Anti-Globalization Cycles

Qu-Toan Do (World Bank)
Andrei Levchenko (U. of Michigan, CEPR, NBER)
Lin Ma (National University Singapore)

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Context

- Backlash against globalization in Western countries
  - Brexit
  - U.S. election of Donald Trump
  - Continental Europe elections (Italy...)
- Political consequences of globalization
  - Distributional impact of globalization long acknowledged (Goldberg 2015)
  - Little research on political implications of trade creating winners and losers.

Our Paper

- Dynamic OLG model with technological diffusion and labor market frictions
- Endogenous trade policy determined through voting (median voter)

Main result

- Over a worker's life-cycle, support for free trade declines (until retirement);
  - b/c older workers/sectors face more competition from the South.
- All three steady states are possible:
  - Trade steady state
  - Autarky steady state
  - Cycles between trade and autarky
    - Cycles are likely to occur when the rate of technology diffusion is high during trade.
- "Globalization tax" is possible, but might be too costly.

Literature

- **political economy of trade.** Mayer (1984), Rodrik (1998), Mayda and Rodrik (2005), Davidson et al. (2007), Lake and Millet (2016), Blanchard and Willmann (2011, 2018).
- **innovation and diffusion.** Krugman(1979), Eaton and Kortum (1996), Cai et al. (2017)

Ingredients of the model

- Two countries (North and South)
- Innovation and technology diffusion (Krugman, 1979; Eaton and Kortum 1996), with higher diffusion rates under trade (Alvarez et al. 2013; Buera and Oberfield 2016; Cai et al. 2017)
- Barriers to occupational/sectoral mobility creates losers and winners from trade (Jones 1971; Feliciano 2001; Attanasio et al. 2004; Topalova 2010; Dix-Carneiro 2014)
- OLG model and trade policy (Trade vs. Autarky) determined by median voter

Intuition

In each period, the median voter in the North faces the tradeoff between:

- Gains from trade
- Competition from the South

Both are history-dependent:

- Gains from trade increase with technology diffusion
- Competition from South increases with technology diffusion

Steady-states:

- steady states depending on parameter values
  - always-trade steady state
  - always-autarky steady state
  - cycles

Outline

1. Model
    1. OLG model of trade with technology diffusion
2. Analytic results
3. Calibration
    1. Phase diagram
    2. Tax simulations
4. Extensions

Model

Two-country trade model

- Two countries: North and South
- Countries populated with n overlapping generations of workers
- Time discrete t
- Trade policy at time t denoted $\gamma(t) \in \{A, T\}$

Products, and Innovation

- Continuum of products, monopolistic-competition.
- Products available for production at time t in North: $[\underline{x}_t; \bar{x}_t]$
  - new products with measure λ_t arrive exogenously in the North
  - knowledge frontier: $\bar{x}_t = \bar{x}_{t-1} + \lambda_t$
  - product obsolescence: $\underline{x}_t = \bar{x}_{t-n}$

Technology Diffusion

- The South does not innovate, but learns from the North.
  - Each product faces a per-period rate of diffusion, θ_t.
  - θ_t depends on the trade policy: $\theta_t = \{\theta_T, \theta_A\}$.
  - Fraction of sector-s products leaked to the South in period t: $\rho(t, s)$

$$\begin{aligned} \rho(t,t) &= \theta_t \\ \rho(t,t-1) &= \theta_{t-1} + (1-\theta_{t-1}) \cdot \theta_t \\ 1-\rho(t,s) &= \prod_{i=s}^{t} (1-\theta_i) \end{aligned}$$

- Once the South learns a product, it engages in Bertrand competition with the Northern firm that produces the same product.

Consumer preference, production, and labor markets

- CES consumption aggregate:

$$U_i = \left(\int_{x \in \Xi_i} q_i(x)^{\frac{\epsilon-1}{\epsilon}} dx \right)^{\frac{\epsilon}{\epsilon-1}}$$

- Production only requires labor. Labor market friction for cohort z working in sector s:

$$h(z,s) = \begin{cases} \delta^{s-z} \bar{h}, & s > z; \\ \bar{h}, & s \leq z. \end{cases}$$

  - Baseline model: $\delta = 0$, no forward switching.

Workers: Timeline

- Labor supply:
  - period-t cohort of size ℓ_t in the North: $L_t^N = \sum \ell_t$
  - L_t^S in the South
- In period t:
  - new workers (ℓ_t) and new products (λ_t) arrive.
  - all Northern workers observe the past policy history, $c_{t-1} = \{\gamma_{t-1}, \gamma_{t-2}, \cdots\}$, and cast votes for the current policy.
  - trade policy determined by majority voting, $\gamma_t = \{T, A\}$.
  - technology diffuses conditional on γ_t.
  - employment, production, consumption...

Analytic Results

Economic equilibrium: autarky

- Labor market clearing in period t, sector z:

$$\ell_z \bar{h} = \lambda_z q^A(t,z)$$

  - $q^A(t,z)$ is the demand of a representative firm.
- Real wage:

$$\frac{w^A(t,z)}{P_t^A} = \left(\frac{\lambda_z}{\bar{h}\cdot\ell_z}\right)^{\frac{1}{\epsilon}} \left(\frac{X_t^A}{P_t^A}\right)^{\frac{1}{\epsilon}} \left(\frac{\epsilon-1}{\epsilon}\right)$$

- Aggregate output:

$$\frac{X_t^A}{P_t^A} = \bar{h}\left[\sum_{z=t-(n-1)}^{t} \left(\lambda_z^{\frac{1}{\epsilon-1}}\ell_z\right)^{\frac{\epsilon-1}{\epsilon}}\right]^{\frac{1}{\epsilon}}$$

Economic equilibrium: trade

- Demand:

$$q^T(t,z) = \left[\frac{X_t^T}{(P_t^T)^{1-\epsilon}} + \frac{X_t^S}{(P_t^S)^{1-\epsilon}}\right] p(t,z)^{-\epsilon}$$

- If technology to produce a good is "diffused", it is produced in the South: labor market clearing

$$\ell_z \bar{h} = [1 - \rho(t,z)]\lambda_z q^T(t,z)$$

Real wages under trade

- Real wage in sector z:

$$\frac{w^T(t,z)}{P_t^T} = \left[\frac{[1-\rho(t,z)]\lambda_z}{\ell_z \bar{h}}\right]^{\frac{1}{\epsilon}} \left(\frac{X_t^T + X_t^S}{P_t^T}\right)^{\frac{1}{\epsilon}} \frac{\epsilon - 1}{\epsilon}$$

- aggregate output:

$$\frac{X_t^T + X_t^S}{P_t^T}$$

$$= \bar{h}\left\{\left[\sum_{z=t-(n-1)}^{t} \rho(t,z)\lambda_z\right]^{\frac{1}{\epsilon}} (L_t^S)^{\frac{\epsilon-1}{\epsilon}} + \left[\sum_{z=t-(n-1)}^{t} [(1-\rho(t,z))\lambda_z]^{\frac{1}{\epsilon}} \ell_z^{\frac{\epsilon-1}{\epsilon}}\right]\right\}^{\frac{\epsilon}{\epsilon-1}}$$

Political economy: the myopic voter

- Result 1: If the voter in cohort z is myopic, then he prefers trade if and only if:

$$\underbrace{1-\rho(t,z)}_{\text{survival rate}} \geq \underbrace{\left[\frac{\left(\frac{X_t^T+X_t^S}{P_t^T}\right)}{\left(\frac{X_t^A}{P_t^A}\right)}\right]^{-1}}_{(\text{gains from trade})^{-1}}$$

- Corollary 1: Support for trade monotonically decrease with age, and therefore the median voter is in the median cohort.
  - with reasonable population growth rates, $z^* = n/2$.

Dynamics

Median voter choice: votes for trade if and only if

$$1-\rho(t,z) \geq \left\{ \frac{\frac{1}{n}\sum \lambda_i^{\frac{1}{\epsilon}} \ell_i^{\frac{\epsilon-1}{\epsilon}}}{\left[\frac{1}{n}\sum \rho(t,i)\lambda_i\right]^{\frac{1}{\epsilon}} \left(\frac{1}{n}L_t^S\right)^{\frac{\epsilon-1}{\epsilon}} + \frac{1}{n}\sum [(1-\rho(t,i))\lambda_i]^{\frac{1}{\epsilon}} \ell_i^{\frac{\epsilon-1}{\epsilon}}} \right\}^{\frac{\epsilon}{\epsilon-1}}$$

- Median voter law of motion:

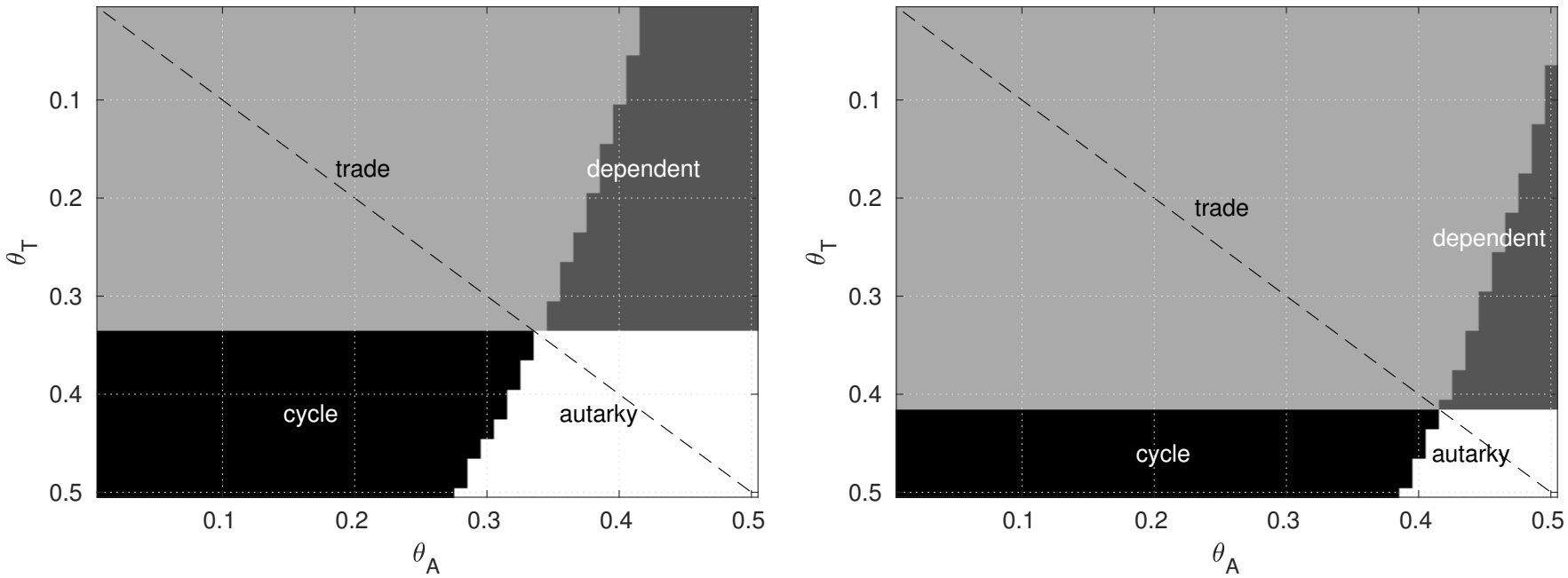
$$\rho(t+1,z+1) = \frac{1-\theta_{t+1}}{1-\theta_z}\rho(t,z)$$

- Gains from trade: for large n, impact of a one-period trade policy second order.

Calibration

- Population and GDP data from *Penn World Table 9.0*, between 1984 and 2014.
- Life span from 25 to 65 years; $n = 7$ implies each period is roughly $40/7 \approx 5.7$ years.
- Average population size of U.S. and China implies $L_s = 4.45$.
- Annual population growth rate in the U.S. (1.009%) and China (0.851%):
  - implied $g_\ell = 1.01009^{5.7} - 1 \approx 0.05908$;
  - implied $g_s = 1.00851^{5.7} - 1 \approx 0.04964$.
- Annual per capita GDP growth rate in the U.S.(1.73%):
  - implied $g_\lambda = 1.0173^{5.7} - 1 \approx 0.1032$.

Phase diagram



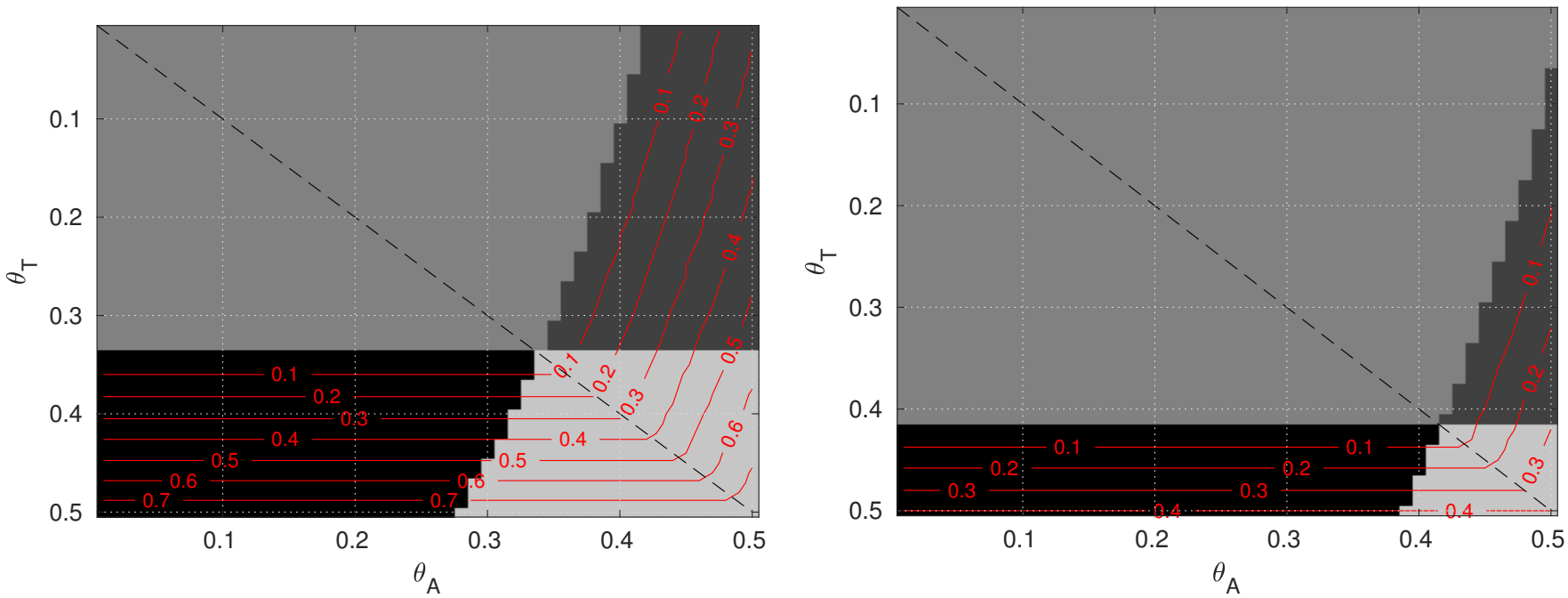
(a) $L_s = 4.45$ (b) $L_s = 8.0$

Figure 1: Diffusion Rates in Trade v.s. Autarky

Policy simulations

- What is the tax policy that would lead to the always-trade steady state?
- Starting point, a "globalization tax", a uniform income tax imposed if and only if the policy is "trade". Tax revenue rebated equally to everyone.
  - Young workers who benefit from trade also earn higher wage, therefore pay more tax.
  - The "globalization tax" with rebate is a transfer payment from the young to the old.
  - An uniform income tax independent of policy also works, but the tax rates need to be much higher to sustain trade.

Minimum globalization tax to sustain trade



(a) $L_s = 4.45$ (b) $L_s = 8.0$

Figure 2: Minimum tax

Extensions

Inter-sectoral mobility

- Labor is allowed to move across sectors with productivity penalty:

$$h(z,s) = \begin{cases} \delta^{s-z}\bar{h}, & s > z; \\ \bar{h}, & s \leq z. \end{cases}$$

- Equilibrium defined
  - optimal occupational choice
  - labor market clearing
  - $M_t(z,s)$: fraction of workers from cohort z employed in sector s in period t.

Equilibrium with inter-sectoral mobility

- Result 1: wages in newer sectors are (weakly) higher
- Result 2: $M(s,s) > 0$: there are always workers of cohort s working in sectors "born" that year too
- Corollary: All workers of the same cohort have the same preference for Trade vs. Autarky

Summary

- Political economy model plugged into a model of trade with technology diffusion and labor market frictions.
- Calibration to look at alternative redistribution instruments.