Appendix

A. Euro area open economy model

Households

$$\frac{e_t c_t^{-\frac{1}{\gamma}}}{c_t^{\frac{\gamma-1}{\gamma}}+b_t^{1/\gamma}\left(\frac{M_t}{P_t}\right)^{\frac{\gamma-1}{\gamma}}}=\lambda_t$$
$$\frac{e_t b_t^{\frac{1}{\gamma}}\left(\frac{M_t}{P_t}\right)^{-\frac{1}{\gamma}}}{c_t^{\frac{\gamma-1}{\gamma}}+b_t^{1/\gamma}\left(\frac{M_t}{P_t}\right)^{\frac{\gamma-1}{\gamma}}}=\lambda_t-\beta E_t\left(\frac{\lambda_{t+1}}{\pi_{t+1}}\right)$$
$$\frac{\eta}{1-h_t}=\lambda_t w_t$$
$$\frac{\lambda_t}{R_t}=\beta E_t\left(\frac{\lambda_{t+1}}{\pi_{t+1}}\right)$$
$$\frac{c_t^H}{c_t^F}=\frac{\omega}{1-\omega}\left(\frac{p_t^H}{p_t^F}\right)^{-\rho}$$
$$E_t\{\frac{\lambda_{t+1}}{\pi_{t+1}}[R_t-\Gamma_t R_t^*]\}=0$$

Country borrowing premium

$$\Gamma_t=\exp(\text{-}\kappa(a_t-\bar{a}))$$

Entrepreneurs

$$Y_t=K_t^{\alpha}(A_t h_t)^{(1-\alpha)}$$
$$\frac{W_t}{P_t}=\xi_t(1-\alpha)\frac{Y_t}{h_t}$$
$$z_t=\xi_t\alpha\frac{Y_t}{K_t}$$
$$E_t f_{t+1}=E_t[\frac{z_{t+1}+(1-\delta)q_{t+1}}{q_t}]$$

Financial accelerator

$$E_t f_{t+1}=E_t[S(\frac{n_{t+1}}{q_t K_{t+1}})\frac{R_t}{\pi_{t+1}}\epsilon_{ft}]$$
$$E_t n_{t+1}=\nu_t[f_t q_{t-1}K_t-E_{t-1}f_t(q_{t-1}K_t-n_t)]+(1-\nu_t)g_t$$

Capital producers

$$q_t-1-\chi\left(\frac{i_t}{K_t}-\delta\right)=0$$
$$K_{t+1}=i_t+(1-\delta)K_t$$

Domestic retailers

$$p_t^H(j)=\frac{\theta}{\theta-1}\frac{E_t\sum_{t=0}^{\infty}(\beta\phi)^l\lambda_{t+l}y_{t+l}(j)\xi_{t+l}}{E_t\sum_{t=0}^{\infty}(\beta\phi)^l\lambda_{t+l}y_{t+l}(j)\pi^l/p_{t+l}}$$
$$1=\phi\left(\frac{\pi}{\pi_t}\right)^{1-\theta}+(1-\phi)(\frac{p_t^H(j)}{P_t})^{1-\theta}$$
$$\pi_t^H=\frac{P_t^H}{P_{t-1}^H}$$

Foreign good retailers

$$p_t^F(j)=\frac{\theta}{\theta-1}\frac{E_t\sum_{t=0}^{\infty}(\beta\phi)^l\lambda_{t+l}y_{t+l}(j)\xi_{t+l}^F}{E_t\sum_{t=0}^{\infty}(\beta\phi)^l\lambda_{t+l}y_{t+l}(j)\pi^l/p_{t+l}}$$

$$1 = \phi \left(\frac{\pi}{\pi_t}\right)^{1-\theta} + (1-\phi)(\frac{p_t^F(j)}{P_t})^{1-\theta}$$
$$\pi_t^F = \frac{P_t^F}{P_{t-1}^F}$$

Aggregate real marginal cost of imported foreign goods

$$\xi_t^F = P_t^*/P_t^F$$

composite inflation: CPI

$$\pi_t = (\pi_t^H)^{\omega}(\pi_t^F)^{(1-\omega)}$$

Foreign demand of home retail consumption good

$$c_t^{H*} = [\left(\frac{p_t^H}{P_t^*}\right)^{-\zeta} y_t^*]^{\tau}(c_{t-1}^{H*})^{(1-\tau)}$$

Current account

$$B_{t+1}^* = p_t^H c_t^{H*} - P_t^* c_t^F + \Gamma_t R_t^* B_t^*$$

Resource constraint

$$Y_t = c_t^H + c_t^{H*} + i_t$$

Total consumption expenditure for the household

$$C_t^H + C_t^F = C_t$$

Money growth

$$\mu_t = \frac{m_t \pi_t}{m_{t-1}}$$

B. Data transformations

The data for the foreign variables is constructed as follows: The foreign nominal interest rate is measured by the rate of 3 month euribor, backdated before 1999. For the financial crises during 2007Q3–2008Q4 when the interbank lending was distracted and euribor rates distorted, we use eurepo. Aggregate foreign output is measured by an export share-weighted basket of imports of the following countries: USA, Japan, UK, Sweden, Germany and Italy (Germany and Italy are included to cover the euro area). Foreign price level in euros is a combination of euro area GDP deflator and an extra-euro area export share-weighted basket of foreign GDP deflators (USA, Japan, UK, Sweden) converted to euros using the respective nominal exchange rate. The data for the real exchange rate is constructed using the foreign price level in euros divided by price of domestic private sector output.

$$\hat{\pi}_t^f = \frac{\beta}{1+\beta\gamma_{p^f}}\hat{\pi}_{t+1}^f + \frac{\gamma_{p^f}}{1+\beta\gamma_{p^f}}\hat{\pi}_{t-1}^f + \frac{(1-\beta\phi^f)(1-\phi^f)}{\phi(1+\beta\gamma_{p^f})}\hat{\xi}_t^f \tag{32}$$

where $\pi_t^f = \frac{p_t^f}{p_{t-1}^f}$, the corresponding real marginal cost is $\xi_t^f = \frac{s_t p^{f*}}{p_t^f}$ and $(1-\phi^f)$ denotes the probability that a retailer of foreign goods resets its price in any given period. We assume that retailers of domestic and foreign goods face the same degree of price rigidity, so that $\phi^f = \phi$

Finally, CPI inflation may be expressed as

$$\hat{\pi}_t = (\hat{\pi}_t^h)^\nu (\hat{\pi}_t^f)^{1-\nu} \tag{33}$$

2.2.4 Monetary policy rule

To close the model we assume, following Ireland (2003), that the central bank conducts monetary policy by adjusting a linear combination of the short-term nominal interest rate, R_t^n, and the money growth rate, $\mu_t = M_t/M_{t-1}$, in response to deviations of output, y_t, and inflation, π_t, from their steady-state values. Thus reaction function of the monetary authority is

$$\frac{R_t^n}{R^n} = \left(\frac{\pi_t}{\pi}\right)^{\rho_\pi} \left(\frac{y_t}{y}\right)^{\rho_y} \left(\frac{\mu_t}{\mu}\right)^{\rho_\mu} \exp(\varepsilon_{R_t^n}) \tag{34}$$

where ε_{R_t} is the monetary policy shock.

3 Bayesian Estimation

In order to test for of a financial accelerator mechanism in Colombia, we estimate and compare two versions of the model. The first model is estimated assuming that there