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

[PRELIMINARY AND INCOMPLETE]

Matej Bajgar, Beata Javorcik

February 21, 2014

This text is NOT a full draft of a working paper but only a preliminary outline of our research and results. The first section briefly motivates our work, puts it to the context of related literature, introduces our data and sketches our empirical methodology. The second section previews our results to date. If the paper is accepted for the conference, we will provide a full draft of the paper by the required deadline.

Abstract

We examine if presence of multinational companies helps increase export sophistication of domestic exporters in an emerging economy. Using matched firm and customs panel data from Romania, we find that stronger presence of foreign firms in downstream industries is related to higher unit values of exports by domestic firms. The effect is not present for final products and products with small scope for quality improvement. It is strongest for firms in the top quartile in terms of unit values or total factor productivity. We also find suggestive evidence that domestic exporters increase their unit values thanks to presence of multinationals in upstream industries. The results are strongest for firms in the bottom quartile of the unit value and productivity distributions which may have previously found it difficult to source inputs from international markets.

1 Description of research

Economic development is strongly related to the sophistication and quality of a country's exports, both in a cross-section and over time Schott (2004), Hausmann et al. (2007), Hidalgo and Hausmann (2009) and Mattoo and Subramanian (2009). From the perspective of an individual firm, reaching a certain quality threshold is a key precondition for successful exporting (Hallak and Sivadasan, 2009; Sutton, 2012). This is also reflected in firms upgrading the quality of their exports prior to starting to export (Iacovone and Javorcik, 2012). Given the observed close correlation between the sophistication of exports and economic prosperity, it is not surprising that upgrading of industrial structure, and in particular exports, is a major objective of industrial policies in many countries around the world.

In this paper, we are exploring one way in which countries may be able to increase the sophistication of their exports. We are asking whether, and if so how, presence of multinational firms improves the quality of exports by local firms in an emerging economy. There are several channels through which it may be happenning. First, studies such as Javorcik (2004), Kugler (2006), Blalock and Gertler (2008) or Javorcik and Spatareanu (2008, 2011) suggest that domestic firms can improve their productivity by learning from MNEs they supply. They may also, as a result of interactions with MNE customers, upgrade the quality of their products. Second, foreign firms in upstream industries may provide higher quality inputs to domestic firms, allowing them to themselves produce higher quality products[1]. This effect is likely to be more important for products which are difficult to trade internationally (e.g. due to high transport costs) or for smaller firms who are unable to source from the world markets. Finally, local exporters could learn to export higher quality products either by observing and copying the practises of MNEs operating in the same industry or by hiring former employees of these MNEs (Poole, forthcoming).

To test these hypotheses, we draw on rich annual panel data describing all Romanian manufacturing firms with more than 20 employees and a subsample of smaller firms for the years 2005-2010, matched to detailed customs data recording Romanian exports in the period 2006-2011 at the level of firm, product, destination and year.

Employing methodology first introduced by Javorcik (2004), we construct for each firm indices measuring the presence of multinational enterprises (MNE) in the same industry (own-industry FDI), supplying industries (upstream FDI) and industries buying inputs (downstream FDI). We define the own-industry FDI as the share of output in the industry due to foreign-owned firms. We then use the input-output tables for calculate the upstream and downstream FDI indices as weighted means of own-industry FDI respectively in supplying and buying industries. We use unit values of exports as a proxy for export quality[2].

We estimate the equation (1). The outcome variable is the log change in the unit values of exports of product p by firm i to country c in year t. The explanatory variables are lagged changes in the FDI indices. Estimating the equation in first differences resolves the obvious problem that a kilogram of caviar has a different value from a kilogram of flour. It also removes any characteristics of firms, products or destinations which are time invariant. In addition, we include industry and region fixed effects in the differenced equation, allowing each industry and each region to have an idiosyncratic trend. We then effectively identify the effect of FDI on deviations from these trends.

$$\Delta log(UV)_{ipct} = \beta_1 \Delta OwnFDI_{s,t-1} + \beta_2 \Delta UpstreamFDI_{s,t-1} + \beta_3 \Delta DownstreamFDI_{s,t-1} + \alpha^1{}_t + \alpha^2{}_s + \alpha^3{}_r + \epsilon_{ipt} \quad (1)$$

Our observations represent firm-product-destination-year combinations, but the FDI indices vary only with industry and year or industry, region and year. We thus adjust standard errors to allow for correlation

[1] The importance of access to high quality inputs for firm performance has been documented by Amiti and Konings (2007) and Kugler and Verhoogen (2012).

[2] Although such proxy is imperfect, it has been extensively used in the literature (Schott, 2004; Hallak, 2006).

between error terms respectively within the same industry and year or industry, region and year.

Our work is most closely related to research analysing the effect of FDI on the quality of exports, as proxied by their unit values. Wang and Wei (2008) and Iacovone and Javorcik (2008) document that foreign-owned firms export at higher unit values than local firms. Chen and Swenson (2007) use detailed trade data from China and find that stronger presence of multinationals in the same industry and location is associated with a larger number of trade transactions and a higher unit value of these transactions. Swenson (2008) shows with the same data that these results may be driven by information spillovers. Harding and Javorcik (2012) take advantage of cross-country data on investment promotion targeted at specific 4-digit SITC sectors. They find that exports in targeted sectors in developing countries enjoy an 11% unit value premium, but their method is unable to pinpoint the exact channels through which FDI affects exporting, and in particular to distinguish between the direct effect of multinationals' own exports and spillovers to domestic exporters.

The advantage of our current approach is threefold. First, detailed firm-level data allow us to distinguish between the higher unit values of the multinationals' own exports and the spillovers to domestic firms. Second, through the use of input-output tables we are able to separately identify own-industry, upstream and downstream spillovers. Finally, we can dig deeper and ask which domestic firms are most likely to benefit from the presence of FDI.

2 Preliminary results

Table 1 presents our baseline results. In columns 1-3, FDI varies only within industry and year. In columns 4-6, FDI is calculated as a weigted average across 8 Romanian regions, with weights given by the inverse of the distance between the capitals of the region with FDI and the region of the given domestic firm. Columns 1 and 4 show the results for all products. But we would expect foreign presence to affect quality only for products with a sufficient scope for quality improvements. We proxy this by the length of quality ladders constructed by Khandelwal (2010). Columns 2 and 5 correspond to products with above-median length of quality ladder and columns 3-6 to products with below-median length of quality ladder.

The results provide little evidence for the effect of own-industry FDI on unit values, but they suggest that both upstream and downstream FDI are related to increased unit values of exports by local firms. As expected, the results for downstream FDI are driven by the products with long quality ladders. The estimates on downstream FDI also become more precisely estimated when we take into account the regional distribution of FDI presence. The coefficients on upstream FDI, on the contrary, do not differ with the length of the quality ladder, and they become insignificant when we employ the regionally weighted measures.

An alternative hypothesis explaining our results could be that foreign firms enter Romania in industries where high quality suppliers are available. To test for this, we run the same regressions, where in addition to lagged FDI variables we include their present and lead values (Wooldridge, 2010). Table 2 shows the results. The estimates on leads are completely insignificant for all FDI variables, suggesting that reverse causality is

Table 1: Overall and regionally weighted FDI

	(1)	(2)	(3)	(4)	(5)	(6)
	Log UV	Log UV (long)	Log UV (short)	Log UV	Log UV (long)	Log UV (short)
Own FDI (s,t-1)	-0.095	-0.190	0.170			
	(0.107)	(0.159)	(0.156)			
Upstream FDI (s,t-1)	0.339***	0.326**	0.335**			
	(0.113)	(0.138)	(0.168)			
Downstream FDI (s,t-1)	0.346*	0.624***	-0.423			
	(0.189)	(0.170)	(0.384)			
Own FDI (s,t-1) (reg. weighted)				-0.113	-0.101	-0.188
				(0.095)	(0.132)	(0.136)
Upstream FDI (s,t-1) (reg. weighted)				-0.021	0.018	-0.082
				(0.107)	(0.132)	(0.132)
Downstream FDI (s,t-1) (reg. weighted)				0.351***	0.493***	-0.033
				(0.119)	(0.132)	(0.229)
Year, region and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.011	0.008	0.016	0.011	0.008	0.016
N	50128	23601	24166	50187	23659	24167

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

not driving our results.

Presence of foreign firms in downstream industries should play role for exporters intermediate but not final products, while such distinction should not apply to foreign presence in upstream industries. This is because we expect that Romanian suppliers of intermediate inputs benefit from their interactions with their MNE customers located in Romania. As shown in Table 3, this is indeed the case. Downstream FDI is positively related to unit values for intermediate goods and possibly to capital goods, but there is no such effect for final goods. Upstream FDI seems to increase unit values of both intermediate and final goods.

The most capable domestic exporters are most likely to win contracts with local MNE affiliates and consequently benefit from the related export spillovers (Javorcik and Spatareanu, 2009). Table 4 indeed shows the effect of downstream FDI on unit values is largest for exporters in the top quartile in terms of unit values and productivity. Upstream FDI, on the contrary, might serve as a new source of high quality inputs particularly for those firms which previously found it difficult to source inputs from the international markets. In line with this observations, the effect of upstream FDI seems to be concentrated mostly in firms in the bottom quartile in terms both unit values and productivity.

As next steps in our analysis, we are going to control for prices in the world markets, see if the results apply more strongly to certain types of export destinations, test if upstream FDI matters more for products requiring inputs with high transport costs and try to better understand the somewhat limited robustness of the results on upstream FDI.

Table 2: Strict exogeneity test

	(1)	(2)	(3)	(4)	(5)	(6)
	Log UV	Log UV (long)	Log UV (short)	Log UV r.w.	Log UV (long) r.w.	Log UV (short) r.w.
Own FDI (s,t-1)	-0.214*	-0.353*	0.115	-0.126	-0.271	-0.056
	(0.129)	(0.192)	(0.236)	(0.129)	(0.199)	(0.165)
Own FDI (s,t)	-0.277**	-0.274**	-0.271	-0.251	-0.209	-0.400
	(0.118)	(0.133)	(0.329)	(0.161)	(0.216)	(0.259)
Own FDI (s,t+1)	-0.021	0.047	-0.229	-0.101	-0.068	-0.075
	(0.224)	(0.294)	(0.386)	(0.264)	(0.336)	(0.453)
Upstream FDI (s,t-1)	0.480***	0.500***	0.518**	0.017	0.061	0.026
	(0.108)	(0.159)	(0.202)	(0.121)	(0.165)	(0.162)
Upstream FDI (s,t)	-0.267***	-0.335**	-0.184	-0.474***	-0.591***	-0.360
	(0.102)	(0.133)	(0.199)	(0.160)	(0.223)	(0.231)
Upstream FDI (s,t+1)	-0.017	0.003	-0.303	0.168	0.255	-0.202
	(0.143)	(0.201)	(0.235)	(0.199)	(0.270)	(0.295)
Downstream FDI (s,t-1)	0.297	0.658	-0.596	0.121	0.597**	-0.682*
	(0.310)	(0.403)	(0.621)	(0.212)	(0.299)	(0.379)
Downstream FDI (s,t)	0.722**	0.731***	0.391	0.773**	0.788*	0.728
	(0.277)	(0.274)	(0.869)	(0.384)	(0.451)	(0.753)
Downstream FDI (s,t+1)	0.350	0.235	1.407	0.190	0.142	0.582
	(0.329)	(0.387)	(1.097)	(0.474)	(0.530)	(1.238)
Year, region and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.016	0.010	0.024	0.015	0.010	0.023
N	30346	14385	14952	30346	14385	14952

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

Table 3: By stage of production

	(1)	(2)	(3)
	Log UV (inter)	Log UV (capit)	Log UV (final)
Own FDI (s,t-1)	-0.476**	0.582	0.213*
	(0.230)	(0.429)	(0.115)
Upstream FDI (s,t-1)	0.437**	-0.899	0.384***
	(0.190)	(0.584)	(0.139)
Downstream FDI (s,t-1)	0.724***	1.023	-0.253
	(0.257)	(0.998)	(0.234)
Year, region and industry fixed effects	Yes	Yes	Yes
R-squared	0.006	0.028	0.018
N	17790	2113	28930

**** 99%, ** 95%, * 90%. Standard errors clustered at industry-year level.*

Table 4: By unit value and TFP quartiles (1=highest)

	(1)	(2)	(3)	(4)	(5)	(6)
	Log UV — UV quart.	Log UV (long) — UV quart.	Log UV(short) — UV quart.	Log UV — TFP quart.	Log UV (long) — TFP quart.	Log UV(short) — TFP quart.
Initial quartile 1	-0.041***	-0.054***	-0.031	-0.012	-0.023	-0.002
	(0.013)	(0.019)	(0.019)	(0.009)	(0.014)	(0.013)
Initial quartile 2	-0.034***	-0.048**	-0.020*	-0.007	-0.012	0.001
	(0.010)	(0.018)	(0.011)	(0.010)	(0.014)	(0.020)
Initial quartile 3	0.000	-0.004	0.008	0.004	0.006	0.005
	(0.016)	(0.018)	(0.024)	(0.011)	(0.016)	(0.012)
Own FDI (s,t-1) * quartile 1	-0.326*	-0.233	-0.509*	-0.303*	-0.543*	0.046
	(0.170)	(0.250)	(0.278)	(0.173)	(0.297)	(0.350)
Own FDI (s,t-1) * quartile 2	-0.230	-0.543**	0.337	-0.119	-0.068	-0.172
	(0.168)	(0.240)	(0.301)	(0.152)	(0.207)	(0.344)
Own FDI (s,t-1) * quartile 3	-0.101	-0.215	0.110	-0.150	-0.456*	0.210
	(0.146)	(0.203)	(0.290)	(0.152)	(0.249)	(0.157)
Own FDI (s,t-1) * quartile 4	0.166	0.239	0.346	0.143	0.308	-0.153
	(0.213)	(0.407)	(0.299)	(0.274)	(0.341)	(0.286)
Upstream FDI (s,t-1) * quartile 1	0.121	0.408	-0.093	0.196	0.548*	-0.034
	(0.183)	(0.266)	(0.292)	(0.165)	(0.282)	(0.197)
Upstream FDI (s,t-1) * quartile 2	0.316	0.547*	0.158	0.381**	0.228	0.428*
	(0.200)	(0.278)	(0.233)	(0.158)	(0.194)	(0.239)
Upstream FDI (s,t-1) * quartile 3	-0.021	-0.081	-0.053	0.092	0.316	-0.051
	(0.219)	(0.227)	(0.297)	(0.138)	(0.218)	(0.248)
Upstream FDI (s,t-1) * quartile 4	0.602***	0.798***	0.494*	0.461**	0.634***	0.223
	(0.186)	(0.304)	(0.278)	(0.185)	(0.236)	(0.280)
Downstream FDI (s,t-1) * quartile 1	1.170***	0.998***	1.130**	0.569***	0.765***	0.060
	(0.246)	(0.321)	(0.533)	(0.200)	(0.261)	(0.585)
Downstream FDI (s,t-1) * quartile 2	0.432	0.815	-0.358	0.528	0.818*	-0.100
	(0.390)	(0.544)	(0.722)	(0.390)	(0.448)	(0.591)
Downstream FDI (s,t-1) * quartile 3	0.353	0.698*	0.029	0.224	0.757	-0.582
	(0.318)	(0.387)	(0.679)	(0.437)	(0.629)	(0.475)
Downstream FDI (s,t-1) * quartile 4	-0.478	-0.840	-0.716	0.280	-0.126	1.125*
	(0.361)	(0.615)	(0.704)	(0.329)	(0.404)	(0.657)
Year, region and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.013	0.011	0.016	0.013	0.011	0.015
N	38752	17548	19667	38422	17437	19524

**** 99%, ** 95%, * 90%. Standard errors clustered at industry-year level. If an exporter first appears in the sample in year t, the product-year UV quartile is calculated for year t, and only observations for t+2 and onwards are included in the sample.*

References

Amiti, Mary and Jozef Konings, "Trade Liberalization, Intermediate Inputs, and Productivity: Evidence from Indonesia," *American Economic Review*, December 2007, *97* (5), 1611–1638.

Blalock, Garrick and Paul J. Gertler, "Welfare gains from Foreign Direct Investment through technology transfer to local suppliers," *Journal of International Economics*, March 2008, *74* (2), 402–421.

Chen, Huiya and Deborah L. Swenson, "Multinational Firms and New Chinese Export Transactions," unpublished manuscript, University of California, Davis January 2007.

Hallak, Juan Carlos, "Product quality and the direction of trade," *Journal of International Economics*, January 2006, *68* (1), 238–265.

_ **and Jagadeesh Sivadasan**, "Firms' Exporting Behavior under Quality Constraints," NBER Working Papers 14928, National Bureau of Economic Research, Inc April 2009.

Harding, Torfinn and Beata S. Javorcik, "Foreign Direct Investment and Export Upgrading," *The Review of Economics and Statistics*, November 2012, *94* (4), 964–980.

Hausmann, Ricardo, Jason Hwang, and Dani Rodrik, "What you export matters," *Journal of Economic Growth*, March 2007, *12* (1), 1–25.

Hidalgo, Cesar A. and Ricardo Hausmann, "The building blocks of economic complexity," *Proceedings of the National Academy of Sciences*, 2009, *106* (26), 10570–10575.

Iacovone, Leonardo and Beata Javorcik, "Getting Ready: Preparation for Exporting," CEPR Discussion Papers 8926, C.E.P.R. Discussion Papers April 2012.

_ **and Beata S. Javorcik**, "Multi-product exporters : diversification and micro-level dynamics," Policy Research Working Paper Series 4723, The World Bank September 2008.

Javorcik, Beata S. and Mariana Spatareanu, "Tough Love: Do Czech Suppliers Learn from their Relationships with Multinationals?," *Scandinavian Journal of Economics*, December 2009, *111* (4), 811–833.

_ **and** _ , "Does it matter where you come from? Vertical spillovers from foreign direct investment and the origin of investors," *Journal of Development Economics*, September 2011, *96* (1), 126–138.

Javorcik, Beata Smarzynska, "Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward Linkages," *American Economic Review*, June 2004, *94* (3), 605–627.

_ **and Mariana Spatareanu**, "To share or not to share: Does local participation matter for spillovers from foreign direct investment?," *Journal of Development Economics*, February 2008, *85* (1-2), 194–217.

Khandelwal, Amit, "The Long and Short (of) Quality Ladders," *Review of Economic Studies*, October 2010, *77* (4), 1450–1476.

Kugler, Maurice, "Spillovers from foreign direct investment: Within or between industries?," *Journal of Development Economics*, August 2006, *80* (2), 444–477.

_ **and Eric Verhoogen**, "Prices, Plant Size, and Product Quality," *The Review of Economic Studies*, 2012, *79* (1), 307–339.

Mattoo, Aaditya and Arvind Subramanian, "Criss-crossing globalization : uphill flows of skill-intensive goods and foreign direct investment," Policy Research Working Paper Series 5047, The World Bank September 2009.

Poole, Jennifer P., "Knowledge Transfers from Multinational to Domestic Firms: Evidence from Worker Mobility," *The Review of Economics and Statistics*, forthcoming.

Schott, Peter K., "Across-product Versus Within-product Specialization in International Trade," *The Quarterly Journal of Economics*, May 2004, *119* (2), 646–677.

Sutton, John, *Competing in Capabilities: The Globalization Process*, Oxford University Press, 2012.

Swenson, Deborah L., "Multinationals and the creation of Chinese trade linkages," *Canadian Journal of Economics*, May 2008, *41* (2), 596–618.

Wang, Zhi and Shang-Jin Wei, "What Accounts for the Rising Sophistication of China's Exports?," NBER Working Papers 13771, National Bureau of Economic Research, Inc February 2008.

Wooldridge, Jeffrey M, *Econometric Analysis of Cross Section and Panel Data*, Vol. 1 of *MIT Press Books*, The MIT Press, 2010.