How Do Firms Adjust When Trade Stops?

P. Lastauskas, A Proskute and A. Zaldokas

Discussion by:
Alessandro Ruggieri (U. of Nottingham)

"Adjustments in and to an Uncertain World" Conference

September 24, 2020

Research questions

- How do firms cope with trade shocks? How do firms adjust labor and capital to drop in foreign demand?

Motivation

- Russia's ban of agricultural, food products and raw material imports from EU and US in August 2014
  - political tensions between Russia and EU about Ukraine conflict
  - retaliation after non-trade (financial) sanctions imposed against Russia in February 2014

- Lithuanian firms largely exposed to Russian restrictions
  - Lithuanian exports make 80% of its GDP
  - 20% of Lithuanian exports were directed to Russia
  - 18% of exports to Russia contained banned product

Firm-level exports dynamics to Russia
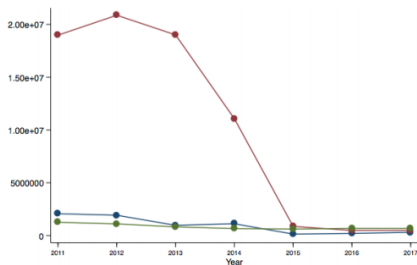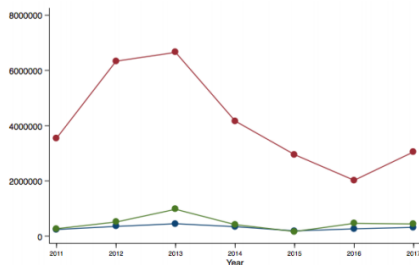
Food manufacturing firms   Food wholesale firms

Notes: Red lines represents firms with high pre-2013 exposure to Russia (with exports over 10% of revenues). Blue line is for low pre-2013 exposure (with exports less than 2% of revenues). Green line is industry average.

Theoretical contributions

- Partial equilibrium model of production and factor adjustment:
    - Three inputs: capital, full-time and and part-time employment
    - Different degree of production substitutability of inputs:
        - Flexible substitutability of full-time labor and capital
        - Unitary substitutability of part-time labor with other factors
    - Different adjustments of inputs:
        - No adjustment costs for part-time workers
        - Convex adjustment costs for capital
        - Non-convex adjustment costs for full-time workers

- Major predictions:
    - Part-time labor is adjusted first after demand shock
    - If shock is large and persistent, capital starts to be adjusted
    - If disinvestment followed by drop in full-time labor, then smaller adjustment is needed under inputs substitutability and larger under complementarity.

Production function estimation (static):

$$Q = [\psi K^{\gamma} + (1 - \psi)L_f^{\gamma}]^{\frac{\phi}{\gamma}} L_p^{1-\phi}$$

- Interior solution for part-time labor uncovers production share, $1 - \phi$
- Given ϕ, linearize the production function to estimate:
    - share of capital in production, ψ
    - elasticity of substituting between full-time labor and capital, γ

Reduced form firm-level diff-in-diff estimation:

$$\Delta Y_{it} = \sum_{j \in \{2014, 2016\}} \beta_j \times \text{Banned export share}_{it} \times \text{Post-j}_t + \gamma_i + \tau_t + \epsilon_{it}$$

- $\Delta Y_{it} =$ difference in adjustment margin Y_{it} between treated (exposed exported) and control firms (non-exposed exporter in the same sector similar in size)
- Banned export share$_{it} =$ fractions of exposed firm's-i sales banned

Dataset

- Sample: whole population of Lithuanian firms in Food manufacturing and Food wholesale industries, 2011-2017

- Information: firm balance sheet, income statement, employment characteristics, trade values by 8-digit HS products and destination (source) country exports (imports)

Findings

- Immediate large drop (increase) in P-T employees and investment for Food manufacturing (wholesale) firms

- Long run drop in F-T employees (only) for Food manufacturing firms

- Immediate increase in the number of new export destinations

Capital adjustment costs

- *Assumption:* **convex** adjustment cost (Cooper and Haltiwanger, 2005)

$$\Phi^K(K_{it}, I_{it}) = \frac{\phi_i^K}{2} \left(\frac{I_{it}}{K_{it}} - \delta \right)^2 K_{it}$$

- *Implication:* **smooth** investment adjustment to drop in demand

$$\underbrace{q_{it}}_{\text{Tobin's q}} = 1 + \underbrace{\phi_i^K \left(\frac{I_{it}}{K_{it}} - \delta \right)}_{\text{marginal cost}}$$

Lantieri, Medina and Tan (2020)

- investment response of Peruvian manufacturing firms to import competition from China
  - increases the investment **inaction region** in the short run
    - a one-st.dev. shock increases inaction region from by $\approx 6\%$
  - effect driven by:
    - decrease in the positive investment region
    - firms with low depreciation rates

Full- and part-time employment

- Full- and part-time employment composed by different types of
  workers:

Part-time workers by gender and education, %

	Overall	≤ H.S.	H.S.	Some College	College
Men, 25+	6.1	6	5.9	6.7	5.9
Women, 25+	16.7	21.0	18.6	17.9	14.3

- Is the distinction between full- and part-time labor intended to capture
  differences in skills?

Full- and part-time employment

Option 1: F-T and P-T labor as proxy for high- and low-skill labor

- Is there better information in the dataset to capture differences in skills?
  - College versus non-college workers
  - Production versus non-production workers

- Is there any evidence about differences in adjustment costs between low-skill and high-skill workers?
  - lower recruitment or screening costs for workers allocated to low-skill tasks?

Full- and part-time employment

Option 2: F-T and P-T labor intended to capture differences in hours arrangement

- The model is developed using the following production function:

$$Q = [\psi K^\gamma + (1 - \psi) L_f^\gamma]^{\frac{\phi}{\gamma}} L_p^{1-\phi}$$

- Assumption critical for estimation:
  - Is the estimate for γ picking up differences in labor adjustment costs between F.T. and P-T. workers relative to capital adjustment?

- Alternative production function:

$$Q = [\psi K^\gamma + (1 - \psi)(L_f + \alpha L_p)^\gamma]^{\frac{1}{\gamma}} \quad \alpha \in (0, 1)$$

  where full- and part-time labor are substitute, and in firms adjustments are driven by differences in adjustment cost.

- Dynamic structural estimation needed?

- Selection of low- and high-skill into part- and full-time arrangements.

Reduced-form evidence

- How are control firms assigned to treated firms?

- Number of new export destinations seems to increase for firms in both sector
  - it strikes with interpretation

Table 6 - Number of new export destinations

	Manufacturing	Wholesale
Banned export share$_{it}$ × Post-2004$_t$	2.035	0.642*
	(1.262)	(0.353)
N	155	233

- Possible alternative reduced-form equation to capture dynamics

$$\Delta Y_{it} = \sum_{j \geq 2014} \beta_j \times \text{Banned export share}_{it} \times \mathbf{1}_{t \geq j} + \gamma_i + \tau_t + \epsilon_{it}$$

Other margins of adjustment

- labor adjustments along types of contract (permanent versus temporary workers)
- wage adjustment

Heterogeneity and selection

- How does firm-level productivity affect factor adjustment after shock?
- How does firm-level productivity and the level of capital affect firm survival in the domestic market after shock?