

Rosanna Pittiglio

Department of Economics,
Second University of Naples,
Italy

✉ rosanna.pittiglio@unina2.it

Filippo Reganati

Faculty of Political Science, Sociology,
and Communication Science,
Sapienza University of Rome,
Italy

✉ filippo.reganati@uniroma1.it

Edgardo Sica

Department of Economics,
University of Foggia,
Italy

✉ edgardo.sica@unifg.it

Acknowledgement: The authors would like to thank all participants in the "2012 Hawaii International Conference on Social Sciences" and in the "XVIth World Congress of the International Economic Association", Beijing, China, for their helpful comments and suggestions. The usual disclaimers apply.

Vertical Spillovers from Multinational Enterprises: Does Technological Gap Matter?

Summary: Foreign direct investment (FDI) from Multinational enterprises (MNEs) can augment the productivity of domestic firms insofar as knowledge "spills over" from foreign investors to local producers. The capacity of local companies to exploit knowledge from MNEs can be affected by the technology gap between foreign and local enterprises at both horizontal (in the same industry) and vertical (in different industries) level. Whereas most of the empirical literature has focused exclusively on the analysis of horizontal and backward spillovers (i.e. between MNEs and local suppliers), the present paper also examines the relationship between FDI-related spillovers and technological gap in the Italian manufacturing sector at forward level (i.e. between MNEs and local buyers). Results suggest that at both intra-industry and forward level, the technological gap is of considerable importance for the spillover effect, particularly in the case of low-medium gap.

Key words: Foreign direct investment, Multinational enterprises, Vertical spillovers, Horizontal spillovers, Technological gap.

JEL: F21, F23.

It is well known in the literature that Foreign direct investment (FDI) from Multinational enterprises (MNEs) can augment the productivity of domestic firms insofar as knowledge "spills over" from foreign investors to local producers (Jens M. Arnold and Beata S. Javorcik 2009; Zuzana Iršová and Tomáš Havránek 2013). In particular, the size of inward FDI-related spillovers seems to be affected by the internal capabilities of local enterprises to absorb external knowledge from foreign firms, above all in terms of technology gap between MNEs and local firms (Sophia P. Dimelis 2005; Sadayuki Takii 2005; Lamia B. Hamida and Philippe Gugler 2009). However, empirical literature has so far focused essentially upon the relationship between inward-FDI spillovers and technological gap at horizontal level (i.e. in the same industry) and at backward level (i.e. between MNEs and local suppliers), disregarding the possibility that FDI spillover can be affected by the technological gap between MNEs and local buyers (forward spillovers). In this framework, the present paper contributes to explore such void in the existing literature by examining the impact exerted by technological gap upon inward-FDI spillovers also at forward level. To this end, the Italian economy has been investigated which, as believed, represents a relevant case-study. Indeed, although Italy was affected in the last years by a sustained flow

of inward-FDI, the scarce propensity to innovate, typical of the Italian firms, could suggest the presence of a relevant technological gap between Italian and foreign firms that may affect the capacity of Italian companies to exploit technological spillovers from MNEs.

The remainder of the paper is structured as follows: Section 1 deals with the literature review, Section 2 describes the estimation strategy and the data used, Section 3 presents the estimation results, and finally, Section 4 sums up the main findings and draws conclusions.

1. Literature Review

Starting from the seminal works of Wesley M. Cohen and Daniel A. Levinthal (1989, 1990), an increasing number of studies have investigated the ability of local companies to integrate and exploit knowledge from MNEs (for the survey, see Nuno Crespo and Maria Paula Fontoura 2007; Roger Smeets 2008). In this framework, literature has identified four different *channels* through which FDI-related spillovers can take place. The first is called “competition effect” and represents the increase in domestic firms’ productivity due to the competition brought by the MNEs’ entry in a country. Indeed, the presence of MNEs may foster domestic companies to increase their productivity by updating manufacturing technologies and adopting advanced management practices to meet this competitive challenge (Cesare Imbriani and Filippo Reganati 2002; Jota Ishikawa and Eiji Horiuchi 2012). In some cases, the competition effect can even reduce the productivity of domestic enterprises, since the presence of MNEs may contribute to increase the cost of labour and raw materials, thus creating a typical crowding-out effect (Francisco García, Byungchae Jin, and Robert Salomon 2013). The second channel is represented by the imitation and demonstration of any activity of foreign technologies by domestic companies. Through the exposure to foreign firms’ activities, local enterprises have the opportunity to observe MNEs’ technologies and management practices and, consequently, to imitate them in their own operations, thus increasing their productivity (Magnus Blomström and Ari Kokko 1998). The third channel works by means of linkages between MNEs and domestic companies occurring both at backward level (when MNEs *are supplied by* local enterprises) and at forward level (when MNEs *supply to* domestic companies) which contribute to spread knowledge from foreign firms to local firms (Rosanna Pittiglio, Reganati, and Edgardo Sica 2008; Jennifer W. Spencer 2008). Finally, the fourth channel is provided by the workers’ mobility and training and occurs when skills of workers, managers, and engineers acquired from MNEs are transferred to local plants (see Imbriani et al. 2011).

Regardless of which channel spillovers occur, their size seems to be affected by the internal capabilities of local enterprises to absorb knowledge from outside, above all in terms of technology gap between MNEs and local enterprises, i.e. in terms of technological advancement of MNEs compared to domestic firms (Hamida and Gugler 2009). It is worth noting that the technological gap can matter for spillovers at both horizontal level and vertical level, since the extent of backward (forward) linkages between MNEs and local suppliers (buyers) of intermediate goods is likely to depend upon the stock of technological capabilities accumulated by domes-

tic firms in supplying (buying) sectors, as compared to that of MNEs. Nevertheless, the theoretical and empirical literatures on the topic are not unanimous on what the relation between the level of technology gap and spillovers should be. Two divergent views emerge in this regard.

The first claims that spillovers occur mainly when the technology gap between domestic and foreign enterprises is large (Jian-Ye Wang and Blomström 1992; Blomström and Edward N. Wolff 1994; Liza Jabbour and Jean-Louis Mucchielli 2007; Jacob A. Jordaan 2008). This is because the less-advanced companies are more open towards the technological accumulation due to backlog of knowledge that they can potentially absorb. In contrast, the opposing view suggests that a quite large technology gap may jeopardise the possibility for domestic companies to assimilate knowledge from MNEs. In this case, the basic idea is that MNE, since too advanced, is unable to leave any impact on the productivity of host country's companies (John Cantwell 1989; Kokko 1994; Dimelis 2005; Takii 2005; Hamida and Gugler 2009; Chun-Hung Lin, Chia-Ming Lee, and Chih-Hai Yang 2011). Indeed, a firm's ability to pursue and adapt the technological developments of other companies largely depends on its existing technological capability: when the technology gap is large, domestic firms do not have the internal knowledge resources necessary to recognize the value and contents of various knowledge elements brought by MNEs, thus making spillovers unlikely. Finally, it is worth noting that most of the empirical literature has focused principally on the analysis of horizontal spillovers (Kokko, Ruben Tansini, and Mario C. Zejan 1996; Fredrik Sjöholm 1999; Changyou Sun, Hyun J. Jin, and Won W. Koo 2002; Hamida and Gugler 2009; Vinish Kathuria 2010; Naotaka Sawada 2010), whereas only a few studies have also taken into consideration the impact of technological gap on backward spillovers (Javorcik 2004; Shandre M. Thangavelu and Sanja S. Pattnayak 2006; Joze P. Damijan et al. 2008).

2. Estimation Strategy and Data Description

In order to investigate the role of technological gap for FDI-related spillovers, the relevance of spillovers is first examined by considering all Italian manufacturing firms, then, the sensitivity of the model to different ranges of technological gap is checked. To do this, a two-step strategy is followed. In the first step, total factor productivity (*TFP*) as the residual of log-log transformation of a Cobb-Douglas production function is estimated. Specifically, a production function is estimated, in which the residuals that are not explained by input factors (capital, labour) are used as a proxy for *TFP*. It should be noted that since profit-maximizing firms respond to increasing productivity by an increased use of factor inputs, estimators that ignore such an endogeneity problem (Ordinary least squares; Fixed effects) inevitably lead to inconsistent estimates of the production function parameters (James Levinsohn and Amil Petrin 2003). Therefore, the semi-parametric approach, suggested by George S. Olley and Ariel Pakes (1996) and then modified by Levinsohn and Petrin (2003) to allow for firm-specific productivity differences that exhibit idiosyncratic changes over time, is employed.

In the second step, the estimated *TFP* to variables measuring the presence of inward-FDI spillovers (horizontal, backward and forward spillover) is related, as well

as other control variables. Given this premise, the following Equation (1) is estimated:

$$TFP_{it} = \sigma + \theta_1 HHI_{jt} + \theta_2 SCALE_{jt} + \theta_3 FP_{jt} + \theta_4 HSPILL_{jt} + \theta_5 BACKSPILL_{jt} + \theta_6 FORSPILL_{jt} + \gamma_i + \delta_t + \varepsilon_{it} \tag{1}$$

$$i = 1, \dots, N$$

$$t = 1, \dots, T$$

where *TFP* is a measure of total factor productivity (constructed as discussed above); *HHI*, *SCALE*, and *FP* are industry time-varying control variables; *HSPILL*, *BACKSPILL*, *FORSPILL* are measures of horizontal, backward and forward spillovers, respectively; γ_i and δ_t individual- and time-specific effects, respectively; ε_{it} the stochastic disturbance term that is assumed to be independently distributed. Table 1 summarizes the explanatory variables used in estimations.

Table 1 Explanatory Variables

Variables	Description
<i>HHI</i>	<p>Herfindahl-Hirschman index of turnover, used as a proxy for the level of concentration and thus competition within the sector and year. It is constructed as:</p> $\sum_{i=1}^N \left[\frac{sales_{ijt}}{sales_{jt}} \right]^2$ <p>It can be readily deduced that <i>HHI</i> is bound between 0 and 1 and that higher <i>HHI</i> indicates greater market concentration, i.e. less competition.</p>
<i>SCALE</i>	<p>Minimum efficient scale of the industry, measured as the ratio between firms' sales above the average sales for the industry, divided by total industry sales. It is employed as a proxy for economies of scale.</p>
<i>FP</i>	<p>Sum of the number of employees at time <i>t</i> by all foreign-owned firms operating in sector <i>j</i> (Davide Castellani and Antonello Zanfei 2007).</p>
<i>HSPILL</i>	<p>Share of foreign firms' output in total sector output. It accounts for the foreign presence in the same sector:</p> $HSPILL_{jt} = \frac{\sum_{i \in j, i=MNEs} OUTPUT_{ijt}}{\sum_{i \in j} OUTPUT_{ijt}}$
<i>BACKSPILL</i>	<p>Foreign presence in linked downstream sectors (to which a local company supplies its inputs):</p> $BACKSPILL_{jt} = \sum_{k, k \neq j} \gamma_{jkt} HSPILL_{kt}$ <p>where γ_{jkt} is the proportion of the <i>j</i>'s output supplied to sourcing sectors <i>k</i> obtained from the input-output table for domestic intermediate consumption (i.e. excluding imports).</p>
<i>FORSPILL</i>	<p>Forward vertical spillovers to local firms that buy inputs from foreign firms:</p> $FORSPILL_{jt} = \sum_{l, l \neq j} \delta_{jl} HSPILL_{lt}$ <p>where δ_{jl} is the proportion of sector <i>j</i>'s inputs purchased from upstream sectors <i>l</i>.</p>

Source: Authors' review.

In the empirical analysis, Equation (1) is first estimated by considering all manufacturing firms, then, by employing an exogenous grouping model, the total

sample is splitted into low-, medium-, and high-technological gaps (i.e. the relative productivity performance of domestic companies *vis-à-vis* foreign companies in the same sector).

The technological gap (AC_{ij}) for firm i is calculated as the difference between the productivity of the average foreign firm and each firm in the sector (Renato G. Flôres Jr., Fontoura, and Rogério G. Santos 2007; Jabbour and Mucchielli 2007). Specifically, the first group (low-technological gap) consists of all firms with an AC below the 25th percentile of the AC distribution across all domestic firms, medium-technological gap contains firms with AC between the 25th and 75th percentiles, high-technological gap includes all companies with an AC above the 75th percentile.

The empirical analysis has been conducted by using manufacturing firm-level data drawn yearly from the *Analisi Informatizzata Delle Aziende (AIDA)* database¹, a commercial dataset provided by the Bureau Van Dijk. AIDA, which has recently been used in a number of empirical studies (e.g. Anna M. Ferragina, Pittiglio, and Reganati 2009, 2012; Imbriani, Pittiglio, and Reganati 2011; Giulio Cainelli, Roberto Ganau, and Donato Iacobucci 2015; Pittiglio, Reganati, and Sica 2015) collects the annual accounts of Italian corporate enterprises and contains information on a wide set of economic and financial variables, such as sales, costs and number of employees, value added, tangible fixed assets, start-up year, sector of activity, legal and ownership status, etc. We consider as foreign those firms that are majority owned, wholly owned, or whose main shareholder is foreign. The company information on the basis of data availability has been included, and outliers excluded. Moreover, firms with less than 10 employees from the sample have also been excluded, and unusual changes in observations that seemed to be errors, such as negative values in the number of employees have been dropped. By omitting all observations for which the necessary data were incomplete, unbalanced panel of approximately 563,000 observations, over the period 2002-2007 was obtained. The advantage of using this dataset is twofold. Firstly, it is highly representative of the entire universe of corporate companies (e.g. in 2007, the sample covers about 87% of total employees declared by the Italian National Institute of Statistics (ISTAT) 2008). Secondly, it reflects the geographical and size distribution of firms in the Italian economy quite well, which is characterized by a large high weight of small and medium-sized enterprises. Variables included in the database were deflated through the price index taken from ISTAT, which also provided the input-output matrix adopted to test for the presence of vertical spillover.

Before formally testing for the presence of spillovers at both intra-industry and inter-industry level, Table 2 provides the mean of the variables for the whole sample distinguished by ownership type (domestic *versus* foreign firms). All figures are averages over the sample period. It can be seen that MNEs are, on average, larger, more productive, and more profitable than domestic firms. They also tend to operate in more concentrated industries with a higher minimum efficient scale.

¹ This data set has been the result of a long term data collecting strategy started in 2002, due to the intention of having a time varying firm ownership information (updated to 2007), instead of only for the year of the acquisition, as commonly-used in the literature, <https://aida.bvdinfo.com/>.

Table 2 Mean Statistics by Ownership Status (Domestic versus Foreign Firms)

	Definition	Domestic firms (1)	Foreign firms (2)	Diff. (1) - (2)	t
<i>TFP</i>	Total factor productivity	9.5	10.4	-0.9	-72.9***
<i>TECH</i>	R&D intensity as the ratio of R&D expenditures on sales	0.0123	0.0024	0.0098	0.1
<i>SCALE</i>	Minimum efficiency scale of industry	0.006	0.015	-0.008	-20.9***
<i>HHI</i>	Herfindahl-Hirschman concentration ratio at industry level	269	456	-186	-20.3***

Note: *** indicates 1% significance level.

Source: Authors' elaboration based on the AIDA database.

3. Empirical Results and Interpretation

Table 3 presents the estimation results of Equation (1). Specifically, column (i) shows results for the whole sample, whereas columns (ii), (iii) and (iv) provide estimations by distinguishing domestic firms according to the level of technological gap (high-, medium-, and low-, respectively). According to the Breush-Pagan and Hausman tests, the model was estimated by means of the Fixed effects estimator (see Abdelkarim Yahyaoui and Atef Rahmani 2009 for a detailed explanation of panel data analysis).

Table 3 Estimation Results of Equation (1)

Regressors	Dependent variable: <i>TFP</i>			
	(i) Total sample	(ii) High gap	(iii) Medium gap	(iv) Low gap
<i>HHI</i>	-0.012** (0.006)	0.018 (0.13)	0.043*** (0.004)	0.054*** (0.012)
<i>FP</i>	0.001 (0.011)	0.065** (0.031)	0.155*** (0.020)	-0.040** (0.018)
<i>HSPILL</i>	0.109 (0.070)	0.193 (0.138)	1.537*** (0.136)	1.105*** (0.159)
<i>SCALE</i>	0.122 (0.220)	0.237 (0.292)	-2.326*** (0.401)	1.631** (0.645)
<i>BACKSPILL</i>	0.241 (0.390)	0.304 (0.763)	-6.381*** (0.699)	-2.326*** (0.864)
<i>FORSPILL</i>	0.007** (0.003)	-0.057*** (0.008)	0.185*** (0.022)	0.0187** (0.008)
<i>Cons</i>	9.523*** (0.291)	0.008 (0.013)	5.444*** (0.517)	11.111*** (0.461)
<i>Time dummies</i>	Yes	Yes	Yes	Yes
<i>Adjusted R²</i>	0.636	0.655	0.707	0.770
<i>No. of OBS</i>	562745	169951	262151	130643

Note: Robust standard errors in brackets. Areg estimation was performed to fit a linear regression absorbing one categorical factor. ***, **, * indicate 1%, 5% and 10% significance level, respectively.

Source: Authors' elaboration based on the AIDA database.

Looking at the regression results in column (i), the absence of both horizontal and backward spillovers is observed since their coefficients are positive but not statistically significant, and on the other, the existence of positive forward spillovers. In other words, results highlight that merely being a customer of foreign companies has a beneficial effect on local firms' productivity, i.e. Italian companies are able to improve themselves once they are offered products and services by MNEs from upstream sectors. Moreover, the negative and significant sign of the *HHI* suggests that productivity is higher in less concentrated sectors. Finally, both *SCALE* and *FP* are positive and not significant.

These results are in line with the literature (Blalock Garrick and Paul Gertler 2003; Javorcik 2004; Jabbour and Mucchielli 2007) which argues that FDI is more likely to take place through vertical linkages rather than at horizontal level. This is because MNEs have an incentive to prevent information leakage to their local competitors, thus reducing the possibility of horizontal spillovers. In contrast, the existence of forward spillovers is plausible, since MNEs in upstream industries may provide inputs to domestic firms that were previously unavailable in the country, or make them more advanced or less expensive technologically, or ensure that they are accompanied by the provision of complementary services.

With regard to the Italian case, the literature has produced ambiguous results. However, the findings in this study seem to broadly confirm the works of Imbriani and Reganati (2004) and of Reganati and Sica (2007) who find evidence of positive but not statistically significant intra-industry spillovers.

On the basis of the estimates reported in columns (ii) - (iv), the findings provide evidence for positive and significant horizontal spillovers, negative and significant backward spillovers, and positive and significant forward spillovers in the low-medium technological gap group of firms. On the other hand, there are negative forward spillovers in the case of high gap firms, since neither the horizontal nor the backward spillovers are significant. In the case of low-medium technological gap, the presence of positive horizontal externalities suggests that domestic firms with at least a basic level of technology are better able to adapt to improved technologies. It is worth noting that this result confirms the findings of Imbriani and Reganati (1999), who find evidence that a small technology gap spurs spillovers from FDI in the Italian case. At the same time, the negative effect of backward linkages with foreign affiliates reflects the fact that these firms benefit from their knowledge of the market to diversify their supply network and thus to impose low prices on their suppliers. Finally, the existence of positive forward spillovers suggests that when the technological gap is low-medium, domestic firms benefit from supplies of intermediate goods and machinery from MNEs, e.g. because the latter provide better quality products and lower costs which enhance the productivity of Italian firms using these inputs. Moreover, domestic firms may receive support in the form of training in sales techniques and supply of sales equipment from MNEs, thereby generating more positive externalities.

In contrast, when the gap between foreign and domestic enterprises is wide, Italian firms in downstream sectors receive a negative externality from MNEs, e.g. because inputs produced locally by foreign firms can be more expensive and less

adapted to local requirements, since MNEs are too technologically advanced by comparison with local enterprises.

4. Conclusions

This paper aimed to test whether the technological gap between MNEs and domestic firms matters for the magnitude of the inward FDI-related spillover effect in the Italian manufacturing sector, not only at horizontal and backward level, but also at forward level, i.e. between MNEs and local buyers of intermediate goods.

The findings can be broadly summarized as follows:

- In general terms, forward spillovers seem to be the primary means by which Italian firms benefit from the presence of foreign companies. Being a customer of foreign companies has a beneficial effect on a firm's productivity probably because firms in the upstream sectors provide better quality products at lower costs, as well as support to local companies in the form of training in sales techniques and supply of sales equipment.

- At both intra-industry and forward level, the technological gap matters considerably for the spillover effect, particularly in the case of low-medium gap.

- However, Italian enterprises exhibit a negative effect from backward linkages with foreign affiliates, probably because MNEs benefit from their knowledge of the market to diversify their supply network and thus to impose low prices on their suppliers.

Although these results are only preliminary, they are encouraging and seem to indicate that the right method in investigating the impact of technological gap for inward-spillovers in the Italian case is being followed. Of course, further analyses need to be conducted in order to check for the robustness of these findings. In particular, the investigation could be extended to the analysis of other possible determinants, such as firm size and the geographical localization of companies, as well as the analysis of other industries such as the Italian service sector.

References

- Arnold, Jens M., and Beata S. Javorcik.** 2009. "Gifted Kids or Pushy Parents? Foreign Direct Investment and Plant Productivity in Indonesia." *Journal of International Economics*, 79(1): 42-53.
- Blomström, Magnus, and Edward N. Wolff.** 1994. "Multinational Corporations and Productivity Convergence in Mexico." In *Convergence of Productivity: Cross-National Studies and Historical Evidence*, ed. William J. Baumol, Richard R. Nelson, and Edward N. Wolff, 263-284. Oxford: Oxford University Press.
- Blomström, Magnus, and Ari Kokko.** 1998. "Multinational Corporations and Spillovers." *Journal of Economic Surveys*, 12(3): 247-277.
- Cainelli, Giulio, Roberto Ganau, and Donato Iacobucci.** 2015. "Do Geographic Concentration and Vertically Related Variety Foster Firm Productivity? Micro-Evidence from Italy." <http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291468-2257/earlyview>.
- Cantwell, John.** 1989. *Technological Innovation and Multinational Corporations*. Oxford: Basil Blackwell.
- Castellani, Davide, and Antonello Zanfei.** 2007. "Multinational Companies and Productivity Spillovers: Is There a Specification Error?" *Applied Economics Letters*, 14(4): 1047-1051.
- Cohen, Wesley M., and Daniel A. Levinthal.** 1989. "Innovation and Learning: The Two Faces of R&D." *Economic Journal*, 99(397): 569-596.
- Cohen, Wesley M., and Daniel A. Levinthal.** 1990. "Absorptive Capacity: A New Perspective on Learning and Innovation." *Administrative Science Quarterly*, 35(1): 128-152.
- Crespo, Nuno, and Maria Paula Fontoura.** 2007. "Determinant Factors of FDI Spillovers: What Do We Really Know?" *World Development*, 35(3): 410-425.
- Damijan, Joze P., Matija Rojec, Boris Majcen, and Mark S. Knell.** 2008. "Impact of Firm Heterogeneity on Direct and Spillover Effects of FDI: Micro Evidence from Ten Transition Countries." Centre for Institutions and Economic Performance Discussion Paper 218/2008.
- Dimelis, Sophia P.** 2005. "Spillovers from Foreign Direct Investment and Firm Growth: Technological, Financial and Market Structure Effects." *International Journal of the Economics of Business*, 12(1): 85-104.
- Ferragina, Anna M., Rosanna Pittiglio, and Filippo Reganati.** 2009. "The Impact of FDI on Firm Survival in Italy." Research Centre International Economics Working Paper 35.
- Ferragina, Anna M., Rosanna Pittiglio, and Filippo Reganati.** 2012. "Multinational Status and Firm Exit in the Italian Manufacturing and Service Sectors." *Structural Change and Economic Dynamics*, 23(4): 363-372.
- Flôres Jr., Renato G., Maria Paula Fontoura, and Rogério G. Santos.** 2007. "Foreign Direct Investment Spillovers in Portugal: Additional Lessons from a Country Study." *European Journal of Development Research*, 19(3): 372-390.
- García, Francisco, Byungchae Jin, and Robert Salomon.** 2013. "Does Inward Foreign Direct Investment Improve the Innovative Performance of Local Firms?" *Research Policy*, 42(1): 231-244.

- Garrick, Blalock, and Paul Gertler.** 2003. "Technology from Foreign Direct Investment and Welfare Gains through the Supply Chain." <http://sticerd.lse.ac.uk/dps/eid2003/blalock.pdf>.
- Hamida, Lamia B., and Philippe Gugler.** 2009. "Are There Demonstration-Related Spillovers from FDI? Evidence from Switzerland." *International Business Review*, 18(5): 494-508.
- Imbriani, Cesare, and Filippo Reganati.** 1999. "Productivity Spillovers and Regional Differences: Some Evidence on the Italian Manufacturing Sector." University of Salerno Centre of Labour Economics and Economic Policy Discussion Paper 48.
- Imbriani, Cesare, and Filippo Reganati.** 2002. "Do Multinational Enterprises Affect Domestic Firms' Productivity?" *Studi economici*, 78(3): 5-18.
- Imbriani, Cesare, and Filippo Reganati.** 2004. "The Effects of Foreign Direct Investment on Local Firms: Some Evidence from Panel Data for the Italian Manufacturing Sector." *Journal of Current Research in Global Business*, 6(9): 18-24.
- Imbriani, Cesare, Rosanna Pittiglio, and Filippo Reganati.** 2011. "Outward Foreign Direct Investment and Domestic Performance: The Italian Manufacturing and Services Sectors." *Atlantic Economic Journal*, 39(4): 369-381.
- Imbriani, Cesare, Rosanna Pittiglio, Filippo Reganati, and Edgardo Sica.** 2011. "How Much Do Technological Gap, Firm Size, and Regional Characteristics Matter for the Absorptive Capacity of Italian Enterprises?" Research Centre International Economics Working Paper 73.
- Iršová, Zuzana, and Tomáš Havránek.** 2013. "Determinants of Horizontal Spillovers from FDI: Evidence from a Large Meta-Analysis." *World Development*, 42(1): 1-15.
- Ishikawa, Jota, and Eiji Horiuchi.** 2012. "Strategic Foreign Direct Investment in Vertically Related Markets." *Economic Record*, 88(281): 229-242.
- Italian National Institute of Statistics.** 2008. *Archivio statistico delle imprese attive*. Rome: Italian National Institute of Statistics.
- Jabbour, Liza, and Jean-Louis Mucchielli.** 2007. "Technology Transfer through Vertical Linkages: The Case of the Spanish Manufacturing Industry." *Journal of Applied Economics*, X(May): 115-136.
- Javorcik, Beata S.** 2004. "Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages." *American Economic Review*, 94(3): 605-627.
- Jordaan, Jacob A.** 2008. "Intra- and Inter-Industry Externalities from Foreign Direct Investment in the Mexican Manufacturing Sector: New Evidence from Mexican Regions." *World Development*, 36(12): 2838-2854.
- Kathuria, Vinish.** 2010. "Does the Technology Gap Influence Spillovers? A Post-Liberalization Analysis of Indian Manufacturing Industries." *Oxford Development Studies*, 38(2): 145-170.
- Kokko, Ari.** 1994. "Technology, Market Characteristics, and Spillovers." *Journal of Development Economics*, 43(2): 279-293.
- Kokko, Ari, Ruben Tansini, and Mario C. Zejan.** 1996. "Local Technological Capability and Productivity Spillovers from FDI in the Uruguayan Manufacturing Sector." *Journal of Development Studies*, 32(4): 602-611.
- Levinsohn, James, and Amil Petrin.** 2003. "Estimating Production Functions Using Inputs to Control for Unobservables." *Review of Economic Studies*, 70(2): 317-341.

- Lin, Chun-Hung, Chia-Ming Lee, and Chih-Hai Yang.** 2011. "Does Foreign Direct Investment Really Enhance China's Regional Productivity?" *Journal of International Trade and Economic Development: An International and Comparative Review*, 20(6): 741-768.
- Olley, George S., and Ariel Pakes.** 1996. "The Dynamics of Productivity in the Telecommunications Equipment Industry." *Econometrica*, 64(6): 1263-1297.
- Pittiglio, Rosanna, Filippo Reganati, and Edgardo Sica.** 2008. "Horizontal and Vertical Spillovers from FDI in the Italian Productive System." University of Foggia Department of Economics, Mathematics and Statistics Report 08/2008.
- Pittiglio Rosanna, Filippo Reganati, and Edgardo Sica.** 2015. "Do Multinational Enterprises Push Up the Wages of Domestic Firms in the Italian Manufacturing Sector?" *Manchester School*, 83(3): 346-378.
- Reganati, Filippo, and Edgardo Sica.** 2007. "Horizontal and Vertical Spillovers from FDI: Evidence from Panel Data for the Italian Manufacturing Sector." *Journal of Business Economics and Management*, 8(4): 259-266.
- Sawada, Naotaka.** 2010. "Technology Gap Matters on Spillover." *Review of Development Economics*, 14(1): 103-120.
- Sjoholm, Fredrik.** 1999. "Technology Gap, Competition and Spillovers from Foreign Direct Investment: Evidence from Establishment Data." *Journal of Development Studies*, 36(1): 53-73.
- Smeets, Roger.** 2008. "Collecting the Pieces of the FDI Knowledge Spillovers Puzzle." *World Bank Research Observer*, 23(2): 107-138.
- Spencer, Jennifer W.** 2008. "The Impact of Multinational Enterprise Strategy on Indigenous Enterprises: Horizontal Spillovers and Crowding Out in Developing Countries." *Academy of Management Review*, 33(2): 341-361.
- Sun, Changyou, Hyun J. Jin, and Won W. Koo.** 2002. "Productivity Spillovers from Inward Foreign Direct Investment in the U.S. Food Processing Industry." *Agribusiness and Applied Economics Report* 504.
- Takii, Sadayuki.** 2005. "Productivity Spillovers and Characteristics of Foreign Multinational Plants in Indonesian Manufacturing 1990-1995." *Journal of Development Economics*, 76(2): 521-542.
- Thangavelu, Shandre M., and Sanja S. Pattnayak.** 2006. "Linkages and Spillovers from Foreign Ownership in the Indian Pharmaceutical Firms." Singapore Centre for Applied and Policy Economics Working Paper 2006/05.
- Wang, Jian-Ye, and Magnus Blomström.** 1992. "Foreign Investment and Technology Transfer: A Simple Model." *European Economic Review*, 36(1): 137-155.
- Yahyaoui, Abdelkarim, and Atef Rahmani.** 2009. "Développement financier et croissance économique: rôle de la qualité des institutions." *Panoeconomicus*, 56(3): 327-357.

THIS PAGE INTENTIONALLY LEFT BLANK