Firms' exporting and importing activities: is there a two-way relationship?

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Background I

- Recent international trade literature has emphasized that firm heterogeneity maps into the internationalization choice: only the more productive firm trade
  - this is mainly due the existence of fixed and sunk costs of export and import which induce self-selection
  - trading activities may in turn further affect firm heterogeneity
  - evidence is of relatively limited effects in the case of export, while they are positive and significant in the case of import
    - Import and productivity (Halpern et al., 2011)
    - Import and product scope (Goldberg et al. 2010)

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Background II

- One recurrent result is that **most traders tend to be engaged in both importing and exporting activities**
  - And such two-way traders are more productive than non-traders or one-way traders
- The **joint occurrence of both import and export** and the level of the firms has been explained by
  - **cost complementarities** (Kashara and Lapham, 2010): doing both export and import allows to save on fixed and sunk costs
  - **imported intermediates** allow the firm to **lower costs** (KL, 2010, HKS, 2011, $\cdots$) or **increase product scope** (Goldberg et al., 2010) which in turn foster exports
  - **exporting** may induce firms to buy foreign inputs since **opens up information channels**
  - selling in foreing markets may require **product adaptation which benefit from foreign inputs**
  - offshoring and fragmentation of production

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Background III

- Previous empirical work addressing the link between import and export has found evidence
    - of cost complementarities and that import protection may cause export destruction in Chile (Kashara and Lapham, 2010),
    - that imports affect firms' exporting activity (Bas and Strauss-Kahn, 2010; Lo Turco and Maggioni, 2011)
    - A two-way causality between firms' import and export in Belgium (Muuls and Pisu, 2009)
- Using data from 27 ECA countries, this paper investigates
    - to what extent export and import are determined by common factors
    - whether there is a direction of causation from one to the other
    - what are the mechanisms

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Data

- Firm-level data from the World Bank Business Environment and Enterprise Performance Survey (BEEPS)
    - cover firms from Eastern European and Central Asian countries (ECA surveys), both from the manufacturing and service sectors (not used in this analysis), for the years 2002, 2005 and 2008
    - the Surveys use standardized survey instruments and a uniform sampling methodology to obtain comparable data and, most importantly, they are designed to provide panel data sets.
    - limitations of the BEEPS data are that
        - answers are directly provided by the managers of the firms and may be subjective
        - a large number of missing observations characterizes some significant variables
    - For the purpose of this analysis, we focus on
        - manufacturing firms from 27 ECA countries (excluding Turkey)
        - two cross sections of data (2008 and 2005 with 3-year lagged explanatory vars) for 975 firms and a total of 1085 observations (for only 110 we have more than 1 cross-sectional observation)

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Data I

Table: Sample composition, by year and trade status

Year	Total	Non Traders	Export -only	Import -only	Two-way traders	
	abs. #			percentage values		
2005	371	27.4	7.2	28.5	36.6	100
2008	714	25.2	5.6	37.8	31.3	100
Total	1,085	25.9	6.1	34.6	33.1	100

Data II

Country	Total	Non traders	Export -only	Import -only	Two-way traders	
	abs. #			percentage values		
Albania	33	18	3	42	36	100
Armenia	67	15	1	54	30	100
Azerbaijan	70	47	4	40	9	100
Belarus	29	10	0	59	31	100
Bosnia	26	19	4	35	42	100
Bulgaria	46	22	9	30	39	100
Croatia	31	10	3	48	39	100
Czech Rep.	16	6	6	25	63	100
Estonia	21	10	5	38	48	100
FYROM	44	11	5	39	45	100
Georgia	31	19	13	26	42	100
Hungary	32	22	6	22	50	100
Kazakhstan	51	55	0	33	12	100
Kyrgyz	37	38	5	32	24	100
Total	1,085	26	6	35	33	100

Country	Total	Non traders	Export -only	Import -only	Two-way traders	
	abs. #			percentage values		
Kyrgyz	37	38	5	32	24	100
Latvia	24	25	13	17	46	100
Lithuania	24	21	4	21	54	100
Moldova	75	24	11	45	20	100
Montenegro	2	0	0	100	0	100
Poland	44	32	11	27	30	100
Romania	74	36	5	42	16	100
Russia	22	23	9	45	23	100
Serbia	60	17	8	10	65	100
Slovakia	17	0	18	6	76	100
Slovenia	41	5	2	7	85	100
Tajikistan	33	33	9	39	18	100
Ukraine	90	34	7	37	22	100
Uzbekistan	45	44	7	36	13	100
Total	1,085	26	6	35	33	100

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Data III

Table: Transition matrix across trade status

<table>
<tr><td rowspan="2"></td><td rowspan="2"></td><td colspan="5">Trade status _t</td></tr>
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		Non traders	Export -only	Import -only	Two-way traders	Total
				absolute numbers		
	Non trader	173	6	103	14	296
	Exporter-only	16	26	12	25	79
Trade Status $_{t-3}$	Importer-only	65	11	188	67	331
	Two-way trader	28	24	73	254	379
	Total	282	67	376	360	1085
				percentage values		
	Non trader	58.5	2.0	34.8	4.7	100.0
	Exporter-only	20.3	32.9	**15.2**	**31.7**	100.0
	Importer-only	19.6	3.3	56.8	**20.2**	100.0
	Two-way trader	7.4	6.3	**19.3**	67.0	100.0
	Total	26.0	6.2	34.7	33.2	100.0

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Table: Descriptive statistics

	Obs.	Non traders	Export -only	Import -only	Two-way traders	Total
		column percentages				
Small (<20)		49.65	20.9	39.1	11.39	31.52
Medium (20-99)		36.88	52.24	36.44	33.61	36.59
Large (100 and over)		13.48	26.87	24.47	55	31.89
		100	100	100	100	100
		average values				
N. employees	1083	69.16	153.01	87.27	250.71	140.82
Sales per worker (in logs)	930	12.10	12.22	12.51	13.10	12.59
=1 if foreign owned, 0 otherwise	1077	0.05	0.26	0.16	0.32	0.19
=1 if State owned, 0 otherwise	1077	0.10	0.05	0.10	0.12	0.10
=1 if introduced new pdt	1085	0.39	0.61	0.57	0.71	0.57
% of white collar workers	1052	29.7%	27.4%	28.0%	29.0%	28.8%

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Empirical model

Our empirical model takes the following form:

$$exp_{it} = \left\{ \begin{array}{ll} 1 & \text{if } exp^*_{it} > 0 \\ 0 & \text{if } exp^*_{it} \leq 0 \end{array} \right. \qquad \text{and} \qquad imp_{it} = \left\{ \begin{array}{ll} 1 & \text{if } imp^*_{it} > 0 \\ 0 & \text{if } imp^*_{it} \leq 0 \end{array} \right. \tag{1}$$

with

$$\left\{ \begin{array}{l} exp^*_{it} = \delta_1 imp_{i,t-3} + \mathbf{x}'_{i,t-3}\beta_1 + \varepsilon_{1it} \\ imp^*_{it} = \delta_2 exp_{i,t-3} + \mathbf{x}'_{i,t-3}\beta_2 + \varepsilon_{2it} \end{array} \right. \tag{2}$$

where the vector of control variables is

$$\mathbf{x}_{i,t-3} = (\text{productivity}_{i,t-3}, \text{size}_{i,t-3}, \text{other}_{i,t-3}, \text{country}_j, \text{sector}_s) \tag{3}$$

and the the error terms are normally distributed with a zero mean, variance equal to 1 and ρ denoting their covariance term

$$\left(\begin{array}{c} \varepsilon_{1it} \\ \varepsilon_{2it} \end{array} \right) \sim N \left[\left(\begin{array}{c} 0 \\ 0 \end{array} \right), \left(\begin{array}{cc} 1 & \rho \\ \rho & 1 \end{array} \right) \right] \tag{4}$$

Table: A two way link between firms' exporting and importing activities, bivariate probit, static model

	(1)		(4)		(5)	
	Export(d)$_{it}$	Import(d)$_{it}$	Export(d)$_{it}$	Import(d)$_{it}$	Export(d)$_{it}$	Import(d)$_{it}$
Import (d)$_{i,t-3}$	0.5884***		0.3434***		0.2337*	
	(0.111)		(0.131)		(0.134)	
Export (d)$_{i,t-3}$		0.2377**		-0.0437		-0.1527
		(0.113)		(0.139)		(0.145)
Small (d)$_{i,t-3}$			-1.2491***	-0.9723***	-1.1295***	-0.9340***
Medium (d)$_{i,t-3}$			-0.5324***	-0.6249***	-0.4882***	-0.6332***
Sales per worker (d)$_{i,t-3}$			0.2136***	0.0952**	0.2176***	0.0997**
Product innovation (d)$_{i,t-3}$					0.1888*	0.1111
Foreign-owned(d)$_{i,t-3}$					0.5888***	0.3619**
State-owned(d)$_{i,t-3}$					0.0602	-0.0999
Share of white collars (d)$_{i,t-3}$					-0.1838	0.1169
Year 2008 (d)	-0.1445	0.1480	-0.1910	0.1726	-0.1338	0.2341*
Constant	-5.6266***	5.5631***	-2.2789***	0.7021	-2.5624***	0.4229
ρ	0.2221***		0.2291**		0.2659***	
Sector fixed effects	Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes	
N. observations	1085		841		797	

Econometric results II

Table: A two way link between firms' exporting and importing activities, bivariate probit, static model

	(1)		(3)		(4)	
	Export (d)$_{it}$	Import (d)$_{it}$	Export (d)$_{it}$	Import (d)$_{it}$	Export (d)$_{it}$	Import (d)$_{it}$
Import (d)$_{i,t-3}$	0.234*		0.188		0.181	
	(0.134)		(0.136)		(0.150)	
Export (d)$_{i,t-3}$		-0.153		-0.148		-0.194
		(0.145)		(0.148)		(0.160)
Sales per worker (log)$_{i,t-3}$	0.218***	0.100**	0.204***	0.089**	0.272***	0.132***
Sales per worker (log)$_{i,t}$					0.131***	0.069
Product innovation (d)$_{i,t-3}$	0.189*	0.111	0.097	0.045	0.108	0.064
Product innovation (d)$_{i,t}$			0.599***	0.457***	0.552***	0.468***
Small (d)$_{i,t-3}$	-1.129***	-0.934***	-1.162***	-0.929***	-1.267***	-0.835***
Medium (d)$_{i,t-3}$	-0.488***	-0.633***	-0.522***	-0.646***	-0.502***	-0.673***
Foreign-owned (d)$_{i,t-3}$	0.589***	0.362**	0.592***	0.343**	0.592***	0.445***
State-owned (d)$_{i,t-3}$	0.060	-0.100	0.114	-0.067	0.161	-0.002
Share of white collars (d)$_{i,t-3}$	-0.184	0.117	-0.220	0.107	-0.492*	0.070
Year 2008 (d)	-0.134	0.234*	-0.217	0.167	-0.320**	0.152
Constant	-2.562***	0.423	-2.604***	0.381	-4.811***	-1.159
Contry fixed effects	Yes		Yes		Yes	
Sector fixed effects	Yes		Yes		Yes	
ρ	0.266***		0.223**		0.225**	
Log-likelihood	410.5		430.2		391.8	
N. observations	797		797		684	

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Econometric results III

Table: A two way link between firms' exporting and importing activities, bivariate probit, dynamic model

	(1)		(3)		(4)	
	Export (d)$_{it}$	Import (d)$_{it}$	Export (d)$_{it}$	Import (d)$_{it}$	Export (d)$_{it}$	Import (d)$_{it}$
Import (d)$_{i,t-3}$	0.257**	0.765***	0.191	0.731***	0.200	0.761***
	(0.126)	(0.119)	(0.145)	(0.119)	(0.145)	(0.131)
Export (d)$_{i,t-3}$	1.345***	-0.040	1.388***	-0.059	1.411***	-0.096
	(0.130)	(0.125)	(0.135)	(0.126)	(0.151)	(0.139)
Sales per worker (log)$_{i,t-3}$	0.211***	0.084**	0.199***	0.074*	0.258***	0.111**
Sales per worker (log)$_{i,t}$					0.089*	0.059
Product innovation (d)$_{i,t-3}$	0.095	0.058	-0.004	0.004	0.029	0.028
Product innovation (d)$_{i,t}$			0.670***	0.395***	0.654***	0.425***
Small (d)$_{i,t-3}$	-0.623***	-0.718***	-0.651***	-0.736***	-0.766***	-0.611***
Medium (d)$_{i,t-3}$	-0.337**	-0.514***	-0.376***	-0.536***	-0.417***	-0.545***
Foreign-owned (d)$_{i,t-3}$	0.221	0.171	0.220	0.168	0.200	0.260
State-owned (d)$_{i,t-3}$	0.065	-0.100	0.107	-0.072	0.064	-0.004
Share of white collars (d)$_{i,t-3}$	-0.356	0.118	-0.412	0.114	-0.642**	0.041
Year 2008 (d)	-0.202	0.234*	-0.311**	0.181	-0.455***	0.163
Constant	-3.394***	-0.044	-3.518***	-0.023	-5.007***	-1.374
ρ	0.298***		0.254***		0.251***	
Contry fixed effects	Yes		Yes		Yes	
Sector fixed effects	Yes		Yes		Yes	
Log-likelihood	582.6		608.5		542.4	
N. observations	797		797		684	

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Econometric results IV

Table: A two way link between firms' exporting and importing activities, dynamic bivariate tobit model

	(1)		(2)	
	Export (%)$_{it}$	Import (%)$_{it}$	Export (%)$_{it}$	Import (%)$_{it}$
Import (%)$_{i,t-3}$	0.089*	0.548***	0.071	0.488***
	(0.047)	(0.052)	(0.052)	(0.056)
Export (%)$_{i,t-3}$	0.824***	-0.035	0.836***	-0.023
	(0.052)	(0.055)	(0.057)	(0.060)
Sales per worker (d)$_{i,t-3}$	7.843***	0.892	8.158***	1.564
Sales per worker (d)$_{i,t}$			3.477***	1.605
Product innovation (d)$_{i,t-3}$	2.791	3.189	1.092	-0.655
Product innovation (d)$_{i,t}$			15.585***	15.193***
Small (d)$_{i,t-3}$	-24.031***	-15.406***	-22.358***	-12.655**
Medium (d)$_{i,t-3}$	-10.215**	-10.809***	-8.339**	-10.319**
Foreign-owned (d)$_{i,t-3}$	8.788**	3.568	(7.723)	5.556
State-owned (d)$_{i,t-3}$	(2.479)	-3.82	(4.520)	-2.421
Share of white collars (d)$_{i,t-3}$	-(0.435)	7.538	-(4.377)	5.34
Year 2008 (d)	-10.845***	3.51	-13.314***	1.803
Constant	-198.186***	8.995	-278.481***	-40.123
σ_1	35.57***		34.375***	
σ_2	42.435***		41.719***	
ρ_{12}	0.135***		0.096*	
LR test of $\rho_{12} = 0$	7.41		3.2	
p-value (chi2(1))	0.0383		0.0738	
Country fixed effects	Yes		Yes	
Sector fixed effects	Yes		Yes	
N. of observations	762		658	

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Concluding remarks

In a large sample of firms from ECA countries, we find that

- Export is a rarer than importing (directly and indirectly)
- A large fraction of internationalised firms are engaged in both importing and exporting activities (two-way traders)
- These two-way traders are the largest and more productive
- Import affects export but exporting does not foster import (once accounted for size and productivity)
    - the effect of importing on exporting seems to be channaled through increases in product innovation and productivity

- Our results are consistent with
    - self-selection: size & productivity $\rightarrow$ both importing & exporting
    - **importing** $\rightarrow$ product innovation (& higher productivity) $\rightarrow$ **exporting**