



Chinese and Indian MNEs' shopping sprees in advanced countries. How good is it for their innovation output?

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The shopping spree of Emerging Market Multinationals (EMNEs)

- Roughly 40% of the investments from emerging economies goes towards advanced countries (UNCTAD, 2016), rich in strategic assets, such as patents and technological skills, much sought after by emerging-market multinational enterprises (EMNEs);
- Acquisitions are on the rise (e.g. Geely acquisitions of Volvo; ChemChina recent acquisitions of Pirelli and Syngenta);

Cuban communism: beginning of the end? The Germany's angst over immigration Economist Dr Evil, the commodity speculator Ireland under siege Keith Richards, management guru Buying up the world The coming wave of Chinese takeovers

What are the EMNEs' key targets?

Individual firms' technological knowledge and expertise Specific regions/districts – "To tap into local knowledge and networks"





How do acquisitions impact on the innovation capacity of the acquiring EMNEs?

Research questions

- Do Chinese and Indian MNEs (EMNEs) benefit (in terms of their innovative output) from investing in innovative target firms or regions?
- What makes this more likely? What are the factors moderating this impact?
 - Acquisitions of medium and high-tech EU28 and US companies (466 deals) made by 301 Chinese and Indian multinationals in the period 2003-201;
 - Focus on the post acquisition innovation output, measured by the number of patents of the acquiring MNEs after the acquisition.

EMNEs face two challenges

1. Weak absorptive capacities

- Need to identify useful knowledge (Bell and Pavitt, 1993; Awate et al. 2014)
- Internal skills and technological capabilities needed to learn and successfully accommodate innovation and learning routines with those of the acquired firm. (Duysters et al., 2009; Awate et al., 2012; Hansen et al., 2016)

2. Low status

- Liability of emergingness (Madhok and Kayhani, 2012)
- Negative stigma jeopardizing EMNEs legitimacy (Hansen et al., 2016)

We claim that there is variation among MNEs on these two dimensions.



- Universe of cross-border acquisitions (CBA) from China and India to U.S. and EU28 (Zephyr-Bureau van Dijk; Thompson SDC Platinum) in 2003-2011
 - 455 deals (301 firms)
 - Focus on medium and high-tech sectors (according to NACE codes) because more likely to seek technologies (Piscitello et al., 2015);
- Match of acquirer and target firms with patent data from PATSTAT (Version October 2014)
- Ad hoc interviews.

Baseline hypotheses



EMNEs' absorptive capacity



EMNEs' status



	Total #	Manufacturing*	Services*	# in host countries
			22	30 USA
China	80 (18.0)	# Manufacturing* Services* Countri 54 32 30 USA (26.7) (12.6) 20 Ger 9 France 176 USA (73.3) (87.4) 32 Ger	20 Germany	
	(10.5)	(20.7)	30 USA 32 (12.6) 9 France 176 USA 221 (87.4) 78 UK	9 France
	260	140	221	176 USA
India	(81.1)	(73.3)	(87.4)	78 UK
				32 Germany
Total	455	202	253	

Table 1. Distribution of acquisitions by country of origin, industry and target countries

% in brackets

* 2-digits NACE codes: a) manufacturing includes: 20, 21, 26, 27, 28, 29, and 30.;b) services include: 59, 60, 61, 62, 63, 64, 65 66, 69, 70, 71, 72, 73, 74, 78, and 80.

Geographical distribution of CBAs and patents in the U.S. and Europe

Figure 1. Geographical distribution of CBAs in the U.S. and Europe



Figure 2. Geographical distribution of PCT patent applications in the U.S. and Europe



Europe



Source: Authors' elaboration on OECD data.



Source: Authors' elaboration on OECD data.

Dependent Variable

Post-deal innovative performance of the acquirer:

- # of INPADOC patent families applied by the acquirer firm in the 3 years after the deal
 - Data source: EPO-PATSTAT Database and ORBIS
 - Differently from patent count from a single legislation, family count makes easier to compare the innovative performance of firms of different nationality;
 - Robustness check: # of USPTO patents.

Baseline variables

- Target firm innovativeness:
 - # of INPADOC families of the target company filed in the 5 years before the acquisition
 - Data source: EPO-PATSTAT Database and ORBIS
- Target region innovativeness:
 - <u>Social filter</u> as a proxy for regional innovative capacity (Crescenzi and Rodriguez Pose, 2014)
 - Logarithm of the cumulated # of PCT patents per capita in the region (TL2) where the target company is located
 - Source: OECD Regional Database

Moderators

- EMNE absorptive capacity (knowledge base)
 - # of INPADOC families of the acquired company filed in the 5 years before the acquisition augmented with the number of their cited patents (Katila and Ahuja, 2001)
 - Sources: EPO-PATSTAT Database and ORBIS

• EMNE Status

- "positive news" in the international press
- 497,873 news (Lexis Nexis All News, between 1990 and 2016) - "positive" dictionary through automated content analysis using LIWC.

Control variables

Following the literature we also includes several controls:

- FDI_EXPERIENCE: The cumulative number of majority acquisitions and greenfield of the acquirer before the deal;
- HORIZONTAL_MA: Dummy variable equal to 1 whether the acquisition is horizontal (both the target and the acquirer belong to the same SIC 2 digit);
- INSTITUTIONAL_DIST: Variable that summarize the cross-country institutional distance following Berry et al (2010);
- *CHINA*: Dummy variable equal to 1 if the acquirer is Chinese;
- US: Dummy variable equal to 1 when the target firm is from United States;
- *SIZE*: Dummy variable equal to 1 if the acquirer is classified "small" or "medium" size by the ORBIS database;
- Further controls: YEAR DUMMY and macro-sector fixed effects

Estimation method

- Poisson Quasi Maximum Likelihood estimation with industry fixed effects at NACE 1 digit;
- Robustness checks:
 - Control for the possibility that patenting and acquiring might not be independent (Valentini and Di Guardo, 2012) with a two-stage count model with sample selection adding an auxiliary equation to control for the probability to undertake an international acquisition (Bratti and Miranda, 2011);
 - Zero-inflated Poisson regressions due to the high number of zeros (Hu and Jefferson, 2009).

Baseline

 H_{B1}: Not supported (Negative and significant)

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H_{B2}: Supported (Positive and significant) (social filter only)

	Controls	Full models					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SIZE	-3.024***	-3.020***	-3.156***	-3.064***	-3.034***	-3.158***	-3.045***
	(0.842)	(0.845)	(0.825)	(0.828)	(0.809)	(0.811)	(0.799)
FDI_EXP	0.255***	0.253***	0.256***	0.255***	0.059***	0.048***	0.053***
	(0.029)	(0.03)	(0.033)	(0.036)	(0.029)	(0.019)	(0.015)
HOR_CBA	0.978°	0.999°	0.831	0.65	0.855***	0.978**	0.805°
	(0.581)	(0.587)	(0.531)	(0.585)	(0.35)	(0.328)	(0.426)
INST_DIST	-0.047	-0.046	-0.057	-0.046	-0.031***	-0.038***	-0.025***
	(0.03)	(0.031)	(0.04)	(0.037)	(0.002)	(0.01)	(0.004)
CHINA	1.874***	1.880***	2.025***	1.946***	2.218***	2.290***	2.262***
	(0.128)	(0.13)	(0.157)	(0.155)	(0.616)	(0.47)	(0.528)
<i>U.S.</i>	-0.071	-0.08	-0.342	0.02	0.188	-0.118	0.145
	(0.575)	(0.583)	(0.563)	(0.592)	(0.205)	(0.152)	(0.144)
TARGET_INNOV		-0.024**				-0.012***	-0.013°
		(0.007)				(0.006)	(0.008)
<mark>SOCIAL_FILTER</mark>			<mark>0.667***</mark>			<mark>0.598**</mark>	
			(0.197)			(0.198)	
REGION_INNOV				-0.046			-0.025
				(0.035)			(0.033)
EMNE_KB					0.003***	0.003***	0.003***
					(0.001	(0.001)	(0.001)
EMNE_STATUS						0.041	0.044
						(0.082)	(0.096)
YEAR DUMMY	YES	YES	YES	YES	YES	YES	YES
Observations	431	431	407	418	431	407	418
LogLikelihood	-8888.101	-8861.734	-8270.702	-8699.576	-5812.646	-5369.461	-5681.14

Models are estimated using Poisson Quasi-Maximum Likelihood. Standard errors in parentheses. Calculations were carried out to more decimal places than are reported. Robust standard errors in parentheses. $^{\circ}<0.1$, $^{*}<0.05$, $^{**}<0.01$, $^{***}<0.001$ **HP1** The negative relationship between the innovativeness of the target firm and the EMNE post-deal innovative output is *less* negative the stronger the knowledge base of the EMNE prior to the deal.

Figure 3 – The moderating role of EMNEs' knowledge base in the relationship between target firm innovativeness and acquirers' post-CBA innovative performance.



Note: Graphs are derived from the estimation presented in Table 4 Column 1. Weak EMNE knowledge base corresponds to the variable *EMNE_KB* equal to 0. Strong EMNE knowledge base corresponds to the 95th percentile of the variable's distribution. *Source*: Authors' calculations.

HP2 EMNE predicted innovative output is *more* positive the *stronger* the EMNE knowledge base

Figure 4. The moderating role of EMNEs' knowledge base in the relationship between target region innovative capacity and acquirers' post-CBA innovative performance



⁽b)

HP3: the negative relationship between the innovativeness of the target firm and EMNE post-deal innovative output is less negative the higher the EMNE status

Figure 5 - The moderating role of EMNEs' status in the relationship between target firm innovativeness and acquirers' post-CBA innovative performance



Note: The graph is derived from the estimation presented in Table 4 Column 5. Low status corresponds to the 5th percentile of the variable *EMNE_STATUS* distribution, while High status corresponds to the 95th percentile. *Source*: Authors' calculations

HP4 The predicted innovative output is *more* positive the *stronger* the EMNE status

Figure 6 - The moderating role of EMNEs' status in the relationship between target region innovative capacity and acquirers' post-CBA innovative performance



Learning through acquisitions is not for everyone

- Acquisitions are not a quick fix for EMNEs' lack of technological capabilities at home;
- Target firms may resist to knowledge transfer, creating barriers to EMNEs' attempts to absorb and appropriate relevant knowledge;
 - This resistance is moderated by a strong knowledge base (expected) and high status (additional mechanism);
- EMNEs are able to benefit from locating in innovative regions, characterized by an ecosystem facilitating innovation and knowledge circulation (measured by the Social Filter);
 - But tapping into regional knowledge is not a trivial issue for EMNEs with low status;
 - EMNEs may find it difficult to benefit from regional assets and actors no matter how innovation-prone the region.

Thank you

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Backup slides

NAME	DESCRIPTION	SOURCE	
Dependent variables			
EMNE_POST_INNOV	NE_POST_INNOV # INPADOC families of the acquirer applied in the 3 years after the deal		
Independent variables			
Measure of target firm innovat	iveness:		
TARGET_INNOV	# INPADOC families of the target firm in the 5 years before the deal	PATSTAT ORBIS	
Measures of target region inno	wative capacity:		
SOCIAL_FILTER	Index built through principal component analysis applied to four OECD-TL2 level variables: share of labor force with tertiary education, rate of unemployment, agricultural employment as share of total employment, share of people aged 15-24 in total population (Appendix A.1)	OECD Regional Database	
REGION_INNOV	Logarithm of the cumulated # of PCT patents per capita in theOECD-TL2 region where the target firm is located in the 5 years before the deal	OECD REG PAT	
Moderating variables:			
EMNE_KB	# INPADOC families of the acquirer in the 5 years before the deal plus # INPADOC families of the cited patents	PATSTAT ORBIS	
EMNE_STATUS	Standardized residual of a regression with the number of positive news about the acquirer as dependent variable and a set of firm-level variables as regressors (Appendix A.2).	Lexis Nexis, ORBIS	
Control variables			
HOR_CBA	Dummy equal 1 if the target and the acquirer are in the same SIC (2 digit) code	ORBIS	
INST_DIST	Institutional distance between the acquirer and the target's country	Berry et al. 2010	
SIZE	Dummy equal to 1 if the acquirer is not in the size categories 'Large' and 'Very Large', as defined in ORBIS	ORBIS	
FDI_EXP	# CBAs and greenfield investments with a majority acquisition prior to the main-deal year	ZEPHYR SDC PLATINUM	
CHINA	Dummy equal to 1 if the acquirer is Chinese	ZEPHYR SDC PLATINUM	
<i>U.S.</i>	Dummy equal to 1 if the target firm/region is located in the U.S.	ZEPHYR SDC PLATINUM	

Descriptive statistics

	Continuous variables				
	Ν	Mean	Std. Dev.	Min	Max
EMNE post-deal innovation output	466	14.223	63.459	0	691
Target firm innovation	466	211.700	4206.825	0	90811
Target region innovation	452	7.708	1.346	0	9.530
EMNE knowledge base	466	59.341	217.683	0	2053
FDI experience	466	2.352	2.492	0	18
Institutional distance	466	19.803	7.489	1.3	38.182
Media-based status	466	0.000	1.000	-2.686	4.455

Categorical/dummy variables			
	Ν	Frequency (%)	
China dummy	466	20.39	
Japan dummy	466	2.36	
U.S. dummy	466	44.21	
Horizontal CBA	466	19.53	
Size	466	43.78	
Experience-based Status	466	14.16	

Correlation table

Table A.1. Correlation table EMNE post-deal Target Target EMNE Mediainnovation FDI Horizontal Institutional China US firm knowledge Experiencebased Japan region output Size experience CBA distance dummy dummy innovation innovation base based status dummy status EMNE post-deal innovation output 1.000 Size 1.000 -0.105 FDI experience 0.160 -0.220 1.000 Horizontal CBA 0.052 -0.125 0.109 1.000 0.003 1.000 Institutional distance -0.159 -0.0930.093 China dummy 0.183 0.157 -0.162 -0.065 -0.436 1.000 Japan dummy 1.000 0.002 0.116 -0.064 0.006 -0.200 0.225 US dummy -0.082 -0.112 0.074 -0.0480.767 -0.147-0.1341.000 Target firm 1.000 innovation -0.011 0.097 -0.045 0.018 -0.059 0.095 0.314 -0.044 Target region innovation -0.010 -0.055 0.053 0.105 0.177 0.107 0.051 0.234 0.036 1.000 EMNE knowledge 0.528 -0.092 base -0.128 0.358 0.021 -0.039 -0.010 -0.075 -0.014 -0.030 1.000 Experience-based 0.103 0.060 0.204 0.083 -0.035 0.037 0.113 -0.037 -0.063 0.130 1.000 status 0.118 0.029 Media-based status -0.011 0.144 -0.1190.090 0.000 -0.007 0.079 0.006 -0.020 0.134 0.024 1.000

Geographical distribution

- U.S. are the preferred recipient country with 206 deals (30 from China and 176 from India) with a strong concentration in the Silicon Valley, followed by New York, New Jersey, and Texas.
- In Europe, the preferred destination is the U.K. (87 deals), which is a target country for many Indian MNEs (78 deals), and within the U.K. the London area, followed by the West Midlands, and South East England.
- The second most preferred destination in Europe is Germany, where acquisitions are concentrated in Bayern and Baden-Württemberg.

Social Filter

- As in Crescenzi and Rodriguez-Pose (2013), Principal Components of share of labor force with tertiary education (*Tertiary education*); unemployment rate (*Unemployment* rate) and agricultural employment as a share of total employment (*Agricultural employment*); and share of people aged 15-24 in the total population (*Young population*).
- The OECD Regional Database is the source for all the variables of interest at the OECD-TL2 level.

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Status is calculated as the standardized residual of the cross-section regression:

- $lnStatusNews_{i,t-1} = \alpha + \beta lnAssetsi, t 1 + \gamma Profit_{i,t-1} + \delta NSubsidiaries_{i,t-1} + \vartheta PatentStock_{i,t-1} + \mu CHINA_i + \pi Listed_{i,t-1} + \sum \rho_j Sector_{i,j} + \sum \varphi_t DealYear_{i,t} + \epsilon,$
- where *InStatusNews* is the natural log of the number of items of "positive news" collected from Lexis Nexis concerning the acquirer involved in deal *i* in the year before the deal (i.e. at time t-1).

Media based status

- We have searched for news concerning the EMNEs in our sample in Lexis Nexis All News database and retrieved 497,873 news (in English only) between 1990 and 2016.
- Then with an automated content analysis using the Linguistic Inquiry and Word Count (LIWC) software, we have identified articles portraying the EMNEs in a positive way.
- The variable is calculated as the standardized residual of the following cross-section regression:

 $\begin{aligned} & \text{InStatusNews}_{i,t-1} = \alpha + \beta \text{InAssets}_{i,t-1} + \gamma \text{Profit}_{i,t-1} + \delta \text{NSubsidiaries}_{i,t-1} + \theta \text{PatentStock}_{i,t-1} + \mu \text{CHINA}_i \\ & +\pi \text{Listed}_{,t-1} + \rho \text{JSector}_{i,j} + \phi \text{tDealYear}_{i,t} + \epsilon, \end{aligned}$

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