

Product Market Competition and FDI Decisions

Appendix B (Online)

B1. Additional Tables

Table B1.1: Summary Statistics by Industries

This table shows summary statistics per industry: the number of FDI projects recorded in each industry, the average value for FDI proclivity (firms recording FDI in each year) and for the average number of FDI doers (firms recording at least one FDI in the aggregate sample period), the average value of FLUIDITY in the industry, and the number of firms per industry.

Industry	Number of FDIs	FDI proclivity	FDI doers	FLUIDITY	N. of firms
Agricultural products	29.00	0.11	0.21	4.81	11.00
Apparel and other	7.00	0.02	0.12	4.21	37.00
Business services	17.00	0.00	0.02	6.52	701.00
Chemical products	738.00	0.05	0.17	10.35	816.00
Coal mining	3.00	0.15	0.65	10.18	1.00
Eating and drinking	5.00	0.01	0.06	5.51	93.00
Electric, gas and sanitation	8.00	0.01	0.09	8.96	83.00
Electronic and other	348.00	0.05	0.26	5.67	460.00
Engineering	6.00	0.01	0.07	7.30	43.00
Fabricated metal	86.00	0.12	0.36	4.27	31.00
Food and kindred	319.00	0.12	0.28	4.36	85.00
Food stores	2.00	0.05	0.30	6.41	5.00
Furniture	44.00	0.10	0.37	3.72	22.00
Healthcare	1.00	0.00	0.00	6.45	4.00
Heavy construction	1.00	0.00	0.00	6.12	13.00
Industrial machinery	418.00	0.08	0.32	5.38	279.00
Lumber and wood	3.00	0.02	0.15	3.36	12.00
Measurement instruments	181.00	0.04	0.22	7.62	367.00
Metal mining	2.00	0.01	0.09	5.20	17.00
Mining and quarrying (non-metal)	12.00	0.06	0.18	6.87	15.00
Miscellaneous manufacturing	13.00	0.03	0.16	4.45	32.00
Oil and gas extraction	32.00	0.01	0.06	10.22	259.00
Paper products	142.00	0.15	0.33	3.39	40.00
Petroleum refineries	87.00	0.11	0.24	7.47	32.00
Primary metal	35.00	0.06	0.36	4.59	48.00
Printing and publishing	3.00	0.02	0.20	4.06	17.00
Rubber	76.00	0.12	0.52	3.78	43.00
Stone, clay and glass	67.00	0.07	0.40	5.23	22.00
Textile mills	16.00	0.07	0.64	3.00	6.00
Tobacco	39.00	0.30	0.72	5.32	4.00
Transportation equipment	551.00	0.19	0.53	4.52	103.00
Wholesale (Durable);	9.00	0.03	0.30	4.19	30.00
Wholesale (Non-durable)	10.00	0.02	0.24	6.08	46.00
Non-classifiable/Other	230.00	0.05	0.13	6.58	90.00

Table B1.2: Summary Statistics by States

This table shows sample period (2003-2019) summary statistics per US state: the average maximum weekly unemployment insurance benefits payments (\$) (MAXBEN), the Real Trade-Weighted Value of the Dollar (RTWVD), and the number of firms.

US State	MAXBEN (weekly, \$)	RTWVD (1988=100)	Number of firms
AK	355.17	106.24	1.00
AL	242.35	98.32	13.00
AR	415.59	96.88	6.00
AZ	234.41	102.80	61.00
CA	441.18	107.67	889.00
CO	472.50	108.62	127.00
CT	562.39	106.35	70.00
DE	332.56	104.88	13.00
FL	275.00	88.69	133.00
GA	319.79	101.58	88.00
HI	518.13	112.19	4.00
IA	425.69	108.36	9.00
ID	357.31	107.55	12.00
IL	461.76	102.68	141.00
IN	383.68	106.22	40.00
KS	420.59	104.21	16.00
KY	403.96	102.28	17.00
LA	255.43	99.91	14.00
MA	791.48	113.72	309.00
MD	386.73	106.24	70.00
ME	433.03	106.75	3.00
MI	362.00	99.69	59.00
MN	497.27	107.73	95.00
MO	297.81	100.49	43.00
MS	210.00	97.93	1.00
MT	427.10	103.76	4.00
NC	429.79	102.68	91.00
ND	319.50	105.76	1.00
NE	334.23	106.41	6.00
NH	407.66	105.53	11.00
NJ	580.74	103.67	168.00
NM	383.67	126.52	2.00
NV	383.87	108.06	24.00
NY	410.83	104.73	239.00
OH	450.12	103.71	91.00
OK	402.62	93.47	41.00
OR	480.23	108.34	35.00
PA	540.25	103.53	156.00
RI	581.26	102.39	9.00
SC	316.99	110.21	15.00
SD	311.18	112.73	4.00
TN	278.88	102.96	30.00
TX	410.01	86.69	449.00
UT	451.14	104.35	47.00
VA	359.51	99.75	72.00
VT	372.68	121.63	6.00
WA	576.14	109.17	78.00
WI	355.49	106.44	51.00
WV	388.24	102.24	2.00
WY	383.67	98.75	1.00

B2. Additional Location Choice Results and Robustness Tests

B2.1 Firm and Temporal Unobserved Heterogeneity

We test another version of the LPM with firm and year fixed effects, thus absorbing firm and temporal unobservable preferences potentially affecting FDI location. The results in Table B2.1 show that, even including firm and year fixed effects, the findings hold robust once more. Overall, the LPM results mostly corroborate those from the clogit, remaining robust to country and firm controls, and to project, firm, and time unobserved effects.

Table B2.1: Competition and FDI Location Choices: LPM Estimates (with Firm Fixed Effects)

This table reports the results of linear probability models. LOCATION is modelled as a function of FLUIDITY plus its interactions with the following country-level locational attributes: 1 ln(GDP) (market size), 2 TFP (total factor productivity), 3 LABOR_GDP (labor costs), 4 NAT_GDP (natural resource rents), 5 CORPORATE_TAXES (taxation). All models include the same vector of country control variables as reported in Table 10, plus a vector of firm controls including the same firm control variables reported in Table 3, plus firm and year fixed effects. Robust standard errors clustered at the firm-level are shown in parenthesis below the coefficients. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

DV: LOCATION (0/1)	1	2	3	4	5
FLUIDITY x ln(GDP)	-0.000 (0.000)				
FLUIDITY x TFP		0.003*** (0.001)			
FLUIDITY x LABOR_GDP			0.002** (0.001)		
FLUIDITY x NAT_GDP				-0.002* (0.001)	
FLUIDITY x CORPORATE_TAXES					-0.003** (0.001)
FLUIDITY	0.001 (0.001)	-0.002*** (0.000)	-0.001** (0.000)	0.000*** (0.000)	0.001*** (0.000)
ln(GDP)	0.008*** (0.000)	0.008*** (0.000)	0.008*** (0.000)	0.008*** (0.000)	0.008*** (0.000)
TFP	-0.025*** (0.003)	-0.039*** (0.004)	-0.025*** (0.003)	-0.025*** (0.003)	-0.025*** (0.003)
LABOR_GDP	-0.014*** (0.005)	-0.014*** (0.005)	-0.024*** (0.006)	-0.014*** (0.005)	-0.014*** (0.005)
NAT_GDP	-0.025*** (0.004)	-0.025*** (0.004)	-0.025*** (0.004)	-0.016*** (0.006)	-0.025*** (0.004)
CORPORATE_TAXES	-0.006* (0.003)	-0.006* (0.003)	-0.006* (0.003)	-0.006* (0.003)	0.009 (0.006)
Firm + Year fixed effects	Yes	Yes	Yes	Yes	Yes
Firm + Country controls	Yes	Yes	Yes	Yes	Yes
R-square	0.044	0.044	0.044	0.044	0.044
Model significance (F) (p-value)	0.000	0.000	0.000	0.000	0.000
N	254,436	254,436	254,436	254,436	254,436

B2.2 Lagged Competition

Next, we consider whether competition and FDI location could be potentially endogenous. In principle, firms' locational decisions (e.g., locating in high TFP countries) could feedback into the competitive structure of their domestic industries. Unfortunately, the grouped data structure of the location dataset makes instrumentation hardly feasible. However, to mitigate endogeneity concerns, we re-estimate the FDI Location choice models lagging FLUIDITY by several time periods (from one to five lags). By creating time lags between competition in the domestic economy and the FDI location choices, we hope to limit the potential impact of such feedback loops. In this analysis, we focus on the interactions of FLUIDITY with TFP and CORPORATE_TAXES (which are the most relevant and interesting findings from our examination of location choices). LPM estimates reported in Table B2.2 show that even when lagging FLUIDITY by one, two, three, four, and five periods, its interactions with productivity remain significantly positive, whereas its interactions with taxation remain significantly negative.

Table B2.2: Competition and FDI Location Choices: LPM Estimates (Lagged FLUIDITY)

This table reports the results of linear probability models. LOCATION is modelled as a function of FLUIDITY (lagged by one, two, three, four, and five periods) plus its interactions with TFP and CORPORATE_TAXES. All models include the same vector of country control variables as reported in Table 10, plus a vector of firm controls including the same firm control variables reported in Table 3. Robust standard errors clustered at the firm-level are shown in parenthesis below the coefficients. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

DV: LOCATION (0/1)	1	2	3	4	5
<i>FLUIDITY Lags</i>	<i>t-1</i>	<i>t-2</i>	<i>t-3</i>	<i>t-4</i>	<i>t-5</i>
L.FLUIDITY x TFP	0.002*** (0.001)	0.002*** (0.001)	0.001** (0.001)	0.001** (0.001)	0.001* (0.001)
TFP	-0.036*** (0.004)	-0.037*** (0.004)	-0.033*** (0.004)	-0.033*** (0.004)	-0.033*** (0.004)
L.FLUIDITY	-0.001*** (0.000)	-0.001*** (0.000)	-0.001* (0.000)	-0.001* (0.000)	0.001* (0.001)
Firm + Country controls	Yes	Yes	Yes	Yes	Yes
Model significance (F) (p-value)	0.000	0.000	0.000	0.000	0.000
N	254,436	254,436	254,436	254,436	238,758
<i>Fluidity Lags</i>	<i>t-1</i>	<i>t-2</i>	<i>t-3</i>	<i>t-4</i>	<i>t-5</i>
L.FLUIDITY x CORPORATE_TAXES	-0.003*** (0.001)	-0.003*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)	-0.004*** (0.001)
CORPORATE_TAXES	0.011* (0.006)	0.010* (0.006)	0.016*** (0.006)	0.013** (0.006)	0.015** (0.007)
L.FLUIDITY	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Firm + Country controls	Yes	Yes	Yes	Yes	Yes
Model significance (F) (p-value)	0.000	0.000	0.000	0.000	0.000
N	254,436	254,436	254,436	254,436	238,758

B2.3 A Closer Look at Productivity and Taxation

The findings from our location choice model suggest that product market competition intensity encourages FDI into countries with stronger productivity and potential for tax savings. In this section, we estimate additional models with economic variables that might assist us in corroborating the validity of these findings. Table B2.3 reports additional estimates.

In column 1, we interact FLUIDITY with the variable HCI (the human capital development index, from PWT). The variable is computed based on the average years of schooling and the returns to education, with higher HCI indicating a more qualified labor force. We find a significantly positive interaction of FLUIDITY and HCI, suggesting that competition renders location choice more responsive to labor force qualification in the host economy. Results in column 2 explore an interaction of FLUIDITY with the variable $\ln(\text{PATENTS})$ (the natural log of the number of patents per capita filed in the host country). We find a significantly positive interaction, indicating that competition increases the sensitivity of location to innovation in the host economy. These findings corroborate the notion that competition encourages FDI as a source of productive efficiency and technological gains.

The findings in column 3 explore an interaction of FLUIDITY with the variable ULC (unit labor costs, sourced from The Conference Board). This variable is widely used to capture labor costs but is available only for a limited number of countries (reason why our running variable for labor costs is LABOR_GDP). We run a sensitivity check to ensure our findings remain robust when employing this alternative measure, finding that labor costs decrease FDI location likelihood, but with weaker effects for firms operating in more competitive industries.

In column 4 we conduct a robustness check with the measurement of corporate taxes. We employ the variable EATR (the effective average corporate tax rate, sourced from Oxford Centre for Business Taxation). The EATR measures the size of the disincentives created by corporate taxes to locate a discrete activity in a particular country. While EATR is a more fine-tuned measure of taxation, it is available for a limited set of countries too, reason why our running variable is statutory corporate taxes. We re-estimate our models with EATR and find that its interaction with FLUIDITY is significantly negative, thus our results remain robust. In columns 5-8 we re-estimate the models via LPM, controlling for the main effect of FLUIDITY and for firm covariates. We still observe statistically significant interactions, and robust results.

Table B2.3: A Closer Look at Productivity and Taxation

This table reports the estimation results of additional location choice regressions. LOCATION is modelled as a function of FLUIDITY (competition) interacted with the following country-level locational attributes: 1 HCI (human capital index), 2 ln(PATENTS) (technological output), 3 ULC (unit labor costs), 4 EATR (effective average tax rate). Models 1-4 are clogit estimates, whereas models 5-8 are LPM estimates. All models include the same country control variables as in the specification reported in Table 10. Models 5-8 include firm controls. Robust standard errors clustered at the firm-level are shown in parenthesis below the coefficients. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

DV: LOCATION (0/1)	1	2	3	4	5	6	7	8
FLUIDITY x HCI	0.071*** (0.014)				0.001*** (0.000)			
FLUIDITY x ln(PATENTS)		0.018*** (0.005)				0.000*** (0.000)		
FLUIDITY x ULC			0.002** (0.001)				0.000** (0.000)	
FLUIDITY x EATR				-0.434** (0.215)				-0.005** (0.002)
HCI	-0.462*** (0.133)				-0.011*** (0.001)			
ln(PATENTS)		-0.132*** (0.038)				-0.001*** (0.000)		
ULC			-0.011** (0.005)				-0.000** (0.000)	
EATR				0.241 (1.231)				0.007 (0.014)
FLUIDITY					-0.002*** (0.000)	-0.001*** (0.000)	-0.003** (0.001)	0.001** (0.001)
Estimation	Clogit	Clogit	Clogit	Clogit	LPM	LPM	LPM	LPM
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	No	No	No	Yes	Yes	Yes	Yes
Model sig. (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	264,732	219,188	107,692	129,367	254,436	219,978	122,284	140,850

B2.4 Agglomeration Economies and Spillover Effects

We also test for the role of competition in spurring agglomeration economies. We estimate three-way interactions of FLUIDITY x AGGLOMERATION x TFP to test for productivity spillovers, and estimate three-way interactions of FLUIDITY x AGGLOMERATION x HCI to test for knowledge spillovers. Table B2.4 shows the results.

In column 1, we find a significantly positive triple interaction FLUIDITY x AGGLOMERATION x TFP, suggesting that firms with higher FLUIDITY are more likely to co-locate with industry peers in countries with higher total factor productivity. Meanwhile, the dual interaction FLUIDITY x AGGLOMERATION is significantly negative, indicating that when TFP is low, firms operating in more competitive industries avoid co-locating with industry peers.

In column 2, we find a significantly positive triple interaction FLUIDITY x AGGLOMERATION x HCI, while the dual interaction FLUIDITY x AGGLOMERATION is significantly negative again. Such results indicate that firms with higher FLUIDITY are more likely to co-locate with peers in countries where local human capital is more qualified. In columns 3 and 4 we re-estimate the models via LPM, obtaining robust results.

Table B2.4: Competition, Agglomeration and Spillovers

LOCATION is modelled as a function of three-way interactions between FLUIDITY, TFP and AGGLOMERATION in columns 1 and 3, and of three-way interactions between FLUIDITY, HCI and AGGLOMERATION in columns 2 and 4. Models 1 and 2 are clogit estimates, models 3 and 4 are LPM estimates. All models include the same country control variables as in the specification reported in Table 10. Models 3 and 4 include firm controls. Robust standard errors clustered at the firm-level are shown in parenthesis below the coefficients. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

DV: LOCATION (0/1)	1	2	3	4
FLUIDITY x TFP x AGGLOMERATION	0.054*** (0.020)		0.006*** (0.002)	
FLUIDITY x HCI x AGGLOMERATION		0.018** (0.009)		0.002*** (0.001)
FLUIDITY x AGGLOMERATION	-0.019* (0.010)	-0.042* (0.022)	-0.003*** (0.001)	-0.006*** (0.002)
FLUIDITY x TFP	0.151*** (0.047)		0.001** (0.001)	
FLUIDITY x HCI		0.063*** (0.015)		0.001*** (0.000)
TFP x AGGLOMERATION	0.162 (0.123)		-0.054*** (0.009)	
HCI x AGGLOMERATION		0.039 (0.054)		-0.018*** (0.004)
TFP	-1.903*** (0.343)	-0.921*** (0.222)	-0.026*** (0.004)	-0.025*** (0.002)
AGGLOMERATION	0.047 (0.058)	0.018 (0.137)	0.047*** (0.006)	0.065*** (0.011)
HCI		-0.565*** (0.138)		-0.009*** (0.001)
FLUIDITY			-0.001** (0.000)	-0.001*** (0.000)
Estimation	Clogit	Clogit	LPM	LPM
Country controls	Yes	Yes	Yes	Yes
Firm controls	No	No	Yes	Yes
Model sig. (p-value)	0.000	0.000	0.000	0.000
N	264,732	264,732	254,436	254,436