Tables and Graphs to complement "Trade, Technology, and Productivity: A Study of Brazilian Manufacturers, 1986-1998"

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The following tables and figures complement Muendler (2004b).

Tables 1 through 4 in section 1 summarize production function estimates from an extended Olley and Pakes (1996) procedure (accounting for 'survivor bias' and 'transmission bias', and partially for 'omitted price', when managements choose efficiency endogenously). The companion paper Muendler (2004a) derives the estimation procedure and carries it out. Table 2 contrasts production function estimates from the extended Olley-Pakes procedure (EOP) with simple ordinary least squares (OLS) estimates.

Section 2 presents tables 5 through 12 and figure 1 for an analysis of total factor productivity (*TFP*) and its relation to trade reform. All estimates on that section are based on EOP estimates of *TFP*.

Section 3 provides a complete replication of the analysis, now based on OLS estimates of *TFP*. Tables 13 through 20 and figure 2 correspond to tables 5 through 12 and figure 1 one by one.

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1 Production function estimates

The following table 1 shows EOP estimates for the five sectors with most firm-year observations. Table 2 contrasts production function estimates from the extended Olley-Pakes procedure (EOP) with simple ordinary least squares (OLS) estimates. Table 3 summarizes estimates of survival probabilities from an intermediate step in the EOP procedure. Table 4 summarizes estimates of foreign input efficiency and makes a comparison of OLS and EOP estimates to coefficient estimates from a fixed-effects estimation.

Table 1: Production Function Estimates (EOP)

Output regressions	Machinery (08)	Wood & furniture (14)	Textiles (22)	Plant products (26)	Food & beverages (31)
Log blue-coll. empl.	.396	.426	.396	.347	.386
	(.025)	(.026)	(.025)	(.021)	(.029)
Log white-coll. empl.	.230	.156	.150	.219	.195
	(.018)	(.014)	(.018)	(.017)	(.016)
Foreign eqpm. share	*.073*	-.299	.138	-.243	*-.044*
	(.099)	(.071)	(.043)	(.101)	(.086)
Log equipment	*.013*	.175	*.030*	.081	.066
	(.016)	(.019)	(.016)	(.018)	(.014)
Log structures	.077	.060	.079	.058	.039
	(.017)	(.016)	(.016)	(.023)	(.013)
Foreign intm. share	*.114*	*.262*	*-.532*	*-.223*	*-.129*
	(.575)	(.239)	(.277)	(.21)	(.268)
Log intermediates	.228	.229	.322	.244	.211
	(.015)	(.013)	(.019)	(.013)	(.012)
Foreign market pen.	*-391.252*	*-529.533*	1008.876	*85.044*	-1945.13
	(713.367)	(306.53)	(419.31)	(305.721)	(547.761)
Nominal tariff	*-19.154*	*-50.555*	97.281	*14.023*	-193.01
	(74.215)	(30.249)	(41.34)	(30.431)	(54.776)
Log aggr. demand	307.473	137.578	289.411	*65.781*	*-115.13*
	(95.159)	(47.621)	(66.741)	(69.821)	(80.881)
Observations	2,695	2,835	3,260	2,764	3,432

Data: *Pesquisa Industrial Annual* 1986-1998. Standard errors from 200 bootstraps.
Not reported: Log age, net investment, real exchange rate, inflation rate, higher-order polynomial terms.

Niv.50	Extended Olley-Pakes procedure							OLS			
	κ^f	k	s	μ^f	m	l^{wh}	l^{bl}	κ^f	k	μ^f	m
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
04	*Nonmetallic mineral goods* (EOP: 1,890, OLS: 2,536 observations)										
	-.035	.080	.035	*-.760*	.225	.151	.497	*-.034*	.080	-.595	.207
	(.091)	(.014)	(.015)	(.585)	(.017)	(.015)	(.022)	(.098)	(.013)	(.18)	(.01)
05	*Iron and steel* (EOP: 470, OLS: 598 observations)										
	-.027	*.027*	*-.060*	*-.513*	.221	*.080*	.493	*-.027*	*.027*	*.262*	.218
	(.105)	(.038)	(.039)	(1.149)	(.063)	(.045)	(.062)	(.235)	(.036)	(.229)	(.02)
06	*Nonferrous metals* (EOP: 290, OLS: 609 observations)										
	-.084	.097	*.004*	*-.633*	.348	.139	.454	*-.116*	.097	*.102*	.33
	(.181)	(.024)	(.019)	(1.015)	(.028)	(.032)	(.049)	(.172)	(.024)	(.142)	(.018)
07	*Other metal products* (EOP: 1,808, OLS: 2,406 observations)										
	.110	*.007*	.072	*.290*	.226	.168	.472	*.108*	*.007*	*-.186*	.214
	(.051)	(.017)	(.017)	(.208)	(.016)	(.016)	(.027)	(.077)	(.013)	(.135)	(.009)
08	*Machinery, equipment and installations* (EOP: 1,991, OLS: 2,629 observations)										
	.054	*.013*	.077	*.114*	.228	.230	.396	*.053*	*.013*	*.045*	.244
	(.099)	(.016)	(.017)	(.575)	(.015)	(.018)	(.025)	(.143)	(.015)	(.1)	(.01)
10	*Electrical equipment and components* (EOP: 1,313, OLS: 1,717 observations)										
	.298	*-.010*	.124	*.137*	.194	.177	.416	*.292*	*-.010*	.253	.21
	(.142)	(.020)	(.016)	(.585)	(.014)	(.02)	(.032)	(.156)	(.019)	(.126)	(.012)

κ^f: share foreign equipment, k: log total equipment, s: log structures, μ^f: share foreign intermediates, m: log total intermediates, l^{wh}: log number of white-collar workers, l^{bl}: log number of blue-collar workers.

Standard errors: Estimates from 200 bootstraps.

Source: *Pesquisa Industrial Anual* 1986-98, deflated with *IPA-OG* and import-weighted foreign *PPI* series (for details see Muendler 2003).

Table 2: Production Functions, continued

Niv.50	Extended Olley-Pakes procedure							OLS			
	κ^f	k	s	μ^f	m	l^{wh}	l^{bl}	κ^f	k	μ^f	m
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
11	*Electronic and communication equipment* (EOP: 912, OLS: 1,180 observations)										
	.115	.045	.091	1.951	.235	.262	.268	*.104*	*.045*	.346	.293
	(.142)	(.021)	(.024)	(.689)	(.039)	(.025)	(.038)	(.141)	(.024)	(.114)	(.013)
12	*Automobiles, trucks and buses* (EOP: 270, OLS: 359 observations)										
	-.457	*-.011*	.093	*1.005*	.183	.103	.701	*-.439*	*-.011*	*.117*	.23
	(.309)	(.047)	(.034)	(1.858)	(.049)	(.05)	(.079)	(.26)	(.036)	(.321)	(.024)
13	*Other transp. equipment and vehicle parts* (EOP: 1,403, OLS: 1,837 observations)										
	.0004	*.007*	.103	*.046*	.226	.187	.517	*.0004*	*.007*	.461	.229
	(.064)	(.017)	(.019)	(.366)	(.014)	(.017)	(.026)	(.09)	(.015)	(.085)	(.01)
14	*Wood and furniture* (EOP: 2,014, OLS: 2,731 observations)										
	-.327	.178	.060	*.262*	.229	.156	.426	-.328	.178	-.394	.232
	(.071)	(.019)	(.016)	(.239)	(.013)	(.014)	(.026)	(.094)	(.015)	(.197)	(.01)
15	*Pulp, paper and paperboard* (EOP: 877, OLS: 1,159 observations)										
	.045	.118	*.018*	*.419*	.243	.213	.416	*.045*	.118	*-.248*	.249
	(.124)	(.03)	(.02)	(.349)	(.025)	(.024)	(.031)	(.163)	(.017)	(.247)	(.013)
16	*Rubber products* (EOP: 573, OLS: 766 observations)										
	-.367	.079	.081	*-.264*	.210	.188	.319	*-.364*	.078	*-.514*	.228
	(.314)	(.032)	(.02)	(1.042)	(.032)	(.036)	(.054)	(.238)	(.03)	(.351)	(.02)

κ^f: share foreign equipment, k: log total equipment, s: log structures, μ^f: share foreign intermediates, m: log total intermediates, l^{wh}: log number of white-collar workers, l^{bl}: log number of blue-collar workers.

Standard errors: Estimates from 200 bootstraps.

Source: *Pesquisa Industrial Anual* 1986-98, deflated with *IPA-OG* and import-weighted foreign *PPI* series (for details see Muendler 2003).

Table 2: Production Functions, continued

Niv.50	Extended Olley-Pakes procedure							OLS			
	κ^f	k	s	μ^f	m	l^{wh}	l^{bl}	κ^f	k	μ^f	m
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
17	*Non-petrochemical chemicals* (EOP: 872, OLS: 1,146 observations)										
	-.056	*.055*	.106	*.146*	.384	.151	.197	*-.158*	.055	-.754	.378
	(.243)	(.037)	(.042)	(1.06)	(.033)	(.021)	(.024)	(.406)	(.024)	(.21)	(.015)
18	*Petrochemicals* (EOP: 704, OLS: 914 observations)										
	-.157	*.032*	.101	*-.065*	.199	.188	.306	*-.171*	*.032*	-.291	.157
	(.204)	(.024)	(.024)	(.201)	(.026)	(.028)	(.038)	(.219)	(.022)	(.125)	(.015)
19	*Miscellaneous chemical products* (EOP: 1,142, OLS: 1,463 observations)										
	-.217	*-.006*	.071	*-.644*	.177	.228	.505	*-.198*	*-.006*	*.052*	.148
	(.231)	(.019)	(.023)	(.481)	(.016)	(.033)	(.035)	(.173)	(.018)	(.09)	(.012)
20	*Pharmaceutical products and detergents* (EOP: 1,212, OLS: 1,574 observations)										
	-.124	.141	*-.018*	*-.372*	.164	.187	.446	*-.262*	.155	-.567	.114
	(.121)	(.021)	(.022)	(.43)	(.015)	(.022)	(.029)	(.178)	(.023)	(.098)	(.013)
21	*Plastics products* (EOP: 1,355, OLS: 1,785 observations)										
	-.070	.068	.053	*-.483*	.197	.210	.442	*-.070*	.068	*.248*	.181
	(.114)	(.017)	(.014)	(.447)	(.019)	(.02)	(.028)	(.135)	(.015)	(.159)	(.01)
22	*Textiles* (EOP: 2,452, OLS: 3,197 observations)										
	.143	*.030*	.080	*-.532*	.322	.150	.396	.143	.030	-.277	.311
	(.043)	(.016)	(.016)	(.277)	(.019)	(.018)	(.025)	(.063)	(.013)	(.086)	(.009)

κ^f: share foreign equipment, k: log total equipment, s: log structures, μ^f: share foreign intermediates, m: log total intermediates, l^{wh}: log number of white-collar workers, l^{bl}: log number of blue-collar workers.

Standard errors: Estimates from 200 bootstraps.

Source: *Pesquisa Industrial Anual* 1986-98, deflated with *IPA-OG* and import-weighted foreign *PPI* series (for details see Muendler 2003).

Table 2: Production Functions, continued

Niv.50	Extended Olley-Pakes procedure							OLS			
	κ^f	k	s	μ^f	m	l^{wh}	l^{bl}	κ^f	k	μ^f	m
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
23	*Apparel and apparel accessories* (EOP: 1,534, OLS: 2,063 observations)										
	.050	.116	.109	*-.644*	.172	.221	.416	*.082*	.109	.457	.198
	(.107)	(.019)	(.016)	(.747)	(.015)	(.018)	(.024)	(.097)	(.019)	(.168)	(.01)
24	*Footwear and leather and hide products* (EOP: 1,454, OLS: 1,858 observations)										
	.225	*.003*	.033	*.684*	.233	.131	.488	*.221*	*.003*	.505	.23
	(.087)	(.017)	(.017)	(.457)	(.02)	(.019)	(.031)	(.117)	(.017)	(.162)	(.014)
25	*Coffee manufacturing* (EOP: 653, OLS: 840 observations)										
	.0004	*.024*	*.054*	*.655*	.200	.272	.294	*.0008*	*.024*	*1.11*	.196
	(.148)	(.036)	(.032)	(1.202)	(.026)	(.041)	(.043)	(.289)	(.029)	(.788)	(.017)
26	*Plant products* (EOP: 2,099, OLS: 2,745 observations)										
	-.247	.084	.057	*-.223*	.244	.219	.347	-.327	.084	-.406	.230
	(.101)	(.018)	(.023)	(.21)	(.013)	(.017)	(.021)	(.14)	(.016)	(.095)	(.009)
27	*Meat and poultry* (EOP: 874, OLS: 1,165 observations)										
	-.124	.074	*.014*	*-.546*	.313	.149	.367	*-.111*	.075	-1.576	.298
	(.163)	(.021)	(.022)	(.733)	(.038)	(.03)	(.044)	(.228)	(.025)	(.525)	(.014)
28	*Dairy products* (EOP: 635, OLS: 832 observations)										
	-.487	*.059*	*-.048*	*2.500*	.278	.166	.290	-.544	.061	*-.495*	.252
	(.200)	(.033)	(.028)	(1.342)	(.03)	(.032)	(.039)	(.247)	(.031)	(.648)	(.016)

κ^f: share foreign equipment, k: log total equipment, s: log structures, μ^f: share foreign intermediates, m: log total intermediates, l^{wh}: log number of white-collar workers, l^{bl}: log number of blue-collar workers.

Standard errors: Estimates from 200 bootstraps.

Source: *Pesquisa Industrial Anual* 1986-98, deflated with *IPA-OG* and import-weighted foreign *PPI* series (for details see Muendler 2003).

Table 2: Production Functions, continued

Niv.50	Extended Olley-Pakes procedure							OLS			
	κ^f	k	s	μ^f	m	l^{wh}	l^{bl}	κ^f	k	μ^f	m
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
29	*Sugar* (EOP: 469, OLS: 1,079 observations)										
	-.574	.061	*.015*	*-1.024*	.333	.105	.175	*-.575*	.061	*-.346*	.33
	(.292)	(.024)	(.019)	(3.404)	(.022)	(.017)	(.019)	(.335)	(.022)	(1.553)	(.014)
30	*Food fats and oils* (EOP: 433, OLS: 562 observations)										
	-.321	.076	.15	*-.089*	.295	.207	.288	-.695	.085	*1.208*	.29
	(.333)	(.024)	(.034)	(1.394)	(.035)	(.044)	(.041)	(.317)	(.027)	(.969)	(.02)
31	*Beverages and other food products* (EOP: 2,568, OLS: 3,367 observations)										
	-.055	.068	.038	*-.129*	.211	.195	.386	*-.055*	.068	-.269	.179
	(.086)	(.014)	(.013)	(.268)	(.012)	(.016)	(.029)	(.139)	(.014)	(.129)	(.008)

κ^f: share foreign equipment, k: log total equipment, s: log structures, μ^f: share foreign intermediates, m: log total intermediates, l^{wh}: log number of white-collar workers, l^{bl}: log number of blue-collar workers.

Standard errors: Estimates from 200 bootstraps.

Source: *Pesquisa Industrial Anual* 1986-98, deflated with *IPA-OG* and import-weighted foreign *PPI* series (for details see Muendler 2003).

Table 3: Survival Probabilities

	Logit			Probit		
	86-90	92-98	89-98[a]	86-90	92-98	89-98[a]
	(1)	(2)	(3)	(4)	(5)	(6)
Real exch. rate (USD)[b]	5.255	1.13	2.301	2.322	.565	1.005
	(.39)	(.507)	(.369)	(.169)	(.223)	(.161)
Foreign mkt. penetration	*.307*	*-.4*	*-.474*	*.138*	*-.172*	*-.198*
	(1.136)	(.615)	(.551)	(.499)	(.271)	(.246)
Nominal tariff	*.529*	*-.446*	-.667	*.233*	*-.24*	-.342
	(.308)	(.738)	(.263)	(.132)	(.327)	(.124)
CPI inflation rate	-.031	.082	-.016	-.014	.039	-.008
	(.005)	(.017)	(.007)	(.002)	(.007)	(.003)
ι(Exporter)			.558			.246
			(.083)			(.036)
Observations	25,783	23,627	28,932	25,783	23,627	28,932
Outcome correlation[c]		.256			.249	

[a]Exporting status observed since 1989.

[b]Annual. Based on *IPA-OG* and US producer price index.

[c]Correlation between predictions (zero to one) and outcomes (either zero or one).

Further regressors: Log age, log capital stock, net investment, constant and second to fourth-order polynomial terms (not reported).

Table 4: Foreign Input Efficiency

Sector counts	OLS	EOP[a]	FE
	(1)	(2)	(3)
t tests for non-zero coefficients			
$\beta_K\gamma_K \neq 0$	13 (11) of 27	8 (3) of 27	3 (1) of 27
$\beta_M\gamma_M \neq 0$	11 (7) of 27	1 (1) of 27	8 (4) of 27
F tests for efficiency differences			
$\beta_K\gamma_K \neq \beta_K$	11 (9) of 27	8 (2) of 27	4 (1) of 27
$\beta_M\gamma_M \neq \beta_M$	11 (3) of 27	3 (1) of 27	11 (2) of 27
Average[b] γ_K and γ_M			
Mean $\widehat{\beta_K\gamma_K}/\widehat{\beta_K}$	5.71 (13 of 27)	-4.73 (3 of 27)	-8.36 (1 of 27)
Mean $\widehat{\beta_M\gamma_M}/\widehat{\beta_M}$	.875 (11 of 27)	8.30 (1 of 27)	.051 (8 of 27)

[a]Variance and covariance estimates from 200 bootstraps. Wald tests instead of F tests.

[b]Sectors included if $\beta_K\gamma_K$ and β_K, or $\beta_M\gamma_M$ and β_M, significantly different from zero at .95 level.

Data: *PIA* 1986-98, deflated with *IPA-OG* and import-weighted foreign *PPI* series.

Figures in (brackets) are counts of positive estimates $\widehat{\beta_K\gamma_K} > 0$ or $\widehat{\beta_M\gamma_M} > 0$. To find upper bounds on sector counts, significance levels are kept at .95 and not adjusted for repeated testing.

2 Effects of trade reform for EOP estimates

In Muendler (2004b), changes to log total factor productivity (TFP) are related to trade reform. Tables 5 through 12 and figure 1 in this section show results of estimations for log TFP when log TFP is estimated with EOP.

Beyond Muendler (2004b), table 19 shows ordered logit estimates of transitions probabilities. All other tables also appear in Muendler (2004b).

Table 5: Foreign Competition and Productivity Change

	FE (EOP)	2SLS-FE (EOP)			FE (GM)
	$\Delta \ln TFP$	$\Delta \ln TFP$	Tariff	M.Pen.	$\Delta \ln TFP$
	(1)	(2)	(3)	(4)	(5)
Nominal tariff	-.132	-.611			-.270
	(.027)	(.072)			(.051)
Market penetration	1.090	3.494			1.565
	(.149)	(.558)			(.289)
κ^f	*-.056*	-.109	-.085	*.001*	-.281
	(.029)	(.03)	(.006)	(.001)	(.057)
μ^f	.090	.081	.069	.028	.418
	(.035)	(.04)	(.008)	(.001)	(.068)
ι(medium L^{tot})[a]	.160	.162	*-.002*	-.003	.198
	(.029)	(.03)	(.006)	(.001)	(.057)
ι(big L^{tot})[a]	.185	.186	*-.013*	-.005	.172
	(.031)	(.031)	(.006)	(.001)	(.059)
ι(medium cap.)[b]	-.091	-.077	*.006*	*.0002*	*.021*
	(.022)	(.022)	(.005)	(.0009)	(.043)
ι(big cap.)[b]	-.101	-.077	*.003*	*-.001*	*.062*
	(.024)	(.025)	(.005)	(.001)	(.047)
Sector demand[c]	-.269	-.347	-.054	.018	-.467
	(.013)	(.018)	(.003)	(.0005)	(.025)
FDI flow[d]	-.039	-.062	-.047	*-.0003*	-.116
	(.008)	(.009)	(.002)	(.0003)	(.016)
Cum. FDI[d]	.020	.059	.037	-.006	.049
	(.007)	(.009)	(.001)	(.0003)	(.014)
Nom. exch. rate (USD)			.583	.075	
			(.015)	(.003)	
CPI Brazil			-.376	-.057	
			(.014)	(.003)	
PPI EU			-.218	.072	
			(.019)	(.004)	
PPI North America			*.035*	-.156	
			(.019)	(.004)	
Obs.	30,841	30,841	30,841	30,841	30,841
R^2 (within)	.021	.002	.860	.595	.032
F (instruments)			1730.7	817.9	

[a]Medium: $(30 \leq L^{tot}_{i,t} < 300)$, big: $(L^{tot}_{i,t} \geq 300)$.
[b]Medium: $K_{i,t} + S_{i,t}$ in middle tercile of all firms in a year, big: in upper tercile.
[c]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[d]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressors: Age, Age^2 (not reported).

Table 6: Foreign Competition and Productivity Change, Over-Identification tests for Validity of Instruments

2SLS-FE (EOP)	Base[a]	Add CPI_{Brazil}	Add WPI_{World}	Add PPI_{OECD}	Add $CPI_{Arg.}$
	(1)	(2)	(3)	(4)	(5)
Nominal tariff	-.594	-.611	-.512	-.612	-.240
	(.073)	(.072)	(.065)	(.071)	(.062)
Market penetration	3.762	3.494	3.558	4.033	2.776
	(.577)	(.558)	(.569)	(.522)	(.563)
Age	-.065	-.065	-.059	-.068	-.038
	(.007)	(.007)	(.006)	(.006)	(.006)
κ^f	-.107	-.109	-.097	-.109	-.067
	(.03)	(.03)	(.03)	(.03)	(.03)
μ^f	*.066*	.081	*.058*	*.058*	*.038*
	(.041)	(.04)	(.04)	(.04)	(.04)
ι(medium L^{tot})[b]	.163	.162	.164	.164	.164
	(.03)	(.03)	(.03)	(.03)	(.03)
ι(big L^{tot})[b]	.189	.186	.19	.19	.195
	(.031)	(.031)	(.031)	(.031)	(.031)
ι(medium cap.)[c]	-.078	-.077	-.081	-.078	-.091
	(.022)	(.022)	(.022)	(.022)	(.022)
ι(big cap.)[c]	-.079	-.077	-.084	-.078	-.1
	(.025)	(.025)	(.025)	(.025)	(.025)
Sector demand[d]	-.348	-.347	-.337	-.353	-.299
	(.018)	(.018)	(.017)	(.017)	(.017)
FDI flow[e]	-.062	-.062	-.059	-.064	-.048
	(.009)	(.009)	(.009)	(.009)	(.009)
Cum. FDI[e]	.059	.059	.054	.062	.035
	(.009)	(.009)	(.009)	(.009)	(.009)
Obs.	30,841	30,841	30,841	30,841	30,841
R^2 (within)	.0008	.002	.006		.016
$\hat{\chi}^2$		3.677	16.799	.878	-91.704
$Pr(\chi^2_{12} > \hat{\chi}^2)$		.989	.157	1	

[a]Baseline instrumental variables: Nom. exch. rate (USD), PPI EU, PPI North America
[b]Medium: $(30 \leq L^{tot}_{i,t} < 300)$, big: $(L^{tot}_{i,t} \geq 300)$.
[c]Medium: $K_{i,t} + S_{i,t}$ in middle tercile of firms in a year, big: in upper tercile.
[d]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[e]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressor: Age^2 (not reported).

Table 7: Foreign Competition and 5-year Productivity Change

	FE (EOP)	2SLS-FE (EOP)			FE (GM)
	$\Delta_{5yr} \ln TFP$	$\Delta_{5yr} \ln TFP$	Δ_5Trf.	Δ_5M.P.	$\Delta_{5yr} \ln TFP$
	(1)	(2)	(3)	(4)	(5)
Δ_{5yr} Tariff	-.648	*-4.585*			*-.629*
	(.259)	(3.132)			(.567)
Δ_{5yr} Mkt. penetr.	*-.656*	*6.449*			-2.232
	(.365)	(5.839)			(.798)
κ^f	*.166*	*.287*	*.023*	*-.007*	*.28*
	(.133)	(.186)	(.012)	(.009)	(.292)
ι(medium L^{tot})[a]	*.64*	*.55*	*.038*	*.033*	*-1.124*
	(.426)	(.513)	(.038)	(.028)	(.931)
ι(big L^{tot})[a]	*.773*	*.691*	*.04*	*.033*	*-1.041*
	(.428)	(.515)	(.038)	(.028)	(.936)
ι(medium cap.)[b]	-.278	-.307	*-.002*	*.002*	*-.06*
	(.087)	(.106)	(.008)	(.006)	(.19)
ι(big cap.)[b]	-.375	-.426	*-.001*	*.006*	*-.017*
	(.099)	(.125)	(.009)	(.006)	(.216)
Sector demand[c]	*-.112*	*-.131*	.064	.032	*-.062*
	(.083)	(.107)	(.008)	(.006)	(.181)
FDI flow[d]	*.107*	*-1.13*	-.059	.14	.596
	(.125)	(1.007)	(.011)	(.008)	(.274)
Cum. FDI[d]	*-.082*	*1.392*	.097	-.152	*-.612*
	(.151)	(1.2)	(.013)	(.009)	(.33)
PPI & WPI World			8.070	5.438	
			(1.067)	(.779)	
PPI EU			-1.122	-.867	
			(.267)	(.195)	
PPI North America			-1.664	-1.352	
			(.303)	(.222)	
Obs.	3,856	3,856	3,856	3,856	3,856
R^2 (within)	.05		.824	.363	.03
F (instruments)			56.1	30.3	

[a]Medium: $(30 \leq L^{tot}_{i,t} < 300)$, big: $(L^{tot}_{i,t} \geq 300)$.
[b]Medium: $K_{i,t} + S_{i,t}$ in middle tercile of firms in a year, big: in upper tercile.
[c]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[d]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressors: Age, Age^2; further IV: PPI OECD (not reported).

Table 8: Efficiency Contribution of Foreign Inputs

EOP	10 *Electrical eqpm.* log *TFP*	10 *Electrical eqpm.* Input	24 *Footw. & leather* log *TFP*	24 *Footw. & leather* Input	28 *Dairy products* log *TFP*	28 *Dairy products* Input
	(1)	(2)	(3)	(4)	(5)	(6)
		$\beta_K\gamma_K \cdot \kappa^f$		$\beta_K\gamma_K \cdot \kappa^f$		$\beta_K\gamma_K \cdot \kappa^f$
1986	8.857	.004	9.314	.002	11.263	-.005
1990	8.730	.014	8.985	.010	10.811	-.026
1992	9.203	.020	9.198	.018	10.914	-.028
1995	9.327	.044	9.029	.042	10.825	-.047
		$\beta_M\gamma_M \cdot \mu^f$		$\beta_M\gamma_M \cdot \mu^f$		$\beta_M\gamma_M \cdot \mu^f$
1996	9.693	.025	8.949	.133	10.867	.071
1998	9.614	.032	9.046	.111	11.032	.196

Foreign inputs in the two sectors with the highest positive significant $\beta_K\gamma_K$ estimates (10, 24) and the sector with the highest positive significant $\beta_M\gamma_M$ estimate (28).

Data: *PIA* 1986-98, deflated with *IPA-OG* and import-weighted foreign *PPI* series.

Table 9: Multinomial Logit Estimates of Transition Probabilities

$\sigma_{i,t}$	Exporter			Non-Exporter		
$\sigma_{i,t+1}$	Non-Exp.	Susp.	Exit	Exp.	Susp.	Exit
	(1)	(2)	(3)	(4)	(5)	(6)
Nominal tariff[a]	1.957	*-1.015*	-2.680	*-.234*	-1.300	-1.732
	(.303)	(1.176)	(.944)	(.152)	(.555)	(.482)
Market penetration	*.270*	*-1.536*	*-.540*	3.334	*-.788*	2.317
	(.672)	(2.156)	(1.257)	(.507)	(1.553)	(1.003)
Real exch. rate (USD)[b]	-.781	*.434*	-2.751	-1.582	*-.614*	-2.523
	(.272)	(.831)	(.696)	(.133)	(.467)	(.387)
ln *TFP-EOP*	-.081	-.232	*.100*	.122	-.328	-.258
	(.038)	(.1)	(.068)	(.021)	(.072)	(.057)
κ^f	-1.156	*-.695*	-2.171	.992	*-1.107*	*-1.242*
	(.329)	(1.221)	(.977)	(.236)	(1.172)	(.839)
μ^f	-1.726	*-.112*	*-.056*	*-.011*	*-2.738*	*.135*
	(.519)	(1.003)	(.648)	(.407)	(2.445)	(.805)
ι(med. L^{tot})[c]	-1.236	*-.836*	-1.69	.861	*-.181*	-.971
	(.456)	(1.066)	(.703)	(.27)	(.333)	(.206)
ι(big L^{tot})[c]	-1.826	*-2.035*	-1.945	1.532	*-.700*	-1.402
	(.456)	(1.082)	(.721)	(.27)	(.379)	(.243)
ι(med. cap.)[d]	-1.085	*-.112*	-1.408	.651	*-.322*	*-.172*
	(.284)	(1.029)	(.413)	(.185)	(.256)	(.197)
ι(big cap.)[d]	-1.511	*-.047*	-1.75	1.416	*-.235*	*-.127*
	(.29)	(1.055)	(.436)	(.188)	(.314)	(.24)
Sector demand[e]	*-.102*	*.057*	*-.035*	.194	.409	*.184*
	(.086)	(.243)	(.164)	(.053)	(.171)	(.138)
FDI flow[f]	*.049*	.512	.384	-.497	*.205*	*-.113*
	(.093)	(.223)	(.192)	(.072)	(.188)	(.163)
Cum. FDI[f]	*.063*	*.013*	-.22	*-.034*	*-.084*	-.143
	(.037)	(.102)	(.075)	(.026)	(.079)	(.054)
Obs.	11,092			22,814		
Pseudo R^2	.045			.081		
$\hat{\chi}^2$	383.6			1398.8		
$Pr(\chi^2_{42} > \hat{\chi}^2)$	.0000			.0000		

[a]Next year's nominal tariff.
[b]Annual. Based on *IPA-OG* and US producer price index.
[c]Medium: $(30 \leq L^{tot}_{i,t} < 300)$, big: $(L^{tot}_{i,t} \geq 300)$.
[d]Medium: $K_{i,t} + S_{i,t}$ in middle tercile of firms in a year, big: in upper tercile.
[e]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[f]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressors: Age and a *constant* (not reported).

Table 10: Further Multinomial Logit Estimates of Transition Probabilities

$\sigma_{i,t}$	Suspended Firm			Non-Exporter		
$\sigma_{i,t+1}$	Exp.	Dom.	Exit	Exp.	Susp.	Exit
	(1)	(2)	(3)	(4)	(5)	(6)
Nominal tariff[a]	-19.311	-8.135	*-3.082*	*-.258*	-1.300	-1.758
	(4.416)	(3.979)	(2.478)	(.175)	(.556)	(.483)
Δ Tariff[a]				-10.132	*-1.411*	*-1.661*
				(.356)	(1.281)	(1.333)
Market penetration	*.003*	*2.509*	*-6.478*	5.811	*-.729*	2.842
	(7.382)	(5.772)	(11.352)	(.549)	(1.663)	(1.041)
Δ Mkt. penetration				-10.597	*7.206*	*-4.683*
				(2.262)	(7.024)	(3.402)
Real exch. rate (USD)[b]	9.303	5.671	*-.192*	-2.771	*-.618*	-2.713
	(3.166)	(2.736)	(3.365)	(.153)	(.487)	(.43)
ln *TFP-EOP*	1.106	*.299*	-.801	.113	-.321	-.273
	(.392)	(.339)	(.366)	(.023)	(.072)	(.057)
κ^f	*3.077*	*.372*	*-2.224*	1.141	*-1.078*	*-1.262*
	(2.593)	(2.718)	(2.965)	(.238)	(1.165)	(.843)
μ^f				*.386*	*-2.754*	*.243*
				(.415)	(2.538)	(.798)
Sector demand[c]	*.217*	*.424*	-1.949	.297	.388	*.225*
	(.871)	(.742)	(.933)	(.06)	(.172)	(.141)
FDI flow[d]	3.535	3.525	*.066*	-.296	*.251*	*-.084*
	(1.729)	(1.488)	(1.077)	(.074)	(.196)	(.164)
Cum. FDI[d]	*-.061*	-1.281	-1.281	*.028*	*-.08*	-.137
	(.449)	(.549)	(.549)	(.027)	(.078)	(.054)
Obs.		104			22,783	
Pseudo R^2		.357			.12	
$\hat{\chi}^2$					2009.5	
$Pr(\chi^2_{48} > \hat{\chi}^2)$					.0000	

[a]Next year's tariff.
[b]Annual. Based on *IPA-OG* and US producer price index.
[c]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[d]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressors: ι(med. L^{tot}), ι(big L^{tot}), ι(med. cap.), ι(big cap.), *Constant*.

Table 11: Ordered Logit Estimates of Transition Probabilities

	Exp.	Non-Exp.	Susp.	Non-Exp.
	(1)	(2)	(3)	(4)
Nominal tariff[a]	1.233	*-.100*	5.754	*-.199*
	(.283)	(.125)	(1.917)	(.13)
Δ Tariff[a]				7.667
				(.284)
Mkt. penetration	*-.105*	-2.491	*-2.520*	-4.465
	(.594)	(.493)	(4.316)	(.518)
Δ Mkt. pen.				10.861
				(2.476)
Real exch. rate (USD)[b]	-1.025	.967	-4.688	1.628
	(.247)	(.12)	(1.681)	(.127)
ln *TFP-EOP*	*-.060*	-.157	-.800	-.150
	(.033)	(.018)	(.171)	(.019)
κ^f	-1.258	-1.236	-3.071	-1.377
	(.325)	(.227)	(1.228)	(.228)
μ^f	-1.172	*-.173*		*-.542*
	(.398)	(.443)		(.449)
Sector demand[c]	*-.078*	-.123	*-1.077*	-.150
	(.076)	(.043)	(.689)	(.046)
FDI flow[d]	*.143*	.457	-1.703	.306
	(.082)	(.069)	(.754)	(.071)
Cum. FDI[d]	*.011*	*-.005*	*-.255*	-.072
	(.033)	(.023)	(.218)	(.024)
Cutoff Exit/Susp.	-3.963	-6.918	-38.532	-7.451
	(1.655)	(.973)	(16.281)	(1.047)
Cutoff Susp./Non-Exp.	*-2.314*	*-.731*	-36.217	*-1.045*
	(1.654)	(.969)	(16.199)	(1.038)
Cutoff Non-Exp./Exp.	*-1.927*	*-.274*	-34.634	*-.588*
	(1.654)	(.971)	(16.181)	(1.04)
Obs.	11,092	22,814	104	22,783
Pseudo R^2	.036	.055	.212	.085
$\hat{\chi}^2$	294.4	933.4	47.51	1521.6

[a]Next year's tariff.
[b]Annual. Based on *IPA-OG* and US producer price index.
[c]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[d]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressors: Age, ι(med. L^{tot}), ι(big L^{tot}), ι(med. cap.), ι(big cap.).

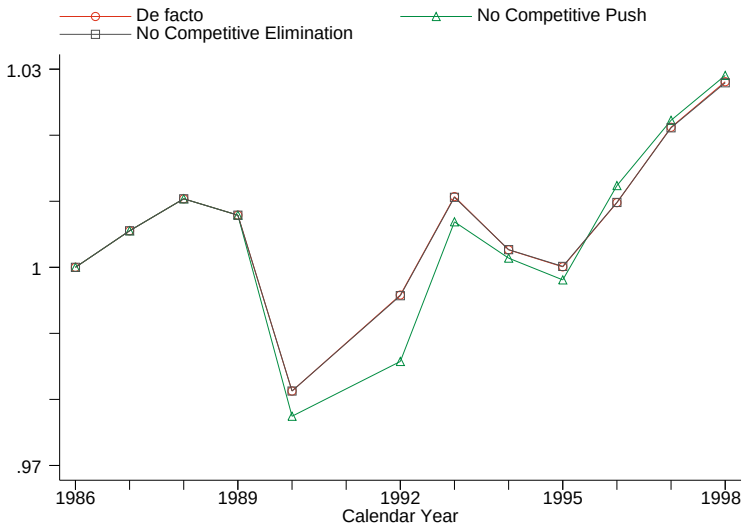
Table 12: Counterfactual Simulations

		log *TFP*				
	Counterfactual	1986	1990	1992	1995	1998
De facto		1	.9813	.9958	1.0001	1.0281
Ch. 1 off	Tariffs unchanged[a]	1	.9774	.9857	.9981	1.0291
Ch. 2 off	κ^f and μ^f lower[b]	1	.9776	.9955	1.0000	1.0271
Ch. 3 off	Tariffs unchanged[c]	1	.9813	.9957	1.0001	1.0279

[a]Tariffs are taken to affect *TFP* change according to the estimate in table 8, column 2.

[b]Based on separate regression estimates, a 10 percentage point lower tariff is taken to result in a 2.62 percentage point higher demand for foreign inputs relative to domestic inputs. This is a very favorable assumption.

[c]Tariffs assumed to affect exit according to estimates in table 9, columns 3 and 6. In the counterfactual sample, an according share of exiting firms is randomly kept (with productivity at the level of their *de facto* exit).



Data: Simulated and *de facto* productivity in *PIA*.

Figure 1: **Log *TFP* under three scenarios**

3 Effects of trade reform for OLS estimates

The following tables 13 through 20 and figure 2 replicate tables 5 through 12 and figure 1 (from the previous section) and show results of the same estimations for log *TFP*, when log *TFP* was estimated with OLS rather than with EOP.

Table 13: Foreign Competition and log *TFP-OLS* Change

	FE (OLS)	2SLS-FE (OLS)			FE (GM)
	$\Delta \ln TFP$	$\Delta \ln TFP$	Tariff	M.Pen.	$\Delta \ln TFP$
	(1)	(2)	(3)	(4)	(5)
Nominal tariff	-.110	-.525			-.270
	(.029)	(.079)			(.051)
Market penetration	1.132	3.991			1.565
	(.163)	(.608)			(.289)
κ^f	-.076	-.121	-.085	*.001*	-.281
	(.032)	(.033)	(.006)	(.001)	(.057)
μ^f	.106	*.064*	.069	.028	.418
	(.038)	(.043)	(.008)	(.001)	(.068)
ι(medium L^{tot})[a]	.146	.151	*-.002*	-.003	.198
	(.032)	(.032)	(.006)	(.001)	(.057)
ι(big L^{tot})[a]	.166	.173	*-.013*	-.005	.172
	(.033)	(.034)	(.006)	(.001)	(.059)
ι(medium cap.)[b]	*-.041*	*-.031*	*.006*	*.0002*	*.021*
	(.024)	(.024)	(.005)	(.0009)	(.043)
ι(big cap.)[b]	*-.044*	*-.025*	*.003*	*-.001*	*.062*
	(.027)	(.027)	(.005)	(.001)	(.047)
Sector demand[c]	-.252	-.328	-.054	.018	-.467
	(.014)	(.019)	(.003)	(.0005)	(.025)
FDI flow[d]	-.036	-.057	-.047	*-.0003*	-.116
	(.009)	(.01)	(.002)	(.0003)	(.016)
Cum. FDI[d]	.021	.058	.037	-.006	.049
	(.008)	(.01)	(.001)	(.0003)	(.014)
Nom. exch. rate (USD)			.583	.075	
			(.015)	(.003)	
CPI Brazil			-.376	-.057	
			(.014)	(.003)	
PPI EU			-.218	.072	
			(.019)	(.004)	
PPI North America			*.035*	-.156	
			(.019)	(.004)	
Obs.	30,841	30,841	30,841	30,841	30,841
R^2 (within)	.016		.86	.595	.032
F (instruments)			1730.7	817.9	

[a]Medium: $(30 \leq L^{tot}_{i,t} < 300)$, big: $(L^{tot}_{i,t} \geq 300)$.
[b]Medium: $K_{i,t} + S_{i,t}$ in middle tercile of all firms in a year, big: in upper tercile.
[c]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[d]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressors: Age, Age^2 (not reported).

Table 14: Foreign Competition and Productivity Change, Over-Identification tests for Validity of Instruments (OLS estimates)

2SLS-FE (OLS)	Base[a]	Add CPI_{Brazil}	Add WPI_{World}	Add PPI_{OECD}	Add $CPI_{Arg.}$
	(1)	(2)	(3)	(4)	(5)
Nominal tariff	-.523	-.525	-.556	-.518	-.297
	(.08)	(.079)	(.071)	(.077)	(.068)
Market penetration	4.026	3.991	4.11	3.966	3.396
	(.628)	(.608)	(.622)	(.567)	(.615)
Age	-.062	-.062	-.065	-.062	-.045
	(.008)	(.008)	(.007)	(.007)	(.007)
κ^f	-.121	-.121	-.125	-.12	-.095
	(.033)	(.033)	(.033)	(.033)	(.033)
μ^f	*.062*	*.064*	*.065*	*.064*	*.044*
	(.044)	(.043)	(.044)	(.043)	(.044)
ι(medium L^{tot})[b]	.151	.151	.151	.151	.152
	(.032)	(.032)	(.032)	(.032)	(.032)
ι(big L^{tot})[b]	.173	.173	.173	.173	.177
	(.034)	(.034)	(.034)	(.034)	(.034)
ι(medium cap.)[c]	*-.031*	*-.031*	*-.03*	*-.031*	*-.039*
	(.024)	(.024)	(.024)	(.024)	(.024)
ι(big cap.)[c]	*-.025*	*-.025*	*-.023*	*-.025*	*-.039*
	(.027)	(.027)	(.027)	(.027)	(.027)
Sector demand[d]	-.328	-.328	-.333	-.327	-.297
	(.019)	(.019)	(.019)	(.019)	(.018)
FDI flow[e]	-.057	-.057	-.059	-.057	-.048
	(.01)	(.01)	(.01)	(.01)	(.01)
Cum. FDI[e]	.059	.058	.061	.058	.043
	(.01)	(.01)	(.01)	(.01)	(.01)
Obs.	30,841	30,841	30,841	30,841	30,841
R^2 (within)					.008
$\hat{\chi}^2$		.052	.644	.056	-79.826
$Pr(\chi^2_{12} > \hat{\chi}^2)$		1	1	1	

[a]Baseline instrumental variables: Nom. exch. rate (USD), PPI EU, PPI North America
[b]Medium: $(30 \leq L^{tot}_{i,t} < 300)$, big: $(L^{tot}_{i,t} \geq 300)$.
[c]Medium: $K_{i,t} + S_{i,t}$ in middle tercile of firms in a year, big: in upper tercile.
[d]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[e]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressor: Age^2 (not reported).

Table 15: Foreign Competition and 5-year Productivity Change

	FE (OLS)	2SLS-FE (OLS)			FE (GM)
	Δ_{5yr} ln TFP	Δ_{5yr} ln TFP	Δ_{5yr} Tf.	Δ_{5yr} M.P.	Δ_{5yr} ln TFP
	(1)	(2)	(3)	(4)	(5)
Δ_{5yr} Tariff	-.439	-3.136			-.629
	(.261)	(2.922)			(.567)
Δ_{5yr} Mkt. penetration	-.765	4.494			-2.232
	(.367)	(5.446)			(.798)
κ^f	.11	.197	.023	-.007	.28
	(.134)	(.173)	(.012)	(.009)	(.292)
ι(medium L^{tot})[a]	.543	.469	.038	.033	-1.124
	(.429)	(.479)	(.038)	(.028)	(.931)
ι(big L^{tot})[a]	.664	.595	.04	.033	-1.041
	(.431)	(.48)	(.038)	(.028)	(.936)
ι(medium cap.)[b]	-.113	-.135	-.002	.002	-.06
	(.088)	(.099)	(.008)	(.006)	(.19)
ι(big cap.)[b]	-.17	-.208	-.001	.006	-.017
	(.1)	(.116)	(.009)	(.006)	(.216)
Sector demand[c]	-.008	-.032	.064	.032	-.062
	(.083)	(.1)	(.008)	(.006)	(.181)
FDI flow[d]	.153	-.741	-.059	.14	.596
	(.126)	(.939)	(.011)	(.008)	(.274)
Cum. FDI[d]	-.128	.938	.097	-.152	-.612
	(.152)	(1.119)	(.013)	(.009)	(.33)
PPI & WPI World			8.07	5.438	
			(1.067)	(.779)	
PPI EU			-1.122	-.867	
			(.267)	(.195)	
PPI North America			-1.664	-1.352	
			(.303)	(.222)	
Obs.	3,856	3,856	3,856	3,856	3,856
R^2 (within)	.033		.824	.363	.030
F (instruments)			56.1	30.3	

[a]Medium: $(30 \leq L^{tot}_{i,t} < 300)$, big: $(L^{tot}_{i,t} \geq 300)$.
[b]Medium: $K_{i,t} + S_{i,t}$ in middle tercile of firms in a year, big: in upper tercile.
[c]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[d]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressors: Age, Age^2; further IV: PPI OECD (not reported).

Table 16: Efficiency of Foreign Inputs (OLS estimates)

OLS	17 *Chemicals* log *TFP* (1)	17 *Chemicals* Input (2)	29 *Sugar* log *TFP* (3)	29 *Sugar* Input (4)	30 *Food fats & oils* log *TFP* (5)	30 *Food fats & oils* Input (6)
		$\beta_K\gamma_K \cdot \kappa^f$		$\beta_K\gamma_K \cdot \kappa^f$		$\beta_K\gamma_K \cdot \kappa^f$
1986	4.811	.004	4.891	-.0000	3.914	.003
1990	4.859	.011	4.959	-.0010	3.963	.007
1992	4.881	.008	4.957	-.0008	3.790	.005
1995	4.801	.033	4.966	-.0004	4.038	.034
		$\beta_M\gamma_M \cdot \mu^f$		$\beta_M\gamma_M \cdot \mu^f$		$\beta_M\gamma_M \cdot \mu^f$
1996	4.749	-.001	4.871	.099	3.896	.072
1998	4.750	-.002	4.965	.076	4.027	.015

Foreign inputs in the two sectors with the highest positive significant $\beta_K\gamma_K$ estimates (17, 30) and the sector with the highest positive significant $\beta_M\gamma_M$ estimate (29).

Data: *Pesquisa Industrial Anual* 1986-98, deflated with *IPA-OG* and import-weighted foreign *PPI* series.

Table 17: Multinomial Logit Estimates of Transition Probabilities

$\ln TFP\text{-}OLS$	$\sigma_{i,t}$ / $\sigma_{i,t+1}$	Exporter			Non-Exporter		
		Non-Exp.	Susp.	Exit	Exp.	Susp.	Exit
		(1)	(2)	(3)	(4)	(5)	(6)
Nominal tariff[a]		2.072	*-.393*	-2.676	-.625	*-1.023*	-1.653
		(.304)	(1.135)	(.985)	(.153)	(.573)	(.503)
Market penetration		*.218*	*-1.586*	*-.723*	3.657	*-.992*	2.466
		(.658)	(1.946)	(1.226)	(.53)	(1.508)	(.986)
Real exch. rate (USD)[b]		-.761	*.552*	-2.759	-1.558	*-.702*	-2.628
		(.272)	(.811)	(.688)	(.132)	(.471)	(.392)
$\ln TFP\text{-}OLS$		-.123	-.509	*.007*	.346	-.357	-.142
		(.052)	(.154)	(.112)	(.028)	(.092)	(.068)
κ^f		-1.084	*-.352*	-2.174	.855	*-1.034*	*-1.265*
		(.33)	(1.169)	(.985)	(.24)	(1.178)	(.853)
μ^f		-1.713	*.013*	*.016*	*-.07*	*-2.746*	*.079*
		(.519)	(1.01)	(.638)	(.402)	(2.455)	(.798)
ι(med. L^{tot})[c]		-1.219	*-.722*	-1.68	.862	*-.169*	-.991
		(.458)	(1.075)	(.707)	(.272)	(.333)	(.205)
ι(big L^{tot})[c]		-1.806	*-1.893*	-1.929	1.541	*-.661*	-1.42
		(.458)	(1.094)	(.727)	(.272)	(.378)	(.244)
ι(med. cap.)[d]		-1.101	*-.234*	-1.434	.699	*-.425*	*-.228*
		(.285)	(1.031)	(.413)	(.185)	(.254)	(.197)
ι(big cap.)[d]		-1.572	*-.344*	-1.753	1.584	*-.504*	*-.255*
		(.291)	(1.058)	(.44)	(.188)	(.309)	(.245)
Sector demand[e]		-.177	*-.204*	*.051*	.235	*.232*	*.051*
		(.079)	(.209)	(.154)	(.054)	(.143)	(.121)
FDI flow[f]		*.009*	*.358*	.387	-.431	*.162*	*-.154*
		(.095)	(.238)	(.187)	(.071)	(.2)	(.17)
Cum. FDI[f]		*.059*	*.030*	-.193	-.086	*-.101*	-.195
		(.037)	(.113)	(.075)	(.025)	(.084)	(.055)
Obs.			11,092			22,814	
Pseudo R^2			.046			.086	
$\hat{\chi}^2$			398.8			1470.5	
$Pr(\chi^2_{42} > \hat{\chi}^2)$			.0000			.0000	

[a]Next year's tariff.
[b]Annual. Based on *IPA-OG* and US producer price index.
[c]Medium: $(30 \leq L^{tot}_{i,t} < 300)$, big: $(L^{tot}_{i,t} \geq 300)$.
[d]Medium: $K_{i,t} + S_{i,t}$ in middle tercile of firms in a year, big: in upper tercile.
[e]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[f]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressors: Age, *Constant* (not reported).

Table 18: Further Multinomial Logit Estimates of Transition Probabilities

$\ln TFP\text{-}OLS$ $\sigma_{i,t}$ / $\sigma_{i,t+1}$	Suspended Firm			Non-Exporter		
	Exp.	Dom.	Exit	Exp.	Susp.	Exit
	(1)	(2)	(3)	(4)	(5)	(6)
Nominal tariff[a]	-20.985	-8.087	*-3.160*	-.703	*-1.026*	-1.676
	(4.28)	(2.757)	(2.169)	(.176)	(.575)	(.504)
Δ Tariff[a]				-10.348	*-1.411*	*-1.454*
				(.358)	(1.216)	(1.29)
Market penetration	*.120*	*-1.707*	*-7.311*	6.281	*-1.071*	2.928
	(6.636)	(4.905)	(8.93)	(.561)	(1.633)	(1.021)
Δ Mkt. penetration				-11.876	*9.364*	*-3.998*
				(2.308)	(7.29)	(3.54)
Real exch. rate (USD)[b]	9.848	5.435	*-.326*	-2.753	*-.693*	-2.778
	(2.922)	(2.611)	(3.327)	(.152)	(.491)	(.43)
$\ln TFP\text{-}OLS$	1.453	1.126	*-.124*	.352	-.354	-.146
	(.397)	(.421)	(.417)	(.029)	(.092)	(.069)
κ^f	*1.453*	*-.907*	*-1.452*	.996	*-.998*	*-1.285*
	(2.093)	(2.575)	(2.268)	(.242)	(1.17)	(.857)
μ^f				*.354*	*-2.82*	*.174*
				(.407)	(2.591)	(.791)
Sector demand[c]	*1.064*	*.830*	*-.962*	.320	*.216*	*.078*
	(.794)	(.685)	(.829)	(.061)	(.145)	(.124)
FDI flow[d]	5.053	4.269	*.142*	-.234	*.219*	*-.126*
	(1.899)	(1.833)	(1.443)	(.073)	(.21)	(.171)
Cum. FDI[d]	*-.358*	-1.265	-1.265	*-.028*	*-.097*	-.192
	(.457)	(.513)	(.513)	(.026)	(.083)	(.055)
Obs.	104			22,784		
Pseudo R^2	.330			.125		
$\hat{\chi}^2$				2104.3		
$Pr(\chi^2_{48} > \hat{\chi}^2)$				.0000		

[a]Next year's tariff.
[b]Annual. Based on *IPA-OG* and US producer price index.
[c]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[d]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressors: ι(med. L^{tot}), ι(big L^{tot}), ι(med. cap.), ι(big cap.), *Constant*.

Table 19: Ordered Logit Estimates of Transition Probabilities

$\ln TFP\text{-}OLS$	Exp.	Non-Exp.	Susp.	Non-Exp.
	(1)	(2)	(3)	(4)
Nominal tariff[a]	1.363	*.233*	5.859	*.137*
	(.283)	(.125)	(1.55)	(.13)
Δ Tariff[a]				7.725
				(.284)
Mkt. penetration	*-.142*	-2.812	*-1.028*	-4.865
	(.579)	(.505)	(5.077)	(.525)
Δ Mkt. pen.				11.923
				(2.489)
Real exch. rate (USD)[b]	-.997	.903	-3.962	1.565
	(.247)	(.118)	(1.905)	(.126)
$\ln TFP\text{-}OLS$	-.134	-.311	-.821	-.304
	(.047)	(.024)	(.261)	(.024)
κ^f	-1.173	-1.121	*-2.006*	-1.264
	(.325)	(.229)	(1.302)	(.231)
μ^f	-1.141	*-.151*		*-.538*
	(.397)	(.439)		(.445)
Sector demand[c]	-.140	-.173	*-.921*	-.187
	(.07)	(.044)	(.557)	(.047)
FDI flow[d]	*.105*	.396	*-1.561*	.249
	(.083)	(.069)	(.842)	(.071)
Cum. FDI[d]	*.014*	*.032*	*-.194*	*-.035*
	(.033)	(.024)	(.209)	(.024)
Cutoff Exit/Susp.	-5.664	-8.693	-32.767	-8.927
	(1.626)	(1.001)	(12.99)	(1.075)
Cutoff Susp./Non-Exp.	-4.015	-2.472	-30.57	-2.481
	(1.625)	(.996)	(12.934)	(1.066)
Cutoff Non-Exp./Exp.	-3.627	-2.016	-29.055	*-2.025*
	(1.623)	(.998)	(12.951)	(1.068)
Obs.	11,092	22,814	104	22,783
Pseudo R^2	.036	.059	.177	.089
$\hat{\chi}^2$	303.3	1020.0	67.92	1618.9

[a]Next year's tariff.
[b]Annual. Based on *IPA-OG* and US producer price index.
[c]Sector-wide sales in *PIA*, augmented by foreign market penetration.
[d]Billion USD per sector. Cumulated FDI is end-of-year stock of invested foreign capital.
Further regressors: Age, ι(med. L^{tot}), ι(big L^{tot}), ι(med. cap.), ι(big cap.).

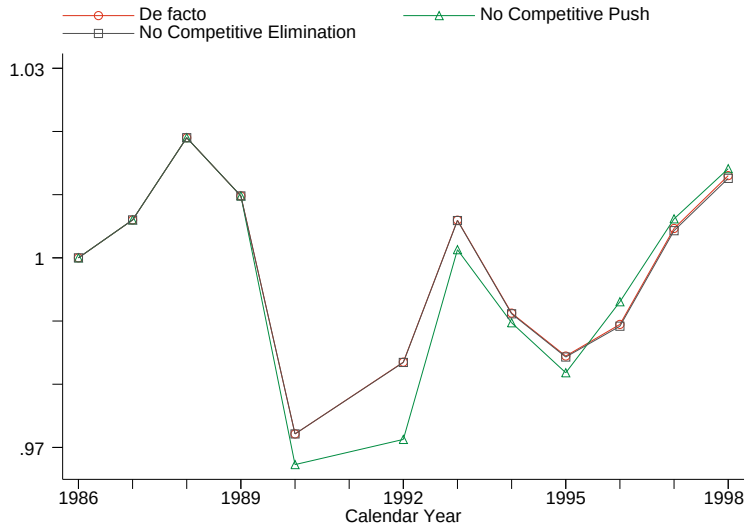
Table 20: Counterfactual Simulations (OLS estimates)

		log *TFP*				
	Counterfactual	1986	1990	1992	1995	1998
De facto		1	.9721	.9835	.9845	1.0130
Ch. 1 off	Tariffs unchanged[a]	1	.9673	.9713	.9818	1.0141
Ch. 2 off	κ^f and μ^f lower[b]	1	.9656	.9822	.9838	1.0115
Ch. 3 off	Tariffs unchanged[c]	1	.9721	.9834	.9843	1.0126

[a]Tariffs assumed to affect *TFP* change according to the estimate in table 16, column 1.

[b]Based on separate regressions, a one percentage point lower tariff is assumed to result in a 26.2 percentage point higher demand for foreign inputs relative to domestic inputs.

[c]Tariffs assumed to affect exit according to estimates in table 17, columns 3 and 6. In the counterfactual sample, an according share of exiting firms is randomly kept (with productivity at the level of their *de facto* exit).



Data: Simulated and *de facto* productivity in *Pesquisa Industrial Annual*.

Figure 2: **Log *TFP* (OLS) under three scenarios**

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