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An estimated dynamic stochastic general equilibrium model for the Romanian economy, considering nominal and real rigidities

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Abstract

This paper is meant to render the estimation, for Romania, of an open economy DSGE model, grounded on the new Keynesian thinking, that is, considering monopolistic competition and nominal and real rigidities. The analysis implies the calibration of certain parameters, based on accepted literature in the matter and on pertinent information for the related economy, on one hand, and the estimation of the remainder of parameters, by resorting to Bayes theorem, on the other hand. Once the posterior probabilities are determined, the results interpretation and relevance is discussed from an economic perspective.

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Keywords: macroeconomic modelling; microeconomic foundations; dynamic analysis; stochastic approach; technological shocks.

1. Introduction

The economic thinking encountered, since its incipient phases, miscellaneous controversies that propelled it forward, each new stage adding more complexity to the previous approaches in the matter. The evolution from classical, Keynesian, neo-classical, neo-Keynesian and monetarist economic theories to the new classical and new Keynesian thoughts have also left traces as for the methods and instruments used to render empirical

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analyses. In 1990, we assist to the birth of the so-called “new neoclassical synthesis”, a combination between the elements specific to the new classical macroeconomics, as the business cycle theory, characterised by the economic agents’ rational expectations and the impact of shocks on the overall economy, on one hand, and the ideas emerging from the new Keynesian thinking, such as the ones relating to the market imperfections and to the price and wage rigidity, on the other hand. The beliefs of the new synthesis supporters gave life, at applicative level, to the last generation models – the dynamic stochastic general equilibrium models (DSGE) – which, starting from the analysis of the behaviour and preferences of households, firms and other economic agents and grasping the economic impact of shocks, try to render complex macroeconomic phenomena as the economic growth or the real business cycle, revealing at the same time the effects of the monetary and fiscal policies on the real economic life. Finding their roots in the paper of Kydland and Prescott, 1982, the DSGE models have been subsequently developed by various specialists like Rotemberg and Woodford, 1997; Clarida et al. 200; Christiano et al. 2005; Smets and Wouters, 2003 and many others. Initially dedicated to the analysis of a perfect competition market requiring flexible prices and imposing the presence of a monetary authority able to induce nominal shocks, the DSGE models quickly extended, the hypothesis of market imperfection, as reflected by real economic life, and of sticky prices Calvo, 1983 and sticky wages Erceg et al., 2000 being introduced. It is the idea of nominal and real rigidity, specific to the new Keynesian thinking, which is focused on in this paper. The model approached hereinafter originates in the work of Almeida, 2009, largely based on the papers of Adolfson et al., 2005; Almeida et al., 2008.

From this point, the study has the following structure: brief description of the final equations of the model in section 2, specification of data selection methodology and sources in section 3, model calibration, determination of priors and estimation results in section 4 and conclusions and further research in section 5.

2. Model

The actual model, developed in line with the new Keynesian vision, contains the following basic economic blocks, as elements of the modular structure: the households, the firms, as domestic, import and composite good firms, respectively final good firms, the Government and the foreign sector. The economic agents’ functions, established based on the main impact factors, are optimised from a stochastic perspective, considering the said constraints. The clearing conditions for the labour, capital, composite good, final good and foreign bond markets, as well as the related identities are also rendered. The model is prepared for analysis by log-linearization, more exactly by putting into logarithm, followed by the development in Taylor’s series around the steady state, therefore opening the way for an effective estimation.

Due to the lack of appropriate space for a detailed presentation of the model (\for further details, see Almeida, 2009, I will directly render hereinafter the log-linearized equations.

$$\hat{K}_{t+1} = \frac{1-\delta}{\zeta}\left(\hat{K}_t - \hat{\zeta}_t\right) + \left(1 - \frac{1-\delta}{\zeta}\right)\left(\hat{\varepsilon}_t^i + \hat{I}_t\right) \tag{1}$$

$$\hat{U}_{z,t}^{c,life} = \hat{U}_{z,t+1}^{c,life} + \hat{R}_t - \hat{\zeta}_{t+1} - \hat{\pi}_{t+1} \tag{2}$$

Equation (1) reflects the capital accumulation, considering the capital depreciation rate and the function turning investments into capital, while (2) is the consumption Euler equation, given the extra-utility obtained by households while increasing consumption by one unit at a time period. The level of private consumption is influenced by the consumer’s habits, by the real interest rate, as well as by any present or future related shock.