The Possible Trinity: Optimal interest rate, exchange rate, and taxes on capital flows in a DSGE model for a Small Open Economy

Guillermo J. Escudé

March 10, 2017

Model modifications due to the detection by Jiang Xu (of Jilin University, China) of an algebraic mistake in the FOC for d in the case of a tax/subsidy scheme whereby $(1+i_t^*)\phi_t^*$ incorrectly multiples $taxsub_{t+1}^D$ (Equation (15) in the text).

Changes in model equations Form 2 (change in level):

Equation (15) in the text:

$$\lambda_t\left(1-taxsub_t^D\right)e_t$$
$$=\beta(1+i_t^*)\phi_t^* E_t\left\{\frac{\lambda_{t+1}e_{t+1}}{\pi_{t+1}^*}\left[\varphi_D\left(\frac{e_t d_t}{Y_t},\frac{e_t r_t}{Y_t}\right)-taxsub_{t+1}^D\right]\right\}$$

should instead be:

$$\lambda_t\left(1-taxsub_t^D\right)e_t$$
$$=\beta E_t\left\{\frac{\lambda_{t+1}e_{t+1}}{\pi_{t+1}^*}\left[(1+i_t^*)\phi_t^*\varphi_D\left(\frac{e_t d_t}{Y_t},\frac{e_t r_t}{Y_t}\right)-taxsub_{t+1}^D\right]\right\}$$

Equation (21) in the text:

$$1=\beta(1+i_t^*)\phi_t^* E_t\left\{\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}\right)\left(\frac{\varphi_D\left(\gamma_t^D,\gamma_t^R\right)-taxsub_{t+1}^D}{1-taxsub_t^D}\delta_{t+1}\right)\right\}.$$

should instead be:

$$1=\beta E_t\left\{\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}\right)\left(\frac{(1+i_t^*)\phi_t^*\varphi_D\left(\gamma_t^D,\gamma_t^R\right)-taxsub_{t+1}^D}{1-taxsub_t^D}\delta_{t+1}\right)\right\}.$$

The equation that follows:

$$\begin{aligned}
& (1+i_t)\,E_t\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}\right) \\
= \quad & (1+i_t^*)\phi_t^* E_t\left\{\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}\right)\left(\frac{\varphi_D\left(e_t d_t/Y_t, e_t r_t/Y_t\right) - taxsub_{t+1}^D}{1-taxsub_t^D}\delta_{t+1}\right)\right\}.
\end{aligned}$$

should instead be:

$$\begin{aligned}
& (1+i_t)\,E_t\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}\right) \\
= \quad & E_t\left\{\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}\right)\left(\frac{(1+i_t^*)\phi_t^*\varphi_D\left(e_t d_t/Y_t, e_t r_t/Y_t\right) - taxsub_{t+1}^D}{1-taxsub_t^D}\delta_{t+1}\right)\right\}.
\end{aligned}$$

The equation that follows:

$$\begin{aligned}
& (1+i_t)\,E_t\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}\right) \\
= \quad & (1+i_t^*)\phi_t^*\left\{\begin{array}{c} E_t\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}\right)E_t\left(\frac{\varphi_D(e_t d_t/Y_t, e_t r_t/Y_t) - taxsub_{t+1}^D}{1-taxsub_t^D}\delta_{t+1}\right) \\ +Cov_t\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}, \frac{\varphi_D(e_t d_t/Y_t, e_t r_t/Y_t) - taxsub_{t+1}^D}{1-taxsub_t^D}\delta_{t+1}\right) \end{array}\right\}.
\end{aligned}$$

should instead be:

$$\begin{aligned}
& (1+i_t)\,E_t\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}\right) \\
= \quad & \left\{\begin{array}{c} E_t\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}\right)E_t\left(\frac{(1+i_t^*)\phi_t^*\varphi_D(e_t d_t/Y_t, e_t r_t/Y_t) - taxsub_{t+1}^D}{1-taxsub_t^D}\delta_{t+1}\right) \\ +Cov_t\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{1}{\pi_{t+1}}, \frac{(1+i_t^*)\phi_t^*\varphi_D(e_t d_t/Y_t, e_t r_t/Y_t) - taxsub_{t+1}^D}{1-taxsub_t^D}\delta_{t+1}\right) \end{array}\right\}.
\end{aligned}$$

Equation (22) in the text:

$$\begin{aligned}
1+i_t &= (1+i_t^*)\phi_t^* E_t\left(\frac{\varphi_D\left(e_t d_t/Y_t, e_t r_t/Y_t\right) - taxsub_{t+1}^D}{1-taxsub_t^D}\delta_{t+1}\right) \\
&= (1+i_t^*)\phi_t^* E_t\left[\left(1+\frac{\overline{\varphi}_D\left(e_t d_t/Y_t, e_t r_t/Y_t\right) - \Delta taxsub_{t+1}^D}{1-taxsub_t^D}\right)\delta_{t+1}\right]
\end{aligned}$$

should instead be:

$$\begin{aligned}
1+i_t &= E_t\left(\frac{(1+i_t^*)\phi_t^*\varphi_D\left(e_t d_t/Y_t, e_t r_t/Y_t\right) - taxsub_{t+1}^D}{1-taxsub_t^D}\delta_{t+1}\right) \\
&= E_t\left[\left(1+\frac{\left[(1+i_t^*)\phi_t^*\varphi_D\left(e_t d_t/Y_t, e_t r_t/Y_t\right)-1\right] - \Delta taxsub_{t+1}^D}{1-taxsub_t^D}\right)\delta_{t+1}\right]
\end{aligned}$$

where in the second equality $\varphi_D\left(.\right) \equiv 1+\overline{\varphi}_D(.)$ is used.
[**This notation is no longer useful here**]

Notice that an increase in $taxsub_t^D$ has the effect of increasing the domestic interest rate (*ceteris paribus*), while an expected increase in the next period has the opposite effect. Hence, if $taxsub_t^D$ increases initially and is subsequently expected to fall, both have the effect of increasing the domestic interest rate (*ceteris paribus*).

[**This remains valid**].

Appendix B: The system of nonlinear equations Risk-adjusted uncovered interest parity

$$1 + i_t = (1 + i_t^*)\phi_t^* E_t \left(\frac{\varphi_t^D - taxsub_{t+1}^D}{1 - taxsub_t^D} \delta_{t+1} \right)$$

or

$$1 + i_t = (1 + i_t^*)\phi_t^* \left(\frac{\varphi_t^D}{1 - tax_t^D} \right) E_t \delta_{t+1}$$

should instead be:

$$1 + i_t = E_t \left(\frac{(1 + i_t^*)\phi_t^* \varphi_t^D - taxsub_{t+1}^D}{1 - taxsub_t^D} \delta_{t+1} \right)$$

or

$$1 + i_t = (1 + i_t^*)\phi_t^* \left(\frac{\varphi_t^D}{1 - tax_t^D} \right) E_t \delta_{t+1}$$

Conclusion This slight change in the specification of this variant of the model should have some effect on the numerical exercises. I am confident, however, that none of the conclusions of the paper are affected.