Management and Organizational Practices Survey - Colombia 2017-2018

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Table 1: Descriptive Statistics (1)

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Management (1-16)	6,034	0.376	0.176	0.026	0.231	0.504	0.958
No Incentives (1-8)	6,034	0.555	0.198	0.056	0.402	0.701	1.000
Incentives (9-16)	6,034	0.222	0.191	0.000	0.071	0.357	0.952
Size(Firm employment)	6,034	125.502	254.973	0	18	117	4,181
Exporters	6,034	0.328	0.470	0	0	1	1
Multiplant	6,034	0.044	0.206	0	0	0	1

Note:The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample in all columns is allobservations with at least 11 non-missing responses to management questions and a successful match to EAM.

The next histogram shows the distribution for magement score (16 questions). As you can see, the distribution is skewed to the left, where the total number of observations is 7,529 in EDIT. This histogram includes all observations with at least 11 non-missing responses to management questions.

Manegement – Colombia vs USA with only EDIT data
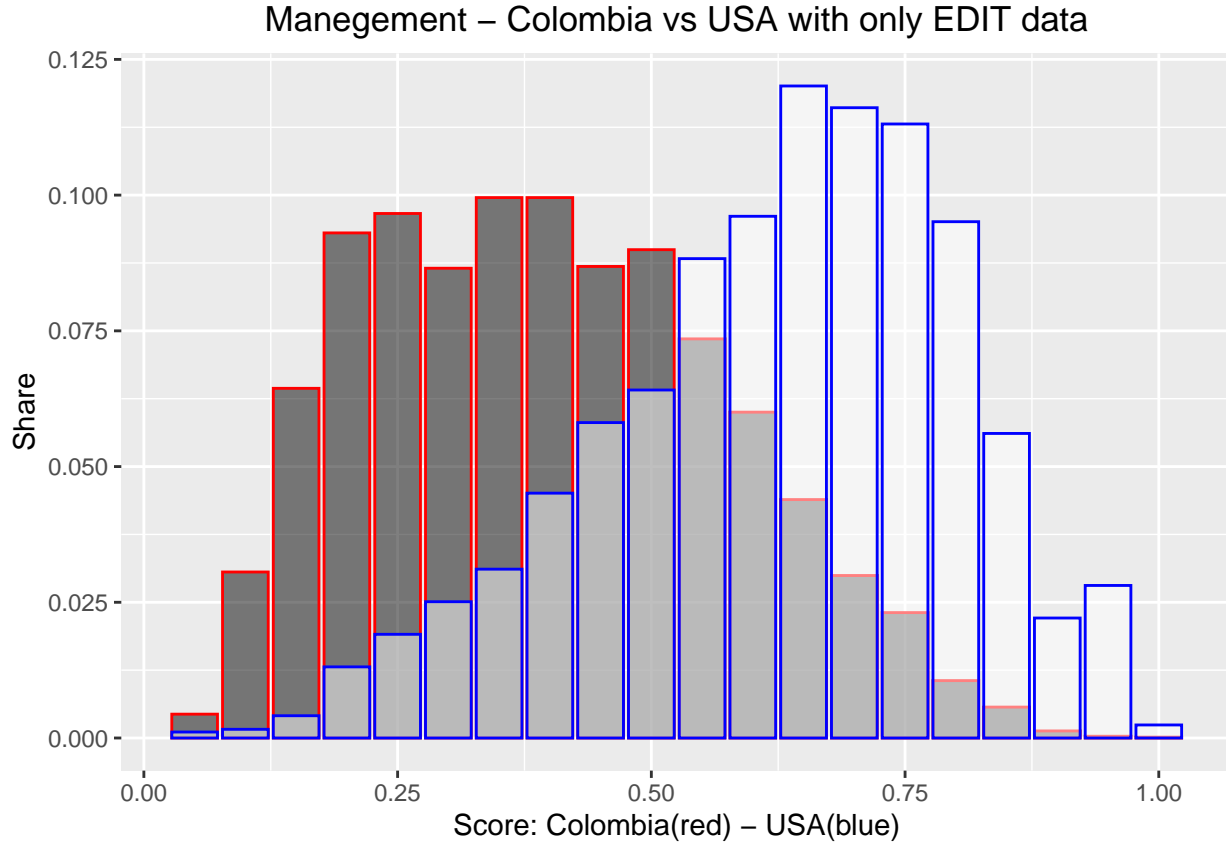
According to Bloom(2019) the average U.S Management score (1-16 questions) is 0.615, the non-incentives (1-8) is 0.643 and the incentives (9-16) is 0.583.

The next table shows the number of observations for each database and our estimates use the merge EDIT-EAM.

Table 2: Databases

Database	n
EDIT 1:All observations	7,529
EDIT 2:At least 11 non-missing values	6,148
EAM 1:All observations	7,911
EAM 2:Collapsed data	7,256
Merge EDIT 2 - EAM 2	6,034

The next histogram shows the distribution for magement score (16 questions) for Colombia and the United States, using the merge between EDIT and EAM with 6,034 observations.

Table 3: Descriptive Statistics (2)

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Total Sales	6,012	40,262.150	270,955.800	8.280	1,273.361	15,685.710	11,679,283.000
Value Added	6,012	15,133.510	73,532.850	0.091	554.676	6,923.818	3,058,511.000
Exports/Sales	6,012	0.068	0.163	0	0	0.04	1
RDi/Sales	1,750	0.010	0.023	0.000	0.0002	0.010	0.381

Note:For the merge between EDIT and EAM,this table shows the descriptive statistics for Total Sales
Value Added in millions of colombian pesos, value of exported products/Sales and value of investment
on research, development and innovation (RDi)/Sales.

Manegement – Colombia vs USA with merge EDIT – EAM data
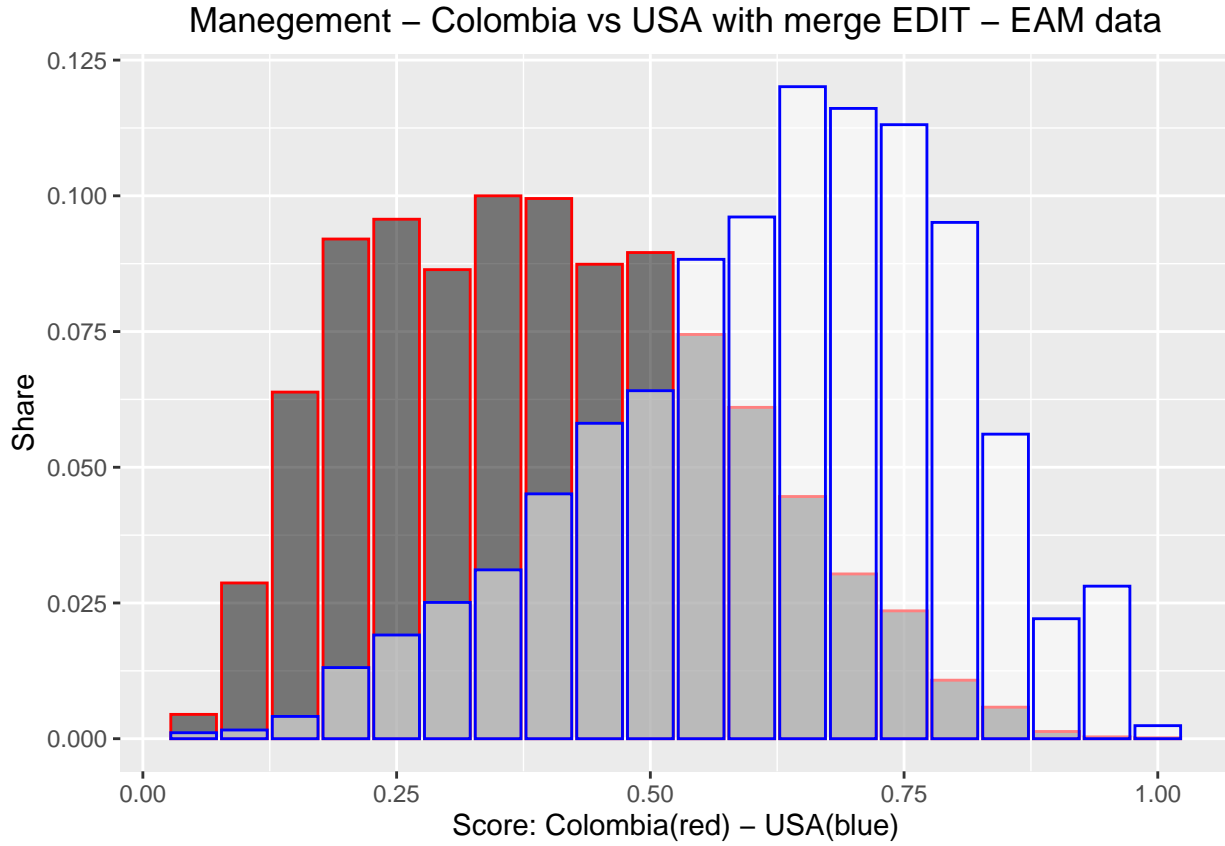
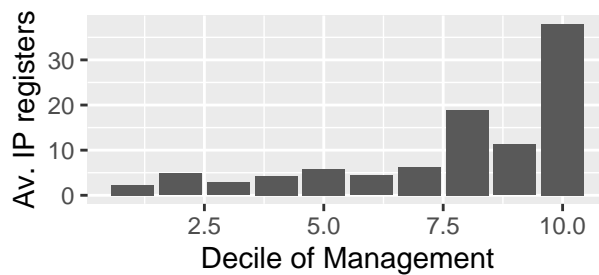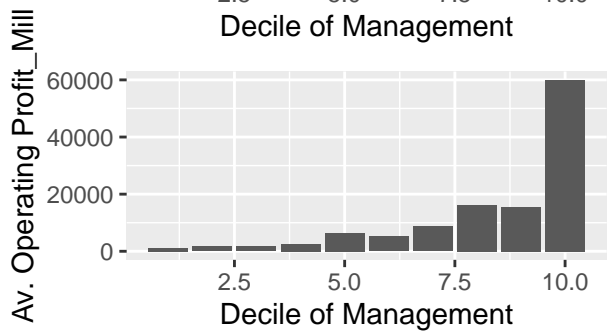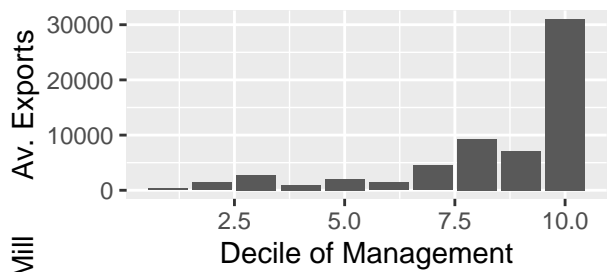# Firm size rises with Management –Non–Linear fit
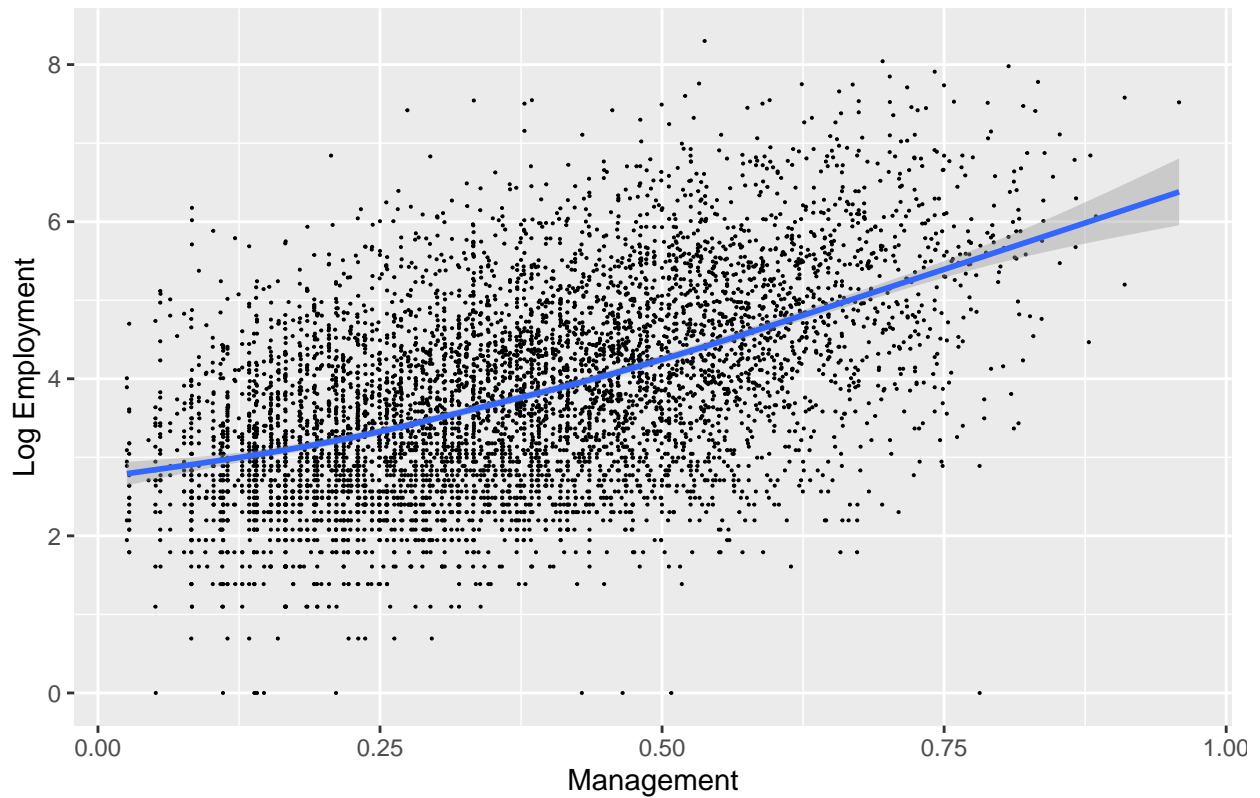
Table 4: Firm Management Scores and Performance

| | Ln(Output/Emp) | | | Ln(Sales/Emp) | | | Profit/Sales | | |
	1	2	3	4	5	6	7	8	9
Management	0.24***	0.24***	0.25***	0.25***	0.25***	0.26***	−0.01	0.01	0.01
	(0.05)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.08)	(0.08)	(0.06)
Ln(Cap/Emp)	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	−0.01	−0.01	−0.01
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)	(0.02)	(0.01)
Ln(Input/Emp)	0.67***	0.68***	0.68***	0.66***	0.67***	0.67***	0.12**	0.10	0.10***
	(0.03)	(0.02)	(0.00)	(0.03)	(0.02)	(0.00)	(0.05)	(0.06)	(0.01)
Ln(Employment)	0.05***	0.05***	0.05***	0.04***	0.04***	0.05***	0.01	0.01	0.01
	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
Degree	0.23**	0.47***	0.46***	0.27***	0.54***	0.52***	−0.07	−0.16	−0.15
	(0.08)	(0.04)	(0.05)	(0.07)	(0.05)	(0.05)	(0.08)	(0.10)	(0.08)
R^2	0.87	0.86	0.86	0.87	0.85	0.85	0.07	0.03	0.03
Adj. R^2	0.87	0.86	0.86	0.86	0.85	0.85	0.05	0.03	0.03
Num. obs.	5988	5988	5988	5988	5988	5988	5988	5988	5988

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.
OLS coefficients with standard errors in parentheses. The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0–1 scale. The sample is all EDIT observations with at least 11 non-missing responses to management questions and a successful match to EAM, which have positive value added, positive employment, and positive imputed capital. The columns 1-3 mean the models with Industry Fixed Effects, Location Fixed Effects and no Fixed Effects, respectively.This also applies for columns 4-6 and 7-9. The regressions include clustered standard errors by CIIU4 and region, depending on the fixed effect applied

Suppose that the firm production function is:

$$Y_i = A_i K_i^{\alpha} L_i^{\beta} I^{\gamma} e^{\delta M_i} e^{\mu X_i} + \varepsilon_i$$

Where Y_i:Production of firm i A_i: Total factor productivity (Excluding Management Practices) K_i:Fixed assets at final of 2018 L_i:Labor inputs: the total number of employees of firm i I_i:Intermediate inputs X_i:Vector of additional factors: the percent of staff with college degree M_i: Management score (1-16)

Dividing by labor and taking logs we can rewrite this in a form to estimate on the data:

$$log\frac{Y_i}{L_i} = \alpha log\frac{K_i}{L_i} + \gamma log\frac{I_i}{L_i} + (\alpha + \beta + \gamma)logL_i + \delta M_i + \mu X_i + u_i$$

We calculate this equation by estimating an OLS regression

Table 5: Firm Management Scores and Performance

	Log(VA/Emp)			(Profits/sales)			Log(1+RDi/Emp)		
	1	2	3	4	5	6	7	8	9
Management	0.64***	0.69***	0.71***	0.05	0.06	0.06	2.94***	2.95***	3.07***
	(0.08)	(0.06)	(0.09)	(0.06)	(0.04)	(0.05)	(0.51)	(0.37)	(0.56)
Ln(Cap/Emp)	0.21***	0.24***	0.24***	0.03***	0.03***	0.02***	0.19*	0.34***	0.33***
	(0.02)	(0.03)	(0.01)	(0.01)	(0.00)	(0.01)	(0.09)	(0.04)	(0.07)
Ln(Employment)	0.18***	0.17***	0.18***	0.03***	0.02*	0.02**	0.11	0.07	0.09
	(0.02)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.08)	(0.09)	(0.08)
Degree	0.89***	1.39***	1.39***	0.05	−0.04	−0.03	1.54	2.72***	2.64***
	(0.14)	(0.08)	(0.14)	(0.09)	(0.05)	(0.10)	(0.95)	(0.75)	(0.81)
R^2	0.20	0.25	0.27	0.01	0.01	0.01	0.05	0.07	0.07
Adj. R^2	0.18	0.25	0.27	−0.02	0.00	0.01	−0.03	0.05	0.07
Num. obs.	5988	5988	5988	5988	5988	5988	1749	1749	1749

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.
OLS coefficients with standard errors in parentheses. The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0–1 scale. The sample is all EDIT observations with at least 11 non-missing responses to management questions and a successful match to EAM, which have positive value added, positive employment, and positive imputed capital. The columns 1-3 mean the models with Industry Fixed Effects, Location Fixed Effects and no Fixed Effects, respectively.This also applies for columns 4-6 and 7-9.The regressions include clustered standard errors by CIIU4 and region, depending on the fixed effect applied

Table 6: Firm Management Scores and Performance

	Log(VA/Emp)			Log(1+RDi/Emp)		
	1	2	3	4	5	6
Management	0.64***	0.69***	0.71***	2.94***	2.95***	3.07***
	(0.08)	(0.08)	(0.08)	(0.56)	(0.56)	(0.55)
Ln(Cap/Emp)	0.21***	0.24***	0.24***	0.19*	0.34***	0.33***
	(0.01)	(0.01)	(0.01)	(0.08)	(0.07)	(0.07)
Ln(Employment)	0.18***	0.17***	0.18***	0.11	0.07	0.09
	(0.01)	(0.01)	(0.01)	(0.08)	(0.08)	(0.07)
Degree	0.89***	1.39***	1.39***	1.54	2.72***	2.64***
	(0.12)	(0.11)	(0.11)	(0.86)	(0.78)	(0.77)
R^2	0.20	0.25	0.27	0.05	0.07	0.07
Adj. R^2	0.18	0.25	0.27	−0.03	0.05	0.07
Num. obs.	5988	5988	5988	1749	1749	1749

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.
OLS coefficients with standard errors in parentheses. The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0–1 scale. The sample is all EDIT observations with at least 11 non-missing responses to management questions and a successful match to EAM, which have positive value added, positive employment, and positive imputed capital. The columns 1-3 mean the models with Industry Fixed Effects, Location Fixed Effects and no Fixed Effects, respectively.This also applies for columns 4-6 and 7-9.The regressions include clustered standard errors by CIIU4 and region, depending on the fixed effect applied

Table 7: Drivers of Productivity Variation

	1	2	3	4
			Log(VA/Emp)	
Management	1.950***	1.687***	1.694***	1.652***
	(0.080)	(0.084)	(0.084)	(0.083)
RDi		0.044***	0.043***	0.038***
		(0.005)	(0.004)	(0.004)
ICT/Emp			0.000*	0.000
			(0.000)	(0.000)
Degree				1.517***
				(0.148)
R^2	0.101	0.115	0.116	0.139
Adj. R^2	0.100	0.115	0.116	0.138
Num. obs.	6026	6026	6026	6026

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.
OLS coefficients with standard errors in parentheses.Dependent variable is firm level log(Value Added/Employment). Independent variables are Management score, RDi is measured as log(1+RDi intensity), where RDi intensity is the total domestic Research, Development and innovation expenditure in 2018 divided by total domestic employment, ICT/Emp is investment per worker (spending on information and communication technology hardware and software per employee), Degree is measured by the share of employees (managers and non-managers) with a college degree.Missing values have been replaced by zero for RDi and by means for the other variables. The regressions include robust standard errors

Table 8: TFP at firm level and Tariffs

	Revenue-based Total Factor Productivity
	1
Average Output Tariff	−0.011
	(0.157)
Weighted Input Tariff	0.905
	(0.532)
R^2	0.006
Adj. R^2	0.006
Num. obs.	5835

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.
OLS coefficients with standard errors in parentheses.Dependent variable is firm level Total Factor Productivity. According to Konings and Amiti(2005),independent variables are the Average Output Tariff and Weighted Input Tariff. The Average Tariff is the average of the tariffs according to the CIIU 4 code of the firm, using the data from International Trade Center ITC: macmap.org.Since tariffs are classified HS codes, we use a table from DANE, which has an equivalence between HS codes and CIIU4, published in: https://www.dane.gov.co/index.php/sistema-estadistico-nacional-sen/normas-y-estandares/nomenclaturas-y-clasificaciones/tablas-correlativas, trade section. For the Weighted Input Tariff, we use the imported input -output matrix (IIOM) published by DANE: https://www.dane.gov.co/index.php/estadisticas-por-tema/cuentas-nacionales/cuentas-nacionales-anuales/matrices-complementarias, (2015). Since IOM does not use CIIU4 codes, we elaborate a concordance table between IIOM activities and two or three digits CIIU4 levels. The average tariff of these two or three digits CIIU4 levels is weighted by the IIOM and subsequently matched to the firm two or three digits CIIU4 codes. The concordance table is in the annex. The regressions include clustered standard errors by four digits CIIU4 codes

Table 9: Drivers of Total Factor Productivity

	Revenue-based Total Factor Productivity - RTFP			
	1	2	3	4
Management	0.147***	0.129***	0.132***	0.128***
	(0.026)	(0.028)	(0.028)	(0.028)
RDi		0.003	0.003	0.002
		(0.002)	(0.002)	(0.002)
ICT/Emp			0.000	0.000
			(0.000)	(0.000)
Degree				0.120**
				(0.057)
R^2	0.005	0.006	0.006	0.008
Adj. R^2	0.005	0.006	0.006	0.007
Num. obs.	5834	5834	5834	5834

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$.
OLS coefficients with standard errors in parentheses. Dependent variable is firm level TFP built from industry firm-level. Independent variables are management score, RDi measured as log(1+RDi intensity) where RDi intensity is the total domestic RDi expenditure divided by total domestic employment, IT investment per worker, skill measured by the share of employees (managers and non-managers) with a college degree.Missing values have been replaced by zero for RDi and by means for the other variables.The regressions include robust standard errors

Table 10: Drivers of Total Factor Productivity

	Revenue-based Total Factor Productivity - RTFP			
	1	2	3	4
Management	0.155**	0.133**	0.133**	0.115*
	(0.048)	(0.049)	(0.049)	(0.049)
RDi		0.005*	0.005*	0.004
		(0.003)	(0.003)	(0.003)
Degree				0.290***
				(0.087)
R^2	0.006	0.009	0.009	0.017
Adj. R^2	0.006	0.007	0.007	0.015
Num. obs.	1718	1718	1718	1718

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$.
OLS coefficients with standard errors in parentheses. Dependent variable is firm level TFP built from industry firm-level. Independent variables are management score, RDi measured as log(1+RDi intensity) where RDi intensity is the total domestic RDi expenditure divided by total domestic employment, IT investment per worker, skill measured by the share of employees (managers and non-managers) with a college degree.Missing values have been replaced by zero for RDi and by means for the other variables.The regressions include robust standard errors

Table 11: Market Competition and Management

	Management				
	1	2	3	4	5
Lerner Index	0.012	0.012	0.012	−0.003	−0.000
	(0.009)	(0.009)	(0.009)	(0.008)	(0.005)
Average Output Tariff		−0.103	0.036	−0.018	−0.033
		(0.125)	(0.182)	(0.190)	(0.089)
Weighted input Tariff			−0.423	−0.419	−0.120
			(0.354)	(0.350)	(0.162)
Inter Lerner*Tariff				0.261	0.055
				(0.140)	(0.084)
Ln(Cap/Emp)					0.013***
					(0.001)
Ln(Employment)					0.069***
					(0.003)
Degree					0.158***
					(0.023)
R^2	0.037	0.038	0.042	0.044	0.309
Adj. R^2	0.033	0.034	0.037	0.039	0.306
Num. obs.	5654	5654	5654	5654	5654

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$.
Lerner Index is the gross profits over sales, where gross profits equals to production value less material costs and wage costs in 2018. The Average Tariff is the average of the tariffs according to the CIIU 4 code of the firm, using the data from International Trade Center ITC: macmap.org. Since tariffs are classified HS codes, we use a table from DANE, which has an equivalence between HS codes and CIIU4, published in: https://www.dane.gov.co/index.php/sistema-estadistico-nacional-sen/normas-y-estandares/nomenclaturas-y-clasificaciones/tablas-correlativas, trade section. For the Weighted Input Tariff, we use the imported input -output matrix (IIOM) published by DANE: https://www.dane.gov.co/index.php/estadisticas-por-tema/cuentas-nacionales/cuentas-nacionales-anuales/matrices-complementarias, (2015). Since IOM does not use CIIU4 codes, we elaborate a concordance table between IIOM activities and two or three digits CIIU4 levels. The average tariff of these two or three digits CIIU4 levels is weighted by the IIOM and subsequently matched to the firm two or three digits CIIU4 codes. The concordance table is in the annex. The last column of this regression table includes a interaction between Lerner Index and Average Output Tariff and full controls. All regressions have Location Fixed Effects by department in Colombia and clustered standard errors by CIIU 4.

Table 12: China Import Share and Management

	Management	
	1	2
China Import Share	−0.097**	−0.031*
	(0.033)	(0.015)
Ln(Cap/Emp)		0.013***
		(0.002)
Ln(Employment)		0.070***
		(0.003)
Degree		0.149***
		(0.022)
R^2	0.011	0.300
Adj. R^2	0.011	0.299
Num. obs.	5654	5654

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$.
The China Import Share means imports from China / Total imports for each industry (4 digits CIIU rev4). This table uses this China Import Share without controls:column (1), and with full controls:column (2). We estimated the China Import Share according to the Import Origin published by DANE and matched them to the firm four digits CIIU4 codes. The regressions include clustered standard errors by four digits CIIU4 codes.

Table 13: Gravity Equation and Management

	Ln Exports	
	1	2
Ln Exporter's GDP	1.217***	1.107***
	(0.014)	(0.020)
Ln Importer's GDP	0.985***	0.988***
	(0.011)	(0.011)
Ln Distance-km	−1.217***	−1.215***
	(0.036)	(0.032)
Contiguous=1	0.943***	1.043***
	(0.171)	(0.153)
Common Language=1	0.578***	0.560***
	(0.071)	(0.071)
Management		0.879***
		(0.123)
R^2	0.746	0.749
Adj. R^2	0.746	0.748
Num. obs.	5212	5212

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.
This table estimates a gravity model, where the dependent variable is Exporter's GDP, and the independent variables are: Importer's GDP, Distance in kilometers between exporter and importer and the average of Exporter's Management. The sample includes 34 countries in 2015, with data from World Management Survey. The regression calculates clustered standard errors by average Exporter's Management

Table 14: Differentiated Products and Management

	Log(1+Exports)
Management	3.545**
	(1.261)
Inter Manag*Diff	−1.453
	(1.589)
Differentiated=1	1.380*
	(0.570)
Ln(Cap/Emp)	0.759***
	(0.102)
Ln(Employment)	2.740***
	(0.159)
Degree	9.060***
	(1.418)
R^2	0.378
Adj. R^2	0.374
Num. obs.	5141

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.
This table examines the relationship between logartithm of (1+value of exported products) at firm level and firm's management practices.It includes a interaction between Management and a Dummy of Differentiated Product:Inter Manag*Diff= 1 when the firm product is differentiated and O otherwise, using Rauch clasifiction. Since Rauch(1999) classifies products at the level of 4 digits of industry, this table assumes that the firm produces only one good, either homogeneous or differentiated, according to its industry(CIIU rev4).In addition, it includes full controls: Ln(Cap/Emp), Ln(Employment) and the percent of staff with college degree. Since Rauch classification used 3 and digit SITC rev.2 levels, we use a concordance table from DANE, which has an equivalence between SITC.rev2 (CPC ver 2.0 in Spanish) and CIIU rev 4, published in: https://www.dane.gov.co/index.php/sistema-estadistico-nacional-sen/normas-y-estandares/nomenclaturas-y-clasificaciones/tablas-correlativas, trade section. The regressions include clustered standard errors by four digits CIIU4 codes

Table 15: Logarithms of trade outcomes and Management

	Log(1+Exports)	Log(1+Imports)	Log(1+Exports+Imports)
Management	2.927***	2.375***	3.524***
	(0.485)	(0.455)	(0.468)
Ln(Cap/Emp)	0.747***	0.757***	0.817***
	(0.074)	(0.075)	(0.072)
Ln(Employment)	2.791***	2.325***	2.970***
	(0.144)	(0.146)	(0.141)
Degree	6.191***	5.636***	6.546***
	(0.954)	(0.621)	(0.987)
R^2	0.480	0.439	0.497
Adj. R^2	0.466	0.425	0.483
Num. obs.	5860	5860	5860

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$.
This table examines the relationship between logartithm of (1+value of exported products), logarithm of (1+value of imported inputs) and logarithm of (1+value of exported products + imported inputs) at firm level and firm's management practices.It includes some controls: Ln(Cap/Emp), Ln(Employment) and the percent of staff with college degree. All regressions include fixed effects for firm location (department) and 4 digits - CIIU 4 (industry) and clustered standard errors by CIIU4.

Table 16: Dummies of trade outcomes and Management

	Dummy Exports	Dummy Imports	Dummy Trade
Management	0.191***	0.133***	0.211***
	(0.037)	(0.032)	(0.034)
Ln(Cap/Emp)	0.044***	0.047***	0.046***
	(0.005)	(0.005)	(0.005)
Ln(Employment)	0.176***	0.147***	0.177***
	(0.009)	(0.009)	(0.009)
Degree	0.378***	0.364***	0.378***
	(0.075)	(0.043)	(0.076)
R^2	0.402	0.385	0.398
Adj. R^2	0.386	0.368	0.382
Num. obs.	5860	5860	5860

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$.
This table examines the relationship between export status (Dummy Exports = 1 if value of exported products>0 and 0 otherwise), import status (Dummy Import=1 if value of imported inputs>0 and 0 otherwise), trade status (Dummy Trade=1 if value of exports + imports>0 and 0 otherwise) and firm's management practices.It includes some controls: Ln(Cap/Emp), Ln(Employment) and the percent of staff with college degree. All regressions include fixed effects for firm location (department) and 4 digits - CIIU 4 (industry) and clustered standard errors by CIIU4.

Table 17: Shares of trade outcomes and Management

	Share of exported products	Share of imported inputs	Share of traded
Management	0.050***	0.072***	0.060***
	(0.012)	(0.019)	(0.012)
Ln(Cap/Emp)	0.011***	0.017***	0.013***
	(0.002)	(0.003)	(0.002)
Ln(Employment)	0.027***	0.043***	0.032***
	(0.003)	(0.004)	(0.003)
Degree	0.089***	0.142***	0.108***
	(0.027)	(0.025)	(0.022)
R^2	0.241	0.276	0.287
Adj. R^2	0.221	0.256	0.267
Num. obs.	5755	5755	5755

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.
This table examines the relationship between Share of exported products = exports/total sales, Share of imported inputs=imports/total inputs, Share of traded=(exports+imports)/(total sales + inputs) and firm's management practices.It includes some controls: Ln(Cap/Emp), Ln(Employment) and the percent of staff with college degree. All regressions include fixed effects for firm location (department) and 4 digits - CIIU 4 (industry) and clustered standard errors by CIIU4.