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"NONAME": A new quarterly model for Belgium ☆

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Abstract

The new quarterly model for Belgium built at the National Bank of Belgium can provide quantitative input into the policy analysis and projection processes within a framework that has explicit micro-foundations and expectations. The intertemporal optimisation of households and firms is subject to polynomial adjustment costs. Other characteristics are: pricing-to-market, flexible mark-ups and incomplete pass-through, a CES production function with an elasticity of substitution below one, time-dependent wage contracting à la Dotsey, King and Wollman and Polynomial Adjustment Costs as in FRB-US. Most of the equations taken individually have acceptable statistical properties and diagnostic simulations suggest that the impulse responses to exogenous shocks are reasonable. Simulations can be conducted under rational expectations as well as under alternative expectations formations.

JEL classification: C5; E2; E3; F41

Keywords: Econometric modelling; Pricing-to-market; CES production function; Wage bargaining; Polynomial adjustment costs

1. Introduction

This paper gives an overview of the new quarterly model of the National Bank of Belgium, called Noname.[1] The model serves as a tool for producing medium term projections along with their risk analysis and constitutes a coherent framework for analysing policy issues. To this end, it allows some compromise between theoretical structure and data matching but it meets the minimum requirement of a clear and delineated treatment of expectations. This structure allows simulations to be conducted under rational expectations as well as under alternative expectations formations as in FRB-US. Noname is, to a large extent, based on dynamic intertemporal optimisation and emphasises the importance of agents' expectations on macroeconomic outcomes. In particular, it embodies overlapping generations of consumers, profit-maximising firms in imperfectly competitive product and labour markets, forward-looking behaviour and costly adjustment processes. It ensures that foreign trade is theoretically consistent with the rest of the demand and supply

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[1] Complete material including derivations of equations, additional simulations and the estimation of the main dynamic equations can be downloaded from the NBB's website at http://www.nbb.be/doc/ts/publications/wp/wp68En.pdf.

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block, it gives theoretical foundations to the empirically observed flexible mark-ups and it allows for a CES production function. The size of the model has been kept as small as possible.

The next section of the paper proceeds by considering the theoretical underpinnings of the model and its steady state properties. In Section 2 the dynamic adjustments are explained. This section also illustrates the impact of expectations on simulation results and Section 3 presents another diagnostic simulation. The final section concludes.

2. Theoretical structure of the model and long run equilibrium equations

2.1. Households

The model embodies overlapping generations of consumers facing a constant probability of death, v, in the spirit of Blanchard's (1985) model of perpetual youth. The probability of death causes future income flows to be discounted at a rate above the market interest rate so that human wealth is defined as the present value of expected future labour incomes — defined net of taxes and inclusive of transfer payments — with a discount factor $(1-v)/(1+r)$ rather than $1/(1+r)$. Such an over-discounting implies that the households' horizon implicit in calculating the present value of future income flows is shortened and, consequently, the strong wealth effects peculiar to "infinite" horizon models are reduced while the influence of current income is strengthened. As a consequence, the extreme version of the Ricardian equivalence does not hold since the present value of future tax changes does not completely match current adjustments in tax payments. The aggregate consumption function can be written as:

$$C_t = \left[1 - (1-v)(1+\mathrm{rr}_t)^{\zeta-1}\varphi^{\zeta}\right][\mathrm{FW}_t + E_t\mathrm{HW}_t]. \tag{1}$$

The propensity to consume out of total wealth — defined as the sum of financial wealth expressed in real term and human wealth — depends on a real rate of return, rr, on the intertemporal elasticity of substitution, ζ, on the probability of death, v, and on the subjective discount rate, φ. Its estimation is based on a log-linear approximation in which the proportionality of consumption to total wealth is ensured by imposing that the coefficients of human and financial wealth sum to one:

$$c_t = 0.95(\mathrm{hw}_t) + 0.05(\mathrm{fw}_t) - 1.2\mathrm{rr}_t. \tag{2}$$

The desired level of consumption depends on the financial wealth which equals the market value of financial assets and human wealth. The magnitude of the coefficient on financial wealth is low as compared to that on human wealth: a 10 p.c. increase in financial wealth only raises consumption by 0.5 p.c. against 9.5 p.c. for human wealth. Finally, the optimal consumption is a negative function of a real short-term interest rate reflecting intertemporal[2] substitution in consumption, i.e. the effect the interest rate exerts on the propensity to consume out of total wealth. According to the estimated coefficient, a 100 basis point cut in the annualised real rate would cause a 0.3 p.c. hike in desired consumption.[3]

2.2. Goods market structure

The emphasis is put on the firms' price decision in order to consistently account for the crucial influence of international competition on a small open economy like Belgium. There are two sectors in the economy: an intermediate goods sector and a final good sector. Two types of monopolistically competitive intermediate goods suppliers are considered. Type one firms produce domestic intermediate goods. Type two firms import foreign intermediate goods to have them resold in the domestic market. The intermediate goods firms' output is sold in the domestic market to final goods retailers or sold to exporters. These retailers combine domestic intermediate goods with imported ones to sell final goods on perfectly competitive markets for consumption, investment and exports.

[2] If interest payments have a positive income effect, they will be accounted for by the financial wealth variable which incorporates capital incomes.

[3] Empirically, this negative sign is probably also a consequence of the inclusion of durable goods in the consumption data.