Oana Simona HUDEA
University of Bucharest, Romania

THE NEW KEYNESIAN THEORY AND ITS ASSOCIATED MODEL

Empirical Study

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Abstract

The basic new Keynesian model rendered in this paper, as well as the analysis of the reaction of economic variables to the occurrence of a structural, monetary policy shock, strengthen the hypothesis exposed at pure theoretical level, namely the active role of Central Banks in economy, the classical dichotomy between the nominal and the real economic factors being abandoned. As reflected by the impulse-response function graphs, the model endogenous variables: output, output gap, labour hours, inflation rate, nominal interest rate and real interest rate, clearly react to the exogenous variables of the same, represented by structural shocks, returning afterwards, more or less quickly, to their initial steady state. In compliance with the literature in the matter, the monetary entity policies, although having a lower impact than the one generated by the technological changes, manifest obvious influences on the model variables, therefore affecting both the decisions of the representative agents, at microeconomic level, and the aggregate economy, as a whole.

INTRODUCTION

The macroeconomic modelling evolved over time, acquiring in its long way to modern approaches, miscellaneous distinctive elements. If we go in line with the Keynesian thinking, we arrive to the new Keynesian theory which, while preserving the essential early Keynesian conceptions relating to imperfect competition markets or to the inflexibility of prices and wages, or the late ones regarding the existing of rational economic agents pursuing to maximise their benefits, that is the utility for households and the profits for firms, comes with fresh elements such as the rational versus adaptive expectations or the relevance of structural shocks at economic level.

Although each stage of Keynesian thinking was marked by the construction of related models, more precisely, the revenues – expenses model, rendering the economy equilibrium in the absence of the labour market analysis, the IS-LM (investments-savings, liquidity preference-money supply) model with two variants, one of them taking prices for fixed and the other one considering the power of the aggregate demand-supply ratio in controlling the nominal price level, or the Mundell-Fleming model, in fact an extension of the IS-LM model, designed for an open economy that considers the balance of payments and where the equilibrium is reach through successive adjustments of the output, interest rate and exchange rate, the new Keynesian moment was in fact the cornerstone in the evolution of nowadays Keynesian-based macroeconomic modelling.

The new vision was specifically modelled by Rotemberg and Woodford (1997), who developed one of the first new microeconomic fundamental-based macroeconomic models of the Keynesian thinking, therefore creating the framework for subsequent analysis of price resetting modalities, monetary policy effects or inflation targeting rules.

Starting from the premises of a monopolistic competition that impedes an instant and costless adjustment of prices, the Keynesian model extended, incorporating various shocks, beside the well-known technological one, including, without limitation, the monetary policy shock, the fiscal shock or the inflation shock.

The effects generated by the monetary policy shocks, central theme of the present paper, began to be clearly reflected by Clarida et al. (2000), the related central ideas being subsequently taken over by Woodford (2003).

An exceptional modelling step in this direction was made by Christiano et al. (2005), who demonstrated that a real and nominal rigidity-based model exceptionally explains the final influences of the monetary entity's decisions.

The real perturbations, as source of economic fluctuations, have slowly increased, Altig et al. (2005) showing that fourteen percents of the variance of aggregate production fluctuations, relating to the business cycle frequencies, were caused by the monetary policy shock, it being surpassed by the technology shock with just one percent.

The list of economic studies belonging to specialists having focused on the new Keynesian models, currently approached as Dynamic Stochastic General Equilibrium (DSGE) models, quickly expanded, encompassing, among many others, the works of Adolfson et al. (2007), Gali (2008), Fernandez-Villaverde (2009), Lees et al. (2011) or Robinson (2013).

The impact of new Keynesian premises-based models at monetary level determined a lot of Central Banks, all over the world, to adopt the same, the Bank of England (Harrison et al., 2005), the Federal Bank of Reserves (Erceg et al., 2006) or the European Central Bank (Christofel et al., 2007) being the most relevant of them.

In line with the above-mentioned, the purpose of this paper is to outline, both theoretically, by the model rendered, accompanied by the related explenations, and empirically, by the impulse-response function analysed, meant to reveal the reaction of variables to the technology and monetary policy shocks, the significant role played by the monetory autority in impacting the real economy of a nation.

MODEL

After having analysed the microeconomic elements generating new Keynesian type macroeconomic effects, the new theory adepts proceeded to the construction of specific models rendering the studied issues. The related models described the decisions of households, firms, governments or national banks, while assuming clear hypotheses as the monopolistic competition and the price or even wage stickiness, and starting from the premises of effective monetary policies, exerting appropriate influences on the real economic variables like the gross domestic product or the unemployment rate. Such small, basic model, outlined by Gali (2008), as a reaction to the new classical model, captures the essence of the new Keynesian thinking.

Households, deemed to be identical, with unlimited period living individuals, pursue to maximise their utility function:

$$E_0 \sum_{t=0}^{\infty} \beta^t U(C_t, N_t) \quad (1)$$

where

E_0 – expected value of households, at time *0*

β – subjective discount factor

U – utility function

N_t – labour hours, at time *t*

with C_t representing a consumption index, taking the following form:

$$C_t = \left(\int_0^1 C_t(i_1)^{1-\frac{1}{\varepsilon}} di_1 \right)^{\frac{\varepsilon}{\varepsilon-1}} \quad (2)$$

where

$C_t(i_1)$ – quantity of good i_1 consumed by households on t, with $i_1 \in [0,1]$

under the budgetary constraint:

$$\int_0^1 P_t(i_1) \times C_t(i_1) di_1 + Q_t \times B_t \le \le B_{t-1} + W_t \times N_t - T_t \quad (3)$$

where

$P_t(i_1)$ – price of goods i_1 on t, with $i_1 \in [0,1]$

W_t – nominal wage

B_t – volume of zero-coupon bonds acquired for one period, at time *t*

Q_t – price of bonds

T_t – aggregate value of incomes (i.e. dividends) and expenses (i.e. fees)

The consumption index C_t should be maximised for any level of expenses, Z_t:

$$\int_0^1 P_t(i_1) \times C_t(i_1) di_1 = Z_t \quad (4)$$

leading to the optimum condition:

$$C_t(i_1)^{-\frac{1}{\varepsilon}} C_t^{\frac{1}{\varepsilon}} = \lambda \times P_t(i_1) \quad (5)$$

where

λ – multiplier of the consumption index constraint

If we consider two goods, i_1 and i_2, we have:

$$C_t(i_2)^{-\frac{1}{\varepsilon}} C_t^{\frac{1}{\varepsilon}} = \lambda \times P_t(i_2) \quad (6)$$

$$C_t(i_1) = C_t(i_2) \times \left[\frac{P_t(i_1)}{P_t(i_2)} \right]^{-\varepsilon} \quad (7)$$

By generalising, we obtain:

$$C_t(i_1) = \frac{Z_t}{P_t} \times \left[\frac{P_t(i_1)}{P_t} \right]^{-\varepsilon} \quad (8)$$

$$C_t(i_1) = \frac{\int_0^1 P_t(i_1) \times C_t(i_1) di_1}{P_t} \times \left[\frac{P_t(i_1)}{P_t} \right]^{-\varepsilon} \quad (9)$$

from where the aggregate price index can be deduced:

$$P_t = \left(\int_0^1 P_t(i_1)^{1-\varepsilon} di_1 \right)^{\frac{1}{1-\varepsilon}} \quad (10)$$

getting to:

$$\int_0^1 P_t(i_1) \times C_t(i_1) di_1 = P_t \times C_t \quad (11)$$

the budgetary constraint becoming:

$$P_t \times C_t + Q_t \times B_t \le B_{t-1} + W_t \times N_t - T_t \quad (12)$$

The resulting optimum conditions are:

$$-\frac{U_{n,t}}{U_{c,t}} = \frac{W_t}{P_t} \quad (13)$$

$$Q_t = \beta \times E_t \left\{ \frac{U_{c,t+1}}{U_{c,t}} \times \frac{P_t}{P_{t+1}} \right\} \quad (14)$$

and, subsequent to the application of the Bernoulli type utility function:

$$U(C_t, N_t) = \frac{C_t^{1-\gamma}}{1-\gamma} - \frac{N_t^{1+\varphi}}{1+\varphi} \quad (15)$$

turn into:

$$C_t^{\gamma} N_t^{\varphi} = \frac{W_t}{P_t} \quad (16)$$

$$Q_t = \beta \times E_t \left\{ \left(\frac{C_{t+1}}{C_t} \right)^{-\gamma} \times \frac{P_t}{P_{t+1}} \right\} \quad (17)$$

By log-linearization, we get:

$$\gamma \times c_t + \varphi \times n_t = w_t - p_t \quad (18)$$

$$c_t = E_t\{c_{t+1}\} - \frac{1}{\gamma} \times (i_t - E_t\{\pi_{t+1}\} - \rho) \quad (19)$$

where

$c_t = \log C_t$

$n_t = \log N_t$

$w_t = \log W_t$

$p_t = \log P_t$

$i_t = -\log Q_t$

$\rho = -\log \beta$

$E_t\{\pi_{t+1}\} = \log E_t\{P_{t+1}\}$

The demand for real balances, in its log-linear form, is represented by:

$$m_t - p_t = y_t - \eta \times i_t \quad (20)$$

where

η – interest semi-elasticity of money demand, with $\eta \ge 0$

Firms have a common technological level A_t, exogenously evolving over time, their production function being described by the equation:

$$Y_t(i_1) = A_t \times N_t(i_1)^{1-\alpha} \quad (21)$$

The model adopts the principle of Calvo (1983), according to which each firm re-establishes its price with the probability (1-θ) at any time, irrespective of the time elapsed from its previous adjustment. Therefore, during each period, (1-θ) producers reset their product-related prices, while θ of them maintain the same unchanged, therefore reflecting the price stickiness.

Dynamics of aggregated prices

Considering that all firms re-establishing their prices select a unique price $P_t *$, and given equation (10), we obtain:

$$P_t = \left[\theta \times (P_{t-1})^{1-\varepsilon} + (1-\theta) \times (P_t *)^{1-\varepsilon}\right]^{\frac{1}{1-\varepsilon}} \quad (22)$$

$$\left(\frac{P_t}{P_{t-1}}\right)^{1-\varepsilon} = \theta + (1-\theta) \times \left(\frac{P_t *}{P_{t-1}}\right)^{1-\varepsilon} \quad (23)$$

$$\Pi_t^{1-\varepsilon} = \theta + (1-\theta) \times \left(\frac{P_t *}{P_{t-1}}\right)^{1-\varepsilon} \quad (24)$$

where

Π_t – level of inflation, at time t

At equilibrium, under non-inflationary circumstances: $P_t * = P_{t-1} = P_t$ for any t, this leading to $\Pi_t = 1$.

By log-linearization of (24), we get:

$$\pi_t = (1-\theta) \times (p_t * - p_{t-1}) \quad (25)$$

where

$\pi_t = \log \Pi_t$

So, in order to detect the evolution of inflation over time, we have to analyse the determining factors influencing the decisions of firms to set the prices for their products.

Setting an optimum price

The firms resetting their price at time t will select that level of $P_t *$ that maximises the market value of their generated profits, as long as such price remains valid:

$$\max_{P_t *} \sum_{k=0}^{\infty} \theta^k \times E_t \left\{ \begin{aligned} & Q_{t,t+k} \times \\ & \times \left[P_t * \times Y_{t+k/t} - \psi_{t+k}(Y_{t+k/t})\right] \end{aligned} \right\}$$

(26)

where

$Q_{t,t+k}$ – stochastic discount factor

ψ_{t+k} – cost function, at time $t+k$

$Y_{t+k/t}$ – income at $t+k$, when the firm resets its price at time t

under the demand constrains, determined based on equation (8):

$$Y_{t+k/t} = C_{t+k} \times \left[\frac{P_t *}{P_{t+k}}\right]^{-\varepsilon} \quad (27)$$

with $Q_{t,t+k}$ resulting from equation (17):

$$Q_{t,t+k} = \beta^k \times \left(\frac{C_{t+k}}{C_t}\right)^{-\gamma} \times \left(\frac{P_t}{P_{t+k}}\right) \quad (28)$$

The first order condition of the maximisation problem is:

$$\sum_{k=0}^{\infty} \theta^k \times E_t \left\{ \begin{aligned} & Q_{t,t+k} \times Y_{t+k/t} \times \\ & \times \left[P_t * - \mathrm{M} \times \vartheta_{t+k/t}\right] \end{aligned} \right\} = 0 \quad (29)$$

where

M – optimum margin applied to the costs of firms, in the absence of any restrictions relating to the price adjustment frequency, with $\mathrm{M} = \frac{\varepsilon}{\varepsilon - 1}$

$\vartheta_{t+k/t}$ – marginal nominal cost at $t+k$ for a firm having lately reset its price at time t, with $\vartheta_{t+k/t} = \frac{\partial \psi_{t+k}}{\partial Y_{t+k/t}}$

If there is no price stickiness, $\theta = 0$, equation (29) turns into:

$$P_t * = \mathrm{M} \times \vartheta_{t+k/t} \quad (30)$$

By log-linearization of equation (29) around the steady state, with zero inflation, we get:

$$\sum_{k=0}^{\infty} \theta^k \times E_t \left\{ \begin{aligned} & Q_{t,t+k} \times Y_{t+k/t} \times \\ & \times \left[\frac{P_t *}{P_{t-1}} - \mathrm{M} \times MC_{t+k/t} \times \Pi_{t-1,t+k}\right] \end{aligned} \right\}$$

(31)

where

$MC_{t+k/t}$ – real nominal cost at $t+k$ for a firm having lately reset its price at time t, with

$$MC_{t+k/t} = \frac{\vartheta_{t+k/t}}{P_{t+k}}$$

$$\Pi_{t-1,t+k} = \frac{P_{t+k}}{P_{t-1}}$$

At equilibrium, under non-inflationary circumstances: $P_t * = P_{t-1} = P_{t+k}$ for any t, leading to $\Pi_{t-1,t+k} = 1$.

In this case $Y_{t+k/t} = Y$, $MC_{t+k/t} = MC$, $Q_{t,t+k} = \beta^k$ and $MC = \frac{1}{\mathrm{M}}$

By expanding equation (31) in Taylor series around the steady state with zero inflation, we obtain:

$$\sum_{k=0}^{\infty}(\theta\times\beta)^k \times$$
$$\times E_t\{[p_t * -(\mu + mc_{t+k/t} + p_{t+k})]\} = 0 \quad (32)$$

$$p_t * = \mu + (1-\theta\times\beta)\times$$
$$\times\sum_{k=0}^{\infty}(\beta\times\theta)^k \times E_t\{mc_{t+k/t} + p_{t+k}\} \quad (33)$$

where

$$\mu = \log\frac{\varepsilon}{\varepsilon - 1}$$
$$mc_{t+k/t} = \log MC_{t+k/t}$$
$$p_{t+k} = \log P_{t+k}$$

At equilibrium, we have:

$$Y_t(i_1) = C_t(i_1) \quad (34)$$

Considering equation (2) and:

$$Y_t = \left(\int_0^1 Y_t(i_1)^{1-\frac{1}{\varepsilon}} di_1\right)^{\frac{\varepsilon}{\varepsilon-1}} \quad (35)$$

we obtain:

$$Y_t = C_t \quad (36)$$

By replacing (36) in (19), we get:

$$y_t = E_t\{y_{t+1}\} - \frac{1}{\gamma}\times(i_t - E_t\{\pi_{t+1}\} - \rho) \quad (37)$$

As for the labour force, the basic equation is the following:

$$N_t = \int_0^1 N_t(i_1)di_1 \quad (38)$$

By inserting $N_t(i)$ from (21) in (38) and in consideration of equation (8), we obtain, at equilibrium:

$$N_t = \int_0^1 \left(\frac{Y_t(i_1)}{A_t}\right)^{\frac{1}{1-\alpha}} di_1 \quad (39)$$

$$N_t = \left(\frac{Y_t}{A_t}\right)^{\frac{1}{1-\alpha}} \times \int_0^1 \left(\frac{P_t(i_1)}{P_t}\right)^{-\frac{\varepsilon}{1-\alpha}} di_1 \quad (40)$$

and by log-linearization:

$$(1-\alpha)\times n_t = y_t - a_t + d_t \quad (41)$$

where

$$d_t = (1-\alpha)\times\log\int_0^1 \left(\frac{P_t(i_1)}{P_t}\right)^{-\frac{\varepsilon}{1-\alpha}} di_1$$

With $d_t = 0$ at non-inflationary steady state:

$$y_t = a_t + (1-\alpha)\times n_t \quad (42)$$

The average real marginal cost at the economy level is determined starting from the expression of the marginal cost of an individual firm:

$$mc_t = (w_t - p_t) - mpn_t \quad (43)$$

$$mc_t = (w_t - p_t) - \frac{1}{1-\alpha}\times$$
$$\times(a_t - \alpha\times y_t) - \log(1-\alpha) \quad (44)$$

respectively:

$$mc_{t+k/t} = (w_{t+k} - p_{t+k}) - mpn_{t+k/t} \quad (45)$$

$$mc_{t+k/t} = (w_{t+k} - p_{t+k}) - \frac{1}{1-\alpha}\times$$
$$\times(a_{t+k} - \alpha\times y_{t+k/t}) - \log(1-\alpha) \quad (46)$$

where

M – marginal labour productivity

The combination of equations (18), (42) and (43), leads to:

$$mc_t = \left(\gamma + \frac{\varphi+\alpha}{1-\alpha}\right)\times y_t -$$
$$-\frac{1+\varphi}{1-\alpha}\times a_t - \log(1-\alpha) \quad (47)$$

respectively:

$$mc = \left(\gamma + \frac{\varphi+\alpha}{1-\alpha}\right)\times y_t^n -$$
$$-\frac{1+\varphi}{1-\alpha}\times a_t - \log(1-\alpha) \quad (48)$$

with

$$\hat{mc}_t = \left(\gamma + \frac{\varphi+\alpha}{1-\alpha}\right)\times(y_t^n - y_t) \quad (49)$$

where

y_t^n – natural level of output

$\tilde{y} = y_t - y_t^n$

$\tilde{y}$ – output-gap

Equation (48), given that at equilibrium $\mathrm{M} = \frac{1}{MC}$, or, by log-linearization, $\mu = -mc$, gives:

$$y_t^n = \psi_{ya}^n \times a_t - \psi_{yo}^n \quad (50)$$

where

$$\psi_{ya}^n = \frac{1+\varphi}{\gamma + \varphi + \alpha\times(1-\gamma)}$$

$$\psi_{ya}^n = \frac{(1-\alpha)\times\varphi[\mu - \log(1-\alpha)]}{\gamma+\varphi+\alpha(1-\gamma)}$$

By centring, considering equations (27), (46) and the equilibrium condition for the market of goods and services, we obtain:

$$\hat{mc}_{t+k/t} = \hat{mc}_{t+k} - \frac{\alpha\times\varepsilon}{1-\alpha}\times(p_t * - p_{t+k}) \quad (51)$$

or, by introducing the same in equation (31), with the related adjustments:

$$p_t * - p_{t-1} = \beta \times \theta \times E_t \{p_{t+1} * - p_t\} + + (1-\beta \times \theta) \times \xi \times \hat{mc}_t + \pi_t \quad (52)$$

where

$$\xi = \frac{1-\alpha}{1-\alpha+\alpha \times \varepsilon}$$

The replacement of $p_t * - p_{t-1}$ from (52) into (25) leads to:

$$\pi_t = \beta \times E_t\{\pi_{t+1}\} + \lambda \times \hat{mc}_t \quad (53)$$

$$\pi_t = \lambda \times \sum_{k=0}^{\infty} \beta^k \times E_t\left\{\hat{mc}_{t+k}\right\} \quad (54)$$

where

$$\lambda = \frac{(1-\theta) \times (1-\beta \times \theta)}{\theta} \times \xi$$

By combining equations (49) and (53), we get the new Keynesian Phillips curve:

$$\pi_t = \beta \times E_t\{\pi_{t+1}\} + K \times \tilde{y}_t \quad (55)$$

where

$$K = \lambda \times \left(\gamma + \frac{\varphi+\alpha}{1-\alpha}\right)$$

Returning to equation (37), with its equivalence for y_t^n:

$$y_t = E_t\{y_{t+1}\} - \frac{1}{\gamma} \times (i_t - E_t\{\pi_{t+1}\} - \rho)$$

$$y_t^n = E_t\{y_{t+1}^n\} - \frac{1}{\gamma} \times (i_t - E_t\{\pi_{t+1}\} - \rho) \quad (56)$$

we obtain, for output-gap, the dynamic IS curve:

$$\tilde{y}_t = E_t\{\tilde{y}_{t+1}\} - \frac{1}{\gamma} \times (r_t - r_t^n) \quad (57)$$

where

$$r_t = i_t - E\{\pi_{t+1}\}$$

$$r_t^n = i_t^n - E\{\pi_{t+1}^n\}$$

If we make use of equations (56) and (50), we get:

$$r_t^n = \gamma \times E_t\{\Delta y_{t+1}^n\} + \rho \quad (58)$$

$$r_t^n = \gamma \times \psi_{ya}^n \times E_t\{\Delta a_{t+1}\} + \rho \quad (59)$$

Finally, a monetary organism conducting the interest rate policy based on a simple, Taylor type, rule is considered:

$$i_t = \phi_\pi \times \pi_t + \phi_y \times \tilde{y}_t + \rho + \upsilon_t \quad (60)$$

where

ϕ_π – coefficient selected by the monetary authority, with $\phi_\pi \geq 0$

ϕ_y – coefficient selected by the monetary authority, with $\phi_y \geq 0$

υ_t – zero-mean exogenous component

The hypothesis of imperfect competition on the market of goods emerges from the above-rendered model, it being revealed by their differentiated production, for each type of product the firm setting its individual price. Subsequently, restrictions are imposed as for the price level adjustment mechanism, only a part of the firms re-establishing their prices in a given period. Also, the model underlines, unlike the new classical model, that under price stickiness conditions, the steady state of real variables cannot be obtained any longer independently of the monetary policy, the latter ceasing to play a neutral role in economy.

Price stickiness is caused by miscellaneous issues: the *menu costs*, meaning the costs associated with any change in prices; the *monetary illusion*, reflecting the perception of money considering their nominal value and not the related purchasing power, this lowering the price fluctuations, even if inflation adjusts its corresponding real level; or the *incomplete information*, impeding the harmonisation of the decisions made by the economic agents acting on a competitive market, such failure being source of economic decline and unemployment generator (Mankiew, 2008), the invisible hand becoming unable to control an optimum flow of production and consumption (Howitt, 2002).

An expansionary monetary policy, represented by a positive shock on the monetary mass, given the quite rigid level of prices, determines consumers to expend more money, this involving a higher demand for goods and services, an associated harmonisation of the latter with the said supply and, therefore, a decreasing unemployment rate.

On the contrary, a restrictive monetary policy, namely a lowering of the monetary mass, normally transposed into either a price or a production decrease, will cause, given the inflexibility of prices, the occurrence of the latter, with undesirable effects leading, in the worst possible scenario, to recession.

METHODOLOGY AND RESULTS

The final equations of the model, used to implement the same in Dynare (4.3.0) of Matlab (7.11.0) are: the money growth equation, resulting from (20), the production function (42), the new Keynesian Phillips curve (55), the dynamic IS curve (57), the natural interest rate definition (59) and the monetary organism interest rate rule (60).

The output gap, natural output, nominal interest rate, real interest rate, natural real interest rate, inflation rate, technology shock and monetary policy shock are also defined.

The brief presentation of a new Keynesian model was meant to underline, as suggested by the related equations, the impact of the monetary organisms' decisions on the evolution of the real economic variables. This idea is hereinafter strengthened by the analysis of the impulse-response function that captures the fluctuation of variables, followed by a quick, normal or delayed return to their initial steady state, subsequent to the occurrence of a technology or monetary policy shock, represented as:

$$\frac{\partial \Xi_{u,t+s}}{\partial \varepsilon_{v,t}}$$

where

$\Xi_{u,t+s}$ – variable subject to a structural shock, at time *t+s*

$\varepsilon_{v,t}$ – technology shock, at time *t*

with all other *t* or *t-n* variables constant

Considering that the purpose of the paper is not to estimate some parameters, but just to reveal the quarterly movement of variables when hit by a structural shock, more specifically by a monetary policy shock, as opposed to the commonly accepted impacting factor represented by the technology shock, the steps undertaken hereinafter are limited, no entry data being necessary, the involved actions being oriented towards the calibration of parameters and the conception and implementation of the related code.

Therefore, before running the Dynare code developed for the model depicted above, the calibration of certain parameters was performed, given the existing literature in the matter (Smets and Wouters, 2003 or Adolfson et al., 2007), as well as previous results for the Euro Area.

It is to be mentioned that, as the analysis has a general economic aim, not particularised for a specific economy, the only concern for the simulation was to perform the related calibration in a unitary manner, for one economy selected at random.

In this empirical analysis, the calibrated parameters are: the capital share in total production (α), the subjective discount factor (β), the monetary authority sensitivity to inflation (ϕ_π), the labour supply elasticity (φ), the coefficient of risk aversion (γ), the elasticity of the money demand as to the nominal interest rate (η), the Calvo parameter (θ), the monetary policy shock autocorrelation parameter (ρ_m), the technology shock autocorrelation parameter (ρ_a) and the demand elasticity (ε) (Table 1).

The graphical results obtained as for the response of the output, output gap, labour hours, inflation rate, nominal interest rate and real interest rate to a technology shock, respectively to a monetary policy shock are presented in Figures 1 and 2 of this paper.

As revealed by the generated output, the economic variables react irrespective if they are hit by a technology shock or a monetary policy shock, although any adjustment to the technological level induces a longer deviation from the steady state. Thus, the technology shock is strong enough so as to make the variables, in the present example, need about 20 to 25 periods, meaning 5-6 years to return to their initial status, while the monetary policy shock let them regain their position after 7 to 8 periods, representing about 2 years.

Although the well known supremacy of the technology shock is revealed also by the present empirical study, the results indicate that, unlike the new classical model, the new Keynesian one outlines, according to the literature in the matter, the active role of the monetary organism, capable of reorienting, via its policy-related decisions, the course of the economic life.

CONCLUSIONS

The main purpose of the present paper was to render, by means of the specific equations of a small new Keynesian model, as well as by the related analysis of the impulse-response function, the essential role of the systematic monetary policy in exerting a certain level of control on the evolution of the real economic variables.

As reflected by the provided graphs, the model endogenous variables, output, output gap, labour hours, inflation rate, nominal interest rate and real interest rate, clearly react to the exogenous variables of the same, represented by structural shocks, returning afterwards, more or less quickly, to their initial steady state. In compliance with the specialised literature, the monetary entity policies, although having a lower impact than the one generated by the technological changes, manifest obvious influences on the model variables, therefore affecting both the decisions of the representative agents, at microeconomic level, and the aggregate economy, as a whole.

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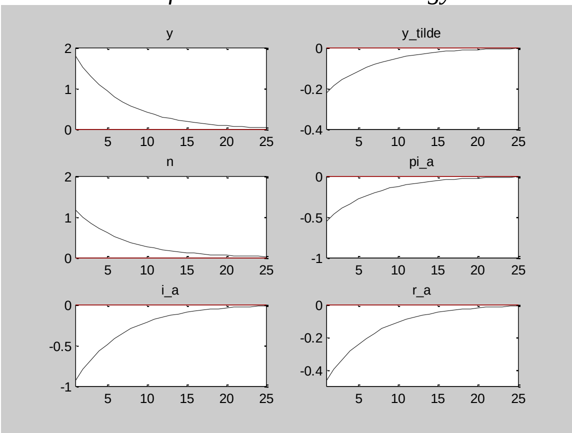
ANNEXES

Table No. 1
Calibration of model parameters

Parameter	Calibrated value
α	0.323
β	0.992
ϕ_{π}	1.500
φ	2.000
γ	1.000
η	4.000
θ	0.750
ρ_m	0.500
ρ_a	0.850
ε	6.000

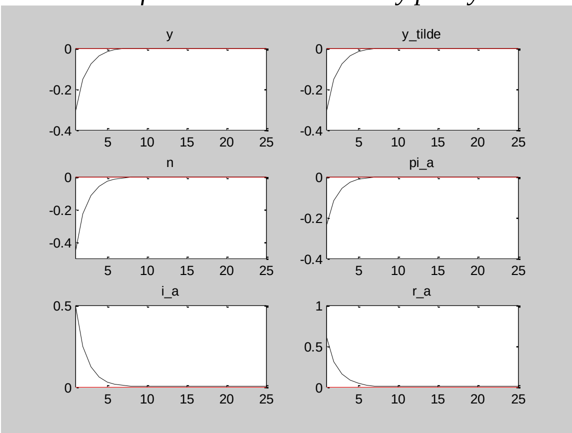
Source: Author's own calibration.

Figure No. 1
Reaction of variables to a technology shock



Source: Author's own calibration.

Figure No. 2
Reaction of variables to a monetary policy shock



Source: Author's own calibration.