NEW ECONOMY Section

DO BEHAVIOR REGIME CHANGES AFFECT THE RELATION BETWEEN PRICE SHOCKS AND DEMAND?

Andrei Silviu DOSPINESCU*

Abstract. *The paper tests a hypothesis relating the impact of a shock in one economic variable to the behavior regime changes. The hypothesis states that a significant change in demand due to a price shock is registered if the change in a structural variable leads to a behavior regime change. The hypothesis is tested by constructing a model which describes the evolution of prices, demand and offer on a market with two economic sectors. The model is build using a system of differential equations. The paper constructs three scenarios with different values for the downward rigidity of prices. The series of demand, offer and the index of prices specific to each scenario are used to define three VAR models and test the response of demand to a shock in the prices specific to each of the economic sectors. The hypothesis was verified indicating that the impact of changes in the structural variables should be analyzed from the perspective of whether they lead to a behavior regime change.*

Keywords*: behavior regime change, system of differential equations, price shocks.*
JEL*: C15, C63.*

1. Introduction

The dynamics of the economic processes are highly unpredictable especially in the short run where a wide range of behaviors affect the predictions. In this respect many economic series including macroeconomic series are characterized by a short-term volatility. Usually the aggregation of these series leads to a decrease in volatility which makes them more easily tractable. In this respect the structural characteristics of the economy help to identify the long term trends and offer a solid base for economic policies and long-term strategies. Nonetheless the behaviors of economic series over the long run are also affected by factors which increase their volatility. These factors take the form of structural changes. They lead to

* CS II, Center for Industrial Economics and Services, Romanian Academy, andreidospinescu@yahoo.com

changes in the behavior of the economic variables but how much of a change remains a debatable question. In this context, the paper addresses the problem of the impact of structural changes from the perspective of their relation with the behavior regime changes.

The objective of the paper is to formulate and tests a hypothesis which stipulates that the behavior regime changes are responsible for the significant modifications in the economic variables. Consequently, not all of the structural changes are equally influential.

The paper is structured as follows. Section 2 presents the impact of structural factors on the economic variables of interest. The focus is on inflation due to the characteristics of the analyzed structural factors, namely the downward rigidity of wages which is a nominal variable strongly connected with inflation. Section 3 introduces the main approaches to behavior regime changes in the literature suggesting the differences between these approaches and the logic of the paper. Section 4 presents the model focusing on the blocks of the model and on the specific system of differential equations. Section 5 builds three scenarios for the analysis of the impact of a price shock on demand. The main contribution of the chapter is the formulation and testing of the hypothesis stipulating that the behavior regime changes are responsible for the significant modifications of demand to a price shock. Section 6 is a synthesis of the main findings of the paper as well as suggestions for future developments.

2. The impact of structural factors on the economic indicators

The different ways to quantify and theoretically define structural changes led to different approaches to analyze the structural component of the economic variable of interest. Dobrescu (2009) analyzes structural inflation from the perspective of the relation between the modifications of the weights of different sectors in the total production and the changes in the prices calculated as a ratio between the sectorial price index and the total aggregated price index. Balke and Wynne (1996) showed that the sectorial technological changes are reflected in the transversal distribution of price changes. Sheedy (2005) analyzed the impact of a shock (changes in the oil price) on the firm’s costs which led to price adjustments with different lags. In this approach the shocks that affect the economy are structural because they reflect the structure of the firms in the economy and the differences in their behaviors.

The paper follows the logic of Sheedy (2005) in the sense that the changes in the key variables due to structural shocks are a result of the structure of the economy and its characteristics. The idea that we want to underline in this paper is that the economic system through its structure (the relation between the components of the system, the feed-back structure, behavior characteristics) facilitates the understanding of the behavior regime changes and their impact on the relation between demand and price shocks.

3. Behavior regime changes

The dynamics of the economic activity suggests that the behaviors of economic agents are not constant over a long period of time and that these behaviors could be significantly different depending on the characteristics of the analyzed period. In this respect the economic data series exhibit breaks which can be associated with events like financial crises (Jeanne and Masson, 2000; Cerra, 2005; Hamilton, 2005) or significant changes in government policy (Hamilton, 1988; Sims and Zha, 2004, Davig, 2004). With the same token, structural changes in the economy can lead to changes in the behavior of the economic agents and consequently to changes/ brakes in the data series. The model constructed in our paper is describing an economy with two economic sectors, with specific behaviors for the producers and the consumers and analysis the evolution of demand, offer and prices in the presence of changes in the downward rigidity of wages. In this respect the changes in the behavior regime are associated with dramatic shifts in demand, consumption or prices, which indicate economic fluctuations associated with different economic cycles. These behavior regime changes are recurrent making them more easily traceable and relevant as they influence the economy on a constant base. From this perspective is understandable why the original application of regime switching, namely the seminal work of Hamilton (1989) was to business cycle recessions and expansions.

The focus of the large majority of papers is on identifying the behavior regime changes and incorporating them into models of different economic process. In this respect, regime-switching models are applied in measuring the economic output, which have been used to model and identify the phases of the business cycle Hamilton (1989), Beaudry and Koop (1993), Tiao and Tsay (1994), Potter (1995), Pesaran and Potter (1997), Chauvet (1998), Van Dijk and Franses (1999), Kim and Nelson (1999b, 1999c), Öcal and Osborne (2000), and Kim, Morley and Piger (2005). Other application focused on applying behavior regime changes in time-series of inflation and interest rates (Evans and Wachtel, 1993; Garcia and Perron, 1996; Ang and Bekaert, 2002), high and low volatility regimes in equity returns (Turner, Startz and Nelson, 1989; Hamilton and Susmel, 1994; Hamilton and Lin, 1996; Dueker, 1997), shifts in the Federal Reserve's policy "rule" (Kim, 2004; Sims and Zha, 2006), and time variation in the response of economic output to monetary policy actions (Garcia and Schaller, 2002; Kaufmann, 2002; Ravn and Sola, 2004; Lo and Piger, 2005).

Our paper focuses on identifying behavior regime changes associated with structural changes in the economy. We accept the finding of other papers that these behavior changes can be traced in different economic series GDP, inflation, interest rate etc. Our interest is to show that if the structural changes are accompanied by behavior regime changes then the reaction of the economic variable to different shocks modify dramatically. This can be equated in some sense with the correlation between studies which showed the presence of behavior regime changes in different economic series and the studies which identified high and low volatility regimes (see the previous paragraph for the literature review). This suggests that not only the economic series change their behavior but that these changes are accompanied by different volatilities, consequently different reactions of the economic variables of interest to economic shocks. The importance of our objective is indicated by the fact that not all structural changes are equal when it comes to their impact on the economy and that the ones which are accompanied by behavior regime changes have a higher impact which is visible in the reaction of key variable to different economic shocks.

4. Model presentation

The chapter will focus on presenting the blocks of the model, the system of differential equations and the algorithm for running the model. The mathematical relations will be presented for a model with n components (consumers, firms). This version of the model uses an accommodative monetary policy. In the context of a constant money velocity, the monetary mass varies to equate the product of the quantity of goods in the economy and the prices of these goods.

Households

The economy is described by a number of consumers with identical preferences. The income is generated by their labor taken into account the number of working hours and the hourly cost of labor.

$$I_t = w_{L_{i,t-1}} * H_{i,t-1}. \quad (1)$$

Where I_t represents the income at moment *t*, $W_{L_{i,t-1}}$ the hourly cost of labor in sector *i* at the moment $t-1$, $H_{i,t-1}$ represents the number of hours worked in sector *i* at the moment $t-1$.

The consumer preferences are described by Cobb-Douglas types of indifference curves. The choice of the function reflects the phenomenon of decreasing marginal utility.

$$U(q_i) = \prod_{i=1}^{6} q_i^{a_i}. \qquad (2)$$

Where q_i represents the quantity of goods produces in sector *i*, ai are the coefficients that reflect the consumers' preferences.

The model doesn't take into account the substitution effect. This doesn't affect the analysis due to the fact that the model focuses on the relation between economic sectors and uses representative goods. In this context, the substitutability effect between different goods is not relevant.

The demand for the goods in the economy reflects the options of the consumers taken into account the disposable income and the preferences and reflects the optimal solution for the consumer. Consequently, the selected bundle of goods represents the solution of the utility maximization problem in the context of the budgetary constraints.

$$\max U(q_i)$$

$$a.c. \qquad (3)$$

$$I_t = \sum_{i=1}^{6} p_{i,t} * q_{i,t}.$$

Where $p_{i,t}$ represents the price of good *i* at moment *t*; the rest of the notations remain unchanged

This version of the model has the following restrictions regarding the income: 1) the incomes are represented by the salaries, consequently the model doesn't take into account other types of accumulations or wealth; 2) the income generated in one period is consumed in that period, thus the saving rate is 0.

Using the Lagrangian multiplier the above described problem can be written as:

$$\max U(q_i) - \lambda\left(\sum_{i=1}^{6} p_{i,t} * q_{i,t} - I_t\right). \qquad (4)$$

Algebraic manipulation of the first order condition leads to the following relation for the demand for good i:

$$q_i = \frac{I_{i,t}}{p_{i,t}(1+(\sum_{j=1}^{6}\alpha_j - \alpha_i / \alpha_i))}. \quad (5)$$

Relation 5 reflects the determining factors for the final demand. The demand for good i depends on the disposable income, the price of good i and the specific coefficients of the indifference curve. Indirectly the demand depends via the disposable income on production.

Firms

The economy is characterized by a representative producer for each of the sectors. The production possibilities of the firms are reflected by a Leontief type of production function. Balke and Wynne (1996) uses Cobb-Douglas type of production function, but this choice assumes variable technological coefficients in the short run. The hypothesis is inconsistent with the economic data. Taken this into consideration it was chosen a Leontief type of production function, for which the technological coefficients are fixed.

$$Y_{j,t} = \max\left\{\frac{x_{1,t-1}}{a_{1,j}}, \ldots \frac{x_{i,t-1}}{a_{i,j}}, \frac{H_{j,t}}{b_j}\right\}. \quad (6)$$

Where $Y_{j,t}$ represents the production of good j at the moment t, $H_{j,t}$ represents the number of hours worked in sector j at the moment t, $x_{i,t-1}$ represents the production in sector i at the moment $t-1$. The coefficient of the production function ai, j and bj satisfy the constraint s ai, $j > 0$, $bj > 0$ and $b_j + \sum_{i=1}^{N} a_{i,j} = 1$ for $i = 1 \ldots N$.

The firms optimize their choice of the quantity produced by maximizing profit.

$$\max Y_{j,t} * P_{j,t} - Y_{j,t} * \sum a_{i,j} * P_{j,t-1} - Y_{j,t} * b_j * w_{L_{j,t}}. \quad (7)$$

Where $W_{L_{j,t}}$ represents the cost of labor in sector j at the moment t, $P_{i,t-1}$ represents the price of good i at the moment $t-1$. The rest of the notations remain unchanged.

The solution to the firm's maximization problem takes into account the characteristics of the production process, namely the production capacity and the intermediate consumption.

From the first order condition it can be seen that the function described by relation (7) is monotonically increasing or decreasing. The monotonicity depends on the costs of the intermediate consumption and of the labor force, on the price of the good *j* and on the technological coefficients. Consequently, relation (7) indicates that the firm will choose to produce the maximum allowed by the production capacity and by the intermediate consumption or not to produce.

The system of differential equations

The system of differential equations models the variation of prices, wages, demand and offer in the context of the interaction between producers and consumers on two markets. The symbols used stand for *pri* – the price of the economic good, for the sector *i*, *cri* – demand for the good produced by the sector *i*, *ori* – offer for the good produced by the sector *i*, *wri* – nominal wage for the sector *i*, *ep* – expected inflation, *is* – the wage index, *as* – wage adjustment index, *rs* – downward rigidity of wages index, aprod – production adjustment index, profitri – the profit of the firm in sector *i* calculated as the difference between income and costs. The relations that model the evolution of prices, wages, demand and offer are described below:

$$p_t^{r_i} = p_{t-1}^{r_i} * \frac{C_{t-1}^{r_i}}{O_{t-1}^{r_i}} * e^p \tag{8}$$

$$w_t^{r_i} = p_{t-1}^{r_i} * \frac{p_t^{r_i}}{p_{t-1}^{r_i}} * i^s = w_{t-1}^{r_i} * \frac{C_{t-2}^{r_i}}{O_{t-2}^{r_i}} * e^p * i^s \tag{9}$$

$$i^s = \begin{cases} a^s & \dfrac{C_{t-1}^{r_i}}{O_{t-1}^{r_i}} > 1 \\ r^s & \dfrac{C_{t-1}^{r_i}}{O_{t-1}^{r_i}} < 1 \end{cases}. \tag{10}$$

$$O_t^{r_i} = O_{t-1}^{r_i} * a_{prod} \tag{11}$$

$$a_{prod} = \begin{cases} a^1 prod & Profit^{r_i} > 0 \\ a^2 prod & Profit^{r_i} < 0 \end{cases} \tag{12}$$

$$C_t^{r_i} = \frac{w_t^{r_i}}{p_t^{r_i}} = \frac{w_1^{r_i}}{p_1^{r_i}} * \frac{C_0^{r_i}}{O_0^{r_i}} * \frac{O_{t-1}^{r_i}}{C_{t-1}^{r_i}}. \tag{13}$$

The system of differential equations reflects the following economic behavior mechanisms. The variation in prices is proportional with the ratio between demand and offer and depends on the inflation expectations. The prices are increasing if the demand is higher than the offer, remain unchanged in the case of equality and decrease otherwise (see relation 8). The variation in wages depends on the variation of prices. An increase in prices generates pressures in the direction of an increase in wages. The wage adjustment is captured by the wage index which can be an index higher than unity (the wages increase more than the prices) equal to unity (the wages increase is equal to the price increase) and lower then unity (the wage increase is lower than the price increase). By algebraic manipulation of the relation (9), the wages can be written as a function of demand and offer with lag two ($t-2$), the inflation expectations and the wage index. The output variation depends on the differences between output and demand and on the production adjustment capacity (which can be seen as the elasticity of output to demand changes). This capacity is endogenously defined and it depends on the specificities of the production process and on the characteristics of the market (see relation 11). There are two possible values of the adjustment indicator, which corresponds to the case of positive profits or negative ones (see relation 12). The demand at the moment t depends on the relation between income and prices. By algebraic manipulation of relation 13, the demand can be written as a function of the demand and offer with one lag ($t-1$), of the demand and offer at time $t0$ and of the ratio of income and price and time $t1$ (see relation 13).

5. Results and discussions

The simulation analyzes the relation between behavior regime changes generated by a structural change and the reaction of demand to prices shocks.

Hypothesis 1

A significant change in demand due to a price shock is registered if the change in a structural variable leads to a behavior regime change.

In order to tests the hypothesis, we had the following strategy described in a five steps:

Step 1. We build three scenarios with different values for the downward rigidity of wages r^s which describes the structural change.

Step 2. The scenarios was run for 30 periods using the model described in chapter 4. We obtained for each scenario 6 series for the key variables: demand, offer and price corresponding to the two sectors of the model (see the presentation of the model).

Step 3. We build three VAR models, one for each of the scenarios and we analyzed the impulse response functions which describe the reaction of the demand to a shock in the price.

The values for the key controlled variables for the three scenarios are presented in Table 1. The model was run obtaining the corresponding series for the key economic variables of interest, namely demand, offer and prices, which are presented as graphs in Appendix 1.

Table 1

Specific values of the six scenarios.

	*S*1	*S*2	*S*3
The coefficients specific to the consumers' utility functions (Cobb-Douglas type $U(Q1,Q2) = Q1a * Q1b$)	$a = 0.6$ $b = 0.4$	$a = 0.6$ $b = 0.4$	$a = 0.6$ $b = 0.4$
Technological coefficients (see production function relation 6)	$ai, j = 0.4$ $bj = 0.6$	$ai,j = 0.4$ $bj = 0.6$	$ai,j = 0.4$ $bj = 0.6$
Inflationary expectations e^p	$e^p = 1.1$	$e^p = 1.1$	$e^p = 1.1$
The wages adjustment to inflation a^w *	$a^w = 1.05$	$a^w = 1.05$	$a^w = 1.05$
Downward rigidity of wages r^s *	$r^p = 0.99$	$r^p = 1.01$	$r^p = 1.03$

*Variables with different values for the scenarios

We obtained 18 series of interest, 6 for each of the scenarios. Using those series, we build three VAR models. The generic VAR model used is presented below:

$$Y_t = A_0 + A_1 Y_t + \varepsilon_t . \qquad (14)$$

Where A_0 is a vector of free terms, A_1 a matrix of the coefficient corresponding to the lag variables and Y_t a vector of the variables.

The vector of the variables Y_t has the form $Y_t = [y_{1t}, y_{2t} y_{3t} y_{4t} y_{5t} y_{6t}]^T$, where T indicate the transpose of the vector, $y_{1,}$ y_2 corresponds to the demand for the two sectors, $y_{1,}$ y_2 corresponds to the demand for the two sectors, $y_{3,}$ y_4 corresponds to the price index for the two sectors, $y_{5,}$ y_6 corresponds to the offer for the two sectors.

The optimal number of lags of the model was identified using the Akaike and Schwartz criteria. The models for which the absolute values of the criteria are minimum were retained.

The values and the statistics for the coefficients of the three VAR models are presented in Appendix 2.

The stability of the VAR models was tested using the AR roots in E-views. It reports the inverse roots of the characteristic AR polynomial. A model is stable if the inverse roots have modulus less than one and are inside of the unit circle. All of the models were stable indicating the validity of the impulse response function output.

In order to test the hypothesis, we have to correlate to elements. The first element is the identification of the behavior regime change. The second element is the impulse response functions for the three scenarios.

Regarding the first element, the key variable which changes values in the three scenarios is the downward rigidity of wages r^s. The variable has a notable effect in modeling the reaction of wages to a decrease in prices. The value of r^s describes the following behavior regime change. If $r^s < 1$ the increase in demand is smaller than the increase in offer leading to a decrease in price, higher volatility of price series and a change in the behavior of demand (the regime change is in the dominant behavior of the producer when it comes to prices). If $r^s < 1$ the increase in demand is higher than the increase in offer leading to a decrease in price, higher volatility of price series and a change in the behavior of demand. This leads to the implication that there should be a noticeable difference between scenarios 2 and 3 on one hand and scenario 1 on the other.

6. Conclusions and further developments

The paper builds a model of differential equations to analyze the relation and evolution of demand, offer and prices on a market with two sectors.

The first objective of the paper was to identify the impact of the changes in the structural variables. In this context the paper analyzed the effect of the changes in the downward rigidity of prices (*rs*) on the demand, offer and prices. The simulations revealed three main conclusions: a) the ambiguity of the sign of the relation between the downward rigidity of prices on one hand and the positive evolution of demand on the other explainable by the trade-off between the increase in productivity due to smaller labor cost and decrease in demand due to the same cause; b) the existence of a structural component of inflation, but at the same time the difficulty of separating the structural signal due to numerous interdependencies in the economy coupled with the numerous roles played by the prices on the market; c) the nonlinear behavior of the systems, namely proportional changes in the inflationary expectations do not lead to proportional changes in the key variables, namely demand, offer and inflation.

The key contribution of the paper was to test a hypothesis regarding the relation between the changes in the trajectories of prices as a result of the changes in the structural variables (downward rigidity of wages and inflationary expectations) and the pattern of the economic transmission mechanisms. The analysis of these mechanisms was based on the Pearson and Spearman correlations. The hypothesis was verified indicating that there are unique characteristics of the transmission mechanisms and of the relations between them that differentiate the high volatility behavior of prices form the low volatility behavior.

The differences between the results obtained using the Pearson and Spearman correlation coefficients indicate the limits that the use of this method has in analyzing the transmission mechanisms and their relations. In this respect, a future research approach would be to use conditional probability. This approach would give higher flexibility in defining the types or relations between the key variables. At the same time, the use of conditional probabilities would facilitate building more complex transmission mechanisms which would include a higher number of variables.

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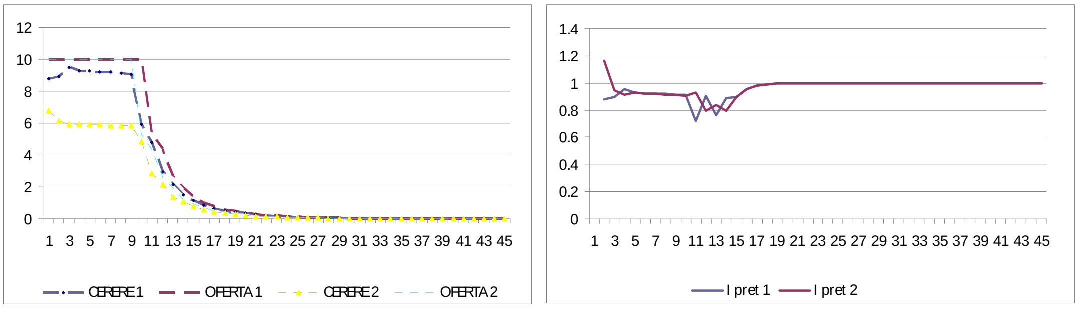
Appendix 1

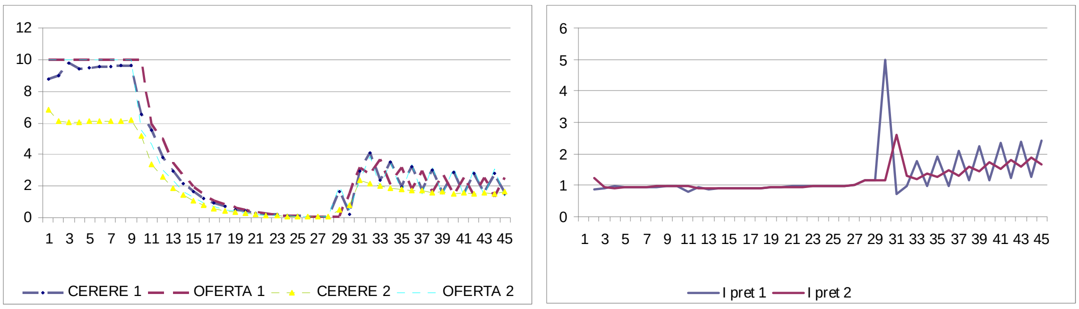
The results of the scenarios

Figure 1. A1
Running the model – scenario 1.



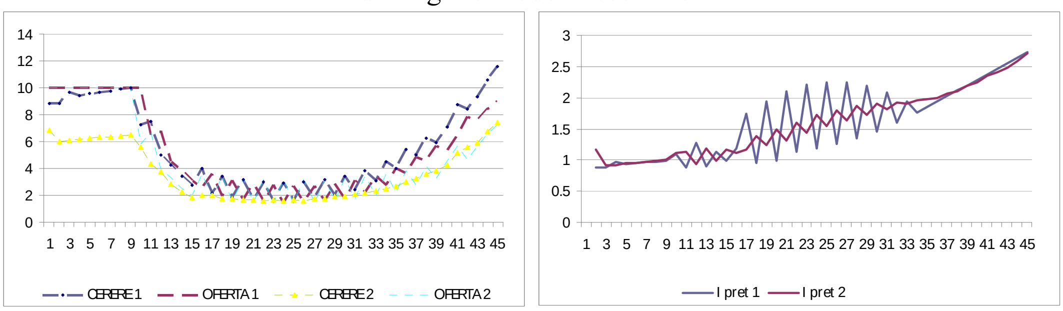
Legend: cerere i – demand in sector i, oferta i – offer in sector i, Ipret i – price chain index in sector i.

Figure 2. A1
Running the model – scenario 2.



Legend: cerere i – demand in sector i, oferta i – offer in sector i, Ipret i – price chain index in sector i

Figure 3. A1
Running the model – scenario 3



Legend: cerere i –demand in sector i, oferta i –offer in sector i, Ipret i – price chain index in sector i.

Appendix 2

Statistical synthesis of the VAR models

VAR MODEL – scenario 1

	S2_C1	S2_C2	S2_IPC1	S2_IPC2	S2_O1	S2_O2
S2_C1(-1)	-1.454296	-0.334910	0.567161	0.010018	0.350349	-2.316726
	(0.60294)	(0.19881)	(0.56689)	(0.04454)	(0.16378)	(0.84304)
	[-2.41202]	[-1.68460]	[1.00047]	[0.22492]	[2.13919]	[-2.74807]
S2_C2(-1)	0.735719	0.486902	0.101560	0.230273	-1.309924	0.553603
	(1.76517)	(0.58203)	(1.65965)	(0.13040)	(0.47948)	(2.46810)
	[0.41680]	[0.83656]	[0.06119]	[1.76587]	[-2.73199]	[0.22430]
S2_IPC1(-1)	0.284157	0.448119	0.120820	0.389879	0.644306	0.085473
	(0.18939)	(0.06245)	(0.17807)	(0.01399)	(0.05144)	(0.26481)
	[1.50040]	[7.17601]	[0.67851]	[27.8665]	[12.5245]	[0.32278]
S2_IPC2(-1)	0.960256	0.302915	0.142456	0.231801	0.490503	1.225629
	(0.84799)	(0.27961)	(0.79729)	(0.06265)	(0.23034)	(1.18567)
	[1.13240]	[1.08336]	[0.17867]	[3.70023]	[2.12947]	[1.03370]
S2_O1(-1)	0.499684	0.008134	-0.533284	-0.115595	0.588192	0.653613
	(0.63023)	(0.20781)	(0.59255)	(0.04656)	(0.17119)	(0.88120)
	[0.79286]	[0.03914]	[-0.89997]	[-2.48281]	[3.43590]	[0.74173]
S2_O2(-1)	1.331040	0.610925	-0.073787	-0.038594	0.888001	2.127353
	(0.32128)	(0.10594)	(0.30207)	(0.02373)	(0.08727)	(0.44922)
	[4.14293]	[5.76693]	[-0.24427]	[-1.62608]	[10.1753]	[4.73565]
C	-1.199452	-0.754194	0.903089	0.405067	-1.186150	-1.241163
	(0.98654)	(0.32529)	(0.92756)	(0.07288)	(0.26798)	(1.37940)
	[-1.21582]	[-2.31851]	[0.97361]	[5.55796]	[-4.42634]	[-0.89978]
R-squared	0.974180	0.993313	0.326017	0.978999	0.998381	0.953420
F-statistic	226.3771	891.2186	2.902304	279.6944	3700.571	122.8101

*Standard errors in ( ) & t-statistics in [ ]

VAR MODEL – scenario 2

	S2_C1	S2_C2	S2_IPC1	S2_IPC2	S2_O1	S2_O2
S2_C1(-1)	-0.104646	0.024615	0.193210	0.054621	0.618873	-0.587401
	(0.32127)	(0.11258)	(0.03361)	(0.02245)	(0.05289)	(0.39174)
	[-0.32573]	[0.21865]	[5.74874]	[2.43303]	[11.7002]	[-1.49945]
S2_C2(-1)	-2.331945	-0.749389	-0.367084	-0.018895	-1.580673	-3.729388
	(1.16417)	(0.40794)	(0.12179)	(0.08135)	(0.19167)	(1.41957)
	[-2.00309]	[-1.83699]	[-3.01408]	[-0.23226]	[-8.24665]	[-2.62712]
S2_IPC1(-1)	3.471788	1.413441	0.238076	0.580608	-0.111126	4.387920
	(1.17622)	(0.41217)	(0.12305)	(0.08219)	(0.19366)	(1.43427)
	[2.95164]	[3.42930]	[1.93478]	[7.06385]	[-0.57382]	[3.05935]
S2_IPC2(-1)	0.198747	-0.279407	0.435531	0.363769	1.269108	-2.282737
	(1.17825)	(0.41288)	(0.12326)	(0.08234)	(0.19399)	(1.43674)
	[0.16868]	[-0.67674]	[3.53336]	[4.41811]	[6.54207]	[-1.58884]
S2_O1(-1)	1.600667	0.505361	0.045731	-0.014663	0.625787	2.050853
	(0.38312)	(0.13425)	(0.04008)	(0.02677)	(0.06308)	(0.46717)
	[4.17795]	[3.76428]	[1.14099]	[-0.54768]	[9.92070]	[4.38992]
S2_O2(-1)	0.923075	0.536777	-0.016925	-0.026255	0.733265	1.754372
	(0.23194)	(0.08128)	(0.02426)	(0.01621)	(0.03819)	(0.28282)
	[3.97979]	[6.60442]	[-0.69751]	[-1.61988]	[19.2016]	[6.20304]
C	-3.391646	-0.843973	0.430505	0.074103	-1.038742	-1.256051
	(1.06328)	(0.37259)	(0.11123)	(0.07430)	(0.17506)	(1.29654)
	[-3.18980]	[-2.26516]	[3.87024]	[0.99733]	[-5.93355]	[-0.96877]
R-squared	0.945568	0.985059	0.984630	0.993214	0.998759	0.957930
F-statistic	60.80018	230.7477	224.2137	512.2845	2816.022	79.69438

*Standard errors in ( ) & t-statistics in [ ]

VAR MODEL – scenario 3

	S3_C1	S3_C2	S3_IPC1	S3_IPC2	S3_O1	S3_O2
S3_C1(-1)	-0.895365	-0.243708	-0.031813	-0.075711	0.429105	-1.427162
	(0.98905)	(0.32717)	(0.17768)	(0.08464)	(0.15978)	(1.35903)
	[-0.90527]	[-0.74489]	[-0.17905]	[-0.89456]	[2.68558]	[-1.05013]
S3_C2(-1)	-0.641677	0.133707	0.715828	0.433465	-1.005428	-2.240848
	(2.88107)	(0.95304)	(0.51756)	(0.24654)	(0.46543)	(3.95879)
	[-0.22272]	[0.14030]	[1.38307]	[1.75820]	[-2.16019]	[-0.56604]
S3_IPC1(-1)	0.447203	0.235051	-0.345737	0.331694	0.051156	0.924737
	(0.75207)	(0.24878)	(0.13510)	(0.06436)	(0.12150)	(1.03340)
	[0.59463]	[0.94481]	[-2.55903]	[5.15401]	[0.42105]	[0.89485]
S3_IPC2(-1)	0.077532	0.035573	0.700969	0.435041	0.125624	0.086076
	(1.20198)	(0.39761)	(0.21593)	(0.10286)	(0.19418)	(1.65160)
	[0.06450]	[0.08947]	[3.24633]	[4.22963]	[0.64695]	[0.05212]
S3_O1(-1)	1.111931	0.203120	-0.445402	-0.166614	0.504811	1.765732
	(0.99159)	(0.32801)	(0.17813)	(0.08485)	(0.16019)	(1.36251)
	[1.12137]	[0.61925]	[-2.50041]	[-1.96359]	[3.15133]	[1.29594]
S3_O2(-1)	1.030590	0.547968	-0.011220	-0.036607	0.713265	1.882923
	(0.29438)	(0.09738)	(0.05288)	(0.02519)	(0.04756)	(0.40450)
	[3.50088]	[5.62714]	[-0.21216]	[-1.45320]	[14.9981]	[4.65494]
C	0.006801	-0.085294	1.014687	0.276022	-0.196769	-0.326544
	(2.21447)	(0.73253)	(0.39781)	(0.18950)	(0.35775)	(3.04284)
	[0.00307]	[-0.11644]	[2.55065]	[1.45660]	[-0.55002]	[-0.10732]
R-squared	0.966294	0.990822	0.953120	0.976403	0.999273	0.943023
F-statistic	100.3376	377.8352	71.15835	144.8257	4813.471	57.92842

* Standard errors in ( ) & t-statistics in [ ]