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Evaluating Macroeconomic Strategies with a calibrated model

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Outline

- Motivation, references
- Main features
- Specification
- Simulations
- Discussion

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Motivation, references

- Is pre-accession exuberance justified?
- Can expenditure booms be explained by reasonable consumption smoothing? No, if we believe in externalities and country risk
- Background:
  - ECB research: Fagan-Gaspar-Pereira
  - calibrated macromodels (Canada, New Zealand)
  - endogenous growth models
  - REER models

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Main features

- Saving-investment linkage is not constrained to a closed economy
  - permanent: cons - risk premium - interest rate
  - transitory: cons - exchange rate - interest rate
- Factors of catch-up from 50-80/100 percen
  - capital accumulation
  - externalities from foreign capital
  - autonomous TFP

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Specification

- Some definitions and mnemonics: Steady-state and particular solution divided, returns normalized by steady state, volumes by GDP, long and short returns:

$$\pi\pi_t = \bar{\pi}_t + \pi_t \qquad rr_t = \bar{r}_t + r_t$$

$$1 + \pi_t = 1 + \sum_{k=t}^{\infty} \pi_k^s \qquad 1 + r_t = 1 + \sum_{k=t}^{\infty} r_k^s$$

$$1 + prem_t = 1 + \sum_{k=t}^{\infty} prem_k^s$$

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Saving-investment linkage

$$r_t = \theta . q_t + prem_t$$

- premium – interest rate channel

$$prem_t^s = \alpha + \beta . nfa_t$$

$$c_t = \alpha_c w_t + \beta_c y_{LAB,t}$$

$$w_t = nfa_t + k_{d,t}$$

$$nfa_{t+1} = \frac{\left(1 + rr_t^s\right) nfa_t - c_t - i_{d,t} + y_{LAB,t} + \pi\pi_{d,t} k_{d,t}}{1 + g_t}$$

- exchange rate – interest rate channel
  - demand:

$$\max \left(A_T (c+i)_T^{-\beta} + A_{NT} (c+i)_{NT}^{-\beta} \right)^{-\frac{1}{\beta_d}}$$

$$s.t. (c+i)_T + q(c+i)_{NT} = 1 - tr$$

  - supply:

$$\max \left(y_T + q y_{NT} \right)$$

$$s.t. \left(B_T y_T^{-\beta} + B_{NT} y_{NT}^{-\beta} \right)^{-\frac{1}{\beta_d}} = c + i - 1$$

  - Adjustment to the equilibrium weight :

$$B_{2,t} = B_{2,t-1} - \lambda \left(B_{2BS,t-1} - B_{2,t-1} \right)$$

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- interest rate – investment link
- path of k, π not explicitly derived from the production function, but forward lookingly in the spirit of Tobin-q

$$k_t^f = \gamma . k_{t-1}^f + \beta(\pi - r) + (1-\gamma)\bar{k}_t^f$$

$$k_t^d = \gamma . k_{t-1}^d + \beta(\pi - r) + (1-\gamma)\bar{k}_t^d$$

$$\pi_{f,t} = \pi_{f,t+1} + \lambda(\bar{k}_f - k_{f,t})$$

$$\pi_{d,t} = \pi_{d,t+1} + \lambda(\bar{k}_d - k_{d,t})$$

$$y_{LAB,t} = 1 - \pi\pi_{d,t} k_{d,t} - \pi\pi_{f,t} k_{f,t}$$

$$i_t^f = (1+g_t)k_{t+1}^f - (1-\delta)k_t^f$$

$$i_t^d = (1+g_t)k_{t+1}^d - (1-\delta)k_t^d$$

Production function and externalities

- production function determines *g*

$$Y_t = A_0 \left(\frac{K_f}{Y} \right)_t^{\gamma_\mu} (1+\mu)^t K_{f,t}^{\alpha_f} K_{d,t}^{\alpha-\alpha_f} L_t^{1-\alpha}$$

- equilibrium cost ratios not explicitly modelled

$$q_{BS,t} = q_{BS,t+1} - \tau \left(g_t - g^* \right)$$

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Model calibration

- Parameters
  - growth = 2%
  - int.rate = 5%
  - α_{KD} = 0.2
  - α_{KF} = 0.1
  - α_{L} = 0.7
  - amort = 8%
  - β_{RISK} = 0.1
- Starting values
  - K/Y = 1.6
  - KD/Y = 1.1
  - KF/Y = 0.5
  - NFA/Y =-0.25
  - Reer misalignment 7%
- Steady state
  - K/Y = 2.14
  - KD/Y = 1.43
  - KF/Y = 0.71
  - NFA/Y = 0
  - W/Y = 1.43
  - C/Y = 0.76
  - I/Y = 0.21
  - TR/Y = 0.03

Catching-up from 50% to 80% relative to EU average ($\gamma_{KF/Y}$=0.7

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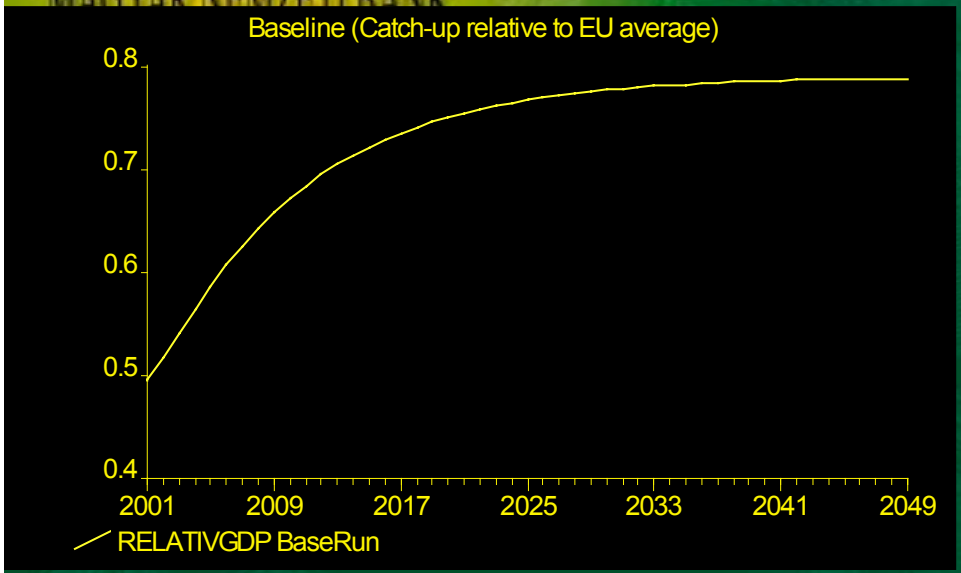
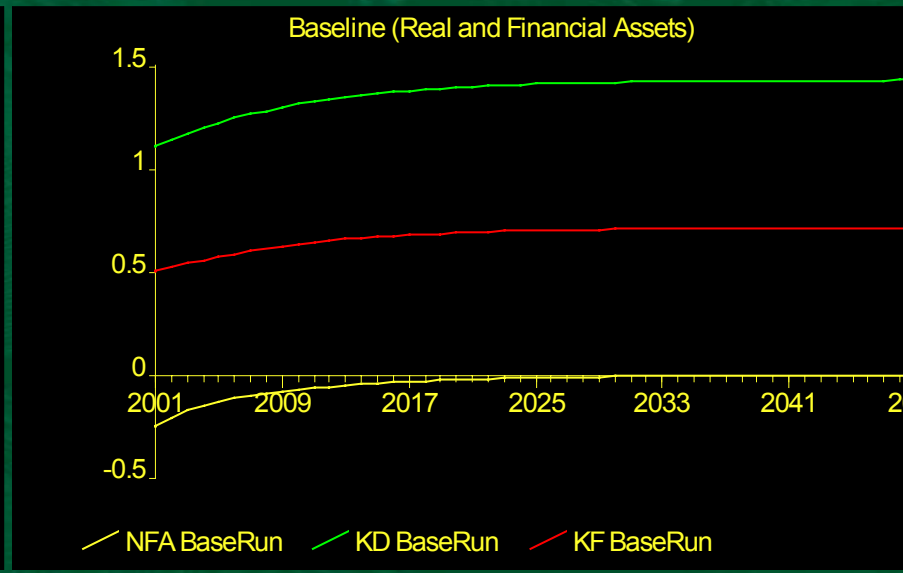
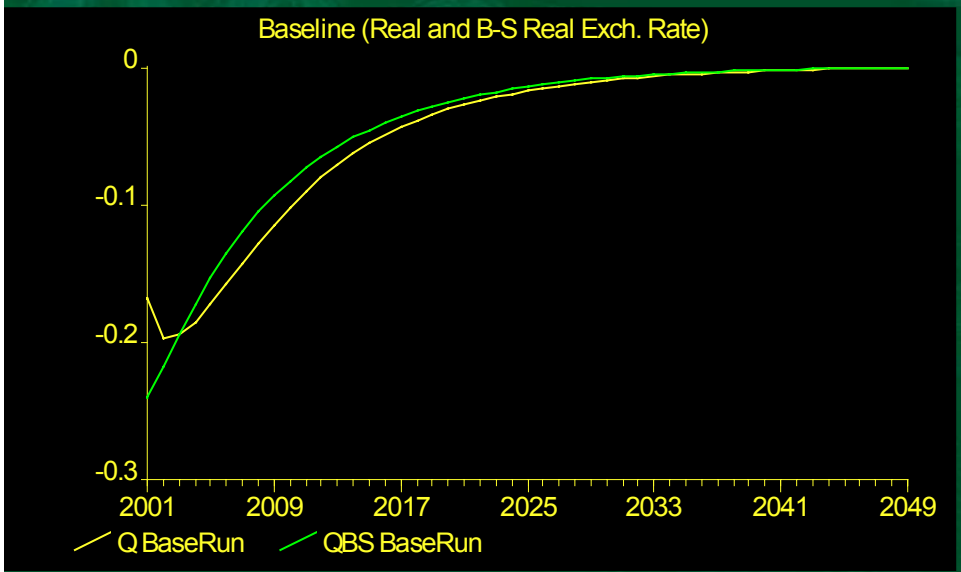
Simulation

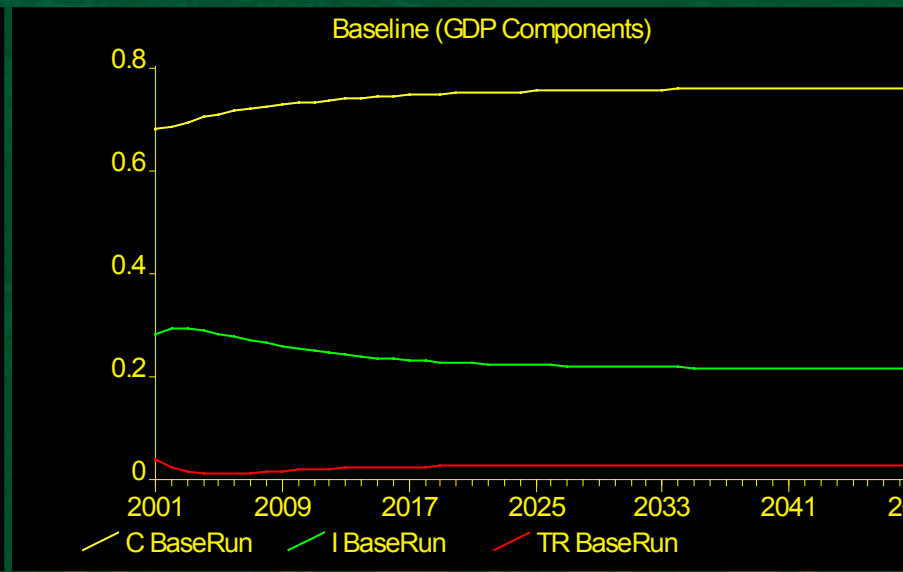
- 3 alternative simulations:
  - "Baseline": flexible factor allocation (production possibility curve), endogenous risk premium, external effect of foreign capital on TFP
  - "Alternative baseline": no risk premium, no external effect of foreign capital on TFP
  - "NATREX": fix factor allocation (production possibility curve)

Simulation: Baseline









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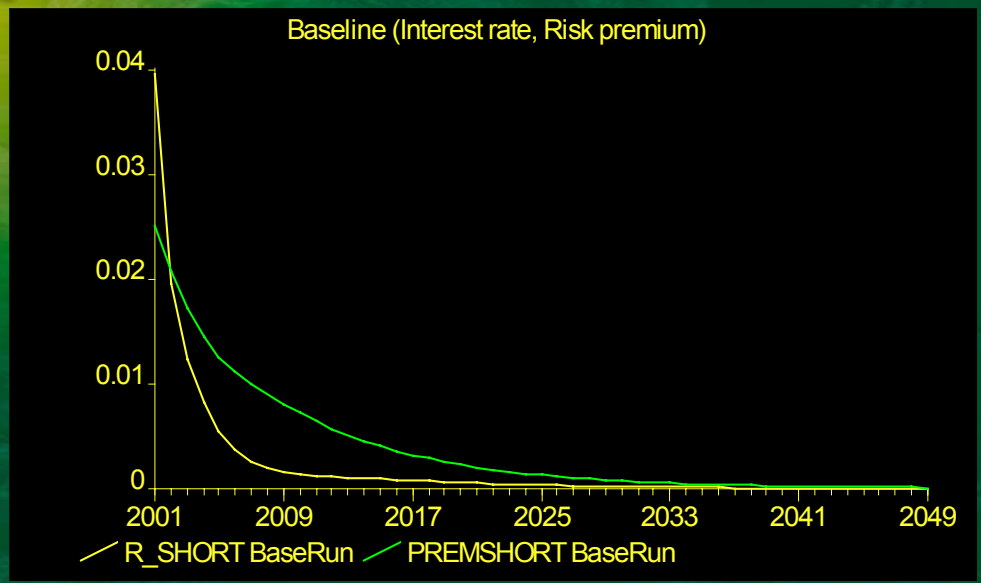
Simulation: Baseline



- Gradual, 30-year-long catching-up period
- Cathing-up from 50% to 80% relative to EU average
- Approx. 24% real appreciation (BS-effect)

Simulation: Alternative baseline

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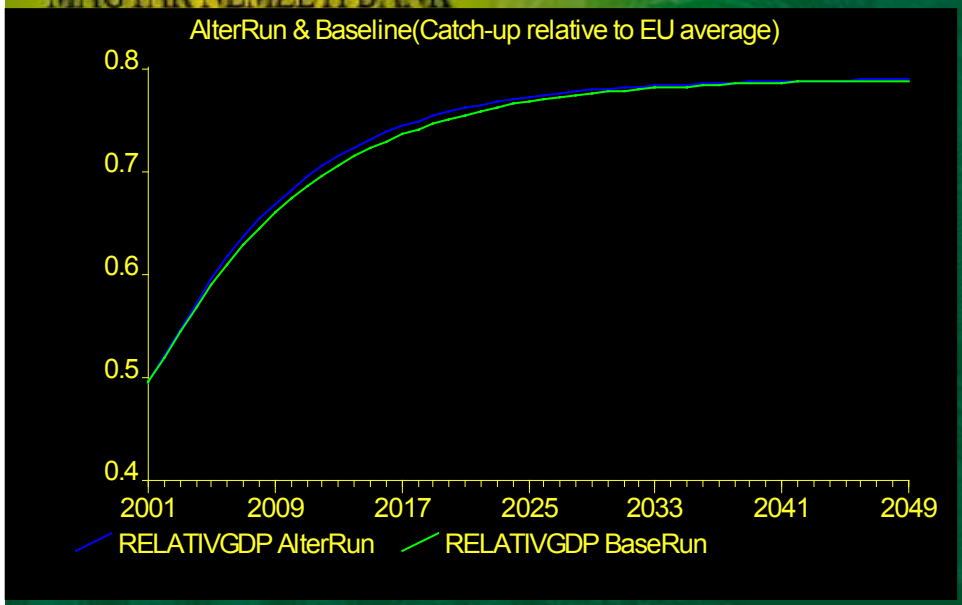
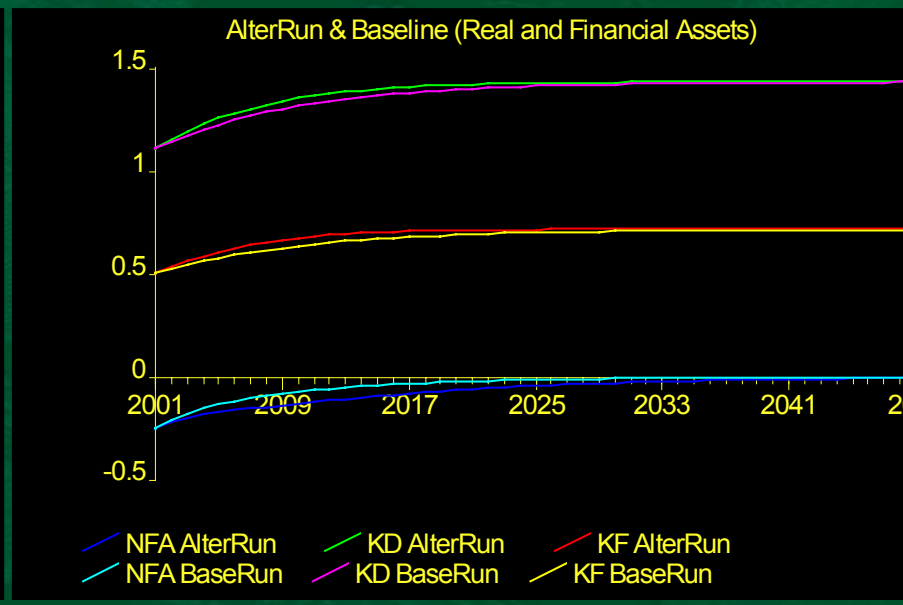
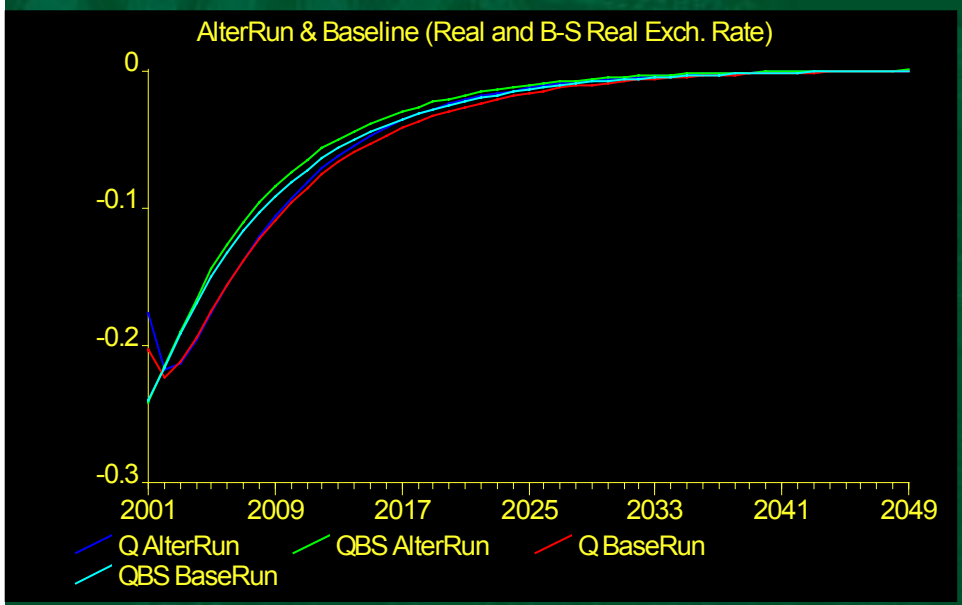
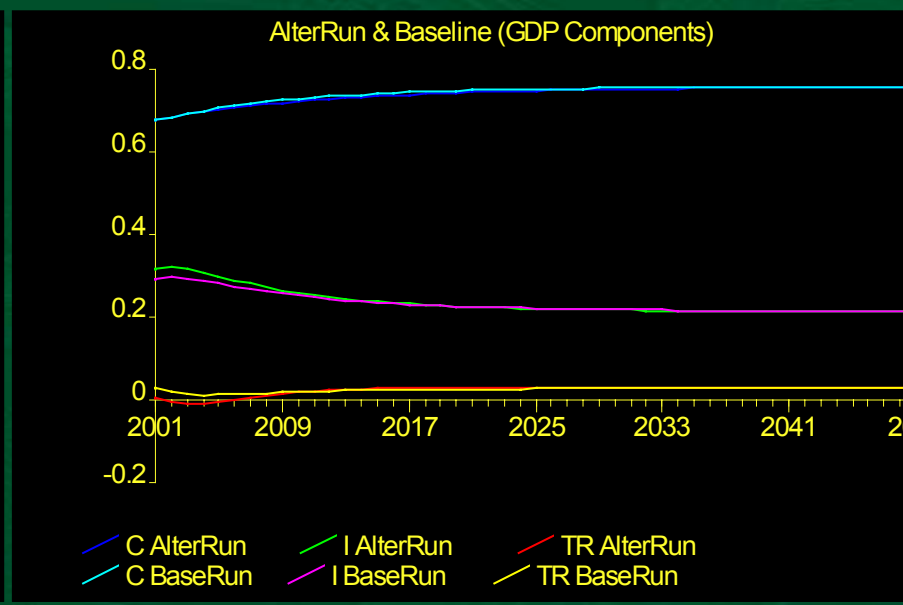
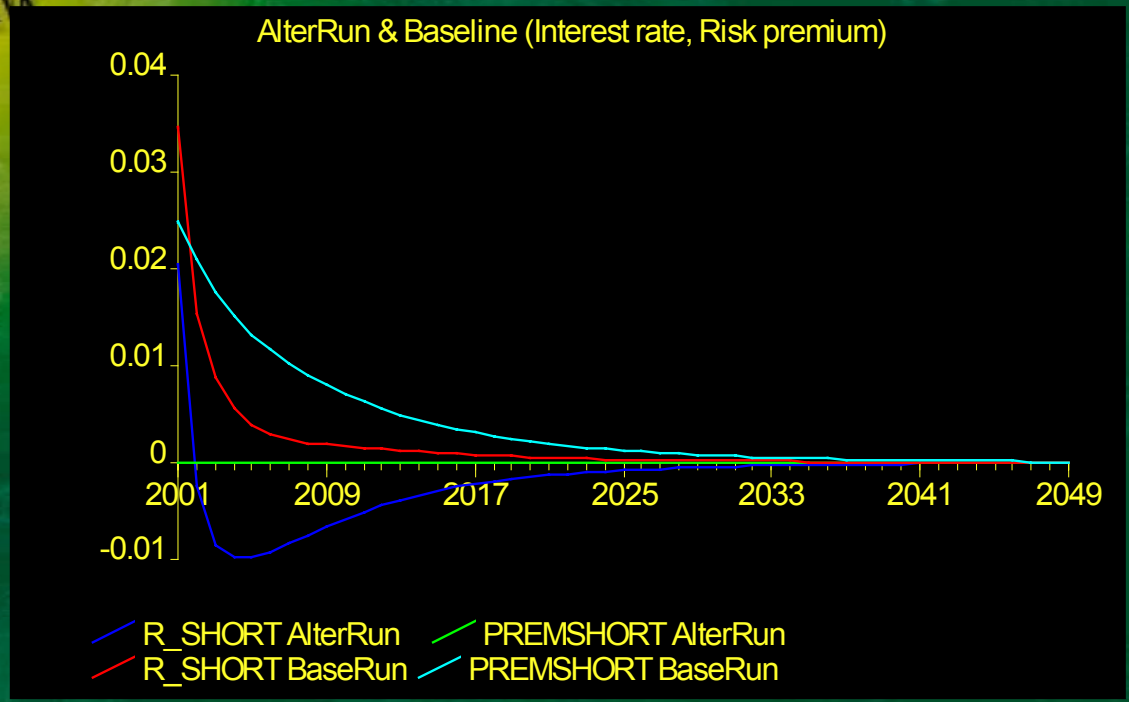








Simulation: Alternative baseline



- Real convergence similar to that of “Baseline”
- Main differences:
  - Risk premium zero → Interest rate lower
    (Lower than world rate due to the appreciation)

Simulation: NATREX

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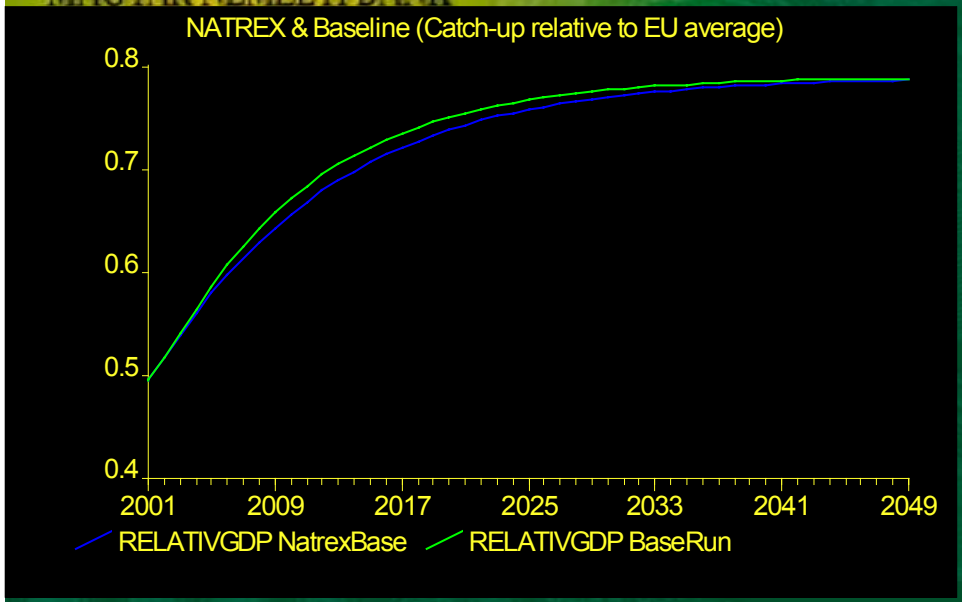
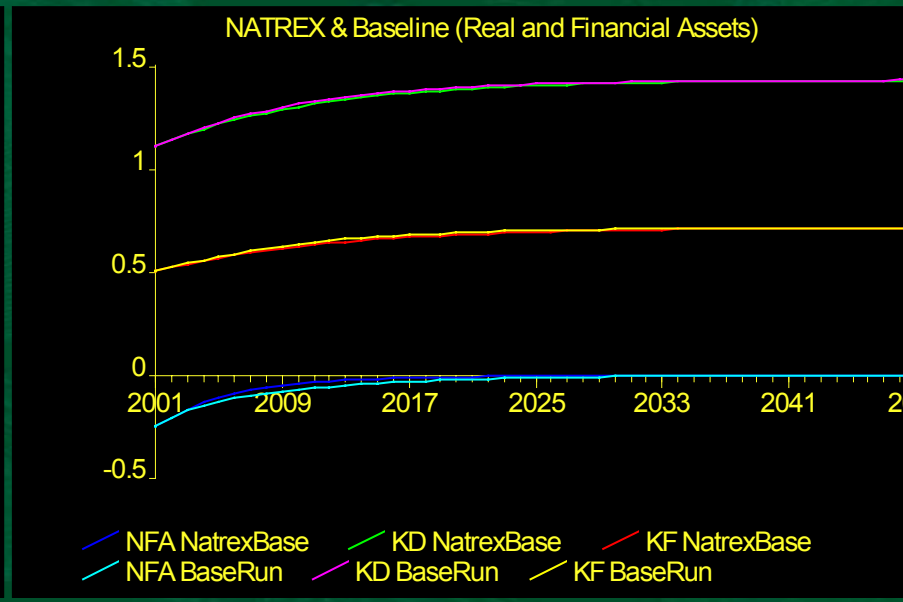
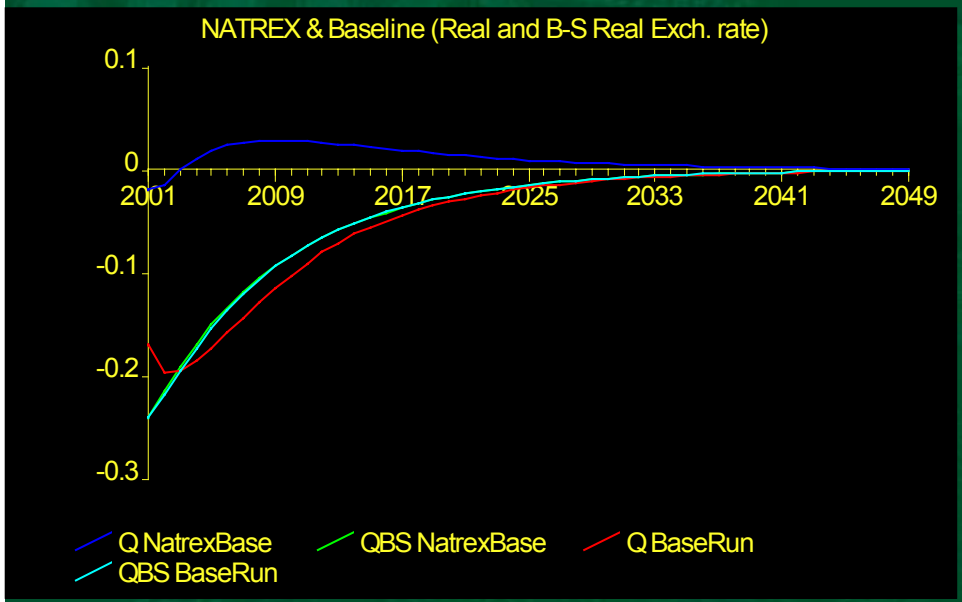
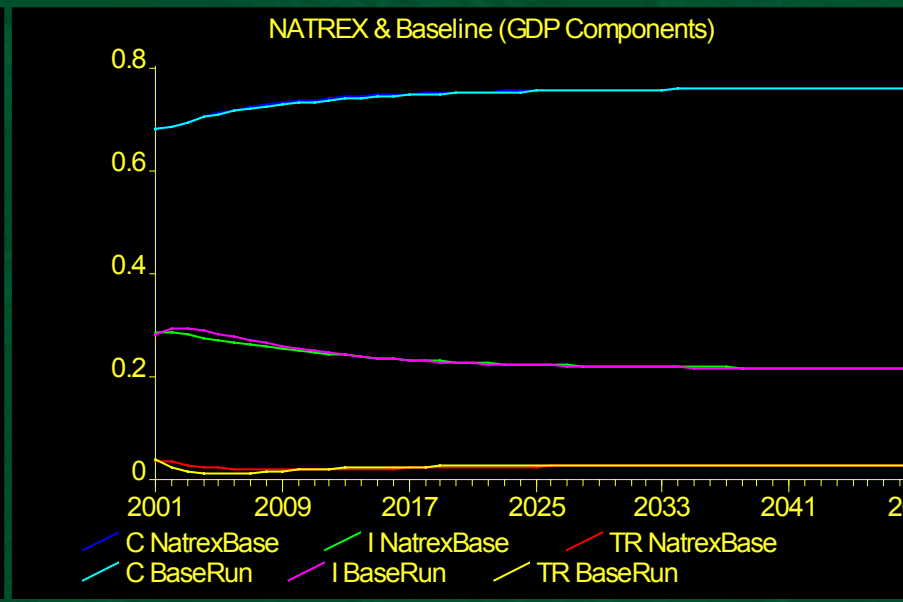
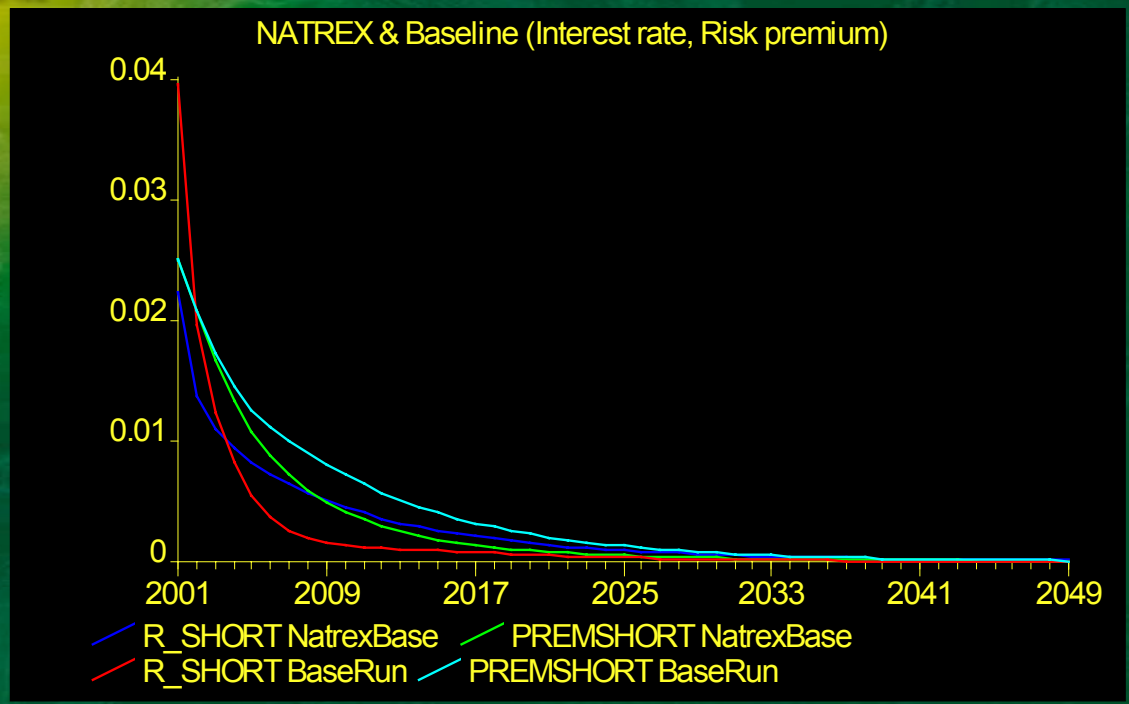








Simulation: NATREX



- Real convergence similar to that of "Baseline"
- Main differences:
  - Real exchange rate path → Interest rate is lower at the beginning but thereafter remains higher

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Simulated shocks

- Assessing the effect of fiscal expenditure treated as a consumption shock
- Shocks:
  - Transitory fiscal (excess consumption) boom
    one period 1 %point increase in C/Y
  - Fiscal boom with raising debt-target
    "Permanent fiscal boom"
    one period 1 %point increase in C/Y and
    1 pct.p decrease in steady state W/Y

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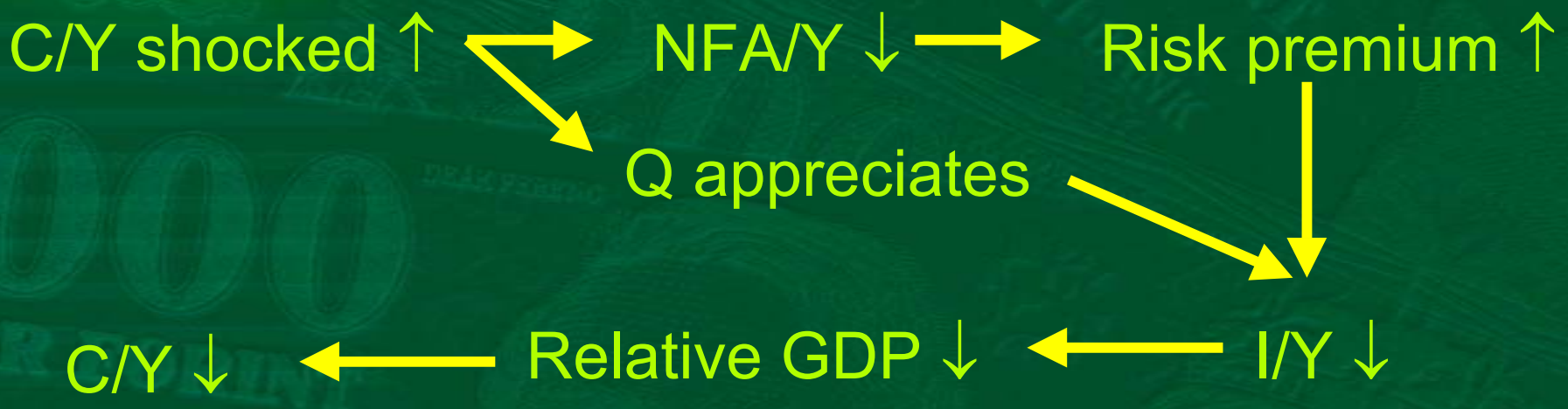
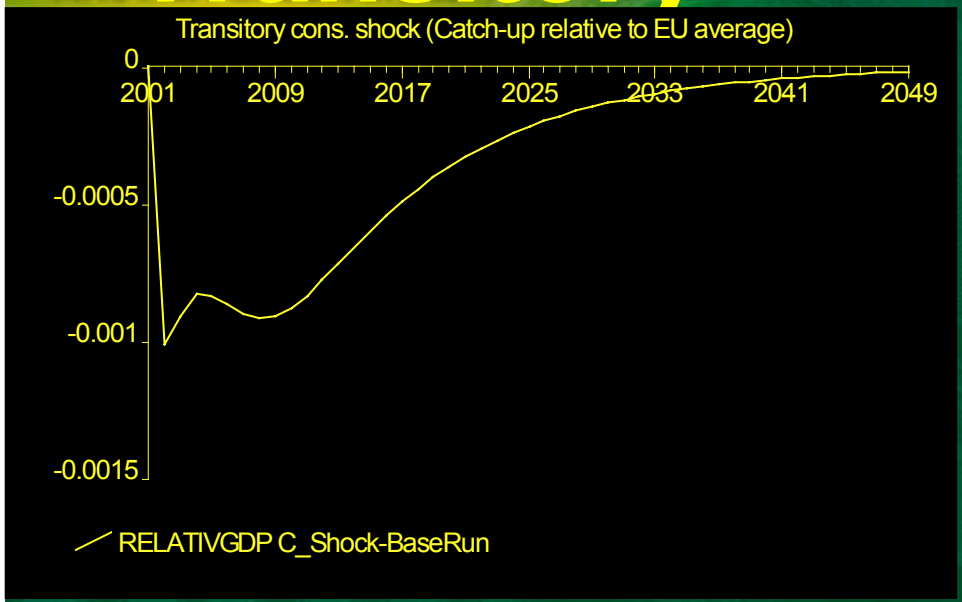
Simulated shocks

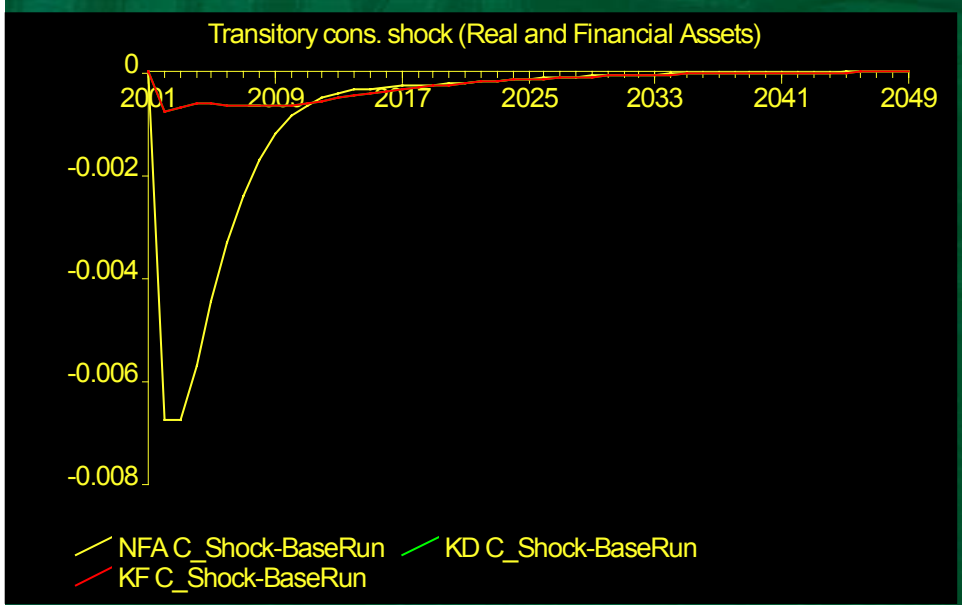
- Transmission mechanism of a fiscal shock



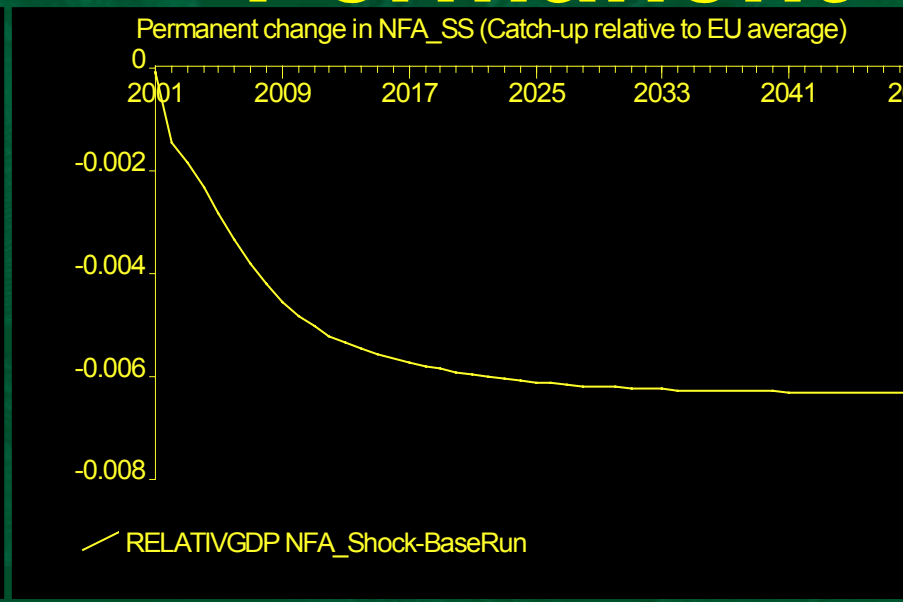
Simulation: fiscal boom

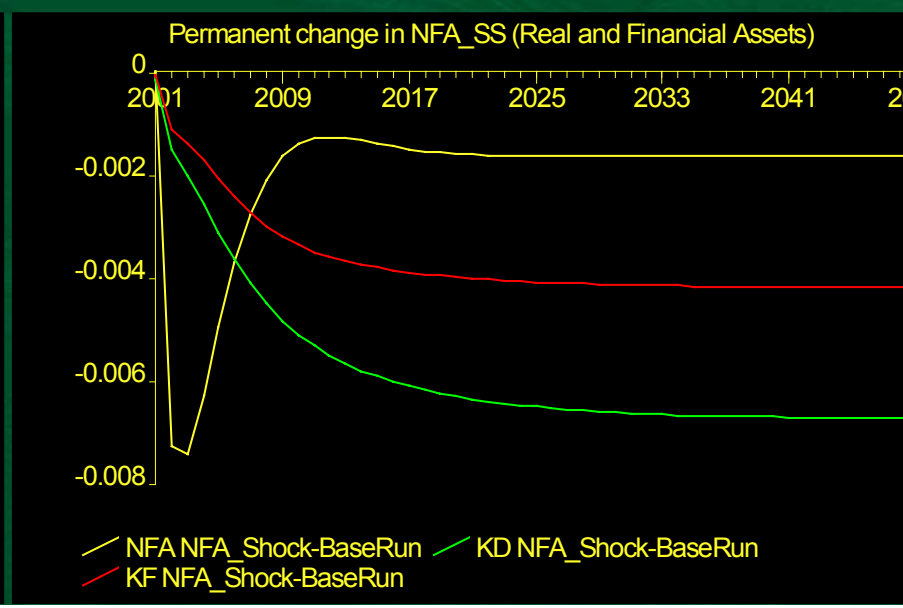
Transitory





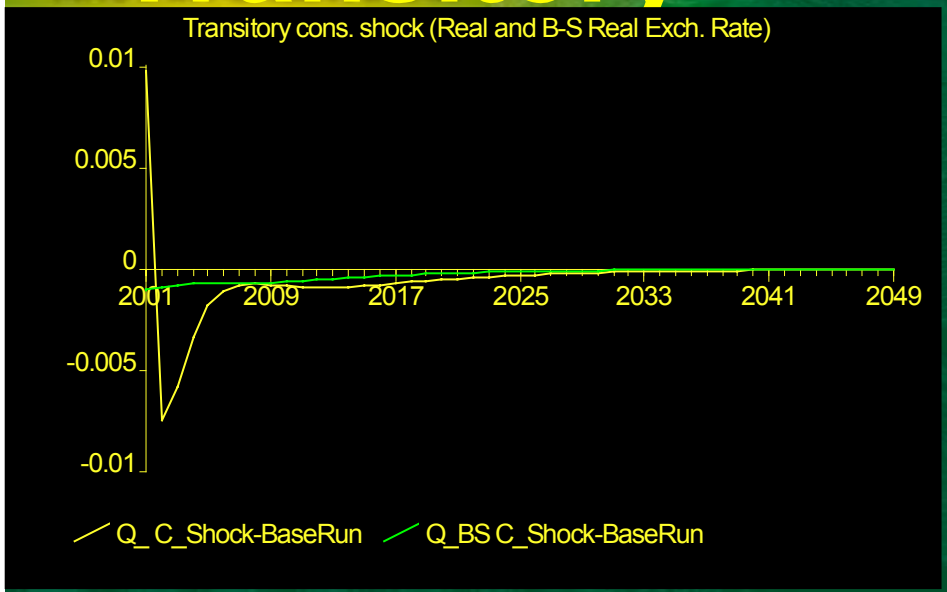
Permanent





Simulation: fiscal boom

Transitory



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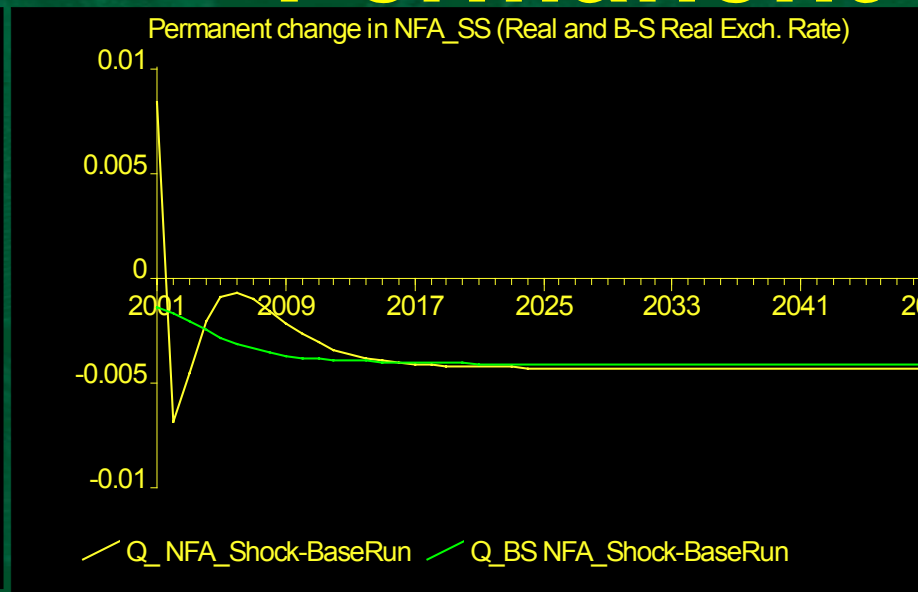
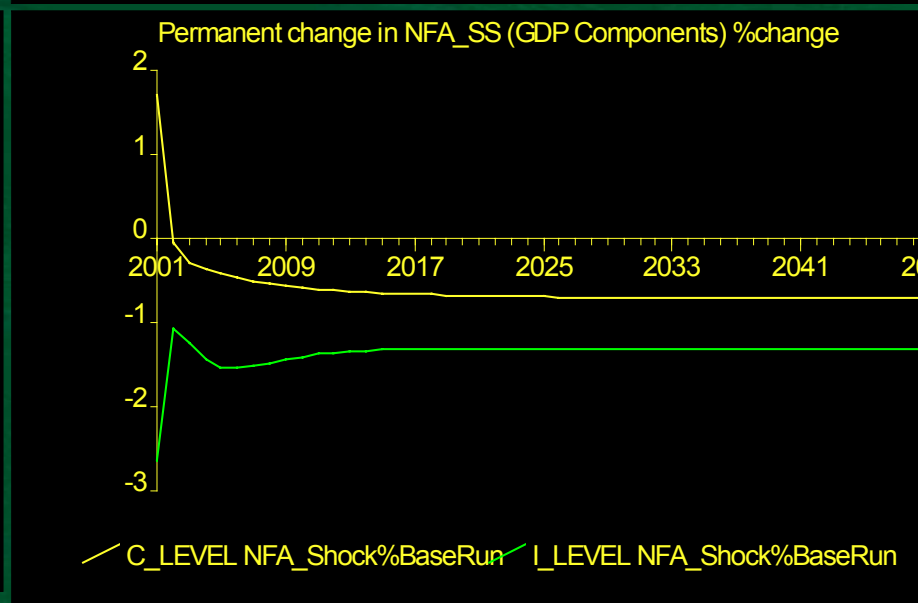
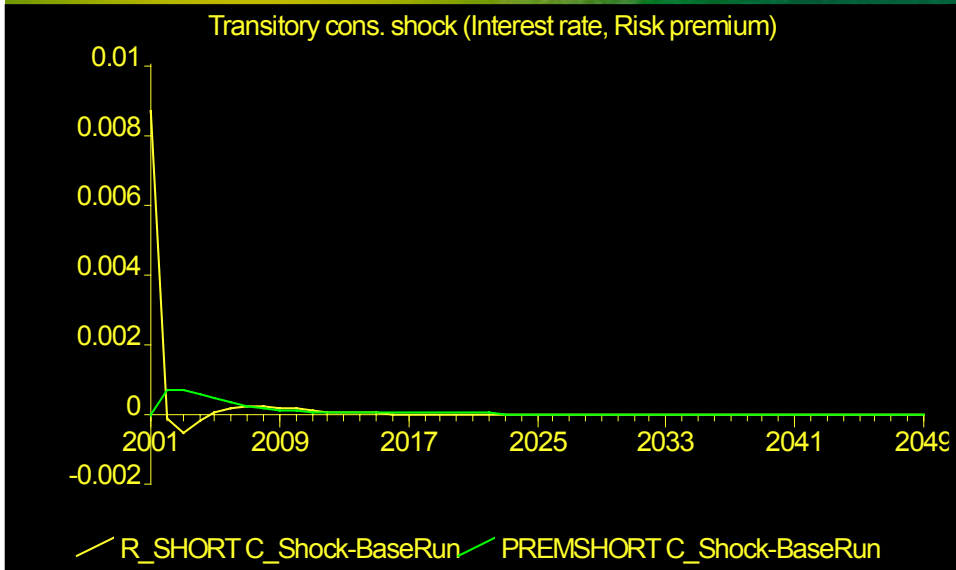




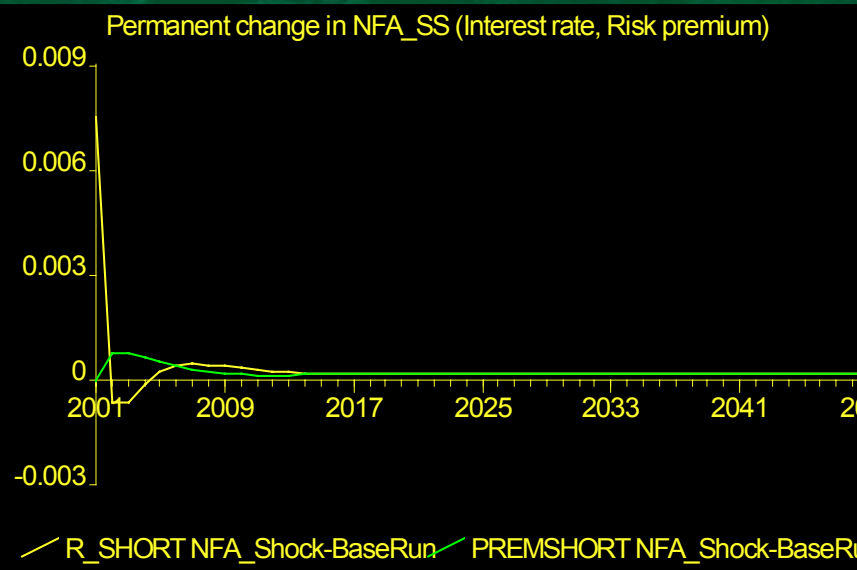
Simulation: fiscal boom

Transitory



- 1 unit excess consumption results in:
  - 4.6 unit total loss in GDP
  - 3.6 unit consumption tightening
    (Time discount ~ 24%)

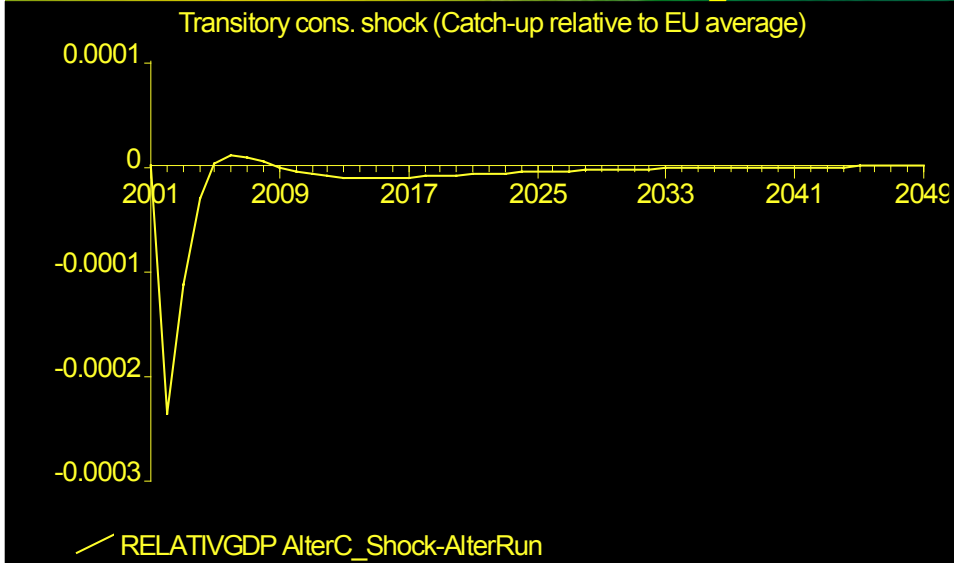
Permanent

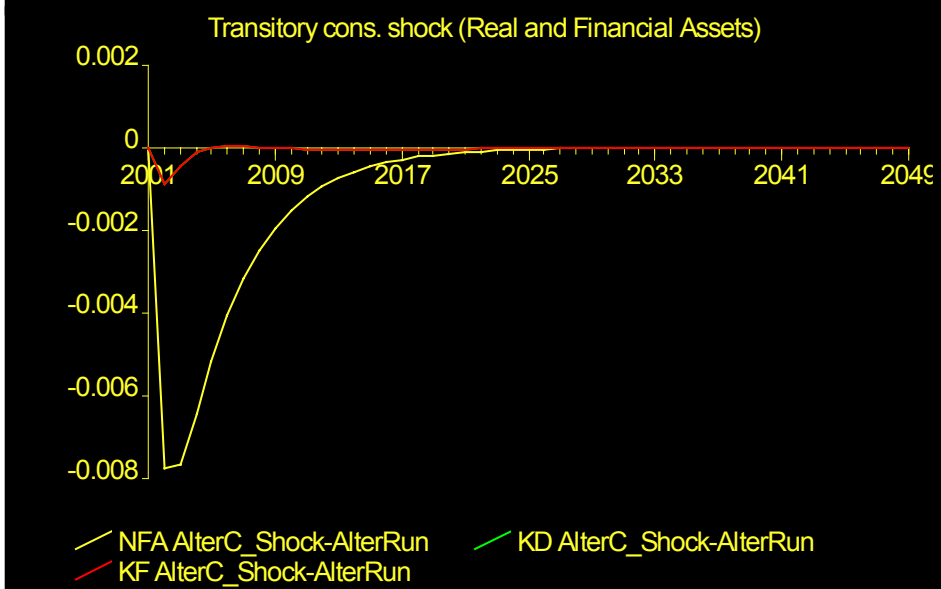


- A decrease in W/Y results in:
  - higher risk premium, inter.
  - lower C/Y, I/Y, K/Y, GDP, NFA/Y

Simulation: fiscal boom (Altern.)

Transitory





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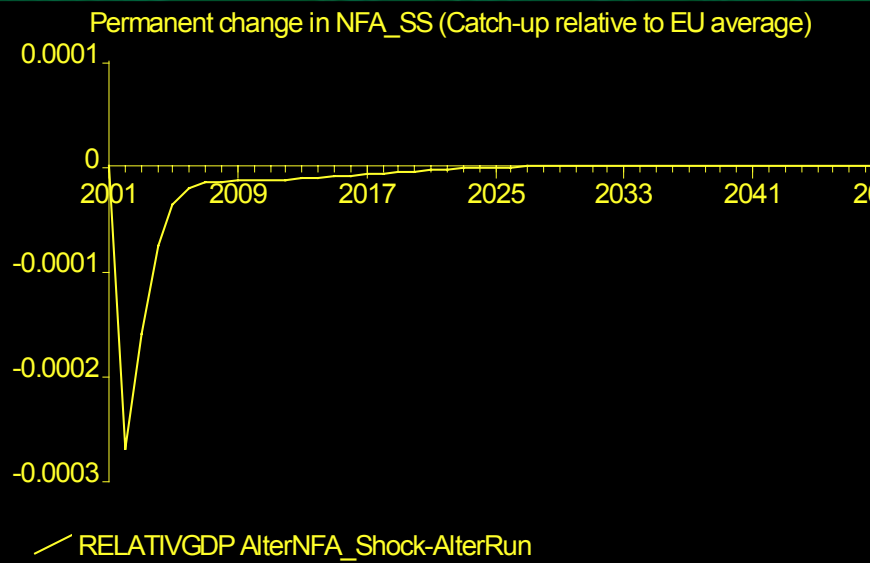
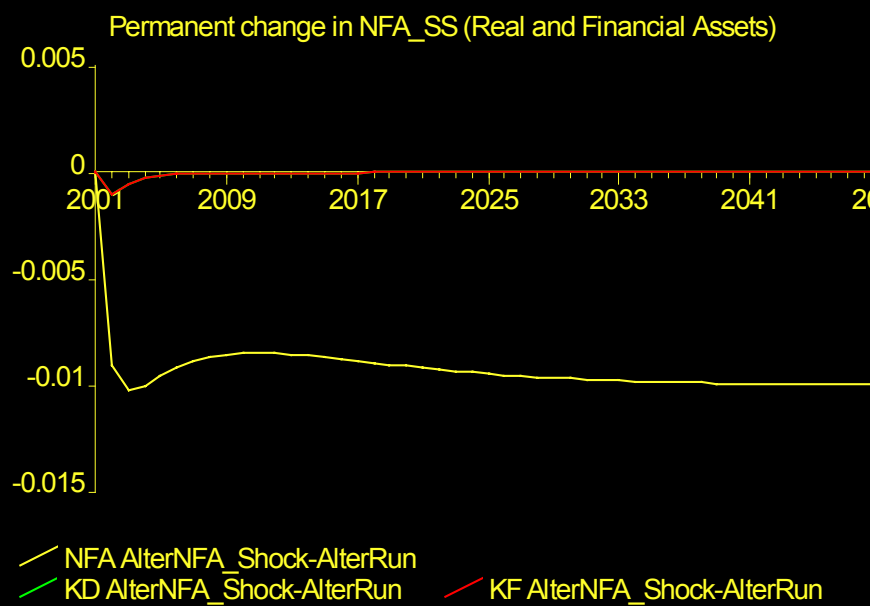
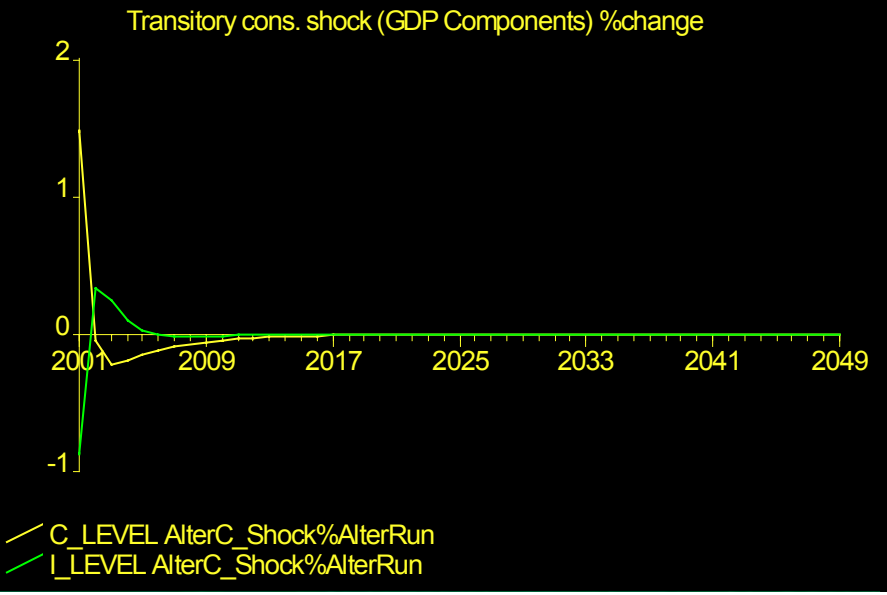




Simulation: fiscal boom (Altern.)

Transitory



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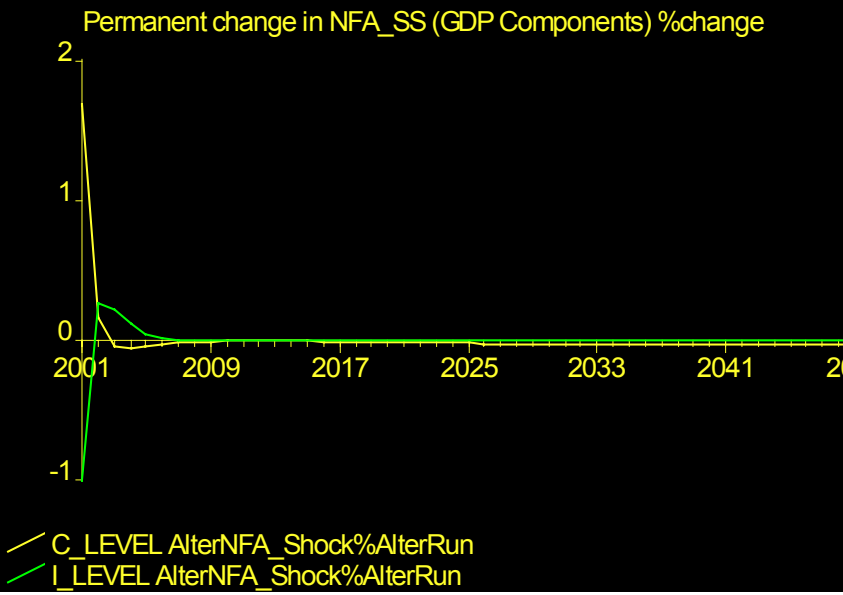
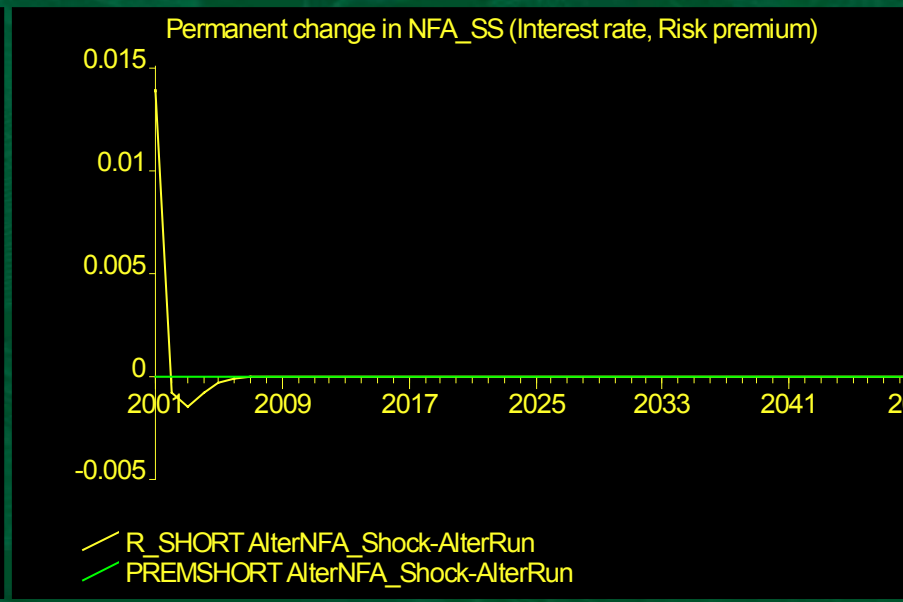


Simulation: fiscal boom (Altern.)

Transitory

Permanent



- 1 unit excess consumption results in:
  - 0.13 unit total loss in GDP
  - 0.23 unit consumption tightening
    (Time discount ~ 6%)

- A change in steady state W/ results in:
  - lower C/Y due to lower NFA/Y
  - other variables unchange

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Conclusion

- Sacrifice paid for consumption (fiscal) exuberance:
  - higher costs of disinflation. Not modeled here
  - lower investments, therefore
    - slower catching-up if growth is investment-dependent
    - lower steady-state output if investors perceive country-risk
- Costs may be very high, over the range of reasonable intertemporal optima

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Thank You for Your Attention

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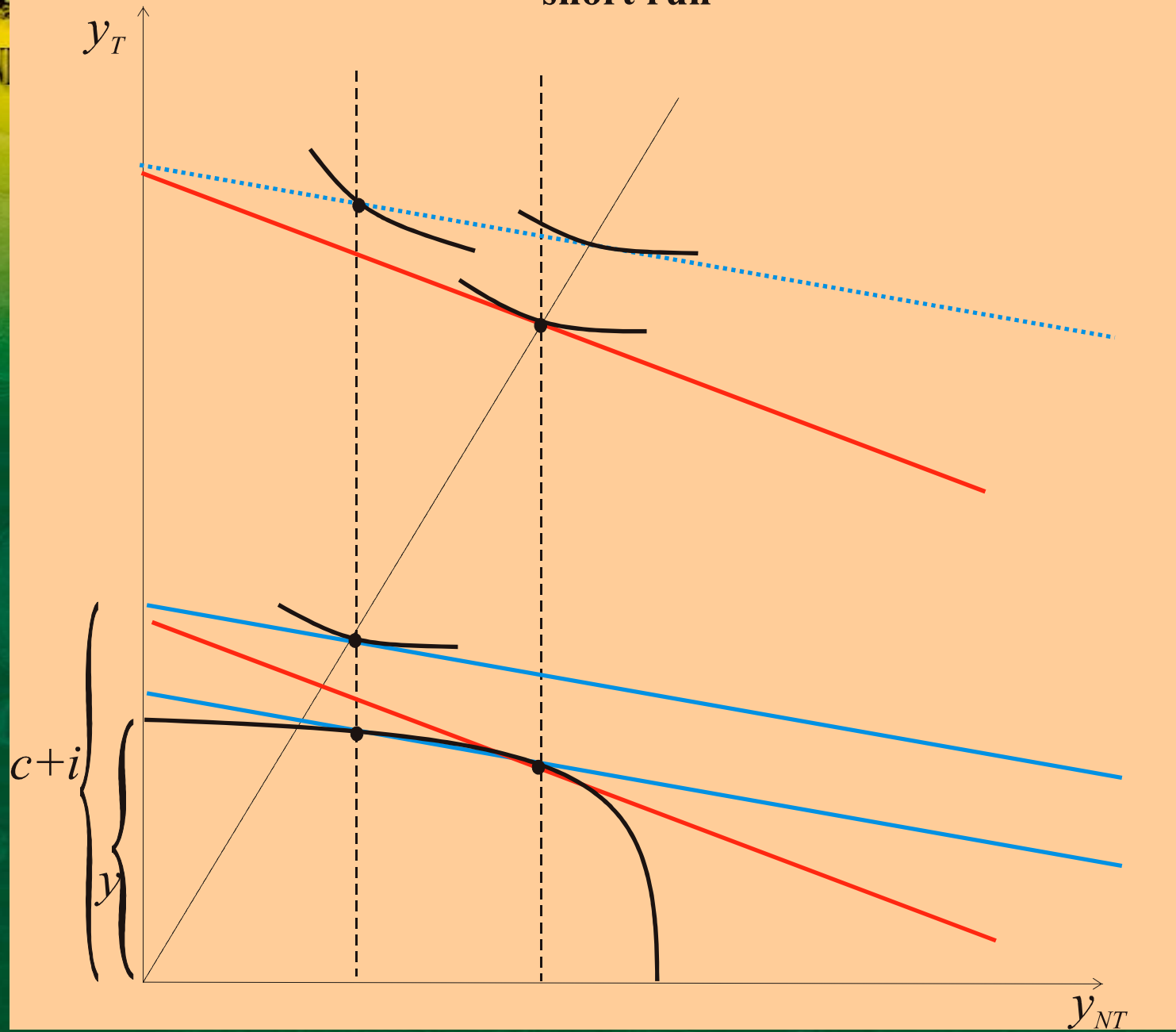
Effect of an increase in expenditure on the real exchange rate: short run



Effect of an increase in expenditure on the real exchange rate: long run