Two country model from Dedola, Karadi and Lombardo 2013, based on Gertler and Karadi 2011. Foreign country variables with *.

Parameters:

β: discount factor

χ: relative utility weight of labor

ε: inverse Frisch elasticity of labor supply

a: exogenous portfolio choice between home risky assets and foreign risky assets

δ: depreciation rate

σ: probability that bankers stay in business in the next period

α: capital share

ξ: initial wealth transfer to new bankers

θ: fraction of divertable assets in bankers' agent problem

Variables: $\{ C, C^*, L, L^*, U, U^*, N, N^*, K, K^*, I, I^*, Y, Y^*, R, R^*, Rk, Rk^*, \nu, \nu^*, \eta, \eta^*, \phi, \phi^*, \Omega, \Omega^*\}$, where U/U^* is the banks' asset holdings, N/N^* is banks' net worth, R/R^* is domestic deposit rate, Rk/Rk^* is Home/Foreign risky asset return, ν/ν^* is banks' marginal value of risky asset, η/η^* is banks' marginal cost of domestic deposit, ϕ/ϕ^* is banks' leverage ratio, Ω/Ω^* is banks' effective discount factor.

Household problem:

$$\beta R = 1 \tag{1}$$

$$\beta R^* = 1 \tag{2}$$

$$\chi L^{\varepsilon} = \frac{(1-\alpha) Y}{L C} \tag{3}$$

$$\chi L^{*\varepsilon} = \frac{(1-\alpha) Y^*}{L^* C^*} \tag{4}$$

Bank problem:

$$\nu = \beta \Omega (Rk - R) \tag{5}$$

$$\nu^* = \beta^* \Omega^* (Rk^* - R^*) \tag{6}$$

$$\eta = \Omega \tag{7}$$

$$\eta^* = \Omega^* \tag{8}$$

$$\phi = \frac{\eta}{\theta - \nu} \tag{9}$$

$$\phi^* = \frac{\eta^*}{\theta - \nu^*} \tag{10}$$

$$\Omega = 1 - \sigma + \sigma (\eta + \nu \phi) \tag{11}$$

$$\Omega^* = 1 - \sigma + \sigma (\eta^* + \nu^* \phi^*) \tag{12}$$

$$N = \sigma ((Rk - R)\phi - a (Rk - Rk^*) + R)N + U \xi \tag{13}$$

$$N^* = \sigma ((Rk^* - R^*)\phi^* - a (Rk^* - Rk) + R^*)N^* + U^* \xi \tag{14}$$

$$U = \phi N \tag{15}$$

$$U^* = \phi^* N^* \tag{16}$$

Production sector problem:

$$Rk = \frac{\alpha Y}{K} + (1 - \delta) \tag{17}$$

$$Rk^* = \frac{\alpha Y^*}{K^*} + (1 - \delta) \tag{18}$$

$$Y = K^{\alpha} L^{1-\alpha} \tag{19}$$

$$Y^* = K^{*\alpha} L^{*1-\alpha} \tag{20}$$

$$K = (I + K (1 - \delta)) \tag{21}$$

$$K^* = (I^* + K^* (1 - \delta)) \tag{22}$$

$$Y = C + I \tag{23}$$

$$Y^* = C^* + I^* \tag{24}$$

Equilibrium:

$$Rk = Rk^* \tag{25}$$

$$K + K^* = U + U^* \tag{26}$$

Steady state:

1, From equation (1) (2) (5) – (16), we can solve the bank problem using the parameters and get $\{R, R^*, Rk, Rk^*, \nu, \nu^*, \eta, \eta^*, \Omega, \Omega^*, \phi, \phi^*\}$

2, Given $\{Rk, Rk^*\}$, we can get $\{K, K^*, Y, Y^*, L, L^*, C, C^*\}$ using equation (3) (4) (17) – (24)

3, The QUESTION is how do can we determine $\{U, U^*\}$ from equation (26). It seems that the asset wealth U and U^* allocation between Home and Foreign country is indeterminate from the equations yet Dynare could find a unique steady state based on this model. It is really confusing to me. Really appreciate if anyone could help here!!!