Growing lemons and cherries?

Pre- and post-acquisition performance of foreign-acquired firms in new EU member states

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Motivation
Foreign direct investment crucial for the CEECs since the mid 1990s

Share of inward FDI inflows in Gross fixed capital formation (%)

Region/economy	1991-95	1996-00	2001-05	2005-11
World	3.8	11.4	9.2	11.7
Developed economies	3.2	10.9	8.2	11.3
European Union	5.0	17.1	14.7	15.2
Bulgaria	4.5	35.0	47.1	51.0
Czech Republic	9.3	21.2	27.3	14.0
Estonia	15.1	22.6	33.2	30.5
Hungary	27.6	31.9	22.4	16.1
Latvia	17.0	30.9	12.0	16.3
Lithuania	2.5	19.4	16.1	14.7
Poland	8.8	16.9	16.8	17.6
Romania	3.2	15.5	21.9	17.1
Slovakia	21.3	12.2	32.6	13.8
Slovenia	3.9	3.8	11.7	6.4
Average EU-NMS	11.3	20.9	24.1	19.8

Mostly positive direct and spillover effects from FDI

Number of significant coefficients in 10 EU NMS (Damijan et al., JCE 2013)

			Firms by size classes				Firms by quintiles of productivity					Gap of domestic vs. foreign firms in productivity		
		All	Micro	Small	Med.	Large	Q1	Q2	Q3	Q4	Q5	G1	G2	G3
Direct effects														
Positive		3	2	1	3	1	2	0	2	2	2	2	2	0
Negative		0	0	0	0	0	0	0	0	0	0	0	0	0
Horizontal spillovers														
Positive spill.														
Nace-3	D	1	0	0	0	0	1	2	0	1	0	0	0	1
	Dw	7	6	5	2	5	3	4	4	4	6	6	4	1
Negative spill.														
Nace-3	D	5	3	5	2	1	0	4	3	4	1	5	2	1
	Dw	0	0	0	1	0	0	1	0	0	0	0	0	1
Vertical spillovers														
Positive spill.														
Nace-3	D	2	0	2	0	1	1	1	1	0	1	4	2	1
	Dw	2	1	1	1	0	1	1	2	0	1	4	0	1
Negative spill.														
Nace-3	D	2	0	0	1	0	1	2	2	1	0	1	0	2
	Dw	1	0	2	0	3	1	1	1	0	1	4	2	2

... but only when accounting for absorptive capacity

Summary of evidence

- Heterogeneity of firms is important
- Horizontal spillovers have become increasingly important over the last decade
    - even more important than vertical spillovers
- Positive horizontal spillovers:
    - only in firms with higher absorptive capacities
    - equally distributed across size classes
    - in medium or high productivity firms and firms closer to technology frontier
- Negative horizontal spillovers:
    - in smaller firms
    - in low to medium productivity firms

Motivation

- foreign direct investment crucial for the CEECs since the mid 1990s
- overall a positive force, but questions remain
    - direct effects and spillovers to other firms
    - choice of entry: greenfield vs acquisitions
- in 1990 - 2009, in the EU15 M&A represented 60.7% of all FDI inflows, but only 17.4% in CEECs
- how do acquisitions impact target firm performance?
- target selection: picking cherries or lemons?

Issues

- greenfield vs acquisitions?
  - *acquisition* mode:
  - it is the fastest way to build up a strong position in a foreign market
  - and it enables foreign investor to come in a possession of acquired firm's strategic assets

- picking *cherries* or *lemons*?
  - "cherries": better performing firms
  - "lemons": under-performing firms

- Concerns about acquisitions
  - adding to productive capacity, potential layoffs, closures, swapping of domestic with foreign suppliers?

Literature review

- foreign owned firms superior performers especially in CEECs
  - surveys by OECD (2007), Bellak (2004), Schiffbauer et al. (2009), etc.
- effects of foreign acqusitions:
- **positive impact** on performance of acquired firms
  - Lichtenberg and Siegel (1987) for the US, Conyon et al (2002) for UK, Arnold and Smarzynska-Javorcik (2005) for Indonesia, Damijan et al (2003a,b; 2013), esp. for Slovenia, etc.
- **no evidence or mixed evidence**
  - Modén (1998) for Sweden, Harris and Robinson (2003) and Barba Navaretti, Venables (2004) for the UK

Effects of targeting "cherries" or "lemons"

- "*cherry picking*"
  - confirmed by Harris and Robinson (2003) for the UK, Bansvik and Haller (2009) for Norway, Zhu et al. (2011) for emerging market firms, and Guadalupe et al. (2011) for Spain
- "*lemons*" with an extensive export network are prefered
  - Fontagne et al. (2012)
- evidence in neither direction
  - Castelani and Zanfei (2004) for Italy, Fukao et al. (2006) for Japan, Karpaty (2007) for Sweden, and Gioia and Thomsen (2004) for Denmark, etc.
- issues such as time since acquisition, "*proximity*" and industry specific factors impact the estimates
- mixed evidence about the impact on employment

Aims of the paper

- picking "cherries" or "lemons" in the CEECs?
- first comparable study on 7 CEECs in 2000 - 2009
- a standardized empirical approach across all country samples
  - with respect to the timing of acquisition
- accounting for the exact moment of acquisition for studying the productivity premia
  - 3 years before till 3 years after the acquisition
- therefore, able to assess the pre- and post-acquisition effects of foreign acquisitions on the acquired firms
- controlling for the heterogeneity of firms
  - with respect to firm size, capital intensity, wages, initial productivity, sector

Data

- Amadeus (accounting data) and Zephyr (M&A) data from BvD for 6 EU-NMS
    - Bulgaria, Czech Republic, Estonia, Poland, Slovakia, Romania
- population data for Slovenia (AJPES) and Amadeus/Zephyr for control
- Period: 2000 - 2009 (4 mio obs.)
- Eurostat (for population data)
- data issues:
    - Amadeus sampling and coverage (exclusion criteria: satisfy at least 1.5 mio € in OR *or* 15 employees *or* 2 mio € in TA)
    - data quality (9 countries dropped due to missing variables and other issues)
    - Zephyr issues (coverage)
    - matching Zephyr to Amadeus (BvDid)

Table: Sample characteristics for domestic and foreign-owned firms (2008)

country	sector	Number of firms		Median employment		Median labor productivity	
		all	acquired	domestic	foreign	domestic	foreign
Bulgaria	manuf	11,225	211	16	178	6,750	6,054
	servic	60,159	643	6	32	18,217	19,352
Czech rep.	manuf	10,361	130	23	225	15,800	20,629
	servic	56,363	55	3	38	16,852	38,260
Estonia	manuf	3,977	60	9	176	10,200	24,145
	servic	33,982	214	4	30	12,000	32,400
Poland	manuf	3,890	66	70	218	18,777	24,137
	servic	12,174	167	23	65	23,650	36,158
Romania	manuf	35,286	55	6	6	6,000	4,000
	servic	194,067	44	2	3	6,000	4,550
Slovenia	manuf	6,826	161	3	18	12,240	15,456
	servic	44,200	588	1	2	17,327	27,428
Slovak rep.	manuf	2,842	23	75	300	21,606	23,992
	servic	12,359	54	15	125	59,043	39,467

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Table:
Sample coverage with respect to population of firms in 2008 (in pct)

size class/country	BUL	CZE	EST	POL	ROM	SLO	SVK
0-9 employees	13.8	1.8	44.6	0.4	29.5	≈ 100	0.2
10-19 employees	56.8	19.8	77.6	32.1	66.6	≈ 100	7.0
20-49 employees	64.8	26.9	76.5	19.5	77.9	≈ 100	4.2
50-249 emp	80.7	27.2	73.8	41.8	54.0	≈ 100	8.5
more than 250 emp	85.5	51.9	66.1	47.1	48.4	≈ 100	11.7

Source: Amadeus and Eurostat.
Note: Sample coverage in terms of number of firms

Econometric model

- effect of foreign acquisition on firm performance:

$$ln(VA/L)_{it-\tau} = \alpha + \beta FDI - start_{it} + \gamma controls_{it-\tau} \qquad (1)$$

- $\tau = 0$ in technical time indicates the period when the acquisition was completed $\tau[-3, 3]$
- *controls* include capital intensity, size, size squarred, wages (all in logs), country, industry and time dummies
- also used TFP (Levinsohn-Petrin algorithm, 2002) as a measure of productivity

- variable of interest $FDI - start_{it}$
  - equals 0 for domestically owned firms (before acquisition as well as for those never aquired)
  - equals 1 for a firm that was acquired in that period
  - excluded (*missing*) for subsequent periods and for firms that were foreign owned throughout

- this definition has two advantages over the more commonly used indicator:
  - unlike using tech. time dummies in one regression, allows for a direct comparison with only non-acquired firms
  - it allows for easier tracking of the performance dynamics relative to the period of completion of merger or acquisition
  - its definition is unchanged after differencing (fixed effects)

Estimation issues

- target-selection bias: *Heckman 2-stage* procedure

$$P(FDI_{it} = 1|FDI_{it-1} = 0, x_{it-1}) = \alpha + \beta controls_{it-1} + v_{it}$$

- controls: size, K/emp, VA/emp, ROA, industry
- endogeneity (IV and GMM)
- estimation on cohorts of firms survived in the sample for at least 7 years (+/- 3 around the acquisition)
- probability weighting of errors used throughout to account for sample representativeness issues
- control for error clustering at the firm level

Table: **Pre- and post-acquisition premia:** Pooled regression

Lags/leads of productivity levels	OLS		OLS 2-stage Heckman		FE 2-stage Heckman	
t-3	-0.143***	(0.059)	-0.218***	(0.051)	-0.167***	(0.040)
t-2	-0.088	(0.057)	-0.162***	(0.049)	-0.183***	(0.039)
t-1	0.063	(0.058)	0.035	(0.048)	0.035	(0.048)
t	0.120**	(0.053)	0.078*	(0.046)	0.045	(0.031)
t+1	0.140***	(0.053)	0.104**	(0.046)	0.073**	(0.031)
t+2	0.164***	(0.053)	0.131***	(0.047)	0.067**	(0.034)
t+3	0.188***	(0.053)	0.161***	(0.048)	0.074**	(0.035)
Growth rates						
(t-1)-(t-3)	0.204***	(0.049)	0.204***	(0.048)	0.070	(0.046)
t-(t-2)	0.242***	(0.043)	0.242***	(0.042)	0.150***	(0.036)
(t+2)-t	0.116***	(0.033)	0.121***	(0.033)	0.101***	(0.031)
(t+3)-(t+1)	0.110***	(0.033)	0.110***	(0.033)	0.078**	(0.032)
Observations	95,492		95,492		95,492	

Notes: Coefficient of the acquisition variable shown only. Dep. var.: VA/L. Control vars: size, size squared;
country, industry and year xixed effects. Robust standard errors in parentheses. Errors clustered at the firm level.
***, ** and * denote statistical significance at 1, 5 and 10 percent.

Table: **Regressions by productivity quartiles**

Levels	1.quartile	2.quartile	3.quartile	4.quartile
t-3	-0.554*** (0.105)	-0.255*** (0.074)	-0.155*** (0.072)	-0.126* (0.06
t-2	-0.192* (0.107)	-0.268*** (0.077)	-0.191*** (0.074)	-0.205*** (0.0
t-1	-0.024 (0.097)	-0.093 (0.087)	-0.065 (0.086)	0.066** (0.03
t	-0.076 (0.065)	-0.015 (0.062)	0.117* (0.063)	0.096* (0.04
t+1	0.072 (0.070)	0.059 (0.051)	0.065 (0.060)	0.083 (0.060
t+2	0.042 (0.070)	0.174***(0.061)	0.124* (0.064)	0.030 (0.067
t+3	0.172*** (0.060)	0.108 (0.077)	0.112 (0.071)	0.027 (0.064
Growth rates				
(t-1)-(t-3)	0.035 (0.109)	-0.047 (0.091)	0.062 (0.049)	-0.041 (0.03
t-(t-2)	-0.005 (0.081)	0.084 (0.068)	0.182***(0.048)	0.068 (0.053
(t+2)-t	0.137* (0.074)	0.212***(0.052)	0.072 (0.047)	0.000 (0.065
(t+3)-(t+1)	-0.071 (0.060)	-0.027 (0.058)	-0.030 (0.041)	-0.088 (0.05
N	17,992	24,137	26,673	26,690

Notes: Coefficient of the acquisition variable shown only. Dep. var.: VA/L. Control vars: size, size squared;
country, industry and year xixed effects. Robust standard errors in parentheses. Errors clustered at the firm level.
***, ** and * denote statistical significance at 1, 5 and 10 percent.

Table: **Regressions by size classes**

Levels	Less than 20	20<emp<50	50<emp<250	More than 250
t-3	-0.537*** (0.078)	0.153 (0.185)	-0.139***(0.054)	-0.169*** (0.078
t-2	-0.467*** (0.080)	-0.271 (0.170)	-0.066 (0.055)	-0.073 (0.002)
t-1	0.090 (0.062)	0.037 (0.125)	-0.025 (0.061)	-0.009 (0.053)
t	0.226*** (0.069)	0.201* (0.106)	0.067 (0.042)	-0.135*** (0.049
t+1	0.161*** (0.056)	0.252** (0.106)	0.083* (0.046)	0.026 (0.056)
t+2	0.177*** (0.062)	0.011 (0.119)	0.082* (0.047)	0.064 (0.048)
t+3	0.298*** (0.054)	0.066 (0.172)	0.095* (0.056)	-0.031 (0.058)
Growth rates				
(t-1)-(t-3)	0.151** (0.077)	0.066 (0.172)	0.165*(0.087)	0.093 (0.062)
t-(t-2)	0.389*** (0.060)	0.263 (0.169)	0.171***(0.047)	-0.054 (0.065)
(t+2)-t	0.178*** (0.057)	0.249** (0.102)	0.071 (0.045)	0.164***(0.049)
(t+3)-(t+1)	-0.094* (0.048)	-0.052 (0.084)	-0.072 (0.047)	-0.051 (0.059)
Observations	43,224	8,521	13,719	30,028

Notes: Coefficient of the acquisition variable shown only. Dep. var.: VA/L. Control vars: size, size squared;
country, industry and year xixed effects. Robust standard errors in parentheses. Errors clustered at the firm level.
***, ** and * denote statistical significance at 1, 5 and 10 percent.

Table: **Country-by-country regressions:**

Levels	BUL	CZE	EST	POL	ROM	SLO	SVK
t-3	0.247	0.247	0.249	0.228	-0.405***	0.170***	0.795
t-2	0.008	0.274	0.263	0.312	-0.383***	0.268***	0.556
t-1	0.033	0.314	0.216	0.390	-0.376*	0.247***	0.384
t	0.323**	0.388	0.120	0.303***	-0.307	0.698***	0.324
t+1	0.364***	0.345	0.214	0.394***	-0.232	0.381***	0.289
t+2	0.358***	0.332*	0.276	0.476***	-0.275	0.305***	-0.128
t+3	0.336***	0.314	0.184	0.554***	0.318**	0.309***	-0.239

Notes: Coefficient of the acquisition variable shown only. Dep. var.: VA/L. Country, sector and year fixed effects included. Robust standard errors in parentheses. Errors clustered at the firm level. ***, ** and * denote statistical significance at 1, 5 and 10 percent.

Table: **Robustness check (IV and GMM)**

	Coefficient estimates	
Lags/leads of	IV fixed effects	GMM fixed effects
t-3	-1.456*** (0.540)	-1.126** (0.446)
t-2	-3.583*** (0.672)	-3.830*** (0.617)
t-1	0.427 (0.058)	0.730*** (0.250)
t	0.624*** (0.221)	0.583** (0.230)
t+1	1.358*** (0.432)	0.325 (0.224)
t+2	13.555*** (0.540)	13.039*** (1.730)
t+3	5.455*** (1.290)	3.248*** (0.783)
Growth rates		
(t-1)-(t-3)	-1.456*** (0.537)	0.056 (0.101)
t-(t-2)	-3.583*** (0.676)	-0.200 (0.129)
(t+2)-t	0.472 (0.287)	-0.042 (0.089)
(t+3)-(t+1)	0.624*** (0.186)	-0.033 (0.085)
Observations	31,328	23,131

Notes: Coefficient of the acquisition variable shown only. Dep. var.: VA/L. Country, sector and year fixed effects included. Robust standard errors in parentheses. Errors clustered at the firm level. ***, ** and * denote statistical significance at 1, 5 and 10 percent.

Further evidence

Labor and capital adjustment before and after acquisition:

- Foreign-acquisitions
- Domestic-acquisitions

Figure 1: Dynamics of employment and total assets of **foreign-acquired** firm relative to cnt-ind-year median values of dom. owned firms
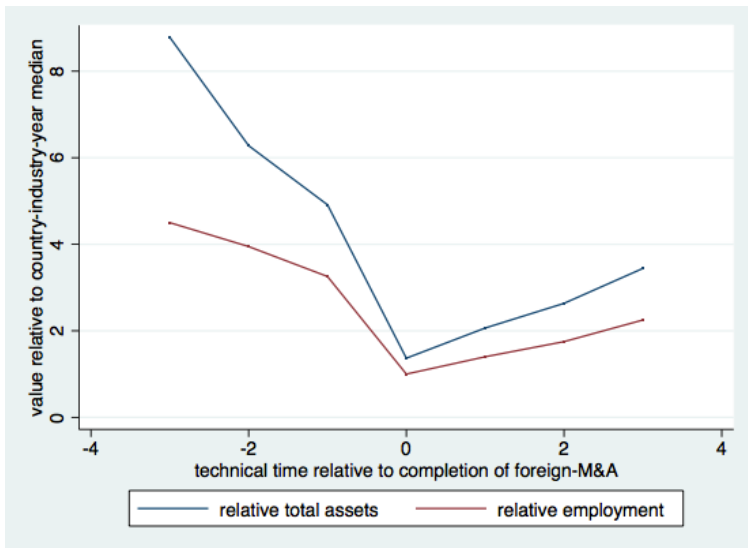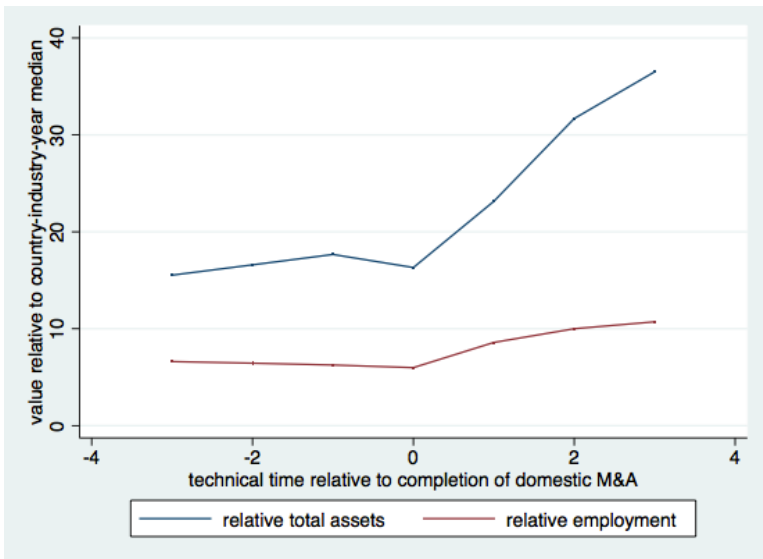
Figure 2: Dynamics of employment and total assets of **dom.-acquired** firms relative to cnt-ind-year median values of dom. owned firms

Summary

- apparent lemons are targeted and their post-acquisition performance improves
- substantial heterogeneity between countries and firms
    - result strongest for small and least productive firms
    - result strongest for 3 countries, weak for 2 countries
- the impact is not solely a consequence of the takeover process
- effects not due to downsizing or capital weakening

Issues

- endogeneity

- sampling issues

- explore the period between the announcement of an M&A and its completion