How Do Firms Adjust When Trade Stops?

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Trade wars abound

Liberalizations = – trade wars?

- We know quite a bit about firm adjustments to trade liberalizations
- We also know something about trade restrictions that affect firm adjustments on the intensive margin
- But how do firms adjust to the sudden, unanticipated and abrupt demand shocks when the trade stops completely?
- Cleanly identifying trade war effect on demand, holding the other economics factors constant, is challenging
  - Trade wars are likely to be correlated with other economic adjustments and/or expectations

This paper

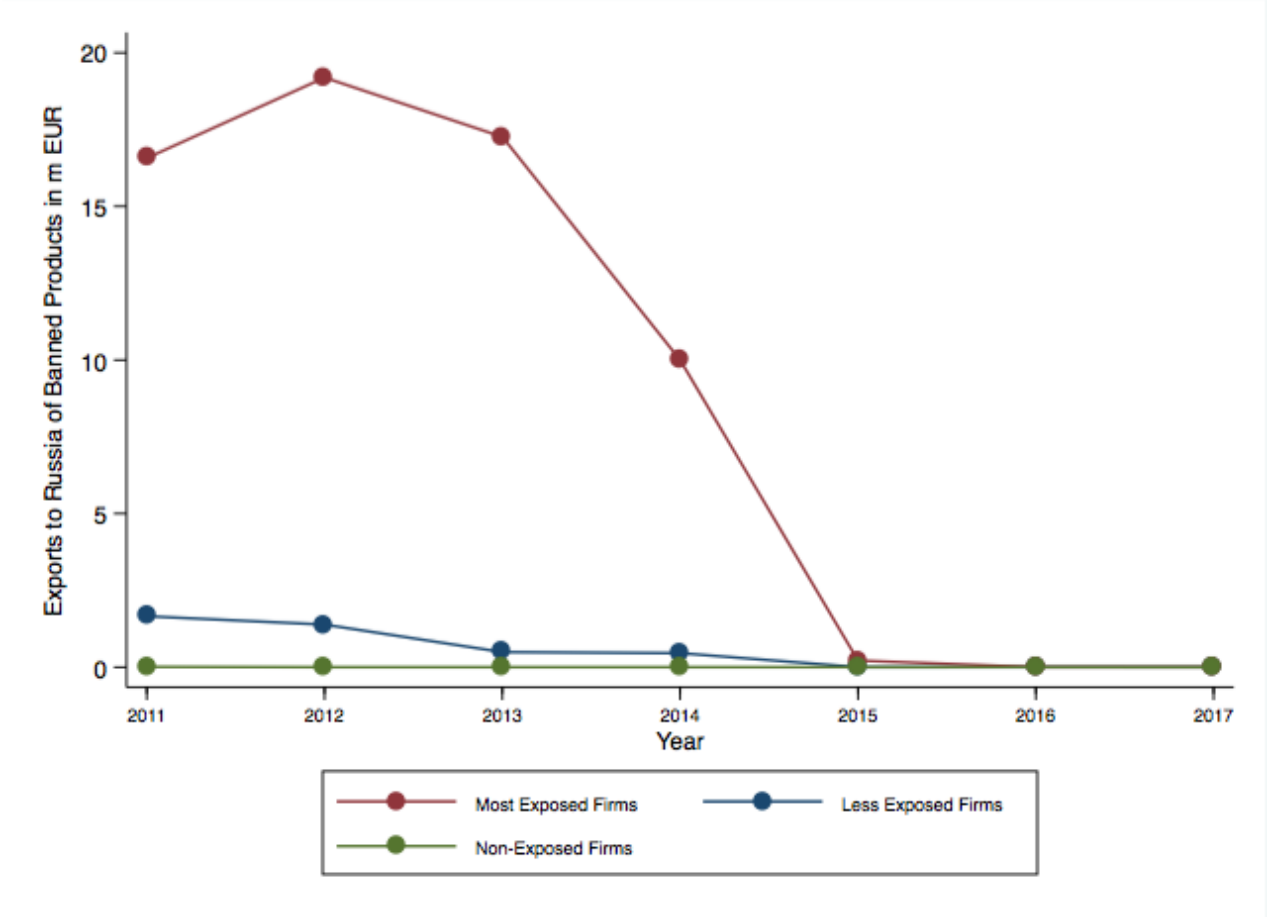
- A major sector of a small open economy lost its main export market for reasons unrelated to economic conditions
  - In 2014, because of the political tensions Russia banned agricultural and food product imports from EU
  - We look at Lithuanian food exporters, using a rich firm-level dataset that covers all firms
- We apply reduced form difference-in-differences strategy to quantify the adjustment margins:
  - Part-time and full-time labor, investment, new export markets
- We then build an internally consistent conceptual framework to explain the empirical findings and derive new predictions

Russia's import restrictions

- Russia-Ukraine conflict led to political tensions between Russia and EU
  - EU financial sanctions on certain individuals in Russia
- Response measures by Russia to ban of agricultural, food product and certain raw material imports from the EU, the US and some other countries in 2014
  - Meats, dairy products, fruits, and vegetables...
  - Initially announced for one year but then extended annually
- Lithuania: small open economy
  - Exports make 80% of its GDP
  - Russia has been one of the main trade partners for Lithuania's agricultural and food product exports
  - 20% of Lithuania's exports were directed to Russia
  - 18% of them were banned product exports

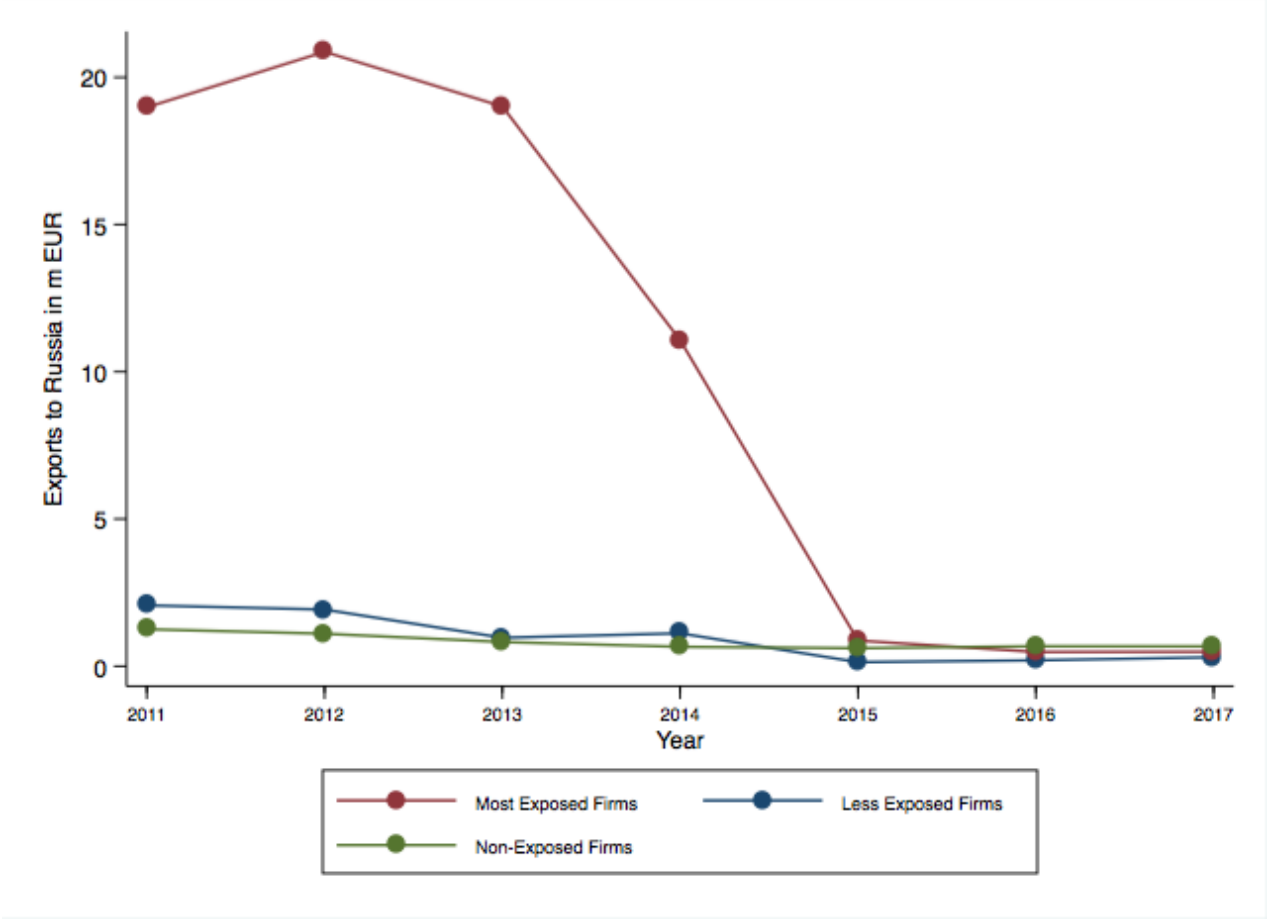
Exports to Russia of banned products

- Banned product exports of the food sector to Russia went virtually to zero:



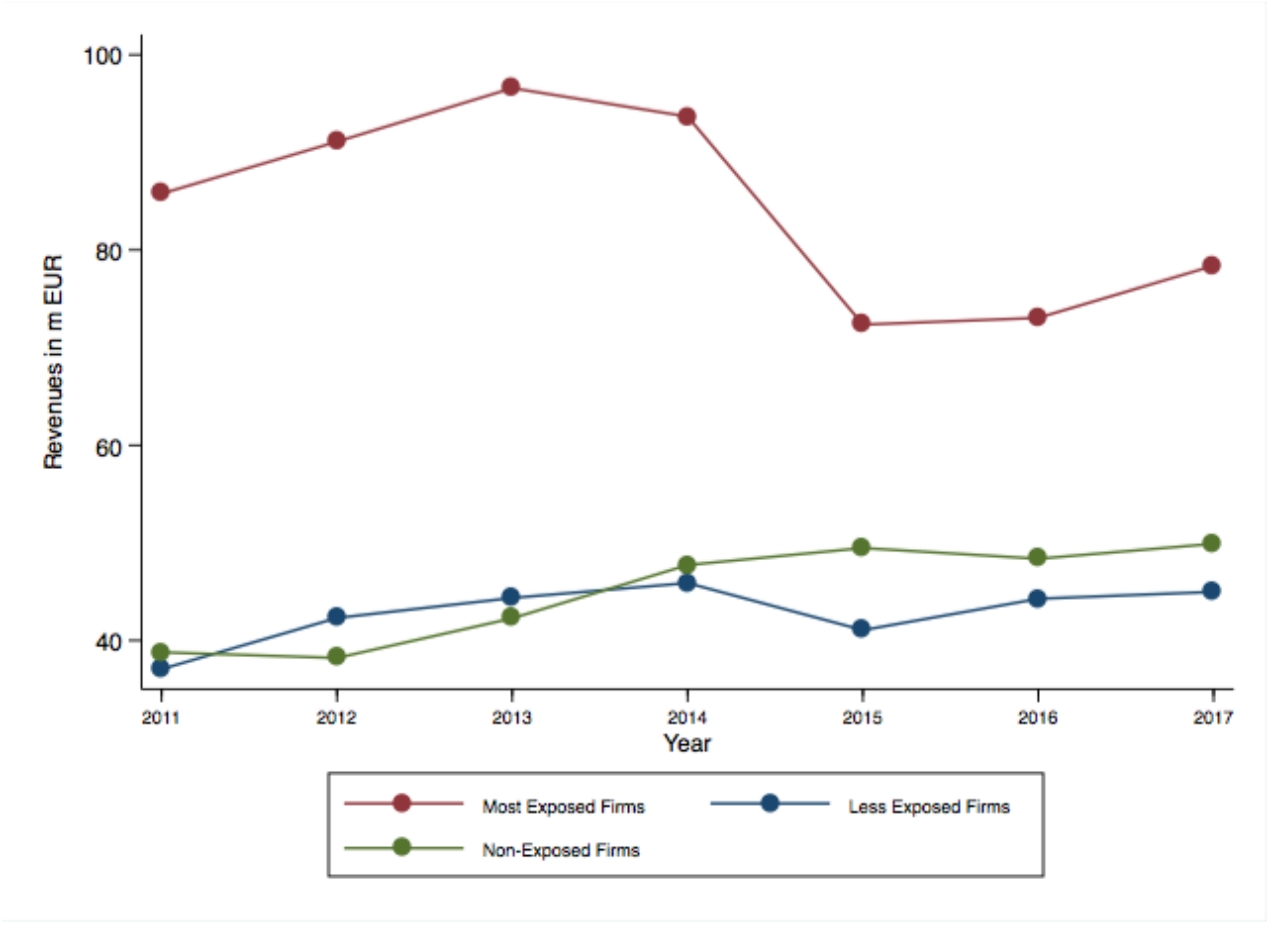
Total exports to Russia

- Sanctions also completely cut food sector's total exports to Russia:



Total revenues

- And that resulted in a drop in total revenues of food firms (even if with a minor later rebound):



Essentially, a triple-difference estimate

- Treated firms:
  - Firms that had banned-product exports to Russia in 2013
- For each treated firm, we find a control firm:
  - Exporting food manufacturer
  - Of all the candidate firms satisfying above, closest in size to the focal treated firm, as measured by the total sales in 2013
- Did the food producers that had a larger *Banned export share* experienced changes in 2014-2017
  - as compared to 2011-2013;
  - as compared to the respective changes in control firms;
  - as compared to the respective changes in changes in corresponding firms with a smaller *Banned export share*?

Main specification

- Reduced form difference-in-differences estimation:

$$\Delta Y_{i,t} = \beta_1 \times \textit{Banned export share}_i \times \textit{Post}2014_t + \gamma_i + \tau_t + \epsilon_{i,t}$$

where

- $\Delta Y_{i,t}$: difference in the adjustment margin $Y_{i,t}$, where the difference is taken between the values of treated and the control groups
  - $\textit{Banned export share}_i$: % of firm i's exports of the banned products to Russia in 2013 over its total sales in 2013
  - $\textit{Post}2014_t$: dummy equal to 1 in the years 2014-2017 and equal to 0 in years 2011-2013
  - γ_i and τ_t: firm- and year-fixed effects

Adjustment margins

- Number of part-time employees
  - In addition, number of hours
- Number of full-time employees
- Investment
  - Change in fixed assets, adjusted for depreciation
- Export reorientation to other markets but Russia

Part-time employees

	(1)	(2)
Banned export share x Post 2014	-145.925***	-123.842**
	(1.817)	(1.842)
Banned export share x Post 2016		-56.902
		(52.741)
Constant	24.937***	24.904***
	(4.499)	(4.495)
R^2	0.752	0.755
N	151	151

- Average exposed firm with 6.69% *Banned export share* reduced part-time employees by 9.76 (compared to the change in control firms), a 67% drop over the pre-period sample mean

Full-time employees

	(1)	(2)
Banned export share x Post 2014	-387.369**	-131.659
	(177.504)	(159.964)
Banned export share x Post 2016		-658.875**
		(314.523)
Constant	141.827***	141.438***
	(16.929)	(17.156)
R^2	0.953	0.956
N	151	151

- Average exposed firm with 6.69% *Banned export share* reduced full-time employees by 25.9 (compared to the change in control firms), a 6.8% drop over the sample mean

Investment

	(1)	(2)
Banned export share x Post 2014	-24.459**	-26.798*
	(0.436)	(0.431)
Banned export share x Post 2016		6.102
		(14.727)
Constant	-0.927	-1.275
	(0.192)	(0.234)
R^2	0.596	0.597
N	126	126

- A drop in investment for the food manufacturers

Conceptual Framework

Assumptions

- CES demand structure + supply side uses the production function similar to Krusell et al. (2000), where Cobb-Douglas over part-time employment and a composite input is assumed. The latter is a CES aggregator of capital and full-time labor
  - This rather simple technology allows for *capital-skill complementarity* or *substitutability*
- We adopt a simplified version of Helpman et al. (2010), where a firm exports its varieties in addition to selling on a domestic market
- Our point of deviation includes firm-specific variable trade costs, reflecting efficiency in transporting goods, accessing customs, managing distribution network, and similarly
- Another extension is a possibility to export to Russia as well as to the rest of the world, rather than one foreign country

Firm's Problem

- In a perfect foresight environment, a firm is *forward-looking* and its profit maximization problem cannot be split into static sub-problems due to *adjustment costs*
- A firm faces different adjustment margins
  - Part-time employees can be changed most quickly
  - Reflecting institutional setup, a firm is required to pay a severance payment when firing full-time labor, ending up in non-convex adjustment costs
  - Capital depreciates and investment takes time, implying that next period's capital requires adjusting investment in the current period

Testable Implications I

Proposition

An exogenous increase in trade costs with Russia induces layoffs of part-time employees. This effect is larger the larger the revenue share of exports to Russia had been before a shock

Remark

If a shock is large relative to the flexible labor margin (part-time employment) and/or considered to be persistent (lost access to Russian market in the future periods, it triggers other adjustments: further inputs reductions and export re-direction to other markets (rest of the world)

Testable Implication II

Proposition

Investment is predicted to drop more, the larger is the part-time employment adjustment. The layoffs of full-time labor are more likely the larger and more persistent is the shock and the larger is the part-time employment adjustment

Remark

A larger shock makes firms reduce temporary workers quicker, thereby making future prospects gloomier. Due to forward-looking behavior, firms start reducing investment straight-away, whereas non-convexity in full-time labor produces a delayed reaction after the shock turns out to be persistent, making firing optimal rather than waiting

Testable Implication III

Proposition

Export reorientation to the rest of the world (ROW), i.e., an increase in the trade share with the rest of the world, is larger the larger is the trade shock

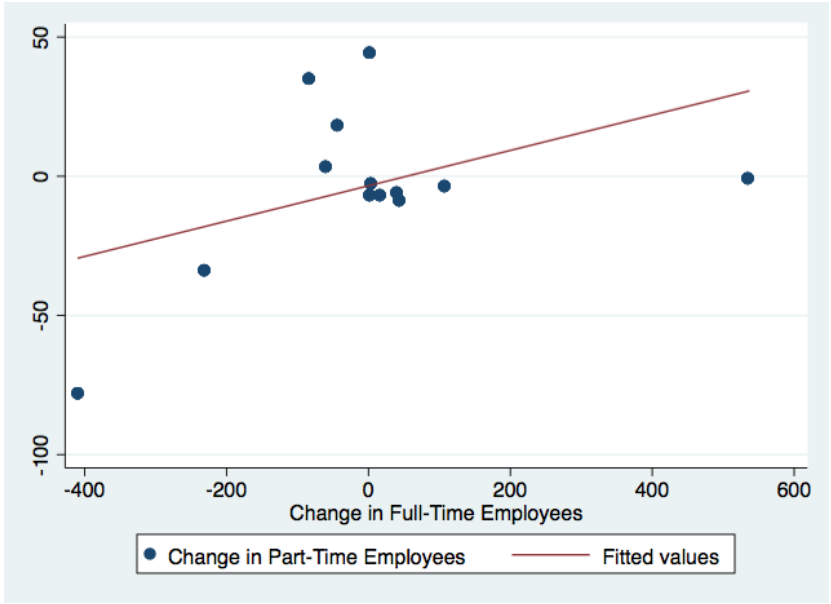
Remark

Larger exposure to the Russian market makes producers search for alternative routes more likely

Taking stock

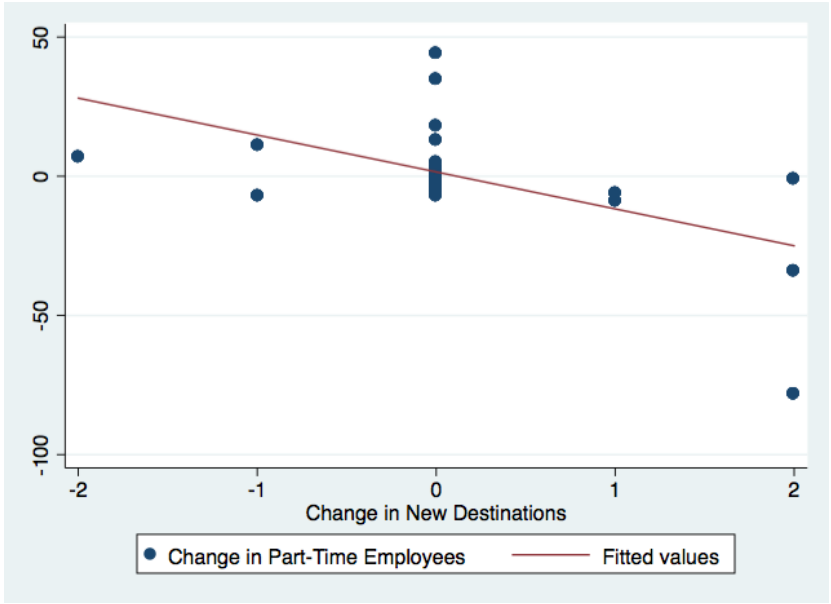
- Pecking-order of adjustments:
  - Firms first adjust on the margin with no adjustment costs, part-time labor
  - For larger shocks, forward-looking firms adjust investment
  - For largest and most persistent shocks, firms also adjust the margin with non-convex adjustment costs, full-time labor
- Change in part-time employment is a key indicator of subsequent adjustments within a firm
- Do the *same* firms that adjust part-time labor follow other adjustments?

Changes in part-time vs full-time employees



- Positive correlation for food producers (coeff.=0.4470***)
  - Food manufacturers that reduced part-time employees relatively more, later laid off full-time employees

Changes in part-time employees vs new destinations



- Negative correlation for food producers (coeff.=-0.5464***)
  - Firms that reduced part-time employees relatively more also engaged into export redirection into other markets

Empirical Evidence: Full-time employees and investment

	(1) ΔFT_empl.	(2) ΔInv.	(3) ΔFT_empl.	(4) ΔInv.
Banned exp. share x Post 2014	-128.022	-26.798*		
	(154.568)	(13.679)		
Banned export share x Post 2016	-484.914*	7.230		
	(271.284)	(15.670)		
ΔPart-time x Post 2016	-0.896	-0.097		
	(1.379)	(0.077)		
Banned exp. share x ΔPart-time x Post 2016	22.104***	0.744*		
	(7.738)	(0.408)		
High banned exp. share (0/1) x Post 2014			-23.849	-5.946**
			(28.690)	(2.898)
High banned exp. share (0/1) x Post 2016			-130.724**	0.852
			(55.829)	(3.301)
ΔPart-time x Post 2016			-2.043	-0.137
			(1.443)	(0.099)
High banned exp. share (0/1) x ΔPart-time x Post 2016			5.366***	0.183*
			(1.561)	(0.103)
Constant	142.967***	-1.056	212.703***	-0.271
	(15.420)	(1.839)	(17.541)	(2.251)
R^2	0.963	0.603	0.963	0.624
N	149	125	119	100

Empirical Evidence: Export reorientation to ROW

	(1) Δshare_row	(2) Δshare_row_sales	(3) Δshare_row	(4) Δshare_row_sales
Banned export share x Post 2014	0.333	0.357		
	(0.469)	(0.273)		
Banned export share x Post 2016	1.100***	0.402		
	(0.408)	(0.373)		
High banned export share (0/1) x Post 2014			-0.005	0.089*
			(0.098)	(0.051)
High banned export share (0/1) x Post 2016			0.207**	0.048
			(0.087)	(0.069)
Constant	-0.286***	-0.136***	-0.274***	-0.079***
	(0.047)	(0.035)	(0.056)	(0.029)
R^2	0.724	0.916	0.591	0.934
N	166	166	129	129

Takeaways

- A unique event when due to political reasons, unrelated to trade, the exporters have lost access to a major export market
  - Part-time labor, as the most flexible margin, adjusts first
  - Further adjustments depend on the shock size and its persistence
  - A larger shock leads to full-time labor and capital changes
  - If the shock is large enough that flexible adjustment margins are exhausted, the firms revert to more active export redirection
- Can be rationalized by a dynamic extension of Helpman et al. (2010) with three inputs having different adjustment cost functions (+ dynamic anticipation)