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News shocks and inflation

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HIGHLIGHTS

- The disinflationary nature of news shocks is re-examined in New Keynesian models.
- The analysis is extended to the model with capital.
- A sensible modification is capable of accounting for the empirical evidence.

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ABSTRACT

This paper shows that the empirically documented disinflationary nature of news shocks is consistent with the implications of a sensibly modified version of a New Keynesian model, even if capital is introduced to the model. The modification proposed in the current paper, however, is different from those already known in the literature. In the presence of capital, the newly proposed modification is better capable of fitting the data.

1. Introduction

A prominent empirical study finds that news shocks are disinflationary (Barsky and Sims, 2011). The benchmark New Keynesian model, however, predicts the opposite (Barsky and Sims, 2009). The modifications to this model proposed by Barsky and Sims (2009) successfully overturn the inflationary predictions from the model economy. These modifications, however, do not perform equally well once endogenous capital accumulation is introduced to the benchmark model. This paper proposes an alternative modification, which is better capable of fitting the data in the presence of capital.

2. Sticky price model with capital

The benchmark New Keynesian model is presented below. The only difference from the economic model studied by Barsky and Sims (2009) is endogenous capital accumulation. The log of the technology level a_t follows a stochastic process,

$$a_t = a_{t-1} + g_{t-1} + \varepsilon_{1,t}$$
$$g_t = (1-\kappa)\,\bar{g} + \kappa g_{t-1} + \varepsilon_{2,t}.$$

$\varepsilon_{1,t}$ is the conventional surprise technology shock. $\varepsilon_{2,t}$ is the news shock, having no immediate impact on the level of technology while portending a period of sustained growth. The non-policy block of the economic model log-linearized around the balanced growth path is summarized by the following equations:

$$0 = E_t\left[c_t - c_{t+1} + i_t - \pi_{t+1}\right] \tag{1}$$

$$0 = E_t\left[c_t - c_{t+1} + \left(1 - \beta e^{-\bar{g}}\left(1-\delta^K\right)\right) r_{t+1}\right] \tag{2}$$

$$y_t = \frac{C}{Y}c_t + \frac{X}{Y}x_t \tag{3}$$

$$\pi_t = \frac{\left(1-\theta\beta e^{-\bar{g}}\right)(1-\theta)}{\theta} mc_t + \beta e^{-\bar{g}} E_t\left[\pi_{t+1}\right] \tag{4}$$

$$y_t = \alpha k_t + (1-\alpha)\left(a_t + n_t\right) \tag{5}$$

$$mc_t = w_t - y_t + n_t \tag{6}$$

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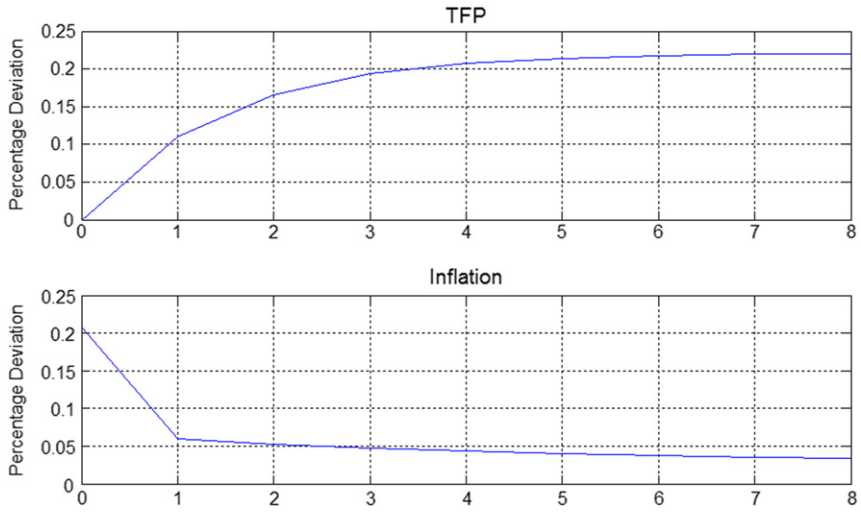

Fig. 1. Responses to news shock in the benchmark New Keynesian model.

$$mc_t = r_t - y_t + k_t \tag{7}$$

$$\frac{1}{\eta} n_t = w_t - c_t + \psi_t \tag{8}$$

$$\psi_t = \zeta \psi_{t-1} + \varepsilon_{3,t} \tag{9}$$

$$e^{\bar{g}} k_{t+1} = (1-\delta) k_t + \left(e^{\bar{g}} - 1 + \delta^K\right) x_t. \tag{10}$$

Eqs. (1) and (2) are the consumption Euler equations, with i_t denoting the nominal interest rate, π_t denoting the inflation rate, and r_t denoting the real rental price of capital. Eq. (3) reflects the accounting identity showing that output is equal to the sum of consumption and investment x_t, with C/Y and X/Y denoting the steady state consumption and investment shares, respectively. Eq. (4) is the conventional New Keynesian Phillips curve, with θ describing the degree of price stickiness and mc_t denoting the real marginal cost. Eq. (5) shows the production function. Eq. (6) shows that the real marginal cost is equal to the log discrepancy between the real wage w_t and the real marginal product of labor, and Eq. (7) shows an analogous relationship with capital. Eq. (8) is the labor supply curve, with ψ_t denoting a stochastic preference parameter whose process is described by Eq. (9). Eq. (10) shows the capital accumulation rule. Adding the policy equation closes the model. I first examine a simple, partial adjustment nominal interest rate rule given by

$$i_t = \rho i_{t-1} + (1-\rho)(\phi_\pi \pi_t) + \varepsilon_{4,t}. \tag{11}$$

Following Barsky and Sims (2009), I set $\eta = 1, \beta = 0.99, \theta = 0.67, \rho = 0.75, \phi_\pi = 1.5, \zeta = 0.6, \kappa = 0.5, \bar{g} = 0.0025, \alpha = 0.33, \delta^K = 0.025$, and the standard deviations of the four shocks at $\sigma_1 = 0.006, \sigma_2 = 0.00165, \sigma_3 = 0.001$, and $\sigma_4 = 0.001$.

News shocks are inflationary in the model economy presented and calibrated above (see Fig. 1) because the wealth effect raises production costs. That is, optimism prompts more consumption, which raises the marginal rate of substitution. This in turn raises both real wages and real marginal costs.

I briefly mention three modifications proposed by Barsky and Sims (2009). While each of these modifications successfully overturns the inflationary predictions from the model economy without capital, none solve the problem equally well in the current model economy because the endogenous capital accumulation creates its own problem. First, the introduction of the exogenous real wage rigidities does not make news shocks disinflationary. This modification weakens the upward pressure on real wages from an inward shift in the labor supply curve; however, with all other factors being equal, the resulting low inflation, low interest rate environment promotes more investment and thereby stimulates the aggregate demand. Because production is demand-determined in the sticky price model, firms increase employment, and the corresponding outward shift in the vertical labor demand curve increases real wages, making a news shock as inflationary as it is in the model without the exogenous real wage rigidities.[1]

Second, the introduction of the monetary policy rule responding to the output growth rate leads to problematic business cycle moments. Specifically, if the reaction coefficient to output growth rate is set high enough to make news shocks disinflationary, the model is no longer able to account for either an unconditional positive correlation between consumption and investment or an unconditional positive correlation between consumption and hours at the business cycle frequency. If the reaction coefficient to output growth rate is set high enough, a surprise technology shock exerts an immediate and strong upward pressure on nominal interest rates, leading to negative responses of investment and hours.

Finally, the monetary authority's misperception of the natural rate of output is not easily incorporated into the model economy with endogenous capital accumulation because the natural rate of output can no longer be written as a simple function of the current states.

3. An alternative modification

This section examines an alternative modification. I propose two changes to the benchmark model; first, I replace sticky nominal prices in the goods market with sticky nominal wages in the labor market (Erceg et al., 2000), and second, I introduce the monetary policy rule responding to the consumption growth rate. Specifically, the five equations in the benchmark model, (4), (6)–(8) and (11), are replaced with the following five equations:

$$w_t - w_{t-1} = \pi_t^w - \pi_t \tag{12}$$

$$y_t - n_t = w_t \tag{13}$$

$$y_t - k_t = r_t \tag{14}$$

$$\pi_t^w = \frac{(1-\theta^w)(1-\beta\theta^w)}{\theta^w}\left(\frac{1}{1+\varepsilon/\eta}(mrs_t - w_t)\right) + \beta E_t\left[\pi_{t+1}^w\right] \tag{15}$$

$$i_t = \rho i_{t-1} + (1-\rho)(\phi_c (c_t - c_{t-1}) + \phi_\pi \pi_t) + \varepsilon_{4,t}. \tag{16}$$

[1] Detailed results are available upon request.