

Trade without Borders

Trade Effect of the 2004 EU Enlargement

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3rd FIW Research Conference, Vienna, 11 Dec 2009

Motivation

The unexplained 'border effect'

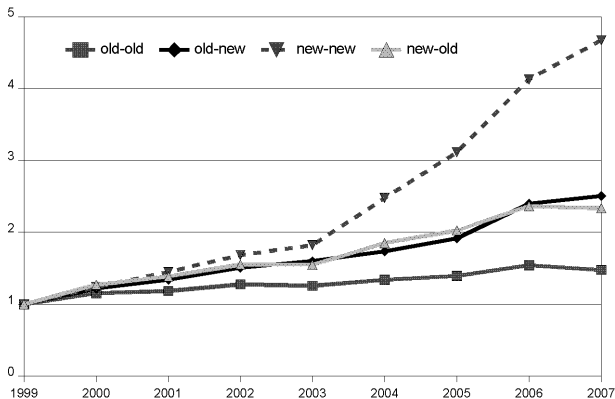
- trade barriers are large even among strongly integrated markets in free trade areas
- intra-national trade is 6 times larger than inter-national trade
 - Canada-US (McCallum 1995; Anderson and Van Wincoop 2003)
 - EU15 (Nitsch 2000; Head and Mayer 2000; Chen 2004)
- border related barriers (other than trade policy measures) are roughly 30-35% ad valorem equivalent (Anderson and Van Wincoop 2004)
- hardly measurable, only indirectly from trade flows

An interesting episode: EU enlargement in 2004

- free trade area for several years
 - EU15, CEFTA, BAFTA
 - complete liberalization for a large subset of manufactures
 - in terms of traditional trade policy measures, i.e. tariffs, quotas and rules of origin
- but evidence shows...
 - 60% of industrial firms in new members report that enlargement led to better access to markets (European Commission Internal Market Survey 2006)
 - trade flows accelerated after 2004

Exports of manufactures in old and new EU members

food, beverages, tobacco and oil manufactures excluded
(in euros, 1999=100)



My contribution

- Uncover part of the 'border effect' by exploiting the episode of EU accession as a natural experiment and estimating its effect on foreign trade
- Main findings:
 - trade for country pairs with at least one new member up by 14% (1.5-3.3% ad valorem equivalent)
 - large differences for country groups: new-new (4-9%), new-old (3-7%), old-new (0-1%)
 - significant anticipatory effect in 2003
 - mostly technology intensive industries
 - dominantly on the surviving (intensive) margin

Empirical strategy

Sample

- annual bilateral exports in euros for 1999-2007
- 22 countries (old: EU15 less Greece; new: EU10 less Cyprus and Malta)
- manufactures excluding food, beverages, tobacco and coke, petroleum and nuclear fuel
- aggregate or 2-digit industry level estimates; margin decomposition at the 6-digit product level

The treatment effect

- EU enlargement as a quasi natural experiment: diff-in-diff strategy
- treatment: country pair is *jointly* becoming members of the EU
- treatment group: country pairs with at least one new member (new-new, new-old, old-new); control group (old-old)
- treatment effect is derived from

$$(x_{t=1}^{treat} - x_{t=0}^{treat}) - (x_{t=1}^{control} - x_{t=0}^{control}) \quad (1)$$

x is log of export, $t = 1$ post-, $t = 0$ pre-accession period

- common treatment or varying treatment (nn, no, on)
- control for other factors that affect trade within a gravity model framework

A gravity estimation

Gravity equation from the model of Anderson and Van Wincoop (2003)

$$X_{ij} = \frac{Y_i Y_j}{Y_W} \left(\frac{T_{ij}}{\Pi_i P_j} \right)^{1-\sigma} \quad (2)$$

where

- X_{ij} : export from country i to j
- Y_i, Y_j : output in i, j
- Y_W : world output
- T_{ij} : bilateral trade cost (ad valorem)
- Π_i : multilateral trade barrier that i 's exports face in the r.o.w.
- P_j : multilateral trade barrier that j imposes on imports from the r.o.w.
- $\Pi_i^{1-\sigma} = \sum_j \frac{Y_j}{Y_W} \left(\frac{T_{ij}}{P_j} \right)^{1-\sigma}$ and $P_j^{1-\sigma} = \sum_i \frac{Y_i}{Y_W} \left(\frac{T_{ij}}{\Pi_i} \right)^{1-\sigma}$
- σ : elasticity of substitution

The panel estimating equation

take logs and introduce time dimension (assume gravity equation holds in each period)

$$x_{ijt} = y_{it} + y_{jt} - y_t^W + (1 - \sigma)t_{ijt} - (1 - \sigma)\pi_{it} - (1 - \sigma)p_{jt} \quad (3)$$

t_{ijt} is assumed to be

$$t_{ijt} = \delta_1 EU_{ijt} D_{ij} + \delta_2 z_{ijt} + \varepsilon_{ijt} \quad (4)$$

where

$$EU_{ijt} = \begin{cases} 1 & \text{if both } i \text{ and } j \text{ in EU} \\ 0 & \text{if either } i \text{ or } j \text{ or both outside EU} \end{cases} \quad (5)$$

$$D_{ij} = \begin{cases} 1 & \text{if common treatment} \\ [D_{nn}, D_{no}, D_{on}] & \text{if varying treatment} \end{cases} \quad (6)$$

The panel estimating equation

substituting (4) into (3)

$$x_{ijt} = y_{it} + y_{jt} - y_t^W + (1 - \sigma) \delta_1 EU_{ijt} D_{ij} + (1 - \sigma) \delta_2 z_{ijt} + (1 - \sigma) \pi_{it} - (1 - \sigma) p_{jt} + (1 - \sigma) \varepsilon_{ijt} \quad (7)$$

problem: π_{it} and p_{jt} are not observable

The regression equation

$$x_{ijt} = \gamma_{ij} + \delta_t + \beta_1 gdp_{it} + \beta_2 gdp_{jt} + \beta_3 EU_{ijt} D_{ij} + \beta_4 euro_{ijt} + \beta_5 tar_{it} + \beta_6 tar_{jt} + \beta_7 reer_{it} + \beta_8 reer_{jt} + u_{ijt} \quad (8)$$

- the time-invariant part of π_{it} and p_{jt} is controlled for by γ_{ij}
- the time-varying part is controlled for by third-country tariffs and real effective exchange rates
- $\hat{\beta}_3 = (1 - \sigma) \hat{\delta}_1$, where δ_1 is the effect in ad valorem equivalent terms

Timing issues

When does the effect appear?

- mid-2004 enlargement, but annual frequency data
- anticipatory effect in 2003 (Copenhagen Summit Dec 2002)
- isn't it due to earlier liberalization steps?

A solution:

- keep odd years: 1999, 2001, 2003, 2005, 2007
- capture anticipatory effect by leading the treatment dummy (EU_{+2})
- placebo experiment by further leading it (EU_{+4})

Results

EU effect estimates

Variable	Common treatment		Varying treatment	
EU	0.133*** [0.041]	0.071** [0.035]		
EU_new_new			0.357*** [0.087]	0.298*** [0.079]
EU_new_old			0.264*** [0.056]	0.165*** [0.047]
EU_old_new			0.038 [0.053]	0.000 [0.046]
EU(+2)		0.118*** [0.035]		
EU_new_new(+2)				0.167*** [0.059]
EU_new_old(+2)				0.218*** [0.051]
EU_old_new(+2)				0.066** [0.033]
Gravity variables	yes	yes	yes	yes
Country-pair fixed effects	yes	yes	yes	yes
Common year effects	yes	yes	yes	yes
Observations	2310	2310	2310	2310
Number of groups	462	462	462	462
Within R^2	0.66	0.66	0.67	0.67

Notes: Robust standard errors (in brackets) are adjusted for clustering at the direction-specific country-pair level. The sample includes every odd year between 1999-2007. * significant at 10%; ** significant at 5%; *** significant at 1%.

Main findings

- Common treatment shows a 14% trade creation
- equivalent to a 1.5-3.3% ad valorem reduction in trade barriers ($\hat{\delta}_1 = \frac{\hat{\beta}_3}{1-\sigma}$ and take σ between 5 and 10)
- Substantial anticipatory effect
- Large differences across country groups
 - 4-9% for new-new
 - 3-7% for new-old
 - 0-1% for old-new
- Mainly technology-intensive industries (NACE 30-34) are affected

Industry estimates

NACE industry	coef.	s.e.
17 Textiles	0.082	0.064
18 Wearing apparel	-0.098	0.110
19 Leather, luggage, footwear	0.052	0.127
20 Wood, excl. furniture	-0.056	0.094
21 Pulp, paper products	0.144	0.118
22 Publishing, printing	0.468***	0.114
24 Chemical products	0.277***	0.092
25 Rubber and plastic prods	0.133**	0.068
26 Other non-metallic mineral	0.063	0.082
27 Basic metals	0.621***	0.116
28 Fabricated metal prods	0.069	0.084
29 Machinery and equipment	0.124	0.079
30 Office machinery and computers	0.325**	0.161
31 Electrical machinery	0.564***	0.086
32 Radio, tv, communication equip	0.630***	0.150
33 Medical, precision, optical instr	0.401***	0.087
34 Motor vehicles, trailers	0.519***	0.177
35 Other transport equipment	-0.078	0.199
36 Furniture, manufacturing n.e.c.	-0.066	0.117

* sign. at 10%; ** sign. at 5%; *** sign. at 1%.

Placebo experiment is supportive

(as if accession in 2000)

Variable	Common treatment		Varying treatment	
	all years	until 2001	all years	until 2001
EU(+4)	0.058 [0.037]	0.054 [0.049]		
EU_new_new(+4)			0.048 [0.068]	-0.027 [0.093]
EU_new_old(+4)			0.102* [0.053]	0.059 [0.063]
EU_old_new(+4)			0.073* [0.040]	0.040 [0.065]
EU and EU(+2) dummies	yes	no	yes	no
Gravity variables	yes	yes	yes	yes
Country-pair fixed effects	yes	yes	yes	yes
Common year effects	yes	yes	yes	yes
Observations	2310	1386	2310	1386
Number of groups	462	462	462	462
Within R^2	0.66	0.48	0.67	0.49

Notes: Robust standard errors (in brackets) are adjusted for clustering at the direction-specific country-pair level. * sign. at 10%; ** sign. at 5%; *** sign. at 1%.

Results on the margins

Which margin of adjustment is important?

- Does trade expand through the introduction of new products to new markets (extensive margin) or through the intensification of already existing trade (intensive margin)?
- Extensive margin (Hummels and Klenow 2005; Kehoe and Ruhl 2009; Euro effect literature)
- Intensive margin: new trade starts in small and grows with time only conditional on survival (Besedes and Prusa 2007; Eaton et al 2008; Ruhl and Willis 2009; Bernard et al 2009)

Extensive, Surviving and Failure margins

Decomposition in the spirit of Besedes and Prusa (2007) on 6-digit product level

$$X_{ijt} - X_{ijt-2} \equiv d_2 X_{ijt} = \sum_k d_2 X_{ijt,k} = \quad (9)$$

$$\begin{aligned} = EM_{ijt}^{(2)} + SM_{ijt}^{(2)} - FM_{ijt}^{(2)} &= \underbrace{\sum_k X_{ijt,k} \Big|_{X_{ijt,k} > 0, X_{ijt-2,k} = 0}}_{\text{extensive}} - \\ &+ \underbrace{\sum_k d_2 X_{ijt,k} \Big|_{X_{ijt,k} > 0, X_{ijt-2,k} > 0}}_{\text{surviving}} + \\ &- \underbrace{\sum_k X_{ijt-2,k} \Big|_{X_{ijt,k} = 0, X_{ijt-2,k} > 0}}_{\text{failure}} \end{aligned} \quad (10)$$

Estimates on the margins

A decomposition of the total export growth rate in percentage terms is

$$\frac{d_2 X_{ijt}}{X_{ijt-2}} = \frac{SM_{ijt}^{(2)}}{X_{ijt-2}} + \frac{EM_{ijt}^{(2)}}{X_{ijt-2}} - \frac{FM_{ijt}^{(2)}}{X_{ijt-2}} \quad (11)$$

The regression equation is time-differenced and estimation is done for total and for each margin growth rate separately.

Variable	Total	Surviving	Extensive	Failure
d_2 EU	0.055* [0.034]	0.096** [0.045]	-0.007 [0.043]	-0.006 [0.033]
d_2 EU(-2)	0.173*** [0.035]	0.187*** [0.032]	-0.005 [0.068]	-0.100*** [0.018]
d_2 EU(+2)	0.106*** [0.031]	0.150*** [0.040]	0.018 [0.048]	0.067*** [0.018]
d_2 (Gravity variables)	yes	yes	yes	yes
Common year effects	yes	yes	yes	yes
Observations	1848	1848	1848	1848
Adjusted R^2	0.16	0.14	0.05	0.11

Notes: Robust standard errors (in brackets) are adjusted for clustering at the direction-specific country-pair level. The sample includes two-year differences of every odd year between 1999-2007. * significant at 10%; ** significant at 5%; *** significant at 1%.

Findings on the margins

- 'medium-run' effect (2007) is stronger than the immediate effect (2005)
- surviving margin adjustment dominates
- extensive margin plays no role
- sign of pre-enlargement restructuring: increase on the surviving margin parallel with more failures in 2003, then less failures in 2007

Conclusion

Summary

- Despite the presence of an FTA, EU enlargement is shown to have caused further trade creation.
- This might be due to declining trade barriers that form part of the so-called 'border effect'.
- The effect is substantial for some country groups: for new-new it is like a 4-9% decline in tariffs.
- Adjustment happened dominantly in already established trade (surviving margin), in line with other evidence showing that extensive margin growth tends to be small in short horizons.
- Discovering the exact causes is a topic for future research (anticipatory effect and industry differences need to be explained).

Thank you!