# On the Role of Financial Frictions and the Saving Rate during Trade Liberalizations

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# Introduction

- The process of globalization involves the integration of goods and financial markets of heterogeneous economies:
  - one central dimension of heterogeneity is financial development;
  - increasingly important role both in the macro and trade literatures.
- Rajan and Zingales (1998): financial underdevelopment affects different sectors differently.
  - differences in financial development can be determinants of comparative advantage.
- Our question: In such an environment with financial frictions, how do goods and financial markets integration interact?
- Approach: Dynamic $2 \times 2$ general-equilibrium model with cross-country variation in financial development and cross-sectoral variation in financial dependence.

# Findings

- Earlier work: in less financially developed economies, trade and capital mobility are *complements* (focused on implications for steady-state rental rate).
- Here: we study how financial frictions and the saving rate shape the long-run effects of trade liberalization on income, consumption and the distribution of wealth in financially underdeveloped economies.
- Key result: when financial frictions are important, the standard static gains from trade liberalization can be severely diluted over time in financially underdeveloped economies.
  - endogenous tightening of credit constraints.
- Steady state consumption and income may well be lower than those that would be attained without trade liberalization. More likely:
  - the higher is financial development (provided that it is below the average one in the world)
  - the higher is the saving rate (for economies with an open capital account).

# Related Literature

- One-Sector, Macro Models:
  - Gertler and Rogoff (1990), Boyd and Smith (1997), Shleifer and Wolfenzon (2002), Reinhart and Rogoff (2004), Kraay et al. (2005), **Caballero, Farhi and Gourinchas (2006)**, Aoki, Benigno and Kiyotaki (2007), and Mendoza, Quadrini and Rios-Rull (2007).
- Financial Development as a Source of Comparative Advantage:
  - Bardhan and Kletzer (1987), Rajan and Zingales (1998), Beck (2002), Matsuyama (2005), Wynne (2005), Ju and Wei (2006), and Manova (2007), **Antràs and Caballero (2009)**.
- Trade Liberalization and Credit Constraints: Chesnokova (2009).
- Second-best literature.

# Plan of the Talk

1. A Small-Open Economy with Financial Frictions
2. Trade Liberalization with a Closed Capital Account
3. Trade Liberalization with an Open Capital Account
4. Discussion

# A Small-Open Economy with Financial Frictions

- Time evolves continuously. Infinitesimal agents are born at a rate $\phi$ per unit of time and die at the same rate; population mass is constant and equal to $L$.
- All agents are endowed with one unit of labor services which they supply inelastically to the market.
- Intertemporal preferences are such that agents save all their income and consume only when they die.
- If $W_t$ denotes aggregate savings accumulated up to date $t$, then aggregate consumption at time $t$ is $\phi W_t$.
- The economy produces two goods (1 and 2) and agents consuming at time $t$ allocate their spending between these two consumption in a way that maximizes

$$U = \left(\frac{C_1}{\eta}\right)^{\eta} \left(\frac{C_2}{1-\eta}\right)^{1-\eta} \tag{1}$$

# Production

- Physical capital is the *only* store of value in the economy and is freely tradable within borders.
  - initial stock of capital is equal to $K_0$, that there is no depreciation.
- New physical capital can be produced by combining goods 1 and 2 according to the same utility aggregator in (1).
  - the relative price of capital $q_t$ is equal to the ideal price index, $q_t = (p_1)^{\eta} (p_2)^{1-\eta} = 1$ (hence, $W_t = K_t$).
- Production in both sectors combines physical capital and labor according to:

$$Y_i = Z (K_i)^{\alpha} (L_i)^{1-\alpha}, \quad i = 1, 2. \tag{2}$$

- Although technology is identical in both sectors, we think of production in sector 1 as being relatively more complex
  - only a fraction $\mu$ of the population knows how to operate that production technology (entrepeneurs)

# Factor Markets

- Goods and labor markets are perfectly competitive and factors of production are freely mobile across sectors.
- Key feature: the capital market has a friction and this friction has an asymmetric effect in the two sectors.
  - for simplicity, financial contracting in sector 2 is perfect (unlimited supply of capital at the equilibrium rental rate $\delta$);
  - when investing in sector 1, rentiers are willing to lend to entrepreneurs only an amount proportional to the wealth of entrepreneurs (sector 1 is more complex).
- Hence, capital invested by entrepreneur $i$ is

$$I^i \leq \theta K_t^i, \quad \text{for } \theta > 1. \tag{3}$$

- If $\theta$ is sufficiently large, (3) does not bind and entrepreneurs are able to allocate a fraction $\eta$ of economy's capital to sector 1 (first-best).
- For financial constraints to bind we need:

  Assumption 1: $\mu\theta < \eta$.

# Equilibrium

- Under A.1, financial constraint binds and allocation of capital to sector 1 is given by

$$K_{1,t} = \theta s_t K_t, \tag{4}$$

  where $s_t \equiv K_t^e / K_t$ is the share of wealth (and thus of the physical capital stock) in the hands of entrepreneurs.
- As long as financial constraints bind in world markets, this economy faces a relative price $\pi \equiv p_2 / p_1 < 1$.
- In order to characterize the dynamic path of this economy, note that aggregate savings of each group (entrepreneurs $e$ and rentiers $r$) evolve according to:

$$\dot{K}_t^e = -\phi s_t K_t + \mu w_t L + s_t R_t K_t, \tag{5}$$

$$\dot{K}_t^r = -\phi \left(1 - s_t\right) K_t + \left(1 - \mu\right) w_t L + \delta_t \left(1 - s_t\right) K_t. \tag{6}$$

- Notation: $w_t \equiv$ wage rate; $\delta_t \equiv$ rental rate; $R_t \equiv$ entrepreneurial return

# Equilibrium Factor Prices

- Equilibrium factor prices can in turn be obtained by
  1. equating the wage rate to the value of the marginal product of labor in each sector;
  2. imposing factor market clearing
  3. equating the value of the marginal product of capital in sector 1 and 2 to $\delta_t (\theta - 1)/\theta + R_t/\theta$ and $\delta_t$, respectively.
- Defining

$$\rho(s_t, \pi) \equiv (1 - \theta s_t)\, \pi^{1/\alpha} + \theta s_t < 1$$

we obtain yield:

$$\begin{aligned} w_t &= \frac{(1-\alpha) Z}{\pi^{1-\eta}} \left( \rho(s_t, \pi) \frac{K_t}{L} \right)^{\alpha} \\ \delta_t &= \alpha Z \pi^{1/\alpha + \eta - 1} \left( \rho(s_t, \pi) \frac{K_t}{L} \right)^{\alpha - 1} \\ R_t &= \left( 1 + \theta \left( \pi^{-1/\alpha} - 1 \right) \right) \delta_t. \end{aligned}$$

- Note: $w_t$ and $\delta_t$ increase in $\pi$, $R_t$ decreases in $\pi$.

# Dynamics and Steady State

- We can now express the dynamic path of $K_t$ and $s_t$ in terms of these two state variables and exogenous parameters:

$$\dot{K}_t = \frac{Z}{\pi^{1-\eta}} \left(\rho\left(s_t, \pi\right) K_t\right)^{\alpha} L^{1-\alpha} - \phi K_t$$

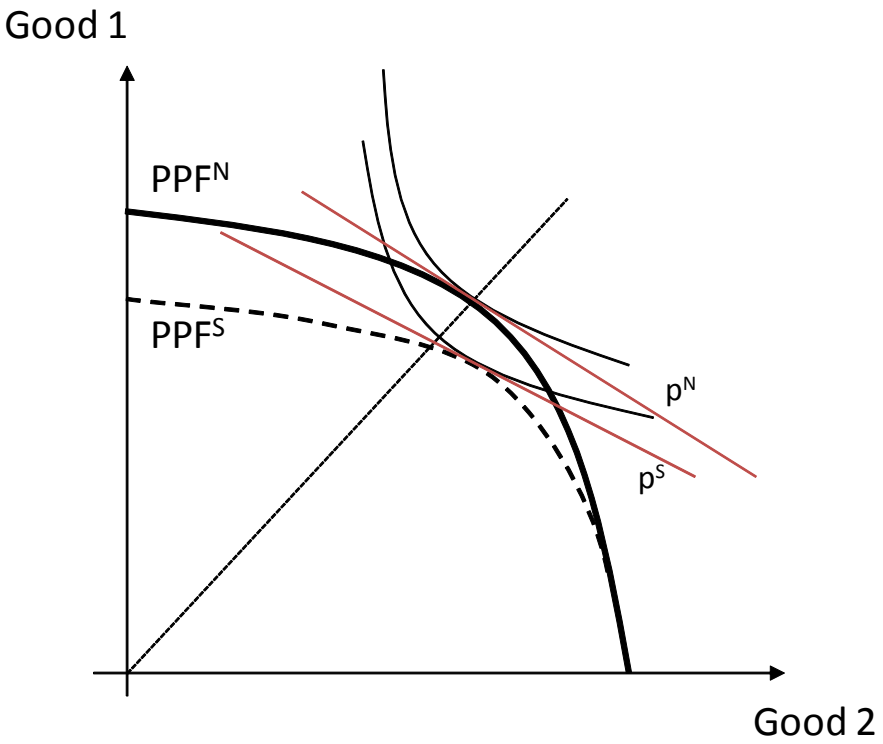
$$\begin{aligned} \dot{s}_t &= \frac{\left[\alpha\left(1-s_t\right)\left(1-\pi^{1/\alpha}\right)\theta s_t - \left(s_t-\mu\right)\left(1-\alpha\right)\rho\left(s_t,\pi\right)\right]}{\pi^{1-\eta}} \\ &\quad \times Z\left(\rho\left(s_t,\pi\right)\frac{K_t}{L}\right)^{\alpha-1}. \end{aligned}$$

- System is stable and converges to a unique steady state with associated factor prices:

$$\begin{aligned} w^* &= \left(1-\alpha\right)\phi\left(\frac{Z}{\phi}\frac{\left(\rho\left(s^*,\pi\right)\right)^{\alpha}}{\pi^{1-\eta}}\right)^{1/(1-\alpha)} \\ \delta^* &= \alpha\phi\frac{\pi^{1/\alpha}}{\rho\left(s^*,\pi\right)} \end{aligned}$$

# Trade Liberalization with a Closed Capital Account

- Suppose now that economy experiences an unexpected trade liberalization at $T > 0$.
- We think of this economy as being relatively financially underdeveloped:
  - trade will tend to increase the relative price of the economy's export sector, which is the less financially dependent sector 2. So $\pi$ goes up.



# Effect on Rental Rate

- In the dynamic version of **AC**, we emphasized the fact that trade liberalization increases the steady-state value of the rental rate of capital $\delta^*$.
- This is the result of two forces:

1. **Impact Effect:** $\delta^*$ increases with $\pi$ holding constant $s^*$. Trade integration allows South to further specialize in its comparative advantage sector, which is the sector without financial frictions (rentier capital works with more labor).
2. **Dynamic Effect:** Trade reduces the entrepreneurial return and hence $s_t$ gradually falls through time and settles at a steady state level that is decreasing in $\pi$.
    - Because $\delta_t$ is decreasing in $s_t$ this leads to further increases in the rental rate along the transition path.

# More on the Dynamic Effect

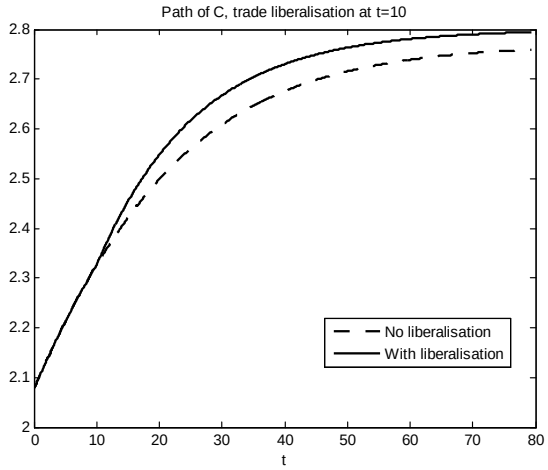
- Remember that this economy is inefficient because it is unable to allocate enough resources to the complex sector 1.
- By reducing the share of capital in the hands of entrepreneurs, trade liberalization aggravates this problem and may qualify the standard arguments in favor of trade liberalization.
- The increased misallocation of capital across sectors leads to a gradual decline in the wage rate ($w_t$ is increasing in $s_t$).
  - incidentally, this is why $\delta_t$ goes up along the transition $p_2 = \zeta \left(\delta_t\right)^{\alpha} \left(w_t\right)^{1-\alpha}$.
- This does not mean that steady-state wages are necessarily lower, since the impact effect is positive.

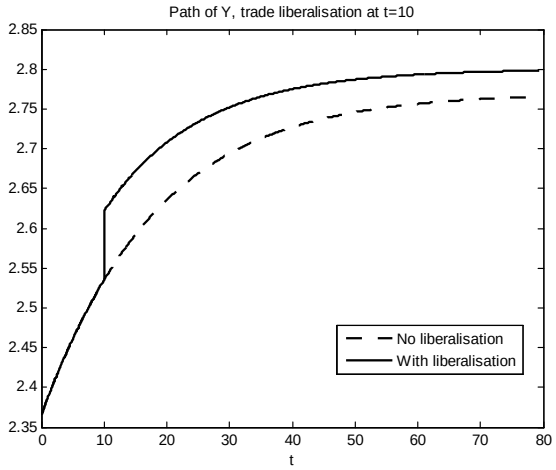
# Our First Key Result

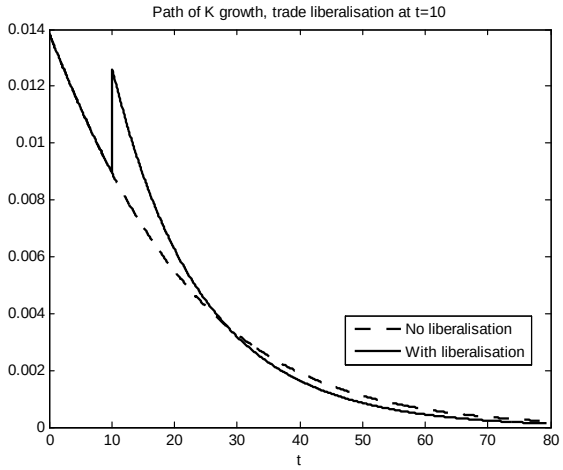
- The gradual tightening of credit conditions also gradually reduces the growth of consumption and income along the transitional path.
- **Proposition 1:** *Consider an economy with a level of financial development below the average world level ($\theta < \theta^W$). Then, there is a unique threshold $\tilde{\theta}$ such that if $\theta > \tilde{\theta}$, a trade liberalization reduces steady-state wages, consumption and output, while the converse is true for $\theta < \tilde{\theta}$.*
- Intuition:
  - static gains from trade are relatively lower for economies with $\theta$ closer to $\theta^W$;
  - tightening of financial constraints is more pronounced in economies that had less binding financial constraints to begin with.

# An Illustration

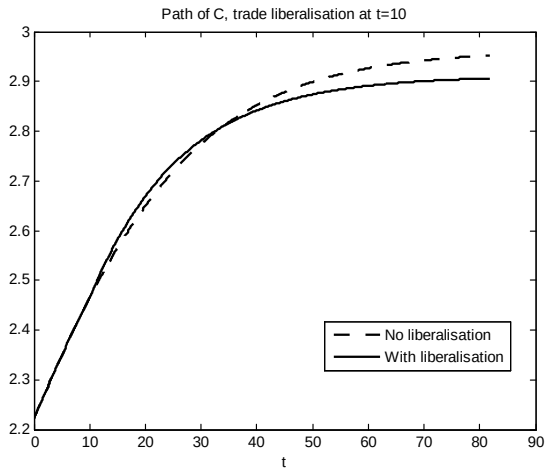
## A. Trade Liberalization for $\theta = 1.1$

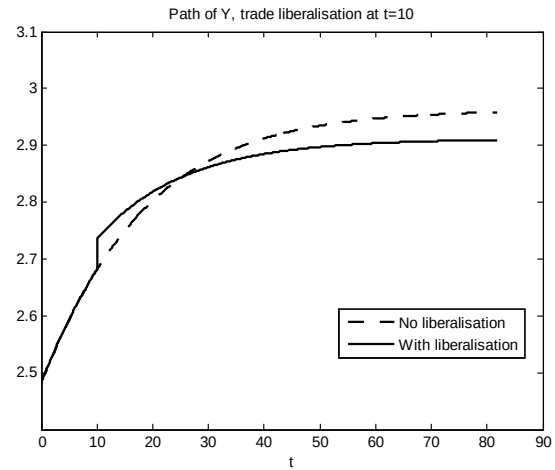


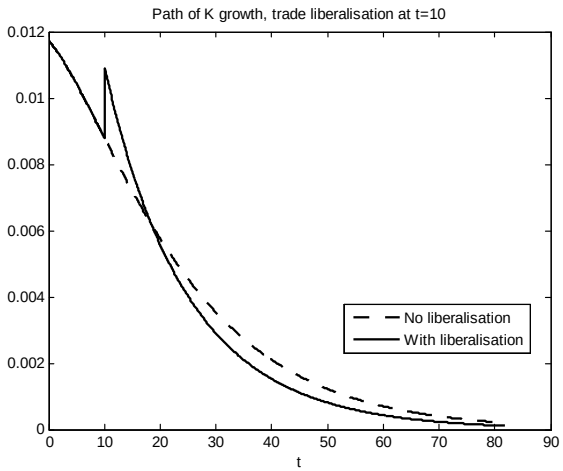




## B. Trade Liberalization for $\theta = 1.4$



# Trade Liberalization with an Open Capital Account

- So far small open economy is linked to the world economy only through the goods market.
- Consider now the case in which the country undergoes a trade liberalization while having an open capital account.
- Dynamics of the domestically owned capital stock $K_t$ and the share $s_t$ of this capital are analogous to those above, but the determination of factor prices is now quite different.
- The real rental rate will be pinned down by world markets (net capital inflows or outflows).
  - For simplicity, we assume that the world rental rate is time-invariant.
- Now the capital-labor ratio in sector 2 is pinned down by the world rental rate and time-invariant parameters $\Longrightarrow$ wage rate is also independent of local conditions (and time invariant):

$$w_t = \frac{1-\alpha}{\alpha}\left(\frac{\alpha Z \pi^{\eta}}{\delta^W}\right)^{1/(1-\alpha)} \delta^W.$$

# Factor Prices with an Open Capital Account

- A process of trade liberalization raises the wage rate, reduces the return to entrepreneurial capital, and leaves the rental rate of capital unchanged.
- Factor prices jump to their new level on impact and remain at that level thereafter.
- Furthermore, an increase in $\pi$ always increases aggregate income on impact (provided $\pi < \pi^W$).
- **But** the fact that factor prices remain constant after the trade liberalization episode **does not** imply that the economy does not feature interesting dynamics after the shock.
- Impact changes on factor prices affect aggregate income, the incentives of the economy to invest as well as the wealth accumulation paths of entrepreneurs and rentiers.
    - dynamics of $K_t$ and $s_t$ still very much affected, and credit constraints again become tighter ($s^*$ falls).

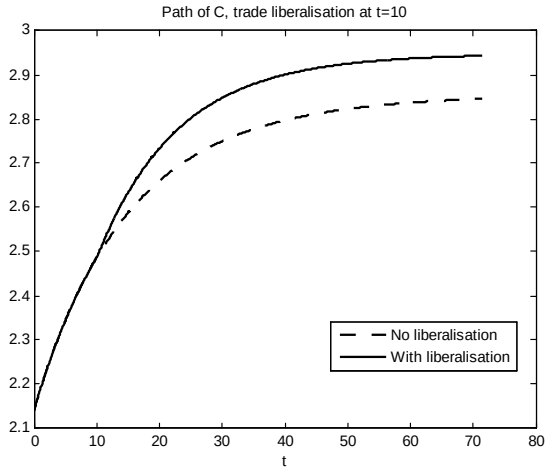
# Our Second Key Result

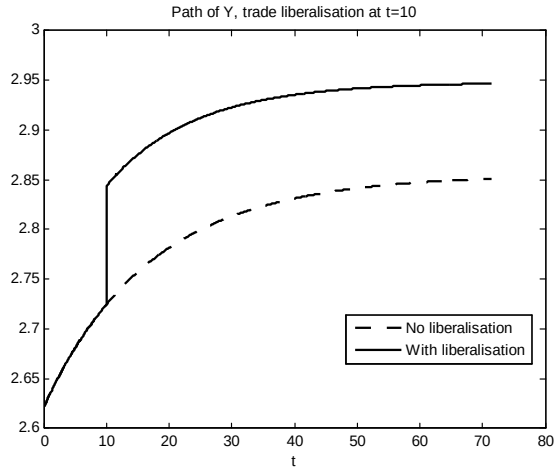
- **Proposition 2:** *Consider an economy with an autarky relative price $\pi$ below the world relative price. Then, there exist thresholds $\tilde{\theta}$ and $\tilde{\phi}$ such that that if $\theta > \tilde{\theta}$ or $\phi < \tilde{\phi}$, a trade liberalization reduces steady-state wages, consumption and output.*

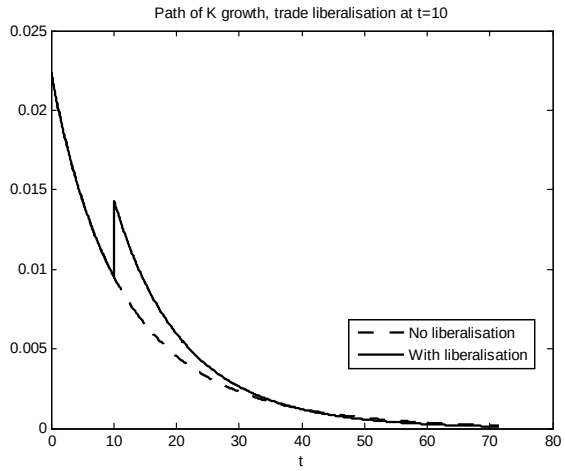
- So trade liberalization is more likely to reduce steady-state consumption and output, the higher is the level of financial development $\theta$ and the propensity to save $1 - \phi$.
- New Result: Economies with high saving rates (low levels of $\phi$) tend to accumulate higher levels of entrepreneurial capital income relative to labor income, and thus the negative effect of trade on the share $s^*$ is particularly harmful for those economies.
- Why does the saving rate matter with an open capital account but not with a closed capital account?
  - Distribution of wealth will be much more responsive to the savings rate in economies where factor prices are pinned down by int'l markets.

# An Illustration

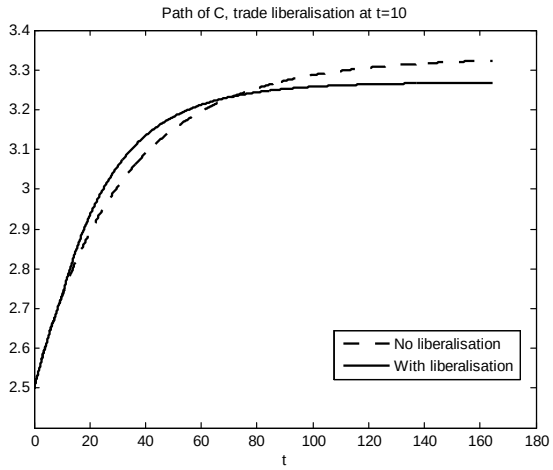
## A. Trade Liberalization for $\phi = 0.1$

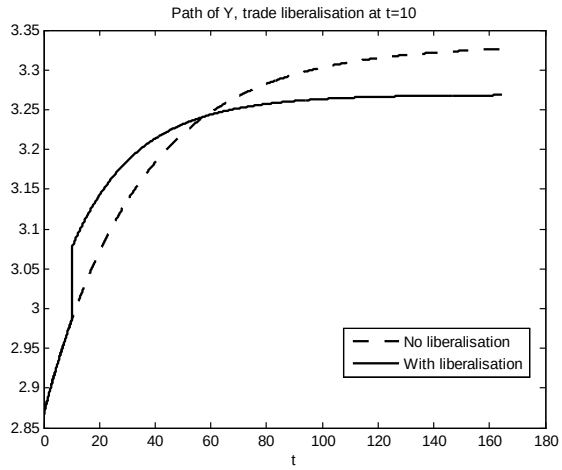


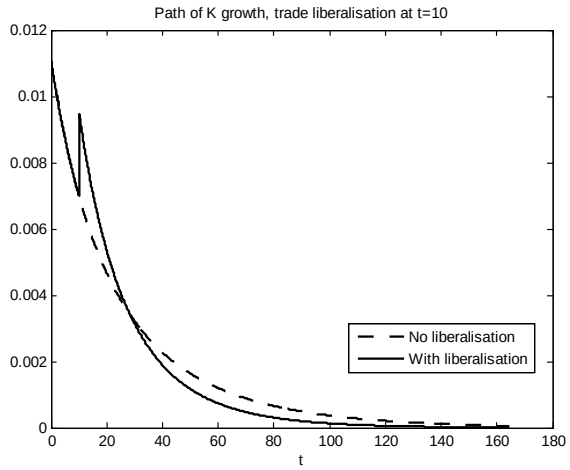




## B. Trade Liberalization for $\phi = 0.075$



# Discussion

- Some limitations of the analysis:

1. Some results may be sensitive to the way we have modeled financial constraints.
   - in our model trade opening tightens credit constraints by reducing wealth inequality, but alternative frameworks might predict a negative link between wealth inequality and financial frictions (see Banerjee and Duflo, 2003).
2. Our result regarding the role of the saving rate is derived from a particularly stylized modelling of intertemporal substitution in consumption, and also seems to be particularly tied to the propensity to save of entrepreneurs.
   - lack of intertemporal substitution complicates welfare analysis.

- Future research should shed light on the robustness of our results in richer and more realistic frameworks.