27th Annual DNB Research Conference

The Macroeconomic Effects of Geopolitical Uncertainty

DeNederlandscheBank

EUROSYSTEEM

Dynamic Effects of Industrial Policies Amidst Geoeconomic Tensions

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The views expressed here do not necessarily reflect the position of Bank of Lithuania or Eurosystem

Roadmap

Question

- What are the dynamic and distributional effects of the recent wave of protectionist policy measures?

Motivation

- U.S./China trade war (2018–) as policy motivation:
  - Rising import tariffs, Show
  - Barriers to global value chains, Show
  - Subsidies for production & development (e.g. CHIPS Act). Show

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  - Rising inequality and anti-globalist sentiment.

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- Why study distribution?
  - Rising inequality and anti-globalist sentiment.
- Why study dynamics?
  - Policymaker myopia.

What We Do

- Develop a dynamic two country model of firm heterogeneity.
  - Offshoring and export choices,
  - Policies: tariffs, offshoring friction, production subsidy & entry subsidy.

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  - Offshoring and export choices,
  - Policies: tariffs, offshoring friction, production subsidy & entry subsidy.
- Solve for transition after 1% shock to each instrument.
- Quantify welfare & (wage) inequality effects of unilateral episodes.
  - Myopia: calculate welfare using subset of transition path.

Preview of Results

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- High-low skill premium
  - Lowered domestically by all instruments.
  - Increased abroad by all instruments.
- Myopia
  - Short-sighted policy makers choose production subsidies.
  - More forward-looking choose tariffs.
  - Gives a race to the bottom though.

Intuition

- Love of variety in consumption.
- Investment in new firms takes time.
- Trade-off: short-run consumption versus more varieties in the long-run.

Roadmap

Setup

- Two countries: North (N) and South (S).
- High-skilled (H) and low-skilled (L) labour are inputs to production.
  - Supplied inelastically.
  - Differential endowments across N and S.

Setup

- Dynamics with discrete time $t \in \{0, 1, 2, ...\}$.
- Three agents: households, firms, government.
- Two-way offshoring with trade in tasks.

Households

- Objective at time t

$$U_t = E_t \sum_{s=t}^{\infty} \underbrace{\beta^{s-t}}_{\text{Discount factor}} \frac{\overbrace{C_s^{1-\gamma}}^{\text{Period utility from consumption}}}{1-\gamma}$$

with CRRA parameter γ.

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- Demand aggregator

$$C_t^{\frac{\theta-1}{\theta}} = \underbrace{\int_{\omega_D} c_{D,t}(\omega)^{\frac{\theta-1}{\theta}} d\omega}_{\text{Domestic firms}} + \underbrace{\int_{\omega_V} c_{V,t}(\omega)^{\frac{\theta-1}{\theta}} d\omega}_{\text{Offshoring firms}} + \underbrace{\int_{\omega_X^*} c_{X,t}^*(\omega)^{\frac{\theta-1}{\theta}} d\omega}_{\text{Southern exporting firms}}$$

Households

- Budget constraint

$$\overbrace{C_t}^{\text{Consumption}} + \overbrace{\Big(\underbrace{N_t + N_{E,t}}_{\text{Incumbent \& entrant mass}}\Big)\ \underbrace{\tilde{v}_t}_{\text{Exp. value}}\ \underbrace{x_{t+1}}_{\#\text{ shares}}}^{\text{Savings in firm equity}} + \overbrace{B_{t+1}}^{\text{Savings bonds}}$$

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$$= \underbrace{(\tilde{v}_t + \overbrace{\tilde{d}_t}^{\text{Dividends}})N_t x_t}_{\text{Payout firm equity}} + \underbrace{(1+r_t)B_t}_{\text{Payout bonds}}$$

$$+ \underbrace{w_{h,t}H}_{\text{High skilled earnings}} + \underbrace{w_{l,t}L}_{\text{Low skilled earnings}} + \underbrace{T_t}_{\text{Governmet transfers}}$$

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- Solution is Euler equations and variety demand. Solution

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  - Once and for all z.

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- Pay sunk cost f_E and draw productivity z from Pareto on $[z_m, \infty)$.
  - Once and for all z.
- Choice of status:
  - Domestic (D),
  - Offshorer (V) with fixed cost f_V,
  - Exporter (X) with fixed cost f_X.
- Exogenous death rate $\delta \in [0, 1]$.

Firms

- Production requires two tasks

$$y_t = \underbrace{[y_{h,t}]^{\alpha}}_{\text{High skilled}} \overbrace{[y_{l,t}]^{1-\alpha}}^{\text{Low skilled}}$$

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$$y_t = \underbrace{[y_{h,t}]^{\alpha}}_{\text{High skilled}} \overbrace{[y_{l,t}]^{1-\alpha}}^{\text{Low skilled}}$$

- If both tasks completed domestically

$$y_{\ell,t} = z \underbrace{Z_t}_{\text{North agg. TFP}} \overbrace{\ell_t}^{\text{Hired skill } \ell \text{ labour}}$$

for $\ell \in \{L, H\}$.

Firms

- Northern firms can offshore the low-skilled task

$$y_{l,t} = z \underbrace{Z_t^*}_{\text{Southern agg. TFP}} \overbrace{l_t^*}^{\text{Hired skill } L \text{ labour}} .$$

- Southern firms can similarly offshore the high-skilled task.

Roadmap

Firms

- Firms' choices functions of their state vector

$$(z, A_t)$$

where A_t is the aggregate state:

Firms

- Firms' choices functions of their state vector

$$(z, A_t)$$

where A_t is the aggregate state:

  - Household problem variables,
  - Policy instruments,
  - TFP processes.

Firms

- Discrete choice of status (s_t, s_t^*) contingent on state (z, A_t)

Service North as domestic (D) or offshorer (V)?

$$\max_{s_t \in \{D,V\}} \overbrace{\{d_{D,t}(z, A_t),\ d_{V,t}(z, A_t)\}}$$

where $d_{\hat{s},t}(z, A_t)$ is dividends for status $\hat{s} \in \{D, V, X\}$.

Firms

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$$\max_{s_t \in \{D,V\}} \overbrace{\{d_{D,t}(z, A_t),\ d_{V,t}(z, A_t)\}}^{\text{Service North as domestic } (D) \text{ or offshorer } (V)?} + \underbrace{\max_{s_t^* \in \{0,1\}} \{d_{X,t}(z, A_t),\ 0\}}_{\text{Export to South or not?}}$$

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Firms

- General form of dividends for $\hat{s} \in \{D, V, X\}$

$$d_{\hat{s},t}(z, A_t) = \Big[\underbrace{\rho_{\hat{s},t}(z, A_t)}_{\text{Real price}} - \underbrace{c_{\hat{s},t}(z, A_t)}_{\text{Marginal cost}}\Big] \underbrace{y_{\hat{s},t}(z, A_t)}_{\text{Demand}} - \underbrace{f_{\hat{s}}(z, A_t)}_{\text{Fixed cost}}$$

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- Where do the policy instruments feature?
  - Production subsidy: $c_{D,t}(z, A_t)$.
  - Import tariff: $y_{X,t}(z, A_t)$.

Show

Equilibrium Definition

- Equilibrium is defined such that
  - All agents are optimising,
  - All markets are clearing,
  - Free entry condition holds, Show
  - Government budget constraint holds, Show
  - Balance of payments condition holds. Show

Roadmap

Internally Calibrated Parammeters

Parameter	Meaning	Moment	Target
f_V	Fixed cost of offshoring in North	0.3%	Fraction of offshoring firms N
f_X	Fixed cost of exporting in North	10%	Fraction of exporting firms N
f_V^*	Fixed cost of offshoring in South	0.3%	Fraction of offshoring firms S
f_X^*	Fixed cost of exporting in South	10%	Fraction of exporting firms S

Externally calibrated parameters

Roadmap

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- 1% shocks to all policy instruments.
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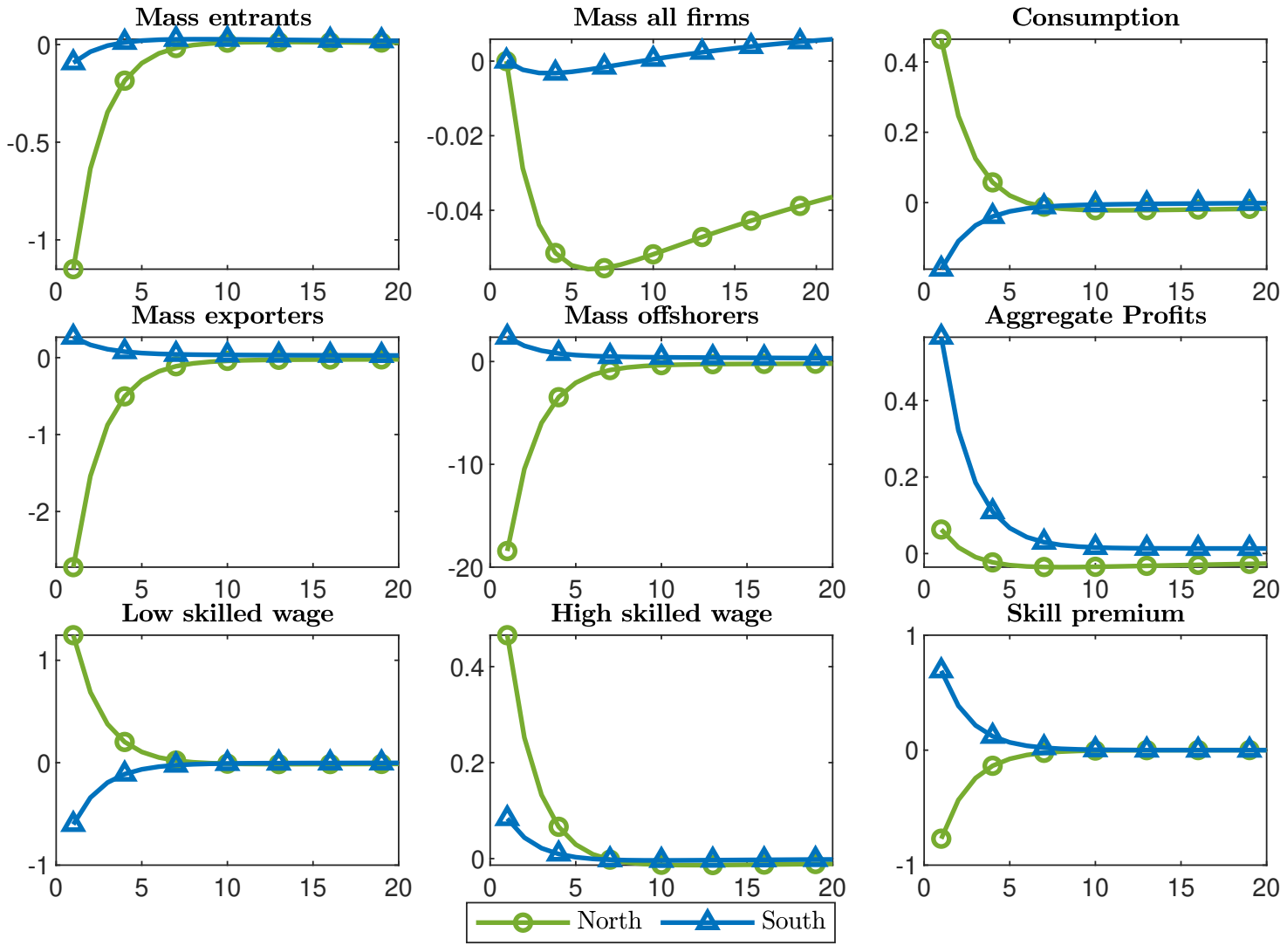
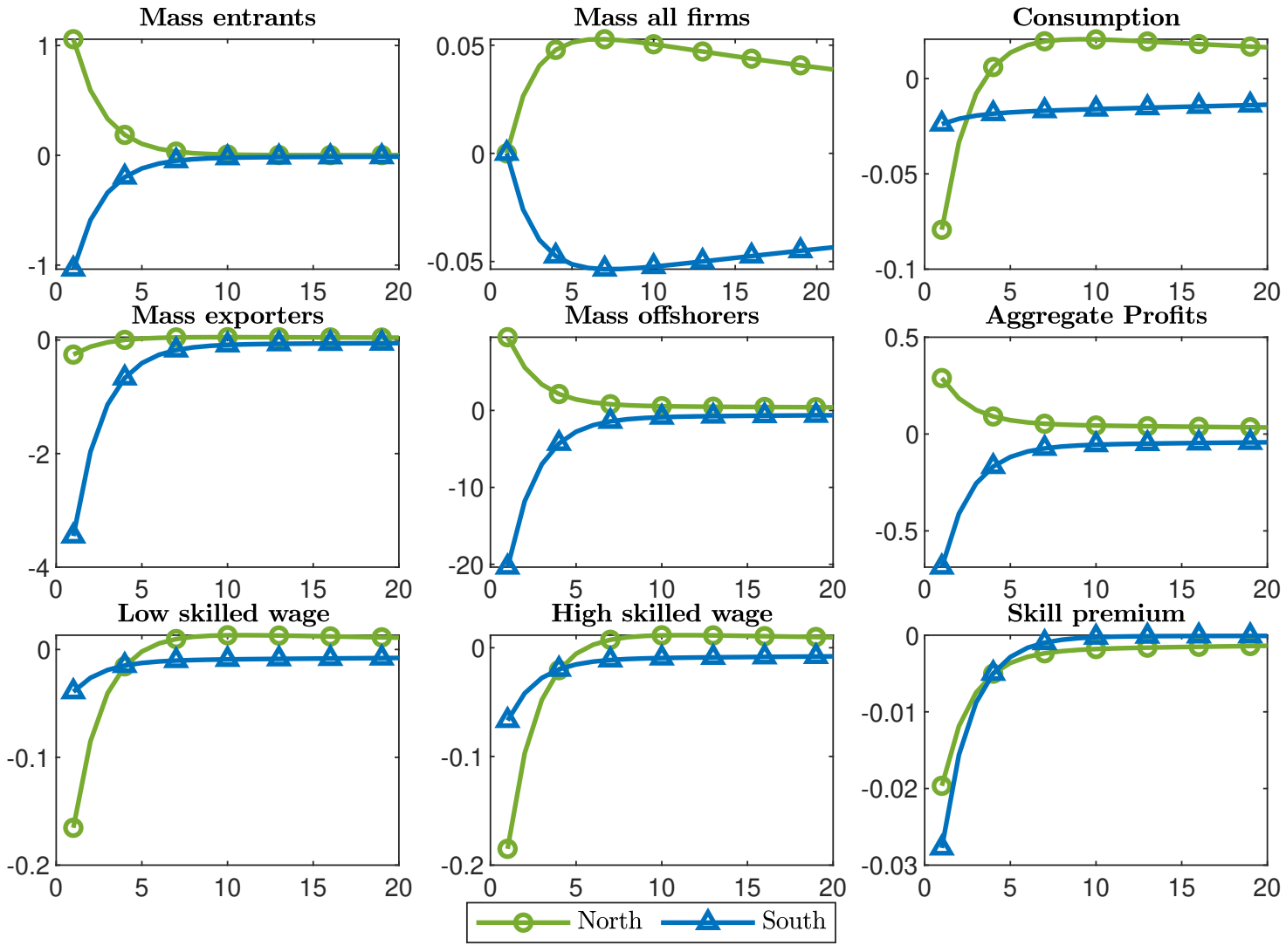
- Will focus on the production subsidy and tariff.
- Welfare in consumption equivalents.
- Welfare policy horizons: 1 year, 4 years, full transition path.

North Production Subsidy



North Tariff



Welfare

One year horizon ($T = 4$)

		South		
		—	τ^{IM*}	s_D^*
North	—	(0.00, 0.00)	(-0.02, -0.06)	(-0.06, 0.23)
	τ^{IM}	(-0.03, -0.02)	(-0.05, -0.08)	(-0.09, 0.21)
	s_D	(0.23, -0.10)	(0.20, -0.16)	(0.17, 0.13)

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Four year horizon ($T = 16$)

North \ South	—	τ^{IM*}	s_D^*
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τ^{IM}	(0.01, -0.02)	(-0.01, -0.01)	(-0.01, -0.03)
s_D	(0.05, -0.03)	(0.03, -0.03)	(0.03, 0.01)

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Infinite horizon ($T \to \infty$)

		South		
		—	τ^{IM*}	s_D^*
North	—	(0.00, 0.00)	(-0.01, 0.01)	(-0.00, 0.00)
	τ^{IM}	(0.01, -0.01)	(-0.00, 0.00)	(0.00, -0.01)
	s_D	(0.00, -0.00)	(-0.00, 0.00)	(0.00, -0.01)

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- Myopic policymakers subsidise domestic production.
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- Protectionism lowers skill premium for levying country; raises for other.