Trade, Competition and Productivity

Gianmarco Ottaviano

LSE and U Bologna

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From Micro to Macro

- In the last couple of decades the field of international trade has become increasingly quantitative
- This is due to two major developments driven by easier accessibility of individual datasets and higher computing power:
    1. Econometric works to study *ex post* the implications of firms' and workers' heterogeneity for the sources, the patterns and the gains from trade
    2. Calibration and simulation of statistical models to investigate *ex ante* the (welfare) implications of counterfactual scenarios for which data are necessarily unavailable (e.g. Brexit)
- For lack of better name, call the latter models "*new quantitative trade models*":
    - $\Longrightarrow$ We should care about the detail of micro reallocations only if this changes our understanding of the aggregate gains from trade

New Quantitative Trade Models (NQTM)

- The idea of using mathematical or statistical models to simulate the effects of counterfactual scenarios has a long tradition (Baldwin and Venables, 1995)
- In particular, 'Computable general equilibrium' (CGE) models remain a cornerstone of trade policy evaluation
- To this tradition NQTMs contribute:
  - A tighter connection between theory and data thanks to more appealing micro-theoretical foundations
  - A more careful estimation of the structural parameters necessary for counterfactual analysis

Eaton and Kortum (2002) and Melitz (2003)

- The trailblazer NQTM is arguably the statistical model proposed and structurally estimated by Eaton and Kortum (2002) to quantify the effects of counterfactuals on trade liberalization and technological progress in 19 OECD countries
  - However, by assuming perfect competition, the Eaton-Kortum model does not speak directly to the parallel research line based on individual heterogeneity, of which the main theoretical reference is Melitz (2003)
- Introducing heterogeneous firms in Krugman (1980), Melitz (2003) provides a theoretical framework consistent with several stylized facts highlighted by the analysis of firm-level datasets
  - But its initial applications did not include counterfactual simulations

Bridging Micro and Macro: Early Attempts

- Early attempts at bridging the two lines of research can be found in Bernard, Eaton, Jensen and Kortum (2003) and Del Gatto, Mion and Ottaviano (2006) – see also Di Mauro, Ottaviano and Taglioni (2009)
- Both papers apply the standard macroeconomic methodology of ‘calibration, validation and simulation’ for counterfactual analysis:
  1. *Calibration* requires the values of the theoretical parameters to be set such that the model matches *some key moments* of the data
  2. *Validation* requires the calibrated model to be able to match *other moments* of the data different from those used for calibrating
  3. *Simulation* of counterfactual scenarios can be ‘reasonably’ performed only if the calibrated model passes the validation checks

Bridging Micro and Macro: Arkolakis, Costinot and Rodriguez-Clare (2012)

- In several respects, Eaton and Kortum (2002) and many variations of Melitz (2003) belong to the same family of models
- All models in this family share the same predicted 'gains from trade' (defined as welfare with trade relative to welfare with autarky), conditional on the changes in two aggregate statistics:
    - $\Longrightarrow$ The observed share of domestic expenditure and an estimate of the trade elasticity
- These models share *four primitive assumptions*: (a) Dixit-Stiglitz preferences; (b) one factor of production; (c) linear cost functions; (d) perfect or monopolistic competition
- They also share *three common macro-level restrictions*: (A) trade is balanced; (B) aggregate profits are a constant share of aggregate revenues; (C) the import demand system exhibits constant elasticity of substitution (CES)

An Impossibility Theorem?

- As this set of assumptions is extremely restrictive, the finding by ACR could be dismissed as some sort of 'impossibility theorem' with very limited practical relevance
- What makes their finding interesting is that some of the most popular trade models do satisfy those restrictive assumptions such as Armington (1969), Krugman (1980), Eaton and Kortum (2002) and several variations of Melitz (2003)
- In this respect, the main contribution of ACR is to theoretically define the main class of state-of-the-art NQTMs

“New Trade Models, Same Old Gains?”

- Do ACR show that the micro details of NQTMs are irrelevant for the quantification of the aggregate welfare effects of counterfactual shocks?
- Not really:
  - $\Longrightarrow$ Different models of the ACR family often produce very different predictions for the same counterfactuals (Costinot and Rodriguez-Clare, 2014)
- Current debate has mostly focused on *first moment* of aggregate welfare changes:
  - $\Longrightarrow$ How much countries gain/lose
- Another interesting way to check robustness is to look at *higher moments*:
  - $\Longrightarrow$ How gains/losses are distributed across countries

A Simple Example from CR

- Welfare losses of a 40% increase in worldwide import tariffs for 20 European countries
- Let's look at correlations of losses across countries generated by different NQTMs

	Without Intermediates			With Intermediates		
	Perfect Competition	Monopolistic Competition		Perfect Competition	Monopolistic Competition	
		Krugman (1980)	Melitz (2003)		Krugman (1980)	Melitz (2003)
	(1)	(2)	(3)	(4)	(5)	(6)
(1)	1	-0.72098	-0.72613	0.998883	-0.63709	-0.72288
(2)		1	0.974937	-0.75233	0.986991	0.933616
(3)			1	-0.75753	0.932363	0.835422
(4)				1	-0.67063	-0.74652
(5)					1	0.955704
(6)						1

Source: Author's elaboration based on percentage losses from Table 3 in Costinot and Rodriguez Clare (2014).

- While considering intermediates mostly affects the average losses, the choice of market structure also affects the cross-country distribution of losses

Micro for Macro: How to Use Data When You Have no Data

- The predictions of NQTMs on the average welfare effects seem to be quite sensitive to considering or not intermediate goods
  - $\Longrightarrow$ More attention to I-O linkages and GVCs, seller-buyer relations
- The predictions of NQTMs on the distribution of welfare effects seem to be very sensitive to the choice of market structure
  - $\Longrightarrow$ More attention to the actual market structures that characterize different sectors
- NQTMs are mostly silent on the 'dynamic' effects that policy intervention may have on economic growth
  - $\Longrightarrow$ More attention to competition, innovation and technology adoption

Micro for Macro: How to Use Data When You Have no Data (Cont.)

- Validation has increasingly gone missing in NQTMs ('exactly identified' instead of 'overidentified' models)
  - $\Longrightarrow$ Micro data are a mine of additional moments for validation
- But even the 'four primitive assumptions' have implications that are clearly at odds with key features of firm-level data
  - $\Longrightarrow$ More attention to demand characteristics, markup behavior, passthrough from input prices to output price, intensive margin reallocations
- To sum up:
  - $\Longrightarrow$ Simulated macro models are needed to quantify the aggregate implications of counterfactual scenarios for which data are by definition not available
  - $\Longrightarrow$ Micro data can be used to discipline the *structure* of macro models and to validate their calibration
  - $\Longrightarrow$ Micro and macro data/models are complementary

Beyond ACR/CR?

- Models in the ACR family were developed under those restrictive assumptions to get as far as possible with analytical solutions
  - $\Longrightarrow$ This loses relevance when in the end NQTMs are anyway solved numerically
- Which assumptions could be dropped more easily?
  - $\Longrightarrow$ (a) Dixit-Stiglitz preferences? YES
  - $\Longrightarrow$ (b) one factor of production? YES
  - $\Longrightarrow$ (c) linear cost functions? YES
  - $\Longrightarrow$ (d) perfect or monopolistic competition
- What about (d) perfect or monopolistic competition?
  - $\Longrightarrow$ General equilibrium models of oligopoly with heterogenous firms and asymmetric countries are plagued by problems of existence, uniqueness and stability of equilibria
  - $\Longrightarrow$ This is a NO-NO for numerical analysis!

“Using Demand to Proxy Market Structure”

- When one is interested in general equilibrium, monopolistic competition with adequate demand properties is able to “mimick" crucial oligopolistic outcomes while avoiding problems of existence, uniqueness and stability
  - $\Longrightarrow$ Ottaviano, Tabuchi and Thisse (2002), Melitz and Ottaviano (2008), Zhelobodko, Kokovin, Parenti and Thisse (2012), Mayer, Melitz and Ottaviano (2014), Mrazova and Neary (2014)
- In particular, Mayer, Melitz and Ottaviano (2015) shows how dispensing with CES demand allows monopolistic competition to:
  - $\Longrightarrow$ Capture *ex post* the observed behavior of markup, passthrough and intensive margin reallocations
  - $\Longrightarrow$ Characterize the “right properties” of demand to be used for *ex ante* counterfactual analysis through NQTMs
  - $\Longrightarrow$ Show that neglecting these properties prevents identifying a key channel through which *trade shocks affect aggregate productivity by altering firms’ competitive environment*

The Model: Utility and Profit Maximization

- L^c identical consumers with individual expenditure normalized to 1:
  - In partial equilibrium (PE) labor supply is perfectly elastic at wage 1
  - In general equilibrium (GE) labor supply is $L^w = L^c$ and wage equals 1 by choice of units
- M horizontally differentiated products indexed $i \in [0, M]$
- Utility maximization problem:

$$\max_{x_i \geq 0} \int_0^M u(x_i) di \text{ s.t. } \int_0^M p_i x_i di = 1$$

- The FOC determine the *inverse* demand function:

$$p_i = \frac{u'(x_i)}{\lambda}, \text{ with } \lambda = \int_0^M u'(x_i) x_i di,$$

where $\lambda > 0$ is the marginal utility of income.

The Model: Utility and Profit Maximization (Cont.)

- Production has linear cost with marginal cost v varying across products
- Product-level profit maximization problem:

$$\max_{q_i \geq 0} \pi(q_i) = p_i q_i - v q_i - f$$

- The optimal level of output $q_v = x_v L^c$ satisfies the first order condition:

$$u'(x_v) + u''(x_v)x_v = \lambda v,$$

where $r(x_v) = \phi(x_v)/\lambda$ with $\phi(x_v) \equiv u'(x_v) + u''(x_v)x_v$ is the *marginal* revenue associated with a given variety

The Model: Utility and Profit Maximization (Cont.)

- Necessary and sufficient conditions for these max problems are:
  - **(A1)** $u(x_i) \geq 0$ with $u(0) = 0$; $u'(x_i) > 0$ and $u''(x_i) < 0$ for $x_i \geq 0$
  - **(A2)** elasticity of inverse demand $\varepsilon_p(x_v) < 1$
  - **(A3)** elasticity of marginal revenue $\varepsilon_r(x_v) > 0$
- IFF. (A1), (A2) and (A3) hold there exists a unique output and price level for all varieties $x_v > 0$ and $p(x_v) > 0$, and for any given lagrangean multiplier $\lambda > 0$

The Model: Conditions for Empirical Consistency

- De Loecker, Goldberg, Pavcnik and Khandelwal (NBER 2012) find that lower costs are associated with larger markups so that cost advantages are not fully passed through to prices
  - $\longrightarrow$ A necessary and sufficient condition for this is

$$\textbf{(B1)}\ \varepsilon_p'(x_v) > 0$$

- Berman, Martin and Mayer (QJE 2012) find that high-performance firms react to a real exchange depreciation by increasing significantly more their markup
  - $\longrightarrow$ Given (B1), a necessary and sufficient condition for this is

$$\textbf{(B2)}\ \frac{\varepsilon_p'(x_v)x_v}{\varepsilon_p(x_v)} < \frac{\varepsilon_r'(x_v)x_v}{\varepsilon_r(x_v)}$$

- Empirically lower cost firms/products are associated with larger employment
  - $\longrightarrow$ A necessary and sufficient condition for this is

$$\textbf{(B3)}\ \varepsilon_r(x_v) < 1$$

The Model: Endogenous Heterogeneity

- Products are supplied by firms that may be single- or multi-product
- Market structure is monopolistically competitive:
  - $\Longrightarrow$ Each product is supplied by only one firm and each firm supplies a countable number of the continuum of products
- Technology exhibits increasing returns to scale:
  - Fixed cost f is the same for all products, marginal cost v differs across them
  - For a given firm, products are indexed in increasing order m of marginal cost from a 'core product' indexed by $m = 0$
  - $M(c)$ denotes the number of products supplied by a firm with core marginal cost c and $v(m,c)$ to denote the marginal cost of its m^{th} product such that $v(m,c) = cz(m)$ with $z(0) = 1$ and $z'(m) > 0$
- Firm entry incurs a sunk cost f^e. Only after this cost is incurred, entrants randomly draw their marginal cost levels for their core products from a common continuous differentiable distribution defined over the support $[0, \infty)$, with density $\gamma(c)$ and cumulative density $\Gamma(c)$.

The Model: Equilibrium Conditions

- Zero Cutoff Profit (ZCP)

$$\pi^*(\widehat{c},\lambda)L^c = f$$

- Free Entry Condition (FE):

$$\sum_{m=0}^{\infty}\left[\int_0^{\widehat{c}/z(m)}\left[\pi^*\left(cz(m),\lambda\right)L^c - f\right]\gamma(c)dc\right] = f^e$$

- Budget Constraint (BC)

$$N_e\left(\sum_{m=0}^{\infty}\int_0^{\widehat{c}/z(m)} p^*\left(cz(m),\lambda\right)x^*\left(cz(m),\lambda\right)\gamma(c)dc\right) = 1$$

where N_e is the number of entrants and * signifies profit, price and quantity that solve the max problems

The Model: Effects of a Demand Shock

- Define a 'positive demand shock' as more consumers ($dL^c > 0$)
- These comparative statics hold in both PE and GE:
  - **Lemma 1.** A positive demand shock increases the marginal utility of income.
  - **Proposition 1 - Extensive margin adjustment.** *(B1) is necessary and sufficient for a positive demand shock to reduce the cost cutoff*, thus increasing multi-product firm productivity through extensive margin adjustment. (B1) is also necessary and sufficient for a positive demand shock to increase (decrease) profit for low (high) cost products.
  - **Proposition 2 - Intensive margin adjustment.** (B1) and (B2) are sufficient for a positive demand shock to reallocate output and revenue from higher to lower cost products. *As long as (B3) holds, assumptions (B1) and (B2) are* also *sufficient for a positive demand shock to reallocate employment from higher to lower cost products*, thus increasing multi-product firm productivity through intensive margin adjustment.

Back to Data

- The model predicts that a positive demand shock increases multi-product firm productivity by shifting resources from high to low cost products (higher 'skewness')
- In particular, the chain of causation is:

$$\text{Demand shock} \longrightarrow \text{Skewness} \longrightarrow \text{Productivity}$$

- This can be tested exploiting detailed export data looking at the impact of demand shocks in export destinations on the skewness of export sales and productivity of multi-product firms

Data on French Multi-Product Exporters

- Comprehensive customs data for firm-product exports to 229 destinations (d) for 1995-2005 (t)
- Exclude service and wholesale/distribution firms (keep manufacturing and agriculture)
- Products recorded at 8-digit level (over 10,000 product codes)

Also country, sector (ISIC-3), and product (HS6) level trade for those destinations:

- GDP and other country level variables
- Imports by destination (d) at ISIC3 $(M^I_{d,t})$ and HS6 $(M^s_{d,t})$ level

Reallocations Over Time: Measuring Trade Shocks

- Changes in the destination markets over time also induce similar pattern of reallocations
- For all firms exporting to destination d, can measure change in
  - $\log GDP_{d,t}$
  - Total imports into d (in ISIC I) excluding French exports: $\log M^I_{d,t}$
  - Both capture demand shocks for French exporters to d (trade-induced for the case of $\log M^I_{d,t}$)

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- ... but we can also construct a firm i-specific measure of the trade-induced demand shock:

$$\text{shock}^I_{i,d,t} \equiv \overline{\log M^s_{d,t}} \quad \forall \text{ products } s \in I \text{ exported by firm } i \text{ to } d \text{ in } t_0$$

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- For all of these demand shocks $X_t = GDP_{d,t}, M^{I}_{d,t}, M^{s}_{d,t}$, we compute the first difference as the Davis-Haltiwanger growth rate:

$$\tilde{\Delta} X_t \equiv (X_t - X_{t-1}) \,/\, (.5X_t + .5X_{t-1}) \,.$$

$\longrightarrow$ Shocks in first differences: $\tilde{\Delta} GDP_{d,t},\ \tilde{\Delta} M^{I}_{d,t},\ \overline{\tilde{\Delta} M^{s}_{d,t}}$

Reallocations Over Time: Impact of Trade Shocks on Intensive and Extensive Margins of Firm Export

Dependent Variable	Δ log Exports per Product			Δ log # Products Exported		
$\tilde{\Delta}$ GDP Shock	0.486^a			0.147^a		
	(0.046)			(0.016)		
$\tilde{\Delta}$ Trade Shock		0.273^a			0.075^a	
		(0.009)			(0.004)	
$\tilde{\Delta}$ Trade Shock - ISIC			0.038^a			0.014^a
			(0.005)			(0.002)
Observations	396740	402522	402522	396740	402522	402522

Standard errors in parentheses: $^c < 0.1$, $^b < 0.05$, $^a < 0.01$

Reallocations Over Time: Skewness of Product Mix

Dependent Variable	$T^{l}_{i,d,t}$	$\Delta T^{l}_{i,d,t}$		$\Delta T^{l,\text{const}}_{i,d,t}$	
Specification	FE	FD	FD-FE	FD	FD-FE
GDP Shock	0.076[a]				
	(0.016)				
Trade Shock	0.047[a]				
	(0.005)				
Trade Shock - ISIC	0.002[a]				
	(0.000)				
$\tilde{\Delta}$ GDP Shock		0.067[a]	0.068[a]	-0.005	-0.004
		(0.012)	(0.016)	(0.008)	(0.009)
$\tilde{\Delta}$ Trade Shock		0.036[a]	0.032[a]	0.012[a]	0.012[a]
		(0.005)	(0.006)	(0.003)	(0.003)
$\tilde{\Delta}$ Trade Shock - ISIC		0.006[a]	0.004	0.002	0.004[b]
		(0.002)	(0.003)	(0.001)	(0.002)
Observations	474506	396740	396740	437626	437626

Standard errors in parentheses: $^{c} < 0.1$, $^{b} < 0.05$, $^{a} < 0.01$

New Data and Productivity

- Merge trade data with production data (comprehensive annual census)
  - Adds firm level variables (by year) for input and output use
- Measure productivity as deflated value-added per worker

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  - Adds firm level variables (by year) for input and output use
- Measure productivity as deflated value-added per worker
  - Aggregates (using firm labor shares) to welfare-relevant real value-added per worker for French manufacturing (so long as industry price deflators are accurately measured)

Aggregating Destination Demand Shocks to Firm-Level

- Main idea: Use firm/destination specific trade shocks to create exogenous (to the firm) measure of trade exposure over time
- Aggregate destination-level trade shock to the firm-level:

$$\text{shock}_{i,t} = \sum_{d,I} s^I_{i,d,t_0} \cdot \text{shock}^I_{i,d,t} \quad \text{and} \quad \tilde{\Delta}\text{shock}_{i,t} = \sum_{d,I} s^I_{i,d,t-1} \cdot \tilde{\Delta}\text{shock}^I_{i,d,t}$$

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- This aggregation only includes shocks for export market (but not for domestic market)
- Since cannot measure exogenous shocks for domestic market, adjust shock to reflect export intensity (i.e. adjust market shares $s_{i,d}$ to reflect sales in domestic market)

$$\text{shock}_{i,t} \times \text{export intensity}_{i,t_0} \quad \text{and} \quad \tilde{\Delta}\text{shock}_{i,t} \times \text{export intensity}_{i,t-1}$$

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- Note: Use t_0 for levels and $t-1$ for first difference: shocks are exogenous to firm decisions in $t > t_0$ (levels) or firm level changes Δ_t (FD)
  $\longrightarrow$ Changes in the set of exported products or exported market shares are not reflected in shock

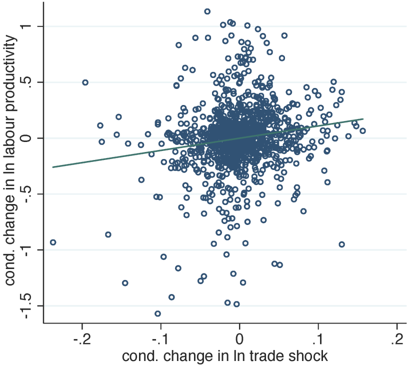
Impact of Demand Shocks on Firm Productivity

Dependent Variable	log prod.	Δ log prod.		log prod.	Δ log prod.	
Specification	FE	FD	FD-FE	FE	FD	FD-FE
log (shock×exp intens)	0.094^a			0.073^a		
	(0.019)			(0.018)		
$\tilde{\Delta}$ (shock×exp intens)		0.134^a	0.116^a		0.108^a	0.096^a
		(0.024)	(0.028)		(0.024)	(0.028)
log K/L				0.228^a		
				(0.007)		
log raw materials				0.091^a		
				(0.004)		
Δ log K/L					0.327^a	0.358^a
					(0.008)	(0.009)
Δ log raw materials					0.100^a	0.093^a
					(0.004)	(0.004)
Observations	213877	188328	188328	201627	174931	174931

Standard errors in parentheses: $^c < 0.1$, $^b < 0.05$, $^a < 0.01$

Impact of Demand Shocks on Firm Productivity: Largest French Exporters

regression line: coef = .783, se = .198, N = 1063
sample: 167 firms representing 50% of French exports in 1996



regression line: coef = 1.094, se = .263, N = 1040
sample: 167 firms representing 50% of French exports in 1996
standard errors clustered by firm

Robustness – No Reponse of Investment

Dependent Variable	ln K/L	Δ ln K/L	Δ ln K/L
Specification	FE	FD	FD-FE
log (trade shock $\times$ export intens.)	-0.018		
	(0.018)		
$\tilde{\Delta}$ (trade shock $\times$ export intens.)		-0.003	-0.005
		(0.017)	(0.020)
Observations	212745	186171	186171

Standard errors in parentheses: $^{c} < 0.1$, $^{b} < 0.05$, $^{a} < 0.01$

Robustness – Returns to Scale

Sample	Employment Increase	Employment Decrease
Dependent Variable	Δ log productivity	Δ log productivity
Specification	FD	FD
$\tilde{\Delta}$ (trade shock $\times$ export intens.)	0.135^a	0.156^a
	(0.035)	(0.045)
Δ log capital stock per worker	0.288^a	0.332^a
	(0.012)	(0.013)
Δ log raw materials	0.091^a	0.097^a
	(0.005)	(0.005)
Observations	69642	65268

Standard errors in parentheses: $^c < 0.1$, $^b < 0.05$, $^a < 0.01$

Robustness – Single Product Firms

Sample	Single Product Firms		
Dependent Variable	log prod.	Δ log prod.	
Specification	FE	FD	FD-FE
log (trade shock $\times$ export intens.)	0.005		
	(0.050)		
log capital stock per worker	0.269^{a}		
	(0.016)		
log raw materials	0.101^{a}		
	(0.010)		
$\tilde{\Delta}$ (trade shock $\times$ export intens.)		-0.021	-0.138^{c}
		(0.062)	(0.079)
Δ log capital stock per worker		0.368^{a}	0.415^{a}
		(0.020)	(0.028)
Δ log raw materials		0.114^{a}	0.090^{a}
		(0.010)	(0.013)
Observations	32870	25330	25330

Robustness – Low/High Export Intensity

Sample	exp. intens. quartile # 1			exp. intens. quartile # 4		
Dependent Variable	log prod.	Δ log prod.		log prod.	Δ log prod.	
Specification	FE	FD	FD-FE	FE	FD	FD-FE
log trade shock	0.009			0.068^a		
	(0.006)			(0.014)		
log K/L	0.278^a			0.217^a		
	(0.022)			(0.015)		
log raw materials	0.070^a			0.128^a		
	(0.006)			(0.010)		
$\tilde{\Delta}$ trade shock		0.000	-0.002		0.096^a	0.100^a
		(0.007)	(0.009)		(0.017)	(0.021)
Δ log K/L		0.323^a	0.367^a		0.325^a	0.368^a
		(0.016)	(0.020)		(0.014)	(0.016)
Δ log raw materials		0.070^a	0.057^a		0.129^a	0.123^a
		(0.006)	(0.006)		(0.008)	(0.010)
Observations	49227	38894	38894	53125	46347	46347

Reallocation Channel? Aggregating from Destination Level to Firm Level

- Trade shocks affect reallocations at destination level
- Effects of reallocations on productivity should come through global sales (i.e. overall production)
- Can aggregation of skewness responses at destination level be used to predict skewness of global sales?

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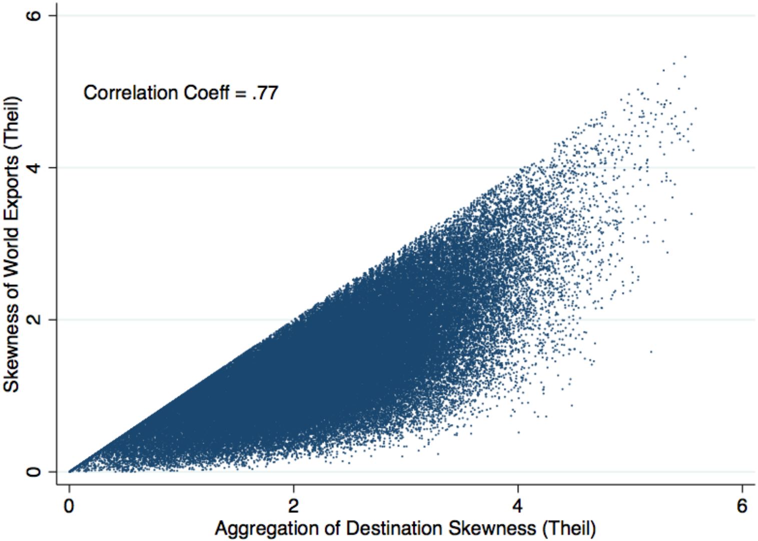
- Can aggregation of skewness responses at destination level be used to predict skewness of global sales?
- Yes: If skewness is measured using Theil index
  - Can write skewness of global export as aggregation of destination skewness:

$$T_{i,t} = \sum_{d} s_{d,i,t} T_{idt} - \text{Between Theil (across } d\text{)}$$

  - Skewness of global production (including domestic sales) is then

$$\text{export intensity}_{i,t} \times T_{i,t} - \text{Between Theil (across export-domestic sales)}$$

Aggregating Product Skewness



Effect of Firm-Level Trade Shocks on Global Skewness

Dependent Variable	$T_{i,t}$	$\Delta T_{i,t}$		Exp. Intens$_{i,t}$	Δ Exp. Intens$_{i,t}$	
Specification	FE	FD	FD-FE	FE	FD	FD-FE
log GDP shock	-0.001			0.003[a]		
	(0.004)			(0.001)		
log trade shock	0.045[a]			0.014[a]		
	(0.009)			(0.003)		
log trade shock - ISIC	-0.001			0.000		
	(0.001)			(0.000)		
$\tilde{\Delta}$ GDP shock		0.118[a]	0.107[a]		0.032[a]	0.035[a]
		(0.031)	(0.038)		(0.010)	(0.012)
$\tilde{\Delta}$ trade shock		0.057[a]	0.050[a]		0.019[a]	0.016[a]
		(0.011)	(0.013)		(0.003)	(0.004)
$\tilde{\Delta}$ trade shock - ISIC		-0.003	-0.010		0.002	0.000
		(0.005)	(0.007)		(0.002)	(0.002)
	(0.110)	(0.004)	(0.004)	(0.030)	(0.001)	(0.001)
Observations	117851	117851	117851	110565	107283	107283

Impact of Global Skewness on Firm Productivity

	OLS			IV – 2SLS		
Dependent Variable	log prod.	Δ log productivity		log prod.	Δ log productivity	
Specification	FE	FD	FD-FE	FE	FD	FD-FE
$T_{i,t}$ $\times$ export intens.	0.114^a			0.709^a		
	(0.009)			(0.226)		
log K/L	0.217^a			0.218^a		
	(0.010)			(0.010)		
log raw materials	0.088^a			0.062^a		
	(0.004)			(0.011)		
$\tilde{\Delta}$ $T_{i,t}$ $\times$ export intens.		0.095^a	0.091^a		1.167^a	0.996^a
		(0.008)	(0.009)		(0.170)	(0.202)
Δ log K/L		0.317^a	0.351^a		0.317^a	0.351^a
		(0.012)	(0.014)		(0.013)	(0.015)
Δ log raw materials		0.089^a	0.088^a		0.065^a	0.071^a
		(0.005)	(0.005)		(0.006)	(0.007)
	(0.056)	(0.003)	(0.004)		(0.004)	
Observations	131047	99490	99490	126367	99490	95895

Conclusion

- Demand shocks in export markets lead French multi-product exporters to reallocate sales towards their best performing products in those markets
- The best performing products in each market are also the firm's best performing global products – so the demand shocks lead to a reallocation of overall production towards better performing products
- Our theoretical model derives the demand and cost conditions that are needed to generate these reallocations
  - ... and highlights the associated increase in competition associated with the demand shocks
- Empirically, we find that the demand shocks induce large and substantial productivity responses for multi-product French exporters