price index in extractive industry, money supply, gross and net wages in extractive industry and foreign exchange rate. For a thorough analysis, the money supply will be split in the monetary base and monetary base multiplier. For skimming and scanning easily the material, the data sets and the names used in econometric tests are specified in the table below.

Table 1. Data sets used in econometric tests

CORE2	The Inflation obtained by eliminating the influence of administered prices and highly volatile components, such as vegetables, fruit, eggs and fuel prices
PPI	Producer Price Index
IPI	Industrial production price index for domestic market in total
IPIE	Industrial production price index for the extractive industry
M1	Narrow money
MB	Monetary base
MBM	Monetary base multiplier
EXCHANGE	Nominal exchange rate lei-dollar
NSEI	Medium monthly net salary for the extractive industry
GSEI	Medium monthly gross salary for the extractive industry

Source: *http://statistici.insse.ro/shop/index.jsp?page=tempo2&lang=ro&context=40*ș*i*http://bnr.ro/Seturi-de-date-628.aspxÂ

At this stage of our research, we show the evolutions of the analyzed monthly data sets for the period 2007-2013. To help the reader, variables are grouped according to the information provided and the evolution of data during the analyzed period.

The analyzed models and data modeling strategy

In this study we proposed 6 models, from the interdependences of the analyzed variables, as follows: there are estimated models with the following data sets: inflation CORE 2, prices in the extractive industry, money supply, net and gross salaries for the extractive industry and foreign exchange rate. From the VAR method we consider only five variables to reach a conclusive model, therefore the estimated 6 models are listed below where the variables are marked as follows (symbols used can be found on pages 3 and 4):

- Model 1: IPI, IPIE, M1, NSEI, EXCHANGE;
- Model 2: IPI, PPI, M1, GSEI, EXCHANGE;
- Model 3: IPI, CORE2, M1, NSEI, EXCHANGE;

- Model 4: MB, MBM, NSEI, EXCHANGE, IPIE;
- Model 5: MB, MBM, GSEI, EXCHANGE, PPI;
- Model 6: MB, MBM, NSEI, EXCHANGE, CORE2.

As seen, for an in-depth analysis and a relevance of results, the models are estimated in 3 versions:

- With the industrial price index and net salaries;
- With the industrial price index and gross salaries;
- With the inflation CORE2 and net salaries.

The reasons for choosing and grouping data, according to the models above are related to the fact that net salaries impact final demand, affecting consumer prices whereas gross salaries impact costs, affecting production costs.

The stages of analysis:

1. Test the integration rank of the variables included in the model;
2. Select the number VAR lags;
3. Test the existence of co-integration;
4. Stability test of VAR;
5. Diagnosis of residual terms of VAR equations;
6. Stability test of the model coefficients.

In order to use variables in the analyses and the econometric tests, data sets were adjusted to eliminate seasonal factors, by means of X12 procedure which is used by the US Census Bureau. Also, the data sets were logarithmic. Data processing and achieving of results were possible with the software Eviews 7.

4. **Research Findings**

In this stage we explain in detail the test results obtained for the 6 (six) econometric models proposed for analysis. The results obtained after interpreting and analyzing them provide a framework for verification of the economic reality through statistical and econometric models.

The first step in the analysis is to determine the integration order, specifically to verify the integration rank of data sets we used the Dickey Fuller test via Eviews 7. In order to understand this stage, two mathematical operations were applied to all data sets: logarithms and the first difference (as specified in the table below).

Table 2. Determining the cointegration rank

Variable	Period	Test Dickey Fuller		Integration
		Specification	Value test	
l_bm_sa	2007m01-2013m12	c, t	-2.85	Non-stationary
dl_bm_sa	2007m01-2013m12	c, t	-15.23	I(1)

l_core2_sa	2007m01-2013m12	c, t	0.92	Non-stationary
dl_core2_sa	2007m01-2013m12	c, t	-6.92	I(1)
l_curs_sa	2007m01-2013m12	c, t	-1.67	Non-stationary
dl_curs_sa	2007m01-2013m12	c, t	-11.00	I(1)
l_ipi_sa	2007m01-2013m12	c, t	-0.46	Non-stationary
dl_ipi_sa	2007m01-2013m12	c, t	-7.66	I(1)
l_ipp_sa	2007m01-2013m12	c, t	-1.71	Non-stationary
dl_ipp_sa	2007m01-2013m12	c, t	-11.51	I(1)
l_mm_sa	2007m01-2013m12	c, t	-1.26	Non-stationary
dl_mm_sa	2007m01-2013m12	c, t	-10.62	I(1)
l_snie_sa	2007m01-2013m12	c, t	-1.44	Non-stationary
dl_snie_sa	2007m01-2013m12	c, t	-9.66	I(1)
l_sbie_sa	2007m01-2013m12	c, t	-1.57	Non-stationary
dl_sbie_sa	2007m01-2013m12	c, t	-9.64	I(1)
l_m1_sa	2007m01-2013m12	c, t	-2.58	Non-stationary
dl_m1_sa	2007m01-2013m12	c, t	-12.10	I(1)
l_ipie_sa	2007m01-2013m12	c, t	-2.17	Non-stationary
dl_ipie_sa	2007m01-2013m12	c, t	-12.06	I(1)

Souce: http://statistici.insse.ro/shop/index.jsp?page=tempo2&lang=ro&context=40 și http://bnr.ro/Seturi-de-date-628.aspx, results obtaines through Eviews

As seen in the table above, the data sets in the models proposed for analysis are rank 1 non-stationary and integrated data sets, as mandatory prerequisites for their inclusion in the next stages of analysis.

The next step in the analysis is **choosing the number of VAR lags**. The Lag was identified according to the LR criteria (LR modified sequential statistical test), FPE (Final Prediction Error), AIC (Akaike information criterion), SC (Schwarz information criterion) and KQ (Hannan-Quinn information criterion). The obtained results are shown in the table below.

Table 3. Choosing the number of VAR lags

Model	Number of identified lag
Model 1	3 lags
Model 2	3 lags
Model 3	3 lags
Model 4	2 lags
Model 5	1 lag / 2 lags
Model 6	2 lags

Source: http://statistici.insse.ro/shop/index.jsp?page=tempo2&lang=ro&context=40 și http://bnr.ro/Seturi-de-date-628.aspx, results obtained through Eviews

To ensure the comparability of models, in this analysis we use lag 3 for models 1, 2 and 3, and for models 4, 5 and 6 we use two lags.

Then we proceed with the **test of cointegration existence** using the Johansen function. This test is made with the lag identified in the stage above.

Table 4.Test of co-integration existence

Model	Statistic Trance	Statistic Max-eigen
Model 1	Cointegration exists, 2 equations	Cointegration exists, 2 equations
Model 2	Cointegration exists, 2 equations	Cointegration exists, 2 equations
Model 3	Cointegration exists, 2 equations	Cointegration exists, 2 equations
Model 4	Cointegration exists, 1 equation	Cointegration does not exist
Model 5	Cointegration exists, 1 equation	Cointegration exists, 1 equation
Model 6	Cointegration exists, 1 equation	Cointegration does not exist

Source: http://statistici.insse.ro/shop/index.jsp?page=tempo2&lang=ro&context=40și http://bnr.ro/Seturi-de-date-628.aspx, rezultateobținuteprinintermediulEviews

The test for the existence of co-integration through the Johansen function gave us positive results for models 1, 2, 3 and 5, which means that these models are still used in the analysis, the other 2 models (4 and 6) are not used as they do not meet the requirements for research purposes.

The fourth stage of the analysis is to **test the stability of VAR** using the software Eviews 7. The test results are given in the table below.

Table 5.Testing the stability of VAR

Model	Test for checking VAR stability
Model 1	No root is outside the unit circle. VAR satisfies the conditions for stability.
Model 2	No root is outside the unit circle. VAR satisfies the conditions for stability.
Model 3	No root is outside the unit circle. VAR satisfies the conditions for stability.
Model 5	No root is outside the unit circle. VAR satisfies the conditions for stability.

Source: http://statistici.insse.ro/shop/index.jsp?page=tempo2&lang=ro&context=40și http://bnr.ro/Seturi-de-date-628.aspx, results obtained through Eviews

The next stage of research is the **diagnosis of residuals**. In this regard, we make a test for the equations, specifically to see if they meet the following requirements:

- Not to be autocorrelated;
- Be homoscedastic (to have a constant variance);
- Be normally distributed.

Table 6. Diagnosis of residuals

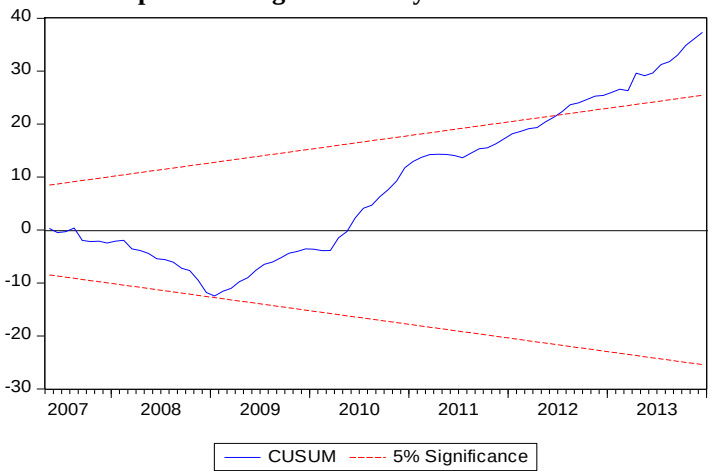
Model	Autocorrelation of errors	Homoscedasticity of errors	Normality of errors
Model 1	Prob =14.37%	Prob = 13.68%	Prob = 0.02%
Model 2	**Prob =12.46%**	**Prob = 13.38%**	**Prob = 7.06%**
Model 3	**Prob = 17.40%**	**Prob = 30.08%**	**Prob = 7.28%**
Model 5	Prob = 29.24%	Prob = 43.80%	Prob = 0.18%

Source: http://statistici.insse.ro/shop/index.jsp?page=tempo2&lang=ro&context=40 și http://bnr.ro/Seturi-de-date-628.aspx, results obtained throughEviews

Testing the results of the „white noise" quality of stochastic terms (residuals) of VAR equations are satisfactory for models 2 and 3. The tested assumptions (lack of autocorrelation, normality and homoscedasticity) are supported at the level of 5% level.

Given the favorable results of the analysis obtained at this stage, the last stage of our research is to test the stability of the model coefficients. This step is necessary to check the viability of the model in terms of the regime change occurring during the analysis. The existence of regime change that could alter the parameters of the model is tested using the CUSUM procedure using the software Eviews 7. From this point of view, it is important that the graph of the tested indicator be within the critical band corresponding to the level statistically, 5% level to be more precise. Graphs 1 and 2 below refer to the stability test of the coefficients for models 2 and 3.

Graph 1. Testing the stability of model 2 coefficients



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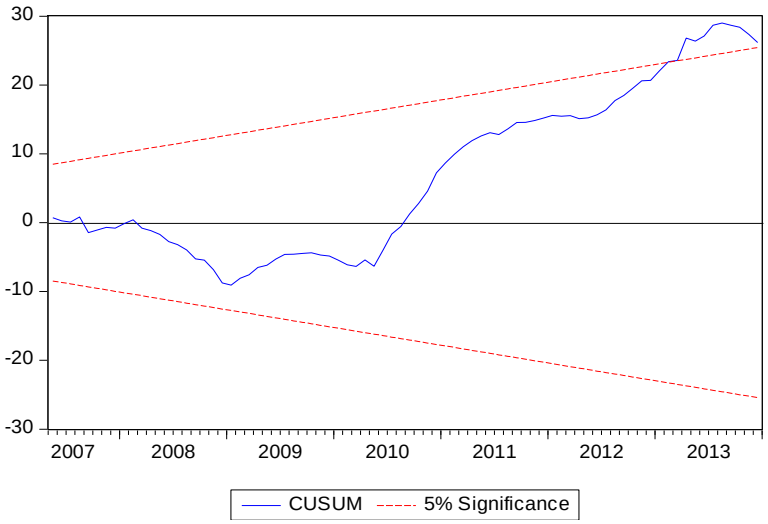
As seen, the test CUSUM shows that the graph of the tested indicator protrudes the critical band corresponding to the statistical level of 5%, this result

indicates the fact that, in the investigated period, there were regime changes which may alter the parameters of the model; in the graph one can see that these changes are visible since 2012.

Graph 2. Testing the stability of model 3 coefficients



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Also for this model, CUSUM test results are similar, with the stipulation that regime changes are visible since 2013. CUSUM test finalizes the stages of diagnosis for the econometric models proposed for analysis. The obtained results show that only 2 models out of 6 show a good approximation of the interaction dynamics structure between the variables in the analysis. The models that meet the essential criteria of VAR are models 2 and 3.

Since VAR gives three types of results: response function to shock, decomposition variation and Granger causality, in the final stage of analysis we estimate the 3 types of results for models 2 and 3 using the software Eviews 7 . First, we present the results for model 2 and then the results for model 3.

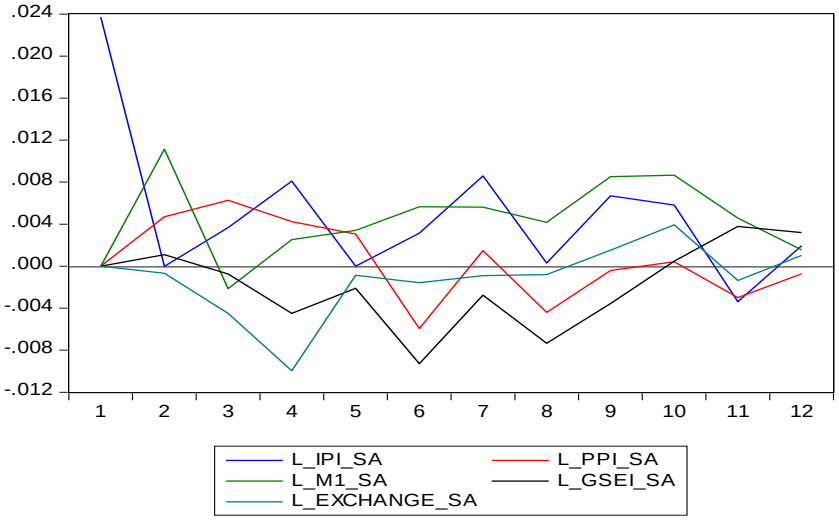
VAR results for model 2

Graph 3 shows, as FRS, IPI responses to shocks coming from all five variables in the model. All series are logarithmic and seasonally adjusted to ensure comparability of results. Considering the purpose of this research (identifying the causes of inflation) we present only the FRS of prices. It can be seen that IPI responds:

- Positively to producer prices in the first five months and negatively afterwards;

- Positively to M1 in the first two months, slightly negatively in the third month and positively from the fourth month;
- Positively to GSEI in the first two months and negatively until the 10th month;
- Negatively to the exchange rate until the 8th month and positively thereafter.

Graph 3. The response of the industrial production price index for the domestic market- in total structural shocks - model 2



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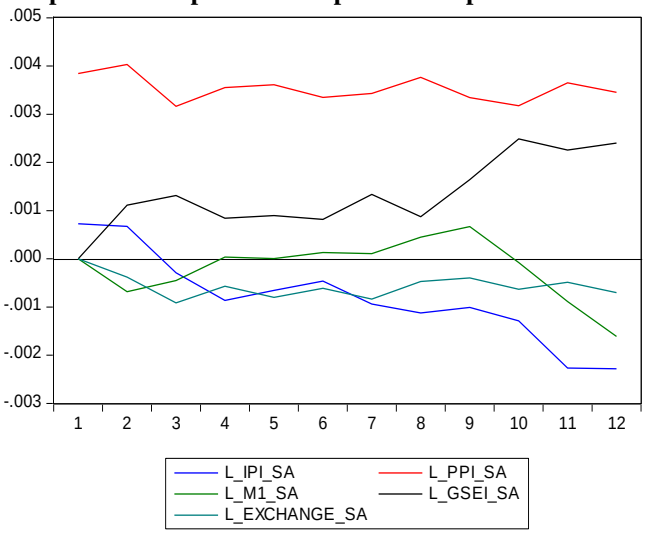
Graph 4 shows the response of producer prices index to the shocks coming from the five variables in the model. All series are logarithmic and seasonally adjusted. As we can see, producer prices respond:

- Positively to industrial prices in the first two months and negatively afterwards;
- Negatively to M1 in the first four months and positively afterwards until the 12thmonth;
- Positively to GSEI throughout the analyzed 12-month period;
- Negatively to exchange rate throughout the entire analyzed period.

Graph 4.The response of the production prices index to the structural shocks–model 2



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We further test the decomposition of variance for IPI and PPI, the 2 variables in model 2 that can show the impact of other variables on prices.

The decomposition of variance for the industrial production shows that their own innovation is the main influence factor, and the difference is taken by the other variables, the production price index, money supply and exchange rate, and the gross salaries for the extractive industry in a very small proportion.

Table 7. Decomposition of variance for the industrial production price index on the domestic market in total - Model 2 (%)

Horizon (months)	IPI	PPI	M1	GSEI	Exchange rate
1	100	0	0	0	0
2	85	1	11	0	2
3	81	3	12	2	4
4	79	4	9	0	7
5	75	7	11	0	7
6	74	8	11	0	6
7	74	9	11	1	6
8	71	10	13	1	6
9	70	11	13	1	6
10	69	11	13	1	5
11	67	12	14	2	5
12	66	12	14	2	6

Source: http://statistici.insse.ro/shop/index.jsp?page=tempo2&lang=ro&context=40și http://bnr.ro/Seturi-de-date-628.aspx, results obtained throughEviews

The DV for the production prices show quite similar results, as follows: their innovations is the primary influence factor, the difference is taken by money supply and exchange rate and, in small proportion, by GSEI. IPI is not an influential factor on production.

Table 8. Decomposition of variance for industrial production prices index - Model 2 (%)

Horizon (months)	IPI	PPI	M1	GSEI	Exchange rate
1	1	99	0	0	0
2	0	95	1	1	3
3	0	90	2	1	7
4	0	87	5	0	8
5	0	85	6	0	8
6	0	84	7	6	9
7	0	83	7	1	9
8	0	83	8	1	8
9	0	82	8	1	8
10	0	82	9	1	8
11	0	81	9	2	8
12	0	81	9	2	8

Source: http://statistici.insse.ro/shop/index.jsp?page=tempo2&lang=ro&context=40 și http://bnr.ro/Seturi-de-date-628.aspx, results obtained through Eviews

The Granger causality test in model 2, defined as the power of predictability of a variable for another variable, reflects accurately the DV results for PPI and IPI, giving the following results:

- M1 and Exchange rate cause Granger on IPI;
- Exchange rate causes Granger on PPI;
- IPI causes Granger on M1.

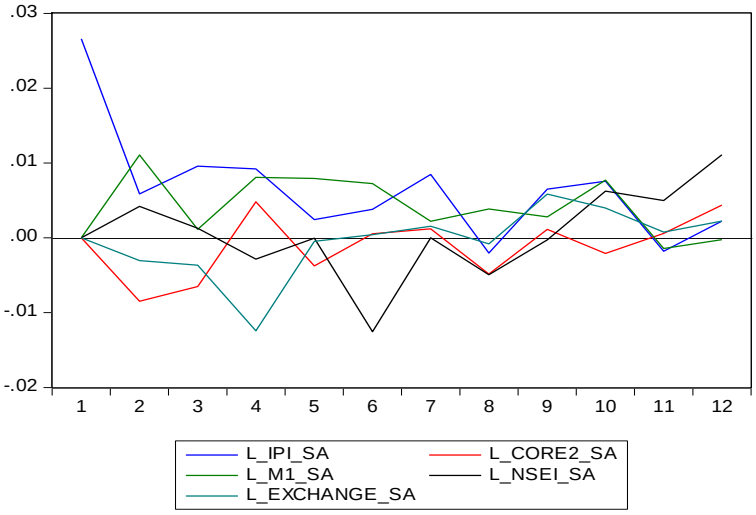
After obtaining the FRS, DV and GC results for model 2, we conclude the following: the low importance of monetary factors in explaining prices; one can notice in FRS tests that IPI responds positively to M1 only in the first two months; this analysis confirms the prices transfer, from the industrial prices to the production prices, and vice versa; gross salaries in the extractive industry are an impact factor for both industrial prices and production prices, and GC tests confirm the power of predictability of the exchange rate for PPI and IPI.

VAR results for model 3

Model 3 is different from model 2 by replacing PPI with inflation CORE2 and GSEI with NSEI. The Graphs showing the responses to shocks are relevant, given that VAR is based on the first difference series of the studied macroeconomic variables. IPI response functions to shock are shown in graph 5 (all data series are logarithmic and seasonally adjusted). As you can see, IPI responses:

- Negatively in the first 3 months to CORE2 inflation and in the coming months it alternates positive responses with negative responses;
- Positively to M1 in the first 11 months and negatively in the 12th month;
- Positively to NSEI in the first 3 months and negatively until the 9th month;
- Negatively to the exchange rate until the 5th month and afterwards it alternates positive responses with negative responses.

Graph 5.Response of the industrial production prices index for the domestic market in total structural shocks - model 3



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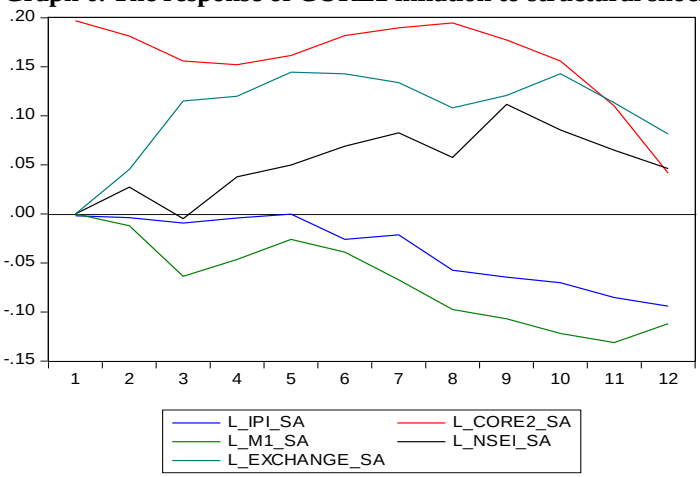
Graph 6 shows how inflation CORE2 responses to the variables in model 3. All data sets are seasonally adjusted and logarithmic. According to it, CORE2 responses:

- Negatively to industrial prices and M1 throughout the analysed period of time;
- Positively to NSEI and exchange rate throughout the analyzed period of 12 months.

Graph 6. The response of CORE2 inflation to structural shocks - model 3



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The decomposition of variance shows that the volatility of both the IPI and CORE2 inflation is largely due to the evolution of their innovations, but the influence decreases in time from lag 1 to lag 12.

Table 9. Decomposition of variance for the industrial production price index on the domestic market in total-model 3 (%)

Horizon (months)	IPI	CORE2	M1	NSEI	Exchange rate
1	100	0	0	0	0
2	86	6	6	1	1
3	81	10	5	1	2
4	80	8	4	1	7
5	78	10	4	1	7
6	78	11	4	2	6
7	78	11	4	1	6
8	74	15	4	1	6
9	73	17	3	1	6
10	70	20	3	1	5
11	66	24	3	2	5
12	63	28	3	2	5

Source: http://statistici.insse.ro/shop/index.jsp?page=tempo2&lang=ro&context=40 și http://bnr.ro/Seturi-de-date-628.aspx, results obtained through Eviews

The DV of IPI indicates their innovations as the main influencing factor, followed by inflation CORE2, M1, EXCHANGE and in a very small percentage by NSEI.

Table 10. Decomposition of variance for CORE2 inflation - model 3 (%)

Horizon (months)	IPI	CORE2	M1	NSEI	Exchange rate
1	0	100	0	0	0
2	0	99	0	0	0
3	0	97	1	1	1
4	0	94	1	1	3
5	0	92	1	1	5
6	0	90	2	1	7
7	0	89	2	1	7
8	1	89	2	1	8
9	1	88	2	1	8
10	2	87	2	1	8
11	3	87	2	1	8
12	4	86	1	1	8

Source: http://statistici.insse.ro/shop/index.jsp?page=tempo2&lang=ro&context=40şi http://bnr.ro/Seturi-de-date-628.aspx, results obtained through Eviews

The decomposition of variance for CORE2 inflation has as major influencing factor their own innovations, followed by the exchange rate, M1, IPI and NSEI. Granger causality results within model 3 are specified below:

- M1 and EXCHANGE cause Granger on IPI;
- IPI, CORE2 and EXCHANGE cause Granger on M1;
- IPI causes Granger on NSEI;

The results obtained after GC for model 3 are confirmed by DV.

The analysis of FRS, DV and GC tests within model 3 drew to the following conclusions: IPI volatility is due to monetary factors on a long period of time (12 months) and to the salaries on a short period of time (3 months), whereas the volatility of inflation CORE2 is shown by salaries and the exchange rate on a long period of time (12 months); the increasing percentage of IPI from 0 to 28% in the analyzed period is due to the evolution of CORE2.

5. **Discussion and conclusions**

Since its emergence and definition as being mainly a phenomenon with negative effects on a long term or a very long term, inflation was studied to identify the causes that produce it, and consequently the macroeconomic variables that can be controlled to prevent future inflation through the implementation of anti-inflationary measures.

This paper analyzed the main causes of inflation in Romania for a period of seven years between 2007 and 2013. The purpose of this study was to analyze the impact at which prices are influenced by monetary factors and production, salaries and the exchange rate. In this regard, our analysis began from 10 variables with

high potential of influence on inflation, which were included in six models proposed for our research.

To shape and diagnose the variables in the models above, we used the method VAR, as it is the best method to determine interdependencies and causalities between variables. In the first three models we analyzed the dynamic relationships between prices, industrial production for the extractive industry, money supply, salaries (nominal and real) and the exchange rate, and in the following three models (4, 5 and 6), the money supply is divided into the monetary base (represented by outside money, controlled by BNR) and the multiplier of monetary base (represented by interior money, controlled by commercial banks through deposit multiplication).

The six stages of VAR method were applied to monthly data series in Romania for the period 2007-2013, after being adjusted to eliminate seasonal and logarithmic factors. The application of methods and econometric models was made through the software Eviews 7. To achieve a comparability of the analyzed models, the results of this research were studied as: the shock response function, the decomposition of variance and the Granger causality.

- Out of the 6 models analyzed, two met the requirements of the VAR method, namely models 2 and 3. The results from these two models were the basis of research findings;
- Money supply, PPI and CORE2 inflation are the main sources of variation for industrial prices after their own shocks, varying from 100% (Table 7) to 66% (Table 9). Given the high percentages allocated to their shocks, these do not come from the other variables estimated in the 2 models (monetary innovation, salaries or exchange rate), but from a factor that cannot be modelled in the analysis, is hard to estimate and certainly has a big influence on price developments, namely *expectations*. The results obtained from DV reveal a great impact of expectations on inflation, especially on a short term, followed by the other factors included in our study. However, the fact that producer prices and inflation CORE2 are the main sources of industrial price variation led us to the conclusions that there was a transfer of prices on the market and that the impact of PPI and CORE2 on production is relevant to our research;
- Monetary factors have a significant influence on prices, primarily on the production prices and then on the industrial prices, accounting for 14% of IPI and 9% of PPI (Tables 7 and 8), which can translate into the idea that the monetary variable M1 can be used as a signal for predicting the evolution of prices. In models 2 and 3 that led us to these conclusions, money supply is not disaggregated; it would have been interesting to get the same results from one of the models 4, 5 or 6 in order to make assessments – which model in the monetary base or multiplier can be used as tools of monetary policy, given that one of these two models can be more easily controlled (managed) as compared to money supply;
- In both models available we found positive reactions of industrial prices and inflation CORE2 to shocks coming from net salaries for the extractive industry, but

the decomposition of variance and Granger causality do not confirm the results above; a possible explanation could be linked to the mining industry, which has faced a lot of problems in recent years;

- The exchange rate responds positively only to shocks from inflation CORE2 and, in two months (6 and 8) of the 12 months' period analyzed for industrial prices, thus contributing to the variation IPI, PPI and CORE2 at a rate of up to 8%, and causing Granger in the models estimated in both M1 and IPI. These results show the low importance of the exchange rate in determining the inflation in our country for the analyzed period;

- It is important to emphasize that, for the inflation control, the monetary policy must be supported by other economic policies and structural adjustments in the major sectors of the national economy.

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