Tariffs and the Trade Deficit

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Banque de France Chair Conference, September 2019

Tariffs

- Stated goal of Trump's trade policy: reduce the current account deficit
- Several issues:
  - Misplaced focus on bilateral deficits
  - Not clear what welfare basis for targeting deficit
- Here more basic issue: does trade policy affect the trade deficit and why?

Trade openness and deficits

- Macro gut reaction: deficits depends on aggregate saving and investment, why should trade policy affect them?
- Things are subtler:
  - intertemporal trade: you have to get goods from country 1 to country 2 when country 1 is borrowing, then from country 1 to country 2 when it's repaying
  - if it you add frictions to both movements, it must make it harder to borrow, so affect saving/lending decisions
- Point made in Obstfeld and Rogoff (2000)
- Recently quantitative work explores the idea in rich firm-level trade models: Fitzgerald (2008), Eaton-Kortum-Neiman (2016), Alessandria and Choi (2016), Reyes-Heroles (2017)

This talk

- Review the intertemporal argument
- What if trade deficits are persistent/structural?
- Explore 2 models where trade deficits can be permanent
  - A model of US as world supplier of safe assets
  - An OLG model with saving imbalances
- Results: effects of tariffs on deficit can be small, zero, negative...

The intertemporal argument

- Simple 2x2x2 endowment economy
- 2 countries, 2 goods, 2 periods
- Cobb-Douglas preferences with home bias:

$$c_t = \left(c_{H,t}\right)^{\omega} \left(c_{F,t}\right)^{1-\omega},$$

$$c_t^* = \left(c_{F,t}^*\right)^{\omega} \left(c_{H,t}^*\right)^{1-\omega},$$

- Notice that H and F are flipped in the second
- Assume

$$\omega > 1/2$$

The intertemporal argument (continued)

- Demand for H,F

$$c_{H,t} = \frac{\omega}{p_{H,t}} p_t c_t$$

$$c_{F,t} = \frac{1-\omega}{(1+\tau)p_{F,t}} p_t c_t$$

- Agents save in international bond a_1
- Three equilibrium conditions, three relative prices
- Equilibrium in bond market, equilibrium in good H in each t
- Simple transfer effect

$$\omega p_t c_t + (1-\omega) p_t^* c_t^* = p_{H,t} e_H$$

with $\omega > 1/2$ more spending to $H \rightarrow$ higher $p_{H,t}/p_{F,t}$

The intertemporal argument (continued)

- What is the effect of a permanent tariff τ on saving behavior?
- Works through Euler equation

$$u'(c_1) = (1 + i_1) \frac{p_1}{p_2} \beta u'(c_2),$$

- Real interest rate different in the two countries because they consume different baskets
- Express all prices in same currency

$$p_t = p_{H,t}^{\omega} \left((1 + \tau) p_{F,t} \right)^{1-\omega}.$$

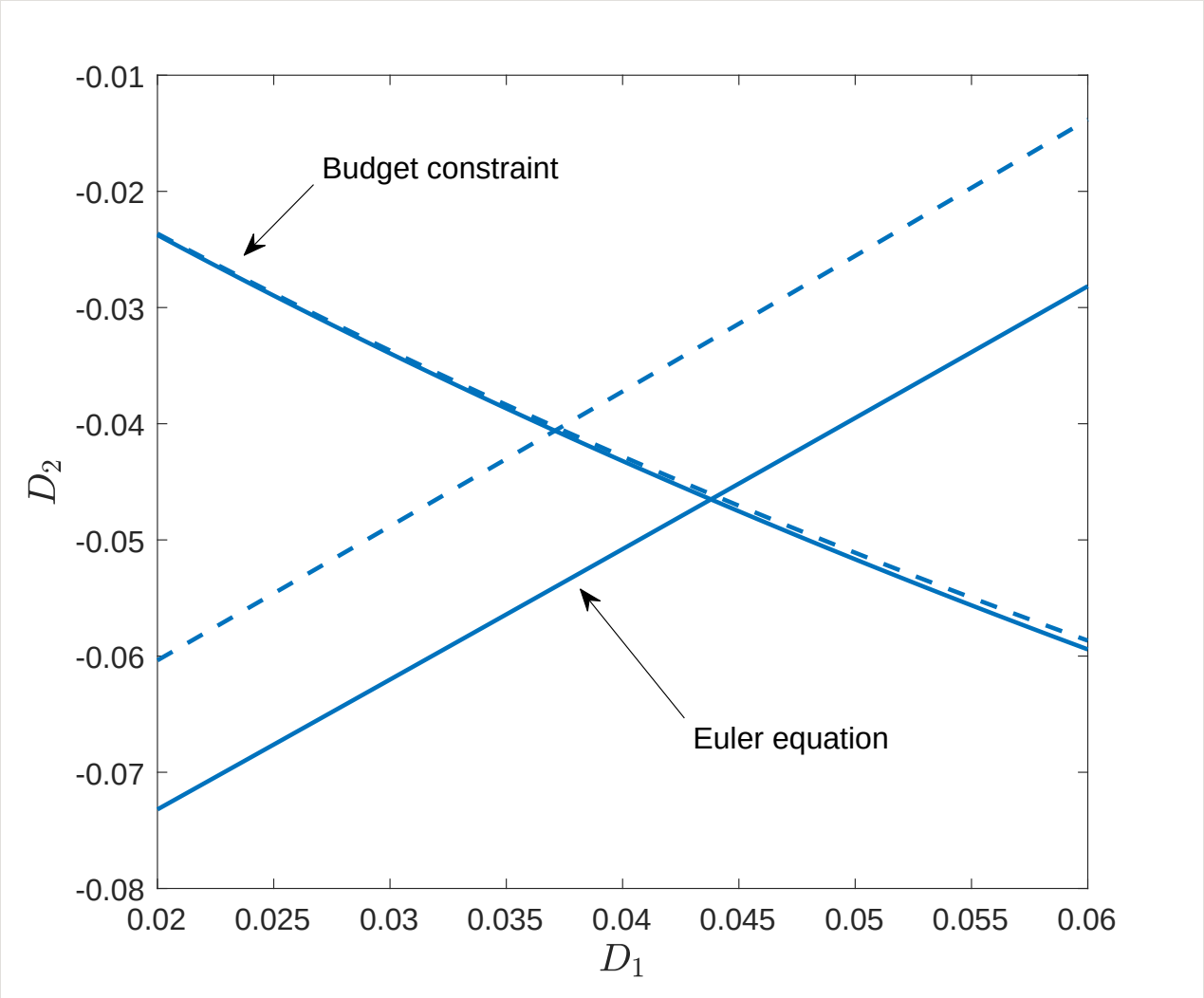
Real interest rates

- Combine Euler equations for both countries, rearrange

$$\frac{u'(c_1)}{u'(c_2)} = \left(\frac{\frac{p_{H,1}}{p_{F,1}}}{\frac{p_{H,2}}{p_{F,2}}} \right)^{2\omega-1} \frac{u'(c_1^*)}{u'(c_2^*)}$$

- The tariff is not there, because it's permanent
- Still in GE it matters, because it moves relative prices...
- 2 equilibrium equations: one from Euler equation, one from budget contraint

Effect of a tariff



D_t: trade deficit of H country

Effects of a tariff (continued)

- **Result 1**: home tariff increases the real interest rate relatively more for the home country

$$\frac{u'(c_1)}{u'(c_2)} = \left(\frac{\frac{p_{H,1}}{p_{F,1}} \uparrow\uparrow}{\frac{p_{H,2}}{p_{F,2}} \uparrow} \right)^{2\omega-1} \frac{u'(c_1^*)}{u'(c_2^*)}$$

- Why? Because in period 1 home country spending is bigger fraction of world spending, so distortions in home spending have bigger effects on relative prices

Effects of trade war

- **Result 2**: both countries imposing a tariff also increases the real interest rate relatively more for the home country

$$\frac{u'(c_1)}{u'(c_2)} = \left(\frac{\frac{p_{H,1}}{p_{F,1}} \downarrow}{\frac{p_{H,2}}{p_{F,2}} \downarrow\downarrow} \right)^{2\omega-1} \frac{u'(c_1^*)}{u'(c_2^*)}$$

- Why? Because in period 2 foreign country spending is bigger fraction of world spending

- Same logic applies to reduction in trading costs. Reyes-Heroles connects increase in trade to increase in global imbalances

Remarks

- Crucial element: deficits are transitory
- Borrow today to repay tomorrow
- Representative agent bridges both periods, so incentives depend on real rate across periods when $D < 0$ and $D > 0$
- What happens if deficits are "structural"?
- (US has trade deficit since the late 70s)
- Explore 2 models where asset trading structure is different so deficits can be permanent

A model of world liquidity supply

- Same 2 goods structure, same endowment economies, same Cobb-Douglas preferences with home bias
- Different reason for trading assets
- Preferences of H consumer

$$\int_0^\infty e^{-\rho t}\left(u\left(c(t)\right)+v\left(\frac{b(t)}{p(t)}\right)\right)dt$$

- Continuous time, infinte horizon (not crucial)
- $v(b/p)$ demand for liquid bonds (crucial)

A model of world liquidity supply (continued)

- Both home and foreign consumers demand liquid bonds
- Only entity that supplies liquid bonds is H government
- Gov't budget constraint

$$\dot{B} + \tau p_F c_F = T + i_b B$$

- Liquidity premium

$$(i - i_b)\, u'(c) = v'\left(\frac{b}{p}\right)$$

where i rate of return on illiquid assets, i_b rate of return on liquid bonds

- Very similar to traditional money demand

Permanent trade deficit

- Suppose all endowments grow at rate g
- Steady state equilibrium with all prices constant, all quantities growing at rate g
- H gov't keeps i_b stable
- Consolidated budget constraint of country H in steady state

$$\underbrace{p_F c_F}_{\text{imports}} - \underbrace{p_H(e_H - c_H)}_{\text{exports}} = \underbrace{ia - i_b b^*}_{\text{interest payments}} - \underbrace{g(a - b^*)}_{\text{current account balance}}$$

$$= (i - g)a + (g - i_b)b^*$$

- **Result**: if parameters satisfy some conditions equilibrium with $a > 0$, $b^* > a$, $i > g > i_b$
- Simple world banker country (Rey-Gourinchas)

Effects of tariff

- Tariff introduced at $t = 0$, economy jumps to new steady state
- Where, depends on valuation effects
- Simple case: suppose all assets denominated in F
- Foreign country wealth excluding liquid asset has flow value:

$$e_F^* - (i - g)a$$

- $\rightarrow$ unchanged demand for liquid asset b^*
- $\rightarrow$ unchanged consumer spending

$$p^* c^* = e_F^* - (i - g)a$$

- however $p^* \uparrow$ and $c^* \downarrow$

Effects of tariff (continued)

- For domestic consumer

$$\uparrow (p_H c_H + p_F c_F) = \uparrow p_H e_H + (i - g)a + (g - i_b)b^*$$

- But the "privilege" $(i - g)a + (g - i_b)b^*$ remains unchanged
- **Result**: zero effect on the trade deficit
- Trade deficit over GDP goes down because GDP higher (terms of trade effect)

Valuation effects

- a more realistic configuration: a denominated in F, b denominated in H
- now two effects that tend to reduce trade deficit:
  - value of home net financial wealth $a_- - b^*_-$ goes down
  - value of foreign total wealth (including non-financial wealth) $p_F e_F/(i-g) - (a_- - b^*_-)$ also goes down
- second effect reduces demand for b^*, first effect means domestics have to shed a
- lower a, lower b^*, less "privilege"
- *welfare remark*: a reduction of the trade deficit in this environment dampens the unilateral welfare benefits of imposing a tariff

Trade war

- all effects above where due to changes in p_H/p_F
- with trade war everything goes in reverse
- **Result**: an increase in both countries' tariffs that keeps p_H/p_F unchanged have zero effects on the trade deficit

Remarks on exchange rate

- Results are in flexible price environment
- Can be interpreted as full employment achieved by CB
- Interpretation is exchange rate adjusts to undo effects of tariff
- Not Lerner symmetry (Costinot-Werning 2019), here just a tariff
- But related to observations about effects of temporary/permanent imp. tariff+exp. subsidy policies in Erceg, Prestipino, Raffo (2017)

An OLG economy

- once more, same goods structure
- now overlapping generations, preferences

$$u\left(c_{t,t}\right)+\beta u\left(c_{t,t+1}\right)$$

- two assets: domestic capital k and international bonds a
- budget constraints

$$\frac{a_{t+1}}{p_t}+k_{t+1}+c_{t,t}=w_t+T_t^y$$

$$c_{t,t+1}=\rho_{t+1}k_{t+1}+\left(1-\delta\right)k_{t+1}+\left(1+i_t\right)\frac{a_{t+1}}{p_{t+1}}+T_{t+1}^o$$

An OLG economy (continued)

- Both c and k same aggregates of H and F
- Optimal savings

$$u'(c_{t,t}) = \beta(1 + r_t)\, u'(c_{t,t+1})$$

where

$$1 + r_t = \frac{p_t}{p_{t+1}}(1 + i_t)$$

- Arbitrage

$$1 + r_t = \alpha \frac{p_{H,t+1}}{p_{t+1}} A_{t+1} k_{t+1}^{\alpha-1} + 1 - \delta$$

- Production of home good

$$y_{H,t} = A_{t+1} k_{t+1}^{\alpha}$$

- Assume tariffs rebated to generation t in proportion to their purchases of F goods (no intergenerational transfers)

An OLG economy (continued)

- Find equilibrium prices
- Two market clearing conditions

$$a_t + a_t^* = 0$$

$$x_{H,t} + x_{H,t}^* = y_{H,t}$$

- where $x_{H,t}$ total purchases of home good for consumption and investment

An OLG economy (continued)

- Log preferences
- Productivity grows at constant rate
- Differences in β
- Steady state boils down to one condition

$$(s(1-\alpha)-\kappa)p_H y_H + (s^*(1-\alpha)-\kappa^*)p_F y_F = 0$$

- where s saving rate of young, κ investment of young

Savings equilibrium

- In steady state can be rewritten as

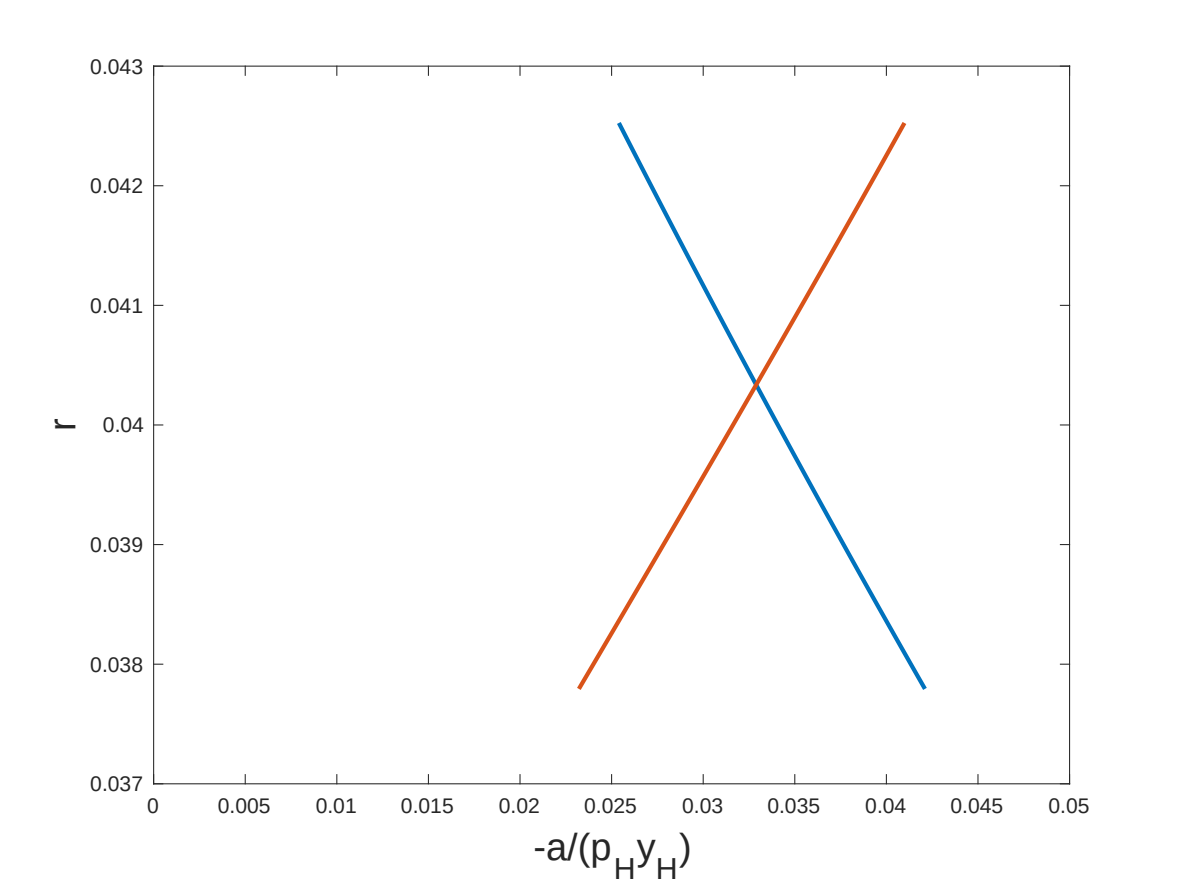
$$-(s(1-\alpha)-\kappa) = (s^*(1-\alpha)-\kappa^*)\frac{p_F y_F}{p_H y_H}$$

  function only of r
- Partial equilibrium effects:
  - tariff has no effect on s
  - tariff reduces $p_F y_F/(p_H y_H)$
  - tariff reduces κ

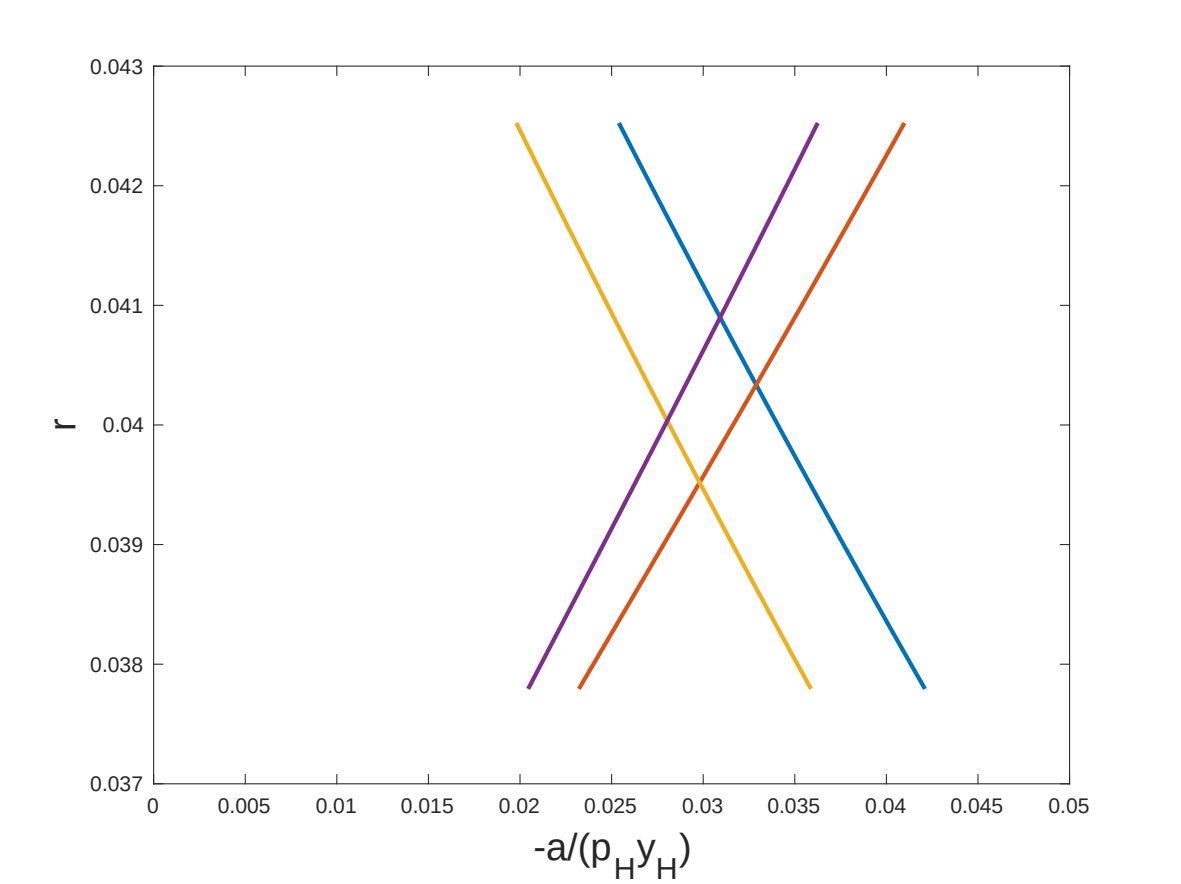
$$1 + r = \alpha \frac{p_H}{p} A k^{\alpha-1} + 1 - \delta$$

- Trade deficit $(g-r)(-a)$, ss with $g > r$

Savings equilibrium (continued)



Tariff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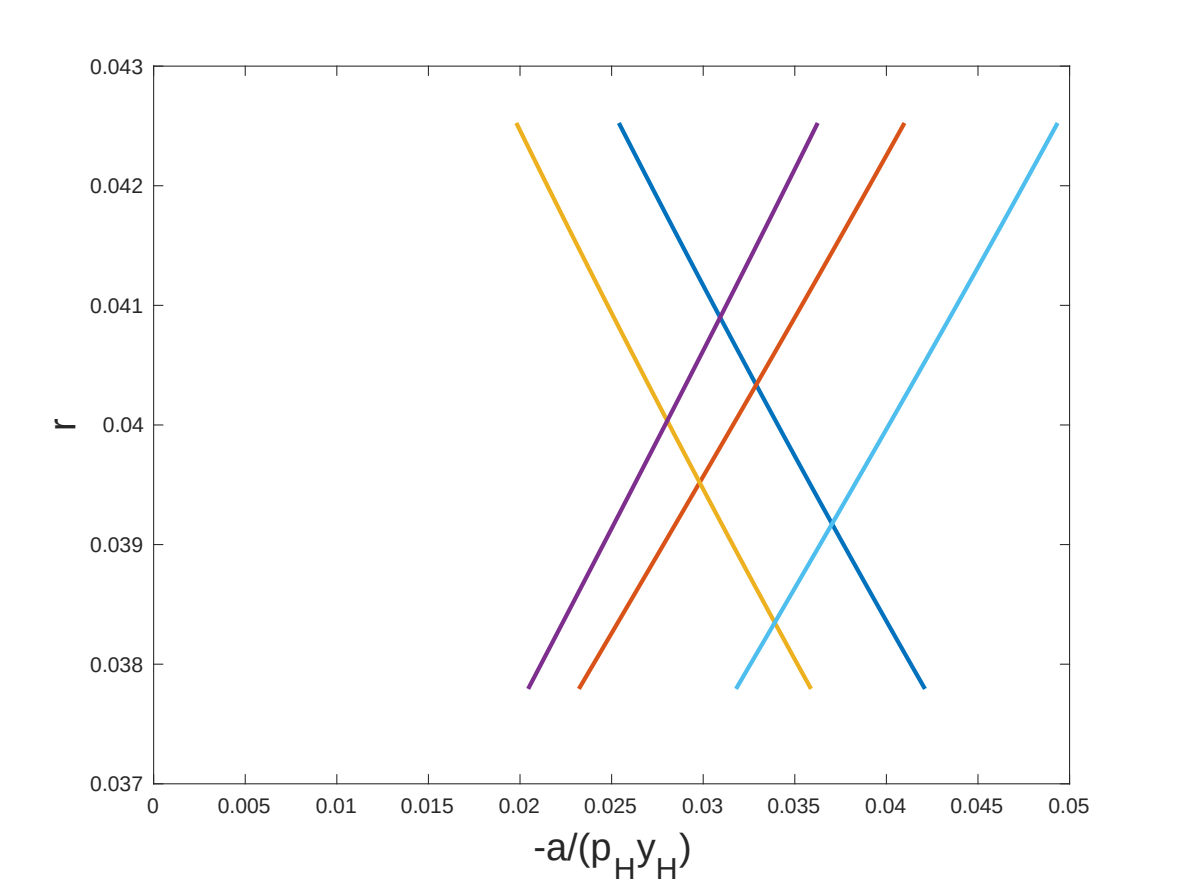
-a/(p_H y_H)

Trade war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Remarks

- Main channel: tariffs depress investment
- Depress natural rate
- Related to observation by Jeanne (2018): trade wars are bad at the ZLB

Conclusions

- Effects of tariffs/trade wars without the real rate effect
- Saving rate not affected
- Valuation effects and effects on investment more important
- Investment effects can depress natural rate