- BGG4.1: Resource constraint for the home good in consumer's basket for non-oil consumption

$$\frac{Y_H}{Y} y_{H,t} = \left((1-\alpha_C)(\frac{C}{Y} + \frac{C^e}{Y}) + (1-\alpha_I)\frac{I}{Y} \right) d_{H,t} + \frac{G}{Y} g_t + \frac{C^*_H}{Y} c^*_{H,t}$$

- BGG4.2: Domestic private demand for the home good consumption

$$\left((1-\alpha_C)(\frac{C}{Y} + \frac{C^e}{Y}) + (1-\alpha_I)\frac{I}{Y} \right) d_{H,t} = (1-\alpha_C)\frac{C}{Y} c_t + (1-\alpha_C)\frac{C^e}{Y} c^e_t - (1-\alpha_C)(\frac{C}{Y} + \frac{C^e}{Y})\eta_C (p_{H,t} - p_t) + (1-\alpha_I)\frac{I}{Y}\left(inv_t - \eta_I (p_{H,t} - p_{I,t}) \right)$$

- BGG4.3: Demand for the home good in consumer's basket

$$c^*_{H,t} = y^*_t - \eta^* (p_{H,t} - p_t - rer_t)$$

- BGG4.4: Imported private deman:

$$\frac{M}{Y} m_t = \alpha_C \frac{C}{Y} c_t + \alpha_C \frac{C^e}{Y} c^e_t - \alpha_C \left(\frac{C}{Y} + \frac{C^e}{Y} \right) \eta_C (p_{F,t} - p_t) + \alpha_I \frac{I}{Y}\left(inv_t - \eta_I (p_{F,t} - p_{I,t}) \right)$$

- BGG4.5: Exports volume (home good + commodity exports)

$$\frac{X}{Y} x_t = \frac{C^*_H}{Y} c^*_{H,t} + \frac{Y_{CO}}{Y} y_{CO,t}$$

- BGG4.6: Definition of Exports deflator

$$\frac{X}{Y}(p_{X,t} - p_t) = \frac{C^*_H}{Y}(p_{H,t} - p_t) + \frac{Y_{CO}}{Y}(p^*_{CO,t} - p^*_t + rer_t)$$

- BGG4.7: Real exchange rate dynamics

$$rer_t = rer_{t-1} + \Delta e_t + \pi^*_t - \pi_t$$

- BGG4.8: Domestic inflation relative to headline inflation

$$(p_{H,t} - p_t) = (p_{H,t-1} - p_{t-1}) + \pi_{H,t} - \pi_t$$

- BGG4.9: Uncovered interest parity

$$i_t = i^*_t + E_t\left[\Delta e_{t+1}\right] + \zeta b^*_t$$

- BGG4.10: External debt dynamics

$$\frac{B^*}{Y}\left(rer_t + b^*_t \right) = \frac{B^*}{Y\beta}\left(i^*_{t-1} + (1+\zeta) b^*_{t-1} + rer_t - \pi^*_t \right) + \frac{M}{Y}\left(rer_t + m_t \right) + \chi \frac{Y_{CO}}{Y}\left(p^*_{CO,t} - p^*_t + rer_t + y_{CO,t} \right) - \frac{X}{Y}\left(p_{X,t} - p_t + x_t \right)$$

- BGG4.11: Phillips curve for the price of foreign goods (imperfect pass-through)

$$\pi_{F,t} = \frac{\beta}{1+\beta\chi_F} E_t\left[\pi_{F,t+1}\right] + \frac{\chi_F}{1+\beta\chi_F}\pi_{F,t-1} + \frac{(1-\theta_F)(1-\beta\theta_F)}{\theta_F (1+\beta\chi_F)} \underbrace{\left(e_t + p^*_t - p_{F,t} \right)}_{rer_t - (p_{F,t} - p_t)}$$

- BGG4.12: Dynamics of relative prices of foreign goods

$$(p_{F,t} - p_t) = (p_{F,t-1} - p_{t-1}) + \pi_{F,t} - \pi_t$$

- BGG4.13: Definition of investment deflator

$$(p_{I,t} - p_t) = (1-\alpha_I)(p_{H,t} - p_t) + \alpha_I (p_{F,t} - p_t)$$

- BGG4.14: Change in the relative price of home good (definition of *home inflation)*

$$0 = (1-\alpha_C)(p_{H,t} - p_t) + \alpha_C (p_{F,t} - p_t)$$

- BGG4.15: Real GDP as a combination of domestic production and commodities

$$y_t = \frac{Y_H}{Y} y_{H,t} + \frac{Y_{CO}}{Y} y_{CO,t}, \text{ note that } \frac{Y_H}{Y} + \frac{Y_{CO}}{Y} = 1$$

- BGG4.16: Euler equation for household consumption

$$c_t = -\sigma \frac{(1-h)}{1+h}\left(i_t - E_t \pi_{t+1}\right) + \frac{1}{1+h} E_t c_{t+1} + \frac{h}{1+h} c_{t-1}$$

- BGG4.17: Entrepreneurial consumption

$$c_t^e = n_t$$

- BGG4.18: Spread between return on capital and opportunity cost of the lent funds

$$E_t\left[rr_{t+1}^K + \pi_{t+1} - i_t\right] = sp_t$$

- BGG4.19: Spread as function of entrepreneurial wealth and capital

$$sp_t = \nu\left(q_t + k_t - n_t\right)$$

- BGG4.20: Definition of return on capital

$$rr_t^k = \left(1-\varepsilon\right)(mc_t + y_t - k_{t-1}) + \varepsilon q_t - q_{t-1},$$

$$\varepsilon = \frac{(1-\delta)}{R^K}$$

- BGG4.21: Investment dynamics

$$q_t - (p_{I,t} - p_t) = \zeta_{INV}\left(inv_t - inv_{t-1}\right) - \beta\zeta_{INV} E_t\left[inv_{t+1} - inv_t\right]$$

- BGG4.22: Production function of home goods

$$y_{H,t} = a_t + \alpha k_{t-1} + (1-\alpha) l_t$$

- BGG4.23: Labor supply equation

$$mrs_t = \sigma_L l_t + \frac{1}{\sigma}\frac{1}{(1-h)} c_t - \frac{1}{\sigma}\frac{h}{(1-h)} c_{t-1}$$

- BGG4.24: Labor demand equation

$$rw_t = mc_t + y_t - l_t$$

- BGG4.25: Phillips curve for the price of home goods

$$\pi_{H,t} = \frac{\beta}{1+\beta\chi_H} E_t\left[\pi_{H,t+1}\right] + \chi_H \frac{\beta}{1+\beta\chi_H} \pi_{H,t-1} + \frac{(1-\theta_H)(1-\beta\theta_H)}{\theta_H (1+\beta\chi_H)}\left(mc_t - (p_{H,t} - p_t)\right)$$

- BGG4.26: Law of motion of capital stock
  $$k_t = \delta inv_t + (1-\delta)k_{t-1}$$
- BGG4.27: Law of motion of entrepreneurial wealth
  $$n_t = \frac{K}{N} rr_t^K - \left(\frac{K}{N} - 1\right)\left(sp_{t-1} + i_{t-1} - \pi_t\right) + n_{t-1}$$
- BGG4.28: Monetary policy rule
  $$i_t = \rho_i i_{t-1} + (1-\rho_i)\left(\phi_\pi \pi_t + \phi_y y_t + \phi_{\Delta e}\Delta e_t\right) + z_t$$
- BGG4.29: Phillips curve for nominal wages
  $$\pi_t^w = \chi_w \pi_{t-1} + \frac{(1-\theta_w)(1-\beta\theta_w)}{\theta_w(1+\varepsilon_w\sigma_L)}\left(mrs_t - rw_t\right) + \beta E_t\left[\pi_{t+1}^w - \chi_w \pi_t\right]$$
- BGG4.30: Definition of wage inflation
  $$\pi_t^w = rw_t - rw_{t-1} + \pi_t$$
- BGG4.31: Law of motion of preference shock
  $$g_t = \rho_g g_{t-1} + \varepsilon_{g,t}$$
- BGG4.32: Law of motion of productivity shock
  $$a_t = \rho_a a_{t-1} + \varepsilon_{a,t}$$
- BGG4.33: Law of motion of monetary policy shock
  $$z_t = \rho_z z_{t-1} + \varepsilon_{z,t}$$
- BGG4.34: Law of motion of commodity exports
  $$y_{CO,t} = \rho_{yco} y_{CO,t-1} + \varepsilon_{yco,t}$$
- BGG4.35: Law of motion of foreign interest rate
  $$i_t^* = \rho_{i*} i_{t-1}^* + \varepsilon_{i*,t}$$
- BGG4.36: Law of motion of foreign inflation
  $$\pi_t^* = \rho_{\pi*}\pi_{t-1}^* + \varepsilon_{\pi*,t}$$
- BGG4.37: Law of motion of commodity prices
  $$\left(p_{CO,t}^* - p_t^*\right) = \rho_{pco*}\left(p_{CO,t-1}^* - p_{t-1}^*\right) + \varepsilon_{pco*,t}$$
- BGG4.38: Law of motion of foreign GDP
  $$y_t^* = \rho_{y*} y_{t-1}^* + \varepsilon_{y*,t}$$