The International Organization of Production in the Regulatory Void*

Online Appendix

Philipp Herkenhoff[†] Sebastian Krautheim[‡]

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[†]University of Mainz

[‡]University of Passau and CESifo. Corresponding author, email: sebastian.krautheim@uni-passau.de

Overview

This Online Appendix contains six sections. In **Section OA.1** we describe the results of several robustness checks of the explorative empirics in Section 2 of the main paper. The corresponding tables are documented in Section OA.1.6. In **Section OA.2** we show that our main results are robust to a relaxed version of Assumption 1 from the main paper, in which investments are observable with an infinitesimal probability only. In **Section OA.3**, we document a version of our model in which consumers ignore information on the underlying production technology contained in observables ("naive consumers"). In **Section OA.4** we combine the assumption of naive consumers with the notion of deniability, i.e., that outsourcing provides more protection from a boycott relative to unethical production within an integrated firm and show that also in this setting. **Section OA.5** provides the solution to an extension of the baseline model, in which we introduce an NGO to explicitly model the link between firm choices and consumer boycotts. Finally, we discuss our data sources in **Section OA.6**.

OA.1 Empirical Robustness

In this section we assess the robustness of our results from the explorative empirics in Section 2 of the main paper. In Section OA.1.1, we report the results from our main specification when using the full EPI instead of only HLT. In Section OA.1.2 we report results from regressions in which the various components of capital intensity are aggregated into one to provide a one-to-one fit for the interaction with capital abundance. In Section OA.1.3, we consider total sales and payroll as normalization variables for our intensity measures instead of total cost. In Section OA.1.4 we use data on pollution intensities from the World Bank's Industrial Pollution Projection System (IPPS), used recently in Bombardini and Li (2020), to replace our measure of the ECSP. Finally, in Section OA.1.5 we explore the cross-country dimension of the data by controlling for industry-year fixed effects only and estimating the level effects of the environmental indeces we use. For the sake of readability, we collect all tables in a separate Section OA.1.6.

OA.1.1 Using the Full EPI Index

In Section 2 of the main paper we argue that the subindex HLT fits better with our ECSP variable than the full EPI because 60% of EPI consist of ecosystem vitality measures such as *growth rates* of various pollutants as well as measures of marine and terrestrial biome protection. In Table OA.1 we report the results of our main specifications using the full EPI index. The level effect of ECSP has the expected sign and significance throughout. All interaction effects with EPI have the right sign and are significant at the 1%-level in columns (3) and (4). In Table OA.2 we report the marginal effects of ECSP at different levels of EPI for columns (1), (2), and (3). The expected pattern of negative and increasing point estimates appears in all columns. We find significant marginal effects for the countries with the worst EPI performance in two out of three specifications.

OA.1.2 Aggregated Capital Intensity

In our main results, we control for additional country-industry interactions using, among other variables, capital abundance and interact it with each of the four disaggregated components of capital intensity. In Table OA.3, we repeat the regressions from our main table with the aggregated measure of capital intensity, including its interaction with capital abundance. We also report the results using the full EPI index. The results are qualitatively and quantitatively almost identical to those from our main table, only the level of significance of the coefficient of ECSP in column (2) is lower than in the main table, while the interaction effect in column (12) of Table OA.3 turns significant compared to its counterpart in column (2) of Table OA.1. In Table OA.4 we report the marginal effects. As in our main results, the pattern of significant and negative coefficients appears throughout, with lack of significance in columns (3) and (9) only.

OA.1.3 Alternative Intensity Definitions

We consider two alternative normalizations for the factor intensity variables (including our measure of the ECSP) in turn: total industry sales and payroll. The payroll variable comprises the sum of all workers' wages. As argued in the main text, we believe that measures that capture the full cost of the production process like total cost or total sales are better suited to measure the importance of a cost component in the overall production process, in particular the environmental cost savings potential (ECSP). An additional argument for using broader measures of factor intensities is the fact that the share of capital expenditure in total cost and the share of the wage bill (payroll) in total cost are significantly correlated with a positive coefficient of 0.1345 in our data. The correlation coefficient is 0.1687 when using total sales in the denominator. This correlation is puzzling when one has a Cobb-Douglas production function in mind with labor and capital as inputs. In the data, a very large portion of an industry's expenditure is allocated to intermediate inputs. When we correlate the sum of payroll and material input expenditure relative to total cost with the share of capital expenditure in total cost, the correlation coefficient is highly significant at -0.5677. We therefore prefer to compute the intensities using total cost in the denominator. We include our results using payroll here nonetheless, because it is used as a normalization variable by Nunn and Trefler (2013).

Tables OA.5 and OA.7, columns (1)-(6), show regression results and marginal effects for the normalization with total industry sales. Coefficients on ECSP as well as its interaction with the environmental indeces all have the same signs and significance levels as in our main table except for the coefficient on ECSP in column (2), which is now only significant at the 10%-level instead of 5%. Additionally, the coefficients on ECSP and its interaction term in columns (7) and (8) each drop to a lower level of significance by one star. Quantitatively, also the point estimates are overall quite similar. In the marginal effects table, the pattern of significantly negative estimates attenuating to zero as the percentiles move to the strongly regulated countries appears in all but column (3).

Tables OA.6 and OA.7, columns (7)-(12), show the results for the normalization with payroll. With this normalization, all coefficient signs but the interaction effect in column (4) are in line with expectations. However, while standard errors only change mildly compared to the table in the main text, the point estimates decrease in absolute magnitude so that only columns (2) and (8) show significant estimates.

Looking at the marginal effects in columns (7) to (12) in Table OA.7, we find that the expected pattern of signs and coefficient sizes does appear for both environmental indeces (except column (8), however, only in columns (7) and (11) do we find significant point estimates for the least-regulated countries.

OA.1.4 Using Pollution Measures

To assess the robustness of our measure of the environmental cost savings potential, we now rerun the relevant parts of our main specification and use data on pollution intensity of US industries from 1987 taken from the World Bank's IPPS instead of data on cost savings from not disposing of waste in the proper manner. In using pollution data, we follow Bombardini and Li (2020) and report results on three pollutants: suspended matter (PT), nitrogen dioxide (NO2), and sulfur dioxide (SO2). We use the total cost normalization throughout and consider all three environmental indeces: EPSI, HLT, and EPI. For each pollutant and index combination, we report the specification from our main results that contains the largest number of controls variables.

The results in Table OA.8 show that the interaction effects between the pollutant and the respective environmental index have the right sign and are typically significant. The negative level effect of the pollutant comes out strongly for *all* environmental indeces in the case of suspended matter (PT). For SO2 and NO2, the level effects of the pollutants come out significantly when we use the indeces HLT and EPI, which is not surprising considering the limited data coverage of EPSI. Turning to the marginal effects in Table OA.9, we find that the familiar pattern is borne out with statistical significance in six of the nine specifications. Out of the three specifications that do not show the pattern, two are based on the EPSI with its very limited coverage, as noted above.

OA.1.5 The Cross-Country Dimension

In our main specification, we controlled for country-year fixed effects and thus looked at differences across industries of varying ECSP controlling for the characteristics of the country in which production takes place. Our interaction effect with the country-specific environmental index then allowed us to gauge the role of differences in ECSP in regulated vs. unregulated countries. We found that differences in ECSP across industries matter most in less-regulated economies. In this section, we explore the cross-country dimension of our data. Instead of country-year fixed effects, we use industry-year fixed effects and include the level effects of our environmental indeces as well as a host of other potential country-level determinants of intrafirm trade as well as their interactions with industry characteristics. We thus study how cross-country differences in the *level* of regulatory policy (EPSI) and the *level* of environmental health outcomes (HLT) affect the share of intrafirm trade. We then study the role of these differences in industries with high vs. low ECSP.

Table OA.10 presents the results. As in our main table, we continue to find positive interaction effects between ECSP and the respective environmental index (EPSI, HLT, or EPI) in all specifications. All of the coefficients are significant at least at the 5%-level, except for the interaction effect in column (2). All of the level effects of the environmental indeces are positive and highly significant at the 1%-level, except again for column (2). Notably, these results continue to hold when we control for various country-level determinants of comparative advantage as well as their interactions with relevant industry characteristics. The positive and significant level effects of the environmental indeces indicate that a stronger environmental stringency in *policy* (EPSI), better *outcomes* in environmental health (HLT) as well as better overall environmental performance (EPI) are correlated with a higher share of integration, even after controlling for standard predictors of institutional quality like rule of law.

In order to understand the full effect of environmental regulation and outcomes for industries of different ECSP, we turn to the marginal effects. The columns of Table OA.11 show the marginal effects of environmental regulatory stringency on intrafirm trade at various percentiles of the distribution of ECSP. The common pattern in most columns of Table OA.11 is a positive and significant baseline effect of stricter regulation even for industries with very low environmental cost savings potential. The effect is then increasing in magnitude and in significance as the ECSP of the industry under consideration increases. In Columns (4) to (9), the point estimates at the 5th and the 90th percentile are statistically different from one another at least at the 95%-level. Columns (2) and (3) also show a pattern of increasing point estimates, but only in column (3) do they reach significance for industries with the largest ECSP.

The results in Table OA.11 can be explained by our theory. Strictly speaking, we expect differences in the regulatory stringency of potential source countries to matter *only* when the industry under consideration has *some* potential cost savings from unethical production in the first place. This mirrors the interpretation of our main result, where we found differences in ECSP across industries to matter *only* in countries with lenient regulation: only there producers have the option of using the unethical technology. The results in Table OA.11 are in line with our theory in the sense that the effect of HLT becomes larger and statistically stronger as we consider industries with higher ECSP. The fact that differences in environmental outcomes matter also for the industries with the lowest ECSP reflects a positive baseline effect of better environmental health outcomes on integration, potentially reflecting institutional benefits of a sourcing location that are not captured by the rule of law variable and the other comparative advantage controls.

OA.1.6 Tables

Table OA.1: Main Specifications with EPI

Dependent Variable: Intrafirm Import Share				
	(1)	(2)	(3)	(4)
Intensity Definition:	Total Cost	Total Cost	Total Cost	Total Cost
log ECSP	-0.0481**	-0.0497**	-0.0413**	
	(0.0229)	(0.0219)	(0.0182)	
log ECSP X EPI	0.0425	0.0471	0.0737***	0.0858***
	(0.0287)	(0.0294)	(0.0264)	(0.0238)
log R&D Intensity	0.0225***	0.0237***	0.0141***	
	(0.00413)	(0.00414)	(0.00391)	
log Skill Intensity	0.00536	-0.0262	-0.0204	
	(0.0151)	(0.0371)	(0.0333)	
log Other Machinery Intensity	0.0466***	-0.0273	0.0319	
	(0.0109)	(0.0532)	(0.0533)	
log Building Intensity	-0.0102	-0.0239	-0.0301	
	(0.00680)	(0.0401)	(0.0375)	
log Auto Intensity	-0.0185***	-0.0118	-0.0307	
	(0.00496)	(0.0248)	(0.0275)	
log Computer Intensity	-0.00541	0.0360	0.0116	
	(0.00882)	(0.0428)	(0.0432)	
Contractibility	-0.0396*	-0.0136	-0.0236	
	(0.0205)	(0.0314)	(0.0318)	
Dispersion			0.0733***	
			(0.0196)	
1(sigma<median) X DUse_TUse			-0.136***	
			(0.0356)	
1(sigma>median) X DUse_TUse			-0.101***	
			(0.0291)	
1(sigma>median)			-0.0295	
			(0.0274)	
log Skill Intensity X log Skill Abundance		0.0142	0.0125	0.0151
		(0.0133)	(0.0128)	(0.0116)
log Other Machinery Intensity X log Capital Abundance		0.00645	-0.000228	-0.00144
		(0.00436)	(0.00446)	(0.00448)
log Building Intensity X Capital Abundance		0.00112	0.00220	0.00255
		(0.00338)	(0.00316)	(0.00292)
log Auto Intensity X log Capital Abundance		-0.000618	0.00176	0.00137
		(0.00217)	(0.00237)	(0.00223)
log Computer Intensity X log Capital Abundance		-0.00317	-0.00212	-0.00116
		(0.00341)	(0.00353)	(0.00314)
Contractibility X Rule of Law		-0.0477	-0.0560	-0.0495
		(0.0458)	(0.0459)	(0.0459)
External Finance Dependence			-0.00627	
			(0.0164)	
Asset Tangibility			-0.206**	
			(0.103)	
External Finance Dependence X Credit / GDP			0.000177**	0.000210***
			(8.06e-05)	(7.94e-05)
Asset Tangibility X Credit / GDP			0.000344	0.000571
			(0.000519)	(0.000496)
Sales Volatility			0.211	
			(0.246)	
Sales Volatility X Labor Market Flexibility			-0.172	-0.118
			(0.279)	(0.252)
Intermediation			0.0827	
			(0.0830)	
Intermediation X Rule of Law			-0.448***	-0.417***
			(0.125)	(0.121)
Country-Year FE	Yes	Yes	Yes	Yes
Industry-Year FE	No	No	No	Yes
IO2007 Industry Clusters	208	208	201	210
Adjusted R-squared	0.164	0.166	0.197	0.236
Observations	125,338	108,893	96,663	103,421

Note: Estimation by OLS with standard errors clustered at the industry level reported in parentheses. ***, **, and * denote significance the 1%, 5%, and 10% level, respectively. Regression includes a constant. log ECSP is the log of expenditure on waste and hazardous materials removal over industry sales. sigma is the estimate of the import demand elasticity from Broda and Weinstein (2006). DUse_TUse measures the share of output of an industry used in production of final output relative to total demand for that industry's output as an intermediate input. EPI stands for Yale University's Environmental Performance Index. See Data Appendix for details.

Table OA.2: Main Specifications with EPI - Marginal Effects

Intensity Definition: Corresp. Table Column / Pctile. :	(1) Total Cost OA.1 (1)	(2) Total Cost OA.1 (2)	(3) Total Cost OA.1 (3)
5	-0.0362**	-0.0363**	-0.0203
	(0.0166)	(0.0156)	(0.0126)
10	-0.0349**	-0.0349**	-0.0184
	(0.0160)	(0.0151)	(0.0121)
20	-0.0325**	-0.0322**	-0.0140
	(0.0150)	(0.0142)	(0.0113)
30	-0.0306**	-0.0301**	-0.0105
	(0.0143)	(0.0135)	(0.0108)
40	-0.0292**	-0.0283**	-0.00763
	(0.0138)	(0.0131)	(0.0104)
50	-0.0275**	-0.0265**	-0.00496
	(0.0132)	(0.0127)	(0.0101)
60	-0.0242*	-0.0219*	0.00277
	(0.0124)	(0.0122)	(0.00988)
70	-0.0205*	-0.0186	0.00826
	(0.0120)	(0.0123)	(0.0102)
80	-0.0185	-0.0165	0.0112
	(0.0120)	(0.0125)	(0.0105)
90	-0.0164	-0.0145	0.0139
	(0.0121)	(0.0128)	(0.0108)

Note: Marginal effects of the respective coefficients of ECSP at percentiles of EPI are calculated from regressions reported at the top of the table.

Table OA.3: Main Specifications with Aggregated Capital Intensity

	Dependent Variable: Intrafirm Import Share													
Intensity Definition: Total Cost	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Environmental Index:	-	-	EPSI	EPSI	EPSI	EPSI	HLT	HLT	HLT	HLT	EPI	EPI	EPI	EPI
log ECSP		-0.0242*	-0.0415***	-0.0381**	-0.0157		-0.0408**	-0.0443***	-0.0287**		-0.0468**	-0.0504**	-0.0389**	
		(0.0125)	(0.0143)	(0.0149)	(0.0144)		(0.0182)	(0.0164)	(0.0139)		(0.0228)	(0.0218)	(0.0184)	
log ECSP X Environmental Index			0.871**	0.726	0.991**	1.229***	0.0308*	0.0369**	0.0548***	0.0602***	0.0430	0.0502*	0.0763***	0.0875***
			(0.431)	(0.452)	(0.452)	(0.448)	(0.0180)	(0.0175)	(0.0167)	(0.0152)	(0.0289)	(0.0292)	(0.0265)	(0.0237)
log R&D Intensity	0.0292***	0.0276***	0.0354***	0.0354***	0.0206***		0.0277***	0.0289***	0.0161***		0.0277***	0.0289***	0.0161***	
	(0.00390)	(0.00411)	(0.00518)	(0.00518)	(0.00471)		(0.00413)	(0.00415)	(0.00411)		(0.00413)	(0.00416)	(0.00411)	
log Skill Intensity	-0.0176	-0.0147	-0.0176	-0.0332	-0.0407		-0.0154	-0.0267	-0.0332		-0.0153	-0.0270	-0.0338	
	(0.0137)	(0.0132)	(0.0149)	(0.0495)	(0.0489)		(0.0133)	(0.0322)	(0.0295)		(0.0132)	(0.0323)	(0.0296)	
log Capital Intensity	0.0185**	0.0293***	0.0446***	-0.000180	0.000786		0.0297***	-0.0366	-0.00420		0.0297***	-0.0393	-0.00636	
	(0.00934)	(0.0100)	(0.0131)	(0.0963)	(0.0941)		(0.0101)	(0.0445)	(0.0435)		(0.0101)	(0.0458)	(0.0441)	
Contractibility	-0.0533**	-0.0388*	-0.0624**	-0.0887*	-0.0934*		-0.0406*	-0.0180	-0.0245		-0.0401*	-0.0191	-0.0253	
	(0.0218)	(0.0210)	(0.0264)	(0.0477)	(0.0487)		(0.0212)	(0.0308)	(0.0318)		(0.0211)	(0.0308)	(0.0318)	
Dispersion					0.0854***				0.0824***				0.0825***	
					(0.0264)				(0.0208)				(0.0208)	
1(sigma<median) X DUse_TUse					-0.128***				-0.136***				-0.136***	
					(0.0473)				(0.0391)				(0.0391)	
1(sigma>median) X DUse_TUse					-0.129***				-0.103***				-0.103***	
					(0.0394)				(0.0297)				(0.0297)	
1(sigma>median)					-0.00288				-0.0316				-0.0317	
					(0.0369)				(0.0293)				(0.0293)	
log Skill Intensity X log Skill Abundance				0.00674	0.0135	0.0159		0.00606	0.00990	0.0142		0.00618	0.0102	0.0145
				(0.0192)	(0.0192)	(0.0189)		(0.0117)	(0.0116)	(0.0106)		(0.0117)	(0.0116)	(0.0107)
log Capital Intensity X log Capital Abundance				0.00363	0.00154	-0.00104		0.00589	0.00151	0.000727		0.00612	0.00169	0.000678
				(0.00779)	(0.00761)	(0.00724)		(0.00364)	(0.00371)	(0.00397)		(0.00373)	(0.00377)	(0.00404)
Contractibility X Rule of Law				0.0374	0.0154	0.0195		-0.0423	-0.0567	-0.0484		-0.0403	-0.0552	-0.0480
				(0.0665)	(0.0662)	(0.0638)		(0.0437)	(0.0447)	(0.0451)		(0.0441)	(0.0450)	(0.0454)
External Finance Dependence					-0.0117				-0.00511				-0.00514	
					(0.0232)				(0.0170)				(0.0170)	
Asset Tangibility					-0.261**				-0.183*				-0.185*	
					(0.119)				(0.0990)				(0.0995)	
External Finance Dependence X Credit / GDP					0.000191	0.000175			0.000167**	0.000206***			0.000168**	0.000207***
					(0.000125)	(0.000124)			(8.05e-05)	(7.91e-05)			(8.02e-05)	(7.89e-05)
Asset Tangibility X Credit / GDP					0.00113*	0.00129**			0.000339	0.000584			0.000363	0.000601
					(0.000586)	(0.000610)			(0.000509)	(0.000486)			(0.000511)	(0.000488)
Sales Volatility					0.199				0.179				0.175	
					(0.312)				(0.249)				(0.249)	
Sales Volatility X Labor Market Flexibility					-0.278	-0.233			-0.140	-0.0935			-0.134	-0.0864
					(0.387)	(0.375)			(0.282)	(0.253)			(0.282)	(0.253)
Intermediation					-0.0951				0.0629				0.0607	
					(0.128)				(0.0858)				(0.0860)	
Intermediation X Rule of Law					-0.249	-0.271			-0.443***	-0.404***			-0.440***	-0.403***
					(0.177)	(0.172)			(0.123)	(0.119)			(0.123)	(0.119)
Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	No	No	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes
IO2007 Industry Clusters	211	209	206	206	200	210	209	209	201	210	209	209	201	210
Adjusted R-squared	0.157	0.159	0.146	0.146	0.190	0.248	0.160	0.162	0.196	0.236	0.160	0.162	0.195	0.236
Observations	128,995	128,352	34,869	34,869	34,150	36,397	125,944	109,686	97,299	104,145	126,177	109,686	97,299	104,145

Note: Estimation by OLS with standard errors clustered at the industry level reported in parentheses. ***, **, and * denote significance the 1%, 5%, and 10% level, respectively. Regression includes a constant. log ECSP is the log of expenditure on waste and hazardous materials removal over industry sales. sigma is the estimate of the import demand elasticity from Broda and Weinstein (2006). DUse_TUse measures the share of output of an industry used in production of final output relative to total demand for that industry's output as an intermediate input. EPI stands for Yale University's Environmental Performance Index. See Data Appendix for details.

Table OA.4: Main Specifications with Aggregated Capital Intensity - Marginal Effects

Intensity Definition: Total Cost	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Corresp. Table Column:	OA.3 (3)	OA.3 (4)	OA.3 (5)	OA.3 (7)	OA.3 (8)	OA.3 (9)	OA.3 (11)	OA.3 (12)	OA.3 (13)
Environm. Index / Pctile.:	EPSI	EPSI	EPSI	HLT	HLT	HLT	EPI	EPI	EPI
5	-0.0373***	-0.0346**	-0.0109	-0.0366**	-0.0386***	-0.0206*	-0.0347**	-0.0360**	-0.0172
	(0.0133)	(0.0137)	(0.0130)	(0.0164)	(0.0148)	(0.0123)	(0.0164)	(0.0156)	(0.0126)
10	-0.0362***	-0.0337**	-0.00969	-0.0347**	-0.0368**	-0.0175	-0.0334**	-0.0346**	-0.0152
	(0.0131)	(0.0135)	(0.0127)	(0.0156)	(0.0143)	(0.0117)	(0.0158)	(0.0150)	(0.0122)
20	-0.0288**	-0.0275**	-0.00123	-0.0317**	-0.0327**	-0.0118	-0.0310**	-0.0317**	-0.0107
	(0.0121)	(0.0123)	(0.0110)	(0.0146)	(0.0134)	(0.0109)	(0.0148)	(0.0141)	(0.0113)
30	-0.0241**	-0.0236*	0.00414	-0.0286**	-0.0291**	-0.00649	-0.0291**	-0.0295**	-0.00706
	(0.0121)	(0.0121)	(0.0105)	(0.0136)	(0.0128)	(0.0103)	(0.0141)	(0.0135)	(0.0108)
40	-0.0214*	-0.0214*	0.00716	-0.0271**	-0.0275**	-0.00391	-0.0276**	-0.0275**	-0.00403
	(0.0122)	(0.0122)	(0.0105)	(0.0132)	(0.0126)	(0.0101)	(0.0136)	(0.0130)	(0.0104)
50	-0.0193	-0.0196	0.00955	-0.0256**	-0.0250**	-0.000867	-0.0260**	-0.0256**	-0.00129
	(0.0124)	(0.0124)	(0.0106)	(0.0129)	(0.0124)	(0.00997)	(0.0130)	(0.0126)	(0.0101)
60	-0.0177	-0.0183	0.0114	-0.0236*	-0.0227*	0.00331	-0.0226*	-0.0208*	0.00671
	(0.0127)	(0.0127)	(0.0108)	(0.0125)	(0.0123)	(0.00990)	(0.0123)	(0.0121)	(0.00982)
70	-0.0159	-0.0167	0.0135	-0.0200*	-0.0153	0.0147	-0.0189	-0.0171	0.0124
	(0.0130)	(0.0130)	(0.0110)	(0.0121)	(0.0126)	(0.0105)	(0.0118)	(0.0121)	(0.0101)
80	-0.0137	-0.0149	0.0160	-0.0153	-0.0131	0.0178	-0.0168	-0.0150	0.0158
	(0.0134)	(0.0134)	(0.0114)	(0.0121)	(0.0129)	(0.0109)	(0.0118)	(0.0123)	(0.0104)
90	-0.0123	-0.0138	0.0176	-0.0136	-0.0114	0.0202*	-0.0147	-0.0128	0.0183*
	(0.0138)	(0.0137)	(0.0117)	(0.0122)	(0.0131)	(0.0112)	(0.0119)	(0.0126)	(0.0107)

Note: Marginal effects of the coefficients of ECSP at percentiles of the respective environmental indeces are calculated from regressions reported at the top of the table.

Table OA.5: Alternative Intensity Definitions - Total Sales

	Dependent Variable: Intrafirm Import Share									
Intensity Definition: Total Sales	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Environmental Index:	-	-	EPSI	EPSI	EPSI	EPSI	HLT	HLT	HLT	HLT
log ECSP		-0.0240*	-0.0401***	-0.0359**	-0.0186		-0.0379**	-0.0407**	-0.0298**	
		(0.0131)	(0.0145)	(0.0147)	(0.0141)		(0.0187)	(0.0167)	(0.0137)	
log ECSP X Environmental Index			0.872**	0.698	0.965**	1.218***	0.0260	0.0318*	0.0507***	0.0566***
			(0.433)	(0.442)	(0.442)	(0.441)	(0.0175)	(0.0173)	(0.0164)	(0.0149)
log R&D Intensity	0.0234***	0.0221***	0.0292***	0.0293***	0.0177***		0.0221***	0.0235***	0.0142***	
	(0.00382)	(0.00398)	(0.00515)	(0.00515)	(0.00454)		(0.00401)	(0.00403)	(0.00392)	
log Skill Intensity	0.00434	0.00986	0.00247	0.00295	-0.00124		0.00926	-0.0267	-0.0238	
	(0.0148)	(0.0144)	(0.0171)	(0.0545)	(0.0556)		(0.0144)	(0.0370)	(0.0337)	
log Other Machinery Intensity	0.0387***	0.0491***	0.0650***	0.134	0.133		0.0496***	-0.0229	0.0291	
	(0.0106)	(0.0104)	(0.0147)	(0.100)	(0.102)		(0.0105)	(0.0540)	(0.0548)	
log Building Intensity	-0.0108	-0.00997	-0.0139*	-0.102	-0.0944		-0.00987	-0.0266	-0.0347	
	(0.00666)	(0.00678)	(0.00802)	(0.0734)	(0.0696)		(0.00681)	(0.0404)	(0.0378)	
log Auto Intensity	-0.0194***	-0.0185***	-0.0251***	-0.103*	-0.103**		-0.0183***	-0.00731	-0.0272	
	(0.00512)	(0.00493)	(0.00721)	(0.0549)	(0.0508)		(0.00498)	(0.0247)	(0.0269)	
log Computer Intensity	-0.00186	-0.00564	0.00759	-0.000319	-0.00865		-0.00563	0.0367	0.0110	
	(0.00851)	(0.00872)	(0.0112)	(0.0743)	(0.0744)		(0.00879)	(0.0424)	(0.0434)	
Contractibility	-0.0494**	-0.0364*	-0.0589**	-0.0952**	-0.103**		-0.0381*	-0.0140	-0.0270	
	(0.0214)	(0.0206)	(0.0246)	(0.0453)	(0.0464)		(0.0207)	(0.0315)	(0.0316)	
Dispersion					0.0645**				0.0726***	
					(0.0257)				(0.0197)	
1(sigma<median) X DUse_TUse					-0.130***				-0.136***	
					(0.0444)				(0.0361)	
1(sigma>median) X DUse_TUse					-0.121***				-0.0981***	
					(0.0378)				(0.0301)	
1(sigma>median)					-0.00598				-0.0317	
					(0.0346)				(0.0275)	
log Skill Intensity X log Skill Abundance				-0.000191	0.00354	0.00747		0.0159	0.0138	0.0165
				(0.0222)	(0.0225)	(0.0219)		(0.0135)	(0.0129)	(0.0118)
log Other Machinery Intensity X log Capital Abundance				-0.00560	-0.00799	-0.00894		0.00625	-4.77e-05	-0.00106
				(0.00820)	(0.00827)	(0.00787)		(0.00446)	(0.00457)	(0.00455)
log Building Intensity X Capital Abundance				0.00715	0.00735	0.00605		0.00138	0.00258	0.00303
				(0.00600)	(0.00569)	(0.00535)		(0.00339)	(0.00318)	(0.00298)
log Auto Intensity X log Capital Abundance				0.00628	0.00682	0.00526		-0.000989	0.00144	0.00102
				(0.00459)	(0.00419)	(0.00386)		(0.00217)	(0.00233)	(0.00219)
log Computer Intensity X log Capital Abundance				0.000641	0.000347	0.00110		-0.00324	-0.00208	-0.00104
				(0.00610)	(0.00609)	(0.00594)		(0.00339)	(0.00356)	(0.00314)
Contractibility X Rule of Law				0.0515	0.0297	0.0329		-0.0444	-0.0505	-0.0425
				(0.0639)	(0.0633)	(0.0612)		(0.0449)	(0.0450)	(0.0448)
External Finance Dependence					-0.0132				-0.00585	
					(0.0232)				(0.0168)	
Asset Tangibility					-0.272**				-0.207**	
					(0.114)				(0.103)	
External Finance Dependence X Credit / GDP					0.000202	0.000184			0.000180**	0.000213***
					(0.000126)	(0.000124)			(8.00e-05)	(7.96e-05)
Asset Tangibility X Credit / GDP					0.00116**	0.00131**			0.000336	0.000566
					(0.000583)	(0.000613)			(0.000512)	(0.000490)
Sales Volatility					0.221				0.215	
					(0.308)				(0.246)	
Sales Volatility X Labor Market Flexibility					-0.289	-0.235			-0.185	-0.132
					(0.389)	(0.377)			(0.278)	(0.251)
Intermediation					-0.0282				0.0833	
					(0.121)				(0.0831)	
Intermediation X Rule of Law					-0.319*	-0.326**			-0.449***	-0.414***
					(0.170)	(0.165)			(0.123)	(0.119)
Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	No	No	No	No	No	Yes	No	No	No	Yes
IO2007 Industry Clusters	210	208	206	206	200	210	208	208	201	210
Adjusted R-squared	0.161	0.163	0.154	0.154	0.193	0.249	0.164	0.166	0.197	0.236
Observations	128,295	127,642	34,620	34,620	33,958	36,148	125,235	109,009	96,770	103,528

Note: Estimation by OLS with standard errors clustered at the industry level reported in parentheses. ***, **, and * denote significance the 1%, 5%, and 10% level, respectively. Regression includes a constant. log ECSP is the log of expenditure on waste and hazardous materials removal over industry sales. sigma is the estimate of the import demand elasticity from Broda and Weinstein (2006). DUse_TUse measures the share of output of an industry used in production of final output relative to total demand for that industry's output as an intermediate input. EPSI represents the OECD's Environmental Policy Stringency Index. HLT stands for the part representing Environmental Health from Yale University's Environmental Performance Index (EPI). See Data Appendix for further details.

Table OA.6: Alternative Intensity Definitions - Payroll

Dependent Variable: Intrafirm Import Share										
Intensity Definition: Payroll	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Environmental Index:	-	-	EPSI	EPSI	EPSI	EPSI	HLT	HLT	HLT	HLT
log ECSP		-0.0207*	-0.0235	-0.0177	-0.000861		-0.0232	-0.0262*	-0.0157	
		(0.0118)	(0.0143)	(0.0141)	(0.0130)		(0.0161)	(0.0154)	(0.0132)	
log ECSP X Environmental Index			0.172	-0.0734	0.0744	0.228	0.00465	0.0107	0.0249	0.0293*
			(0.415)	(0.429)	(0.428)	(0.444)	(0.0157)	(0.0154)	(0.0157)	(0.0150)
log R&D Intensity	0.0196***	0.0185***	0.0258***	0.0258***	0.0171***		0.0186***	0.0196***	0.0133***	
	(0.00443)	(0.00444)	(0.00545)	(0.00544)	(0.00472)		(0.00447)	(0.00444)	(0.00403)	
log Skill Intensity	0.0590**	0.0605**	0.0560	0.0560	0.0221		0.0595**	0.0625	0.0471	
	(0.0282)	(0.0285)	(0.0378)	(0.114)	(0.118)		(0.0287)	(0.0546)	(0.0573)	
log Other Machinery Intensity	0.0483***	0.0592***	0.0731***	0.150	0.142		0.0596***	-0.0158	0.0433	
	(0.0103)	(0.0104)	(0.0132)	(0.0927)	(0.0910)		(0.0104)	(0.0503)	(0.0489)	
log Building Intensity	-0.0128*	-0.0113	-0.0163**	-0.0953	-0.0843		-0.0112	-0.0237	-0.0266	
	(0.00655)	(0.00690)	(0.00820)	(0.0736)	(0.0716)		(0.00694)	(0.0406)	(0.0386)	
log Auto Intensity	-0.0158***	-0.0153***	-0.0213***	-0.112**	-0.109**		-0.0152***	-0.0229	-0.0367	
	(0.00511)	(0.00493)	(0.00708)	(0.0542)	(0.0510)		(0.00496)	(0.0247)	(0.0273)	
log Computer Intensity	-0.00749	-0.0102	0.000915	-0.00469	0.00414		-0.0102	-0.0322	-0.0317	
	(0.00857)	(0.00852)	(0.0114)	(0.0812)	(0.0815)		(0.00856)	(0.0458)	(0.0492)	
Contractibility	-0.0606***	-0.0446**	-0.0730***	-0.110**	-0.112**		-0.0461**	-0.00564	-0.0144	
	(0.0204)	(0.0199)	(0.0241)	(0.0460)	(0.0467)		(0.0200)	(0.0313)	(0.0321)	
Dispersion					0.0590**				0.0694***	
					(0.0261)				(0.0195)	
1(sigma<median) X DUse_TUse					-0.138***				-0.139***	
					(0.0440)				(0.0349)	
1(sigma>median) X DUse_TUse					-0.126***				-0.0983***	
					(0.0376)				(0.0288)	
1(sigma>median)					-0.0103				-0.0337	
					(0.0343)				(0.0270)	
log Skill Intensity X log Skill Abundance				4.78e-05	-0.000191	0.00444		0.000889	-0.00920	-0.00137
				(0.0485)	(0.0484)	(0.0474)		(0.0254)	(0.0256)	(0.0237)
log Other Machinery Intensity X log Capital Abundance				-0.00622	-0.00872	-0.00850		0.00654	-0.000948	-0.00246
				(0.00760)	(0.00741)	(0.00710)		(0.00412)	(0.00416)	(0.00422)
log Building Intensity X Capital Abundance				0.00641	0.00640	0.00510		0.000982	0.00181	0.00195
				(0.00601)	(0.00582)	(0.00549)		(0.00341)	(0.00324)	(0.00301)
log Auto Intensity X log Capital Abundance				0.00737	0.00741*	0.00614		0.000625	0.00232	0.00194
				(0.00453)	(0.00420)	(0.00388)		(0.00215)	(0.00234)	(0.00214)
log Computer Intensity X log Capital Abundance				0.000454	-0.000844	0.000436		0.00216	0.00140	0.00172
				(0.00663)	(0.00664)	(0.00651)		(0.00374)	(0.00406)	(0.00355)
Contractibility X Rule of Law				0.0519	0.0300	0.0297		-0.0756*	-0.0800*	-0.0750*
				(0.0650)	(0.0645)	(0.0635)		(0.0443)	(0.0444)	(0.0443)
External Finance Dependence					-0.0134				-0.0103	
					(0.0225)				(0.0160)	
Asset Tangibility					-0.266**				-0.207**	
					(0.113)				(0.102)	
External Finance Dependence X Credit / GDP					0.000213*	0.000194			0.000210***	0.000242***
					(0.000126)	(0.000124)			(7.95e-05)	(8.00e-05)
Asset Tangibility X Credit / GDP					0.00121**	0.00134**			0.000418	0.000650
					(0.000587)	(0.000618)			(0.000537)	(0.000518)
Sales Volatility					0.239				0.219	
					(0.310)				(0.248)	
Sales Volatility X Labor Market Flexibility					-0.302	-0.241			-0.172	-0.117
					(0.390)	(0.379)			(0.278)	(0.252)
Intermediation					-0.0515				0.0616	
					(0.124)				(0.0863)	
Intermediation X Rule of Law					-0.266	-0.264			-0.402***	-0.361***
					(0.175)	(0.170)			(0.129)	(0.126)
Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	No	No	No	No	No	Yes	No	No	No	Yes
IO2007 Industry Clusters	210	208	206	206	200	210	208	208	201	210
Adjusted R-squared	0.163	0.164	0.155	0.156	0.193	0.248	0.165	0.168	0.197	0.235
Observations	128,400	127,747	34,620	34,620	33,958	36,148	125,336	109,094	96,846	103,604

Note: Estimation by OLS with standard errors clustered at the industry level reported in parentheses. ***, **, and * denote significance the 1%, 5%, and 10% level, respectively. Regression includes a constant. log ECSP is the log of expenditure on waste and hazardous materials removal over industry sales. sigma is the estimate of the import demand elasticity from Broda and Weinstein (2006). DUse_TUse measures the share of output of an industry used in production of final output relative to total demand for that industry's output as an intermediate input. EPSI represents the OECD's Environmental Policy Stringency Index. HLT stands for the part representing Environmental Health from Yale University's Environmental Performance Index (EPI). See Data Appendix for further details.

Table OA.7: Alternative Intensity Definitions - Marginal Effects

Intensity Definition:	(1) Total Sales	(2) Total Sales	(3) Total Sales	(4) Total Sales	(5) Total Sales	(6) Total Sales	(7) Payroll	(8) Payroll	(9) Payroll	(10) Payroll	(11) Payroll	(12) Payroll
Corresp. Table Column:	OA.5 (3)	OA.5 (4)	OA.5 (5)	OA.5 (7)	OA.5 (8)	OA.5 (9)	OA.6 (3)	OA.6 (4)	OA.6 (5)	OA.6 (7)	OA.6 (8)	OA.6 (9)
Environm. Index / Pctile.:	EPSI	EPSI	EPSI	HLT	HLT	HLT	EPSI	EPSI	EPSI	HLT	HLT	HLT
5	-0.0359***	-0.0326**	-0.0140	-0.0344**	-0.0359**	-0.0224*	-0.0227*	-0.0181	-0.000505	-0.0226	-0.0245*	-0.0120
	(0.0135)	(0.0136)	(0.0127)	(0.0169)	(0.0152)	(0.0122)	(0.0132)	(0.0130)	(0.0118)	(0.0147)	(0.0139)	(0.0116)
10	-0.0348***	-0.0317**	-0.0128	-0.0328**	-0.0343**	-0.0195*	-0.0225*	-0.0182	-0.000412	-0.0223	-0.0240*	-0.0106
	(0.0133)	(0.0134)	(0.0124)	(0.0162)	(0.0147)	(0.0117)	(0.0129)	(0.0127)	(0.0115)	(0.0141)	(0.0135)	(0.0111)
20	-0.0273**	-0.0258**	-0.00456	-0.0303**	-0.0308**	-0.0142	-0.0210*	-0.0188	0.000223	-0.0219*	-0.0228*	-0.00800
	(0.0123)	(0.0123)	(0.0108)	(0.0152)	(0.0139)	(0.0110)	(0.0117)	(0.0115)	(0.0100)	(0.0133)	(0.0126)	(0.0103)
30	-0.0226*	-0.0220*	0.000667	-0.0277*	-0.0276**	-0.00931	-0.0201*	-0.0192*	0.000626	-0.0214*	-0.0218*	-0.00560
	(0.0122)	(0.0122)	(0.0104)	(0.0143)	(0.0133)	(0.0104)	(0.0114)	(0.0113)	(0.00968)	(0.0126)	(0.0120)	(0.00964)
40	-0.0200	-0.0199	0.00360	-0.0263*	-0.0263**	-0.00691	-0.0196*	-0.0194*	0.000852	-0.0211*	-0.0213*	-0.00443
	(0.0123)	(0.0123)	(0.0103)	(0.0139)	(0.0131)	(0.0103)	(0.0115)	(0.0114)	(0.00975)	(0.0123)	(0.0118)	(0.00942)
50	-0.0179	-0.0182	0.00593	-0.0251*	-0.0242*	-0.00410	-0.0192*	-0.0196*	0.00103	-0.0209*	-0.0206*	-0.00305
	(0.0125)	(0.0125)	(0.0105)	(0.0135)	(0.0129)	(0.0101)	(0.0116)	(0.0116)	(0.00992)	(0.0120)	(0.0115)	(0.00922)
60	-0.0162	-0.0169	0.00774	-0.0234*	-0.0222*	-0.000330	-0.0188	-0.0198*	0.00117	-0.0206*	-0.0199*	-0.00120
	(0.0128)	(0.0128)	(0.0106)	(0.0131)	(0.0128)	(0.0101)	(0.0117)	(0.0118)	(0.0101)	(0.0118)	(0.0114)	(0.00909)
70	-0.0143	-0.0153	0.00991	-0.0204	-0.0159	0.0103	-0.0184	-0.0199	0.00134	-0.0201*	-0.0178	0.00400
	(0.0131)	(0.0131)	(0.0109)	(0.0127)	(0.0130)	(0.0107)	(0.0120)	(0.0121)	(0.0104)	(0.0115)	(0.0114)	(0.00950)
80	-0.0122	-0.0137	0.0122	-0.0164	-0.0138	0.0132	-0.0180	-0.0201	0.00151	-0.0194*	-0.0171	0.00544
	(0.0135)	(0.0135)	(0.0113)	(0.0125)	(0.0133)	(0.0111)	(0.0123)	(0.0125)	(0.0109)	(0.0116)	(0.0115)	(0.00981)
90	-0.0108	-0.0125	0.0137	-0.0149	-0.0124	0.0153	-0.0178	-0.0202	0.00163	-0.0191	-0.0167	0.00650
	(0.0138)	(0.0138)	(0.0116)	(0.0126)	(0.0136)	(0.0114)	(0.0126)	(0.0129)	(0.0112)	(0.0118)	(0.0117)	(0.0101)

Note: Marginal effects of log ECSP at percentiles of the respective environmental index are calculated from regressions reported at the top of the table.

Table OA.8: Pollution Intensities

	Dependent Variable: Intrafirm Import Share											
Intensity Definition: Total Cost	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Pollutant, Environmental Index:	PT, -	PT, EPSI	PT, HLT	PT, EPI	SO2, -	SO2, EPSI	SO2, HLT	SO2, EPI	NO2, -	NO2, EPSI	NO2, HLT	NO2, EPI
log Pollutant	-0.00429	-0.0130**	-0.0168***	-0.0198***	0.00273	-0.00514	-0.00948**	-0.0117*	0.000937	-0.00689	-0.0137***	-0.0159***
	(0.00362)	(0.00574)	(0.00413)	(0.00555)	(0.00355)	(0.00593)	(0.00435)	(0.00601)	(0.00362)	(0.00567)	(0.00447)	(0.00590)
log Pollutant X Environmental Index		0.407**	0.0184***	0.0250**		0.272	0.0159***	0.0207**		0.215	0.0183***	0.0231**
		(0.192)	(0.00620)	(0.00987)		(0.184)	(0.00555)	(0.00947)		(0.186)	(0.00574)	(0.00928)
log R&D Intensity	0.0252***	0.0211***	0.0179***	0.0179***	0.0266***	0.0199***	0.0175***	0.0175***	0.0255***	0.0188***	0.0169***	0.0169***
	(0.00416)	(0.00497)	(0.00397)	(0.00397)	(0.00421)	(0.00486)	(0.00397)	(0.00397)	(0.00409)	(0.00474)	(0.00385)	(0.00385)
log Skill Intensity	-0.00623	-0.0839	-0.0687**	-0.0690**	-0.00228	-0.0365	-0.0480	-0.0482	-0.00532	-0.0510	-0.0472	-0.0470
	(0.0163)	(0.0594)	(0.0323)	(0.0320)	(0.0164)	(0.0602)	(0.0332)	(0.0330)	(0.0162)	(0.0599)	(0.0330)	(0.0328)
log Other Machinery Intensity	0.0447***	0.0985	-0.0306	-0.0325	0.0320***	0.151	-0.00499	-0.00814	0.0380***	0.158	0.00847	0.00423
	(0.0121)	(0.121)	(0.0604)	(0.0607)	(0.0115)	(0.112)	(0.0556)	(0.0563)	(0.0116)	(0.111)	(0.0545)	(0.0550)
log Building Intensity	-0.0116	-0.0851	-0.0328	-0.0327	-0.0119*	-0.113	-0.0305	-0.0305	-0.0132**	-0.126*	-0.0327	-0.0324
	(0.00707)	(0.0756)	(0.0408)	(0.0407)	(0.00667)	(0.0713)	(0.0377)	(0.0378)	(0.00667)	(0.0717)	(0.0376)	(0.0376)
log Auto Intensity	-0.0201***	-0.0431	0.0121	0.0103	-0.0181***	-0.0801	-0.0256	-0.0263	-0.0177***	-0.0678	-0.0178	-0.0191
	(0.00536)	(0.0576)	(0.0285)	(0.0282)	(0.00560)	(0.0567)	(0.0281)	(0.0281)	(0.00561)	(0.0567)	(0.0281)	(0.0281)
log Computer Intensity	-0.00399	-0.0810	-0.0241	-0.0210	-0.00263	-0.0492	-0.00495	-0.00172	-0.00224	-0.0373	-0.0133	-0.00958
	(0.00947)	(0.0794)	(0.0445)	(0.0448)	(0.00965)	(0.0743)	(0.0443)	(0.0446)	(0.00949)	(0.0750)	(0.0434)	(0.0439)
Contractibility	-0.0550**	-0.118**	-0.0338	-0.0347	-0.0544**	-0.111**	-0.0249	-0.0265	-0.0539**	-0.117**	-0.0236	-0.0258
	(0.0221)	(0.0507)	(0.0331)	(0.0332)	(0.0220)	(0.0510)	(0.0331)	(0.0332)	(0.0224)	(0.0507)	(0.0322)	(0.0324)
Dispersion		0.0697***	0.0773***	0.0774***		0.0582**	0.0723***	0.0724***		0.0551**	0.0690***	0.0691***
		(0.0250)	(0.0194)	(0.0194)		(0.0258)	(0.0204)	(0.0204)		(0.0264)	(0.0208)	(0.0208)
1(sigma<median) X DUse_TUse		-0.151***	-0.145***	-0.145***		-0.135***	-0.140***	-0.140***		-0.141***	-0.143***	-0.143***
		(0.0523)	(0.0394)	(0.0393)		(0.0487)	(0.0388)	(0.0388)		(0.0507)	(0.0401)	(0.0401)
1(sigma>median) X DUse_TUse		-0.132***	-0.109***	-0.110***		-0.114***	-0.0928***	-0.0929***		-0.127***	-0.103***	-0.103***
		(0.0432)	(0.0326)	(0.0326)		(0.0425)	(0.0325)	(0.0325)		(0.0418)	(0.0315)	(0.0315)
1(sigma>median)		-0.00926	-0.0279	-0.0279		-0.00863	-0.0323	-0.0323		-0.00286	-0.0266	-0.0266
		(0.0391)	(0.0295)	(0.0294)		(0.0373)	(0.0295)	(0.0294)		(0.0374)	(0.0295)	(0.0295)
log Skill Intensity X log Skill Abundance		0.0352	0.0284**	0.0285**		0.0197	0.0229*	0.0230*		0.0243	0.0213	0.0213
		(0.0240)	(0.0130)	(0.0130)		(0.0243)	(0.0133)	(0.0132)		(0.0242)	(0.0132)	(0.0132)
log Other Machinery Intensity X log Capital Abundance		-0.00374	0.00603	0.00619		-0.00865	0.00317	0.00344		-0.00891	0.00242	0.00278
		(0.00985)	(0.00509)	(0.00511)		(0.00914)	(0.00463)	(0.00468)		(0.00903)	(0.00456)	(0.00459)
log Building Intensity X Capital Abundance		0.00639	0.00225	0.00224		0.00869	0.00207	0.00207		0.00965	0.00220	0.00217
		(0.00620)	(0.00347)	(0.00346)		(0.00585)	(0.00322)	(0.00323)		(0.00589)	(0.00321)	(0.00321)
log Auto Intensity X log Capital Abundance		0.00227	-0.00164	-0.00149		0.00504	0.00146	0.00151		0.00407	0.000821	0.000933
		(0.00479)	(0.00248)	(0.00247)		(0.00467)	(0.00246)	(0.00246)		(0.00469)	(0.00246)	(0.00246)
log Computer Intensity X log Capital Abundance		0.00647	0.00107	0.000806		0.00343	-0.000722	-0.000995		0.00272	2.67e-05	-0.000287
		(0.00647)	(0.00359)	(0.00361)		(0.00615)	(0.00364)	(0.00366)		(0.00624)	(0.00361)	(0.00364)
Contractibility X Rule of Law		0.0467	-0.0490	-0.0474		0.0413	-0.0564	-0.0535		0.0507	-0.0582	-0.0542
		(0.0680)	(0.0464)	(0.0467)		(0.0682)	(0.0460)	(0.0463)		(0.0680)	(0.0450)	(0.0454)
External Finance Dependence		-0.0211	-0.00516	-0.00529		-0.0242	-0.00764	-0.00786		-0.0209	-0.00185	-0.00228
		(0.0259)	(0.0185)	(0.0185)		(0.0257)	(0.0193)	(0.0193)		(0.0266)	(0.0194)	(0.0194)
Asset Tangibility		-0.225**	-0.136	-0.139		-0.261**	-0.188*	-0.191*		-0.262**	-0.182*	-0.185*
		(0.114)	(0.105)	(0.104)		(0.114)	(0.103)	(0.103)		(0.115)	(0.103)	(0.103)
External Finance Dependence X Credit / GDP		0.000217	0.000166*	0.000168*		0.000212	0.000150*	0.000153*		0.000216	0.000142	0.000147
		(0.000153)	(8.62e-05)	(8.61e-05)		(0.000148)	(8.76e-05)	(8.78e-05)		(0.000154)	(9.11e-05)	(9.10e-05)
Asset Tangibility X Credit / GDP		0.000961	0.000109	0.000148		0.00103*	0.000192	0.000229		0.00107*	0.000201	0.000248
		(0.000611)	(0.000515)	(0.000513)		(0.000600)	(0.000522)	(0.000519)		(0.000615)	(0.000527)	(0.000526)
Sales Volatility		0.229	0.201	0.199		0.224	0.233	0.234		0.106	0.0758	0.0773
		(0.276)	(0.212)	(0.212)		(0.298)	(0.246)	(0.246)		(0.275)	(0.223)	(0.223)
Sales Volatility X Labor Market Flexibility		-0.335	-0.182	-0.180		-0.222	-0.146	-0.147		-0.196	-0.0269	-0.0292
		(0.378)	(0.268)	(0.268)		(0.379)	(0.285)	(0.285)		(0.375)	(0.275)	(0.276)
Intermediation		-0.0326	0.0671	0.0691		-0.0501	0.0582	0.0607		-0.0385	0.0602	0.0645
		(0.124)	(0.0795)	(0.0792)		(0.119)	(0.0772)	(0.0768)		(0.117)	(0.0765)	(0.0761)
Intermediation X Rule of Law		-0.287	-0.379***	-0.382***		-0.305*	-0.398***	-0.402***		-0.324*	-0.398***	-0.406***
		(0.180)	(0.130)	(0.130)		(0.172)	(0.123)	(0.123)		(0.171)	(0.124)	(0.124)
Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	No	No	No	No	No	No	No	No	No	No	No	No
IO2007 Industry Clusters	183	175	176	176	195	185	186	186	193	183	184	184
Adjusted R-squared	0.167	0.199	0.199	0.198	0.162	0.195	0.198	0.198	0.163	0.197	0.198	0.198
Observations	111,778	29,664	85,376	85,376	118,290	31,196	89,577	89,577	118,493	31,142	89,653	89,653

Note: Estimation by OLS with standard errors clustered at the industry level reported in parentheses. ***, **, and * denote significance the 1%, 5%, and 10% level, respectively. Regression includes a constant. PT stands for total suspended matter. PT, NO2, and SO2 are measured in kg per dollar of output. EPSI stands for the OECD's Environmental Policy Stringency Index. HLT stands for the Environmental Health part of Yale University's Environmental Performance Index (EPI). See Data Appendix for further details.

Table OA.9: Pollution Intensities - Marginal Effects

Intensity Definition: Total Cost	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Corresp. Table Column:	OA.8 (2)	OA.8 (3)	OA.8 (4)	OA.8 (6)	OA.8 (7)	OA.8 (8)	OA.8 (10)	OA.8 (11)	OA.8 (12)
Pollutant, Env. Index / Pctile.:	PT, EPSI	PT, HLT	PT, EPI	SO2, EPSI	SO2, HLT	SO2, EPI	NO2, EPSI	NO2, HLT	NO2, EPI
5	-0.0111**	-0.0140***	-0.0127***	-0.00384	-0.00711*	-0.00578	-0.00586	-0.0110***	-0.00931**
	(0.00518)	(0.00363)	(0.00366)	(0.00530)	(0.00381)	(0.00395)	(0.00509)	(0.00397)	(0.00404)
10	-0.0106**	-0.0130***	-0.0121***	-0.00350	-0.00624*	-0.00522	-0.00559	-0.0100***	-0.00869**
	(0.00506)	(0.00349)	(0.00355)	(0.00515)	(0.00364)	(0.00379)	(0.00495)	(0.00381)	(0.00391)
20	-0.00709	-0.0111***	-0.0106***	-0.00117	-0.00457	-0.00402	-0.00375	-0.00809**	-0.00735**
	(0.00443)	(0.00330)	(0.00336)	(0.00430)	(0.00337)	(0.00350)	(0.00425)	(0.00358)	(0.00368)
30	-0.00488	-0.00930***	-0.00941***	0.000307	-0.00303	-0.00302	-0.00258	-0.00633*	-0.00623*
	(0.00432)	(0.00323)	(0.00327)	(0.00399)	(0.00320)	(0.00331)	(0.00407)	(0.00344)	(0.00353)
40	-0.00365	-0.00844***	-0.00844***	0.00114	-0.00228	-0.00220	-0.00193	-0.00546	-0.00532
	(0.00437)	(0.00323)	(0.00324)	(0.00392)	(0.00314)	(0.00320)	(0.00408)	(0.00340)	(0.00345)
50	-0.00266	-0.00740**	-0.00753**	0.00179	-0.00139	-0.00145	-0.00141	-0.00444	-0.00448
	(0.00446)	(0.00327)	(0.00326)	(0.00392)	(0.00310)	(0.00313)	(0.00414)	(0.00339)	(0.00341)
60	-0.00190	-0.00606*	-0.00499	0.00230	-0.000204	0.000731	-0.00100	-0.00310	-0.00213
	(0.00456)	(0.00338)	(0.00352)	(0.00395)	(0.00309)	(0.00313)	(0.00421)	(0.00341)	(0.00347)
70	-0.000986	-0.00221	-0.00303	0.00292	0.00313	0.00228	-0.000520	0.000724	-0.000315
	(0.00471)	(0.00396)	(0.00389)	(0.00403)	(0.00336)	(0.00333)	(0.00434)	(0.00376)	(0.00369)
80	-3.70e-05	-0.00114	-0.00202	0.00355	0.00403	0.00312	-1.75e-05	0.00179	0.000620
	(0.00491)	(0.00418)	(0.00412)	(0.00416)	(0.00350)	(0.00348)	(0.00452)	(0.00391)	(0.00385)
90	0.000624	-0.000348	-0.00110	0.00400	0.00473	0.00388	0.000332	0.00257	0.00147
	(0.00507)	(0.00435)	(0.00435)	(0.00427)	(0.00362)	(0.00366)	(0.00466)	(0.00404)	(0.00402)

Note: Marginal effects of the respective coefficients of log(Pollutant) at percentiles of the respective environmental index are calculated from regressions reported at the top of the table.

Table OA.10: Cross-Country Dimension

	Dependent Variable: Intrafirm Import Share								
Intensity Definition: Total Cost	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Environmental Index:	EPSI	EPSI	EPSI	HLT	HLT	HLT	EPI	EPI	EPI
log ECSP X Environmental Index	0.993**	0.852*	1.200***	0.0403***	0.0433***	0.0596***	0.0569**	0.0683***	0.0906***
	(0.416)	(0.440)	(0.435)	(0.0143)	(0.0148)	(0.0149)	(0.0223)	(0.0234)	(0.0232)
Environmental Index	11.47***	4.657*	7.632***	0.522***	0.519***	0.585***	0.803***	0.937***	0.957***
	(2.513)	(2.649)	(2.647)	(0.0883)	(0.0904)	(0.0905)	(0.138)	(0.144)	(0.142)
log Skill Intensity X log Skill Abundance		0.00623	0.0144		0.0120	0.00914		0.0120	0.00910
		(0.0212)	(0.0213)		(0.0111)	(0.0114)		(0.0111)	(0.0114)
log Skill Abundance		0.103*	0.137**		0.0168	0.0192		-0.0115	-0.00127
		(0.0589)	(0.0603)		(0.0304)	(0.0313)		(0.0305)	(0.0314)
log Other Machinery Intensity X log Capital Abundance		-0.00327	-0.00696		0.00325	-0.00110		0.00241	-0.00180
		(0.00765)	(0.00760)		(0.00388)	(0.00436)		(0.00400)	(0.00442)
log Capital Abundance		0.0425	0.0333		-0.00308	0.00469		-0.000470	0.00704
		(0.0433)	(0.0436)		(0.0237)	(0.0251)		(0.0243)	(0.0255)
log Building Intensity X log Capital Abundance		0.00437	0.00497		0.00157	0.00212		0.00172	0.00232
		(0.00526)	(0.00506)		(0.00303)	(0.00292)		(0.00302)	(0.00292)
log Auto Intensity X log Capital Abundance		0.00514	0.00546		-0.000148	0.00170		-2.28e-05	0.00182
		(0.00410)	(0.00375)		(0.00202)	(0.00212)		(0.00205)	(0.00213)
log Computer Intensity X log Capital Abundance		-0.000357	0.000291		-0.00137	-0.000884		-5.94e-05	-0.000124
		(0.00578)	(0.00574)		(0.00279)	(0.00292)		(0.00286)	(0.00295)
Contractibility X Rule of Law		0.0596	0.0381		-0.0459	-0.0544		-0.0461	-0.0527
		(0.0624)	(0.0614)		(0.0451)	(0.0454)		(0.0455)	(0.0457)
Intermediation X Rule of Law			-0.309*			-0.368***			-0.367***
			(0.164)			(0.122)			(0.122)
Rule of Law		0.354***	0.389***		0.143***	0.258***		0.0980***	0.229***
		(0.0354)	(0.0755)		(0.0184)	(0.0539)		(0.0199)	(0.0542)
External Finance Dependence X Credit / GDP			0.000187			0.000204***			0.000196**
			(0.000122)			(7.71e-05)			(7.70e-05)
Asset Tangibility X Credit / GDP			0.00144**			0.000547			0.000520
			(0.000602)			(0.000481)			(0.000478)
Credit / GDP			4.17e-05			0.000280*			0.000295*
			(0.000190)			(0.000154)			(0.000154)
Sales Volatility X Labor Market Flexibility			-0.201			-0.133			-0.129
			(0.373)			(0.247)			(0.252)
Labor Market Flexibility			0.00798			-0.0151			-0.00596
			(0.0741)			(0.0453)			(0.0461)
Country-Year FE	No	No	No	No	No	No	No	No	No
Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IO2007 Industry Clusters	221	214	210	229	217	210	229	217	210
Adjusted R-squared	0.169	0.189	0.197	0.133	0.146	0.164	0.137	0.148	0.163
Observations	38,093	36,735	36,093	137,611	116,315	103,421	137,870	116,315	103,421

Note: Estimation by OLS with standard errors clustered at the industry level reported in parentheses. ***, **, and * denote significance the 1%, 5%, and 10% level, respectively. Regression includes a constant. EPSI stands for the OECD's Environmental Policy Stringency Index. HLT stands for the Environmental Health part of Yale University's Environmental Performance Index. See Data Appendix for further details.

Table OA.11: Cross-Country Dimension - Marginal Effects

Intensity Definition:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Corresp. Table Column:	OA.10 (1)	OA.10 (2)	OA.10 (3)	OA.10 (4)	OA.10 (5)	OA.10 (6)	OA.10 (7)	OA.10 (8)	OA.10 (9)
Env. Index / ECSP Pctile.:	EPSI	EPSI	EPSI	HLT	HLT	HLT	EPI	EPI	EPI
5	4.522***	-1.301**	-0.755	0.241***	0.217***	0.170***	0.405***	0.460***	0.325***
	(0.529)	(0.661)	(0.651)	(0.0156)	(0.0170)	(0.0179)	(0.0245)	(0.0330)	(0.0336)
10	4.779***	-1.065*	-0.409	0.251***	0.228***	0.184***	0.419***	0.477***	0.347***
	(0.448)	(0.581)	(0.573)	(0.0131)	(0.0143)	(0.0153)	(0.0207)	(0.0295)	(0.0302)
20	5.028***	-0.861	-0.141	0.260***	0.237***	0.197***	0.431***	0.493***	0.368***
	(0.383)	(0.525)	(0.526)	(0.0111)	(0.0123)	(0.0134)	(0.0178)	(0.0270)	(0.0277)
30	5.224***	-0.689	0.0969	0.268***	0.246***	0.209***	0.443***	0.506***	0.385***
	(0.346)	(0.491)	(0.497)	(0.00989)	(0.0111)	(0.0121)	(0.0160)	(0.0255)	(0.0262)
40	5.385***	-0.556	0.285	0.275***	0.254***	0.219***	0.453***	0.518***	0.401***
	(0.328)	(0.474)	(0.484)	(0.00952)	(0.0106)	(0.0116)	(0.0155)	(0.0249)	(0.0255)
50	5.534***	-0.429	0.461	0.281***	0.260***	0.228***	0.461***	0.528***	0.414***
	(0.322)	(0.467)	(0.480)	(0.00968)	(0.0106)	(0.0115)	(0.0158)	(0.0249)	(0.0254)
60	5.688***	-0.301	0.645	0.287***	0.266***	0.237***	0.469***	0.538***	0.428***
	(0.330)	(0.469)	(0.485)	(0.0103)	(0.0111)	(0.0119)	(0.0167)	(0.0253)	(0.0257)
70	5.843***	-0.173	0.823*	0.293***	0.273***	0.246***	0.479***	0.549***	0.442***
	(0.349)	(0.480)	(0.498)	(0.0114)	(0.0120)	(0.0127)	(0.0184)	(0.0263)	(0.0265)
80	6.105***	0.0533	1.142**	0.303***	0.284***	0.261***	0.493***	0.566***	0.465***
	(0.404)	(0.520)	(0.541)	(0.0137)	(0.0141)	(0.0147)	(0.0218)	(0.0287)	(0.0288)
90	6.441***	0.341	1.551**	0.317***	0.299***	0.283***	0.513***	0.590***	0.498***
	(0.502)	(0.601)	(0.623)	(0.0176)	(0.0182)	(0.0185)	(0.0280)	(0.0338)	(0.0336)

Note: Marginal effects of the coefficients of the respective Environmental Index at percentiles of ECSP are calculated from regressions reported at the top of the table.

OA.2 Robustness of Assumption 1: Only Prices Observable to Consumers

In this section, we assess the robustness of our Assumption 1 by considering a setting in which prices are the only observable variables to consumers. We show that under a reasonable parameter restriction and the additional assumption that investments are observable with an infinitesimally small probability, ethical investment quantities are the Pareto-dominant Nash equilibrium.

Recall the demand function for variety ω under CES utility,

$$y(\omega) = Ap(\omega)^{-\frac{1}{1-\alpha}} I(\omega)^{\frac{1}{1-\alpha}}.$$

We assume that an unethical firm will face positive demand with some probability if and only if it sets the same price $p(\omega)^e_k$ as an ethical firm. We assume that quantities and investments are - for now - *unobservable*.

Expected demand for a firm is then[1]

$$E[y(\omega)]^{obs.pr.} = \begin{cases} \gamma Ap(\omega)^{-\frac{1}{1-\alpha}} & \text{if } \; p(\omega) = p(\omega)^e_k \\ 0 & \text{otherwise.} \end{cases} \tag{OA.1}$$

[1]To avoid confusion, we label objects specific to the model featuring the relaxed version of Assumption 1, i.e., featuring only observable prices, with "*obs.pr.*".

Output is produced using the familiar production technology

$$x(\omega) = \left(\frac{h(\omega)}{\beta}\right)^{\beta} \left(\frac{m(\omega)}{1-\beta}\right)^{1-\beta}$$

and in equilibrium the firm sets the ethical price and maximizes expected profits conditional on this ethical price.

Best response functions under unethical production Headquarter and supplier face the following optimization problems.

$$\max_{h(\omega)_k^u} \gamma\phi_k p(\omega)_k^e \left(\frac{h(\omega)}{\beta}\right)^{\beta} \left(\frac{m(\omega)}{1-\beta}\right)^{1-\beta} - c_h h(\omega)_k^u \tag{OA.2}$$

$$\max_{m(\omega)_k^u} \gamma\left(1-\phi_k\right) p(\omega)_k^e \left(\frac{h(\omega)}{\beta}\right)^{\beta} \left(\frac{m(\omega)}{1-\beta}\right)^{1-\beta} - c_m^u m(\omega)_k^u, \tag{OA.3}$$

where the first part is *expected revenue*, i.e. full demand with probability γ, zero demand otherwise.

The headquarter's FOC implies

$$h(\omega)_k^{u,obs.pr.} = \left(\frac{\gamma\phi_k p(\omega)_k^e}{c_h}\right)^{\frac{1}{1-\beta}} \frac{\beta}{1-\beta} m(\omega)_k^u \tag{OA.4}$$

The supplier's FOC implies

$$m(\omega)_k^{u,obs.pr.} = \left(\frac{\gamma\left(1-\phi_k\right) p(\omega)_k^e}{c_m^u}\right)^{\frac{1}{\beta}} \frac{1-\beta}{\beta} h(\omega)_k^u \tag{OA.5}$$

These FOCs give *linear* best response functions, which only intersect at the origin. It is easy to show that optimal $h(\omega)_k^{u,obs.pr.}$ of the headquarter has a larger slope in $m(\omega)_k^{u.obs.pr.}$ than $h(\omega)_k^{u,obs.pr.}$ in the supplier's FOC. We depict the headquarter's (blue line) and the supplier's (green line) FOCs in Figure OA.1.

Using each of the FOCs together with the production function, we can solve for the values $h(\omega)_k^{u,obs.pr.}$ and $m(\omega)_k^{u,obs.pr.}$ satisfying each FOC as a function of the produced quantity $x(\omega)$. Note that both parties will never want to produce more than $x(\omega) = Ap(\omega)_k^{e-\frac{1}{1-\alpha}}$, as this is the maximum quantity that can be sold at the (fixed) ethical price. This quantity is indicated by the isoquant in Figure OA.1.

From the headquarter's FOC, we get

$$\begin{aligned} h(\omega)_k^{u,obs.pr.} &= \beta\gamma p(\omega)_k^e \frac{\phi_k}{c_h} x(\omega) \\ m(\omega)_k^{u,obs.pr.} &= (1-\beta)\left(\gamma p(\omega)_k^e \frac{\phi_k}{c_h}\right)^{-\frac{\beta}{1-\beta}} x(\omega), \end{aligned}$$

with $x(\omega) \leq Ap(\omega)_k^{e-\frac{1}{1-\alpha}}$. Using the condition with equality, we can pin down point (I) from Figure OA.1

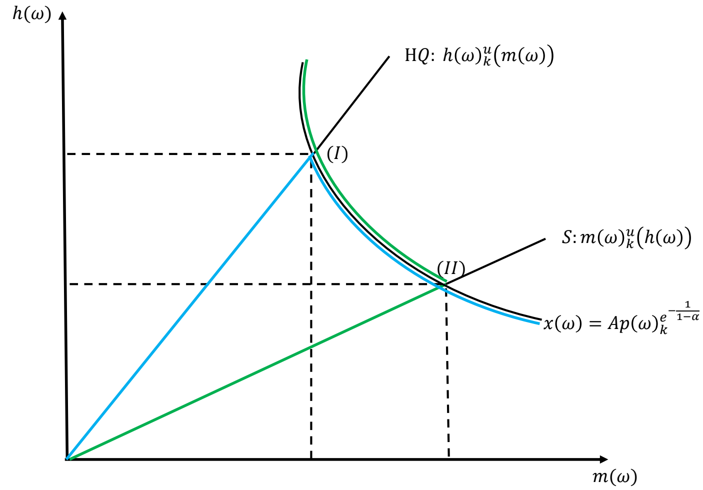

Figure OA.1: Best Response Functions When Only Prices are Observable

as

$$h(\omega)^{u,obs.pr.}_{k,(I)} = \beta\gamma p(\omega)_k^{e-\frac{\alpha}{1-\alpha}} \frac{\phi_k}{c_h} A \tag{OA.6}$$

$$m(\omega)^{u,obs.pr.}_{k,(I)} = (1-\beta)\left(\gamma \frac{\phi_k}{c_h}\right)^{-\frac{\beta}{1-\beta}} p(\omega)_k^{e-\frac{\beta}{1-\beta}-\frac{1}{1-\alpha}} A. \tag{OA.7}$$

From the supplier's FOC, we get

$$h(\omega)^{u,obs.pr.}_{k} = \beta\left(\gamma p(\omega)^e_k \frac{1-\phi_k}{c^u_m}\right)^{-\frac{1-\beta}{\beta}} x(\omega)$$
$$m(\omega)^{u,obs.pr.}_{k} = (1-\beta)\gamma p(\omega)^e_k \frac{1-\phi_k}{c^u_m} x(\omega)$$

with $x(\omega) \leq Ap(\omega)_k^{e-\frac{1}{1-\alpha}}$. Using the condition with equality, we can pin down point (II) from Figure OA.1 as

$$h(\omega)^{u,obs.pr.}_{k,(II)} = \beta\left(\gamma \frac{1-\phi_k}{c^u_m}\right)^{-\frac{1-\beta}{\beta}} p(\omega)_k^{e-\frac{1}{\beta}-\frac{\alpha}{1-\alpha}} A \tag{OA.8}$$

$$m(\omega)^{u,obs.pr.}_{k,(II)} = (1-\beta)\gamma p(\omega)_k^{e-\frac{\alpha}{1-\alpha}} \frac{1-\phi_k}{c^u_m} A \tag{OA.9}$$

Shape of the Best Response Function The linear best response functions imply that the produced quantity is increased until it reaches the maximum amount that can be sold at the ethical price. The points

(I) and (II) identified above pinpoint the values at which each party's best response function reaches this upper bound. How do the best response function continue beyond these points? Any unilateral increase in investment beyond points (I) or (II) would increase the output quantity above the sellable level and therefore reduce profits. Therefore, the best response to further increases in investment by the other party is to reduce own investment. Starting from point (I), for example, the headquarter would react to an increase in $m(\omega)$ with a reduction in $h(\omega)$. It is feasible but profit-reducing for the headquarter to cut its own investment so much that output is reduced below the maximum sellable amount. Therefore, best response function of the headquarter continues downwards *along* the isoquant depicted in Figure OA.1. Symmetrically, the supplier's best response to increasing investment in $h(\omega)$ is to reduce $m(\omega)$ and move upwards along the isoquant starting from point (II). We then have a continuum of Nash equilibria on the isoquant between points (I) and (II), where both best response functions coincide. How do these Nash equilibria compare to the optimal investment quantities under ethical production, and, by extension, to the "mimicking" equilibrium implied by Assumption 1?

Relationship to Ethical and Mimicking Investments Using the equilibrium decisions of ethical firms, we can calculate $p(\omega)_k^e$ as

$$p(\omega)_k^e = \frac{R(\omega)_k^e}{y(\omega)_k^e} = \frac{1}{\alpha}\left(\frac{c_h}{\phi_k}\right)^{\beta}\left(\frac{c_m^e}{1-\phi_k}\right)^{1-\beta}. \tag{OA.10}$$

Plugging this into equations (OA.6), (OA.7), (OA.8), and (OA.9), one can show that the equilibrium ethical investments $(h(\omega)_k^e, m(\omega)_k^e)$ is one possible equilibrium within the continuum of Nash equilibria defined by the overlap of the two best response functions if γ is not too small. Specifically, we have that

$$h(\omega)_{k,(II)}^{u,obs.pr.} < h(\omega)_k^e \leq h(\omega)_{k,(I)}^{u,obs.pr.} \tag{OA.11}$$

$$m(\omega)_{k,(I)}^{u,obs.pr.} < m(\omega)_k^e \leq m(\omega)_{k,(II)}^{u,obs.pr.} \tag{OA.12}$$

if $\gamma \geq \alpha$. Note that we impose a lower bound for the value of γ also in the baseline model in order to ensure the existence of the unethical integration cutoff β_u.

Now assume that there is a small probability $\epsilon > 0$ for investment levels to be observable. By expected profit maximization, the ethical investment levels then Pareto-dominate all the other possible Nash equilibria along the isoquant in Figure OA.1. Thus, in our setting with only prices being observable, the outcome is isomorphic to the one implied by Assumption 1.

Assumption 1 can therefore be relaxed: in a setting in which only prices are observable and in which the probability of a boycott is not too high, it is sufficient to assume an infinitesimal probability of observable investments to generate outcomes for prices, quantities, and investment that are identical to those derived in the baseline model.

OA.3 The Model with Naive Consumers

To better understand the role of Assumption 1 in our model, we remove it in this section. It turns out that the model collapses to an uninteresting setting, in which the headquarter's choice between integration and outsourcing is entirely independent of the (un)ethical technology choice of the supplier.

OA.3.1 Ethical and Unethical Investments

Ethical investments remain identical to the baseline model and imply the same ethical revenues

$$R(\omega)_k^e = A^{1-\alpha}\left[\left(\frac{h(\omega)_k^e}{\beta}\right)^{\beta}\left(\frac{m(\omega)_k^e}{1-\beta}\right)^{1-\beta}\right]^{\alpha} \tag{6}$$

In case the unethical technology is chosen, both the headquarter and the supplier take the boycott risk $1-\gamma$ and the unethical cost advantage $1-\mu$ into account when they choose their optimal investments as they do not have to face a *certain* boycott when they deviate from an ethical firm's choices.

Based on the baseline model, demand is given by

$$y(\omega) = Ap(\omega)^{-\frac{1}{1-\alpha}} I(\omega)^{\frac{1}{1-\alpha}} \tag{3}$$

where $I(\omega)$ is an indicator variable that takes the value of 1 if and only if there is no boycott against the firm producing variety ω. As the boycott probability is given by $1-\gamma$, the expected demand of a firm using the unethical technology is given by

$$E\left[y(\omega)\right] = \gamma Ap(\omega)^{-\frac{1}{1-\alpha}}. \tag{OA.13}$$

As in the baseline model, the firm will produce output

$$x(\omega) = \left(\frac{h(\omega)}{\beta}\right)^{\beta}\left(\frac{m(\omega)}{1-\beta}\right)^{1-\beta} \tag{5}$$

to meet expected demand so that expected revenue from unethical production is given by[2]

$$E\left[R(\omega)_k^u\right]^{naive} = p(\omega)_k^u E\left[y(\omega)\right] = (\gamma A)^{1-\alpha}\left[\left(\frac{h(\omega)}{\beta}\right)^{\beta}\left(\frac{m(\omega)}{1-\beta}\right)^{1-\beta}\right]^{\alpha}. \tag{OA.14}$$

Using the unethical technology, the headquarter and supplier will then maximize

$$\max_{h(\omega)_k^u} \ \phi_k E\left[R(\omega)_k^u\right] - c_h h(\omega)_k^u \tag{OA.15}$$

$$\max_{m(\omega)_k^u} \ (1-\phi_k)\, E\left[R(\omega)_k^u\right] - c_m^u m(\omega)_k^u. \tag{OA.16}$$

For the headquarter, the problem is identical to ethical maximization, except that the probability of a boycott not happening γ is attached to the market size parameter A, reflecting lower expected demand. The supplier also faces the lower expected market size and in addition takes into account the lower marginal cost of production $c_m^u < c_m^e$.

These maximization problems are solved non-cooperatively as in the baseline model and yield optimal

[2] To avoid confusion, we label objects specific to the variant of the model with naive consumers using the superscript "*naive*".

investments

$$h(\omega)_k^{u,naive} = \beta\gamma A\alpha^{\frac{1}{1-\alpha}}\frac{\phi_k}{c_h}\left[\left(\frac{c_h}{\phi_k}\right)^{\beta}\left(\frac{c_m^u}{1-\phi_k}\right)^{1-\beta}\right]^{-\frac{\alpha}{1-\alpha}} \tag{OA.17}$$

$$m(\omega)_k^{u,naive} = (1-\beta)\,\gamma A\alpha^{\frac{1}{1-\alpha}}\frac{1-\phi_k}{c_m^u}\left[\left(\frac{c_h}{\phi_k}\right)^{\beta}\left(\frac{c_m^u}{1-\phi_k}\right)^{1-\beta}\right]^{-\frac{\alpha}{1-\alpha}} \tag{OA.18}$$

and equilibrium expected revenue

$$E\left[R(\omega)_k^u\right]^{naive} = \gamma A\alpha^{\frac{\alpha}{1-\alpha}}\left[\left(\frac{c_h}{\phi_k}\right)^{\beta}\left(\frac{c_m^u}{1-\phi_k}\right)^{1-\beta}\right]^{-\frac{\alpha}{1-\alpha}}. \tag{OA.19}$$

Note that this expression is unequal to $\gamma R(\omega)_k^e$ from the baseline model because of the lower marginal cost c_m^u.

OA.3.2 Technology Choice

In choosing the preferred technology, the supplier again trades off the expected ethical revenue premium against the cost savings from unethical production:

$$E\left[\Delta R_s\right] = (1-\phi_k)\left[R(\omega)_k^e - E\left[R(\omega)_k^u\right]\right] \tag{OA.20}$$

$$\Delta C = c_m^e m(\omega)_k^e - c_m^u m(\omega)_k^u. \tag{OA.21}$$

Note the following differences to the baseline model. First, without Assumption 1, we have the unethical quantity $m(\omega)_k^u$ associated with the lower marginal cost c_m^u (instead of $m(\omega)_k^e$). Second, the terms on the right-hand side of Equations (OA.20) and (OA.21) are not necessarily positive.

Next, we derive the supplier's (un)ethical technology cutoff β_S^{naive} using the profit functions using

$$\pi_{S,k}^e = (1-\phi_k)\,R(\omega)_k^e - c_m^e m(\omega)_k^e$$
$$\pi_{S,k}^u = (1-\phi_k)\,E\left[R(\omega)_k^u\right] - c_m^u m(\omega)_k^u$$

and

$$E[R(\omega)_k^u] = \gamma\mu^{-\frac{\alpha(1-\beta)}{1-\alpha}}R(\omega)_k^e$$
$$m(\omega)_k^u = \alpha\,(1-\beta)\,\frac{1-\phi_k}{c_m^u}E[R(\omega)_k^u].$$

Unethical production is preferred if $\pi_{S,k}^e < \pi_{S,k}^u$, or

$$(1-\phi_k)\,R(\omega)_k^e\left[1-\alpha\,(1-\beta)\right] < \gamma\mu^{-\frac{\alpha(1-\beta)}{1-\alpha}}\,(1-\phi_k)\,R(\omega)_k^e\left[1-\alpha\,(1-\beta)\right]$$

which implies unethical production to be chosen for all $\beta < \beta_S^{naive}$, given by

$$\beta_S^{naive} = 1 - \frac{1-\alpha}{\alpha}\frac{\ln\gamma}{\ln\mu} \tag{OA.22}$$

OA.3.3 Organizational Choice Is Independent of γ and μ

The headquarter again maximizes the total surplus of the match. Therefore, the ratio of profits under vertical integration and outsourcing for ethical production is still given by the Θ^e from the baseline model.

For unethical production, the headquarter chooses vertical integration or outsourcing $k \in \{V, O\}$ to maximize

$$E\left[\Pi_k^u\right]^{naive} = E\left[R(\omega)_k^u\right] - c_m^u m(\omega)_k^u - c_h h(\omega)_k^u \tag{OA.23}$$

$$E\left[\Pi_k^u\right]^{naive} = \gamma\mu^{-\frac{\alpha(1-\beta)}{1-\alpha}} A\alpha^{\frac{\alpha}{1-\alpha}} \left[\left(\frac{c_h}{\phi_k}\right)^{\beta}\left(\frac{c_m^e}{1-\phi_k}\right)^{1-\beta}\right]^{-\frac{\alpha}{1-\alpha}} \left[1-\alpha\left(1-\beta\right)+\phi_k\alpha\left[1-2\beta\right]\right] \tag{OA.24}$$

From the above equations we can see that γ and μ will cancel in the ratio of $E\left[\Pi_V^u\right]$ and $E\left[\Pi_O^u\right]$. This implies that the headquarter's decision between integration and outsourcing does not depend on the supplier's technology.

In the model without Assumption 1, there is a unique cutoff for the supplier's technology choice, but the headquarter's integration choice does *not* interact with the technology choice. This model is therefore at odds with our empirical findings, as it implies that we should not observe stronger outsourcing in sectors with a stronger incentive for unethical production, as outsourcing and technology are chosen independently of one another. This highlights that Assumption 1 provides a parsimonious and tractable mechanism generating a link between outsourcing and unethical production.

OA.4 The Naive Consumers-*cum*-Deniability Model

In this model, we discard Assumption 1 and assume that it is not necessary for an unethical firm to elicit positive demand from consumers and explore the implications of adding *deniability*. We consider *deniability* the idea that by outsourcing production to an independent supplier, the headquarter is shielded from the boycott threat more than if the supplier were integrated in the firm. This might be the case when it is more difficult or more costly for an NGO to establish the link between the supplier and the headquarter or to convince consumers that this link exists. In either case, outsourcing reduces the risk of a boycott. We therefore model deniability by assuming that the probability that a firm is hit by a boycott $1-\gamma_k$ with $k \in \{O, V\}$ is smaller when it outsources production so that $1-\gamma_O < 1-\gamma_V$.

As we will see below, this change affects both the technology and the integration cutoff.

OA.4.1 Ethical and Unethical Investments

Ethical investments are identical to the baseline model and imply the same ethical revenues

$$R(\omega)_k^e = A^{1-\alpha}\left[\left(\frac{h(\omega)_k^e}{\beta}\right)^{\beta}\left(\frac{m(\omega)_k^e}{1-\beta}\right)^{1-\beta}\right]^{\alpha} \tag{6}$$

In case the unethical technology is chosen, both the headquarter and the supplier take the boycott risk and the lower cost into account when they choose their optimal investments as they do not have to face a *certain* boycott when they deviate from an ethical firm's choices.

Based on the baseline model, demand is given by

$$y(\omega) = Ap(\omega)^{-\frac{1}{1-\alpha}} I(\omega)^{\frac{1}{1-\alpha}} \tag{3}$$

where $I(\omega)$ is an indicator variable that takes the value of 1 if and only if there is not boycott again the firm producing variety ω. As the boycott probability is given by $1-\gamma_k$ with $k \in \{V, O\}$, the expected demand of a firm using the unethical technology is given by

$$E\left[y(\omega)\right] = \gamma_k A p(\omega)^{-\frac{1}{1-\alpha}}.$$

As in the baseline model, the firm will produce output

$$x(\omega) = \left(\frac{h(\omega)}{\beta}\right)^{\beta} \left(\frac{m(\omega)}{1-\beta}\right)^{1-\beta} \tag{5}$$

to meet expected demand so that expected revenue from unethical production is given by[3]

$$E\left[R(\omega)_k^u\right]^{deni.} = p(\omega)_k^u E\left[y(\omega)\right] = (\gamma_k A)^{1-\alpha} \left[\left(\frac{h(\omega)}{\beta}\right)^{\beta} \left(\frac{m(\omega)}{1-\beta}\right)^{1-\beta}\right]^{\alpha}. \tag{OA.25}$$

Using the unethical technology, the headquarter and supplier will then maximize

$$\max_{h(\omega)_k^u} \phi_k E\left[R(\omega)_k^u\right] - c_h h(\omega)_k^u \tag{OA.26}$$

$$\max_{m(\omega)_k^u} \left(1-\phi_k\right) E\left[R(\omega)_k^u\right] - c_m^u m(\omega)_k^u \tag{OA.27}$$

For the headquarter, the problem is identical to ethical maximization, except that the probability of a boycott not happening γ_k is attached to the market size parameter A, reflecting lower expected demand. The supplier also faces the lower expected market size and in addition takes into account the lower marginal cost of production $c_m^u < c_m^e$.

These maximization problems are solved non-cooperatively as in the baseline model and yield optimal investments

$$h(\omega)_k^{u,deni.} = \beta \gamma_k A \alpha^{\frac{1}{1-\alpha}} \frac{\phi_k}{c_h} \left[\left(\frac{c_h}{\phi_k}\right)^{\beta} \left(\frac{c_m^u}{1-\phi_k}\right)^{1-\beta}\right]^{-\frac{\alpha}{1-\alpha}} \tag{OA.28}$$

$$m(\omega)_k^{u,deni.} = (1-\beta) \gamma_k A \alpha^{\frac{1}{1-\alpha}} \frac{1-\phi_k}{c_m^u} \left[\left(\frac{c_h}{\phi_k}\right)^{\beta} \left(\frac{c_m^u}{1-\phi_k}\right)^{1-\beta}\right]^{-\frac{\alpha}{1-\alpha}} \tag{OA.29}$$

and equilibrium expected revenue

$$E\left[R(\omega)_k^u\right]^{deni.} = \gamma_k A \alpha^{\frac{\alpha}{1-\alpha}} \left[\left(\frac{c_h}{\phi_k}\right)^{\beta} \left(\frac{c_m^u}{1-\phi_k}\right)^{1-\beta}\right]^{-\frac{\alpha}{1-\alpha}} \tag{OA.30}$$

[3] To avoid confusion, we label objects specific to the "deniability" variant of the model with the superscript "*deni.*".

Note that this expression is unequal to $\gamma R(\omega)_k^e$ from the baseline model because of the lower marginal cost c_m^u and because the boycott risk $1-\gamma_k$ now depends on the organizational form of the firm.

OA.4.2 Technology Choice

When the supplier takes the technology decision, the organizational form has already been chosen by the headquarter. The supplier therefore takes the organizational choice as given and now faces two cutoffs depending on the organizational form of the firm. We can state the following

Lemma OA.1 ***Technology Choice*** *In the naive consumers*-cum-*deniability model, the organizational form of the firm influences the technology choice facing the supplier in addition to the headquarter intensity β. Specifically, the supplier of an outsourcing firm chooses unethical production when the headquarter intensity is lower than the (un)ethical technology cutoff under outsourcing $\beta_{S,O}^{deni.}$, which is given by*

$$\beta_{S,O}^{deni.} = 1 - \frac{1-\alpha}{\alpha}\frac{\ln \gamma_O}{\ln \mu} \tag{OA.31}$$

while the supplier of integrated firm chooses unethical production when the headquarter intensity is lower than the (un)ethical technology cutoff under outsourcing $\beta_{S,V}^{deni.}$, which is given by

$$\beta_{S,V}^{deni.} = 1 - \frac{1-\alpha}{\alpha}\frac{\ln \gamma_V}{\ln \mu}, \tag{OA.32}$$

where $\beta_{S,O}^{deni.} > \beta_{S,V}^{deni.}$ so that unethical production is attractive for a larger range of sectors if outsourcing is chosen. Irrespective of organizational form, the range of headquarter intensities for which unethical production is chosen by the supplier is decreasing in μ. If unethical and ethical production have the same marginal cost, i.e. $\mu = 1$, unethical production is never preferred. As the unethical technology approaches zero marginal cost, both cutoffs tend to 1 and unethical production is preferred for all headquarter intensities β.

Proof: *With*

$$\begin{aligned}
\pi_{S,k}^{e} &= (1-\phi_k)\, R(\omega)_k^e - c_m^e m(\omega)_k^e \\
\pi_{S,k}^{u,deni.} &= (1-\phi_k)\, E\left[R(\omega)_k^u\right]^{deni.} - c_m^u m(\omega)_k^u
\end{aligned}$$

and

$$\begin{aligned}
E[R(\omega)_k^u]^{deni.} &= \gamma_k \mu^{-\frac{\alpha(1-\beta)}{1-\alpha}} R(\omega)_k^e \\
m(\omega)_k^u &= \alpha\,(1-\beta)\,\frac{1-\phi_k}{c_m^u} E[R(\omega)_k^u]^{deni.}
\end{aligned}$$

We have that unethical production is preferred if $\pi_{S,k}^{e} < \pi_{S,k}^{u,deni.}$:

$$(1-\phi_k)\, R(\omega)_k^e \left[1-\alpha\,(1-\beta)\right] < \gamma_k \mu^{-\frac{\alpha(1-\beta)}{1-\alpha}}\, (1-\phi_k)\, R(\omega)_k^e \left[1-\alpha\,(1-\beta)\right]$$

which implies unethical production to be chosen for all $\beta < \beta_{S,k}^{deni.}$, given by equations (OA.31) *and* (OA.32).

Because $\gamma_O > \gamma_V$ and $\frac{\partial \beta_{S,k}^{deni.}}{\partial \gamma_k} > 0$ (i.e. a greater chance of not getting a boycott increases the range of headquarter intensities for which unethical production is preferred), it follows that $\beta_{S,O}^{deni.} > \beta_{S,V}^{deni.}$.

Further it holds that

$$\frac{\partial \beta_{S,k}^{deni.}}{\partial \mu} = \frac{1-\alpha}{\alpha \mu} \frac{\gamma_O}{(\ln \mu)^2} < 0$$
$$\lim_{\mu \to 1^-} \beta_{S,k}^{deni.} = 1 - \frac{1-\alpha}{\alpha} \ln \gamma_k \cdot \lim_{\mu \to 1^-} \frac{1}{\ln \mu} = -\infty$$
$$\lim_{\mu \to 0^+} \beta_{S,k}^{deni.} = 1 - \frac{1-\alpha}{\alpha} \ln \gamma_k \cdot \lim_{\mu \to 0^+} \frac{1}{\ln \mu} = 1$$

QED.

OA.4.3 The Unethical Outsourcing Incentive

The headquarter maximizes the total surplus of the match. Therefore, and as in the baseline model, the ratio of profits under vertical integration and outsourcing for ethical production is given by

$$\Theta^e(\beta) = \left[\left(\frac{\phi_V}{\phi_O} \right)^{\beta} \left(\frac{1-\phi_V}{1-\phi_O} \right)^{1-\beta} \right]^{\frac{\alpha}{1-\alpha}} \frac{1-\alpha(1-\beta) + \phi_V \alpha [1-2\beta]}{1-\alpha(1-\beta) + \phi_O \alpha [1-2\beta]}. \tag{OA.33}$$

For unethical production, the headquarter chooses vertical integration or outsourcing $k \in \{V, O\}$ to maximize

$$\begin{aligned} E\left[\Pi_k^{u,deni.}\right] &= E\left[R(\omega)_k^{u,deni.}\right] - c_m^u m(\omega)_k^u - c_h h(\omega)_k^u \\ &= \gamma_k \mu^{-\frac{\alpha(1-\beta)}{1-\alpha}} A \alpha^{\frac{\alpha}{1-\alpha}} \left[\left(\frac{c_h}{\phi_k} \right)^{\beta} \left(\frac{c_m^e}{1-\phi_k} \right)^{1-\beta} \right]^{-\frac{\alpha}{1-\alpha}} [1-\alpha(1-\beta) + \phi_k \alpha [1-2\beta]] \end{aligned}$$

The integration cutoff $\beta_u^{deni.}$ is thus defined by setting the ratio of unethical profits under integration and outsourcing

$$\Theta^{u,deni.}(\beta) = \left[\left(\frac{\phi_V}{\phi_O} \right)^{\beta} \left(\frac{1-\phi_V}{1-\phi_O} \right)^{1-\beta} \right]^{\frac{\alpha}{1-\alpha}} \frac{\gamma_V (1-\alpha(1-\beta) + \phi_V \alpha [1-2\beta])}{\gamma_O (1-\alpha(1-\beta) + \phi_O \alpha [1-2\beta])} \tag{OA.34}$$

equal to 1.

Proposition OA.1 ***Unethical Outsourcing Incentive***

*In the naive consumers-*cum*-deniability model, the headquarter's optimal integration vs. outsourcing decision depends on the technology used by the supplier. When the supplier is anticipated to implement the ethical technology, integration is chosen for any headquarter intensity β above the unique ethical integration cutoff β_e. If the unethical technology is implemented, the integration cutoff is larger: $\beta_e < \beta_u^{deni.}$. This creates a range of headquarter intensities $\beta \in \left(\beta_e, \beta_u^{deni.}\right)$ in which the headquarter chooses outsourcing iff the supplier (who chooses technology according to Lemma OA.1 produces unethically and* *integration otherwise. A sufficient condition for a unique interior solution $\beta_u^{deni.} \in (\beta_e, 1)$ to exist is given by $\frac{\gamma_O}{\gamma_V} < \left(\frac{\phi_V}{\phi_O}\right)^{\frac{\alpha}{1-\alpha}} \frac{1-\phi_V\alpha}{1-\phi_O\alpha}$. Intuitively, the deniability advantage from outsourcing must not be too large.*

Proof:

Existence *Because β_e is identical to the integration cutoff from Antràs (2003), the result for existence of β_e follows directly from the proof in Antràs (2003), Appendix 2.*

For $\beta_u^{deni.}$, we have the following: Because $\frac{\gamma_V}{\gamma_O} < 1$, it follows that $\Theta^e(\beta) > \Theta^{u,deni.}(\beta)$ for all $\beta \in [0,1]$. The proof in Antràs (2003) shows that $\Theta^e(\beta = 0) < 1$ and so it follows from $\Theta^e(\beta) > \Theta^{u,deni.}(\beta)$ that also $\Theta^{u,deni.}(\beta = 0) < 1$. For existence we need in addition that

$$\Theta^{u,deni.}(\beta = 1) = \left(\frac{\phi_V}{\phi_O}\right)^{\frac{\alpha}{1-\alpha}} \frac{\gamma_V}{\gamma_O} \cdot \frac{1-\phi_V\alpha}{1-\phi_O\alpha} > 1.$$

Because $\phi_V > \phi_O$ and $\frac{\partial}{\partial x}(1-\alpha x)\, x^{\frac{\alpha}{1-\alpha}} > 0$ for $\alpha \in (0,1)$ and $x \in (0,1)$ (see Antràs, 2003, p. 1414), we have that

$$\left(\frac{\phi_V}{\phi_O}\right)^{\frac{\alpha}{1-\alpha}} \cdot \frac{1-\phi_V\alpha}{1-\phi_O\alpha} > 1$$

but because $\frac{\gamma_V}{\gamma_O} < 1$ this result could be overturned if γ_O is too large relative to γ_V. $\beta_u^{deni.}$ exists as long as

$$\left(\frac{\phi_V}{\phi_O}\right)^{\frac{\alpha}{1-\alpha}} \cdot \frac{1-\phi_V\alpha}{1-\phi_O\alpha} > \frac{\gamma_O}{\gamma_V}$$

If the condition is violated, i.e. if the deniability benefit from outsourcing is too large, then $\Theta^{u,deni.}(\beta)$ rises above 1 at a value of $\beta > 1$.[4]

Uniqueness *Uniqueness is proven by showing that $\Theta^e(\beta)$ and $\Theta^{u,deni.}(\beta)$ rise monotonically in β for $\beta \in [0,1]$. As the ethical cutoff β_e is equivalent to the one from Antràs (2003), $\frac{\partial\Theta^e(\beta)}{\partial\beta} > 0$ from the proof from Antràs (2003), Appendix 2. For the unethical case $l = u$, consider that $\frac{\gamma_V}{\gamma_O}$ is a positive multiplicative constant and is thus irrelevant for the sign of the derivative. The proof from Antràs (2003), Appendix 2, Lemma 3, can then be applied.*

Relative Size *For the relative size of the two cutoffs implied by $\Theta^e(\beta)$ and $\Theta^{u,deni.}(\beta)$, consider again that $\Theta^e(\beta) > \Theta^{u,deni.}(\beta)$ for all $\beta \in [0,1]$ because $\frac{\gamma_V}{\gamma_O} < 1$. Given the result on uniqueness above, it follows that $\beta_u^{deni.} > \beta_e$.*

QED.

Taken together, Lemma OA.1 and Proposition OA.1 imply the cutoff structure shown in Figure OA.2. Instead of three cases (as in the baseline model), we now need to differentiate between six cases. The ranges of headquarter intensity labeled “O,u or V,e” require further explanation. In these ranges, which

[4] Note that this condition is not necessary for the model to generate the pattern we find in the data. If the condition is violated, the cutoff $\beta_u^{deni.}$ will be larger than 1 and will thus lie outside the admissible range of β. As can be observed from Figure OA.2, this would only remove some of the cases, but it would not alter the fact that conditional on unethical production, outsourcing is more attractive.

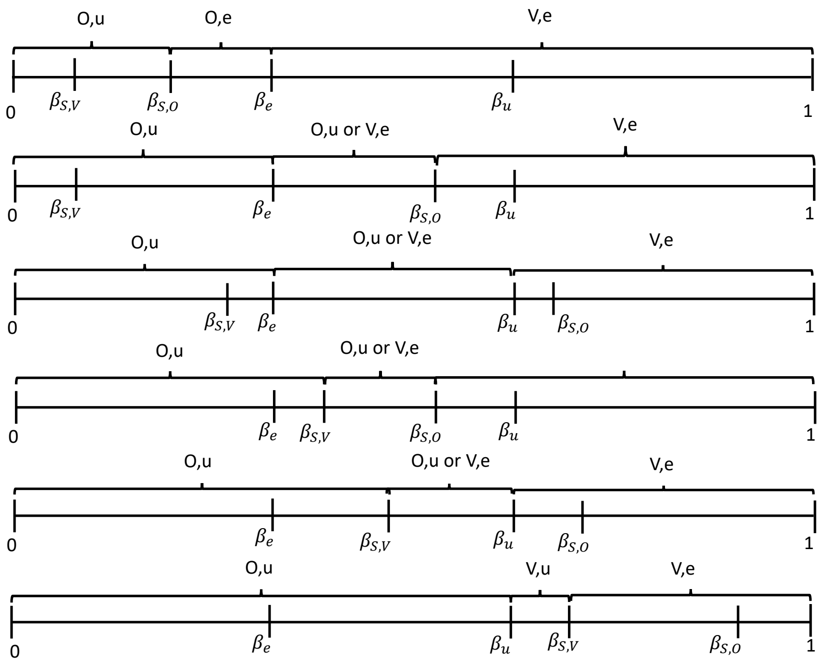

Figure OA.2: Taxonomy of Cases in with Deniability and without Mimicking

can be represented as the intersection of the ranges $(\beta_e, \beta_u^{deni.})$ and $(\beta_{S,V}^{deni.}, \beta_{S,O}^{deni.})$, the cutoff structure does not produce a unique combination of organizational form and technology. Consider, for example, the second scenario in which $\beta_{S,O}^{deni.} > \beta_e$. For a headquarter intensity $\beta \in \left(\beta_e, \beta_{S,O}^{deni.}\right)$, the headquarter faces the following decision. If it anticipated the choice of the ethical technology by the supplier, it would optimally choose integration, and because $\beta > \beta_{S,V}^{deni.}$, the supplier would indeed choose ethical production in this case. However, another scenario is possible. If the headquarter anticipated unethical production by the supplier, the optimal choice would be outsourcing as $\beta < \beta_u^{deni.}$, and because $\beta < \beta_{S,O}^{deni.}$ the supplier would indeed choose outsourcing in that case as well. At the intersection of $(\beta_e, \beta_u^{deni.})$ and $(\beta_{S,V}^{deni.}, \beta_{S,O}^{deni.})$, the organizational decision of the headquarter is thus an instrument to influence the technology choice of the supplier. This is a key difference to our baseline model, where the headquarter can never affect the supplier's decision. We conduct the additional analysis needed to characterize the optimal decision in the following section before moving on to the description the equilibrium of the model.

OA.4.4 Organizational Choice as an Instrument

For the parameter range in which the organizational choice of the headquarter determines the technology choice of the supplier, the two profit functions of ethical integration (V, e) and unethical outsourcing (O, u) need to be compared separately. In these ranges, and only there, is the organizational choice of the headquarter an instrument to influence the technology decision of the supplier. If the headquarter chooses vertical integration, the supplier will optimally choose ethical production. If the headquarter chooses outsourcing, the supplier's optimal choice is unethical production.

In analogy to the analysis above, we can define $\Theta^{O,u;V,e}(\beta)$ as the profit ratio determining the headquarter's optimal choice between unethical outsourcing and ethical integration, where the cutoff $\beta_{O,u;V,e}$ is defined by setting $\Theta^{O,u;V,e}(\beta_{O,u;V,e}) = 1$.

$$\Theta^{O,u;V,e}(\beta) = \frac{\Pi_V^e}{E(\Pi_o^u)} = \frac{A\alpha^{\frac{\alpha}{1-\alpha}}\left[\left(\frac{c_h}{\phi_V}\right)^{\beta}\left(\frac{c_m^e}{1-\phi_V}\right)^{1-\beta}\right]^{-\frac{\alpha}{1-\alpha}}\left[1-\alpha\left(1-\beta\right)+\phi_V\alpha\left(1-2\beta\right)\right]}{\gamma_O A\alpha^{\frac{\alpha}{1-\alpha}}\left[\left(\frac{c_h}{\phi_O}\right)^{\beta}\left(\frac{\mu c_m^e}{1-\phi_O}\right)^{1-\beta}\right]^{-\frac{\alpha}{1-\alpha}}\left[1-\alpha\left(1-\beta\right)+\phi_O\alpha\left(1-2\beta\right)\right]} \tag{OA.35}$$

$$\Theta^{O,u;V,e}(\beta) = \frac{\mu^{\frac{\alpha(1-\beta)}{1-\alpha}}}{\gamma_O} \cdot \Theta^e(\beta) \tag{OA.36}$$

We illustrate the mechanics described in Lemma OA.2 in Figure OA.3.

Lemma OA.2 ***Organizational Choice as an Instrument*** *If and only if the headquarter intensity* $\beta \in \left([\beta_{S,V}^{deni.}, \beta_{S,O}^{deni.}] \cap [\beta_e, \beta_u^{deni.}]\right)$, *the organizational choice of the headquarter is an instrument to control the technology choice of the supplier. The supplier chooses unethical production in case of outsourcing and ethical production in case of vertical integration. The headquarter's choice between unethical outsourcing and ethical integration is determined by the unique cutoff* $\beta_{O,u;V,e}$.

Proof:

Existence *We show that the new cutoff* $\beta_{O,u;V,e}$ *exists in the range* $\beta \in \left([\beta_{S,V}^{deni.}, \beta_{S,O}^{deni.}] \cap [\beta_e, \beta_u^{deni.}]\right)$ *by showing that* $\beta_{O,u;V,e}$ *is decreasing in* μ *and moves from being smaller than* β_e *when* $\mu = 1$ *to a value larger than* $\beta_u^{deni.}$ *when* $\mu \to 0$. *Note that* β_e *and (in contrast to our baseline model) also* $\beta_u^{deni.}$ *are independent of* μ *so that performing comparative statics on* $\beta_{O,u;V,e}$ *and discussing the corner cases with respect to* μ *is sufficient to show the existence of the cutoff in the relevant range.*

We show that $\frac{\partial \beta_{O,u;V,e}}{\partial \mu} < 0$ *by implicitly differentiating*

$$\Theta^{O,u;V,e}((\beta_{O,u;V,e})) = F_1(\beta_{O,u;V,e}) \cdot F_2(\beta_{O,u;V,e}) = 1$$

with respect to μ, *implying that*

$$\frac{\partial F_1}{\partial \mu}F_2 + \frac{\partial F_2}{\partial \mu}F_1 \overset{!}{=} 0,$$

where we have

$$\frac{\partial F_1}{\partial \mu} = \frac{\alpha}{1-\alpha}F_1\left[\frac{1-\beta_{O,u;V,e}}{\mu} + \frac{\partial \beta_{O,u;V,e}}{\partial \mu}\ln\left(\frac{1}{\mu}\left(1+\frac{\delta^{\alpha}}{\phi_O\left(1-\delta^{\alpha}\right)}\right)\right)\right]$$
$$\frac{\partial F_2}{\partial \mu} = -\frac{\partial \beta_{O,u;V,e}}{\partial \mu}\frac{\alpha\left(1-\phi_O\right)\delta^{\alpha}\left(2-\alpha\right)}{\left[1-\alpha\left(1-\beta_{O,u;V,e}\right)+\phi_O\alpha\left(1-2\beta_{O,u;V,e}\right)\right]^2}$$

Plugging in, multiplying through with the denominator of $\frac{\partial F_2}{\partial \mu}$ *and simplifying gives that*

$$\frac{1-\beta_{O,u;V,e}}{\mu}\Omega(\beta_{O,u;V,e}) = \frac{\partial \beta_{O,u;V,e}}{\partial \mu}\left[\left(1-\alpha\right)\left(1-\phi_O\right)\delta^{\alpha}\left(2-\alpha\right) - \ln\left(\frac{1}{\mu}\left(1+\frac{\delta^{\alpha}}{\phi_O\left(1-\delta^{\alpha}\right)}\right)\right)\Omega(\beta_{O,u;V,e})\right],$$

where $\Omega(\cdot) > 0$ *is defined above. Because the left-hand side is positive, for* $\frac{\partial \beta_{O,u;V,e}}{\partial \mu} < 0$ *we need that the* *term in brackets is negative, or equivalently that*

$$(1-\alpha)(1-\phi_O)\,\delta^\alpha(2-\alpha) < \ln\left(\frac{1}{\mu}\left(1+\frac{\delta^\alpha}{\phi_O(1-\delta^\alpha)}\right)\right)\Omega(\beta_{O,u;V,e})$$

This condition holds following Antràs (2003), Appendix 2, and because $\mu<1$, *so that* $\ln\left(\frac{1}{\mu}\left(1+\frac{\delta^\alpha}{\phi_O(1-\delta^\alpha)}\right)\right) > \ln\left(1+\frac{\delta^\alpha}{\phi_O(1-\delta^\alpha)}\right)$.

Now consider the corner cases. From Equation (OA.36) *we know that*

$$\Theta^{O,u;V,e}(\beta) = \frac{\mu^{\frac{\alpha(1-\beta)}{1-\alpha}}}{\gamma_O}\cdot\Theta^e(\beta)$$

Because $\gamma_O<1$ *it follows immediately that*

$$\Theta^{O,u;V,e}(\beta,\mu=1) > \Theta^e(\beta)$$

and hence,

$$\beta_{O,u;V,e|\mu=1} < \beta_e.$$

Using the fact that $\Theta^{u,deni.}(\beta)=\frac{\gamma_V}{\gamma_O}\Theta^e(\beta)$ *it follows that* $\Theta^{O,u;V,e}(\beta)<\Theta^{u,deni.}(\beta)$, *and hence* $\beta_{O,u;V,e} > \beta_u^{deni.}$ *when*

$$\beta < 1-\frac{1-\alpha}{\alpha}\frac{\ln\gamma_V}{\ln\mu}.$$

with

$$\lim_{\mu\to 0^+} 1-\frac{1-\alpha}{\alpha}\frac{\ln\gamma_V}{\ln\mu} = 1$$

so that $\beta_{O,u;V,e}>\beta_u^{deni.}$ *for a sufficiently small* μ. *This shows that* $\beta_{O,u;V,e}$ *covers the full range between* β_e *and* $\beta_u^{deni.}$ *as we move from* $\mu=1$ *to* $\mu=0$.

Uniqueness *We show uniqueness by showing that* $\frac{\partial\Theta^{O,u;V,e}(\beta)}{\partial\beta}>0$. *Recall* $\phi_V=\phi_O+\delta^\alpha(1-\phi_O)$ *so that* $1-\phi_V=(1-\phi_O)(1-\delta^\alpha)$. *Then*

$$\Theta^{O,u;V,e}(\beta) = F_1\cdot F_2,$$

where

$$F_1 = \gamma_O^{-1}\left[\mu(1-\delta^\alpha)\left(\frac{1}{\mu}\left(1+\frac{\delta^\alpha}{\phi_O(1-\delta^\alpha)}\right)\right)^\beta\right]^{\frac{\alpha}{1-\alpha}}$$

$$F_2 = \left[1+\frac{\delta^\alpha(1-\phi_O)\,\alpha(1-2\beta)}{1-\alpha(1-\beta)+\phi_O\alpha(1-2\beta)}\right]$$

For uniqueness we need that $\frac{\partial \Theta^{O,u;V,e}(\beta)}{\partial \beta} = \frac{\partial F_1}{\partial \beta} F_2 + \frac{\partial F_2}{\partial \beta} F_1 > 0$ *for all* $\beta \in [0,1]$.

Note:

$$\begin{aligned}
\frac{\partial F_1}{\partial \beta} &= F_1 \frac{\alpha}{1-\alpha} \ln \left[\frac{1}{\mu} \left(1 + \frac{\delta^\alpha}{\phi_O (1-\delta^\alpha)} \right) \right] \\
\frac{\partial F_2}{\partial \beta} &= \frac{-\alpha \delta^\alpha (1-\phi_O)(2-\alpha)}{[1-\alpha(1-\beta)+\phi_O \alpha (1-2\beta)]^2}
\end{aligned}$$

Then $\frac{\partial \Theta^{O,u;V,e}(\beta)}{\partial \beta} > 0$ *can be simplified to*

$$\ln \left[\frac{1}{\mu} \left(1 + \frac{\delta^\alpha}{\phi_O (1-\delta^\alpha)} \right) \right] \Omega(\beta) > (2-\alpha)(1-\alpha)\delta^\alpha (1-\phi_O),$$

where $\Omega(\beta) = [1-\alpha(1-\beta)+\phi_V \alpha (1-2\beta)] \cdot [1-\alpha(1-\beta)+\phi_O \alpha(1-2\beta)]$. *Because* $1/\mu > 1$, $\ln[\cdot] > 0$. *The remainder of the proof then follows from Antràs (2003), Appendix 2.*

Relationship of $\beta_{O,u;V,e}$ to the supplier cutoffs *We still need to show how the movement of* $\beta_{O,u;V,e}$ *across the two integration cutoffs coincides with the movement of the supplier cutoffs* $\beta_{S,k}^{deni.}$, *which define the range in which* $\beta_{O,u;V,e}$ *is relevant by their overlap with the range* $[\beta_e, \beta_u^{deni.}]$.

Above, we already saw that

$$\Theta^{O,u;V,e}(\beta) = \frac{\mu^{\frac{\alpha(1-\beta)}{1-\alpha}}}{\gamma_O} \cdot \Theta^e(\beta).$$

We also know that

$$\Theta^{u,deni.}(\beta) = \frac{\gamma_V}{\gamma_O} \cdot \Theta^e(\beta)$$

with $\frac{\gamma_V}{\gamma_O} < 1$ *so that*

$$\Theta^{O,u;V,e}(\beta) = \frac{\mu^{\frac{\alpha(1-\beta)}{1-\alpha}}}{\gamma_V} \cdot \Theta^{u,deni.}(\beta).$$

These relationships imply

$$\begin{aligned}
\Theta^{O,u;V,e}(\beta) > \Theta^e(\beta) \text{ iff } \beta > 1 - \frac{1-\alpha}{\alpha}\frac{\ln \gamma_O}{\ln \mu} = \beta_{S,O}^{deni.} \\
\Theta^{O,u;V,e}(\beta) > \Theta^{u,deni.}(\beta) \text{ iff } \beta > 1 - \frac{1-\alpha}{\alpha}\frac{\ln \gamma_V}{\ln \mu} = \beta_{S,V}^{deni.}
\end{aligned}$$

The functional forms of the conditions are equivalent to the two supplier cutoffs $\beta_{S,k}^{deni.}$, $k \in \{V, O\}$, *and therefore inherit all the properties of the supplier cutoffs shown in Lemma OA.1, in particular, the conditions can take any value on the headquarter intensity interval* $[0,1]$ *as* μ *changes.*

We can now make the following observations. (1) From the uniqueness part we know that $\Theta^{O,u;V,e}(\beta)$ *is strictly increasing in* β. *(2)* $\Theta^{O,u;V,e}(\beta)$ *has unique crossing points with* $\Theta^e(\beta)$ *and* $\Theta^{u,deni.}(\beta)$ *at the values of* $\beta_{S,O}^{deni.}$ *and* $\beta_{S,V}^{deni.}$, *respectively. (3) The unique* $\beta_{O,u;V,e}$ *is decreasing in* μ.

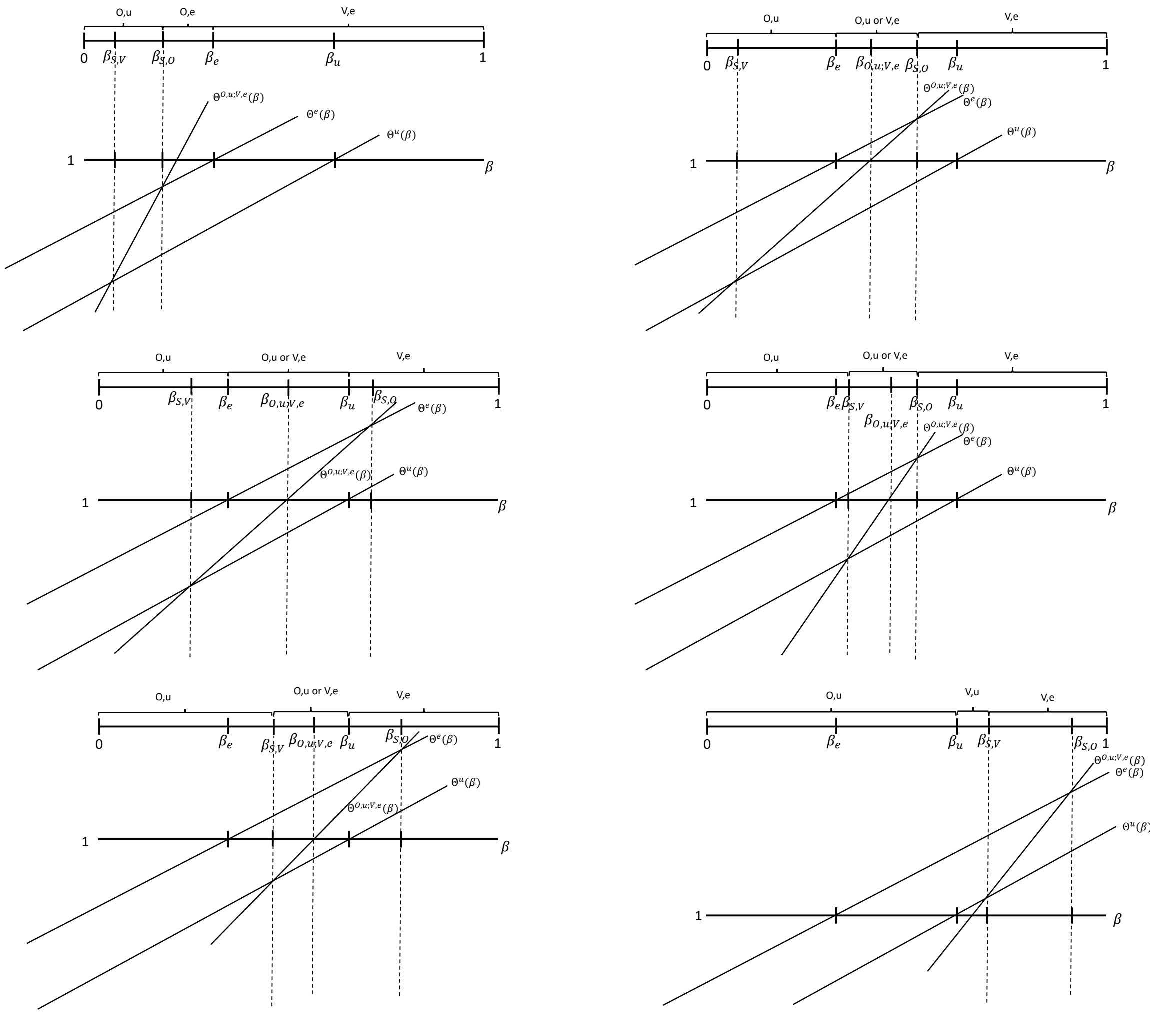

Figure OA.3: Organizational Choice as an Instrument

The following argument is illustrated in Figure OA.3. From the above observations, it follows that $\beta_{O,u;V,e} = \beta_e$ *when* $\beta_{S,O}^{deni.} = \beta_e$*. A small decrease in* μ *makes* $\beta_{S,O}^{deni.} > \beta_e$*, while* $\beta_{S,V}^{deni.}$ *also rises but stay below* β_e *(the top-right scenario in Figure OA.3. Also,* $\beta_{O,u;V,e} > \beta_e$ *after a small decrease in* μ*. For* $\beta \in \left[\beta_e, \beta_{S,O}^{deni.}\right)$ *it holds that* $\Theta^e(\beta) > \Theta^{O,u;V,e}(\beta) > \Theta^{u,deni.}(\beta)$ *and because* $\frac{\partial \Theta^{O,u;V,e}}{\partial \beta} > 0$*, it follows that* $\beta_{O,u;V,e} \in \left(\beta_e, \beta_{S,O}^{deni.}\right)$ *and thus* $\beta_{O,u;V,e} \in \left(\left[\beta_e, \beta_u^{deni.}\right] \cap \left[\beta_{S,V}^{deni.}, \beta_{S,O}^{deni.}\right]\right)$*. As* μ *decreases further,* β_e *and* $\beta_u^{deni.}$ *remain fixed while* $\beta_{S,O}^{deni.}$*,* $\beta_{S,V}^{deni.}$ *and* $\beta_{O,u;V,e}$ *increase and traverse the range* $[\beta_e, \beta_u^{deni.}]$*. When* $\beta_{S,V}^{deni.} = \beta_u^{deni.}$*, also* $\beta_{O,u;V,e} = \beta_u^{deni.}$*. Any further decrease in* μ *increases the cutoff* $\beta_{O,u;V,e}$ *above* $\beta_u^{deni.}$ *and therefore outside the range* $\left[\beta_e, \beta_u^{deni.}\right] \cap \left[\beta_{S,V}^{deni.}, \beta_{S,O}^{deni.}\right]$*. At the same time, as* $\beta_{S,V}^{deni.}$ *increases above* $\beta_u^{deni.}$ *as well, the decision between unethical outsourcing and ethical integration governed by* $\Theta^{O,u;V,e}$ *becomes irrelevant (the bottom-right scenario in Figure OA.3). QED.*

OA.4.5 Equilibrium

We are now able to state the following proposition.

Proposition OA.2 ***Equilibrium***

*In the naive consumers-*cum*-deniability model,*

(i) there exist six possible orderings of $\beta_{S,V}^{deni.}$, $\beta_{S,O}^{deni.}$, β_e, *and* $\beta_u^{deni.}$ *than can arise in equilibrium. (1)* $\beta_{S,V}^{deni.} < \beta_{S,O}^{deni.} < \beta_e < \beta_u^{deni.}$*; (2)* $\beta_{S,V}^{deni.} < \beta_e < \beta_{S,O}^{deni.} < \beta_u^{deni.}$*; (3)* $\beta_{S,V}^{deni.} < \beta_e < \beta_u^{deni.} < \beta_{S,O}^{deni.}$*; (4)* $\beta_e < \beta_{S,V}^{deni.} < \beta_{S,O}^{deni.} < \beta_u^{deni.}$*; (5)* $\beta_e < \beta_{S,V}^{deni.} < \beta_u^{deni.} < \beta_{S,O}^{deni.}$*; (6)* $\beta_e < \beta_u^{deni.} < \beta_{S,V}^{deni.} < \beta_{S,O}^{deni.}$*. The cutoff* $\beta_{O,u;V,e}$ *is relevant iff* $\left[\beta_e, \beta_u^{deni.}\right] \cap \left[\beta_{S,V}^{deni.}, \beta_{S,O}^{deni.}\right] \neq \emptyset$*, in cases (2), (3), (4) and (5).*

(ii) the integration cutoff $\bar{\beta}^{deni.}$ *is given by:*

$$\bar{\beta} = \begin{cases} \min\left\{\beta_{O,u;V,e}; \beta_u^{deni.}\right\} & \textit{if } \beta_{S,O}^{deni.} > \beta_e \\ \beta_e & \textit{otherwise.} \end{cases} \tag{OA.37}$$

(iii) Unethical outsourcing and ethical integration are equilibrium outcomes in all six cases. Unethical integration ethical outsourcing can occur in cases (1) and (6), respectively.

(iii) In case 2 to 5, where $\beta_{O,u;V,e}$ *is the relevant integration cutoff, there is a sharp dichotomy of ethical integration and unethical outsourcing. (iv) In case 1, where* $\beta_{S,V}, \beta_{S,O} < \beta_e$*, ethical outsourcing may occur and in case 6, where* $\beta_{S,V}, \beta_{S,O} > \beta_u$*, unethical integration is a possible equilibrium outcome.*

Proof:

(i) Follows directly from Lemmas OA.1 and OA.2 as well as Proposition OA.1.

(ii) Consider (1). Headquarters in sectors with $\beta < \beta_e$ *choose outsourcing. Suppliers in sectors with* $\beta < \beta_{S,O}^{deni.}$ *choose the unethical technology, and suppliers in sectors with* $\beta \in \left(\beta_{S,O}^{deni.}, \beta_e\right)$ *choose the ethical technology. For all* $\beta > \beta_e$*, suppliers choose the ethical technology because* $\beta_{S,O}^{deni.}, \beta_{S,V}^{deni.} < \beta_e$*. Therefore headquarter choose integration when* $\beta > \beta_e$ *and* β_e *is the outsourcing cutoff.*

Consider (2). For any technology, headquarters in sectors with $\beta < \beta_e$ *choose outsourcing. Because* $\beta_{S,O}^{deni.} > \beta_e$*, all suppliers in this range choose the unethical technology. Within the range* $[\beta_e, \beta_{S,O}^{deni.}]$*, the cutoff* $\beta_{O,u;V,e}$ *is relevant and divides the interval in headquarter choosing outsourcing for* $\beta \in (\beta_e, \beta_{O,u;V,e})$*, which suppliers then choosing unethical production because in this range still* $\beta < \beta_{S,O}^{deni.}$*. If* $\beta \in \left(\beta_{O,u;V,e}, \beta_{S,O}^{deni.}\right)$*, headquarters choose integration and suppliers choose ethical production because in this range* $\beta > \beta_{S,V}^{deni.}$*, which is the relevant supplier cutoff given integration. For all* $\beta > \beta_{S,O}^{deni.}$*, suppliers choose ethical production irrespective of the organizational form. As these* $\beta > \beta_e$*, the headquarter opts for integration and thus* $\beta_{O,u;V,e}$ *is the outsourcing cutoff.*

Consider (3). For any technology, headquarters in sectors with $\beta < \beta_e$ *choose outsourcing. Because* $\beta_{S,O}^{deni.} > \beta_e$*, all suppliers in this range choose the unethical technology. Within the range* $[\beta_e, \beta_u^{deni.}]$*, the cutoff* $\beta_{O,u;V,e}$ *is relevant and divides the interval in headquarter choosing outsourcing for* $\beta \in (\beta_e, \beta_{O,u;V,e})$*, which suppliers then choosing unethical production because in this range still* $\beta < \beta_{S,O}^{deni.}$*. If* $\beta \in (\beta_{O,u;V,e}, \beta_u^{deni.})$*, headquarters choose integration and suppliers choose ethical production because in this range* $\beta > \beta_{S,V}^{deni.}$*, which is the relevant supplier cutoff given integration. For all* $\beta > \beta_u^{deni.}$*, the headquarter chooses integration irrespective of the technology of the supplier. Given integration, suppliers in this range choose integration because* $\beta_{S,V}^{deni.} < \beta_u^{deni.}$*. Hence,* $\beta_{O,u;V,e}$ *is the outsourcing cutoff.*

Consider (4). For any organizational form, suppliers choose the unethical technology when $\beta < \beta_{S,V}^{deni.}$*. Given this, the relevant headquarter cutoff is* $\beta_u^{deni.}$ *and headquarters choose outsourcing in this range.*

For $\beta \in \left(\beta_{S,V}^{deni.}, \beta_{S,O}^{deni.}\right)$, the cutoff $\beta_{O,u;V,e}$ is relevant. For $\beta \in \left(\beta_{S,V}^{deni.}, \beta_{O,u;V,e}\right)$, the headquarter chooses outsourcing and with $\beta_{S,O}^{deni.} > \beta_{O,u;V,e}$, suppliers choose the unethical technology in this range. For $\beta \in \left(\beta_{O,u;V,e}, \beta_{S,O}^{deni.}\right)$, the headquarter chooses integration and with $\beta_{S,V}^{deni.} < \beta_{O,u;V,e}$, suppliers in this range choose the ethical technology. For all $\beta > \beta_{S,O}^{deni.}$, suppliers choose the ethical technology irrespective of organizational form. Because $\beta_{S,O}^{deni.} > \beta_e$, headquarter choose integration in this range. Therefore, $\beta_{O,u;V,e}$ is the outsourcing cutoff.

Consider (5). For any organizational form, suppliers choose the unethical technology when $\beta < \beta_{S,V}^{deni.}$. Given this, the relevant headquarter cutoff is $\beta_u^{deni.}$ and headquarters choose outsourcing in this range. For $\beta \in \left(\beta_{S,V}^{deni.}, \beta_u^{deni.}\right)$, the cutoff $\beta_{O,u;V,e}$ is relevant. For $\beta \in \left(\beta_{S,V}^{deni.}, \beta_{O,u;V,e}\right)$, the headquarter chooses outsourcing and with $\beta_{S,O}^{deni.} > \beta_{O,u;V,e}$, suppliers choose the unethical technology in this range. For $\beta \in \left(\beta_{O,u;V,e}, \beta_u^{deni.}\right)$, the headquarter chooses integration and with $\beta_{S,V}^{deni.} < \beta_{O,u;V,e}$, suppliers in this range choose the ethical technology. For all $\beta > \beta_u^{deni.}$, headquarters choose integration irrespective of the supplier's technology. Because $\beta_u^{deni.} > \beta_{S,V}^{deni.}$, suppliers choose the ethical technology in this case and therefore $\beta_{O,u;V,e}$ is the outsourcing cutoff.

Consider (6). For all $\beta < \beta_{S,V}^{deni.}$, suppliers choose the unethical technology for any organizational form. Therefore, headquarters choose outsourcing for $\beta < \beta_u^{deni.}$ and vertical integration for $\beta \in \left(\beta_u^{deni.}, \beta_{S,V}^{deni.}\right)$. For $\beta > \beta_{S,V}^{deni.}$, headquarters always choose integration because $\beta_{S,V}^{deni.} > \beta_u^{deni.}$ and given integration, suppliers choose the ethical technology when $\beta > \beta_{S,V}^{deni.}$. Hence, $\beta_u^{deni.}$ is the outsourcing cutoff.

(iii) and (iv) follow directly from (i) and (ii).

QED.

Proposition OA.2 is illustrated in Figure OA.4. It shows how the six different possible orderings of cutoffs result in three different organizational patterns across the range of headquarter intensities that correspond to those we find in our baseline model. Unethical outsourcing and ethical integration are equilibrium outcomes in all cases. Ethical outsourcing and unethical integration are equilibrium outcomes in cases (1) and (6) only. In the intermediate cases (2) - (5), the new cutoff $\beta_{O,u;V,e}$ turns out to be the unique separator between unethical outsourcing and ethical integration.

Proposition OA.2 has a corollary that relates this model's results to Proposition 4 from the baseline model.

Corollary OA.1 ***Aligned Preferences between Headquarter and Supplier*** *In the naive consumers-cum-deniability model, the preferences for (un)ethical production are aligned between headquarter and supplier. If the headquarter were able to choose the production technology together with the firm's organizational form such that the full expected profits are maximized, the outcome would be observationally equivalent to the proposed model, in which technology is not contractible and is unilaterally chosen by the supplier.*

Proof: *Consider the choice between ethical and unethical production for the headquarter, maximizing the full expected profits conditional on a particular organizational form $k \in \{V, O\}$. The corresponding*

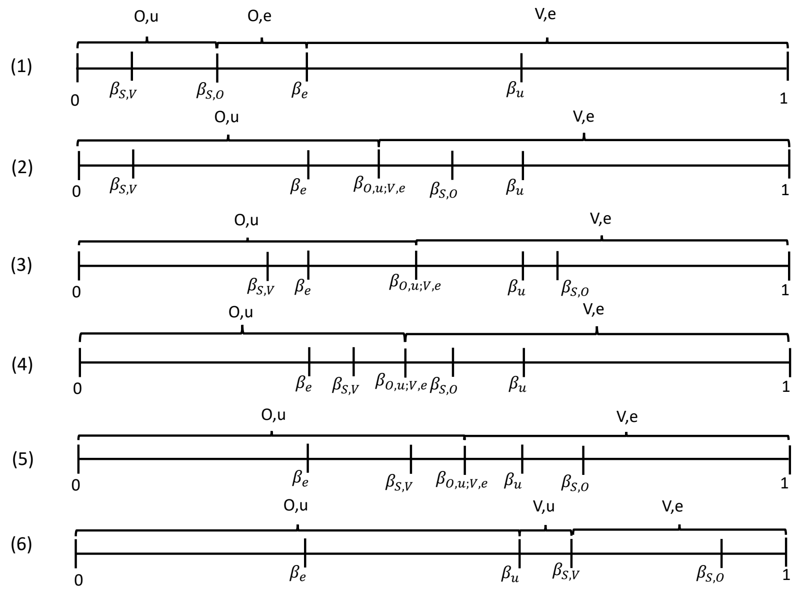

Figure OA.4: Taxonomy of Cases in Equilibrium

ratio is then given by

$$\Theta^{k,u;k,e}(\beta) = \frac{A\alpha^{\frac{\alpha}{1-\alpha}}\left[\left(\frac{c_h}{\phi_k}\right)^{\beta}\left(\frac{c_m^e}{1-\phi_k}\right)^{1-\beta}\right]^{\frac{-\alpha}{1-\alpha}}\left[1-\alpha\left(1-\beta\right)+\phi_k\alpha\left(1-2\beta\right)\right]}{\gamma_k A\alpha^{\frac{\alpha}{1-\alpha}}\left[\left(\frac{c_h}{\phi_k}\right)^{\beta}\left(\frac{\mu c_m^e}{1-\phi_k}\right)^{1-\beta}\right]^{\frac{-\alpha}{1-\alpha}}\left[1-\alpha\left(1-\beta\right)+\phi_k\alpha\left(1-2\beta\right)\right]},$$

which immediately implies that the headquarter prefers ethical production under organizational form k iff

$$\beta > 1 - \frac{1-\alpha}{\alpha}\frac{\ln\gamma_k}{\ln\mu}.$$

The cutoffs implied by this condition coincide with the supplier cutoffs $\beta_{S,V}^{deni.}$ and $\beta_{S,O}^{deni.}$. QED.

In the baseline model there is a range of headquarter intensities for which the supplier chooses unethical production while the headquarter would oblige the supplier to produce ethically. By contrast, in this model with deniability and without mimicking, the headquarter would make the same choices for (un)ethical production as the supplier.

Proposition OA.3 ***Empirical Prediction*** *In the naive consumers-*cum*-deniability model, the outsourcing cutoff is weakly increasing in the unethical cost advantage, i.e.* $\frac{\partial\bar{\beta}^{deni.}}{\partial 1-\mu} \geq 0$.

Proof:

This follows directly from Proposition OA.2 and the fact that $\frac{\partial\beta_{O,u;V,e}}{\partial\mu} < 0$ *as shown in the proof of Lemma OA.2. QED.*

Although it is intuitive and simple to introduce deniability into the model (substituting for Assumption 1), the analysis of the equilibrium turns out to be more complex than the baseline model. Where in the baseline model, the value of one unique cutoff in closed form (β_S) in relation to two other cutoffs (β_e and β_u) is sufficient, here a more complex taxonomy of cases arises. This is illustrated in Figure OA.4. However, the model remains tractable and also delivers the same empirical prediction as the baseline model, that the outsourcing cutoff is weakly increasing in the unethical cost advantage. In contrast to the baseline model, preferences concerning the technology of headquarter and supplier are now aligned.

OA.5 Extension: NGOs, Firms, and Consumer Boycotts

In this section, we introduce elements of private politics to explicitly model the link between firm choices and consumer boycotts. Our extension features private information on technology and an advocacy NGO investigating firms. We take a clear stand on how consumer boycotts emerge and how unethical production affects the risk of facing a boycott. While in the baseline model we imposed that failure of an unethical firm to pool with ethical firms leads to a boycott with certainty, we derive this here from the expectation formation of the NGO and firms' equilibrium response to it. We show that the qualitative results of the baseline model as well as the relation to the empirics we derive from it continue to hold in this extension of the model.

OA.5.1 Co-Existence of Ethical and Unethical Firms

We assume that the type of technology used is private information of the headquarter-supplier match. With the technology used in production being a credence attribute, i.e. consumers care about it but cannot infer it from the final product, private information allows unethical producers to pass as ethical firms and avoid a boycott.

In the baseline model, either all firms in a sector choose the ethical technology or all choose the unethical technology. This is a very stylized pattern that directly stems from the fact that all firms in a sector are identical. In a sector in which all firms implement the unethical technology, mimicking would not make sense, as there are no ethical firms to pool with. We therefore assume that only a fraction κ of suppliers in each sector is able to use the unethical technology. Because of this, in equilibrium there will be at least a fraction $1 - \kappa$ of firms that produce ethically. In period t_0, when the headquarter offers the transfer payment to the supplier and decides the organizational form of the firm, neither party knows whether unethical production will be possible. This is only revealed at the next stage just before investment decisions are taken and the (un)ethical technology choice is made.[5] This assumption implies that the organizational choice of the firm does not contain information on the type of the firm: when it is taken, the headquarter does not know whether the unethical technology will be available in period $t_1(a)$.

OA.5.2 NGO Investigations and Consumer Boycotts

We assume that there is an NGO that is able to investigate firms and to organize such boycotts. As the focus of this paper remains on the international organization of production, we keep the modeling of the

[5] One way to think about this is as follows. Ex-ante the supplier knows that there is some probability κ that it can e.g. bribe government officials to turn a blind eye on toxic waste disposal into a river or on the violation of work safety standards. If this is actually possible in the individual case, only turns out after the match is formed and some investments are made.

NGO relatively stylized.[6]

While technology cannot be directly observed from outside the match, output and prices can be used to infer investment quantities. We assume that the NGO is sophisticated enough to determine the optimal choices of an ethical firm in a given sector. It then potentially faces two types of firms. First, firms that deviate from these choices and are therefore openly unethical. In this case, identifying the firm as unethical is costless for the NGO (we will see below that this is not an assumption, but an outcome of the extended model). Second, a group of *seemingly ethical firms* that are all identical in terms of observables, but which contains ethical and (mimicking) unethical firms. When unethical production is profitable in expectation, the NGO knows that a fraction κ of firms among the seemingly ethical firms are in fact unethical.

As for the group of seemingly ethical firms, we assume the NGO's investigation to be costly. And indeed, in reality, the acquisition of verifiable information on pollution and working conditions and the link to final consumer brands is a costly and possibly dangerous (and illegal) activity in many countries.[7] The result of such an investigation is that the NGO learns about the technology used by a given firm. If the firm is of the ethical type, no boycott is started. If the firm is unethical, the NGO can start a campaign, i.e. it recommends to consumers to boycott the firm. While investigating the technology implemented by the supplier is costly for the NGO, we assume for simplicity that triggering the consumer boycott is costless.

A key feature of our modeling is that consumers *trust* NGOs, and indeed, surveys repeatedly and consistently find that NGOs are the most trusted institutions before government, business and media.[8] Our modeling reflects this relationship of trust in that consumers do not request the type of evidence from the NGO that would be required in a court of justice. They take their boycott decision based on the subjective judgment of the NGO. To illustrate the point, consider the following example: an advocacy NGO sends an agent into a polluting production plant in China. The agent reports (and provides photographs showing) that workers in the plant stitched a well-known label into the shirts produced there. For the NGO this may be sufficient evidence to call for a boycott – and given the trust in the NGO – this may also be sufficient for consumers not to buy that label anymore. But this would clearly not be sufficient evidence (one witness, some photos - even obtained in an illegal private undercover operation) to lead to a conviction in a court of justice, e.g. if the owner of the label sued its supplier for unethical practices. It is important to note that this implies that NGOs may find out about unethical production and consumers may engage in a boycott while the implemented technology remains - legally - unverifiable and therefore not contractible between the headquarter and the supplier.[9]

As investigations are costly, the fraction of firms $1 - \gamma$ the NGO can monitor depends on the funds F it can raise. To organize ideas, we assume that this relation is determined by $1 - \gamma = \Psi(F)$, where $\Psi(F)$ is strictly increasing in F. Also here, we keep the modeling very stylized and simply take the funds F as

[6] Different to, e.g., Krautheim and Verdier (2016) or Aldashev and Verdier (2009) we do not intend to contribute to a better understanding of the endogenous emergence of NGOs, interactions with donors, the trade-offs shaping the fundraising process or the optimal allocation of funds across firms or sectors.

[7] See our discussion in Section 3.1.3 of the main paper.

[8] See, for example, the Edelman Trust Barometer for 2019, at `/https://www.edelman.com/sites/g/files/aatuss191/files/2019-03/2019_Edelman_Trust_Barometer_Global_Report.pdf`, accessed March 7, 2019. In our model, consumers' trust towards NGOs implies that they are willing to base boycott decisions on recommendations by the NGO.

[9] For a more detailed discussion of this important point, see Section 3.1.3 of the main paper.

exogenous.

These are the extensions and refinements we make in order to model the endogenous occurrence of consumer boycotts. All other events in the different periods are just as in the baseline model. We will next discuss the belief formation of the NGO and the informational content of the firms' choices.

OA.5.3 NGO Beliefs and Investigations

The non-cooperative investment game results for each firm in an observable investment profile $i(\theta) = \{h(\theta), m(\theta)\}$ with $h(\theta) \geq 0$ and $m(\theta) \geq 0$.[10] In period t_3, the NGO picks an action $s_i \in \{0, 1\}$ which is to initiate an investigation on a firm with investment profile i or not.[11]

The NGO has a belief function $\eta(\theta \mid i)$. Conditional on observing some investment profile i, it assigns a probability of $\eta(\theta \mid i)$ to the firm being of type θ. If $\eta(\theta = u \mid i) = 1$, the NGO immediately starts an investigation.

Proposition OA.4 *In the extended model, (i) ethical firms are indifferent to NGO investigations and therefore set their investments independently of NGO beliefs; (ii) unethical firms face an NGO investigation with certainty unless they mimic (i.e., set the same investment as) ethical firms. If unethical firms mimic ethical firms, their probability of being investigated is reduced to* $1 - \gamma < 1$.
Proof: *In the text.*

The expectations of the NGO follow Bayes' Law implying the following belief function

$$\eta(\theta = e \mid i) = \frac{Pr(i \mid \theta = e)\ Pr(\theta = e)}{Pr(i \mid \theta = e)\ Pr(\theta = e) + Pr(i \mid \theta = u)\ Pr(\theta = u)}. \tag{OA.38}$$

Note that ethical firms are indifferent to being investigated: they always get full demand in period t_5, as they never face a boycott. Denote by $\tilde{i}$ the investment profile of an ethical firm resulting from the non-cooperative investment game. Even if it could, an ethical firm would never adjust $\tilde{i}$ to accord with an arbitrary belief of the NGO, as this only affects the probability of being investigated, which has no effect on the firm.

We therefore have $Pr(\tilde{i} \mid \theta = e) = 1$ and $Pr(\bar{i} \mid \theta = e) = 0$ for any $\bar{i} \neq \tilde{i}$. Therefore, $\tilde{i}$ is the only investment profile for which the NGO assigns a positive probability to ethical production: $\eta(\theta = e \mid \tilde{i}) > 0$ and $\eta(\theta = e \mid \bar{i}) = 0$ for any $\bar{i} \neq \tilde{i}$. Any other investment profile triggers an immediate investigation by the NGO.

[10] Note two things. First, we speak of an observable investment profile, however, investments can be inferred from optimal quantities and prices, so they do not necessarily have to be observable. Second, for ease of exposition we suppress the organizational subscript k and the variety index ω where possible. It is well understood that the strategies are chosen and decision are made conditional on outsourcing or vertical integration chosen by the headquarter at an earlier point in the game.

[11] When the investments are interpreted by the NGO as containing information on the implemented technology, one could think that there is room for strategic signaling when setting investments. This would place us in the context of a signaling game similar to the one in Krautheim and Verdier (2016). The core idea of the signaling literature in economics (Spence 1973, 1974) is that an agent of a 'high' type may deviate from an otherwise optimal action for the sole purpose to differentiate itself from a 'low' type which would otherwise pool with the 'high' type in terms of observables. This requires that all parties understand that an action is taken on purpose in order to signal one's type. The obvious difference to our setting is that investments - the decision that contains information about the type of the firm - are set non-cooperatively. With incomplete contracts headquarter and supplier can not even coordinate on the profit maximizing investment, let alone an investment in order to signal their type.

The NGO can compute if in a given sector firms have an incentive to be unethical. When unethical firms in that sector pool with ethical firms by setting $\tilde{i}$, they form a group of *seemingly ethical firms* for which investigation is costly for the NGO. As in this case $\eta(\theta = e \mid \tilde{i}) < 1$, the NGO trivially maximizes its objective of starting a boycott against the largest possible number of unethical firms by spending its whole budget on investigations of firms in the seemingly ethical group (and then start costless boycotts against all identified unethical firms).[12]

OA.5.4 Non-Cooperative Investments with Degenerate Demand

We have seen above that unethical firms can only generate positive demand (in expectation) by investing $\tilde{i}$. For this investment the firm faces full demand if it arrives at stage t_5 without a boycott.

Lemma OA.3 *The equilibrium investment profile $\tilde{i}$ of an ethical firm is characterized by the same expressions, i.e. equations* (10) *and* (11), *as the equilibrium profile i^* in the baseline model.*
Proof: *This directly follows from the fact that the optimal choices of the headquarter and the supplier in a match that only has the ethical technology available (or in a sector where all firms endogenously choose ethical production), is unaffected by any element of the model extension.*

It remains to be shown that $\tilde{i} = i^*$ is the equilibrium outcome of the non-cooperative investment game also for an unethical firm. Clearly, it is a Nash equilibrium of the investment game if it yields positive profits in expectation, as any deviation from it would lead to zero demand. As in the Antràs (2003) model, zero-zero is a Nash equilibrium that is ruled out by the Pareto dominance assumption.

Consider the case of an unethical firm. It follows from Equations (13) and (14) that the best response to any investment level other than $i_k^* = \{h_k^e, m_k^e\}$, with $k \in \{V, O\}$ is zero for both parties, as any deviation from i_k^* leads to an investigation by the NGO resulting in a boycott with zero demand. No party would ever find it optimal to choose an investment that is not on its best response function, as it would be strictly dominated by playing the best response. We can therefore state the following proposition.

Proposition OA.5 *In the extended model, unethical firms mimic ethical firms, i.e. the equilibrium investment profile of an unethical firm is identical to the equilibrium investment profile of an ethical firm.*
Proof: *In the text.*

[12] One may think that the fact that the NGO interprets the investment levels as containing information of the type of the firm can only work in a context of homogeneous firms; as with heterogeneous firms, each firm has a different 'ethical' output level. Heterogeneous levels of production, investments and prices, however, are not a problem *per se*. Additional complexity only arises if the underlying driver of heterogeneity is unobservable to the NGO. The most straightforward way of introducing firm heterogeneity would therefore be to assume firm heterogeneity in quality, which has become a standard modeling approach in the literature on trade and quality (see, e.g., Baldwin and Harrigan, 2011, and references therein). Being part of the utility function of the consumer, quality can hardly be private information of the firm, so that the intuition of our model extension goes through also with heterogeneous firms. Some comments on heterogeneity in quality vs. productivity are in order. First, already Melitz (2003) points out that modeling heterogeneity in quality and productivity is isomorphic (Footnote 7, p. 1699). Second, models with heterogeneous quality imply that larger firms set higher prices, a stylized fact that heterogeneity in productivity cannot capture (see, e.g., Kugler and Verhoogen, 2012). Third, the empirical measure of 'productivity' is a residual which could equally well be attributed to 'quality'. But even the introduction of heterogeneity in productivity (combined with productivity being private information of the firm) would not be inconsistent with our modeling. In this case, the NGO would know the distribution of 'ethical' prices, investments and output levels and the actual distribution. For those, say, prices where the actual distribution deviates most from the 'ethical' distribution, the NGO may choose stronger levels of investigation. We do not expect this additional layer of complexity to add substantially to addressing the research questions of this paper.

Using the results of this section, we show in the Online Appendix that the extended model delivers the same qualitative results as the baseline model. Expressions only differ as they now also contain the fraction $1-\kappa$ of firms that cannot use the unethical technology, which we introduced for consistency in the extension.

OA.5.5 Solving the Extended Model

We solve the extended model by backward induction. As we have seen above, in period t_5, all firms not having faced a boycott in period t_3 set the same price and generate the same revenues as in equation (6) of the baseline model. Bargaining takes place in period t_4 and also delivers the same outcome as in the baseline model. In period t_3 nature decides which of the unethical firms face a boycott. A fraction $1-\gamma$ of firms is investigated. The unethical firms among them are boycotted. In period t_2, production of intermediates takes place, again with the same quantities as in the baseline model.

These quantities are chosen in period $t_1(b)$ and are given by (10) for the headquarter and by (11) for the supplier. Firms who choose to produce ethically and those who would like to be unethical but only have the ethical technology available reach these investment quantities in the investment game with continuous best response functions. Firms who have the unethical technology available and whose suppliers choose to use it, optimally mimic the firms who are forced to be ethical.

In period $t_1(a)$, the supplier finds out whether it is able to use the unethical technology in the production of the variety ω it has been matched with. It then maximizes expected profits by comparing expected unethical profits of mimicking $E(\pi^u_{S,k})$ to the certain profits of ethical production $\pi^e_{S,k}$ (as well as the outcome of zero demand in case of openly unethical production, which is never optimal). This comparison is identical to the baseline model. Although only a fraction κ of firms are able to use the unethical technology, from the perspective of an unethical firm the probability of being investigated and being hit by a boycott is $1-\gamma$. Therefore, as in the baseline model, the supplier would prefer unethical production whenever $\beta < \beta_S = 1 - \frac{1-\gamma}{\alpha(1-\mu)}$. Only a fraction κ of suppliers is able to use the unethical technology, the others must choose ethical production even if $\beta < \beta_S$. Investments are then made simultaneously and non-cooperatively, where the headquarter spends $c_h h(\omega)^e_k$ on headquarter services and the supplier spends $c^e_m m(\omega)^e_k$ in case of ethical production and $c^u_m m(\omega)^e_k$ otherwise.

In period t_0, the headquarter chooses the organizational form and extracts a transfer payment before knowing whether the supplier will be able to use the unethical technology. As in the baseline model, the headquarter intensity β determines the organization of production. If $\beta > \beta_S$, the supplier will implement the ethical technology in period $t_1(a)$. The headquarter then chooses outsourcing for $\beta < \beta_e$ and integration otherwise and extracts a transfer payment amounting to the full profits of the supplier under ethical production $\pi^e_{S,k}$ given by equation (17) in the baseline model.

If $\beta < \beta_S$, the headquarter anticipates that the supplier will choose the unethical technology if it is able to do so and mimic ethical firms. At t_0, this happens with probability κ from the perspective of both supplier and headquarter. The headquarter therefore extracts the supplier's future expected profits, which are now different from the baseline model and given by

$$(1-\kappa)\pi^e_{k,S} + \kappa\, E(\pi^u_{k,S}),$$

where $E(\pi^u_{k,S})$ is given by equation (18) in the baseline model. Accordingly, the organizational decision is now also slightly modified compared to the baseline model. Even with $\beta < \beta_S$, there is still a probability $1-\kappa$ that ethical production takes place. Therefore, the ratio of profits under integration relative to outsourcing is in this case given by [13]

$$\tilde{\Theta}^u(\beta) = \frac{(1-\kappa)\,\Pi^e_V + \kappa E\left(\Pi^u_V\right)}{(1-\kappa)\,\Pi^e_O + \kappa E\left(\Pi^u_O\right)},$$

where Π^e_k and $E\left(\Pi^u_k\right)$ are given by equations (20) and (21) from the baseline model. Simplification yields

$$\tilde{\Theta}^u(\beta) = \left[\left(\frac{\phi_V}{\phi_O}\right)^{\beta}\left(\frac{1-\phi_V}{1-\phi_O}\right)^{1-\beta}\right]^{\frac{\alpha}{1-\alpha}} \frac{\gamma' - (1-\beta)\,\alpha\mu' + \phi_V\alpha\left[\mu' - \beta\,(1+\mu')\right]}{\gamma' - (1-\beta)\,\alpha\mu' + \phi_O\alpha\left[\mu' - \beta\,(1+\mu')\right]},$$

where $\gamma' \equiv 1-\kappa\,(1-\gamma)$ and $\mu' \equiv 1-\kappa\,(1-\mu)$. The integration cutoff under unethical production $\tilde{\beta}_u$ is implicitly defined by

$$\tilde{\Theta}^u(\tilde{\beta}_u) = 1. \tag{OA.39}$$

Corollary OA.2 to Lemma OA.3 summarizes the organization of production with the ethical technology in the extended model.

Corollary OA.2 *In the extended model, β_e is unchanged and still defined by equation* (22).
Proof: *This follows directly from Lemma OA.3.*

For production using the unethical technology, we can state the following proposition paralleling Proposition 1 from the baseline model.

Proposition OA.6 *In the extended model, the headquarter's optimal integration vs. outsourcing decision depends on the technology used by the supplier. When the supplier is anticipated to implement the ethical technology, integration is chosen for any headquarter intensity β above the unique ethical integration cutoff β_e. If the unethical technology is implemented, the integration cutoff is larger: $\tilde{\beta}_u > \beta_e$. This creates a range of headquarter intensities $\beta \in \left(\beta_e, \tilde{\beta}_u\right)$ in which the headquarter chooses outsourcing iff the supplier produces unethically and integration otherwise. A sufficient condition for a unique interior solution $\tilde{\beta}_u \in (\beta_e, 1)$ to exist is given by $\gamma > 1 - \frac{3(1-\phi_V)}{(3+\phi_V)\kappa}$.*

Proof: *In the text.*

Setting $\kappa = 1$ reduces $\tilde{\Theta}^u(\beta)$ to $\Theta^u(\beta)$ from the baseline model. Inspection of the definitions of γ' and μ' reveals that $\frac{\partial\gamma'}{\partial\gamma} > 0$ with $0 < \gamma < \gamma' < 1$ and that $\frac{\partial\mu'}{\partial\mu} > 0$ with $0 < \mu < \mu' < 1$. This implies that the proofs we provide for existence and uniqueness of the integration cutoff β_u as well as the relative size of β_e and β_u in Appendix Sections A.2.1, A.2.2, and A.2.3 continue to hold qualitatively for $\tilde{\beta}_u$. It also follows directly that $\beta_e < \tilde{\beta}_u < \beta_u$. To see this, note that β_u and $\tilde{\beta}_u$ are both decreasing in γ, and for any value of $\gamma, \kappa \in (0,1)$ it holds that $\gamma' > \gamma$. In terms of parameter constraints, we now require $\gamma' > \frac{4\phi_V}{3+\phi_V}$ for existence and uniqueness. Inserting the definition of γ' and solving for γ gives the parameter constraint

[13] To avoid confusion, we indicate objects specific to the model extension featuring an NGO with the a tilde (˜).

stated in Proposition OA.6. It is straightforward to show that the condition is less strict on γ than the condition in the baseline model.

Next, we can state the following proposition about the different cases that may arise in the extended model paralleling Proposition 2 from the baseline model.

Proposition OA.7 *In the extended model, (i) there exist three possible orderings of β_S, β_e, and $\tilde{\beta}_u$ that can arise in equilibrium: $\beta_e < \beta_S < \tilde{\beta}_u$ (Case 1); $\beta_e < \tilde{\beta}_u < \beta_S$ (Case 2) and $\beta_S < \beta_e < \tilde{\beta}_u$ (Case 3), (ii) the integration cutoff $\tilde{\beta}$ is given by:*

$$\tilde{\beta} = \begin{cases} \min\{\beta_S; \tilde{\beta}_u\} & \text{if } \beta_S > \beta_e \\ \beta_e & \text{otherwise.} \end{cases} \tag{OA.40}$$

(iii) In Case 1, where $\beta_S \in \left(\beta_e, \tilde{\beta}_u\right)$, there is a sharp dichotomy of ethical integration and unethical outsourcing. (iv) In Case 2, where $\beta_S > \tilde{\beta}_u$, unethical integration may occur and in Case 3, where $\beta_S < \beta_e$, ethical outsourcing is a possible equilibrium outcome.

Proof: *Follows directly from the proof of Proposition 2 in Appendix Section A.3 together with the parameter constraint from Proposition OA.6, which ensures that $\tilde{\beta}_u \in (0, 1)$. All the relationships given in Appendix Section A.3 hold when $\bar{\beta}$ is replaced with $\tilde{\beta}$ and $\tilde{\beta}_u$ replaces β_u.*

Paralleling Proposition 3 from the baseline model, we can state the following proposition.

Proposition OA.8 *In the extended model, the outsourcing cutoff is weakly increasing in the unethical cost advantage, i.e. $\frac{\partial \tilde{\beta}}{\partial(1-\mu)} \geq 0$.*
Proof: *In the text.*

It has been shown above that β_S and β_e remain unchanged in the extended model. Concerning $\tilde{\beta}_u$, Proposition OA.6 implies that Proposition 1 can be applied in the extended model with the adjusted parameter condition. In the proof of Proposition 1, it is shown in Appendix Section A.2.3 that β_u is increasing in $1 - \mu$. Because μ' is increasing in μ, it therefore follows that also $\frac{\partial \tilde{\beta}_u}{\partial 1-\mu} > 0$.

OA.6 Data Appendix

OA.6.1 Correlation Table

Table OA.12 provides the pairwise correlations between the explanatory variables of our preferred specification, column (8) of Table 2 in Section 2 of the main paper.

OA.6.2 Intrafirm Trade

Data on intrafirm trade flows cover the years 2007 to 2014. Up to and including the year 2012, the data are coded in NAICS 2007 industry codes and the other two years are coded in NAICS 2012. We use the NAICS 2007 concordance with IO2007 industry provided by the BEA with its Input-Output tables and the NAICS 2007 to NAICS 2012 concordance from the U.S. Census Bureau to recode the import flows.

Table OA.12: Correlations Among Explanatory Variables

	ECSP	R&D	Skill	Other Machinery	Building	Auto	Computer	Contractibility	Dispersion	Sigma	DUse_TUse	EPSI	HLT	Skill Abun.	Capital Abun.	Rule of Law
ECSP	1															
R&D	-0.1739***	1														
Skill	-0.1471***	0.3806***	1													
Other Machinery	0.4293***	-0.0042	-0.0746***	1												
Building	0.2541***	0.0639***	0.1015***	0.5196***	1											
Auto	0.1048***	-0.2225***	0.2631***	0.1108***	0.1366***	1										
Computer	-0.0832***	0.3083***	0.7159***	0.1171***	0.2327***	0.3086***	1									
Contractibility	0.3306***	-0.2915***	-0.6050***	0.1718***	0.0681***	-0.1534***	-0.4319***	1								
Dispersion	-0.1170***	0.1081***	-0.0908***	0.0730***	0.0097***	-0.1702***	0.0309***	0.0310***	1							
Sigma	-0.0434***	-0.0368***	-0.1446***	-0.0982***	0.0176***	-0.0800***	-0.1041***	0.1175***	0.0294***	1						
DUse_TUse	-0.0592***	0.0218***	0.1254***	-0.1437***	-0.0143***	0.0251***	0.0730***	-0.2204***	-0.0368***	0.0192***	1					
EPSI	-0.0238***	-0.0007	-0.0037	-0.0156***	-0.0339***	-0.0178***	-0.0081	0.0011	0.0052	0.0092*	0.0020	1				
HLT	-0.0137***	0.0047	-0.0128***	0.0027	-0.0059*	-0.0204***	-0.0328***	0.0144***	-0.004	0.0377***	-0.0153***	0.7408***	1			
Skill Abun.	-0.0039***	0.0047	-0.0130***	0.0063**	-0.0056*	-0.0136***	-0.0302***	0.0161***	-0.0118***	0.0363***	-0.0138***	0.5669***	0.6593***	1		
Capital Abun.	-0.0300***	0.0144***	-0.0048	0.0008	-0.0121***	-0.0316***	-0.0388***	0.006**	-0.0035	0.031***	-0.0244***	0.7339***	0.7534***	0.719***	1	
Rule of Law	-0.0165***	0.0093***	0.0012	-0.0035	-0.0086***	-0.0164***	-0.0188***	0.0001	-0.004	0.03***	-0.0171***	0.7688***	0.8039***	0.6259***	0.7799***	1

Note: The table shows the correlation between the logs of the listed variables (except for Contractibility, Dispersion, Sigma, DUse_TUse and HLT, which are in levels) using the cost normalization. The sample is identical to the one from the specification in Column 8 of Table 2.

OA.6.3 Industry Characteristics

Data used to construct the ECSP measure, capital intensity and its components, and skill intensity come from from the Annual Survey of Manufactures (ASM). We use data from 2007 to 2014 and exploit variation across industries and over time. The ASM data are slightly more aggregated than 6-digit NAICS 2007 codes for the years 2007 to 2011 and are coded as NAICS 2012 in the remaining three years. We use the concordance between IO2007 and NAICS 2007 provided by the BEA with its 2007 Input-Output tables as well as the NAICS 2012 to NAICS 2007 concordance provided by the U.S. Census Bureau to achieve a consistent aggregation.

R&D R&D data come from Compustat. We download information on sales and R&D expenditure of U.S. firms listed in Compustat for the years 2007 to 2014. Each firm-year was provided with the NAICS 2007 industry in which the firm operates. The firm-level observations were aggregated at the NAICS 2007 level and then recoded to IO2007 using the concordance from the BEA Input-Output table.

Contractibility Contractibility is a measure of industry contractibility suggested by Nunn and Trefler (2008). We follow Antràs and Chor (2013) and Nunn (2007) in the construction of this measure. We download the original Rauch (1999) data in SITC rev. 2 codes and associate the product classification of the 4-digit codes with HS10 codes from Pierce and Schott (2012). These HS10 codes are then mapped to IO2007 industries via the IO2002-HS10 concordance provided by the BEA and the NAICS 2002 to NAICS 2007 concordances from the US Census Bureau. For each IO2007 industry, we then calculate the share of HS10 codes within each IO2007 code that are classified as neither reference-priced nor traded on an organized exchange (the 'liberal' classification). Contractibility is defined as 1 minus this share.

Dispersion Within-industry dispersion is taken from the dataset provided by Antràs and Chor (2013) who in turn take the data from Nunn and Trefler (2008), who construct dispersion as the standard deviation of the HS10 log exports within each HS6 code across U.S. port locations and destination countries from the year 2000. The aggregation of these original estimates to IO2002 codes is described in Antràs and Chor (2013), Appendix B, p. 2201. We take their data and convert them to IO2007 codes.

DUse_TUse *DUse_TUse* measures the share of industry output used as intermediates that is used in final good production. In the construction of this variable we follow closely the description of the implementation in Antràs and Chor (2013), pp. 2160 and 2161, who construct the measure from the 2002 IO Use Table. We use the 2007 IO use table from the BEA to make the data compatible with our time period. Regressing the data provided by Antràs and Chor (2013) on our self-constructed values of *DUse_TUse*, we find an R-squared of 76.8%, a constant term of -0.02689 and slope coefficient of .96902. Because we expect the vertical relationships within an economy to be relatively slow moving over time, these values make us confident about the correctness of our own implementation of the construction.

Intermediation The *intermediation* variable is taken from the Antràs and Chor (2013) dataset who in turn took their data from Bernard, Jensen, Redding, and Schott (2013). They measure the importance of wholesalers as intermediaries in 1997 at the industry level from establishment-level data on wholesale employment shares. Antràs and Chor (2013) describe how they map the data from the original HS2 level to IO2002 industries in their paper in Appendix B, p. 2202. We take their data off the shelf and convert the IO2002 industries to IO2007 industries using the Input-Output tables from the BEA and NAICS 2002 to NAICS 2007 concordances provided by the US Census Bureau.

OA.6.4 Import Demand Elasticities

For the construction of the IO2007-level import demand elasticities we follow the Antràs and Chor (2013) methodology. First, we combine the original estimates at the HS10-level with a full list of HS10 industry codes from Pierce and Schott (2012). We then employ HS10-level US imports summed over the years 2007 to 2014 from Schott (2008) to generate trade-weighted elasticities for HS10 codes that do not have an estimate. In the first round, we use HS10 codes that share the same first nine digits to generate the missing elasticities. We repeat the procedure using the first eight digits, then seven, up until two digits to fill in as many elasticities as possible. Because there are two different estimates for the same HS10 code 2103204020, we drop the observation. We then use a concordance table built from the BEA IO2002-HS10 concordance and a IO2002-IO2007 crosswalk to aggregate the HS10 codes to IO2007 industries, again using total imports from 2007 to 2014 as weights. We are left with three IO2007 codes without an assigned elasticity: 112120, 323120, and 333295. Those are assigned the values of the nearest neighbors 1121A0, 323110, and 33329A.

OA.6.5 Environmental Policy Stringency Index

We download the data from the OECD.stat website from 2007 up to the most recent year for which all countries were assigned an index value, which was 2012 at the time of the download. The data are available from `/https://stats.oecd.org/Index.aspx?DataSetCode=EPS`. According to the OECD's definition, a policy is more stringent if it puts a higher explicit or implicit price on pollution or environmentally harmful behavior. An index value of 0 is the lowest stringency possible, while an index value of 6 denotes the highest stringency. The maximum value the index attains in our sample is 4.41 for Denmark in 2009. The lowest value is .375 for Brazil in 2011.

OA.6.6 Yale University's Environmental Performance Index

We download panel data on the values of the subindeces of the EPI from `/https://epi.yale.edu/downloads/epi2020indicators20200604.zip` and use the weights for the 2020 version of EPI from `/https://epi.yale.edu/downloads/epi2020weights20200604.csv` to aggregate the subindeces. We also construct the subindex HLT with appropriate weights. HLT focuses on environmental health while the full EPI contains measures of ecosystem vitality. In our analysis, we use the full index labeled EPI as well as the subindex focusing on environmental health measures (HLT). We do so because we believe that the HLT subindex with its components Air Quality, Safety of Drinking Water, Heavy Metal Exposure and the quality of Waste Management provides a better connection with our measure of unethical cost savings potential, which is based on the cost of removing (hazardous) waste, than the Ecosystem Vitality part of EPI, which mainly consists of *growth rates* of various pollutants as well as measures of marine and terrestrial biome protection.

OA.6.7 Country-Industry Interactions

We take **rule of law** from the World Governance Indicators (Kaufmann, Kraay, and Mastruzzi, 2010), **capital abundance** is measured as physical capital per worker from the Penn World Tables version 9.0 (Feenstra, Inklaar, and Timmer, 2015) and **skill abundance** is measured as average years of schooling at all levels from the Barro and Lee (2013) dataset.

The following data have all come from the dataset that accompanies Antràs (2016), but have been compiled by different sources which we mention here. **External (financial) dependence** comes from Rajan and Zingales (1998), and **(asset) tangibility** from Braun (2002) . **Credit / GDP** measures credit provided by the banking sector as a percentage of GDP from the World Development Indicators. **(Labor market) flexibility** and **sales volatility** come from Cuñat and Melitz (2012). Where applicable, we convert the IO2002 codes from Antràs (2016) to the IO2007 codes used in our paper.

OA.6.8 Pollution Data

In our robustness checks, we replace our measure of the unethical cost savings potential with a measure of 1987 US pollution intensities of various pollutants from the World Bank Industrial Pollution Projection System (IPPS), which is also used in Bombardini and Li (2020). We download data on pollution intensities by US SIC code from `/https://development-data-hub-s3-public.s3.amazonaws.com/ddhfiles/140612/nipr_ipps_us_sic_pounds_of_pollution_wps1413.zip`. Documentation can be found at `/https://datacatalog.worldbank.org/dataset/wps1431-ipps-pollution-intensity-and-abatement-cost/resource/27fc1a57-d882-4bae-a70d`. We use a concordance table from Pierce and Schott (2012) to crosswalk the data from their original US SIC format to IO2007 industries, the classification we use in our estimates. In our estimates, we use intensities measured in kg per dollar value of total output and focus on the three pollutants used by Bombardini and Li (2020), suspended particles (PT), SO2, and NO2.

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