

Technical Appendix to
**NEW AND IMPROVED: DOES FDI BOOST PRODUCTION
COMPLEXITY IN HOST COUNTRIES?**

Beata S. Javorcik, Alessia Lo Turco and Daniela Maggioni

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Appendix A. Additional Figures and Tables

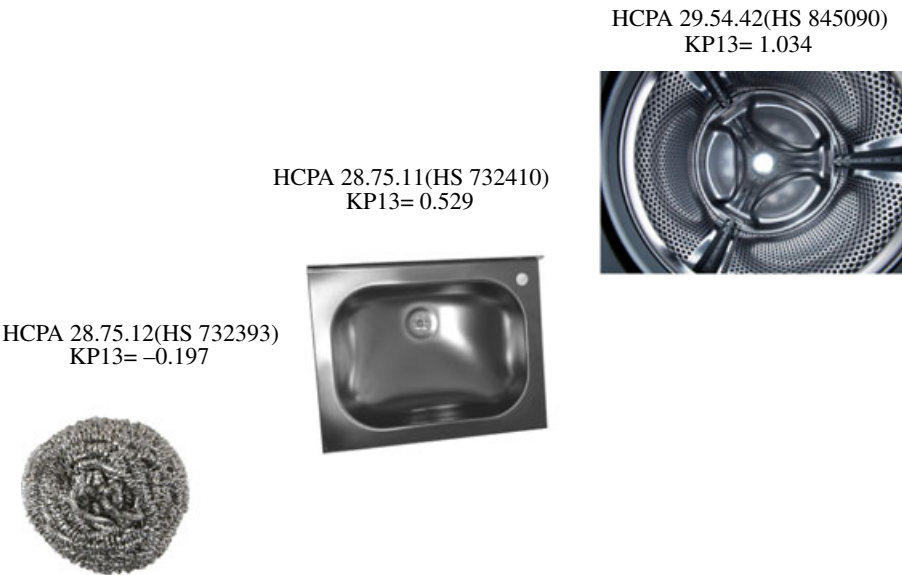


Fig. A1. *The Complexity Ranking of Stainless Steel Products*
Source. BACI database. Own calculations.

(a)



(b)



(c)



Fig. A2. *Turkish Manufacturing Production, 2005/9*

Notes. (a) Production value in 2005. (b) Average production value growth – 2005/9. (c) Average weight of new products in production value – 2005/9. Quartiles of variables distribution are represented by means of different grey tonalities, with the darker ones identifying upper quartiles. The top panel displays the NUTS 3 spatial distribution of Turkish manufacturing production value. The middle panel chart displays the NUTS 3 spatial distribution of Turkish manufacturing production value average growth. The lower panel chart displays the NUTS 3 spatial distribution of the 2005–9 average weight of new products in manufacturing production value.

Source. TurkStat SBS and AIPS. Own calculations.

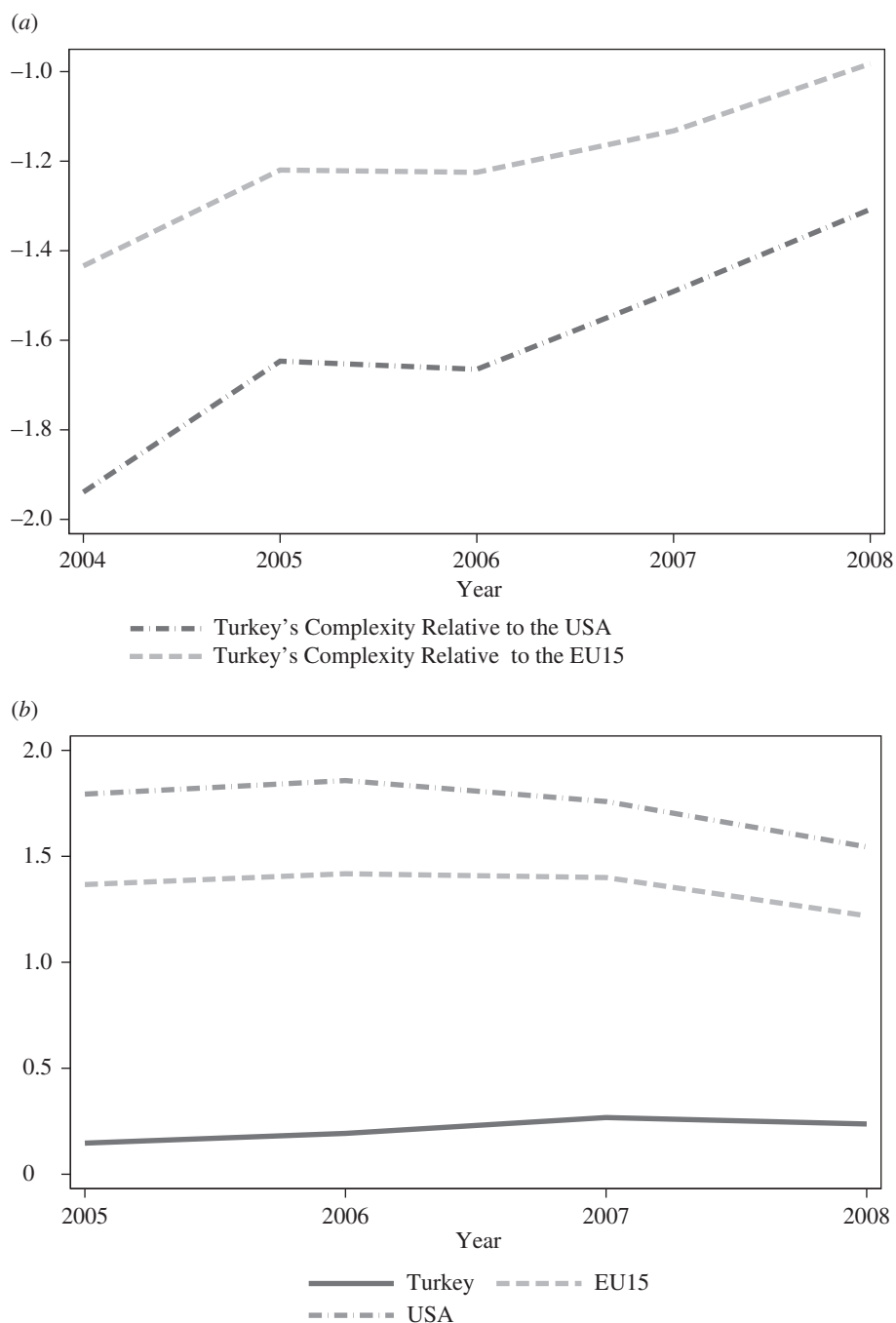


Fig. A3. *Product Sophistication Evolution – Cross-country Comparison*

Notes. (a) Relative complexity evolution. (b) Absolute complexity evolution. In both Figures EU refers to the average across EU15 member states.

Source. BACI database. Own calculations.

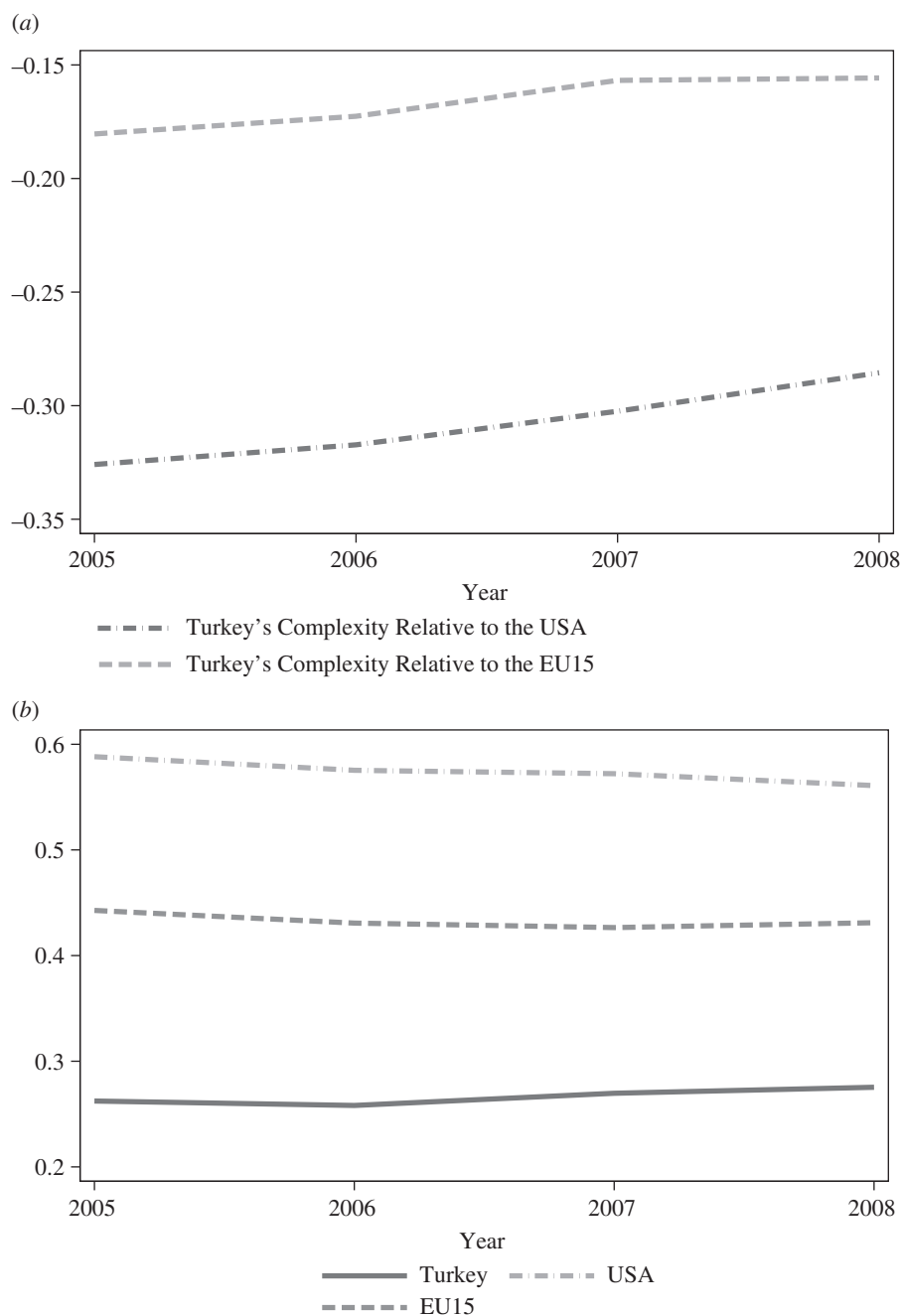


Fig. A4. *Product Sophistication Evolution – Metal Products*

Notes. (a) Weighted average of $K_{p,13}$ in Turkey relative to the USA and the EU in NACE Rev 1.1 Sector 28. (b) Weighted average of $K_{p,13}$ across products in NACE Rev 1.1 Sector 28. In both Figures EU refers to the average across EU15 member states.

Source. BACI database. Own calculations.

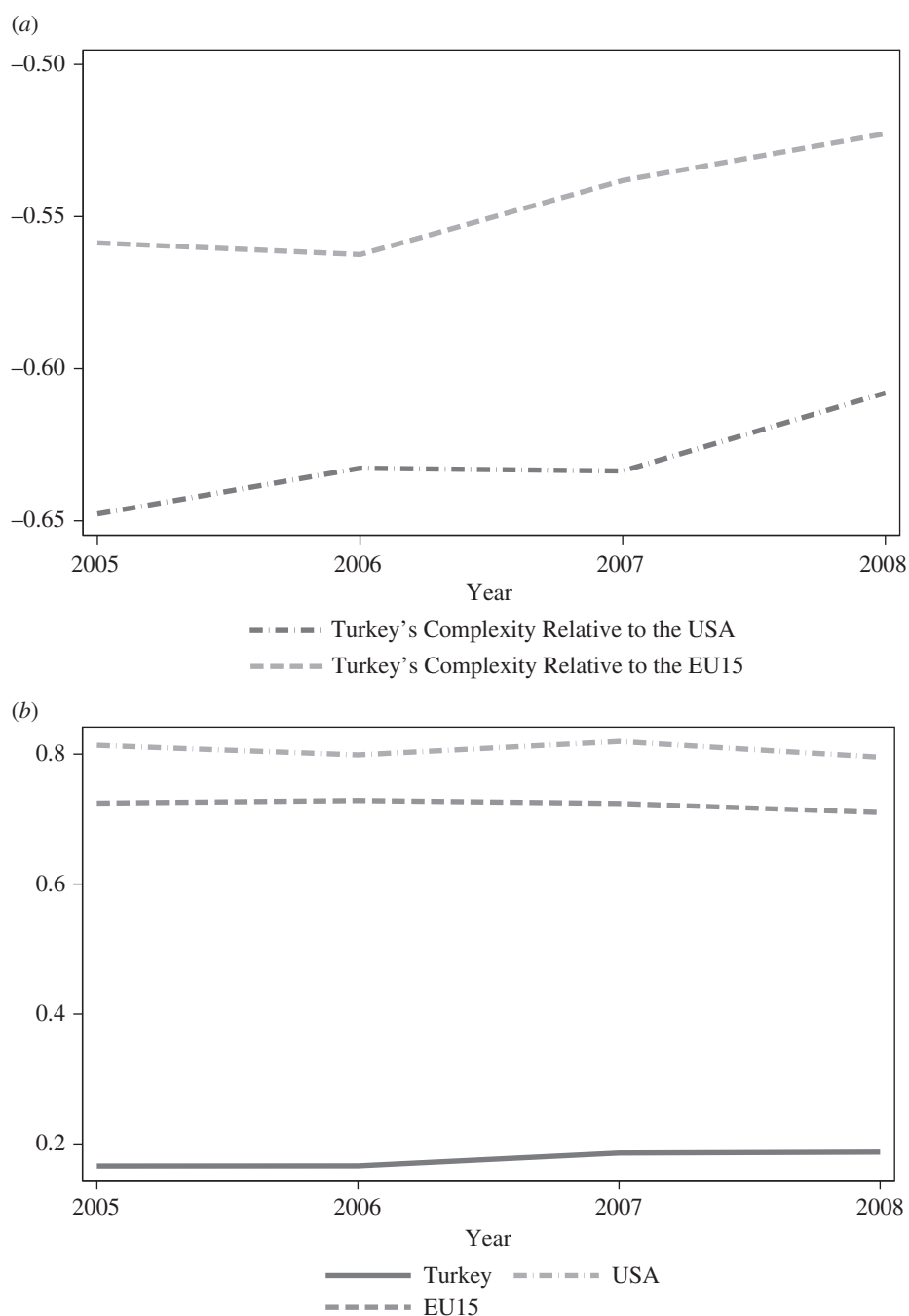


Fig. A5. *Product Sophistication Evolution – Chemical and Pharmaceutical Products*

Notes. (a) Weighted average of $K_{p,13}$ in Turkey relative to the USA and the EU in NACE Rev 1.1 Sector 24. (b) Weighted average of $K_{p,13}$ across products in NACE Rev 1.1 Sector 24. In both Figures EU refers to the average across EU15 member states.

Source. BACI database. Own calculations.

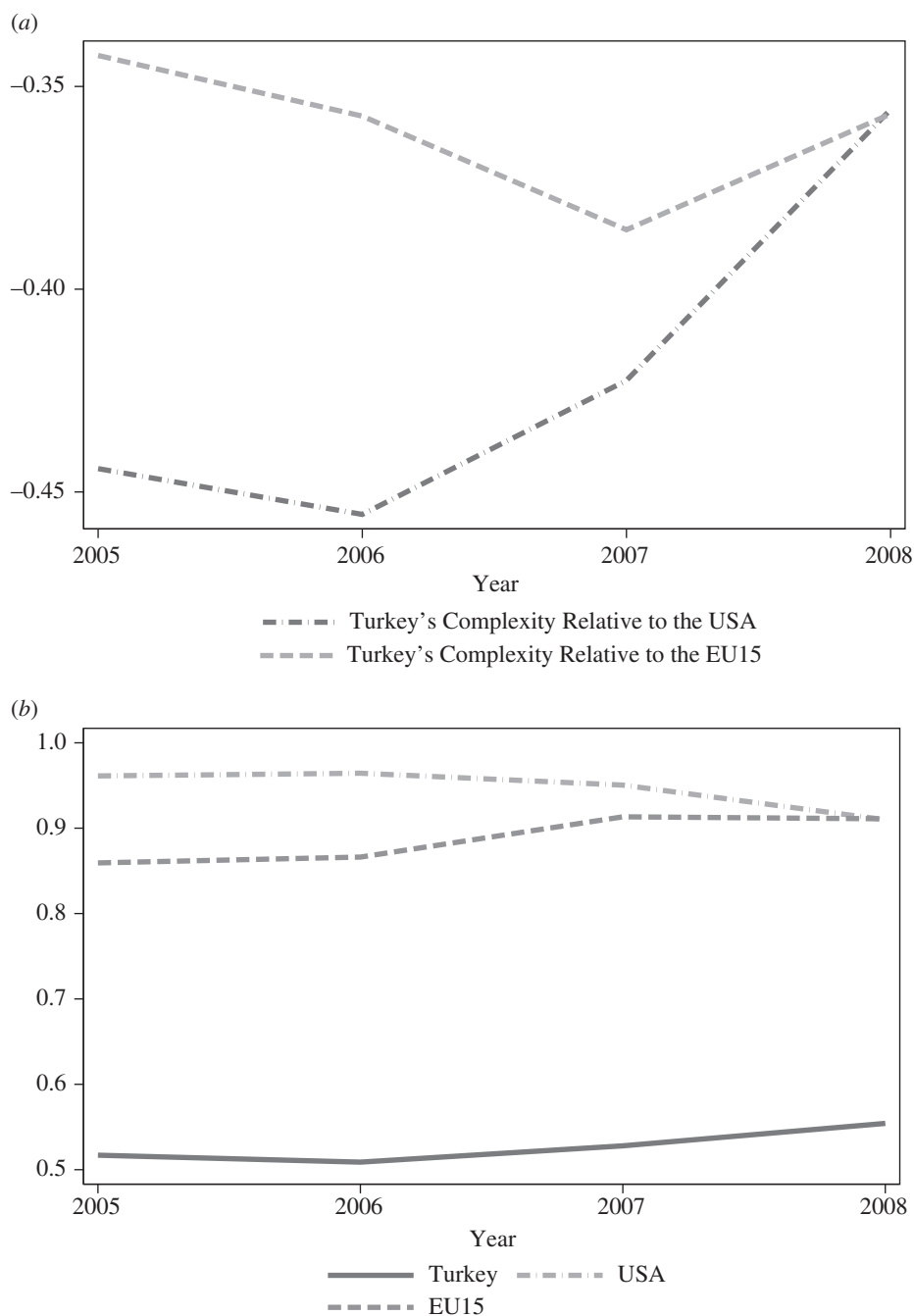


Fig. A6. *Product Sophistication Evolution – Machinery and Equipment*

Notes. (a) Weighted average of $K_{p,13}$ in Turkey relative to the USA and the EU in NACE Rev 1.1 Sector 29. (b) Weighted average of $K_{p,13}$ across products in NACE Rev 1.1 Sector 29. In both Figures EU refers to the average across EU15 member states.

Source. BACI database. Own calculations.

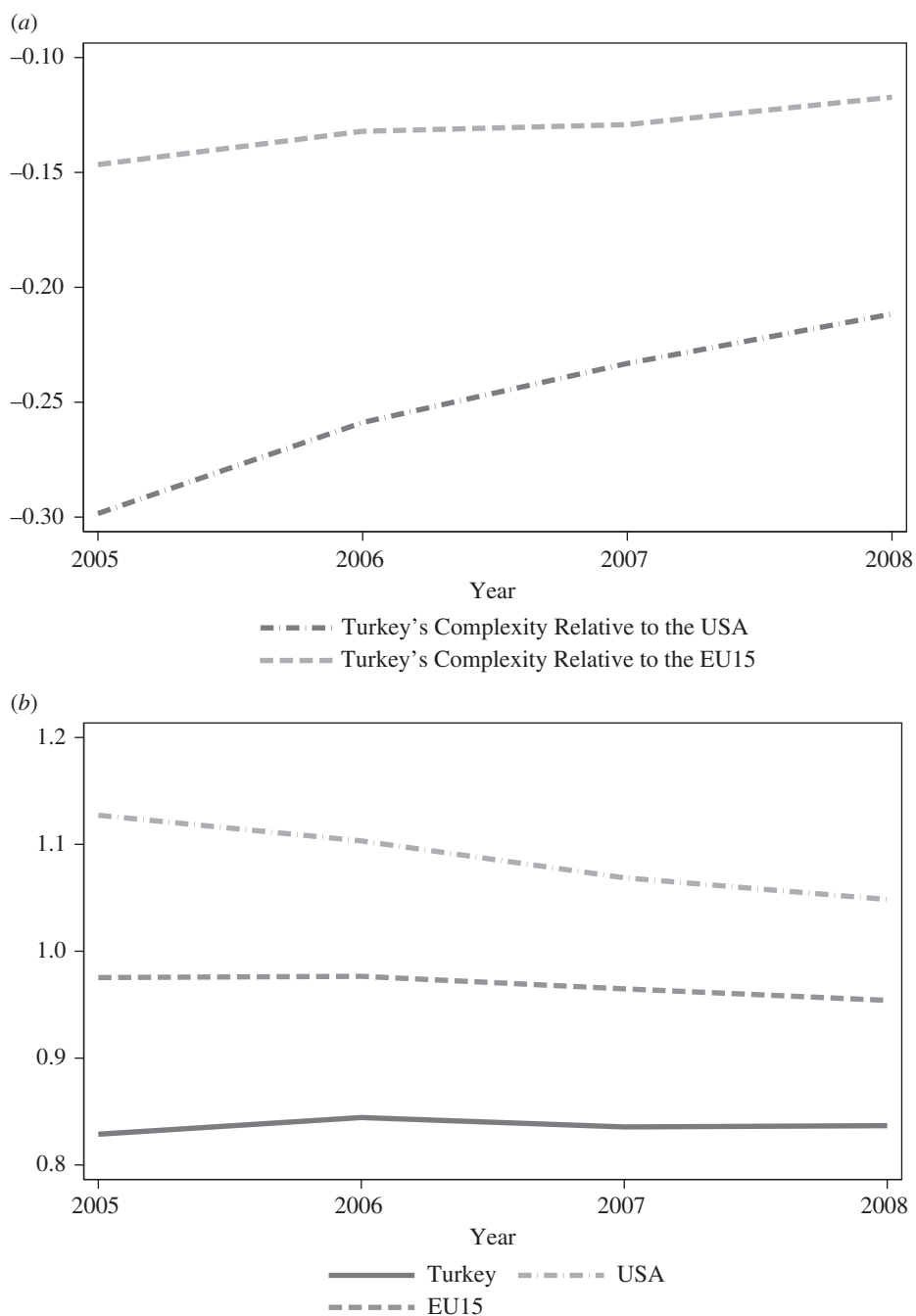


Fig. A7. *Product Sophistication Evolution – Transport Equipment*

Notes. (a) Weighted average of $K_{p,13}$ in Turkey relative to the USA and the EU in NACE Rev 1.1 Sector 34. (b) Weighted average of $K_{p,13}$ across products in NACE Rev 1.1 Sector 34. In both Figures EU refers to the average across EU15 member states.

Source. BACI database. Own calculations.



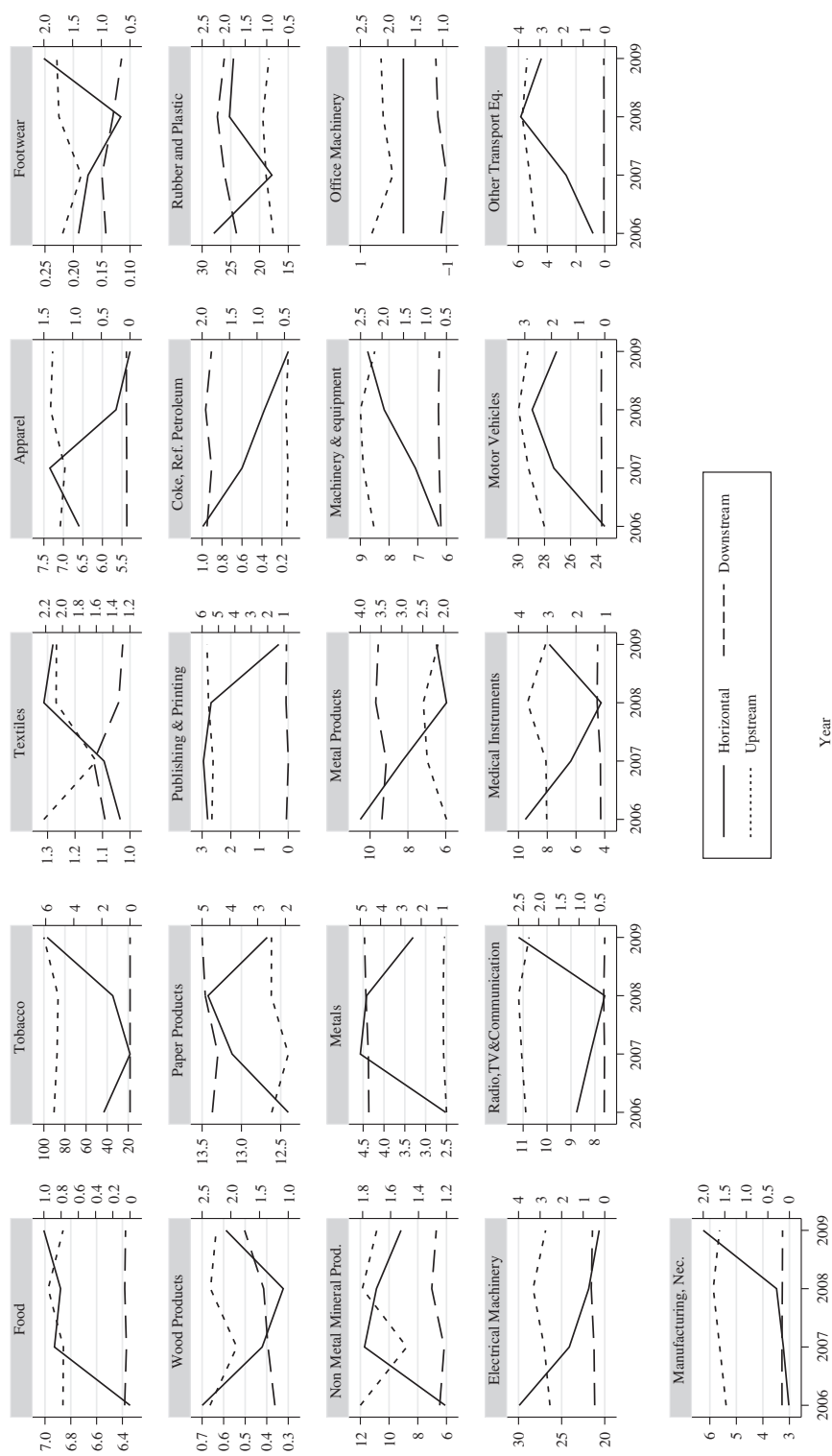


Fig. A9. *Foreign Output Evolution by 2-digit Sector*
Note. Percentage figures from the calculations of equations (4)–(6) as shown in main text.
Sources: TurkStat SBS. Own Calculations.

Table A1
Sample Composition – By NUTS2 Region

Region	NUTS2 code	Innovators		All firms		Innovators (%)
		Frequency	%	Frequency	Percent	
Istanbul	10	3,006	52.98	15,800	43.12	19.03
Tekirdag	21	59	1.04	477	1.3	12.37
Balikesir	22	29	0.51	387	1.06	7.49
Izmir	31	457	8.05	2,972	8.11	15.38
Aydin	32	121	2.13	1,263	3.45	9.58
Manisa	33	179	3.15	1,231	3.36	14.54
Bursa	41	300	5.29	3,250	8.87	9.23
Kocaeli	42	166	2.93	1,609	4.39	10.32
Ankara	51	307	5.41	2,307	6.3	13.31
Konya	52	135	2.38	1,131	3.09	11.94
Antalya	61	92	1.62	614	1.68	14.98
Adana	62	111	1.96	813	2.22	13.65
Hatay	63	75	1.32	564	1.54	13.30
Kirikkale	71	28	0.49	253	0.69	11.07
Kayseri	72	192	3.38	954	2.6	20.13
Zonguldak	81	22	0.39	237	0.65	9.28
Kastamonu	82	21	0.37	163	0.44	12.88
Samsun	83	127	2.24	736	2.01	17.26
Trabzon	90	54	0.95	427	1.17	12.65
Erzurum	A1	2	0.04	48	0.13	4.17
Agri	A2	3	0.05	26	0.07	11.54
Malatya	B1	22	0.39	276	0.75	7.97
Van	B2	4	0.07	61	0.17	6.56
Gaziantep	C1	132	2.33	802	2.19	16.46
Sanliurfa	C2	20	0.35	205	0.56	9.76
Mardin	C3	10	0.18	35	0.1	28.57
		5,674	100	36,641	100	15.49

Sources. TurkStat AIPS and SBS. Own calculations.

Table A2
Sample Composition – By NACE Sector

Sector	NACE Rev 1.1 code	Innovators		All firms		Innovators (%)
		Frequency	%	Frequency	Percent	
Food	15	520	9.16	4,631	12.64	11.23
Textile	17	689	12.14	5,525	15.08	12.47
Apparel	18	1,581	27.86	4,950	13.51	31.94
Footwear	19	102	1.8	1,061	2.9	9.61
Wood	20	133	2.34	769	2.1	17.30
Paper	21	95	1.67	906	2.47	10.49
Publishing	22	81	1.43	658	1.8	12.31
Chemicals	24	193	3.4	1,271	3.47	15.18
Non-metallic minerals	26	225	3.97	2,919	7.97	7.71
Basic metals	27	141	2.49	1,261	3.44	11.18
Metal products	28	368	6.49	2,836	7.74	12.98
Machinery	29	615	10.84	3,841	10.48	16.01
Office machinery	30	6	0.11	29	0.08	20.69
Electrical machinery	31	147	2.59	1,164	3.18	12.63
Radio, TV and communications	32	42	0.74	209	0.57	20.10
Professional instruments	33	62	1.09	341	0.93	18.18
Transport equipment	34	166	2.93	1,393	3.8	11.92
Other transport equipment	35	14	0.25	133	0.36	10.53
Furniture and manufacturing n.e.s.	36	494	8.71	2,744	7.49	18.00
Total		5,674	100	36,641	100	15.49

Sources. TurkStat AIPS and SBS. Own calculations.

Table A3
Descriptive Statistics

Variable	Observations	Mean	SD	Min	Max
K_{it}^{New}	5,674	-0.400	1.013	-2.556	2.601
$HorizontalcFDI_{it-1}$	5,674	0.062	0.095	0.000	0.999
$DownstreamcFDI_{it-1}$	5,674	0.009	0.016	0.000	0.140
$Upstream FDI_{it-1}$	5,674	0.017	0.013	0.000	0.121
K_{it-1}^{All}	5,674	-0.450	1.025	-2.303	2.137
$Size_{it-1}$	5,674	3.883	0.755	2.197	6.851
$Labour_Productivity_{it-1}$	5,674	9.488	0.681	7.230	11.587
$R\&D_Employment_Share_{it-1}$	5,674	0.434	2.787	0.000	75.556
$Wage_{it-1}$	5,674	8.791	0.364	6.301	11.068

Sources. TurkStat AIPS and SBS. Own calculations.

Table A4
Selection Model – Further Robustness Checks

	Employment-based FDI measures (1)	Relevant innovations (2)	Cross-section (3)	Single region (4)	S.E. clustering		Regional controls				Firm international status (11)
					Region-year (5)	Region-sector (6)	(7)	(8)	(9)	(10)	
<i>Downstream FDI_{it-1}</i>	4.433*** (1.131)	3.109*** (0.839)	3.390*** (0.818)	3.297*** (0.855)	2.971*** (0.737)	2.971*** (0.835)	2.937*** (0.845)	2.862*** (0.848)	2.965*** (0.839)	3.022*** (0.838)	2.970*** (0.756)
<i>Upstream FDI_{it-1}</i>	-0.53 (0.905)	-0.98 (0.892)	-0.272 (0.917)	-1.107 (0.977)	-0.500 (0.868)	-0.500 (0.802)	-0.256 (0.870)	-0.356 (0.873)	-0.278 (0.872)	-0.185 (0.868)	-0.518 (0.806)
<i>Horizontal FDI_{it-1}</i>	0.049 (0.126)	0.091 (0.110)	0.069 (0.112)	0.161 (0.105)	0.101 (0.095)	0.101 (0.103)	0.111 (0.111)	0.070 (0.114)	0.115 (0.111)	0.119 (0.111)	0.102 (0.101)
<i>Size_{it-1}</i>	-0.018* (0.010)	-0.022* (0.012)	-0.019 (0.012)	-0.024 (0.017)	-0.018* (0.010)	-0.018 (0.011)	-0.023** (0.011)	-0.023** (0.011)	-0.023** (0.011)	-0.022** (0.011)	-0.022** (0.011)
<i>Labour_Productivity_{it-1}</i>	-0.005 (0.013)	-0.004 (0.015)	-0.003 (0.016)	-0.003 (0.021)	-0.005 (0.014)	-0.005 (0.018)	-0.002 (0.015)	-0.003 (0.015)	-0.002 (0.015)	-0.002 (0.015)	-0.008 (0.013)
<i>R&D_Employment_Share_{it-1}</i>	0.003 (0.003)	0.003 (0.004)	0.003 (0.003)	0.002 (0.004)	0.003 (0.004)	0.003 (0.004)	0.002 (0.004)	0.002 (0.004)	0.002 (0.004)	0.002 (0.004)	0.003 (0.003)
<i>Wage_{it-1}</i>	0.096*** (0.025)	0.091*** (0.029)	0.073*** (0.028)	0.119*** (0.035)	0.097*** (0.025)	0.097*** (0.030)	0.115*** (0.028)	0.113*** (0.028)	0.115*** (0.028)	0.115*** (0.028)	0.096*** (0.025)
<i>K_{it-1}^{all}</i>	0.270*** (0.018)	0.262*** (0.020)	0.284*** (0.020)	0.269*** (0.050)	0.269*** (0.030)	0.269*** (0.043)	0.249*** (0.020)	0.247*** (0.020)	0.249*** (0.020)	0.249*** (0.018)	0.270*** (0.018)
$\hat{\lambda}$	0.012 (0.011)	0.042 (0.028)	0.006 (0.009)	-0.003 (0.008)	0.011 (0.013)	0.011 (0.016)	0.010 (0.013)	0.010 (0.011)	0.010 (0.011)	0.011 (0.011)	0.010 (0.011)
<i>VA_{it-1}</i>							0.013 (0.014)				
<i>LP_{it-1}</i>								0.063* (0.038)			
<i>Out_{it-1}^{Unit}</i>								0.014 (0.013)		0.005 (0.017)	
<i>Emp_{it-1}^{Unit}</i>											0.013 (0.018)
<i>Importer_{it-1}</i>											0.014 (0.017)
<i>Exporter_{it-1}</i>											0.017 (0.017)

Table A4
(Continued)

	Employment-based FDI measures (1)	Relevant innovations (2)	Cross- section (3)	Single region (4)	S.E. clustering		Regional controls			Firm international status (11)
					Region- sector-year (5)	Region- sector (6)	(7)	(8)	(9)	
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector × year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region × year	36,641	36,633	12,354	28,191	36,633	36,633	30,897	30,895	30,898	36,633
Observations										

Notes. *Significant at 10% level; **significant at 5% level; ***significant at 1% level. This Table presents the second step estimates from a Heckman selection model (as in Tables 2 and 3). We do not report the first step results to save space. In all specifications, the dependent variable is K^{firm} . Robust standard errors are clustered by firm and displayed in parentheses (1)–(3), (5), (8)–(11). In column (4), instead, robust standard errors are clustered by region and sector, as FDI spillover measures vary by region-sector-year for single region firms. In columns (5) and (6), respectively, standard errors are clustered by region-sector-year and by region-sector.

Table A5
Instrumental Variable Approach. First Stage

	IV set 1			IV set 2		
	<i>Downstream FDI</i>	<i>Upstream FDI</i>	<i>Horizontal FDI</i>	<i>Downstream FDI</i>	<i>Upstream FDI</i>	<i>Horizontal FDI</i>
Competition × underdeveloped region						
<i>Downstream</i>	−0.008*** (0.001)	−0.002*** (0.001)	0.001 (0.004)			
<i>Upstream</i>	−0.002*** (0.001)	−0.001* (0.001)	−0.018*** (0.006)			
<i>Horizontal</i>	−0.001 (0.001)	0.003*** (0.000)	−0.009** (0.004)			
FDI Supply × info flow						
<i>Downstream</i>	0.003*** (0.000)	−0.001* (0.000)	−0.006*** (0.002)	0.004*** (0.000)	−0.002*** (0.000)	−0.012*** (0.003)
<i>Upstream</i>	−0.005*** (0.001)	0.001** (0.001)	−0.008 (0.005)	−0.003*** (0.001)	0.001 (0.001)	−0.005 (0.004)
<i>Horizontal</i>	0.000 (0.000)	0.001*** (0.000)	0.022*** (0.003)	0.000 (0.000)	0.001*** (0.000)	0.023*** (0.003)
Competition × distance to gateways						
<i>Downstream</i>				−0.001*** (0.000)	−0.001*** (0.000)	−0.003*** (0.001)
<i>Upstream</i>				−0.000* (0.000)	−0.001*** (0.000)	−0.007*** (0.001)
<i>Horizontal</i>				−0.000*** (0.000)	0.000*** (0.000)	0.000 (0.001)
Observations	4,493	4,493	4,493	4,493	4,493	4,493
R ²	0.213	0.013	0.055	0.167	0.025	0.104
F-statistic	48.07	7.93	21.40	40.41	14.09	34.14
	IV set 3			IV set 4		
	<i>Downstream FDI</i>	<i>Upstream FDI</i>	<i>Horizontal FDI</i>	<i>Downstream FDI</i>	<i>Upstream FDI</i>	<i>Horizontal FDI</i>
Competition × underdeveloped region						
<i>Downstream</i>	−0.008*** (0.001)	−0.002*** (0.001)	0.004 (0.004)			
<i>Upstream</i>	−0.001*** (0.000)	−0.001** (0.000)	−0.007 (0.006)			
<i>Horizontal</i>	−0.001 (0.001)	0.002*** (0.000)	−0.005 (0.005)			
Competition × distance to gateways						
<i>Downstream</i>				−0.001*** (0.000)	−0.000*** (0.000)	−0.002*** (0.001)
<i>Upstream</i>				0.000 (0.000)	−0.000*** (0.000)	−0.005*** (0.001)
<i>Horizontal</i>				−0.000*** (0.000)	0.000*** (0.000)	0.000 (0.001)
DTTs × info flow/competition for FDI						
<i>Downstream</i>	0.953*** (0.149)	0.329*** (0.117)	−8.980*** (1.172)	0.978*** (0.158)	0.280** (0.124)	−9.644*** (1.173)
<i>Upstream</i>	0.498*** (0.084)	−0.564*** (0.079)	−6.745*** (0.612)	0.570*** (0.086)	−0.605*** (0.084)	−7.238*** (0.606)
<i>Horizontal</i>	0.247*** (0.071)	−0.118 (0.080)	10.294*** (0.826)	0.240*** (0.074)	−0.197** (0.082)	9.765*** (0.830)
Observations	4,721	4,721	4,721	4,721	4,721	4,721
R ²	0.183	0.034	0.091	0.149	0.046	0.123
F-statistic	40.44	22.02	35.72	35.47	28.55	45.40

Notes. *Significant at 10% level; **significant at 5% level; ***significant at 1% level. Robust standard errors, clustered by firm, are displayed in parentheses.

Table A6
Selection Model – Firm Heterogeneity

	Complexity (1)	Labour productivity (2)	Size		FDI origin (5)
			L > 42 employees (3)	L > 100 employees (4)	
<i>Downstream FDI</i> _{<i>it</i>-1}	7.904*** (1.382)	2.935*** (0.836)	3.452*** (0.811)	3.244*** (0.773)	
<i>Upstream FDI</i> _{<i>it</i>-1}	0.014 (0.813)	-0.5 (0.807)	-0.516 (0.809)	-0.541 (0.806)	
<i>Horizontal FDI</i> _{<i>it</i>-1}	0.099 (0.101)	0.101 (0.101)	0.100 (0.101)	0.098 (0.100)	
<i>Downstream FDI</i> _{<i>t</i>-1} × <i>D</i> ^{K High}	-5.628*** (1.332)				
<i>D</i> ^{K High}	0.035 (0.024)				
<i>Downstream FDI</i> _{<i>t</i>-1} × <i>D</i> ^{L^P High}		0.06 (0.650)			
<i>D</i> ^{L^P High}		0.003 (0.025)			
<i>Downstream FDI</i> _{<i>t</i>-1} × <i>D</i> ^{L^{ab} High}			-1.122* (0.634)	-1.692** (0.841)	
<i>D</i> ^{L^{ab} High}			0.004 (0.024)	0.049 (0.033)	
<i>Downstream FDI</i> _{<i>t</i>-1} ^{High}					3.637*** (1.400)
<i>Downstream FDI</i> _{<i>t</i>-1} ^{Low}					40.258 (39.134)
<i>Upstream FDI</i> _{<i>t</i>-1} ^{High}					-1.312 (1.631)
<i>Upstream FDI</i> _{<i>t</i>-1} ^{Low}					-10.967 (24.796)
<i>Horizontal FDI</i> _{<i>t</i>-1} ^{High}					0.098 (0.161)

Table A6
(Continued)

	Complexity (1)	Labour productivity (2)	Size		FDI origin (5)
			L > 42 employees (3)	L > 100 employees (4)	
<i>Horizontal FDI</i> _{<i>t-1</i>} ^{<i>new</i>}					
<i>K</i> _{<i>t-1</i>} ^{<i>All</i>}	0.279*** (0.019)	0.269*** (0.018)	0.270*** (0.018)	0.270*** (0.018)	-9.784 (19.073)
<i>Size</i> _{<i>t-1</i>}	-0.016 (0.010)	-0.018* (0.010)	-0.012 (0.015)	-0.028* (0.016)	0.268*** (0.018)
<i>Labour_Productivity</i> _{<i>t-1</i>}	-0.004 (0.013)	-0.007 (0.019)	-0.004 (0.013)	-0.004 (0.013)	-0.019* (0.010)
<i>R&D_Employment_Share</i> _{<i>t-1</i>}	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	-0.003 (0.013)
<i>Wage</i> _{<i>t-1</i>}	0.093*** (0.025)	0.097*** (0.025)	0.097*** (0.025)	0.098*** (0.025)	0.003 (0.003)
$\hat{\lambda}$	0.011 (0.011)	0.011 (0.011)	0.012 (0.011)	0.011 (0.011)	0.096*** (0.025)
Fixed effects	Yes	Yes	Yes	Yes	0.010 (0.010)
Sector \times year	Yes	Yes	Yes	Yes	
Region \times year	Yes	Yes	Yes	Yes	
Observations	5,674	5,674	5,674	5,674	

Notes. *Significant at 10% level; **significant at 5% level; ***significant at 1% level. In all specifications the dependent variable is K^{new} . All variables are at the firm level and robust standard errors are clustered by firm and displayed in parentheses.