Common shocks and the spillover of news shocks in small open economies models

Petre Caraiani[1]

Common shocks were recently proposed as a way to fix the lack of transmission of foreign shocks in small open economy models. This paper studies whether this small extension can also improve the spillover of news shocks in small open economies.

Keywords: open economy, news shocks, news spillovers;

JEL Classification: E32;

1. Introduction

The research on the role of news shocks in driving the business cycles has initially focused on the closed economies case. Only more recently the issue of news shocks in small open economies has been approached. Such studies include the papers by Beaudry et al. (2008) or Kosaka (2013). On the other hand, the work up to now has largely focused on getting the conditions under which foreign shocks can generate news driven international and national

[1] Researcher, Institute for Economic Forecasting, Romanian Academy, Calea 13 Septembrie no. 13, Bucharest, Romania; email: caraiani@ipe.ro.

business cycles in a small open economy (that is, positive comovement between output, investments, hours and consumption within and between countries).

The present research however rather aims at revealing the quantitative importance of news shocks. In doing so, the paper follows the recent work by Fujiwara et al. (2011), Schmitt-Grohe and Uribe (2012) or Khan and Tsoukalas (2012). In analyzing the role of foreign news shocks for the domestic economy, the paper tests whether introducing common shocks or common news shocks improves the quantitative importance of foreign news shocks. By testing the potential role of common shocks and common news shocks, the paper also contributes to understanding if the spillover of news shocks is determined by the presence or not of common shocks. It is well known that common shocks were shown to be an important determinant for shock spillovers in the recent paper by Justiniano and Preston (2010a).

The paper is organized as follows. In the following section, the model used in this paper is discussed. The calibration and simulation of the model are discussed in the third section. The third section also details the results and comments upon them. Section four concludes.

2. The model

The paper uses on the reference models in the New Open Economy Macroeconomics tradition, namely it follows the contribution by Justiniano and Preston (2010b). The model can be seen as an extension of the earlier NOEM model in Gali and Monacelli (2005) and Monacelli

(2005). The main differences relative to the latter models are the introduction of imperfect pass-through (due to rigidities in the local currency pricing), habit formation as well price indexation.

Since the model is well known in the literature, the presentation of the model reduces itself to an outline of the main features of the model. The log-linear version of the model can be found in Appendix A.

The model is in a particular manner specified. The study considers here mainly a structural version of the foreign economy (while the alternative of AR(1) processes for foreign output, foreign inflation and foreign interest rate is not included but only commented upon). The model is also assumed without price indexation, which does not significantly alter the results in any way.

The model assumes utility maximizing households who optimally choose expenditures across both domestic and foreign goods. Households are characterized by habit formation. The economy consists in two sectors. One sector comprises the monopolistic domestic producers while the other sector consists in monopolistic retailers. For both types of agents, Calvo type rigidities are assumed which give rise to a Phillips curve for each sector. The monetary authority in the domestic economy follows a Taylor rule which includes an exchange rate component following the recent evidences that favor this specification. The uncovered interest parity relationship is also introduced. Finally, the foreign economy mirrors the domestic economy, except that it is specified as a closed economy one since the domestic economy cannot influence it. The model also assumes AR(1) processes for domestic and foreign TFP.

3. Calibration and Simulation

The paper considers the case of Canada as the domestic economy and United States as the foreign one. The model is calibrated by considering the available results in the literature on Canada and US, following the results in Justiniano and Preston (2010a, b), or Lubik and Schorfheide (2007).

The model is simulated under three different assumptions. In the baseline version, the model assumes the standard specification of shocks (there are no common shocks). In the specification with common shocks, the shocks in the domestic economy (on TFP, domestic interest rate, and inflation) are assumed to be composed from two components: a common shock with the foreign economy (US) and a specific shock to the domestic economy. This specification follows the approach in Justiniano and Preston (2010a). Finally, in the third specification, rather than assuming common shocks, the paper assumes common news shocks, following the evidences in Kosaka (2013) on the fact that small open economies like Canada react to US domestic news shocks.

A particular discussion deserves the specification of news shocks. The paper follows the literature, like in Fujiwara et al. (2011), in specifying news shocks . However, the paper did not optimally choose the news horizon since this would have implied estimating the model at different horizons and discriminating between competing models using criteria like Bayes Factor. The paper however selected three different horizons, namely news at horizon 1, at horizon 4 and at horizon 1 and 4, which cover the usual specifications in the literature with respect to the new horizon, see Fujiwara et al. (2011) or Schmitt-Grohe and Uribe (2012). Obviously, the results can be extended for different news horizons.

The results for all simulations are presented in Appendices B, for the baseline specification, C, for the specification using common shocks and D for the specification using common news shocks. The paper focuses on output, which was widely studied in literature and is the main variable of interest, as well as on exchange rate, a variable less studied until now.

For the baseline specification, neither foreign shocks nor foreign news shocks matter too much for output; however the news shocks on foreign inflation account for about eight percent in changes in exchange rate, while the news shocks on foreign TFP account for about 30% (for the case of both news horizons combined).

Using the specification based on common shocks, news shocks (in foreign TFP and foreign inflation) are found to matter only for exchange rate movements. However, introducing common shocks make shocks in foreign TFP explain 20% to 30% of movements in domestic output for the different news horizons considered.

When common news shocks are considered, news shocks on foreign TFP explain about 35% of changes in domestic output, while news on foreign inflation explain around 6% from the fluctuations in output.

Alternatively, a specification using AR(1) processes for the foreign variables was also used, however the changes are rather minor. These results are available at request.

4. Conclusion

This paper has studied whether the introduction of common shocks or common news shocks matter for the spillover of news shocks in a small open economy model. The evidences point to the fact that these specifications can influence the degree of spillovers. At the same time, it was found that they have rather strong effects for shocks and news shocks on foreign TFP and quite weak effects for news shocks on foreign inflation. A limited role appears for the foreign interest rate.

References

Beaudry, P., Dupaigne, M. and F. Portier. (2011). "Modeling News-Driven International Business Cycles", *Review of Economic Dynamics* 14(1): 72-91.

Fujiwara, I., Hirose, Y. and M. Shintani. (2011). "Can news be a major source of aggregate fluctuations? a Bayesian DSGE approach", *Journal of Money, Credit, and Banking* 43, 1–29.

Gali, J. and T. Monacelli. (2005). "Monetary Policy and Exchange Rate Volatility in a Small Open Economy", *Review of Economic Studies 72*: 707-734.

Khan, H. and J. Tsoukalas. (2012). "The Quantitative Importance of News Shocks in Estimated DSGE Models", *Journal of Money, Credit and Banking* (forthcoming).

Justiniano, A. and B. Preston. (2010a). "Monetary policy and uncertainty in an empirical small open-economy model", *Journal of Applied Econometrics* 25 (1): 93-128.

Justiniano, A. and B. Preston. (2010b). "Can Structural small open-economy models account for the influence of foreign disturbances?", *Journal of International Economics 81*: 61-74.

Kosaka, M.S. (2013). "News-Driven International Business Cycles", *B.E. Journal of Macroeconomics, Volume 13, Issue 1*.

Lubik, T.A. and F. Schorfheide. (2007). "Do central banks respond to exchange rate movements? A structural investigation", *Journal of Monetary Economics* 54(4): 1069-1087.

Monacelli, T. (2005). "Monetary policy in a low pass-through environment", *Journal of Money, Credit and Banking* 37: 1047 – 1066.

Schmitt-Grohe, S. and M. Uribe. (2012). „What's news in business cycle?", *Econometrica* 80(6).

Appendix A. The model

$$(1-\alpha)c_t = y_t - \alpha\eta(2-\alpha)s_t - \alpha\eta\psi_{F,t} - \alpha y_t^* \quad (1)$$

$$\Delta\psi_{F,t} = (\Delta e_t + \pi_t^*) - \pi_{F,t} \quad (2)$$

$$\Delta s_t = \pi_{F,t} - \pi_{H,t} \quad (3)$$

$$\Delta q_t = \Delta\psi_{F,t} + (1-\alpha)\Delta s_t \quad (4)$$

$$\pi_{H,t} = \theta_H^{-1}(1-\theta_H)(1-\beta\theta_H)mc_t + \beta E_t\pi_{H,t+1} + \varepsilon_{\pi,t} \quad (5)$$

$$mc_t = \phi y_t - (1+\phi)v_{a,t} + \alpha s_t + \sigma(1-h)^{-1}(c_t - hc_{t-1}) \quad (6)$$

$$\pi_{F,t} = \theta_F^{-1}(1-\theta_F)(1-\beta\theta_F)\psi_{F,t} + \beta E_t\pi_{F,t+1} \quad (7)$$

$$c_t - hc_t = y_t^* - hy_{t-1}^* + \sigma^{-1}(1-h)[\psi_{F,t} + (1-\alpha)s_t] \quad (8)$$

$$(r_t - E_t\pi_{t+1}) - (r_t^* - E_t\pi_{t+1}^*) = E_t\Delta q_{t+1} + ers_t \quad (9)$$

$$r_t = \rho_r r_{t-1} + (1-\rho_r)(\phi_\pi\pi_t + \phi_y y_t + \phi_e\Delta e_t) + \varepsilon_{r,t} \quad (10)$$

$$y_t^* - hy_{t-1}^* = E_t(y_{t+1}^* - hy_t^*) - \sigma^{-1}(1-h)(r_t^* - E_t\pi_{t+1}^*) \quad (11)$$

$$mc_t^* = \phi y_t^* - (1+\phi)v_{a,t}^* - \sigma(1-h)^{-1}(y_t^* - hy_{t-1}^*) \quad (12)$$

$$\pi_t^* = \theta_H^{-1}(1-\theta_H)(1-\beta\theta_H)mc_t^* + \beta E_t\pi_{t+1}^* + \varepsilon_{\pi^*,t} \quad (13)$$

$$r_t^* = \rho_r^* r_{t-1}^* + (1-\rho_r^*)(\phi_\pi^*\pi_t^* + \phi_t^* y_t^*) + \varepsilon_{r^*,t} \quad (14)$$

$$v_{a,t} = \rho_a v_{a,t-1} + \varepsilon_{a,t} \quad (15)$$

$$v_{a,t}^* = \rho_a^* v_{a,t-1}^* + \varepsilon_{a^*,t} \quad (16)$$

$$ers_t = \rho_{ers} ers_{t-1} + \varepsilon_{rs,t} \quad (17)$$

Appendix B. Results for the baseline model

Variance Decomposition (in percent)	ε_a	ε_r	ε_{pi}	ε_{rs}	ε_{a*}	ε_{r*}	ε_{pi*}	ε_{a_1}	ε_{a_4}	ε_{a*_1}	ε_{a*_4}	ε_{pi_1}	ε_{pi_4}	ε_{pi*_1}	ε_{pi*_4}	ε_{r_1}	ε_{r_4}	ε_{r*_1}	ε_{r*_4}
H=1																			
y_t	32.5	3.0	6.3	2.6	1.1	0.1	0.3	35.6	-	1.2	-	13.2	-	0.5	-	3.0	-	0.1	-
Δe_t	1.4	17.4	0.8	22.5	15.0	2.0	1.9	1.3	-	19.0	-	1.4	-	4.2	-	11.5	-	1.2	-
H=4																			
y_t	31.1	2.9	6.0	2.5	1.1	0.1	0.3	-	35.2	-	1.1	-	17.8	-	0.5	-	1.0	-	0.05
Δe_t	1.4	17.0	0.8	22.0	14.7	2.0	1.9	-	0.8	-	23.3	-	1.3	-	7.2	-	6.6	-	0.7
H=1,4																			
y_t	20.5	1.9	3.9	1.6	0.7	0.08	0.2	22.5	23.2	0.8	1.0	8.3	11.7	0.3	0.3	1.9	0.7	0.1	0.04
Δe_t	1.0	12.3	0.5	15.9	10.7	1.4	1.4	0.94	0.6	13.5	16.9	1.0	0.9	3.0	5.2	8.1	4.8	0.9	0.5

Note: h is the news horizon.

Appendix C. Results for the model with common shocks

Variance Decomposition (in percent)	ε_{a}	ε_{r}	ε_{pi}	ε_{rs}	ε_{a*}	ε_{r*}	ε_{pi*}	ε_{a_1}	ε_{a_4}	ε_{a*_1}	ε_{a*_4}	ε_{pi_1}	ε_{pi_4}	ε_{pi*_1}	ε_{pi*_4}	ε_{r_1}	ε_{r_4}	ε_{r*_1}	ε_{r*_4}
H=1																			
y_t	21.3	2.0	4.1	1.7	31.4	0.1	3.1	24.2	-	0.8	-	8.6	-	0.3	-	1.9	-	0.0	-
Δe_t	1.4	18.4	0.9	23.8	9.1	2.1	0.7	0.9	-	20.1	-	1.4	-	7.8	-	12.1	-	0.7	-
H=4																			
y_t	20.7	1.9	4.0	1.7	30.4	0.7	3.1	-	23.5	-	0.7	-	11.9	-	0.3	-	0.7	-	0.0
Δe_t	1.5	18.7	0.8	24.3	9.2	0.3	0.7	-	0.9	-	25.7	-	1.4	-	7.9	-	7.3	-	0.8
H=1,4																			
y_t	15.4	1.4	2.9	1.2	22.7	0.5	2.2	16.9	17.5	0.6	0.5	6.2	8.8	0.2	0.2	1.4	0.5	0.1	0.0
Δe_t	1.0	13.2	0.6	17.4	6.5	0.2	0.5	1.0	0.6	14.4	18.1	1.0	1.0	3.2	5.6	8.7	5.1	0.9	0.5

Note: h is the news horizon.

Appendix D. Results for the model with common news shocks

Variance Decomposition (in percent)	ε_{a}	ε_{r}	ε_{pi}	ε_{rs}	ε_{a*}	ε_{r*}	ε_{pi*}	ε_{a_1}	ε_{a_4}	ε_{a*_1}	ε_{a*_4}	ε_{pi_1}	ε_{pi_4}	ε_{pi*_1}	ε_{pi*_4}	ε_{r_1}	ε_{r_4}	ε_{r*_1}	ε_{r*_4}
H=1																			
y_t	20.3	1.9	3.9	1.6	0.7	0.1	0.2	22.2	-	32.3	-	8.2	-	5.6	-	1.8	-	0.7	-
Δe_t	1.5	19.4	0.9	25.1	16.8	2.2	2.1	1.4	-	13.4	-	1.5	-	1.9	-	12.8	-	0.3	-
H=4																			
y_t	19.8	1.8	3.8	1.6	0.2	0.1	0.2	-	22.4	-	30.7	-	11.3	-	6.8	-	0.6	-	0.2
Δe_t	1.8	23.0	1.1	29.7	10.8	2.7	2.5	-	1.1	-	9.9	-	1.7	-	6.0	-	8.9	-	0.2
H=1,4																			
y_t	12.1	1.1	2.3	1.0	0.5	0.0	0.1	13.2	13.7	16.6	18.8	4.9	6.9	2.2	4.1	1.1	0.4	0.2	0.1
Δe_t	1.2	15.4	0.7	20.0	13.3	1.8	1.7	1.1	0.7	1.4	16.9	1.2	1.1	0.5	4.0	10.1	6.0	2.0	0.1

Note: h is the news horizon.