Climbing the Rungs of the Quality Ladder: FDI and Domestic Exporters in Romania

Matej Bajgar [1] Beata Javorcik [2]

[1]OECD and University of Oxford

[2]University of Oxford

matej.bajgar@oecd.org

October 6, 2015

Motivation

- Quality and sophistication of exports positively correlated with level of development (Schott, 2004; Hummels and Klenow, 2005)
- Countries exporting more sophisticated goods grow faster (Hausmann, Hwang, and Rodrik, 2007; Hidalgo and Hausmann, 2009)
- If "you become what you export" is indeed true, how can countries facilitate export upgrading?
- Can FDI inflows help?

How can FDI affect the quality of exports?

Downstream FDI

- Incentive to upgrade to become supplier
- Help from MNEs to suppliers

Upstream FDI

- Higher quality inputs lead to higher quality output (Kugler and Verhoogen, 2012)
- If there is fixed cost of importing, smaller firms may be unable to access imported inputs

Own-sector FDI

- Demonstration effects
- Worker flows (Poole, 2012)

How can FDI affect the quality of exports?

Downstream FDI

- Incentive to upgrade to become supplier
- Help from MNEs to suppliers

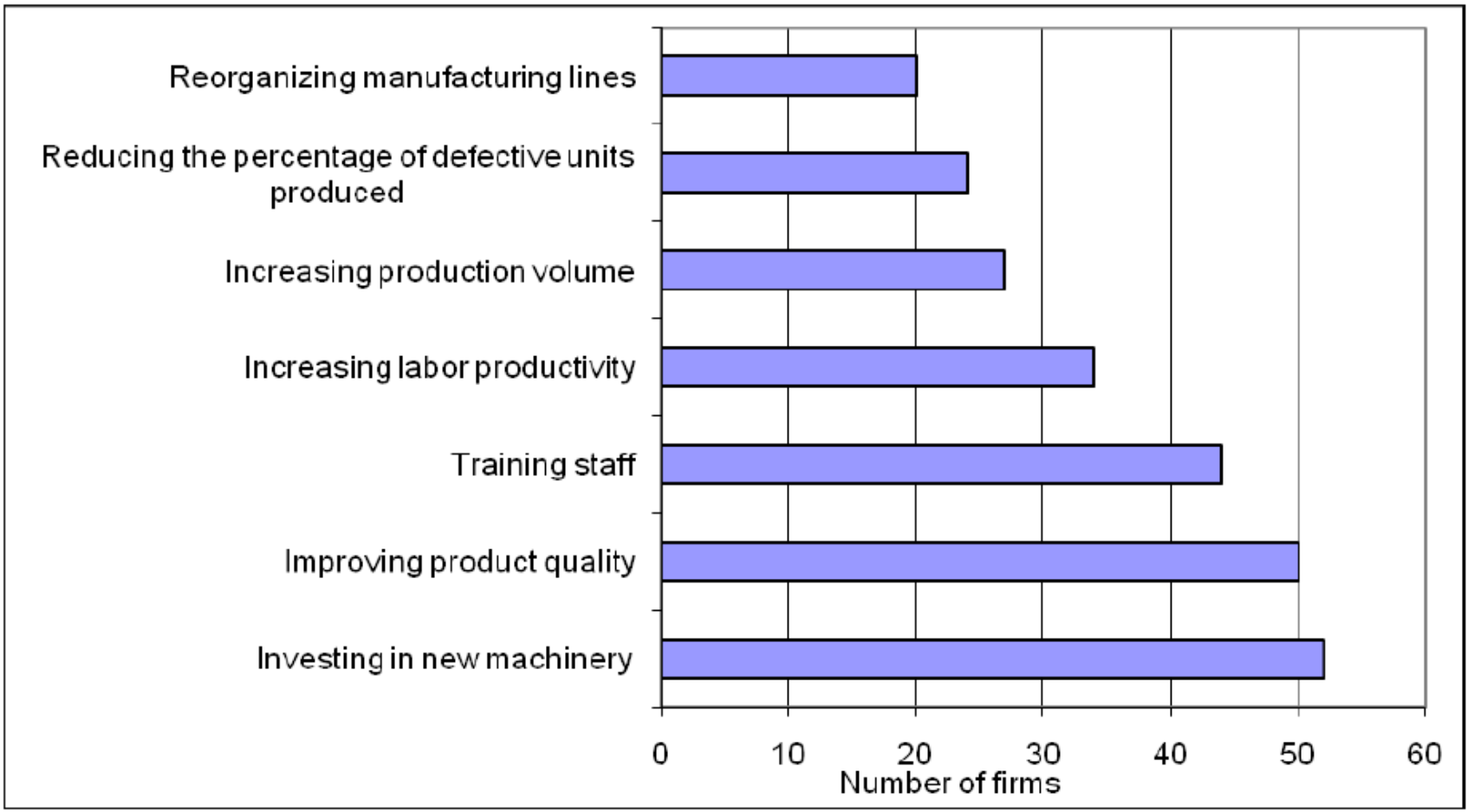
Upstream FDI

- Higher quality inputs lead to higher quality output (Kugler and Verhoogen, 2012)
- If there is fixed cost of importing, smaller firms may be unable to access imported inputs

Own-sector FDI

- Demonstration effects
- Worker flows (Poole, 2012)

Improvements undertaken by Czech firms in order to supply MNEs



Source: Javorcik (2008).

How can FDI affect the quality of exports?

Downstream FDI

- Incentive to upgrade to become supplier
- Help from MNEs to suppliers

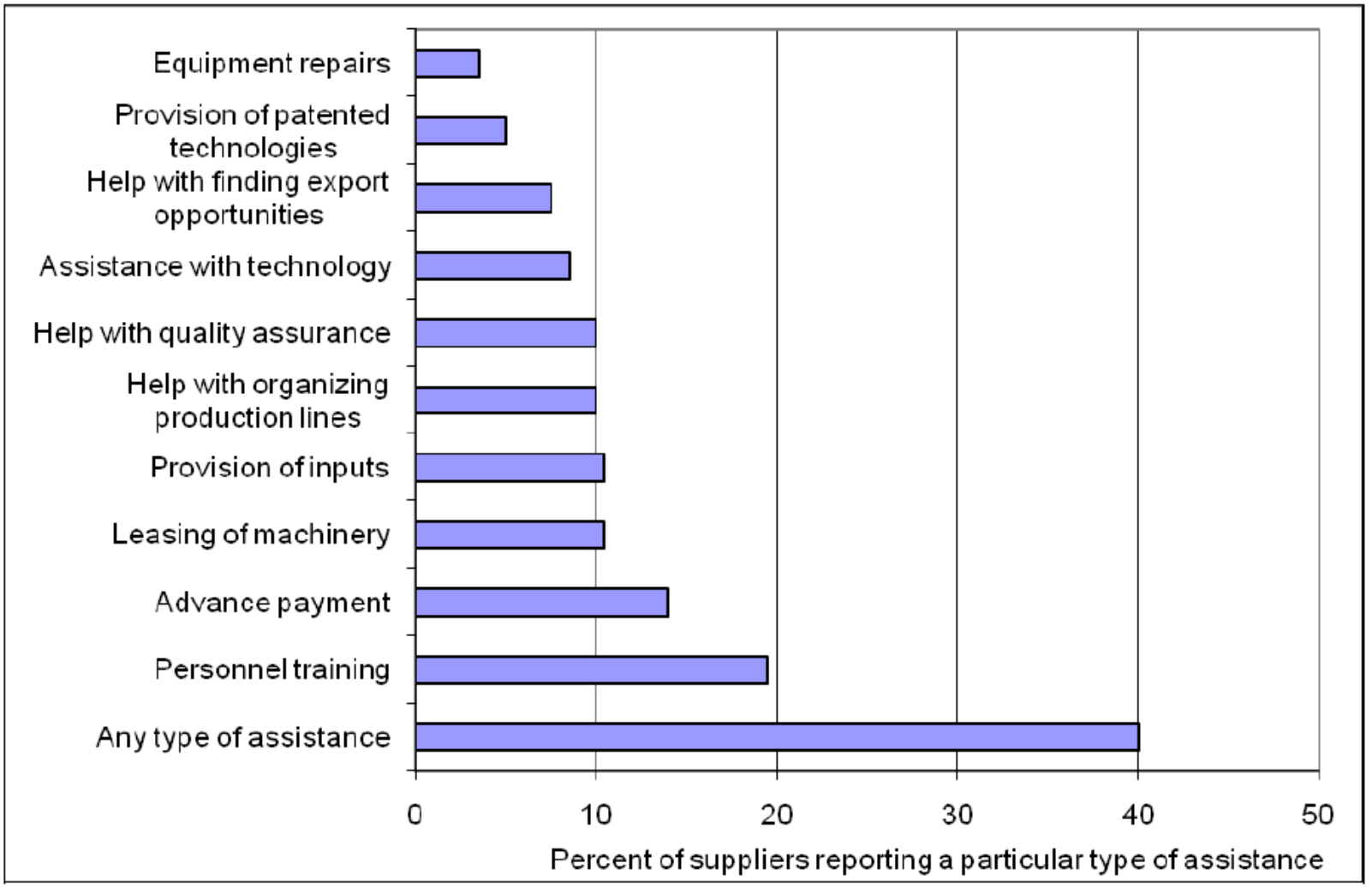
Upstream FDI

- Higher quality inputs lead to higher quality output (Kugler and Verhoogen, 2012)
- If there is fixed cost of importing, smaller firms may be unable to access imported inputs

Own-sector FDI

- Demonstration effects
- Worker flows (Poole, 2012)

Assistance received by Czech firms from MNEs



Source: Javorcik (2008).

How can FDI affect the quality of exports?

Downstream FDI

- Incentive to upgrade to become supplier
- Help from MNEs to suppliers

Upstream FDI

- Higher quality inputs lead to higher quality output (Kugler and Verhoogen, 2012)
- If there is fixed cost of importing, smaller firms may be unable to access imported inputs

Own-sector FDI

- Demonstration effects
- Worker flows (Poole, 2012)

How can FDI affect the quality of exports?

Downstream FDI

- Incentive to upgrade to become supplier
- Help from MNEs to suppliers

Upstream FDI

- Higher quality inputs lead to higher quality output (Kugler and Verhoogen, 2012)
- If there is fixed cost of importing, smaller firms may be unable to access imported inputs

Own-sector FDI

- Demonstration effects
- Worker flows (Poole, 2012)

Preview of results

- Results consistent with Romanian exporters upgrading the quality of export products thanks to
  - supplying downstream MNEs
  - access to inputs from upstream MNEs
- The effect of downstream FDI driven by
  - non-final products
  - products with larger scope for quality differentiation
  - firms with high productivity and product quality

Talk outline

Romanian data

Firm panel, 2005-2010

- All firms with >20 employees, sample of smaller firms
- Final sample 15,000 domestic and 5,000 foreign manufacturing firms

Customs data, 2006-2011

- Exports by firm, year, 8-digit product and destination
- Final sample 65,000 domestic and 142,000 observations

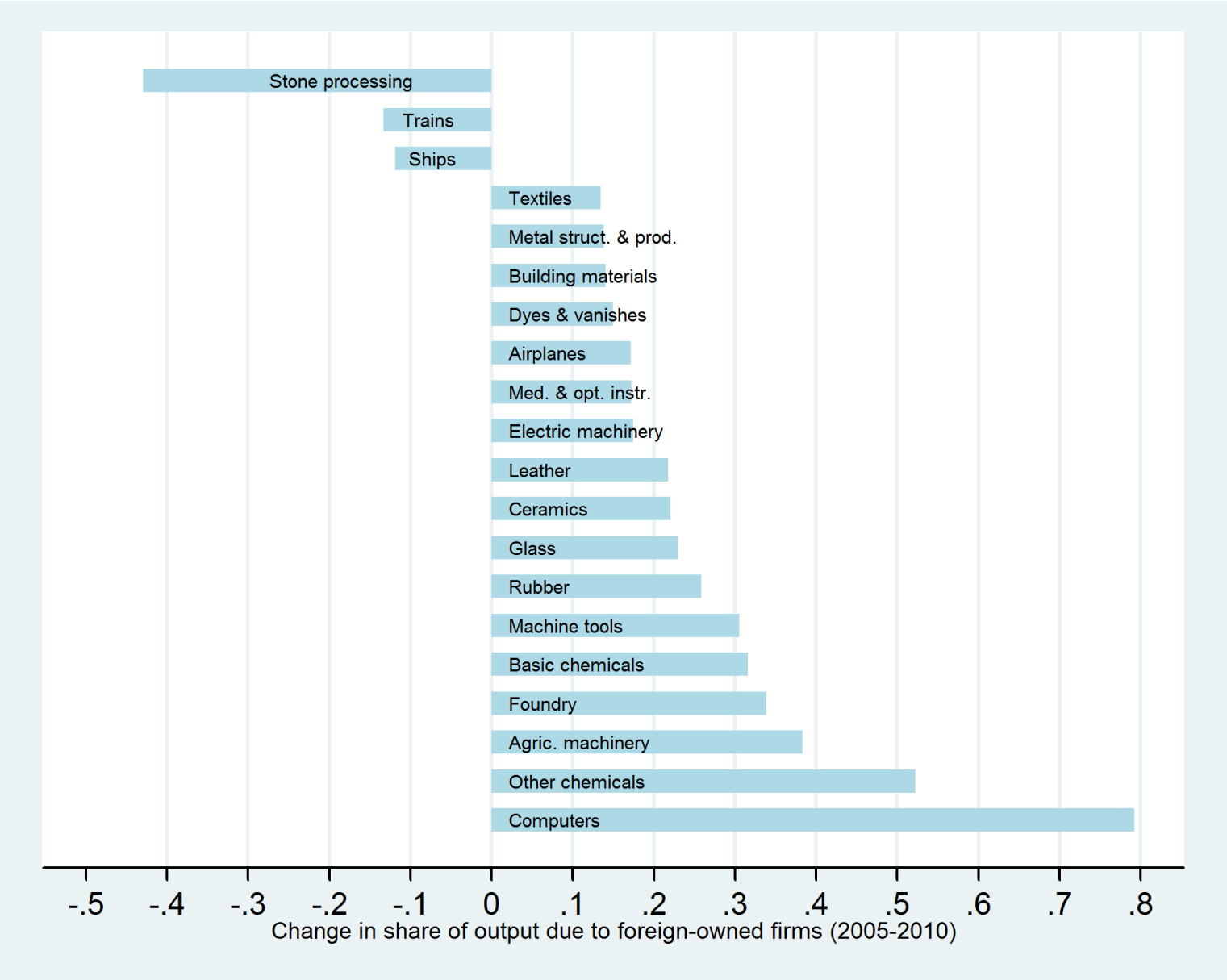
Input-output table

- 58 manufacturing industries

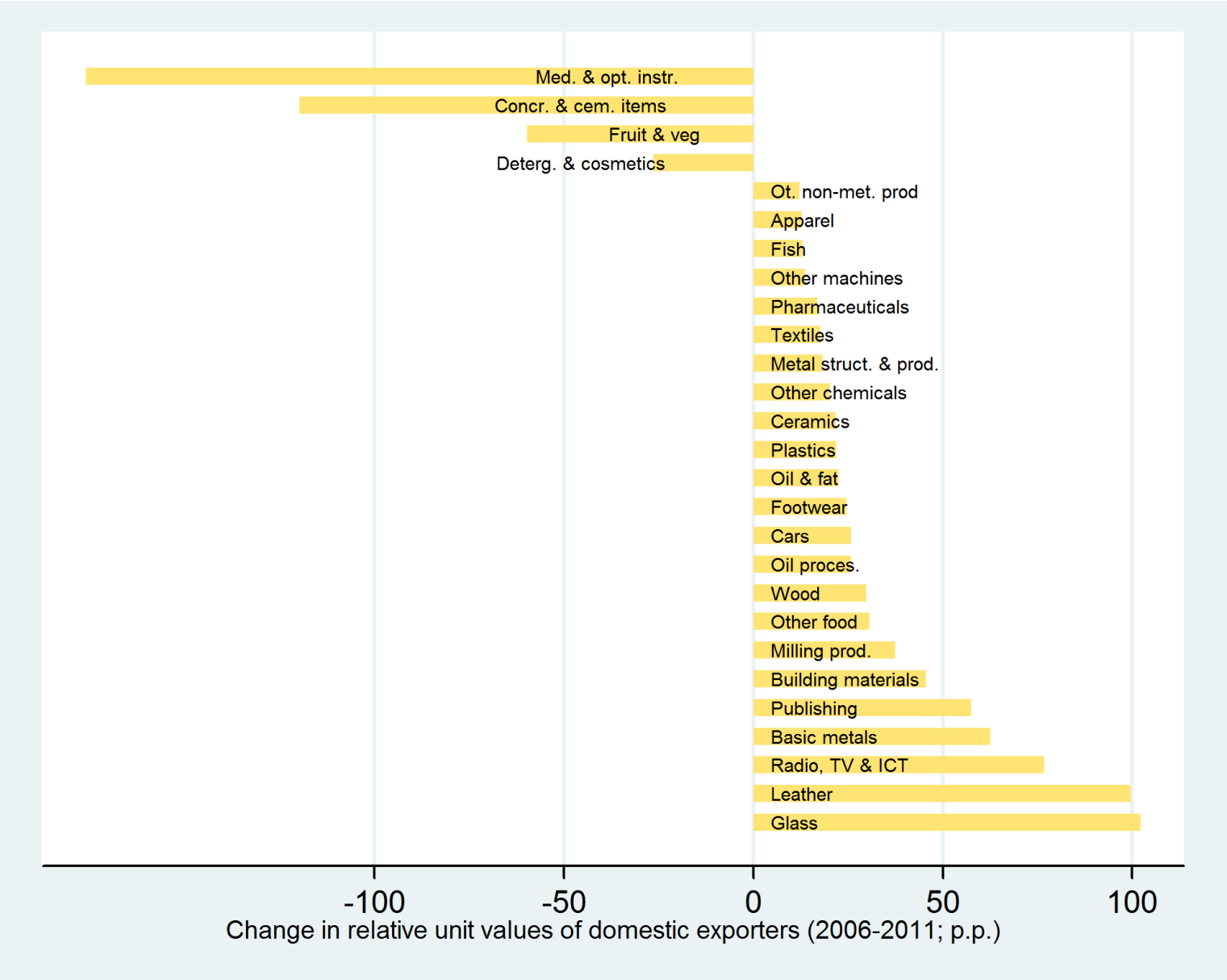
Romania (2005-2010)

- Manufacturing — 30% of value added
- GDP p.c. PPP — 36% of EU average
- FDI inflows — 5.5% of GDP
- Foreign share of output in average manufacturing industry
  - 2005 — 55%
  - 2010 — 62%
- Median unit values of domestic exporters relative to EU15 (%)
  - 2006 — 70%
  - 2011 — 82%

Industries with largest changes in foreign presence (2005-2010)



Industries with largest changes in unit values relative to EU15 (2005-2010)



Specification

$$\Delta log(UV)_{ipct} = \beta_3 \Delta FDI^{down}_{s,t-1} + \alpha_t + \beta_2 \Delta FDI^{up}_{s,t-1} + \beta_1 \Delta FDI^{own}_{s,t-1} + \alpha_s + \alpha_r + \epsilon_{ipt}$$

- Export unit values as proxy for quality (Schott, 2004; Hummels, Klenow, 2005; Hallak, 2006&2010)
- Also examine import unit values (Kugler, Verhoogen, 2010; Manova, Zhang, 2010)
- Observations by firm, 8-digit product, destination and year
- Domestic manufacturing exporters
- First and second differences, also try levels and third differences
- Clustering by industry-year

FDI variables

Own-industry foreign share

- FDI_{st}^{own} = share of sectoral output due to foreign-owned firms

Downstream-industry foreign share

- $FDI_{st}^{down} = \sum_{d \in sectors} downlink_{sd} FDI_{dt}^{own}$
- $downlink_{sd}$ = share of intermediate inputs sales by sector s sold to sector d

Upstream-industry foreign share

- $FDI_{st}^{up} = \sum_{u \in sectors} uplink_{us} FDI_{ut}^{own}$
- $uplink_{us}$ = share of intermediate inputs sector s buys from sector u

Baseline

	(1)	(2)	(3)	(4)
	Levels	First diff.	Second diff.	Third diff.
(Δ) Downstream FDI (s,t-1)	0.759***	0.388**	0.957***	1.076***
	(0.193)	(0.178)	(0.282)	(0.401)
(Δ) Upstream FDI (s,t-1)	0.178**	0.296***	0.161	0.576***
	(0.078)	(0.109)	(0.171)	(0.195)
(Δ) Own FDI (s,t-1)	-0.210**	-0.074	-0.361**	0.005
	(0.082)	(0.108)	(0.151)	(0.250)
Year FE	Yes	Yes	Yes	Yes
Firm-product-destination FE	Yes	No	No	No
Industry and region FE	No	Yes	Yes	Yes
R-squared	0.084	0.011	0.016	0.014
N	65052	50717	25579	9469

**** 99%, ** 95%, * 90%.*

Magnitudes

- Increase in FDI^{down} in 2005-2010 implies **2.5-6%** increase in UV
- Increase in FDI^{up} in 2005-2010 implies **1-3.5%** increase in UV

Strict exogeneity test

	First differences
	(1)
Δ Downstream FDI (s,t-1)	0.474
	(0.374)
Δ Downstream FDI (s,t)	0.939**
	(0.453)
Δ Downstream FDI (s,t+1)	0.184
	(0.312)
Δ Upstream FDI (s,t-1)	0.333***
	(0.102)
Δ Upstream FDI (s,t)	-0.342**
	(0.134)
Δ Upstream FDI (s,t+1)	0.005
	(0.151)
Δ Own FDI (s,t-1)	-0.224
	(0.166)
Δ Own FDI (s,t)	-0.327*
	(0.190)
Δ Own FDI (s,t+1)	-0.024
	(0.177)
Year FE	Yes
Industry and region FE	Yes
R-squared	0.016
N	30546

**** 99%, ** 95%, * 90%. Strict exogeneity test described by Wooldridge, 2010.*

Controlling for international prices

	First differences		Second differences	
	Baseline	Int. prices control	Baseline	Int. prices control
	(1)	(2)	(3)	(4)
Δ Downstream FDI (s,t-1)	0.388**	0.399**	0.957***	0.960***
	(0.178)	(0.177)	(0.282)	(0.284)
Δ Upstream FDI (s,t-1)	0.296***	0.294***	0.161	0.149
	(0.109)	(0.109)	(0.171)	(0.172)
Δ Own FDI (s,t-1)	-0.074	-0.078	-0.361**	-0.356**
	(0.108)	(0.107)	(0.151)	(0.152)
Δ Log UV of EU exports (p,t)		0.003		0.007*
		(0.002)		(0.004)
Year FE	Yes	Yes	Yes	Yes
Industry and region FE	Yes	Yes	Yes	Yes
R-squared	0.011	0.011	0.016	0.016
N	50716	50716	25579	25579

**** 99%, ** 95%, * 90%.*

Does stage of production matter?

- Quality of both intermediate and final goods likely to be affected by MNE presence in sectors supplying inputs
- Quality of intermediates likely to be affected by MNC presence in downstream sectors

By stage of production

	First differences		Second differences	
	Non-final	Final	Non-final	Final
	(1)	(2)	(3)	(4)
Δ Downstream FDI (s,t-1)	0.772***	-0.290	1.527***	0.582
	(0.242)	(0.240)	(0.405)	(0.477)
Δ Upstream FDI (s,t-1)	0.207	0.358***	0.565**	-0.067
	(0.201)	(0.126)	(0.245)	(0.197)
Δ Own FDI (s,t-1)	-0.317	0.243**	-0.944***	-0.023
	(0.228)	(0.117)	(0.229)	(0.148)
Year FE	Yes	Yes	Yes	Yes
Industry and region FE	Yes	Yes	Yes	Yes
R-squared	0.007	0.018	0.016	0.019
N	20238	29145	9963	15000

**** 99%, ** 95%, * 90%.*

By quality ladder length (Khandelwal, 2010)

- Estimates quality as ability to sell more for a given price
- Length of quality ladder = max(quality) - min(quality)
- Measures scope for quality improvement

By quality ladder length

	First differences		Second differences	
	Long	Short	Long	Short
	(1)	(2)	(3)	(4)
Δ Downstream FDI (s,t-1)	0.654***	-0.348	0.972***	1.049
	(0.166)	(0.380)	(0.291)	(0.693)
Δ Upstream FDI (s,t-1)	0.287**	0.295*	0.533***	-0.116
	(0.130)	(0.156)	(0.163)	(0.216)
Δ Own FDI (s,t-1)	-0.173	0.196	-0.567***	-0.195
	(0.155)	(0.154)	(0.159)	(0.282)
Year FE	Yes	Yes	Yes	Yes
Industry and region FE	Yes	Yes	Yes	Yes
R-squared	0.008	0.016	0.017	0.015
N	23943	24396	11736	12823

**** 99%, ** 95%, * 90%.*

By initial UV, TFP and revenue quartiles

Should all Romanian producers benefit equally?

- Allow for heterogeneous effects based on initial UV, TFP and revenue quartile
- Initial quartile calculated based on first period in which firm or firm-product-destination observed
- Regressions include only observations 2 and more years after such initial period

By initial UV, TFP and revenue quartiles - Downstream

	First differences			Second differences		
	UV	TFP	SIZE	UV	TFP	SIZE
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Downstream FDI (s,t-1) * Top quartile	1.083***	0.388*	0.340*	1.623***	1.025***	0.701**
	(0.246)	(0.221)	(0.195)	(0.564)	(0.361)	(0.299)
Δ Downstream FDI (s,t-1) * Quartile 2	0.552	0.740**	0.313	1.646***	0.755**	1.933***
	(0.404)	(0.311)	(0.534)	(0.605)	(0.373)	(0.723)
Δ Downstream FDI (s,t-1) * Quartile 3	0.429	0.518	1.363**	0.419	1.479*	2.616**
	(0.320)	(0.425)	(0.689)	(0.699)	(0.773)	(1.030)
Δ Downstream FDI (s,t-1) * Quartile 4	-0.453	0.200	2.135	-0.213	0.710	5.748
	(0.356)	(0.287)	(1.815)	(0.697)	(0.580)	(3.699)
Δ Upstream FDI (s,t-1), by quartiles	Yes	Yes	Yes	Yes	Yes	Yes
Δ Own FDI (s,t-1), by quartiles	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry, region and quartile FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.013	0.012	0.013	0.018	0.017	0.018
N	39033	47784	48661	20599	24171	24626

**** 99%, ** 95%, * 90%. For each firm-product-destination, table includes only observations from 2+ years after initial exports.*

Import unit values and FDI

- Export unit values — may capture mark-ups
- Import unit values
  - Do not depend on mark-ups
  - Higher-quality output requires higher-quality inputs
  - Complementarity between domestic and imported inputs
  - Competitive pressure leads to importing cheaper inputs
- Estimation
  - Same data and methodology as before
  - Observations by firm, 8-digit product and year

Import unit values and FDI

	First differences		Second differences	
	(1)	(2)	(3)	(4)
	Exporters	All firms	Exporters	All firms
Δ Downstream FDI (s,t-1)	0.273**	0.208*	0.453**	0.439**
	(0.133)	(0.114)	(0.215)	(0.222)
Δ Upstream FDI (s,t-1)	0.127	0.214***	0.191	0.307**
	(0.086)	(0.072)	(0.146)	(0.124)
Δ Own FDI (s,t-1)	-0.199*	-0.184**	-0.411***	-0.399***
	(0.106)	(0.085)	(0.151)	(0.147)
Year FE	Yes	Yes	Yes	Yes
Industry and region FE	Yes	Yes	Yes	Yes
R-squared	0.005	0.005	0.005	0.004
N	110924	135144	70638	84709

**** 99%, ** 95%, * 90%.*

Conclusion

- Results consistent with Romanian exporters upgrading the quality of export products thanks to
  - supplying downstream MNEs
  - access to inputs from upstream MNEs
- The effect of downstream FDI driven by
  - non-final products
  - products with larger scope for quality differentiation
  - firms with high productivity and product quality
- New policies for quality upgdading?
  - FDI promotion
  - facilitation of supplier-buyer relationship with MNEs

Robustness checks - FDI variables one by one

	First differences			
	(1)	(2)	(3)	(4)
	Baseline	One by one	One by one	One by one
Δ Downstream FDI (s,t-1)	0.388**	0.457***		
	(0.178)	(0.127)		
Δ Upstream FDI (s,t-1)	0.296***		0.374***	
	(0.109)		(0.098)	
Δ Own FDI (s,t-1)	-0.074			0.140
	(0.108)			(0.091)
Year FE	Yes	Yes	Yes	Yes
Industry and region FE	Yes	Yes	Yes	Yes
Destination FE	No	No	No	No
R-squared	0.011	0.011	0.011	0.011
N	50717	50717	50717	50779

**** 99%, ** 95%, * 90%.*

Robustness checks - destination trends, imports, firm-product level

	First differences			
	(1)	(2)	(3)	(4)
	Dest. fixed effects	Ind. imports control	Firm imports control	Firm-prod. level
Δ Downstream FDI (s,t-1)	0.386**	0.466**	0.423**	0.767**
	(0.175)	(0.189)	(0.177)	(0.302)
Δ Upstream FDI (s,t-1)	0.305***	0.181*	0.310***	0.317**
	(0.108)	(0.104)	(0.114)	(0.149)
Δ Own FDI (s,t-1)	-0.073	-0.069	-0.100	0.015
	(0.107)	(0.107)	(0.110)	(0.126)
Δ Log industry imports (st)		0.095***		
		(0.022)		
Δ Log firm imports (it)			0.003	
			(0.004)	
Year FE	Yes	Yes	Yes	Yes
Industry and region FE	Yes	Yes	Yes	Yes
Destination FE	Yes	No	No	No
R-squared	0.011	0.012	0.012	0.009
N	50717	50717	47102	32331

**** 99%, ** 95%, * 90%.*

By origin of FDI

	First differences		Second differences	
	Rich	EU	Rich	EU
	(1)	(2)	(3)	(4)
Δ Downstream FDI from ... countries (s,t-1)	0.435**	0.382**	1.004***	0.909***
	(0.181)	(0.175)	(0.306)	(0.300)
Δ Upstream FDI from ... countries (s,t-1)	0.243**	0.278**	0.209	0.184
	(0.111)	(0.113)	(0.163)	(0.170)
Δ Own FDI from ... countries (s,t-1)	-0.083	-0.073	-0.354**	-0.289*
	(0.111)	(0.110)	(0.152)	(0.161)
Δ Downstream FDI from non-... countries (s,t-1)	0.494***	0.428**	1.103***	0.950***
	(0.183)	(0.175)	(0.338)	(0.270)
Δ Upstream FDI from non-... countries (s,t-1)	0.160	0.236*	0.092	-0.116
	(0.132)	(0.135)	(0.233)	(0.314)
Δ Own FDI from non-... countries (s,t-1)	-0.068	-0.071	-0.553***	-0.420**
	(0.114)	(0.107)	(0.199)	(0.183)
Year FE	Yes	Yes	Yes	Yes
Industry and region FE	Yes	Yes	Yes	Yes
R-squared	0.012	0.011	0.016	0.016
N	50717	50717	25579	25579

**** 99%, ** 95%, * 90%.*

Regionally-weighted FDI

	First differences		Second differences	
	Baseline	Regionally weighted	Baseline	Regionally weighted
	(1)	(2)	(3)	(4)
Δ Downstream FDI (s,t-1)	0.388**	0.331***	0.957***	0.400**
	(0.178)	(0.113)	(0.282)	(0.189)
Δ Upstream FDI (s,t-1)	0.296***	0.000	0.161	-0.353**
	(0.109)	(0.111)	(0.171)	(0.161)
Δ Own FDI (s,t-1)	-0.074	-0.100	-0.361**	-0.263**
	(0.108)	(0.091)	(0.151)	(0.123)
Year FE	Yes	Yes	Yes	Yes
Industry and region FE	Yes	Yes	Yes	Yes
R-squared	0.011	0.011	0.016	0.016
N	50716	50716	25579	25579

**** 99%, ** 95%, * 90%.*