Online Appendix
Multinational Expansion in Time and Space

Stefania Garetto
BU, CEPR, and NBER

Xiao Ma
Peking University

Lindsay Oldenski
Georgetown University

Natalia Ramondo*
BU, CEPR, and NBER

February 6, 2026

O.1 Data Description

We use data on the operations of US MNEs from the Bureau of Economic Analysis (BEA). Our sample is primarily composed of foreign affiliates that are majority-owned during their whole life. Only about one percent of affiliates go from majority- to minority-owned and less than two percent go from minority- to majority-owned. We also remove affiliates and parents with zero total sales.

Reporting thresholds. The BEA collects firm-level data on the operations of US multinational enterprises (MNEs) in its annual surveys of US direct investment abroad. All US-located firms that have at least one foreign affiliate and that meet a minimum threshold of assets, sales, or net income are required by law to respond to these surveys. These minimum thresholds of assets, sales, or net income required for reporting affiliate sales by destination differ over time. In general, these reporting thresholds increased in recent years, reaching US$60 million of sales by 2011. Additionally, benchmark survey years (i.e., years in which the survey is more comprehensive), which occur every 5 years, have lower reporting thresholds. Table O.1 shows the reporting thresholds for the years in our sample. Finally, exports to Canada are observed in benchmark years 1989, 1994, 1999, 2004, and 2009, while exports to the United Kingdom and Japan are observed in 1989, 1994, and 1999.

Tax havens. Our sample contains affiliates that do not operate in tax haven countries. Affiliates in tax haven countries are likely to open for different reasons than production purposes, and to

*E-mail: garettos@bu.edu; xiaoma@phbs.pku.edu.cn; lindsay.oldenski@georgetown.edu; nramondo@bu.edu.

Table O.1: BEA minimum survey exemptions levels.

Survey year	Minimum exemption levels (in US$ millions)	Survey year	Minimum exemption levels (in US$ millions)
1987-88	10	2000-03	30
1989	**3**	**2004**	**25**
1990 -93	15	2005-07	40
1994	**3**	2008	60
1995-98	20	**2009**	**25**
1999	**7**	2010-11	60

Notes: Exemption levels are for majority-owned foreign affiliates. Benchmark survey years are in bold.

Table O.2: Tax haven countries excluded from our sample.

Anguilla	Turks and Caicos	Monaco	Antigua and Barbuda	US Virgin Islands
San Marino	Aruba	Belize	Maldives	Bahamas
Costa Rica	Mauritius	Barbados	Panama	Seychelles
British Virgin Islands	Bermuda	Bahrain	Cayman Islands	Macau
Vanuatu	Dominica	Andorra	Marshall Islands	Grenada
Liberia	Samoa	Montserrat	Cyprus	Nauru
Netherlands Antilles	Gibraltar	Tonga	St. Kitts and Nevis	Malta
St Vincent and Grenadines	St Lucia	Liechtenstein		

Note: From Gravelle (2015).

be subject to different cost structures than affiliates in non-tax haven countries. We exclude countries defined as tax havens by Gravelle (2015), except for Ireland, Switzerland, Hong Kong, and Singapore, countries that meet some of the criteria for tax haven status but also have a substantial amount of US MNE production. We do not drop the Channel Islands and the Isle of Man because affiliates in those places are combined with affiliates in the United Kingdom. Similarly, affiliates in the Cook Islands and Niue are combined with affiliates in New Zealand. Table O.2 reports the list of countries that we exclude from our sample.

Industry classification. Each foreign affiliate is assigned an industry classification based on its primary activity according to the BEA International Surveys Industry (ISI) system, which closely follows the 3-digit Standard Industrial Classification (SIC) system. The BEA uses 3-digit SIC-based ISI codes for years prior to 1999. From 1999 onward, they use 4-digit NAICS-based ISI codes. For consistency, we convert the NAICS-based codes to 3-digit SIC-based ISI codes for the relevant years.

Table O.3: Summary: Ten-year sample construction

As percent of the full sample:	
Affiliates that existed in the data in 1987	22%
Affiliates that entered the data in 2003 or later	17%
Affiliates aged 11 and greater that were not in the data in 1987, but existed for at least 10 years in the data	7%
Affiliates that entered the dataset between 1988 and 2002, but were in the dataset for less than 10 years	26%
Affiliates aged 1-10 included in our balanced panel	28%
Total	100%
Number of years an affiliate is observed in our full dataset	
Mean	10.7
Median	9.0

Note: Median is the mean of the eleven observations around the actual median.

Unit of observation. According to the BEA definition, an affiliate is a business enterprise operating in a given host country; it thus can operate several plants in different locations within the host country. The BEA reporting rules permit consolidated reporting for distinct plants located in the same country that operate in the same narrowly defined industry or otherwise are integral parts of the same business operation. We consolidate observations of enterprises belonging to the same parent company and operating in the same country and 3-digit industry. We group these enterprises' activities together and refer to them as a single affiliate.

Construction of ten-year sample. To provide evidence on the evolution of affiliate sales over time, we also construct a balanced panel of affiliates that we can observe from birth through the tenth year of life. First, we drop 22 percent of the total observations because they correspond to affiliates that existed in the dataset in the first year of our sample (1987). Because we cannot observe the birth year of these affiliates, we do not know their age. Next, we drop 17 percent of the total observations because they belong to affiliates that didn't enter the data until 2003 or later. Our dataset ends in 2011, so we can only observe less than 10 years for any of these affiliates. Next, we drop 26 percent of the total observations because they belong to affiliates that entered the dataset between 1988 and 2002, but exited after less than 10 years. Finally, we lose seven percent of the total observations because they belong to affiliates in our 10-year sample, but correspond to observations of these affiliates in their 11th year of life or greater. This leaves us with 28 percent of the total observations. This sample is consistent with the life span of a typical firm in the data, as the mean length of time that an affiliate is observed in our full dataset is 10.7 years, and the median is 9 years.

O.2 Facts: Robustness

Table O.4: Affiliate sales and number of affiliates: horizontal vs export sales. OLS.

Dependent variable	Share of total affiliate sales				Share of affiliates			
	horizontal sales		export sales		horizontal sales		export sales	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
affiliate age	-0.002	-0.012***	-0.005**	0.005***	0.00003	-0.001	0.016***	0.031***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.0006)	(0.001)	(0.008)
country-year fe	yes	yes	yes	yes	yes	yes	yes	yes
industry fe	yes	no	yes	no	yes	no	yes	no
affiliate fe	no	yes	no	yes	no	yes	no	yes
Observations	36,135	36,135	25,958	25,958	38,080	38,080	38,080	38,080
R-squared	0.079	0.013	0.092	0.000	0.042	0.0001	0.116	0.036

Notes: Observations at the affiliate-year level, for new majority-owned affiliates that survive for at least ten consecutive years, in manufacturing. In columns (1)-(4), the dependent variable is horizontal (export) sales, as a share of total affiliate sales, for affiliates with positive horizontal (export) sales; in columns (5)-(8), the dependent variable is the share of affiliates with positive horizontal (export) sales. Standard errors, clustered at the parent level, are in parenthesis. Levels of significance are denoted $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.1$.

Table O.5: Affiliate sales relative to parent sales. OLS.

(a) Affiliate horizontal sales, as a share of parent sales		(b) Affiliate total sales, as a share of parent sales	
D(age = 2)	-0.0013	D(years to export entry = -5)	-0.0110
	(0.0014)		(0.0073)
D(age = 3)	-0.0007	D(years to export entry = -4)	-0.0201***
	(0.0013)		(0.0064)
D(age = 4)	0.0011	D(years to export entry = -3)	-0.0162**
	(0.0014)		(0.0071)
D(age = 5)	0.0012	D(years to export entry = -2)	-0.0129*
	(0.0011)		(0.0080)
D(age = 6)	0.0012	D(years to export entry = -1)	-0.0150**
	(0.0011)		(0.0067)
D(age = 7)	0.0002	D(years to export entry = 1)	-0.0041
	(0.0009)		(0.0041)
D(age = 8)	0.0002	D(years to export entry = 2)	-0.0049
	(0.0008)		(0.0070)
D(age = 9)	0.0011	D(years to export entry = 3)	0.0054
	(0.0009)		(0.00813)
D(age = 10)	0.0022	D(years to export entry = 4)	0.0010
	(0.0014)		(0.0075)
		D(years to export entry = 5)	0.0019
			(0.0067)
Observations	38,080		38,080
R-squared	0.001		0.002

Notes: Observations at the affiliate-year level, for new majority-owned affiliates that survive for at least ten consecutive years, in manufacturing. In panel (a), the dependent variable is the value of affiliate horizontal sales relative to the domestic sales of the US parent, for new affiliates. D(age = a) is a dummy variable that equals 1 if the affiliate's age = a. In panel (b), the dependent variable is affiliate total sales relative to the domestic sales of the US parent. D(years to export entry = t) is a dummy variable that equals 1 for affiliates that start exporting during our sample period in year t relative to when they begin exporting. Controls for t$\geq$6 and t$\leq$-6 are included but not reported here. Country-year and affiliate fixed effects included. Standard errors, clustered at the parent level, are in parentheses. Levels of significance are denoted $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.1$.

Table O.6: Horizontal affiliate sales, relative to US parent sales, robustness. OLS.

Dep var:	Affiliate horizontal sales relative to US parent sales					
	First affiliate	Subsequent affiliate	GVC affiliate	Non-GVC affiliate	Greenfield affiliate	M&A affiliate
	(1)	(2)	(3)	(4)	(5)	(6)
D(age=2)	-0.0052	-0.0005	-0.0022	-0.0006		
	(0.0037)	(0.0009)	(0.0016)	(0.0020)		
D(age=3)	-0.0037	-0.0008	-0.0011	-0.004	-0.0177	0.0019
	(0.0036)	(0.001)	(0.0013)	(0.0043)	(0.0216)	(0.0051)
D(age=4)	-0.0014	0.0009	0.0011	-0.0043	-0.0076	0.0003
	(0.0037)	(0.0007)	(0.0012)	(0.0046)	(0.0096)	(0.0041)
D(age=5)	-0.0008	0.0009*	0.0004	0.0037	-0.0065	0.0017
	(0.0026)	(0.0005)	(0.0012)	(0.0034)	(0.0074)	(0.0034)
D(age=6)	0.0003	0.0002	0.0015	-0.0036	-0.0072	0.002
	(0.003)	(0.0004)	(0.0014)	(0.0018)	(0.0075)	(0.0026)
D(age=7)	-0.0025	0.0003	0.0003	-0.0034	-0.0069	0.0025
	(0.0024)	(0.0004)	(0.001)	(0.0014)	(0.0074)	(0.0024)
D(age=8)	-0.0022	0.0002	0.0006	-0.0047	-0.0054	0.0026
	(0.0024)	(0.0004)	(0.0009)	(0.0025)	(0.0065)	(0.0022)
D(age=9)	-0.0012	0.0012*	0.0013	-0.0042	-0.0008	0.0036*
	(0.0019)	(0.0007)	(0.001)	(0.0019)	(0.0022)	(0.0021)
D(age=10)	0.002	0.0011	0.0012	0.0056	0.0002	0.0029
	(0.003)	(0.0008)	(0.001)	(0.0083)	(0.0015)	(0.0018)
Observations	17,360	20,720	27,760	10,320	2,214	3,564
R^2	0.0034	0.0013	0.0022	0.0015	0.0116	0.0075

Notes: Observations at the affiliate-year level, for new majority-owned affiliates that survive for at least ten consecutive years, in manufacturing. Dependent variable is the ratio of horizontal sales to US parent sales. First affiliate refers to the first foreign affiliate opened by the parent, while subsequent affiliate refers to second or higher. GVC affiliate refers to affiliates with positive intra-firm trade, while non-GVC affiliate refers to affiliates with zero intra-firm trade. M&A affiliate refers to affiliates created through a merger or acquisition of an existing firm, while greenfield affiliate refers to a new firm. All specifications include affiliate and country-year fixed effects. Standard errors, clustered at the parent level, are in parenthesis. Levels of significance are denoted $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.1$.

Table O.7: Unconditional and conditional probability of affiliate entry. OLS.

	Unconditional	Continent	Border	Language	Income	All
Canada	0.021	***0.021***	†	0.023	***0.021***	†
		(0.525)	–	(0.000)	(0.553)	–
United Kingdom	0.025	0.027	***0.030***	***0.026***	0.026	***0.030***
		(0.000)	(0.143)	(0.292)	(0.008)	(0.143)
Germany	0.023	0.026	0.029	0.028	0.024	0.028
		(0.000)	(0.000)	(0.010)	(0.000)	(0.010)
Ireland	0.010	0.010	0.011	0.010	0.010	0.011
		(0.001)	(0.010)	(0.000)	(0.005)	(0.011)
China	0.027	0.037	0.050	0.048	0.051	0.057
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
France	0.021	0.024	0.028	***0.023***	0.022	0.029
		(0.000)	(0.000)	(0.018)	(0.000)	(0.000)
Brazil	0.016	0.022	0.027	***0.025***	0.023	***0.019***
		(0.000)	(0.000)	(0.063)	(0.000)	(0.614)
Singapore	0.016	0.023	0.044	0.017	***0.016***	0.045
		(0.000)	(0.000)	(0.000)	(0.300)	(0.000)
Mexico	0.024	0.029	***0.028***	0.034	0.031	***0.024***
		(0.000)	(0.620)	(0.000)	(0.000)	(0.961)
Japan	0.016	0.021	†	†	***0.016***	†
		(0.000)	–	–	(0.224)	–

Notes: Probabilities of affiliate entry into the top-ten most popular destinations of US MNEs. Conditional probabilities refer to the probability of observing an MNE opening an affiliate in a country given that the parent already has an affiliate in a "similar" country. "All" refers to similarity in all the dimensions. (†): Insufficient observations. The sample is restricted to parents with at least two affiliates worldwide. Conditional probabilities in ***bold*** are not significantly different from the relevant unconditional probability. P-values from tests of equality of the conditional and unconditional probabilities are in parentheses.

Table O.8: Unconditional and conditional probability of affiliate entry. 2SLS.

	Unconditional	Continent	Border	Language	Income	All
Canada	0.021	***0.020***	†	***0.020***	***0.019***	†
		(0.912)	–	(0.710)	(0.659)	(0.685)
United Kingdom	0.025	***0.027***	***0.026***	***0.028***	***0.027***	***0.028***
		(0.479)	(0.745)	(0.272)	(0.549)	(0.446)
Germany	0.023	***0.025***	***0.024***	***0.021***	***0.025***	***0.025***
		(0.647)	(0.793)	(0.623)	(0.675)	(0.702)
Ireland	0.010	***0.009***	***0.007***	***0.008***	***0.007***	***0.008***
		(0.495)	(0.323)	(0.547)	(0.382)	(0.461)
China	0.027	0.036	0.046	0.040	0.050	0.051
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
France	0.021	***0.023***	***0.024***	***0.019***	***0.023***	***0.023***
		(0.557)	(0.622)	(0.545)	(0.637)	(0.668)
Brazil	0.016	0.012	0.011	0.012	0.011	0.011
		(0.005)	(0.002)	(0.004)	(0.003)	(0.003)
Singapore	0.016	0.010	0.012	0.012	0.014	0.012
		(0.000)	(0.001)	(0.001)	(0.041)	(0.001)
Mexico	0.024	0.028	***0.022***	0.019	***0.022***	***0.019***
		(0.011)	(0.270)	(0.013)	(0.315)	(0.120)
Japan	0.016	***0.015***	†	†	***0.013***	†
		(0.570)	–	–	(0.332)	(0.418)

Notes: Probabilities of affiliate entry into the top-ten most popular destinations of US MNEs. Conditional probabilities refer to the probability of observing an MNE opening an affiliate in a country given that the parent already has an affiliate in a "similar" country. "All" refers to similarity in all the dimensions. (†): Insufficient observations. The sample is restricted to parents with at least two affiliates worldwide. Conditional probabilities in ***bold*** are not significantly different from the relevant unconditional probability. P-values from tests of equality of the conditional and unconditional probabilities are in parentheses.

Table O.9: Unconditional and conditional probability of affiliate entry, GVC vs non-GVC affiliates.

	Unconditional	Continent	Border	Language	Income	All
			GVC Affiliates			
Canada	0.021	***0.022***	†	0.024	***0.021***	†
		(0.733)	–	(0.000)	(0.360)	–
United Kingdom	0.026	0.028	***0.030***	***0.027***	0.027	***0.030***
		(0.001)	(0.204)	(0.426)	(0.008)	(0.204)
Germany	0.024	0.026	0.030	***0.028***	0.025	***0.028***
		(0.000)	(0.000)	(0.024)	(0.000)	(0.024)
Ireland	0.010	0.011	***0.012***	0.011	***0.010***	***0.012***
		(0.003)	(0.012)	(0.001)	(0.005)	(0.012)
China	0.028	0.038	0.051	0.049	0.052	0.057
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
France	0.022	0.025	0.029	***0.024***	0.023	0.029
		(0.000)	(0.000)	(0.059)	(0.000)	(0.000)
Brazil	0.017	0.022	0.027	***0.025***	0.024	***0.019***
		(0.000)	(0.000)	(0.070)	(0.000)	(0.713)
Singapore	0.017	0.024	0.045	0.018	***0.017***	0.046
		(0.000)	(0.000)	(0.000)	(0.292)	(0.000)
Mexico	0.025	0.030	***0.028***	0.034	0.031	***0.024***
		(0.000)	(0.699)	(0.000)	(0.000)	(0.936)
Japan	0.016	0.022	†	†	***0.017***	†
		(0.000)	–	–	(0.092)	
			Non-GVC Affiliates			
Canada	0.009	***0.014***	†	0.012	***0.0073***	†
		(0.483)	–	(0.002)	(0.233)	–
United Kingdom	0.009	***0.011***	‡	***0.008***	***0.0091***	‡
		(0.516)	–	(0.668)	(0.830)	–
Germany	0.010	***0.011***	***0.014***	***0.017***	***0.0096***	***0.0165***
		(0.687)	(0.308)	(0.552)	(0.552)	(0.552)
Ireland	‡	‡	‡	‡	‡	‡
		–	–	–	–	–
China	0.006	***0.007***	***0.007***	***0.010***	***0.0217***	‡
		(0.656)	(0.795)	(0.444)	(0.249)	–
France	0.006	***0.007***	***0.014***	***0.009***	***0.006***	***0.0238***
		(0.015)	(0.014)	(0.248)	(0.023)	(0.069)
Brazil	0.005	***0.007***	***0.033***	‡	***0.007***	‡
		(0.521)	(0.192)	–	(0.547)	–
Singapore	‡	‡	‡	‡	‡	‡
		–	–	–	–	–
Mexico	0.006	***0.010***	‡	***0.024***	***0.0210***	‡
		(0.176)	–	(0.131)	(0.143)	–
Japan	0.005	†	†	‡	***0.0038***	†
		–	–	–	(0.386)	–

Notes: Probabilities of affiliate entry into the top-ten most popular destinations of US MNEs. Conditional probabilities refer to the probability of observing an MNE opening an affiliate in a country given that the parent already has an affiliate in a "similar" country. "All" refers to similarity in all the dimensions. "GVC affiliates" ("non-GVC affiliates") are affiliates with positive (zero) intra-firm trade flows. (†): Insufficient observations. (‡): Not shown for confidentiality reasons. The sample is restricted to parents with at least two affiliates worldwide. Conditional probabilities in ***bold*** are not significantly different from the relevant unconditional probability. P-values from tests of equality of the conditional and unconditional probabilities are in parentheses.

Table O.10: Unconditional and conditional probability of affiliate entry, different parent samples.

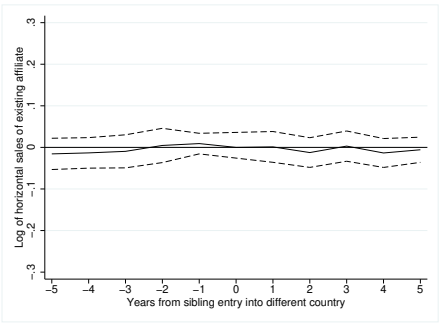
	Unconditional	Continent	Border	Language	Income	All
			Parents with at least five affiliates worldwide			
Canada	0.0252	***0.0258***	†	0.0258	***0.0250***	†
		(0.724)	–	(0.000)	(0.286)	–
United Kingdom	0.0300	***0.0302***	***0.0324***	***0.0301***	***0.0230***	***0.0324***
		(0.661)	(0.506)	(0.865)	(0.520)	(0.506)
Germany	0.0345	0.0353	***0.0353***	***0.0319***	0.0346	***0.0319***
		(0.000)	(0.284)	(0.210)	(0.000)	(0.210)
Ireland	0.0166	***0.0169***	***0.0174***	***0.0169***	0.0167	***0.0174***
		(0.025)	(0.311)	(0.163)	(0.000)	(0.311)
China	0.0451	0.0489	0.0568	0.0579	0.0581	0.0599
		(0.000)	(0.000)	(0.000)	(0.000)	(0.004)
France	0.0335	0.0341	0.0364	***0.0322***	0.0335	***0.0339***
		(0.000)	(0.000)	(0.263)	(0.000)	(0.758)
Brazil	0.0273	***0.0290***	***0.0294***	***0.0253***	0.0308	***0.0188***
		(0.212)	(0.413)	(0.674)	(0.001)	(0.091)
Singapore	0.0289	0.0322	0.0507	***0.0293***	0.0290	0.0508
		(0.000)	(0.000)	(0.061)	(0.000)	(0.000)
Mexico	0.0340	***0.0354***	***0.0313***	***0.0367***	***0.0361***	***0.0243***
		(0.351)	(0.739)	(0.121)	(0.107)	(0.247)
Japan	0.0269	0.0288	†	†	***0.0269***	†
		(0.007)	–	–	(0.598)	–
			Parents with at least ten affiliates worldwide			
Canada	0.0291	***0.0291***	†	0.0292	***0.0291***	†
		(0.964)	–	(0.017)	(0.286)	–
United Kingdom	0.0273	0.0275	***0.0264***	***0.0276***	***0.0273***	***0.0264***
		(0.000)	(0.810)	(0.218)	(0.610)	(0.809)
Germany	0.0354	0.0357	***0.0349***	***0.0306***	0.0354	***0.0306***
		(0.000)	(0.508)	(0.027)	(0.000)	(0.027)
Ireland	0.0224	***0.0224***	***0.0220***	0.0225	***0.0224***	***0.0220***
		(0.862)	(0.680)	(0.002)	(0.105)	(0.680)
China	0.0587	***0.0600***	***0.0616***	0.0661	***0.0598***	***0.0620***
		(0.069)	(0.382)	(0.007)	(0.687)	(0.515)
France	0.0395	***0.0396***	***0.0401***	***0.0376***	***0.0395***	***0.0382***
		(0.697)	(0.214)	(0.123)	(0.116)	(0.283)
Brazil	0.0321	***0.0299***	***0.0277***	0.0286	***0.0323***	0.0183
		(0.112)	(0.084)	(0.505)	(0.808)	(0.007)
Singapore	0.0432	***0.0439***	0.0564	***0.0431***	***0.0432***	0.0564
		(0.238)	(0.008)	(0.556)	(0.610)	(0.008)
Mexico	0.0423	***0.0412***	***0.0282***	***0.0393***	0.0388	***0.0247***
		(0.535)	(0.085)	(0.088)	(0.009)	(0.039)
Japan	0.0361	***0.0365***	†	†	***0.0361***	†
		(0.478)	–	–	(0.865)	–

Notes: Probabilities of affiliate entry into the top-ten most popular destinations of US MNEs. Conditional probabilities refer to the probability of observing an MNE opening an affiliate in a country given that the parent already has an affiliate in a "similar" country. "All" refers to similarity in all the dimensions. (†): Insufficient observations. Conditional probabilities in ***bold*** are not significantly different from the relevant unconditional probability. P-values from tests of equality of the conditional and unconditional probabilities are in parentheses.

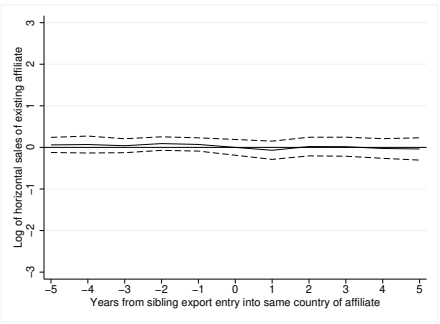
Figure O.1: Total horizontal and export sales of existing affiliates and siblings activities.

OLS estimation

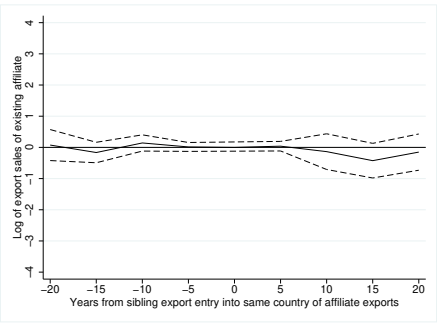
(a)



(b)

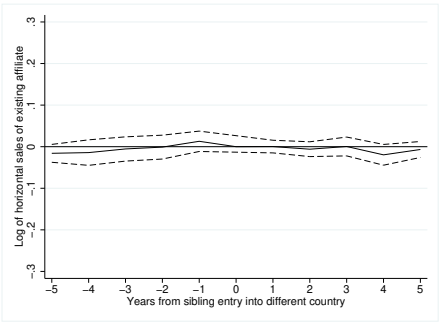


(c)

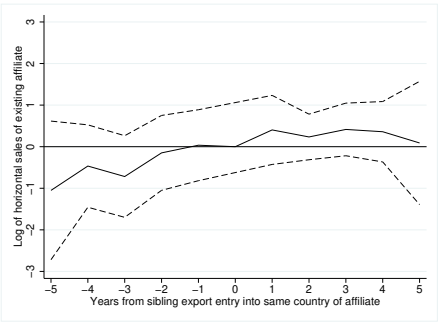


2SLS estimation

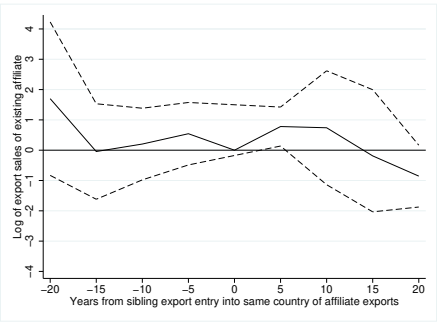
(d)



(e)



(f)



Notes: Total horizontal sales include sales to both unaffiliated and affiliated parties in the host market of the affiliate. Total export sales include exports to both unaffiliated and affiliated parties. Figure O.1a (O.1d) includes all affiliates of US MNEs in manufacturing. Figure O.1b (O.1e) includes affiliates located in Canada, UK, and Japan. Figure O.1c (O.1f) includes affiliates exporting to Canada, UK, and Japan. Figures O.1a (O.1d) and O.1b (O.1e) show coefficients (solid line) from regressing the log of horizontal sales for an affiliate in country j and 3-digit industry h belonging to parent p at time $t \in \{-5, ...5\}$ on a set of dummies indicating: in Figure O.1a (O.1d), time from opening an affiliate in country $j^{'} \neq j$ belonging to the same parent p and industry h; and in Figure O.1b (O.1e), time from export entry into j of an affiliate located in country $j' \neq j$ belonging to the same parent p and industry h, with $j = Canada, UK, Japan$. Figure O.1c (O.1f) shows coefficients (solid line) from regressing the log of export sales to country j by affiliates located in country $k \neq j$ and 3-digit industry h belonging to parent p at time $t \in \{-20, -15, ...15, 20\}$ on a set of dummies indicating time from export entry into j of an affiliate located in country $k' \neq j$ and $k' \neq k$ belonging to the same parent p and industry h as the affiliate located in k and exporting to j, with $j = Canada, UK, Japan$. We include the log of the MNE global sales, the log of the US parent sales, affiliate fixed effects and year fixed effects. Standard errors are clustered at the affiliate level. Dashed lines denote 95% confidence intervals.

O.3 Instrumental Variable Estimation: First Stage Description

We estimate the probabilities of affiliate entry using 2SLS. We instrument for the existence of sibling affiliates in other countries using the presence of bilateral tax treaties (BTTs) between the

US and each host country. BTTs reduce the cost of foreign affiliate activity for US multinational firms by preventing double taxation.[1] Kovak et al. (2021) show that BTTs, which are implemented at the country-level for political reasons after a long and often uncertain period of negotiation, are exogenous to the behavior of firms, making them a good instrument for MNE foreign affiliate activity.

Following Kovak et al. (2021), our first stage estimating equation is

$$D_{pct} = \beta_1 BTT_{ct} + \beta_2 \mathbf{X}_{ct} + \beta_3 parsibbtt_{pct} + \beta_4 sibsibbtt_{pct} + \delta_{pc} + \gamma_t + u_{pct}, \tag{O.1}$$

where D_{pct} is a dummy equal to one if parent p has an affiliate in country c in year t, BTT_{ct} is a dummy equal to one if the United States has a BTT in force with country c in year t, $\mathbf{X}_{pct}$ is a vector of standard predictors of FDI location, and δ_{pc} are parent-country fixed effects, while γ_t are time fixed effects. The variable $parsibbtt_{pct}$ is the share of employment of affiliates of parent p in year 0 located in countries other than c with a BTT with the United States in year t,

$$parsibbtt_{pct} = \frac{\sum_{c' \neq c} BTT_{c't} * Emp_{pc'0}}{\sum_{c' \neq c} Emp_{pc'0}}, \tag{O.2}$$

while $sibsibbtt_{pct}$ is the share of employment of affiliates of parent p in year 0 located in countries other than c with a BTT with country c in year t,

$$sibsibbtt_{pct} = \frac{\sum_{c' \neq c} BTT_{cc't} * Emp_{pc'0}}{\sum_{c' \neq c} Emp_{pc'0}}. \tag{O.3}$$

The results of the first stage estimation for affiliate opening and affiliate export are shown in Tables O.11 and O.12, respectively.[2]

[1] Double taxation occurs when the same foreign affiliate income is taxed in both the host country and the MNE headquarters country. For US MNEs, this is generally due to limits on the size of the foreign tax credit available to US-owned firms. BTTs include provisions that eliminate double taxation, thus lowering the cost of foreign affiliate activity for US multinational firms that choose to operate in countries that have a BTT with the United States.

[2] Results from a first-stage without any additional controls but the same set of fixed effects, delivers virtually the same results as the ones presented in Tables O.11.

Table O.11: Instrumental variable estimation: first stage for affiliate existence.

Dependent variable	D (affiliate)	D (new affiliate)
	(1)	(2)
$D\left(BTT_{us,c,t}\right)$	0.005***	0.002***
	(0.002)	(0.001)
Parent-Sibling BTT	0.049***	0.008***
	(0.002)	(0.001)
Affiliate-Sibling BTT	0.006**	0.003**
	(0.002)	(0.001)
$\ln\left(rgdp_{us,t} + rgdp_{c,t}\right)$	0.679***	0.195**
	(0.107)	(0.078)
$\ln\left(rgdp_{us,t} - rgdp_{c,t}\right)^2$	-0.032**	-0.024***
	(0.015)	(0.008)
$\ln\left\|Skill_{us,t} - Skill_{c,t}\right\|$	-0.017***	0.003**
	(0.002)	(0.001)
$\ln TCost_{c,us,t}$	-0.001***	-0.0002
	(0.0002)	(0.0001)
$D\left(BIT_{us,c,t}\right)$	-0.009***	0.002***
	(0.001)	(0.001)
$D\left(FTA_{us,c,t}\right)$	0.009***	-0.0004
	(0.002)	(0.002)
$\ln Exchange\ rate_{c,t}$	-0.0001***	0.000**
	(0.00003)	(0.000)
Observations	3,160,363	3,160,363
R-squared	0.064	0.012
F-statistic	282.5	89.7

Notes: Dependent variable: (1) dummy equals 1 if an affiliate of parent p exists in country c in year t; (2) dummy equals 1 if parent p opens a new affiliate in country c in year t. "Parent-Sibling BTTs" is defined in (O.2), while "Affiliate-Sibling BTT" is defined in (O.3). All specifications include parent-country and year fixed effects. Standard errors, clustered at the country-year level, are in parenthesis. Levels of significance are denoted $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.1$.

Table O.12: Instrumental variable estimation: first stage for affiliate exports.

Dependent variable	D (affiliate exports to)		
	Canada	United Kingdom	Japan
	(1)	(2)	(3)
$D\left(BTT_{us,c,t}\right)$	0.0002**	0.0001**	0.00003
	(0.0001)	(0.00003)	(0.00002)
Parent-Sibling BTT	0.0004***	0.0001***	0.0001**
	(0.0001)	(0.00002)	(0.0001)
Affiliate-Sibling BTT	-0.0002	0.0003	-0.00002
	(0.0003)	(0.0002)	(0.00004)
$\ln\left(rgdp_{us,t} + rgdp_{c,t}\right)$	0.014	0.001	0.00001
	(0.019)	(0.001)	(0.001)
$\ln\left(rgdp_{us,t} - rgdp_{c,t}\right)^2$	0.001	0.0001	0.0001
	(0.003)	(0.0001)	(0.0001)
$\ln\lvert Skill_{us,t} - Skill_{c,t}\rvert$	0.001**	0.0001	-0.00001
	(0.0003)	(0.0001)	(0.00002)
$\ln TCost_{c,us,t}$	0.00001	0.00001	-2.00E-06
	(0.00003)	(0.00003)	(2.00E-06)
$D\left(BIT_{us,c,t}\right)$	-0.001***	0.0001**	0.00003**
	(0.0001)	(0.00002)	(0.00002)
$D\left(FTA_{us,c,t}\right)$	0.0005	-0.00004	-0.0002
	(0.001)	(0.0001)	(0.0001)
$\ln Exchange\ rate_{c,t}$	1.00E-06	3.00E-06	1.00E-06
	(1.00E-06)	(3.00E-06)	(1.00E-06)
Observations	3,160,363	3,160,363	3,160,363
R-squared	0.005	0.0003	0.0001
F-statistic	15.77	8.40	3.32

Notes: Dependent variable: dummy equals 1 if an affiliate of parent p located in country c in year t exports to Canada (1), United Kingdom (2), and Japan (3). "Parent-Sibling BTTs" is defined in (O.2), while "Affiliate-Sibling BTT" is defined in (O.3). All specifications include parent-country and year fixed effects. Standard errors, clustered at the country-year level, are in parenthesis. Levels of significance are denoted $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.1$.

O.4 Facts: Additional Results

Table O.13: Gravity in affiliate opening. OLS.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(GDP)	0.0322***						0.0271***	0.0143***
	(0.0035)						(0.0035)	(0.0035)
log(distance)		-0.0593***					-0.0476***	-.0450***
		(0.0044)					(0.0072)	(0.0071)
log(horizontal sales)			0.0332***					0.0276***
			(0.0022)					(0.0022)
common continent				0.1018***			-0.0083	-0.0103
				(0.0119)			(0.0193)	(0.0192)
common language					0.0706***		0.0520***	0.0418***
					(0.007)		(0.0072)	(0.0072)
common income group						0.0830***	0.0336***	0.0299***
						(0.0083)	(0.0087)	(0.0086)
Observations	132,493	132,493	132,493	132,493	132,493	132,493	132,493	132,493
R-squared	0.0964	0.1022	0.0895	0.0975	0.0961	0.0932	0.1112	0.1135

Notes: Dependent variable = 1 for the first affiliate of an MNE, and 0 for subsequent affiliates. *common income group* = 1 if the affiliate's host country is in the same World Bank income group as the US. All specifications include parent and year fixed effects. Standard errors in parentheses. Levels of significance are denoted $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.1$.

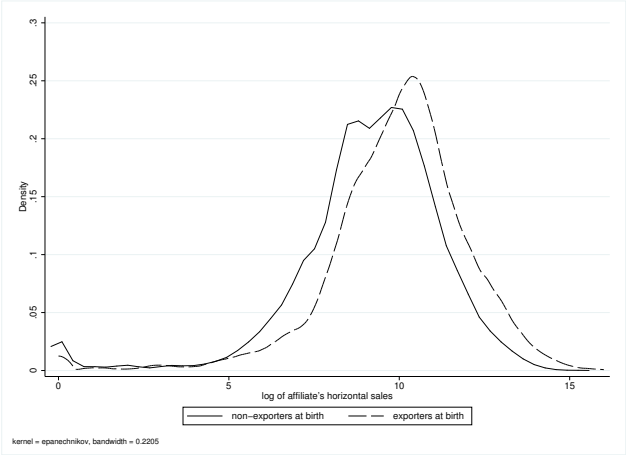
Table O.14: Persistence, entry, and exit.

Persistence in Affiliate Operations					Parent Size at Affiliate Entry and Exit	
	$N^a_{j,t}/N^a_{j,t-1}$	$N^{\sim a}_{j,t}/N^{\sim a}_{j,t-1}$	$N^h_{j,t}/N^h_{j,t-1}$	$N^e_{j,t}/N^e_{j,t-1}$	Transition dummies	Coefficient
Canada	0.9997	1.0116	0.9879	1.0152	Entry	0.0074
UK	1.0114	1.002	1.0471	1.0240		(0.0048)
Germany	1.0184	1.0008	1.0892	1.0252	Exit	-0.0216
France	1.0236	0.9998	1.0679	1.0319		(0.0062)
Japan	1.0385	1.0014	1.0354	1.0692		
Mexico	1.0341	0.9967	1.0086	1.0629		
Ireland	1.0201	1.0041	1.0912	1.0252		
Brazil	1.0267	1.0016	1.0328	1.0424		
Singapore	1.0608	0.9996	1.2417	1.0705		
China	1.2239	0.984	1.1995	1.2804		
Average	1.0457	1.0002	1.0801	1.0647		

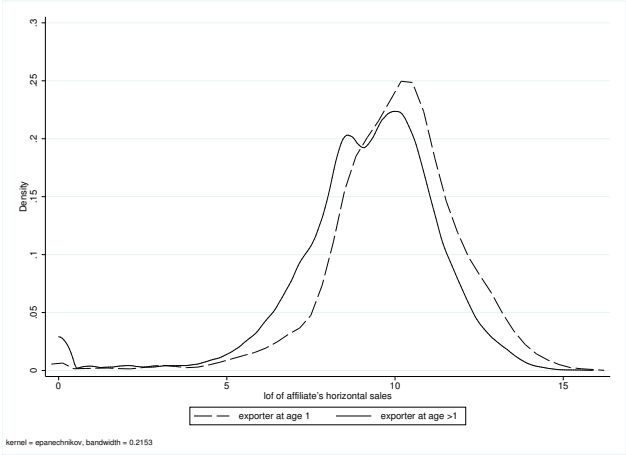
Notes: Left panel: $N^a_{j,t}$ ($N^{\sim a}_{j,t}$) denotes the number of MNEs that have (do not have) an affiliate in country j in year t. $N^h_{j,t}$ ($N^e_{j,t}$) denotes the number of MNEs that have a horizontal (exporting) affiliate in country j in year t. MNE counts are averaged over all years. Right panel: OLS coefficients from regressing ln(parent domestic sales) on affiliate entry and exit dummies. Year and affiliate fixed effects included. Robust standard errors. N = 111,802. Coefficients on entry and exit are significantly different from each other at the 0.0005% confidence level.

Figure O.2: Affiliate size, export status, and the timing of export entry.

(a) Non-exporters vs exporters at birth



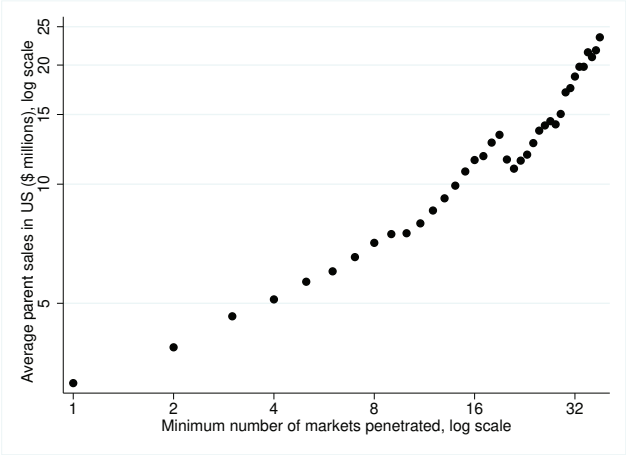
(b) Early vs late exporters



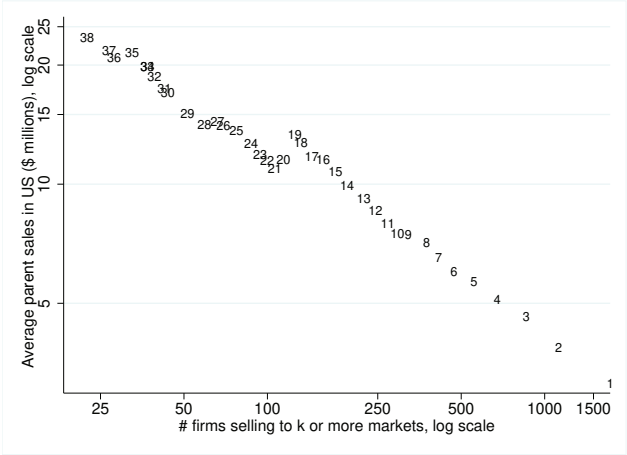
Notes: Sample of new majority-owned affiliates that survive for at least ten consecutive years, in manufacturing. Kernel density of log horizontal sales for affiliates that: are born with exclusively horizontal sales (non-exporters) and those with exports (exporters), in (O.2a); start exporting in their first year of life and those that start older, in (O.2b).

Figure O.3: Parent size in the United States and MNE entry.

(a) Number of markets penetrated



(b) Number of firms penetrating multiple markets



Notes: Observations at the country-year level.

O.5 Facts: Subsample of Affiliates in the Top-Ten Host Countries

In this section, we report the same facts as in Section 2 in the paper, but using the sample of affiliates located in the top-ten host countries for US MNEs. This sample is used to calibrate the model and perform quantitative exercises in Section 5 in the paper. Note that our fact in Section 2.3 showing that affiliate entry follows a weak "extended gravity" pattern is already calculated using the top-ten host countries.

Table O.15: Summary Statistics. Subsample of affiliates in the top-ten host countries.

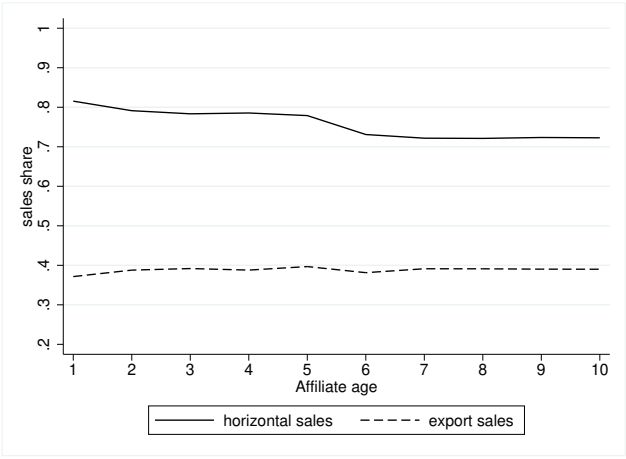
	Horizontal sales	Export sales
No. of observations	67,290	67,290
with positive sales	64,652 (96%)	47,025 (70%)
of pure type	20,083 (30%)	2,645 (3.9%)
Sales accounted by pure type	14%	6.0%
Average share of total affiliate sales	72%	28%
Average affiliate sales over parent sales	7.7%	4.8%

Notes: Observations are at the affiliate-year level, for new majority-owned affiliates in manufacturing. A pure-type affiliate is an affiliate for which at least 99 percent of sales are either only horizontal or only export sales.

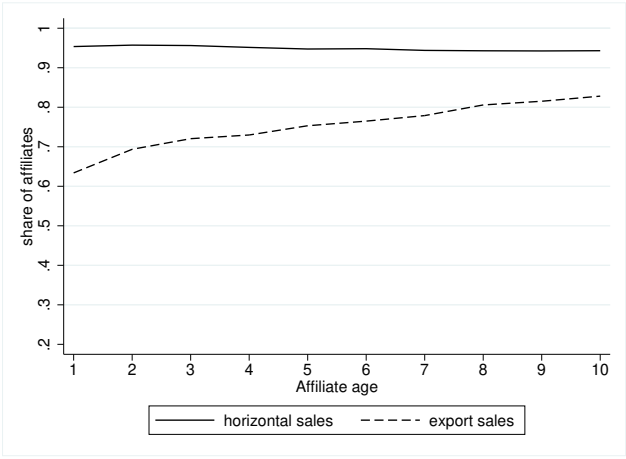
I. MNE affiliates start with sales in their host market and expand into export markets.

Figure O.4: Affiliate sales and number of affiliates: horizontal vs export sales.

(a) Affiliate sales shares



(b) Share of affiliates

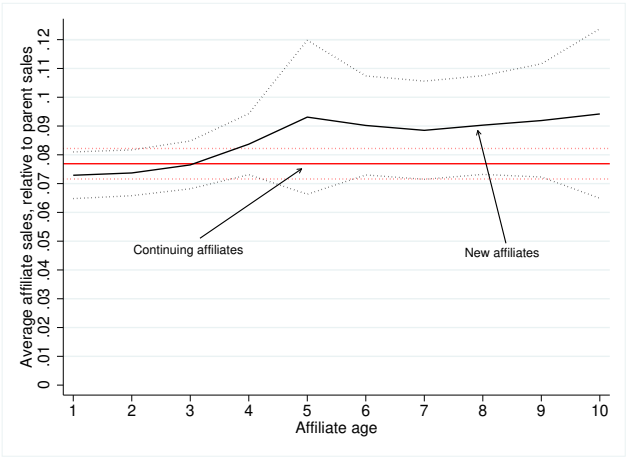


Notes: Sample of new majority-owned affiliates that survive for at least ten consecutive years, in manufacturing, in the top-ten host countries for US FDI. Horizontal and export sales refer, respectively, to sales to the market where the affiliate is located, and to sales to markets outside the local market. (O.4a): average sales, as a share of total affiliate sales, including only affiliates with positive horizontal and export sales, respectively. (O.4b): share of affiliates with positive horizontal and export sales, respectively.

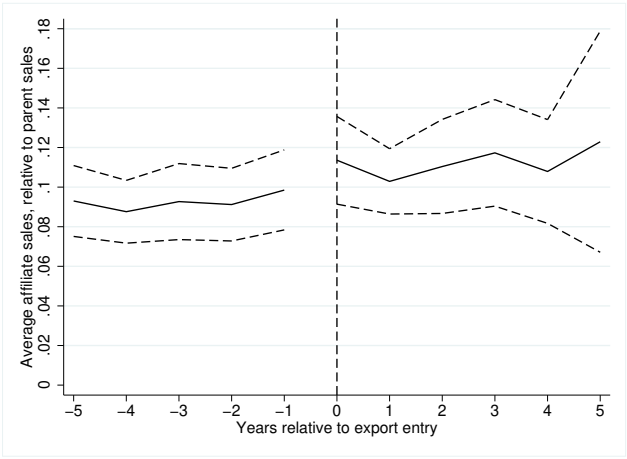
II. Affiliate sales as a share of parent sales grow at the time of export entry.

Figure O.5: Affiliate sales relative to parent sales.

(a) Horizontal sales, new affiliates



(b) Total sales, new exporters



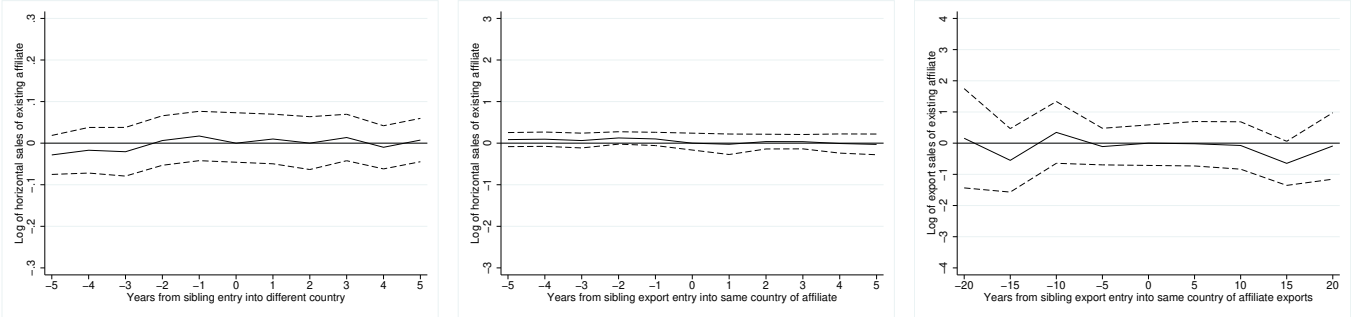
Notes: Sample of affiliates in the top-ten host countries for US FDI. Figure O.5a reports the average value of affiliate horizontal sales relative to the domestic sales of the US parent, for new affiliates surviving at least ten years (black) and for all affiliates of all ages (red). Figure O.5b reports the average value of affiliate total sales, relative to the domestic sales of the US parent, for a subsample of affiliates that are born with only horizontal sales and start exporting at a later age.

IV. Horizontal and export sales of existing affiliates do not change with sibling activities.

Figure O.6: Horizontal and export sales of existing affiliates and siblings activities.

OLS estimation

(a) (b) (c)



Notes: Figure O.6a includes all affiliates of US MNEs in manufacturing, in the top-ten host countries for US FDI. Figure O.6b includes affiliates located in Canada, UK, and Japan. Figure O.6c includes affiliates in the top-ten host countries that export to Canada, UK, and Japan. Figures O.6a and O.6b show coefficients (solid line) from regressing the log of horizontal sales for an affiliate in country j and 3-digit industry h belonging to parent p at time $t \in \{-5, ...5\}$ on a set of dummies indicating: in Figure O.6a, time from opening an affiliate in country $j^{'} \neq j$ belonging to the same parent p and industry h; and in Figure O.6b, time from export entry into j of an affiliate located in country $j' \neq j$ belonging to the same parent p and industry h, with $j = Canada, UK, Japan$. Figure O.6c shows coefficients (solid line) from regressing the log of export sales to country j by affiliates located in country $k \neq j$ and 3-digit industry h belonging to parent p at time $t \in \{-20, -15, ...15, 20\}$ on a set of dummies indicating time from export entry into j of an affiliate located in country $k' \neq j$ and $k' \neq k$ belonging to the same parent p and industry h as the affiliate located in k and exporting to j, with $j = Canada, UK, Japan$. We include the log of the MNE global sales, the log of the US parent sales, affiliate fixed effects and year fixed effects. Standard errors are clustered at the affiliate level. Dashed lines denote 95% confidence intervals.

O.6 Sorting properties of the myopic firm problem

We state formally here the propositions behind the sorting properties of the model described in Section 3.3. To this end, we assume that $f_{ijk} \approx 0$, for all i, j, k, so that there is no endogenous exit, hence $A^e_{ijk}(z) = A^h_{ij}(z) = 0$ in (15) and (17). With this restriction, we can obtain closed-form solutions for the affiliate entry and export entry thresholds,

$$\bar{Y}_{ij}(z) = \left(\frac{\beta_i}{\beta_i - 1}\right)\left(\frac{\sum_{k\in\mathcal{E}_{ij}(z)} W_j f_{ijk} + \rho W_j F_{ijj}}{\rho}\right)\left(\frac{\sum_{k\in\mathcal{E}_{ij}(z)} \tilde{\pi}_{ijk}(z)}{\rho - \mu_i}\right)^{-1}, \quad \text{for all } k$$

$$\bar{Y}_{ijk}(z) = \left(\frac{\beta_i}{\beta_i - 1}\right)\left(\frac{W_j f_{ijk} + \rho W_j F_{ijk}}{\rho}\right)\left(\frac{\tilde{\pi}_{ijk}(z)}{\rho - \mu_i}\right)^{-1}, \quad \text{for } j \neq k$$

where $\mathcal{E}_{ij}(z)$ denotes the subset of markets k, including j, served from location j by firm z from country i, and where we skip the dependence on aggregate variables to ease the notation.

The option value terms are

$$B^o_{ij}(z) = \tilde{\beta}_i \left(\frac{\sum_{k\in\mathcal{E}_{ij}(z)} W_j f_{ijk} + \rho W_j F_{ijj}}{\rho} \right)^{1-\beta_i} \left(\frac{\sum_{k\in\mathcal{E}_{ij}(z)} \tilde{\pi}_{ijk}(z)}{\rho - \mu_i} \right)^{\beta_i} + \sum_{k\notin\mathcal{E}_{ij}(z)} B^o_{ijk}(z), \quad \text{for all } k$$

$$B^o_{ijk}(z) = \tilde{\beta}_i \left(\frac{W_j f_{ijk} + \rho W_j F_{ijk}}{\rho} \right)^{1-\beta_i} \left(\frac{\tilde{\pi}_{ijk}(z)}{\rho - \mu_i} \right)^{\beta_i} \quad \text{for } j \neq k.$$

with $\tilde{\beta}_i \equiv \beta_i^{-\beta_i}(\beta_i - 1)^{\beta_i - 1}$.

Proposition 1. *For a given triplet $\{i, j, k\}$, more productive firms have lower entry thresholds into a host market and lower entry thresholds into export markets: $\partial\bar{Y}_{ij}(z)/\partial z \leq 0$ and $\partial\bar{Y}_{ijk}(z)/\partial z \leq 0$.*

Proof. Follows immediately noticing that $\frac{\partial\tilde{\pi}_{ijk}(z)}{\partial z} > 0$, for all i, j, k.

Corollary 1. *More productive firms enter more export markets.*

Proof. $\frac{\partial\left[\mathbb{P}\left\{y\geq\bar{Y}_{ij}(z)\right\},\forall j\right]}{\partial z} = \frac{\partial\left[\mathbb{P}\left\{y\geq\bar{Y}_{ij}(z)\right\},\forall j\right]}{\partial\bar{Y}_{ij}(z)} \frac{\partial\bar{Y}_{ij}(z)}{\partial z}$ where the first term is negative and Proposition 1 implies that the second term is weakly negative, so that $\frac{\partial\left[\mathbb{P}\left\{y\geq\bar{Y}_{ij}(z)\right\},\forall j\right]}{\partial z} \geq 0$.

Corollary 2. *The mass of firms having affiliates in n host markets is decreasing in n.*

Proof. Without loss of generality, assume that all firms only sell in country i and are considering whether and where to open affiliates at $t = 1$. Order the productivity thresholds needed to open an affiliate in a market in ascending order, and let $\bar{z}_n$ ($\bar{z}_{n-1}$) denote the maximum among the first n ($n-1$) productivity thresholds, so that $\bar{z}_n \geq \bar{z}_{n-1}$. Let M_{ij} denote the mass of firms that at $t = 1$ open affiliates in country j: $M_{ij} = \int_{\bar{z}_{ij}}^{\infty} dG(z)$, so $\frac{\partial M_{ij}}{\partial\bar{z}_{ij}} \leq 0$. Let $\bar{M}_n$ ($\bar{M}_{n-1}$) denote the mass of firms that at $t = 1$ open affiliates in the n ($n-1$) countries with the lowest productivity thresholds. Then, $\bar{z}_n \geq \bar{z}_{n-1}$ and $\frac{\partial M_{ij}}{\partial\bar{z}_{ij}} \leq 0$ implies that $\bar{M}_n \leq \bar{M}_{n-1}, \forall n$.

Proposition 2. *For a firm with productivity z, $\partial\bar{Y}_{ij}(z)/\partial\tau_{ijj} \geq 0$ and $\partial\bar{Y}_{ij}(z)/\partial F_{ijj} \geq 0$. Similarly, $\partial\bar{Y}_{ijk}(z)/\partial\tau_{ijk} \geq 0$ and $\partial\bar{Y}_{ijk}(z)/\partial F_{ijk} \geq 0$.*

Proof. Follows immediately noticing that an affiliate's variable profits are decreasing in the MNE efficiency loss, $\frac{\partial\tilde{\pi}_{ijk}(z)}{\partial\tau_{ijk}} < 0$, for all i, j, k.

O.7 Connectedness of the sets $\Omega_{ijk}(t)$

With some abuse of notation, we define the sets $\Omega_{ijk}(t)$,for $j \neq k$ and $\Omega_{ijj}(t)$ as the set of productivities such as

$$\begin{aligned}\Omega_{ijk}(t) &= \Big\{z : z \in \Big\{\Omega_{ijk}(t-\Delta t) \bigcap [\underline{z}_{ijk}(t), \infty)\Big\} \bigcup \\ &\quad \Big\{(\Omega_{ijj}(t-\Delta t) \backslash \Omega_{ijk}(t-\Delta t)) \bigcap [\bar{z}_{ijk}(t), \infty)\Big\}\Big\}, \end{aligned} \tag{O.4}$$

$$\begin{aligned}\Omega_{ijj}(t) &= \Big\{z : z \in \Big\{\Omega_{ijj}(t-\Delta t) \bigcap [\underline{z}_{ij}(t), \infty)\Big\} \bigcup \\ &\quad \Big\{(\Omega_{i}(t-\Delta t) \backslash \Omega_{ijj}(t-\Delta t)) \bigcap [\bar{z}_{ij}(t), \infty)\Big\}\Big\}, \end{aligned} \tag{O.5}$$

with $\Omega_i(t) = [1, \infty)$.

Proposition 3. *Let the support of the distribution $G(z)$ be $[1, \infty)$. Then, for $j \neq k$,*

$$\Omega_{ijj}(t) = [\tilde{z}_{ij}(t), \infty) \qquad \Omega_{ijk}(t) = [\tilde{z}_{ijk}(t), \infty),$$

where

$$\tilde{z}_{ij}(t) = \begin{cases} \bar{z}_{ij}(t) & \text{if } \tilde{z}_{ij}(t-1) \geq \bar{z}_{ij}(t) \\ \max\{\tilde{z}_{ij}(t-1), \underline{z}_{ij}(t)\} & \text{if } \tilde{z}_{ij}(t-1) < \bar{z}_{ij}(t) \end{cases},$$

and similarly,

$$\tilde{z}_{ijk}(t) = \begin{cases} \bar{z}_{ijk}(t) & \text{if } \tilde{z}_{ijk}(t-1) \geq \bar{z}_{ijk}(t) \\ \max\{\tilde{z}_{ijk}(t-1), \underline{z}_{ijk}(t)\} & \text{if } \tilde{z}_{ijk}(t-1) < \bar{z}_{ijk}(t) \end{cases}.$$

Proof. We show the proof for $\Omega_{ijj}(t)$. The one for $\Omega_{ijk}(t)$, $j \neq k$, is analogous. We present the proof under discrete time to ease the notation. The proof proceeds by induction. Since the mass of firms is given, $\Omega_i(t) = [1, \infty)$, for all t. At $t = 0$, $\Omega_{ijj}(0) = \emptyset$, for all i, j. At $t = 1$,

$$\Omega_{ijj}(1) = \Big\{z : z \in \Big\{\Omega_{ijj}(0) \bigcap [\underline{z}_{ij}(1), \infty)\Big\} \bigcup \Big\{[1, \infty) \bigcap [\bar{z}_{ij}(1), \infty)\Big\}\Big\}.$$

At $t = 2$,

$$\Omega_{ijj}(2) = \Big\{z : z \in \Big\{\Omega_{ijj}(1) \bigcap [\underline{z}_{ij}(2), \infty)\Big\} \bigcup \Big\{[1, \bar{z}_{ij}(1)] \bigcap [\bar{z}_{ij}(2), \infty)\Big\}\Big\}.$$

Let $\underline{\bar{z}}_{ij}(1,2) \equiv \max\{\bar{z}_{ij}(1), \underline{z}_{ij}(2)\}$. Then,

$$\Omega_{ijj}(2) = \Big\{ z : z \in \big[\underline{\bar{z}}_{ij}(1,2), \infty\big) \bigcup \Big\{ [1, \bar{z}_{ij}(1)] \bigcap [\bar{z}_{ij}(2), \infty) \Big\} \Big\},$$

which leads to

$$\Omega_{ijj}(2) = \begin{cases} [\bar{z}_{ij}(2), \infty) & \text{if } \bar{z}_{ij}(1) \geq \bar{z}_{ij}(2) \\ \big[\underline{\bar{z}}_{ij}(1,2), \infty\big) & \text{if } \bar{z}_{ij}(1) < \bar{z}_{ij}(2) \ . \end{cases}$$

Let $\tilde{z}_{ij}(2)$ denote the lower bound of $\Omega_{ijj}(2)$. Then, at $t = 3$,

$$\Omega_{ijj}(3) = \Big\{ z : z \in \Big\{ \Omega_{ijj}(2) \bigcap \big[\underline{z}_{ij}(3), \infty\big) \Big\} \bigcup \Big\{ [1, \tilde{z}_{ij}(2)] \bigcap [\bar{z}_{ij}(3), \infty) \Big\} \Big\}.$$

Let $\underline{\bar{z}}_{ij}(2,3) \equiv \max\{\tilde{z}_{ij}(2), \underline{z}_{ij}(3)\}$. Then, following the same procedure as above,

$$\Omega_{ijj}(3) = \Big\{ z : z \in \big[\underline{\bar{z}}_{ij}(2,3), \infty\big) \bigcup \Big\{ [1, \tilde{z}_{ij}(2)] \bigcap [\bar{z}_{ij}(3), \infty) \Big\} \Big\},$$

which leads to

$$\Omega_{ijj}(3) = \begin{cases} [\bar{z}_{ij}(3), \infty) & \text{if } \tilde{z}_{ij}(2) \geq \bar{z}_{ij}(3) \\ \big[\underline{\bar{z}}_{ij}(2,3), \infty\big) & \text{if } \tilde{z}_{ij}(2) < \bar{z}_{ij}(3) \ . \end{cases}$$

Since $\tilde{z}_{ij}(1) = \bar{z}_{ij}(1)$, by induction for all $t \geq 1$, one obtains the result.

Law of motion for the mass of firms. With this property, $M^E_{ijk}(t + \Delta t)$ and $M^X_{ijk}(t + \Delta t)$ in (19), as well as the productivity index in (20), can be written as

$$M^E_{ijk}(t + \Delta t) = [M_{ijj}(t) - M_{ijk}(t)] \int_{\min\{\bar{z}_{ijk}(t+\Delta t), \tilde{z}_{ijk}(t)\}}^{\tilde{z}_{ijk}(t)} \frac{g(z)}{G(\tilde{z}_{ijk}(t))} dz, \quad \text{for} \quad j \neq k$$

$$M^X_{ijk}(t + \Delta t) = M_{ijk}(t) \int_{\tilde{z}_{ijk}(t)}^{\max\{\underline{z}_{ijk}(t+\Delta t), \tilde{z}_{ijk}(t)\}} \frac{g(z)}{(1 - G(\tilde{z}_{ijk}(t)))} dz \quad \text{for} \quad j \neq k$$

and

$$z_{ijk}(t) \equiv \left[\int_{\tilde{z}_{ijk}(t)}^{\infty} z^{\eta-1} \frac{g(z)}{(1 - G(\tilde{z}_{ijk}(t)))} dz \right]^{\frac{1}{1-\eta}},$$

with analogous expressions for host-country entry and exit.

O.8 Algorithm

Procedure to compute entry and exit thresholds.

1. For each triplet $\{i,j,k\}$, and each z, we compute $\{\bar{Y}^e_{ijk}(z,1), \underline{Y}^e_{ijk}(z,1), A^e_{ijk}(z,1), B^o_{ijk}(z,1)\}$ in $t=1$, where we start by assuming that the affiliate export value is zero. We select the solution with the highest precision across firms, and apply Lemma O.8 to extend this solution to each $t>1$. We then record the export status of each affiliate in each year, construct the sets $\mathcal{E}_{ij}(z,t)$, and compute the export value for each affiliate in each year,

$$X_{ij}(z,t) = \sum_{k\in\mathcal{E}_{ij}(z,t)} V^e_{ijk}(z,Y_i(t)) + \sum_{k\notin\mathcal{E}_{ij}(z,t)} V^o_{ijk}(z,Y_i(t)).$$

2. We build a grid with points $r\in[0,1]$. Assuming that the export value is equal to a fraction r of entry costs, we compute the entry thresholds $\{\bar{Y}^r_{ij}(z,1), \underline{Y}^r_{ij}(z,1)\}$ and $\{A^r_{ij}(z,1), B^{o,r}_{ij}(z,1)\}$, for each affiliate at $t=1$. We then compute the proportional decline $\bar{u}(r)$ and $\underline{u}(r)$, respectively, in $\bar{Y}_{ij}(z,t)$ and $\underline{Y}_{ij}(z,t)$, as

$$\bar{u}(r) = \frac{\bar{Y}^r_{ij}(z,1)}{\bar{Y}^{noexp}_{ij}(z,1)} \qquad \underline{u}(r) = \frac{\underline{Y}^r_{ij}(z,1)}{\underline{Y}^{noexp}_{ij}(z,1)}.$$

   We then interpolate the functions $\bar{u}(r)$ and $\underline{u}(r)$ to the entire interval [0,1], and set $\bar{u}(r) = \underline{u}(r) = 0$ if $r\geq 1$. Finally, we compute the affiliate's entry and exit thresholds in each period as

$$\bar{Y}_{ij}(z,t) = \bar{Y}^{noexp}_{ij}(z,t)\bar{u}\left(\frac{X_{ij}(z,t)}{W_j(t)f_{ijj}/\rho + W_j(t)F_{ijj}}\right),$$

   and

$$\underline{Y}_{ij}(z,t) = \underline{Y}^{noexp}_{ij}(z,t)\underline{u}\left(\frac{X_{ij}(z,t)}{W_j(t)f_{ijj}/\rho + W_j(t)F_{ijj}}\right).$$

Solution for zero affiliate export value. The following lemma shows the solution of the model when the affiliate export value is zero. We use this solution to initialize the algorithm.

We first simplify the notation. We remove dependance on aggregate variables, and define the following:

$$x \equiv \frac{1}{\eta}\left(\frac{\eta}{\eta-1}\right)^{1-\eta}\left(\frac{\tau_{ijk}W_j}{z}\right)^{1-\eta}\frac{P_k^{\eta-1}X_k}{\rho-\mu_i},$$

and

$$y \equiv W_j(t).$$

Further, let E denote the affiliate export value,

$$E(z;Y_i) \equiv \sum_{k\in\mathcal{E}_{ij}(z)} V^e_{ijk}(z;Y_i) + \sum_{k\notin\mathcal{E}_{ij}(z)} V^o_{ijk}(z;Y_i).$$

where $k \neq j$, and $\mathcal{E}_{ij}(z)$ is the set of markets that firm z with Home i serves from location j.

With this simplified notation, the system of value-matching and smooth-pasting conditions determining affiliate entry can be written as

$$B^o_{ij}\bar{Y}^{\beta_i}_{ij} = A_{ij}\bar{Y}^{\alpha_i}_{ij} + x\bar{Y}_{ij} - y\left(\frac{f_{ijj}}{\rho} + F_{ijj}\right) + E(z;\bar{Y}_{ij}) \tag{O.6}$$

$$B^o_{ij}\underline{Y}^{\beta_j}_{ij} = A_{ij}\underline{Y}^{\alpha_i}_{ij} + x\underline{Y}_{ij} - y\left(\frac{f_{ijj}}{\rho}\right) \tag{O.7}$$

$$\beta_i B^o_{ij}\bar{Y}^{\beta_i-1}_{ij} = \alpha_i A_{ij}\bar{Y}^{\alpha_i-1}_{ij} + x + \frac{\partial E(z;\bar{Y}_{ij})}{\partial Y_i} \tag{O.8}$$

$$\beta_i B^o_{ij}\underline{Y}^{\beta_i-1}_{ij} = \alpha_i A_{ij}\underline{Y}^{\alpha_i-1}_{ij} + x \tag{O.9}$$

Lemma O.8. Suppose that $E(z;Y_i) = 0$. If $\{\bar{Y}_{ij}(x,y), \underline{Y}_{ij}(x,y), A_{ij}(x,y), B^o_{ij}(x,y)\}$ is the solution to the system of equations (O.6)–(O.9) for a given (x,y) pair, then the solution of the system for any other pair (x',y') can be constructed as

$$\bar{Y}_{ij}(x',y') = \bar{Y}_{ij}(x,y)\left(\frac{x'}{x}\right)^{-1}\left(\frac{y'}{y}\right) \tag{O.10}$$

$$\underline{Y}_{ij}(x',y') = \underline{Y}_{ij}(x,y)\left(\frac{x'}{x}\right)^{-1}\left(\frac{y'}{y}\right) \tag{O.11}$$

$$A_{ij}(x',y') = A_{ij}(x,y)\left(\frac{x'}{x}\right)^{\alpha_i}\left(\frac{y'}{y}\right)^{1-\alpha_i} \tag{O.12}$$

$$B^o_{ij}(x',y') = B^o_{ij}(x,y)\left(\frac{x'}{x}\right)^{\beta_i}\left(\frac{y'}{y}\right)^{1-\beta_i}. \tag{O.13}$$

Proof. We need to find solutions $\{\bar{Y}_{ij}(x',y'), \underline{Y}_{ij}(x',y'), A_{ij}(x',y'), B^o_{ij}(x',y')\}$ for the systems of equations (O.6)–(O.9) corresponding to x' and y',

$$B^o_{ij}(x',y')\bar{Y}_{ij}(x',y')^{\beta_i} = A_{ij}(x',y')\bar{Y}_{ij}(x',y')^{\alpha_i} + x'\bar{Y}_{ij}(x',y') - y'\left(\frac{f_{ijj}}{\rho} + F_{ijj}\right)$$

$$B^o_{ij}(x',y')\underline{Y}_{ij}(x',y')^{\beta_i} = A_{ij}(x',y')\underline{Y}_{ij}(x',y')^{\alpha_i} + x'\underline{Y}_{ij}(x',y') - y'\left(\frac{f_{ijj}}{\rho}\right)$$

$$\beta_i B^o_{ij}(x',y')\bar{Y}_{ij}(x',y')^{\beta_i-1} = \alpha_i A_{ij}(x',y')\bar{Y}_{ij}(x',y')^{\alpha_i-1} + x'$$

$$\beta_i B^o_{ij}(x',y')\underline{Y}_{ij}(x',y')^{\beta_i-1} = \alpha_i A_{ij}(x',y')\underline{Y}_{ij}(x',y')^{\alpha_i-1} + x'.$$

Plugging in Equations (O.10)–(O.13) yields

$$B^o_{ij}(x,y)\bar{Y}_{ij}(x,y)^{\beta_i} = A_{ij}(x,y)\bar{Y}_{ij}(x,y)^{\alpha_i} + x\bar{Y}_{ij}(x,y) - y\left(\frac{f_{ijj}}{\rho} + F_{ijj}\right)$$

$$B^o_{ij}(x,y)\underline{Y}_{ij}(x,y)^{\beta_i} = A_{ij}(x,y)\underline{Y}_{ij}(x,y)^{\alpha_i} + x\underline{Y}_{ij}(x,y) - y\left(\frac{f_{ijj}}{\rho}\right)$$

$$\beta_i B^o_{ij}(x,y)\bar{Y}_{ij}(x,y)^{\beta_i-1} = \alpha_i A_{ij}(x,y)\bar{Y}_{ij}(x,y)^{\alpha_i-1} + x$$

$$\beta_i B^o_{ij}(x,y)\underline{Y}_{ij}(x,y)^{\beta_i-1} = \alpha_i A_{ij}(x,y)\underline{Y}_{ij}(x,y)^{\alpha_i-1} + x,$$

which always holds given that, by assumption, $\{\bar{Y}_{ij}(x,y), \underline{Y}_{ij}(x,y), A_{ij}(x,y), B^o_{ij}(x,y)\}$ is the solution to the system of equations (O.6)–(O.9).

Table O.17: Calibrated parameters: shock correlation.

	BRA	CAN	CHN	FRA	GBR	GER	IRL	JPN	MEX	SGP	USA
BRA	1.00	0.57	0.11	0.30	0.19	0.42	-0.44	0.37	0.36	0.37	0.46
CAN	0.57	1.00	-0.04	0.19	0.63	0.50	-0.56	0.70	0.58	0.74	0.72
CHN	0.11	-0.04	1.00	0.69	0.19	0.56	0.04	0.25	0.32	-0.13	-0.52
FRA	0.30	0.19	0.69	1.00	0.56	0.91	0.17	0.23	-0.42	0.12	-0.02
GBR	0.19	0.63	0.19	0.56	1.00	0.63	-0.11	0.36	-0.20	0.43	0.40
GER	0.42	0.50	0.56	0.91	0.63	1.00	-0.07	0.41	-0.29	0.30	0.18
IRL	-0.44	-0.56	0.04	0.17	-0.11	-0.07	1.00	-0.30	-0.47	-0.33	-0.34
JPN	0.37	0.70	0.25	0.23	0.36	0.41	-0.30	1.00	0.02	0.62	0.69
MEX	0.36	0.58	0.32	-0.42	-0.20	-0.29	-0.47	0.02	1.00	0.18	0.28
SGP	0.37	0.74	-0.13	0.12	0.43	0.30	-0.33	0.62	0.18	1.00	0.53
USA	0.46	0.72	-0.52	-0.02	0.40	0.18	-0.34	0.69	0.28	0.53	1.00

Notes: Correlation between productivity shocks in country i and i'.

Table O.18: Calibrated parameters: bilateral iceberg trade costs.

	BRA	CAN	CHN	FRA	GBR	GER	IRL	JPN	MEX	SGP	USA
BRA	1.00	1.00	3.71	3.13	1.54	3.17	3.13	5.31	2.94	3.62	2.50
CAN	7.47	1.00	8.01	6.87	3.41	6.92	6.63	11.87	5.83	8.80	4.45
CHN	1.48	1.00	1.00	1.21	1.00	1.19	1.21	2.05	1.35	1.02	1.00
FRA	4.56	1.00	4.40	1.00	1.17	1.99	2.33	5.25	4.53	4.73	2.71
GBR	5.58	1.17	5.35	2.27	1.00	2.51	2.46	6.33	5.48	5.78	3.30
GER	2.62	1.00	2.46	1.13	1.00	1.00	1.38	3.64	2.59	2.66	1.89
IRL	9.39	1.00	9.07	4.79	1.23	5.01	1.00	4.82	9.13	9.85	2.76
JPN	3.03	1.00	1.68	2.54	1.00	2.51	2.53	1.00	2.65	2.16	1.29
MEX	3.15	1.00	3.62	3.33	1.86	3.35	3.26	5.63	1.00	3.91	2.24
SGP	6.12	1.06	4.34	5.49	1.60	5.44	5.56	4.42	6.18	1.00	2.74
USA	2.57	1.26	2.83	2.38	2.35	2.40	2.30	2.82	2.05	3.09	1.00

Notes: Row is exporter j, and column is importer k.

Table O.19: Calibrated parameters: fixed and sunk costs.

	f_j^h	F_j^h	$f_{j,US}^e$	$F_{j,US}^e$	f_{jk}^e	F_{jk}^e	$f_j^{h,no-exp}$	$F_j^{h,no-exp}$
Brazil	0.02645	0.00205	0.00306	0.00623	0.00226	0.01486	0.01714	0.00077
Canada	0.00410	0.00004	0.00071	0.00001	0.00058	0.00000	0.00200	0.00001
China	0.00426	0.00049	0.00027	0.01858	0.00022	0.00230	0.00235	0.00014
France	0.00627	0.00057	0.00053	0.00044	0.00033	0.00702	0.00296	0.00010
Great Britain	0.00604	0.00016	0.00051	0.00008	0.00088	0.00010	0.00240	0.00003
Germany	0.00907	0.00164	0.00020	0.00738	0.00003	0.01361	0.00408	0.00021
Ireland	0.00078	0.00031	0.00009	0.00064	0.00000	0.00148	0.00027	0.00003
Japan	0.01044	0.00376	0.00030	0.01098	0.00017	0.02322	0.00631	0.00073
Mexico	0.00890	0.00079	0.00029	0.01586	0.00158	0.00219	0.00501	0.00024
Singapore	0.00179	0.00008	0.00004	0.00270	0.00001	0.00248	0.00066	0.00001
United States	–	–	–	–	0.00133	0.0000	–	–

Notes: f_j^h (F_j^h) is the fixed (sunk) cost of opening an affiliate in country j. $f_{j,US}^e$ ($F_{j,US}^e$) is the fixed (sunk) cost of exporting from j to the United States. f_{jk}^e (F_{jk}^e) is the fixed (sunk) cost of exporting from j to a destination k other than the United States. The superscript $no-exp$ refers to the calibrated model with no export platforms.

O.9 Calibration: Results by Country

Table O.16: Calibrated parameters: productivity process and MNE efficiency loss.

	μ_i	σ_i	$Y_i(0)$	τ_j^M
Brazil	0.065	0.68	0.0005	11.8
Canada	0.065	0.31	0.299	0.94
China	0.065	0.27	0.0002	37.3
France	0.065	0.37	0.255	1.85
Great Britain	0.065	0.33	0.172	1.54
Germany	0.065	0.43	0.388	2.16
Ireland	0.065	0.39	4.134	1.27
Japan	0.065	0.41	1.000	2.54
Mexico	0.065	0.53	0.003	7.77
Singapore	0.065	0.57	0.554	1.95
United States	0.065	0.11	1.000	1.00

Notes: μ_i and σ_i denote the drift and standard deviation of the aggregate shock Y_i. $Y_i(0)$ denotes the initial value of the shock process in country i, relative to the US. τ_j^M is the efficiency loss experienced by US firms producing in country j.

Table O.20: Targeted static moments: affiliate sales, by destination. Model vs data.

Share of:	Affiliate sales to host market		Affiliate sales to the US		Affiliate sales to third countries	
	data	model	data	model	data	model
Brazil	0.018	0.018	0.072	0.072	0.142	0.138
Canada	0.048	0.048	0.261	0.263	0.113	0.113
China	0.003	0.003	0.099	0.100	0.219	0.086
France	0.038	0.038	0.075	0.074	0.364	0.353
Great Britain	0.052	0.052	0.111	0.112	0.371	0.368
Germany	0.047	0.047	0.092	0.091	0.413	0.308
Ireland	0.002	0.002	0.242	0.235	0.515	0.494
Japan	0.034	0.034	0.047	0.049	0.130	0.129
Mexico	0.011	0.011	0.173	0.172	0.128	0.124
Singapore	0.003	0.003	0.222	0.221	0.488	0.482
United States	–	–	–	–	0.150	0.148
Average	0.026	0.026	0.139	0.139	0.276	0.249

Notes: Affiliate sales to the host market are expressed as a share of the parent's US sales. Affiliate sales to the US and to third countries are expressed as a share of affiliate sales in the host market. Calculations are conditional on affiliate entry, but unconditional on affiliate exports. Averages across years.

Table O.21: Targeted static moments: affiliate export sales, by destination. Model vs data.

Share of:	Affiliate sales to Canada		Affiliate sales to the United Kingdom		Affiliate sales to Japan	
	data	model	data	model	data	model
Brazil	0.008	0.005	0.008	0.008	0.004	0.004
Canada	–	–	0.006	0.006	0.003	0.003
China	0.008	0.000	0.002	0.001	0.037	0.036
France	0.010	0.006	0.091	0.089	0.006	0.006
Great Britain	0.012	0.012	–	–	0.009	0.009
Germany	0.009	0.000	0.079	0.019	0.010	0.011
Ireland	0.053	0.040	0.386	0.374	0.082	0.079
Japan	0.006	0.000	0.001	0.000	–	–
Mexico	0.007	0.004	0.001	0.001	0.002	0.002
Singapore	0.024	0.023	0.047	0.046	0.147	0.144
Average	0.015	0.010	0.069	0.061	0.033	0.033

Notes: Affiliate sales to destination j are expressed as a share of affiliate sales in the host market. Calculations are conditional on affiliate entry, but unconditional on affiliate exports. Averages across (benchmark) years.

Table O.22: Targeted static moments: number of affiliates. Model vs data.

Share of:	MNEs with affiliates in j		Affiliates in j exporting to the US		Affiliates in j exporting to other countries	
	data	model	data	model	data	model
Brazil	0.198	0.196	0.515	0.512	0.674	0.666
Canada	0.544	0.544	0.725	0.724	0.478	0.476
China	0.184	0.183	0.382	0.391	0.548	0.545
France	0.312	0.311	0.539	0.531	0.747	0.735
Great Britain	0.554	0.554	0.605	0.604	0.739	0.732
Germany	0.367	0.363	0.608	0.597	0.760	0.662
Ireland	0.122	0.122	0.575	0.555	0.760	0.739
Japan	0.155	0.149	0.468	0.486	0.578	0.598
Mexico	0.302	0.300	0.647	0.637	0.494	0.488
Singapore	0.129	0.128	0.597	0.592	0.724	0.718
United States	–	–	–	–	0.880	0.877
Average	0.287	0.285	0.566	0.563	0.671	0.658

Notes: MNEs with affiliates in j are expressed as shares of the total number of US MNEs. Exporting affiliates are expressed as shares of the total number of affiliates in j. Calculations are conditional on affiliate entry. Averages across years.

Table O.23: Targeted dynamic moments: entry. Model vs data.

Share of:	MNEs opening affiliates in j		Affiliates in j that start exporting to: the United States		other countries	
	data	model	data	model	data	model
Brazil	0.021	0.016	0.032	0.031	0.037	0.038
Canada	0.060	0.025	0.024	0.010	0.036	0.009
China	0.029	0.025	0.027	0.034	0.040	0.044
France	0.038	0.028	0.033	0.028	0.025	0.032
Great Britain	0.069	0.040	0.029	0.021	0.027	0.020
Germany	0.046	0.036	0.030	0.038	0.025	0.040
Ireland	0.015	0.014	0.037	0.037	0.030	0.050
Japan	0.020	0.017	0.032	0.042	0.030	0.049
Mexico	0.036	0.027	0.029	0.039	0.033	0.031
Singapore	0.019	0.011	0.026	0.035	0.028	0.043
United States	–	–	–	–	0.018	0.006
Average	0.035	0.024	0.030	0.032	0.030	0.033

Notes: MNEs opening affiliates in j are expressed as shares of the total number of US MNEs in the period before entry. Affiliates that start exporting are expressed as shares of the total number of affiliates in j in the period before export entry. Calculations are conditional on affiliate entry. Averages across years.

Table O.24: Untargeted dynamic moments: exit. Model vs data.

Share of:	MNEs shutting down affiliates in j		Affiliates in j that stop exporting to the United States		other countries	
	data	model	data	model	data	model
Brazil	0.102	0.066	0.027	0.019	0.032	0.020
Canada	0.125	0.013	0.021	0.004	0.028	0.017
China	0.082	0.104	0.020	0.008	0.031	0.020
France	0.117	0.066	0.029	0.029	0.021	0.027
Great Britain	0.128	0.042	0.026	0.015	0.023	0.022
Germany	0.122	0.071	0.029	0.015	0.024	0.020
Ireland	0.119	0.088	0.030	0.017	0.030	0.033
Japan	0.111	0.059	0.029	0.007	0.029	0.010
Mexico	0.114	0.072	0.021	0.018	0.026	0.028
Singapore	0.115	0.066	0.023	0.015	0.026	0.020
United States	–	–	–	–	0.021	0.011
Average	0.113	0.065	0.025	0.015	0.027	0.021

Notes: MNEs shutting down affiliates in j are expressed as shares of the total number of affiliates in j in the period before exit. Affiliates that stop exporting are expressed as shares of the total number of affiliates in j that export in the period before export exit. Calculations are conditional on affiliate exit. Averages across years.

Table O.25: Exporter and early-exporter size advantage (untargeted). Model vs data.

	Exporter size advantage			Early exporter size advantage		
	data-mean	model-mean	model-median	data-mean	model-mean	model-median
Brazil	6.31	32.1	22.4	3.49	10.0	8.01
Canada	3.39	7.88	7.95	2.52	6.12	6.13
China	7.84	39.8	18.9	3.08	14.9	10.2
France	4.46	13.6	13.3	1.95	6.82	6.64
Great Britain	1.93	9.36	9.19	1.52	6.57	6.51
Germany	5.47	20.7	18.4	4.24	6.65	5.86
Ireland	8.02	19.9	16.1	8.57	6.59	5.72
Japan	12.5	106	78.2	2.31	22.8	16.9
Mexico	4.21	52.0	39.9	2.08	12.8	10.2
Singapore	8.59	29.6	21.4	7.04	9.14	7.76

Notes: Observations at the affiliate-year level, for new majority-owned affiliates that survive for at least ten consecutive years, in manufacturing. Exporter size advantage refers to the mean (median) size of exporting MNE affiliates relative to the average size of non-exporting MNE affiliates, an average across countries and years. Early-exporter size advantage refers to the mean (median) size of MNE affiliates that start exports in their first year of life relative to the average size of MNE affiliates that start exports after their first year of life. Size refers to horizontal affiliate sales; early versus late exporters refers to affiliates that are born with exports versus the ones that start exporting later.

Table O.26: Calibrated MNE export costs, as share of sales, by country.

	Sunk export costs $W_j(t)F^e_{jk}$ (% of horizontal affiliate sales)						Fixed export costs $W_j(t)f^e_{jk}$ (% of average affiliate exports)					
	to United States			to other countries			to United States			to other countries		
Sales percentiles	5th	50th	95th	5th	50th	95th	5th	50th	95th	5th	50th	95th
Brazil	4.96	3.29	1.64	17.05	10.13	4.94	15.70	8.23	1.59	12.62	6.77	3.03
Canada	0.13	0.08	0.01	0.01	0.00	0.00	18.61	10.72	1.53	19.06	10.71	4.57
China	50.73	38.87	23.40	9.65	7.15	4.55	5.16	1.68	0.21	13.94	6.66	1.94
France	2.34	1.63	0.47	54.83	35.97	8.67	17.93	10.30	1.57	7.03	4.97	1.29
Great Britain	0.62	0.43	0.07	0.99	0.64	0.09	18.50	10.61	1.55	19.19	10.62	3.82
Germany	29.67	20.49	9.55	79.50	50.82	22.98	5.02	2.70	0.38	0.43	0.26	0.08
Ireland	41.74	28.04	15.73	130.03	89.82	50.39	13.51	6.94	1.11	0.66	0.44	0.10
Japan	21.07	13.60	8.07	56.61	34.17	21.20	6.06	2.91	0.44	2.08	0.99	0.17
Mexico	53.00	38.71	19.09	7.15	4.20	2.15	3.37	1.92	0.29	18.26	10.01	4.65
Singapore	79.74	52.63	27.88	108.33	57.48	30.91	2.68	1.44	0.28	1.04	0.70	0.18
United States	–	–	–	0.00	0.00	0.00	–	–	–	18.80	11.82	2.64
Average	28.40	19.78	10.59	42.19	26.40	13.26	10.65	5.74	0.90	10.28	5.81	2.04

Notes: Horizontal sales in the year the affiliate first exports to the destination. Export sales to a destination are averages across years.

Table O.27: Calibrated MNE costs, as share of sales, by country.

	Baseline						No export platforms					
	Sunk costs $W_j(t)F_j^h$ (% of US parent sales)			Fixed costs $W_j(t)f_j^h$ (% of horizontal sales)			Sunk costs $W_j(t)F_j^h$ (% of US parent sales)			Fixed costs $W_j(t)f_j^h$ (% of horizontal sales)		
Sales percentiles	5th	50th	95th	5th	50th	95th	5th	50th	95th	5th	50th	95th
Brazil	0.14	0.09	0.02	34.60	19.67	2.82	0.03	0.03	0.01	15.82	11.76	1.95
Canada	0.03	0.02	0.00	51.81	30.09	4.14	0.01	0.00	0.00	17.60	11.36	1.58
China	0.07	0.04	0.01	32.99	17.13	2.04	0.02	0.01	0.00	17.66	9.47	1.10
France	0.36	0.21	0.03	50.69	28.97	4.26	0.04	0.03	0.01	15.99	11.74	1.70
Great Britain	0.12	0.07	0.01	62.42	35.03	4.66	0.02	0.01	0.00	17.23	11.07	1.44
Germany	1.43	0.78	0.14	52.19	28.72	3.97	0.14	0.09	0.02	16.66	11.28	1.50
Ireland	0.23	0.13	0.02	75.84	42.73	6.64	0.02	0.01	0.00	16.71	11.50	1.76
Japan	3.50	1.73	0.31	33.15	19.52	2.75	0.53	0.30	0.06	17.57	11.51	1.57
Mexico	0.14	0.09	0.02	40.74	23.04	3.33	0.03	0.02	0.01	15.91	11.67	1.70
Singapore	0.03	0.02	0.00	78.78	39.88	6.91	0.00	0.00	0.00	15.33	11.60	1.82
Average	0.61	0.32	0.06	51.32	28.48	4.15	0.08	0.05	0.01	16.65	11.30	1.61

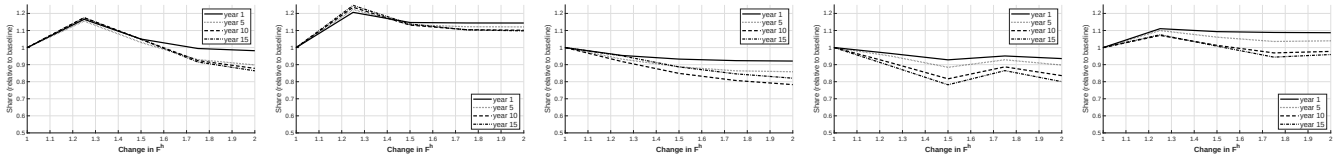
Notes: US parent sales in the year of affiliate entry. Horizontal sales are averages across years. No export platforms refers to the calibrated model without that option.

O.10 Quantitative Analysis: Additional Results

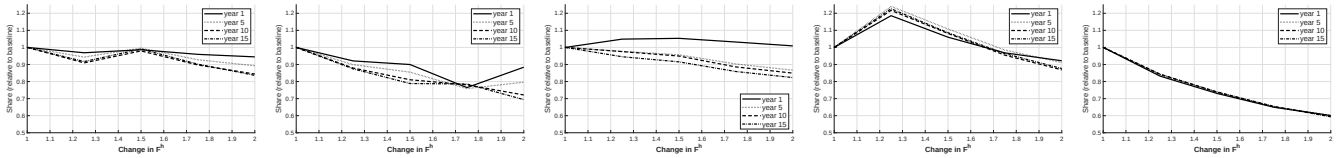
Figure O.7: The dynamic effects of sunk vs fixed costs: Share of US MNE affiliates in country j.

Changes in sunk entry costs.

(a) Brazil. (b) Canada. (c) China. (d) France. (e) United Kingdom.

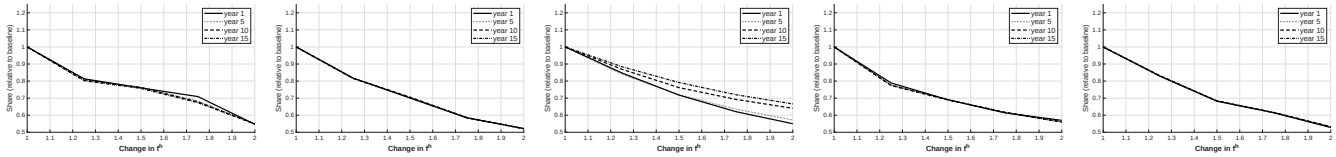


(f) Germany. (g) Ireland. (h) Japan. (i) Mexico. (j) Singapore.

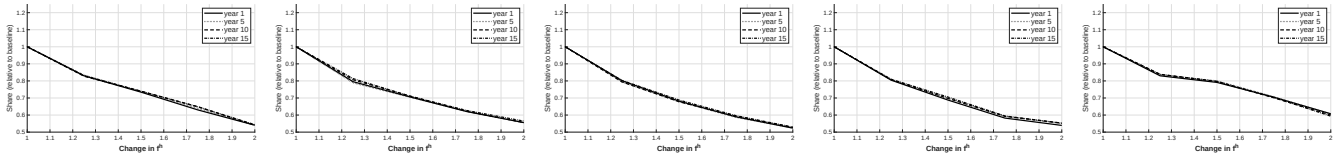


Changes in fixed operating costs.

(k) Brazil. (l) Canada. (m) China. (n) France. (o) United Kingdom.



(p) Germany. (q) Ireland. (r) Japan. (s) Mexico. (t) Singapore.

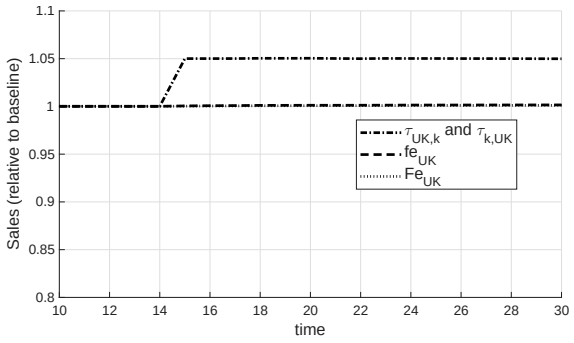


Notes: Changes in f_j^h and F_j^h, for $j = 1, \ldots 10$. Years 1, 5, 10, and 15, after the shock.

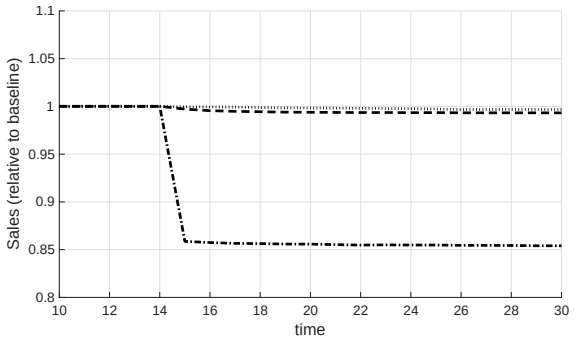
Figure O.8: UK trade shock: Firms in the United Kingdom and France.

Firms in United Kingdom.

(a) US MNE affiliate sales to UK.

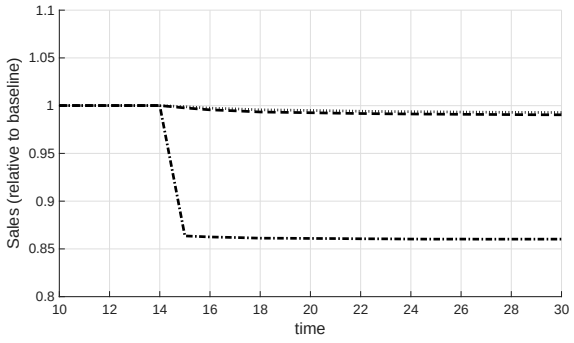


(b) US MNE affiliate sales to EU.

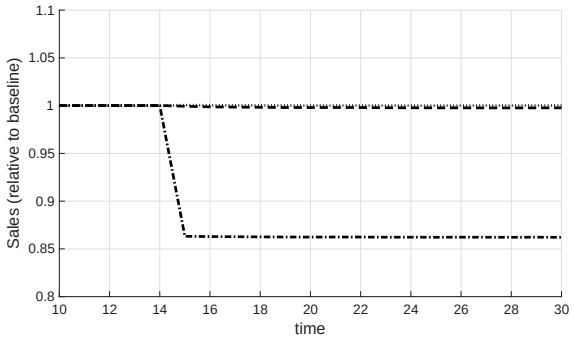


Firms in France.

(c) US MNE affiliate sales to UK.



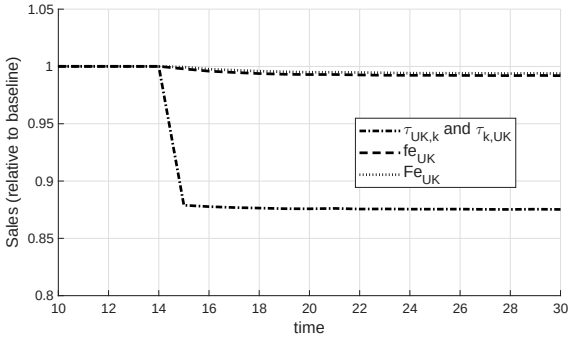
(d) French firms sales to UK.



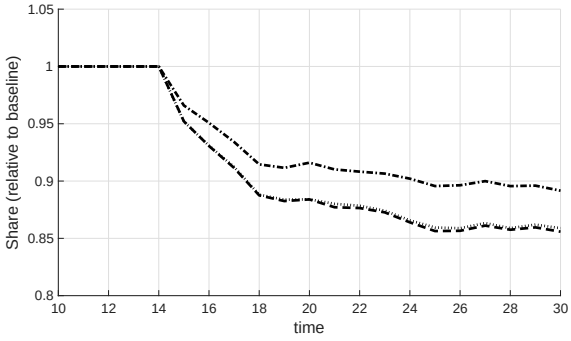
Notes: Increase in F^e_{UK}, f^e_{UK}, and $\tau^T_{UK,k}$ and $\tau^T_{k,UK}$, where k refers to Ireland, Germany, and France.

Figure O.9: UK trade shock: Firms in Ireland.

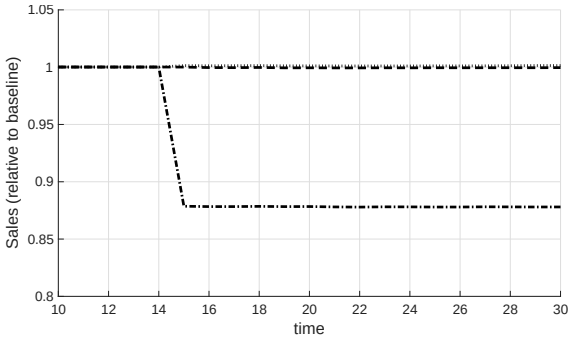
(a) US MNE affiliate sales to UK.



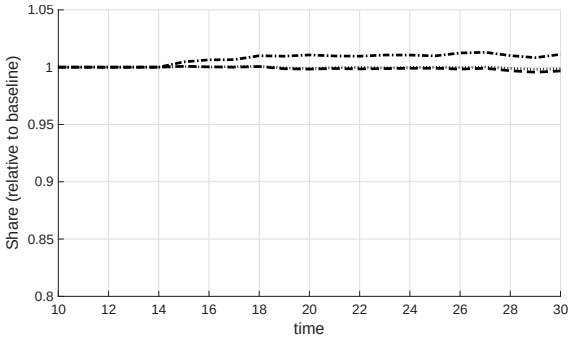
(b) US MNE affiliates exporting to UK.



(c) Irish firms sales to UK.



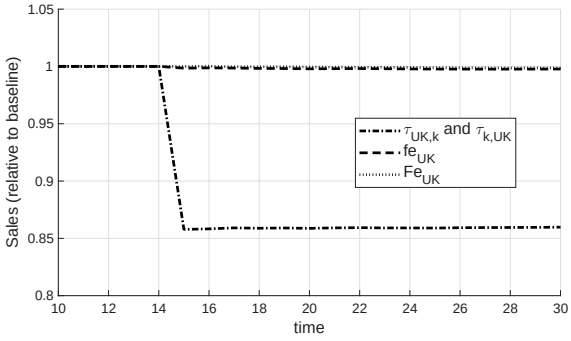
(d) Irish firms exporting to UK.



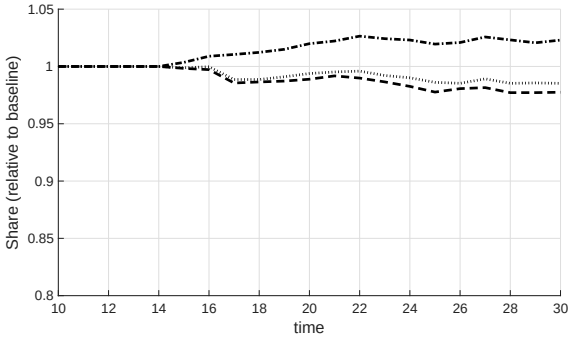
Notes: Increase in F^e_{UK}, f^e_{UK}, and $\tau^T_{UK,k}$ and $\tau^T_{k,UK}$ where k refers to Ireland, Germany, and France.

Figure O.10: UK trade shock: Firms in Germany.

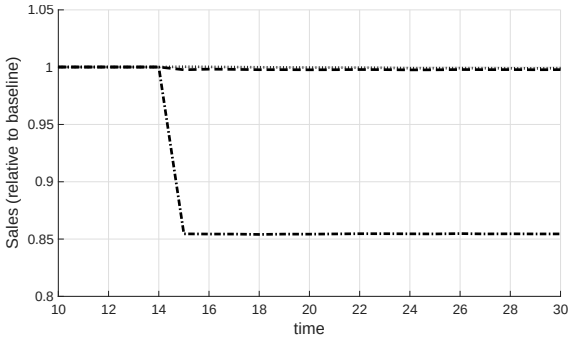
(a) US MNE affiliate sales to UK.



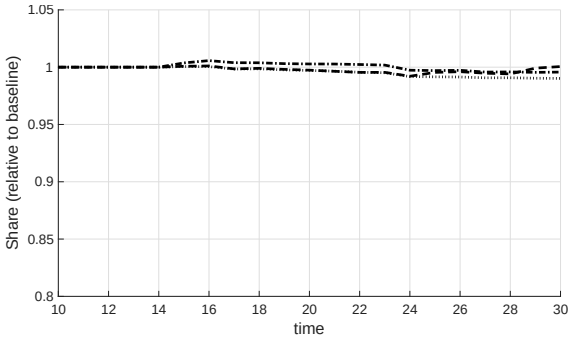
(b) US MNE affiliates exporting to UK.



(c) German firms sales to UK.



(d) German firms exporting to UK.



Notes: Increase in F^e_{UK}, f^e_{UK}, and $\tau^T_{UK,k}$ and $\tau^T_{k,UK}$ where k refers to Ireland, Germany, and France.

References

Gravelle, J. (2015). Tax havens: International tax avoidance and evasion. *Congressional Research Service 7*(5700), 1–55.

Kovak, B., L. Oldenski, and N. Sly (2021). The labor market effects of offshoring by U.S. multinational firms. *Review of Economics and Statistics 103*(2).