Could Spillovers from Multinationals Affect the Trade Activities of Local Firms?

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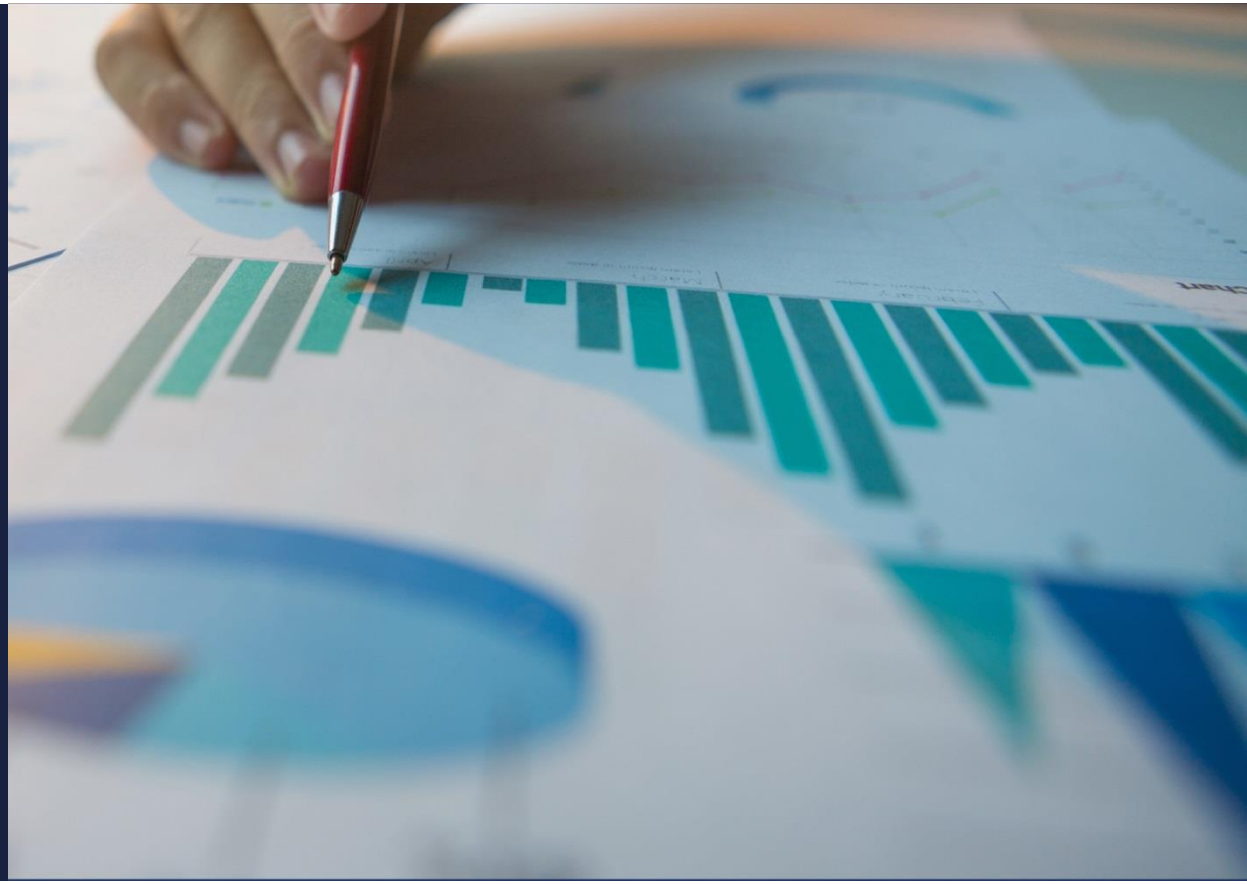

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Disclaimers

This paper draws on research carried out for the European Commission in the context of the European Semester (Framework Contract ENTR/300/PP/2013/FC-WIFO). The views expressed here are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

This research uses statistical data from the Central Statistics Office (CSO) of Ireland. The permission for controlled access to confidential micro data sets has been granted in line with the Statistics Act, 1993. Results are based on analysis of strictly controlled Research Microdata Files provided by the Central Statistics Office (CSO). The CSO does not take any responsibility for the views expressed or the outputs generated from this research.

Recent International and Irish Evidence

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Outline

- Research and Policy Context
- International Evidence
- Data and Empirical Methodology
- Results
- Policy Implications

Research and Policy Context

- Multinationals are associated with **new technologies and advanced management know-how**
  - International evidence indicates that multinationals are more productive than local firms
  - Indirect positive effects on the performance of local firms via knowledge spillovers
- **Knowledge diffusion** from multinationals to local firms could increase aggregate productivity
  - International evidence suggests that the productivity slowdown in recent years is linked to a slowdown of knowledge and innovation diffusion from top performance firms to laggard firms
- **Ireland – one of the most globalised economies in the world**
  - Multinational firms **contribute substantially to Ireland's economic performance and competitiveness**
  - **Foreign-owned firms** - large scale, capital-intensive, concentrated in high-productivity sectors, concentrated geographically, highly globalised
  - **Irish-owned firms** - much smaller, more labour-intensive, more-embedded in local economies, less internationalised

Spillovers from Multinationals to Local Firms – Main Channels

- **Demonstration effects:** local firms learn about new technologies and markets from the activities of multinationals
- **Competition**: competitive pressure lead local firms to innovate more; however, possible crowding –out could affect negatively local firms
- **Supply chain linkages***:* knowledge transfer between multinationals and local firms in upstream and downstream sectors via buyer-supplier links
- **Labour mobility***:* tacit knowledge transfer (embedded in human capital/skills)

Spillovers from Multinationals to Local Firms – Spillovers Types

Horizontal Spillovers – linked to the presence of foreign-owned firms in the local firm's industry or region

- *Intra-industry spillovers*
- *Intra-region spillovers*

Vertical Spillovers – via supply chain linkages

- *Inter-industry forward linkages* – purchases by local firms from foreign affiliates
- *Inter-industry backward linkages* – supplies by local firms to foreign affiliates

Multinationals and the Trade Activities of Local Firms

- Lower trade costs - reduced informational barriers to trade, learning about export and import opportunities
- Increased production capabilities and product quality upgrading can foster both export performance and imports of new/better inputs
- However, weaker local firms could be driven out of exporting

International Evidence

- *Aitken et al (1997); Greenaway et. al, (2004)*: higher export probability linked to intra-industry spillovers - Mexican and UK firms, respectively
- *Swenson (2008)*: new export connections (product and destinations) linked to intra-industry information spillovers - Chinese exporters
- *Swenson and Chen (2014)*: higher prices and higher survival rates for new export transactions linked to intra-industry spillovers - Chinese firms
- *Harding and Javorcik (2012)*: export quality upgrade in developing countries –industry data on FDI and export unit-values
- *Bajgar and Javorcik (2017)*: product quality upgrading through supply chain spillovers; negative effect from intra-industry spillovers - transaction level data from Romania
- *Ciani and Imbruno (2017)*: product quality upgrading from forward linkages; product quality downgrading from horizontal spillovers – transaction level data from Bulgaria

Research Objectives and Novelties

- Examine whether and to what extent multinationals affect the trade activity of Irish-owned firms in terms of **diversity of transactions** and **trade intensity**
- Analyse both exports and imports
    - Long time span: 1996-2012
- Examine the effect of both horizontal (same industry or region) and vertical spillovers (supply chain linkages)
    - Account for different input sourcing behaviour of multinationals
- Examine the role of *absorptive capacity* of domestic firms - identified by their R&D activity

Key Findings

Spillovers from multinationals' activity impact **positively** on the **diversification of exports and imports of local firms**

Exports

- **Foreign presence in the same industry**
  - Local firms export to more countries

- **Supplying inputs to multinationals**
  - Local firms export more products
  - Local firms export to more countries

Imports

- **Purchasing inputs from multinationals**
  - Local firms import more products
  - Local firms import from more countries

Key Findings

Some **negative** effects arise from multinationals through **intra-region spillovers:**

- Lower number of products exported and imported
- Lower number of import origins

The absorptive capacity of local firms appears to enhance spillover effects on their trade activities - mostly via forward linkages:

- **R&D active firms** which purchase inputs from multinationals are more likely to benefit and diversify their trade activities:
    - Exports to more destinations
    - More products imported
    - Imports from more countries

Data

- **Trade data** – *Intrastat and Extrastat, CSO*
  - Merchandise exports and imports at firm-product-country-year level, 1996-2012

- **Firm level data -** *Census of Industrial Production (CIP), CSO*
  - Balance sheet information - employment, value added, turnover, materials, wages, R&D expenditure, 1996-2012

- **Industry level data –** *WIOD data base*

  - Input-output annual data for Ireland and other 42 major countries in the world, 2000-2014

Empirical Methodology

$$\ln(Y)^{d}_{ijrt} = \beta_1 \mathbf{Hor}_{j,t-1} + \beta_2 \mathbf{Hor}_{r,t-1} + \beta_3 \mathbf{For}_{j,t-1} + \beta_4 \mathbf{Bac}_{j,t-1} + \sum_{q=1}^{5} \beta_q \mathbf{Z}_{ijrt-1} + \mu_i + \rho_t + \varepsilon_{ijrt}$$

$\ln(Y)^{d}_{ijrt}$ The trade outcome of domestic firm **i** in sector **j**, in county **r** and in year **t.**

- no. products; no. destinations/origins; export- or import- intensity.

$$\mathrm{Hor}_{j,t-1} = \frac{\mathrm{Emp}^{f}_{jt-1}}{\mathrm{Emp}_{jt-1}}$$ The employment share of foreign firms in **industry j** at time t-1.

$$\mathrm{Hor}_{r,t-1} = \frac{\mathrm{Emp}^{f}_{rt-1}}{\mathrm{Emp}_{rt-1}}$$ The employment share of foreign firms in **region r** at time t-1

$$\mathrm{For}_{j,t-1} = \sum_{l} \delta_{lj} \mathrm{Hor}_{l,t-1}$$ where δ_{lj} is the share of **inputs** of industry j **purchased** from industry *l*

$$\mathrm{Bac}_{j,t-1} = \sum_{l} \gamma_{lj} \mathrm{Hor}_{l,t-1}$$ where γ_{lj} is the share of **output** of industry j **supplied to** industry *l*

Results – Exports: Product Variety

Table 1: FDI spillovers on No. of Exported Products

			(1)	(2)	(3)	(4)
Hor. Sector$_{(t-1)}$			-0.0617	-0.0469	-0.0626	-0.0502
			(0.0809)	(0.0740)	(0.0877)	(0.0786)
Hor. County$_{(t-1)}$			**-0.215*** **	**-0.219*** **	**-0.235*** **	**-0.239*** **
			(0.0561)	**(0.0566)**	**(0.0642)**	**(0.0646)**
Forward$_{(t-1)}$				0.250		0.234
				(0.582)		(0.644)
Backward-Home$_{(t-1)}$				**0.335***		**0.279'**
				(0.165)		**(0.192)**
RD$_{(t-1)}$					-0.0251	-0.0244
					(0.0397)	(0.0407)
RD$_{(t-1)}$	**x**	Hor. Sector$_{(t-1)}$			0.00127	0.00302
					(0.0794)	(0.0821)
		Hor. County$_{(t-1)}$			0.0552	0.0565
					(0.0594)	(0.0592)
		Forward$_{(t-1)}$				0.0426
						(0.251)
		Backward-Home$_{(t-1)}$				0.153
						(0.199)
Sales gr. and HHI$_{(t-1)}$			Y	Y	Y	Y
Firm controls$_{(t-1)}$			Y	Y	Y	Y
N observations			11722	11722	11722	11722

Note: Authors' estimates based Ireland's Central Statistics Office (CSO) data. All regressions include **firm** and **year fixed effects**. Forward and backward spillover measures are computed excluding imports. Standard errors clustered at the sector level in brackets, ' p<0.15, * p<0.1, ** p<0.05, *** p<0.01.

Results – Exports: Destination Variety

Table 2: FDI spillovers on No. of Export Destinations

			(1)	(2)	(3)	(4)
Hor. Sector$_{(t-1)}$			**0.150****	**0.138****	**0.145****	**0.135****
			(0.0569)	**(0.0549)**	**(0.0528)**	**(0.0506)**
Hor. County$_{(t-1)}$			-0.0626	-0.0630	-0.0485	-0.0486
			(0.0687)	(0.0687)	(0.0779)	(0.0783)
Forward$_{(t-1)}$				0.339		0.178
				(0.463)		(0.493)
Backward-Home$_{(t-1)}$				**0.373'**		0.292
				(0.228)		(0.206)
RD$_{(t-1)}$					-0.0318	-0.0244
					(0.0245)	(0.0236)
RD$_{(t-1)}$	**x**	Hor. Sector$_{(t-1)}$			0.00622	-0.00606
					(0.0490)	(0.0541)
		Hor. County$_{(t-1)}$			-0.0337	-0.0342
					(0.0612)	(0.0609)
		Forward $_{(t-1)}$				**0.379***
						(0.209)
		Backward-Home$_{(t-1)}$				0.186
						(0.196)
Sales gr. and HHI$_{(t-1)}$			Y	Y	Y	Y
Firm controls$_{(t-1)}$			Y	Y	Y	Y
N observations			11685	11685	11685	11685

Note: Authors' estimates based Ireland's Central Statistics Office (CSO) data. All regressions include **firm** and **year fixed effects**. Forward and backward spillover measures are computed excluding imports. Standard errors clustered at the sector level in brackets, ' p<0.15, * p<0.1, ** p<0.05, *** p<0.01.

Results – Export Intensity

Table 3: FDI spillovers on Exported Intensity

			(1)	(2)	(3)	(4)
Hor. Sector$_{(t-1)}$			-0.0111	-0.0217	-0.0210	-0.0301
			(0.0195)	(0.0202)	(0.0200)	(0.0205)
Hor. County$_{(t-1)}$			-0.0104	-0.00971	0.000854	0.00188
			(0.0237)	(0.0237)	(0.0302)	(0.0304)
Forward_Nimp$_{(t-1)}$				0.125		0.0574
				(0.223)		(0.199)
Backward-H_Nimp$_{(t-1)}$				0.0329		0.0413
				(0.0799)		(0.0771)
RD$_{(t-1)}$					0.00109	0.00424
					(0.0105)	(0.00996)
RD$_{(t-1)}$	**x**	Hor. Sector$_{(t-1)}$			**0.0279'**	0.0222
					(0.0188)	(0.0185)
		Hor. County$_{(t-1)}$			-0.0267	-0.0274
					(0.0201)	(0.0203)
		Forward_Nimp$_{(t-1)}$				0.147
						(0.103)
		Backward-H_Nimp$_{(t-1)}$				-0.0398
						(0.0537)
Sales gr. and HHI$_{(t-1)}$			Y	Y	Y	Y
Firm controls$_{(t-1)}$			Y	Y	Y	Y
N observations			11716	11716	11716	11716

Note: Authors' estimates based Ireland's Central Statistics Office (CSO) data. All regressions include **firm** and **year fixed effects**. Forward and backward spillover measures are computed excluding imports. Standard errors clustered at the sector level in brackets, ' p<0.15, * p<0.1, ** p<0.05, *** p<0.01.

Summary of Findings - Exports

- **Horizontal** spillovers - intra-industry and intra-region:
  - **Products**: negative intra-region spillovers
  - **Destinations**: positive intra-industry spillovers

- **Vertical** spillovers – supply chain linkages:
  - **Products**: positive spillovers via backward linkages
  - **Destinations**: positive spillovers via backward linkages
    - Positive spillovers for R&D active firms via forward linkages

Results – Imports: Product Variety

Table 4: FDI spillovers on No. of Imported Products

			(1)	(2)	(3)	(4)
Hor. Sector$_{(t-1)}$			0.0430	0.0325	0.0313	0.0261
			(0.0566)	(0.0569)	(0.0558)	(0.0562)
Hor. County$_{(t-1)}$			**-0.164***	**-0.166***	**-0.194***	**-0.196***
			(0.0897)	**(0.0886)**	**(0.100)**	**(0.0998)**
Forward $_{(t-1)}$				**0.937***		0.644
				(0.489)		(0.498)
Backward-Home$_{(t-1)}$				-0.106		-0.129
				(0.155)		(0.165)
RD$_{(t-1)}$					-0.0534*	-0.0444*
					(0.0277)	(0.0258)
RD$_{(t-1)}$	**x**	Hor. Sector$_{(t-1)}$			0.0299	0.00996
					(0.0535)	(0.0528)
		Hor. County$_{(t-1)}$			**0.0893***	**0.0883***
					(0.0489)	**(0.0494)**
		Forward$_{(t-1)}$				**0.635****
						(0.282)
		Backward-Home$_{(t-1)}$				0.0650
						(0.118)
Sales gr. and HHI$_{(t-1)}$			Y	Y	Y	Y
Firm controls$_{(t-1)}$			Y	Y	Y	Y
N observations			20435	20435	20435	20435

Note: Authors' estimates based Ireland's Central Statistics Office (CSO) data. All regressions include **firm** and **year fixed effects**. Forward and backward spillover measures are computed excluding imports. Standard errors clustered at the sector level in brackets, ' p<0.15, * p<0.1, ** p<0.05, *** p<0.01.

Results – Imports: Origin Variety

Table 5: FDI spillovers on No. of Import Origins

			(1)	(2)	(3)	(4)
Hor. Sector$_{(t-1)}$			0.0529	0.0409	0.0376	0.0301
			(0.0359)	(0.0361)	(0.0305)	(0.0321)
Hor. County$_{(t-1)}$			**-0.0858***	**-0.0887***	**-0.107****	**-0.109****
			(0.0441)	**(0.0433)**	**(0.0466)**	**(0.0461)**
Forward $_{(t-1)}$				**1.052*****		**0.811****
				(0.297)		**(0.296)**
Backward-Home$_{(t-1)}$				0.132		0.113
				(0.104)		(0.0912)
RD$_{(t-1)}$					-0.0653**	-0.0583**
					(0.0252)	(0.0229)
RD$_{(t-1)}$	**x**	Hor. Sector$_{(t-1)}$			0.0429	0.0246
					(0.0361)	(0.0338)
		Hor. County$_{(t-1)}$			0.0593	0.0587
					(0.0422)	(0.0426)
		Forward $_{(t-1)}$				**0.541****
						(0.198)
		Backward-Home $_{(t-1)}$				0.0549
						(0.0795)
Sales gr. and HHI$_{(t-1)}$			Y	Y	Y	Y
Firm controls$_{(t-1)}$			Y	Y	Y	Y
N observations			20388	20388	20388	20388

Note: Authors' estimates based Ireland's Central Statistics Office (CSO) data. All regressions include **firm** and **year fixed effects**. Forward and backward spillover measures are computed excluding imports. Standard errors clustered at the sector level in brackets, ' p<0.15, * p<0.1, ** p<0.05, *** p<0.01.

Results – Import Intensity

Table 6: FDI spillovers on Import Intensity

			(1)	(2)	(3)	(4)
Hor. Sector$_{(t-1)}$			0.0325'	0.0254	0.0345*	0.0273
			(0.0202)	(0.0200)	(0.0207)	(0.0203)
Hor. County$_{(t-1)}$			-0.0132	-0.0126	-0.0168	-0.0162
			(0.0177)	(0.0175)	(0.0190)	(0.0188)
Forward $_{(t-1)}$				0.126		0.140
				(0.129)		(0.126)
Backward-Home $_{(t-1)}$				0.0557		0.0341
				(0.0559)		(0.0570)
RD$_{(t-1)}$					-0.00866	-0.00838
					(0.00807)	(0.00767)
RD$_{(t-1)}$	**x**	Hor. Sector$_{(t-1)}$			-0.00422	-0.00369
					(0.0156)	(0.0165)
		Hor. County$_{(t-1)}$			0.00958	0.00978
					(0.0147)	(0.0147)
		Forward $_{(t-1)}$				-0.0301
						(0.0798)
		Backward-Home$_{(t-1)}$				**0.0780****
						(0.0336)
Sales gr. and HHI$_{(t-1)}$			Y	Y	Y	Y
Firm controls$_{(t-1)}$			Y	Y	Y	Y
N observations			20428	20428	20428	20428

Note: Authors' estimates based Ireland's Central Statistics Office (CSO) data. All regressions include **firm** and **year fixed effects**. Forward and backward spillover measures are computed excluding imports. Standard errors clustered at the sector level in brackets, ' p<0.15, * p<0.1, ** p<0.05, *** p<0.01.

Summary of Findings - Imports

- **Horizontal spillovers** – intra-industry and intra-region:
  - **Products**: negative intra-region spillovers
    - Partially offset by firms doing R&D
  - **Origins**: negative intra-region spillovers

- **Vertical spillovers** – supply chain linkages:
  - **Products**: positive spillovers via forward linkages - for R&D active firms
  - **Origins**: positive spillovers via forward linkages -stronger in R&D active firms
  - **Intensity**: positive spillovers via backward linkages for R&D active firms

Policy Implications

- Spillovers from multinationals **could foster the diversification of exports and imports of Irish-owned firms –** important in the context of Brexit

- Since knowledge spillovers are not automatic, **enhancing the absorptive capacity** of local firms is key in order to ensure they can benefit from advanced knowledge and technologies

- Since most knowledge spillovers appear to come about through supply chain linkages, **facilitating production linkages between local and multinational firms** could be beneficial for the trade performance of local firms

Foreign-ownership *Premia*

	(1) Labour Productivity	(2) Wages per Employee	(3) Export Intensity	(4) Import Intensity
Foreign EU owned	0.224***	0.493***	0.104***	0.055***
	(0.021)	(0.022)	(0.007)	(0.006)
Foreign non-EU owned	0.355***	0.565***	0.182***	0.053***
	(0.025)	(0.022)	(0.009)	(0.005)
Constant	0.639***	0.359***	0.109***	0.001
	(0.017)	(0.072)	(0.012)	(0.008)
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Number of observations	80,268	80,488	80,733	80,733

Source: Authors' estimates based on data from the Census of industrial Production (CIP) and the Annual Services Inquiry (ASI), 2008-2014.