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ABSTRACT

INTERNATIONAL MANAGERIAL SKILL AND BIG COLOMBIAN EXPORTING FIRMS' PERFORMANCE, 2006-2014*

Federico Alberto Merchan Alvarez

This paper uses a sample of the biggest private Colombian exporting firms to propose and estimate a two-step methodology for measuring international managerial skill and calculating its impact on firm performance. The first step quantifies the manager's organizational capital contribution to improvements in Bloom et al.'s (2021) *production efficiency* (ability to assemble inputs into final goods) and/or *quality capacity* (skill to make high quality goods) mechanisms, through the median of export unit value regression residuals at firm-year level (multiplying by -1 the price competition products' residuals). The second step is regression analysis of firm performance. Results indicate that: i) international managerial quality has a significant and robust positive effect on total export value via the intensive margin, ii) exported value elasticity relative to international managerial quality is around 3 times larger than exported value elasticity relative to exogenous global demand shocks, and iii) better managers in the international market do not necessarily upgrade export quality.

Keywords: management practices, quality vs price competition, firm's performance, intensive margin, exporting.

JEL classification: F16, F10, M11, M12, L25

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1 Introduction

One of the principal methodological challenges that the managerial economics literature has faced for many years is how to measure executive talent accurately. Although this has been somewhat addressed in recent decades by a variety of specialized management surveys,[1] none of these surveys inquire into the specific management practices involved in the production of exported products. Although the World Management Survey (WMS)[2] and the German Management and Organizational Practices Survey (GMOP)[3] ask about export share relative to operating income and obtain basic information about firm activity abroad, they do not distinguish between firms' management practices for selling goods in the international versus the local markets. However, export management is a research topic that should be analyzed in more depth, as some economic hypotheses indicate that big exporting firms have incentives to export goods that differ from those they sell in the local market, and that they implement different managerial practices for each type of goods.

For example, *learning by exporting* (LBE) indicates that when firms start exporting, their productivity is increased through various mechanisms: learning processes from foreign customers and rivals, improving product quality, shipment size adjustment (De Loecker, 2013), adopting new technologies, acquiring important information about foreign markets, and upgrading product design (Tse et al., 2017). But even within the literature that holds that LBE exists,[4] the evidence is not conclusive in two aspects: i) what mechanism drives LBE,[5] and ii) whether the productivity gains and knowledge acquired in the international market through LBE can be implemented in the overall production process, or if the upgrade occurs only in the firms' international market segment.

Also, the Alchian–Allen theorem states that the demand for high-quality goods relative to low-quality substitutes will rise if the transaction costs are constant per unit because the high-quality goods become relatively cheaper. Miljkovic and Gomez (2019) found this theorem to be valid for Brazilian coffee exports, and there is also supporting evidence for Colombian coffee exports.[6] On a larger scale, Hummels and Skiba (2004) proved the Alchian–Allen theorem's validity with disaggregated bilateral trade data for six importing countries with all exporters. Therefore, firms' managers would have

[1] Including the World Management Survey, which is the biggest survey around the globe to measure managerial practices in a consistent way for 20,000 manufacturing firms in 34 countries (Bloom & Van Reenen, 2007), the Management and Organizational Practices Survey by the US Census Bureau (Buffington et al., 2017), the German Management and Organizational Practices Survey (Broszeit et al., 2019), and the National Survey on Productivity and Competitiveness of Micro, Small, and Medium-size Enterprises in Mexico (Bloom et al., 2022).

[2] See World Management Survey questionnaire: *Manufacturing Survey Instrument (worldmanagementsurvey.org)*

[3] See German Management and Organizational Practices Survey questionnaire: *infas_Fragebogen_Morg_5078_20141020_.indd (iab.de)*

[4] Wagner (2007) indicates that empirical evidence underlines self-selection into exporting market mechanisms (i.e., only the more productive firms are able to export), but there is no conclusive proof that exports enhance productivity. Nevertheless, later studies like De Loecker (2013) for Slovenia, Tse et al. (2017) for China, and Fernandez and Isgut (2015) for Colombia report positive LBE evidence.

[5] De Loecker (2013) identifies strategic decisions that are pertinent to innovativeness, production capability, and human capital, while Hovhannisyan and Mendez (2019) focus on workers' training.

[6] Colombia is the third-largest exporting coffee country in the world; however, the majority of the high-quality Colombian coffee is exported such that Colombian inhabitants drink low-quality imported coffee: https://www.bbc.com/mundo/noticias-america-latina-51622198.

incentives to promote high-quality export goods, assuming that the Alchian–Allen theorem is always valid.[7]

Additionally, managers who excel in the local market do not necessarily export efficiently because exporting requires further skills and knowledge.[8] In this sense, the managerial practices involved in the production and distribution of exported goods differ from the managerial practices for goods sold in the local market. However, the current repertoire of specialized management surveys do not measure these differences and academic evidence is similarly scarce. Thus, this paper contributes to the literature by proposing an original methodology for estimating managerial quality specifically in the international market and for calculating its impact on different firm outcomes.

To the best of the author's knowledge, only three papers relate international firm outcomes with management quality using large firm samples.[9] First, Bloom et al. (2021), using a merged sample of the World Management Survey (WMS) and the customs and financial statements for a set of American and Chinese firms, prove that better managed firms have a higher probability of exporting. They export at higher value and a higher number of products, and they import higher quality inputs. The authors also calculate that management has greater explanatory power than total factor productivity (TFP) on different trade outcomes. Second, Görg and Hanley (2017) explore firm management and trade outcome relationship from the opposite causality direction using the German Management and Organizational Practices Survey (GMOP). They find that switching into exporting between 2008 and 2013 impacts German management performance positively. Third, Sala and Yalcin (2014) construct a "*managerial input*" proxy variable based on the firm manager's international experience (obtained from a rich Denmark employer-employee matched database), and find that managerial input is as important as productivity and fixed costs of a firm's selection into the international market.

The methodology implemented in this paper attempts to measure international managerial skill and its impact on different firm outcomes[10] through a two-step procedure, in which the export unit value is first decomposed into its predicted and residual components. The second step uses a sophisticated aggregation of the residuals at firm-year level as the independent variable in a firm performance regression.[11] More specifically, international managerial quality is calculated through the median of detailed export unit value regression residuals multiplied by -1 for those products that compete internationally by price. This is a proxy variable of the degree to which the organizational capital invested by the manager enables improvements in international production efficiency and/or the quality capacity mechanisms described by Bloom et al. (2021).[12] For this purpose, an expanded version of Baldwin and Ito's (2011) methodology for classifying products that compete in the international market by price and quality is explained and calculated.

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[7] The evidence for the Alchian–Allen theorem is not conclusive. Theoretically, Borcherding and Silberberg (1978) show that introduction of a third good could vitiate the theorem's validity. Empirically, Lawson and Raymer (2006) do not find evidence of the theorem based on the daily sales information for a single gasoline station that sold three gasoline types.

[8] The "*Learn how to export*" section from The International Trade Administration (US government publication) provides an overview of all the required steps, procedures, and skills for exporting: Learn How To Export (trade.gov)

[9] Most of the export management empirical research takes the form of case studies with small sample sizes; the median sample of the 16 most influential empirical articles about this subject is 202 firms, based on Leonidou et al.'s (2010) classification (see appendix table 1A).

[10] Exported value, number of exported products, number of export country destinations, number of country destinations-exported products, Herfindahl-Hirschman Index (HHI) calculated at firm level, exports of quality goods relative to total exports, profit rate and imported inputs unit value.

[11] Chen et al. (2017) provide a literature review of the two-step procedure implementation in the empirical accounting and finance research.

[12] A robustness analysis weights the exported goods based on Rauch's (1999) product classification, given that managers are more able to differentiate the export price for differentiated commodities than for homogeneous goods.

This empirical approach brings some advantages: the methodology can be replicated for other countries without survey collection costs and it is possible to compare international managerial quality relevance on firm's performance relative to other internal and external explanatory variables.[13] That being said, it is not possible to calculate the international managerial quality variable for non-exporting firms; hence this paper does not contribute to the literature on self-selecting into exporting. Also, how the potential model misspecification, measurement error, and sampling error derived from the two-step econometric approach are minimized is addressed in later sections.

This paper proceeds as follows. The next section includes the theoretical framework, section III describes the data, section IV defines the international managerial quality calculation and the baseline econometric specification, section V presents the results, and section VI concludes.

2 Theoretical framework

Bloom et al. (2021) proposes the most recent theoretical approach to describing trade and management dynamics. Their baseline model makes some standard assumptions about representative consumers' demand for variety, and foreign countries' expenditure for each good. Also, the model assumes that each firm receives an exogenous managerial ability $\varphi \in (0, \infty)$ from distribution $g(\varphi)$ at the firm level, and an i.i.d vector firm-product specific expertise level $\lambda_i \in (0, \infty)$ from distribution $z(\lambda)$. It is supposed that managerial ability is equal to TFP. Finally, φ level determines the *production efficiency* (ability to assemble inputs into final goods) and *quality capacity* (capacity to make high-quality goods).

Then, it is assumed that producing one unit of physical output requires $(\varphi\lambda_i)^{-\delta}$ units of labor with wage normalized to 1. Also, firms can produce one quality unit $q_i(\varphi, \lambda_i) = (\varphi\lambda_i)^{\theta}$ at a marginal cost of $(\varphi\lambda_i)^{\theta-\delta}$ workers. δ measures the degree to which good management lowers input requirements, and θ reflects the management's magnitude of skill to enhance firms' capacity to produce higher-quality goods. The firms' profit maximization leads to the next optimal export price of good *i* to destination country *j:*

$$p_{ij}(\varphi, \lambda_i)^* = \frac{\tau_j (\varphi\lambda_i)^{\theta-\delta}}{\alpha} \qquad (1)$$

where τ_j is country *j*'s iceberg trade cost, and α is the CES exponent of the consumer utility function. The difference between θ and δ will determine the optimal export price charged by the firm. If $\theta = 0$ and $\delta > 0$, effective management improves the firm's efficiency but not product quality, and the optimal price will decrease. If $\theta > 0$ and $\delta = 0$, management improves product quality and the optimal price will increase. Finally, when $\theta > 0$ and $\delta > 0$, both management mechanisms are active, and the export price will vary according to which parameter is larger.

Examples of management policies that increase production efficiency include "optimizing inventory control, synchronizing and monitoring production targets across manufacturing stages, reducing wastage, incentivizing workers, and so on." (Bloom et al., 2021, p.447). The strategies that upgrade quality capacity, measured in the parameter θ, cover "tighten quality control, ensure the compatibility of specialized inputs, facilitate complex assembly, and minimize costly mistakes." (Bloom et al., 2021, p.447). Intuitively, the managerial knowledge stock that enables the successful implementation of these

[13] Following the literature recommendation: "*Export performance should be assessed at two broad levels – the external environment level and the internal level. However, there is a lack of agreement on the domains and measurement of the determinants of export performance*" (Coelho et al., 2008, p.363)

strategies is what the academic literature has referred to as organizational capital, a non-traditional intangible asset that has been broadly defined.[14]

The methodological section of this paper does not directly estimate any Bloom et al. (2021) parameter, but it incorporates the theoretical concept that better managers in the international market boost production efficiency and quality capacity mechanisms. This paper assumes that managers expand *production efficiency* minimizing the export price of products that compete in the international market by price, and expand *quality capacity* maximizing the export price of products that compete in the international market by quality, via improvements in organizational capital. This assumption follows the sign of the correlation between the three parameters (p_{ji}, θ, δ) described in the optimal price equation 1, but it differs from the original Bloom et al. (2021) approach, which considered and estimated δ and θ as firm-invariant structural parameters.

3 Data

The sample used in this paper is a merge of two public Colombian datasets:[15]

- Customs data: Exports (imports) disaggregated at HS 10-digit product-country destination (origin)-firm id level. Data include traded value and exported (imported) quantity. The information is provided by the Colombian National Administrative Statistics Department (DANE by its Spanish acronym). The imported and exported value were deflated based on the US GDP deflator (2014 is the base year).
- *Big private firms' financial statements*: The Business Information and Reporting System (SIREM by its Spanish acronym) reports the financial statements (balance sheet, income statement, and cash flow) for firms supervised by the Colombian Companies Superintendence. The principal criterion for supervising a firm is that its total assets or operating income exceed 30,000 current legal Colombian minimum wages. Published information has passed its internal validation processes. One limitation of this dataset is that it does not include total number of employees, so operating expenses is used as a proxy variable.[16] The variables used in this dataset were deflated using an industry-specific annual Producer Price Index (PPI) reported by the Colombian Central Bank (2014 is the base year).

Figures 1 and 2 show the historical participation of big private Colombian exporting firms relative to total exporting firms and total exported value. On annual average, big private exporting firms represent 41% of total exporting firms with valid firm ID[17] (around 3,434 of 8,338 firms per year) and 62% of total

[14] On one hand, Dessein and Prat (2022) define organizational capital as an intangible productive asset that can be produced only with input from the firm's top management leadership, including: i) relational contracts, ii) corporate culture, iii) firm-specific human capital, or iv) firm capabilities. On the other hand, Black and Lynch (2005) define organizational capital as the firm's organizational structure that contributes to its productive capacity, including work force training, employee voice, and work design (including the use of cross-functional processes).

[15] Data was downloaded in February 2021. It was deleted from the sample firms close to bankruptcy (firms whose equity was smaller than 0, or whose debt ratio (liabilities/assets) is larger than 1, or whose return on assets (profit/assets) is smaller than -1).

[16] The Colombian government shared the Colombian payroll data (PILA, by its Spanish acronym) for the big private Colombian exporting firms included in this paper with an anonymous firm-id to guarantee anonymization. Therefore, it was not possible to merge it with the databases described above. The payroll database would allow for remuneration and supply labor data to be included into the analysis (e.g., wages and worked/vacation days).

[17] The valid firm ID ("NIT") is composed of a 9-digit random number plus a verification digit. The way in which firms report the NIT in the custom database is not homogenous: only some firms report the verification digit. For the financial statements

exported value[18] (around US$28,322 million of US$46,256 million per year). Also, big private Colombian exporting firms export higher values, export more products, export more products to more countries, and report lower export concentration than other exporting firms (see appendix table 2A). Additionally, big private exporting firms have larger fixed assets, greater operating income, more non-tangible assets, and higher TFP than big private non-exporting firms (see appendix table 3A).

***Figure 1*. Total Colombian exports disaggregated by firm classification**

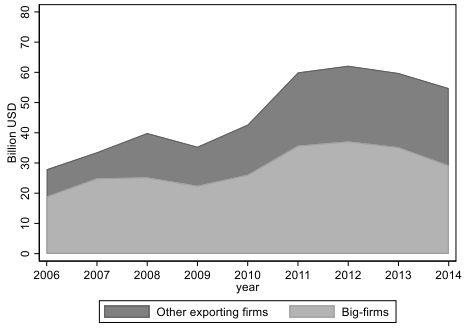
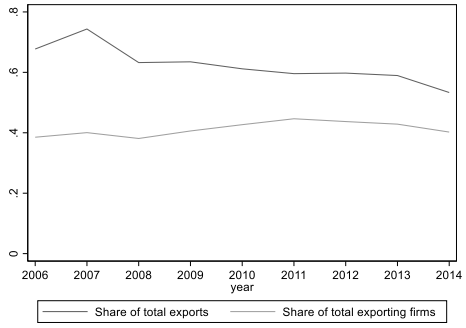


***Figure 2*. Big exporting Colombian firms relative to total exporting firms**



Source: Colombian National Administrative Statistics Department (DANE by its Spanish acronym), Colombian Companies Superintendence and authorial calculations. Note: Total exporting firms exclude firm IDs (NIT) with fewer than 9 digits, which are low magnitude transactions made by individuals (not firms).

4 Methodology

As TFP is one of the most relevant economic variables, how to measure it has been one of the most debated academic topics since the 1940s (Mahadevan, 2003). Although the basic approach of using the production function residual as a proxy variable has been widely criticized,[19] most recent methodologies still continue to rely on the error/residual calculation, albeit while attempting to resolve some of its issues.[20] In the same way, empirical accounting and finance papers have measured other relevant unknown variables based on regressions residuals, with some studies including it as an independent variable in a second regression: "*numerous studies use residuals from a first-step regression as independent variables in a second regression. For example, residuals or transformed residuals, proxying for constructs such as accrual quality, discretionary accruals, managerial ability, etc. are commonly used as independent variables of interest in regression models*" (Chen et al., 2017, p.8).

This paper therefore applies a two-step methodology to measure managerial skill in the international market and its impact on firm performance. In first place, international managerial quality is computed as the median of export unit value regression residuals for each firm-year, multiplied by -1 for those products that compete in the international market by price. Essentially, the fraction of the export unit value not attributable to a set of firm characteristics and a group of detailed fixed effects is used as a

dataset, all firms do not report the verification digit. For the customs data, exported IDs with fewer than 9 digits are excluded because these are low magnitude export transactions made by individuals (not firms).

[18] 80% excluding the largest Colombian exporting firm (*Ecopetrol*), which on annual average accounts for 22,7% of the total exported value. The financial statements dataset does not include it because its ownership has public and private participation.

[19] "*It is nothing more than a measure of what we do not know*" Mahadevan (2003, p.366).

[20] Mollisi and Rovigatti (2017) group methodologies for calculating TFP in terms of: i) fixed effects, ii) instrumental variables, and iii) control function approaches.

proxy variable of the quality manager's strategies and the manager's organizational capital contribution to maximize: i) *quality capacity*: the higher the residual, the better the management for products competing on quality, and ii) *production efficiency*: the lower the residual, the better the management for products competing on price. The international managerial quality variable is then included as an explanatory variable in the regression of international firms' performance.

The steps of the methodology are described below. Also, the potential econometric issues derived from the two-step estimation (model misspecification, measurement error, and sampling error) are addressed.

4.1 Classifying markets as price or quality competition

Baldwin and Ito (2011) classify markets based on an export unit value (EUV) regression for each HS 6-digit, in which the destination country's GDP, its GDP per capita, the distance between exporter and importer, and the year fixed effects are included as explanatory variables, using customs data for each of the world's top 8 exporters plus Australia. The distance coefficient will indicate if the market competes internationally by price or quality. The theoretical foundation of using distance as the key determinant variable is that traditional heterogeneous firm trade models, as in Melitz (2003), hold that higher productivity firms produce cheaper goods. The qualitative heterogeneous firm trade model predicts that more productive firms sell more expensive goods. As only the more productive firms find it profitable to serve more remote destinations, the trading distance will indicate if the good is competing internationally by price (negative distance coefficient) or by quality (positive distance coefficient).

This paper adds three innovations to Baldwin and Ito's (2011) market classification methodology. First, a dummy variable indicating if the destination country is contiguous to Colombia was included; this accounts for Colombia's high political tensions with its neighboring countries during the studied years.[21] Then, the following regression was estimated for each HS 6-digit market:

$$ln(EUV)_{pkt} = \beta_o + \beta_1 ln\, distance_{kt} + \beta_2 ln\, GDP_{kt} + \beta_3 ln\, GDPpc_{kt} + \beta_4 Contiguity_{kt} + \partial_t + \in_{pkt} \qquad (2)$$

where subscript *p* denotes the HS 10-digit product, *t* the year, *k* the destination country, and ∂_t the year fixed effects. Secondly, the unit of observation for each regression (HS 10-digit product-destination country) has a higher disaggregation level than Baldwin and Ito's (2011) original HS aggregation (HS 6-digit product-destination country). This is because Colombia exports a smaller number of products than the world's top exporters; consequently, the probability of getting a significant distance coefficient is lower because the sample size will be smaller.[22]

Third and most important, the export unit value regression described in equation 2 was estimated for broader market aggrupation (HS 5-digit, HS 4-digit, HS 3-digit, HS 2-digit, HS 1-digit), and then the markets (HS 6-digit) were classified according to the regression of the respective narrower market aggrupation in which the distance coefficient was significant.[23] The market classification is more precise

[21] There was also a large bilateral real exchange rate devaluation with Venezuela.

[22] Distance will also have a selection effect if equation 2 is estimated with disaggregated HS 10-digit level data: "*the distance-price-gradient prediction stems from product/firm selection, not from firms' pricing behavior*" (Baldwin & Ito, 2011, p.114).

[23] For example, there are six potential estimations of equation 2 associated with the HS code ABCDEF: one for all *p* (HS 10-digit product) belonging to HS 1-digit (A), one for all *p* belonging to HS 2-digit (AB), one for all *p* belonging to HS 3-digit (ABC), one for all *p* belonging to HS 4-digit (ABCD), one for all *p* belonging to HS 5-digit (ABCDE), and one for all *p* belonging to HS 6-digit (ABCDEF)). Initially, the HS code (ABCDEF) is classified as price or quality competition if the distance coefficient of equation 2 estimated for all *p* belonging to HS 6-digit (ABCDEF) is significant. If not, the HS code (ABCDEF) is classified as price or quality competition if the distance coefficient of equation 2 estimated for all *p* belonging to HS 5-digit (ABCDE) is significant. If not, the HS code (ABCDEF) is classified as price or quality competition if the distance coefficient of equation 2 estimated for all *p*

as the regression aggrupation level is narrower (HS-6 digit is preferable to HS-5 digit), but it is less likely to get a significant distance coefficient because the sample for each regression is smaller. This modified methodology allows all markets to be classified—compared to Baldwin and Ito (2011)—and still takes advantage of the highly disaggregated Colombian customs data characteristics, as the unit of observation for all regressions is the HS 10-digit product-destination country.

In total, 7074 regressions were estimated, in which 18% of the markets were classified at the initial HS 6-digit aggrupation level, 10% at HS 5-digit, 24% at HS 4-digit, 29% at HS 3-digit, 10% at HS 2-digit, 6% at HS 1-digit, and the remaining 3% using the whole sample regression (table 1). The market classification results indicate that 55% of the markets compete by quality and 45% by price. Also, the annual average percentage of quality competition products' export value relative to total exported value for the big private Colombian exporting firms is 30% (for the other exporting firms it is 25%), and the trend slightly decreased during the analyzed time horizon for both types of firm (figure 3).

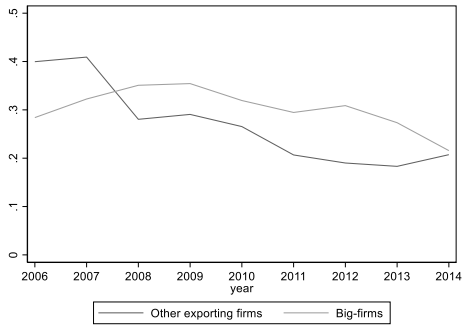
***Table 1*. Market classification (price or quality competition)**

HS aggrupation level per regression	Number of markets classified[1]	Percentage of markets classified relative to total markets	Number of groups in each HS aggrupation level	Number of regressions[2]	Median observations per regression	Average observations per regression
HS6-dig	898	18.43	4,872	3,258	27	65
HS5-dig	474	9.73	3,402	2,486	52	129
HS4-dig	1,151	23.62	1,215	1,049	216	454
HS3-dig	1,419	29.13	174	173	1,738	2,506
HS2-dig	477	9.79	97	97	4,317	8,277
HS1-dig	296	6.08	10	10	25,674	34,913
Whole sample	157	3.22	1	1	291,888	291,888

Classification	Number of markets	Percentage of markets
Price competition	2,173	44.6
Quality competition	2,699	55.4
Total	4,872	100

[1]The markets classified as price (quality) competition are those whose distance coefficient is significant and negative (positive) in equation 2. [2] The number of regressions does not match with the number of groups in each HS aggrupation level if the sample is insufficient to estimate equation 2 for certain groups.

***Figure 3*. Quality competition products exports relative to total exports**



Source: Colombian National Administrative Statistics Department (DANE by its Spanish acronym), Colombian Companies Superintendence, and authorial calculations. The product classification follows the methodology explained in section 4.1.

belonging to HS 4-digit (ABCD) is significant, and so on. In the most pessimistic scenario, the HS code (ABCDEF) is classified as price or quality competition according to the distance coefficient of the regression using the whole sample.

4.2 International managerial quality estimation

In first place, the export unit value (EUV) regression is estimated as follows:

$$ln(EUV)_{pfkt} = \beta_o + \beta_1 ln\, GDP_{kt} + \beta_2 ln\, GDPpc_{kt} + \beta_3 tf_{p*kt} + \Gamma X_{ft} + \theta New_{pfkt} + \varphi Number\_p\_k_{pfkt} + \partial_p + \partial_f + \partial_k + \partial_t + \in_{pfkt} \quad (3)$$

where subscript *p* denotes HS 10-digit product, p* is the HS 6-digit product, *f* the firm, *k* the destination country, and *t* the year. $ln\, GDP_{kt}$ and $ln\, GDPpc_{kt}$ are destination country variables that vary over time (GDP and GDP per capita). $Tariff_{p*kt}$[24] is the ad-valorem import tariff imposed by destination country *k* on product p*. Firm level variables X_{ft} include log fixed assets, log operating expenses, log non-tangible assets,[25] mark-up, and TFP calculated using Levinsohn and Petrin's (2003) methodology.[26] New_{ftkp} includes three independent and mutually exclusive dummies that identify new export decisions made by firm *f* in year *t* to control for the adjustment cost of innovating: i) if it is a new product *p* exported to an "old" country destination *k*, ii) if it is an "old" product *p* exported to a new country destination *k,* or iii) if it is a new product *p* exported to a new country destination *k*. $Number\_p\_k_{ftkp}$ denotes the number of products that firm *f* exports in year *t*, the number of destination countries to which firm *f* exports in year *t*, and the number of product-destination countries to which firm *f* exports in year *t* (in logarithm). Finally, ∂_k is the destination country fixed effects, ∂_p the HS 10-digit product fixed effects, ∂_f the firm fixed effects, and ∂_t the year fixed effects. Robust standard errors are clustered at country destination-year level.

The baseline export unit value regression is shown in column 1 of table 2. Column 2 adds double fixed effects interactions between destination country, product, year, and firm fixed effects, and column 3 has the triple fixed effect interactions. Column 4 keeps the fixed effects of column 3 but excludes TFP.[27] As the international managerial quality variable is intended to calculate the manager's organizational capital contribution to increase production efficiency and quality capacity of the exported products across years, the double and triple fixed effects interactions added in columns 2 and 3 do not absorb this variation because neither are defined as the combination of firm fixed effect with a time-changing variable fixed effect. These additional fixed effects (FE) control for the unobserved characteristics of combinations of product, year, destination country, and firm, which are orthogonal from the manager's control and impact on export unit value.

For example, product-year FEs in column 2 are included because of large unit value differences between products: "they take out all observed and unobserved global factors that might change the relative unit values over time. For instance, if the relative price of computers to pencils goes down in year t due to technological progress or changes in demand, this effect will be absorbed by the product-year fixed effect" (Harding & Javorcik, 2012, p.970). Also, product-firm-country destination FE controls for the average unit value of each product sold by each firm to each country destination. Consequently, the specification error due to omission of relevant explanatory variable is minimized when international managerial quality is calculated with residuals from column 2 and 3 because double and triple FE

[24] Source of tariff dataset is Feodora Teti's Global Tariff database (Teti, 2020). Product level aggregation is HS 6-digit.

[25] Firm level variables were calculated as Log(x+1) in order to include firms that report $0 in the variables, particularly non-tangible assets.

[26] TFP calculation was calculated using all sample (big private exporting and not exporting firms) with *prodest* Stata command (Mollisi & Rovigatti, 2017). See appendix table 4A for results.

[27] One of the disadvantages of the methodology proposed in this paper is that TFP inclusion in the EUV regression raises a trade-off. On one hand, TFP is redundant because international managerial talent is one of the TFP components. On other hand, it is relevant because its inclusion allows to control for the fact that equation 3 residuals do not capture non-international managerial TFP components. Since TFP components cannot be split, the only feasible solution is to calculate EUV regression with and without TFP and show both results.

interactions are relevant EUV determinants. Consequently, this calculation reduces the measurement error of international managerial quality in the second-step regression.

Then, modified residuals $\hat{v}_{pkft}$ are defined as in equation 4 based on equation 3 residuals ($\hat{\epsilon}_{pkft}$) and market classification. Once the components of $\hat{v}_{pkft}$ are put in ascending order for each firm-year, the baseline international managerial quality is calculated as the median of $\hat{v}_{pkft}$ for each firm f in year t (equations 5A and 5B):

$$\hat{v}_{pkft} = \begin{cases} \hat{\epsilon}_{p1kft}, & where\ p1\ is\ the\ set\ of\ products\ that\ compete\ by\ quality\ exported\ by\ firm\ f\ in\ year\ t \\ \hat{\epsilon}_{p2kft} * (-1), & where\ \ p2\ is\ the\ set\ of\ products\ that\ compete\ by\ price\ exported\ \ by\ firm\ f\ in\ year\ t \end{cases} \quad (4)$$

$$International\ managerial\ quality\ (IMQ)_{ft} = \left(\frac{n+1}{2}\right)^{th} obs\left(\hat{v}_{pkft}\right)\ for\ odd\ number\ of\ observations \quad (5A)$$

$$International\ managerial\ quality\ (IMQ)_{ft} = \frac{\frac{n^{th}}{2} + \left(\frac{n}{2}+1\right)^{th}}{2} obs\left(\hat{v}_{pkft}\right)\ for\ even\ \ number\ of\ observations \quad (5B)$$

Initially, $\hat{v}_{pkft}$ are aggregated by the median, which is a more accurate central tendency measure when there are outliers in the sample.[28] However, as a robustness check, modified residuals $\hat{v}_{pkft}$ are also aggregated by the simple average. Also, there is an alternative definition of international managerial quality, which is the median of the modified residuals $\hat{v}_{pkft}$ multiplied by a factor α based on Rauch's (1999) product classification, where α is higher for those products in which the manager can influence the exported price in a higher proportion: $\alpha_{differentiated\ producs} > \alpha_{referenced\ price} > \alpha_{organized\ exchange}$. It is more likely that a manager will be able to competitively export differentiated products at better prices than the homogeneous products, because the market for the latter behaves in a more competitive way. The factor α is obtained from the coefficient of the links variable (a dummy that takes the value of one if the two countries share a language or colonial tie) on bilateral trade value in the original Rauch (1999) regression.[29] In addition, appendix B shows a composed international managerial quality calculation, in which the residuals for homogeneous goods are obtained from quantity regression, assuming a perfect competitive market for those goods (price takers).

Figure 4 shows binned scatter plots between international managerial quality obtained from the third export unit value regression (IMQ3) in the x-axis, and eight different firms' outcomes in the y-axis. Most of the flat fit lines indicate null simple correlation between IMQ3 and exported value, number of exported products, number of destination countries' exports, number of export products-destination countries, imported inputs unit value, Herfindahl-Hirschman Index (HHI) (squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers), and export quality share (exported value of products that compete in the international market by quality relative to total exported value). Profit rates have a positive visible correlation with IMQ3, suggesting that better managed international firms are more profitable.

Additionally, figure 5 shows that IMQ3 is not correlated with some of the variables included in its calculation (operating expenses, fixed assets, non-tangible assets, and TFP), indicating that there is null multicollinearity in the firm performance regressions that are explained in the next section. Also, the null correlation between firm size and international managerial quality can be attributed to the fact that the metric described in this paper does not increase simply because the firm exports more products. On

[28] Outliers were not excluded from the estimation because they could identify successful managers; products sold internationally extremely expensive or extremely cheap could increase the international managerial quality, under the methodology proposed herein, if the former competes by quality and the latter by price.

[29] See table 6 in Rauch (1999). For the liberal definition: 0.598 (organized exchange), 0.604 (referenced price) and 0.875 (differentiated commodities). For the conservative definition: 0.425 (organized exchange), 0.66 (referenced price) and 0.866 (differentiated commodities)

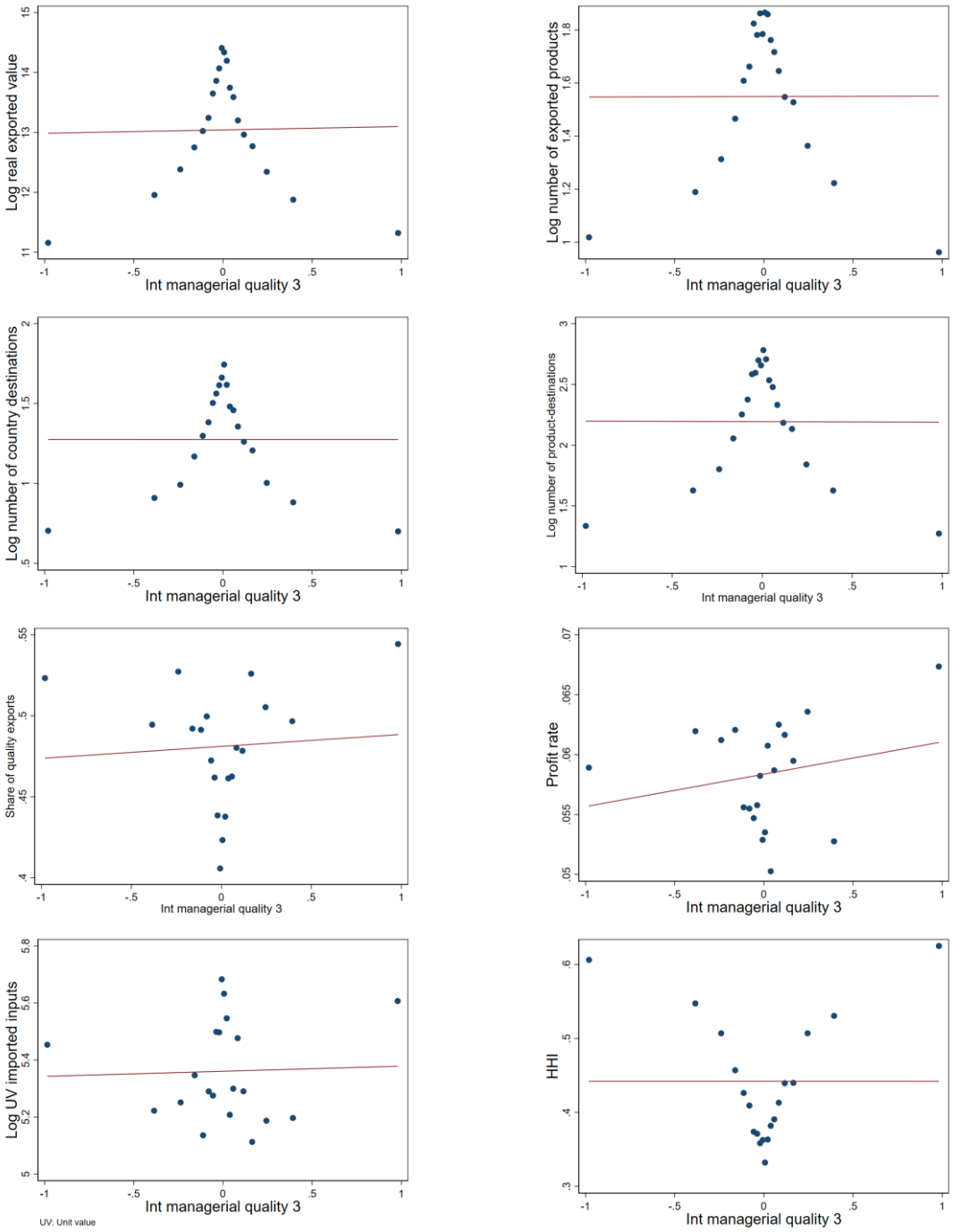
the contrary, the metric identifies that, compared with big exporters, small exporters can export more efficiently relative to their firm's capabilities.

***Table 2*. Export unit value regression**

	(1)	(2)	(3)	(4)
VARIABLES	Log (export unit value)			
Log GDP	-0.102			
	(0.204)			
Log GDPpc	0.142			
	(0.219)			
Applied tariff (ad-valorem component)	-0.00204*	0.000947		
	(0.00105)	(0.00149)		
Log real stock non-tangible assets (USD)	0.00132	0.000688	0.000380	0.000302
	(0.00109)	(0.000869)	(0.000846)	(0.000839)
Log real stock property, plant and equipment (USD)	0.00940	0.00297	0.00763	0.00250
	(0.0102)	(0.00703)	(0.00674)	(0.00256)
Log real operating expenses (USD)	-0.0155	-0.0210	-0.00956	0.00591
	(0.0176)	(0.0135)	(0.0136)	(0.00843)
Mark-up (operating income / sales cost)	0.000956	0.000628	-0.000498	-0.000442
	(0.000664)	(0.00428)	(0.000626)	(0.000615)
Dummy new product in t	-0.0107	0.00852	-0.00147	-0.00286
	(0.0124)	(0.0123)	(0.0130)	(0.0130)
Dummy new destination in t	0.0948***	0.0559***	0.0109	0.0120
	(0.0134)	(0.0148)	(0.0191)	(0.0189)
Dummy new product-destination in t	0.0553**	0.0184	0.0446	0.0436
	(0.0270)	(0.0312)	(0.0370)	(0.0370)
Log number of exp products-country destinations	-0.198***	-0.103***	-0.0815***	-0.0791***
	(0.0226)	(0.0186)	(0.0175)	(0.0168)
Log number of country destinations	0.120***	0.0656***	0.0499***	0.0501***
	(0.0219)	(0.0156)	(0.0149)	(0.0149)
Log number of exported products	0.0528***	0.0392***	0.0260**	0.0234**
	(0.0171)	(0.0134)	(0.0115)	(0.0113)
TFP, Levinsohn & Petrin (2003)	0.319***	0.150**	0.128**	
	(0.0889)	(0.0754)	(0.0624)	
Observations	438,937	367,970	276,462	279,755
R-squared	0.732	0.904	0.938	0.938
Country destination fixed effects	Yes	No^r	No^r	No^r
Product fixed effects	Yes	No^r	No^r	No^r
Year fixed effects	Yes	No^r	No^r	No^r
Firm fixed effects	Yes	No^r	No^r	No^r
Product-firm fixed effects	No	Yes	No^r	No^r
Product-destination fixed effects	No	Yes	No^r	No^r
Product-year fixed effects	No	Yes	No^r	No^r
Destination-year fixed effects	No	Yes	No^r	No^r
Firm-destination fixed effects	No	Yes	No^r	No^r
Product-firm-destination fixed effects	No	No	Yes	Yes
Product-year-destination fixed effects	No	No	Yes	Yes

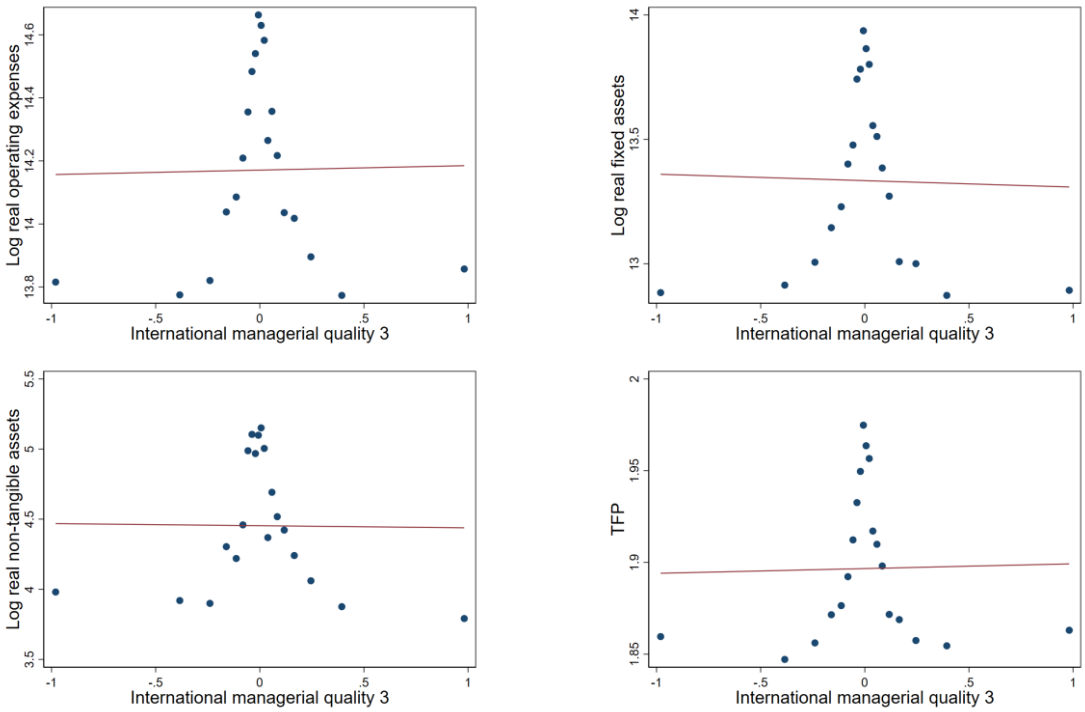
Export unit value = real exported value/quantity. Robust standard errors clustered at country-year level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. No^r: redundant fixed effects.

***Figure 4*. Binned scatter plots between international managerial quality and firm performance measures**



***Note: Profit rate* is defined as operating profit relative to operating income. *Share of quality exports* is defined as exported value of products that compete internationally by quality relative to total exported value, and the *Herfindahl-Hirschman Index (HHI)* is calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers.**

***Figure 5*. Binned scatter plots between international managerial quality and explanatory variables**



Note: TFP calculation based on Levinsohn & Petrin (2003) methodology. See appendix A4.

4.3 International firm performance regression

The firms' performance baseline regression is:

$$log\, Y_{ft} = \beta_o + \beta_1 IMQ3_{ft} + \beta_2 Log\ global\ demand\ exp_{ft} + \Gamma X_{ft} + \partial_f + \partial_{st} + v_{ft} \qquad (6)$$

where firm outcome (Y) includes the dependent variables as previously defined and graphed: i) log exported value, ii) number of exported products, iii) number of export destination countries, iv) number of exported products-destination countries, v) Herfindahl-Hirschman Index (HHI) for exports, vi) quality exports share, vii) profit rate, and viii) simple average of imported inputs unit value. $IMQ3_{ft}$ is the international managerial quality described in equation 5 and estimated with the residuals from the third EUV regression (column 3 of table 2). X_{ft} is a vector of firm-level characteristics including log fixed assets, log non-tangible assets, log operating expenses[30], and TFP clean of the international management component.[31] ∂_f are firm fixed effects and ∂_{ts} are industry[32]-year fixed effects, which absorb annual industry shocks allowing comparisons within industry-year.

$Log\ global\ demand\ exp_{ft}$ measures the degree to which the global market demands the products exported by the firm. It is exogeneous from manager decision (by construction) and it allows the importance of international factors on firm performance to be calculated. It is defined as $Log\ global\ demand\ exp_{ft} = \ln(\sum_{kp} ID_{kpt} * share\_exp_{pk,t=0})$, where $share\_exp_{pk,t=0}$ is the share of product p (HS 6-digit) exported to country k in total exports of firm f in its first sample year, and ID_{kpt} is the

[30] As explained above, firm level variables were calculated as Log(x+1) in order to include firms that report $0 in any variable, particularly non-tangible assets.

[31] It is calculated as the residual of a regression of TFP on international managerial quality as in Bloom et al. (2021).

[32] ISIC 3-digit.

imported value of country *k* of product *p* in year *t* excluding Colombian exports.[33] Figure 6 shows that international managerial quality is not correlated with exogenous external demand shocks, highlighting that IMQ measures innate manager quality uninfluenced by external conditions. Finally, table 5A (appendix) presents descriptive statistics for the dependent and independent variables included in the regressions.

Two econometric issues emerge from this specification. First, IMQ could be measured with error because it is a proxy variable constructed from residuals. For this reason, baseline firm performance regressions (equation 6) include IMQ3, which is the international managerial quality variable calculated with the EUV regression that, as previously explained, has the lowest specification error. In terms of IMQ statistical significance and the magnitude of its coefficient, Jennings et al. (2023) found that a combination of one variable with measurement error, and fixed effects with higher absorption level[34] could distort inferences (falsely rejecting a true null hypothesis) and even inflate coefficients (contrary to the traditional attenuation effect). As absorption rate of the fixed effects described in equation 6 with international managerial qualities is on average 10%[35], which is way below the 90% threshold identified by Jennings et al. (2023), the statistical significance of IMQ is reliable. However, it would be necessary to determine if the measurement error in IMQ is correlated with the control variables to establish if the attenuation effect vanishes or not.[36]

Secondly, the standard errors could be understated because the independent variable of interest (IMQ) is a generated regressor (i.e., produced by estimates) and is therefore subject to sampling bias. Although Chen et al. (2023) prove that standard error bias is not present when the generated regressor is calculated based on residuals and absolute residuals, IMQ is generated based on a particular adjustment in which the price competition products' residuals are multiplied by -1. Consequently, the standard error for β_1 coefficient is calculated through bootstrapping, which is an effective tool to correct the sampling bias (Chen et al. 2023), and acts as a robustness check of the standard errors clustered at firm level.

For this purpose, β_1 coefficient in equation 6 was estimated using an alternative econometric procedure based on the Frisch-Waugh-Lovell theorem, which makes the bootstrapping calculation computationally easier. First, a regression is estimated where the dependent variable is the residual of a regression of Y on equation 6's other explanatory variables ($\beta_2 ln\ Ext\ Demand\ exp_{ft} + \Gamma X_{ft} + \partial_f + \partial_{st} + v_{ft}$), and the independent variable is the residual of a regression of IMQ3 on equation 6's other explanatory variables ($\beta_2 ln\ Ext\ Demand\ exp_{ft} + \Gamma X_{ft} + \partial_f + \partial_{ft} + v_{ft}$), which will estimate the same β_1 coefficient. It is feasible to bootstrap standard errors in Stata.

Additionally, two placebo tests were included. Firstly, firm' equity was added as an additional dependent variable in order to check that IMQ does not have a statistically significantly effect on the variables it theoretically should not affect. Secondly, a placebo IMQ was constructed following the same procedure described above but with imported unit value residuals (see table 6A) in order to verify that only the

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[33] The results are robust when $Log\ global\ demand\ exp_{ft} = \sum_{kp}(ln(ID_{kpt}) * share\_exp_{pk,t=0})$

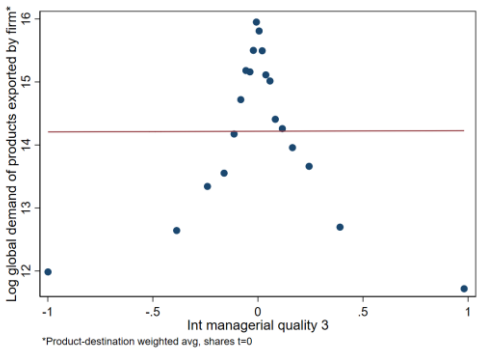
[34] The absorption rate is defined as the R-squared from a regression of the independent variable of interest on fixed effects. In this case, the absorption rate is the R-squared from a regression of international managerial quality on firm and industry–year fixed effects.

[35] Jennings et al. (2023) state that absorption levels above 90% produce biased coefficients and wrong statistical inference. Absorption rates of the fixed effects described in equation 6 with all international managerial qualities are below 31% (30.8%, 7.1%, 6.9%, 7%, 7%, 5.8%, and 6.8%).

[36] Jennings et al. (2023) show that if one variable with measurement error is correlated with one explanatory variable, measurement error does not attenuate the coefficient. Also, they show that when fixed effects are added, the attenuation effect could vanish in a bigger proportion or even flip to a positive bias.

original IMQ has explanatory power on the dependent variables. In both cases, β_1 coefficients should be not statistically significant.

Figure 6. **Binned scatter plot between firm international managerial quality and exogenous global demand for products exported by firm**



Note: The y-axis variable is defined as $Log\ global\ demand_{ft} = \ln(\sum_{kp} ID_{kpt} * share\_exp_{kp,t=0})$, where $share\_exp_{kp,t=0}$ is the share of product p (HS 6-digit) exported to country k in total exports of firm f in its first sample year, and ID_{kpt} is the imported value of country k of product p in year t excluding Colombian exports. International managerial quality in x-axis is defined as in equation 5.

5 Results

Table 3 shows the estimation of international firms' performance regression as described in equation 6. The results indicate that a 1% increase in international managerial quality (IMQ) raises the firm's exported value by 0.07% (column 1) and does not impact any extensive margin measure (columns 2–5). Both results imply that better managers in the international market focus on maximizing the production efficiency and quality capacity mechanisms for those products already exported by the firm, leading firms to increase their exported value and profit rate (column 7) via the intensive margin. Also, better managers do not increase the export share of products that compete in the international market by quality (column 6).

The null IMQ effect on extensive margin measures contradicts previous empirical findings (Bloom et al. 2021) but is partially aligned with the Baldwin and Forslid (2010) theoretical model for heterogeneous firms with beachhead costs, which found an '*anti-variety*' globalization effect. Similarly, the null IMQ effect on export quality share also somehow opposes previous empirical findings that highlight that "*countries that latch on to higher productivity goods will perform better*" (Hausmman et al., 2007, p.3)[37] and question the validity of the Alchian–Allen theorem described in the introduction.[38] While the findings of this paper suggest that upgrading quality exports and increasing the number of exported products may not be most profitable and efficient manager decision, this conclusion should be interpreted in a short-term framework. It does not refute the potential long-term aggregate benefits of upgrading quality exports (Hausmman et al., 2007), especially in an emerging economy (Sutton, 2007) such as Colombia.

One potential explanation of this result is that the manager's low intertemporal discount factor makes them prioritize expanding the export capacity of the firm's extant exported products and product destinations over exploring new markets or exporting new products. Future research could incorporate

[37] Basically, "*countries become what they produce*" (Hausmman et al., 2007, p.1)

[38] Although its formal proof would require collecting detailed freight rate data and performing specific econometric analysis.

a manager objective prioritization function into the theoretical models; this would allow optimal manager behavior to be derived, and dynamic international managerial quality to be calculated.

Furthermore, IMQ does not explain significantly the average imported input unit value (column 8); this is to be expected because if better managers are not upgrading export quality or increasing the number of exported products, they will not require better inputs from the international market. Besides, the non-tangible assets is the least significant explanatory variable of those included in the regressions; this indicates that non-traditional intangible assets, such as the organizational capital measured in IMQ, is a more relevant determinant of international firms' performance than the traditional non-tangible assets measured in firms' financial statements. Nonetheless, this result could be underestimating the intangible asset effect because of limitations in the way it is measured (Crouzet et al., 2022). In fact, 59% of the big private Colombian exporting firms report null intangible assets.

In comparative terms, figure 7 shows that IMQ coefficients are statistically larger (around 3 times) than the coefficients that measure the magnitude of global market demand for the products exported by the firm when exported value is the dependent variable. This suggests that endogenous improvements in international managerial quality can boost the exported value to a higher magnitude than when exogenous improvements occur in international market conditions. Also, managers are more decisive when the IMQ calculation considers product differentiation via i) higher weights assigned to differentiated products (see Rauch, 1999, and tables 4 and 9A), or ii) when residuals of quantity regression instead of unit value are assigned to homogeneous goods (see appendix B).

As a robustness check, equation 6 was estimated replacing IMQ3 by other IMQs. Most of the inferences mentioned before hold in most of the robustness checks: when IMQ is calculated with the residuals of the third unit value regression weighted by the liberal Rauch (1999) product classification (table 4); when IMQ is calculated with the median of the first unit value regression residuals (table 7A); when IMQ is calculated with the median of the second unit value regression residuals (table 8A); when IMQ is calculated with the residuals of the third unit value regression weighted by the conservative Rauch (1999) product classification (table 9A); when IMQ is calculated with the simple average of the third unit value regression residuals (table 10A); when IMQ is calculated with the median of the fourth unit value regression residuals (table 11A); and when IMQ is calculated with quantity regression residuals for homogeneous goods (appendix B).

Finally, the placebo tests performed well because none of the international managerial quality variables report a significant effect on firms' equity (column 9), and IMQ3 calculated with the imported unit value regression residuals (table 6A) does not report any significant effect on most of the dependent variables (table 5). Additionally, the main results are significant when the standard errors are bootstrapped with 1,000 replications (table 12A) and 5,000 replications (table 13A), which correct the potential sampling bias.

Table 3. **International managerial quality 3 impact on firms' performance**

VARIABLES	(1) Log real exported value	(2) Log No. exported products	(3) Log No. destination countries	(4) Log No. products-destination	(5) HHI exports[1]	(6) Quality exports (share)[2]	(7) Profit rate[3]	(8) Log average UV imported inputs	(9) Equity (P*)
International managerial quality 3	0.0668***	0.00940	0.00409	0.00420	-0.00188	0.000117	0.00276*	-0.0264	0.000285
	(0.0238)	(0.0102)	(0.00806)	(0.0114)	(0.00404)	(0.00332)	(0.00152)	(0.0395)	(0.00682)
Log global demand of products exported by firm (product-destination weighted avg, shares t=0)	0.0258***	0.0162***	0.0152***	0.0232***	-0.00493***	-0.000501	6.80e-05	0.00725	-0.000636
	(0.00303)	(0.00151)	(0.00124)	(0.00166)	(0.000510)	(0.000551)	(0.000168)	(0.00443)	(0.00101)
Log real stock property, plant and equipment (USD)	0.217***	0.0485***	0.0546***	0.0804***	-0.00773**	0.000330	0.0112***	0.331***	0.188***
	(0.0235)	(0.0123)	(0.00946)	(0.0136)	(0.00354)	(0.00310)	(0.00218)	(0.0426)	(0.0122)
Log real stock non-tangible assets (USD)	0.00686***	0.00417***	0.00327***	0.00423***	-0.000745*	-0.000382	0.000102	0.00486	0.00666***
	(0.00263)	(0.00150)	(0.00112)	(0.00161)	(0.000436)	(0.000395)	(0.000177)	(0.00447)	(0.00115)
Log real operating expenses (USD)	0.353***	0.132***	0.106***	0.173***	-0.0230***	-0.0130**	-0.0145***	0.219***	0.172***
	(0.0408)	(0.0203)	(0.0165)	(0.0234)	(0.00619)	(0.00506)	(0.00541)	(0.0785)	(0.0235)
TFP (excluding int management component)[a]	3.485***	0.726***	0.598***	1.064***	-0.0543	0.00700	0.173***	1.478***	1.124***
	(0.277)	(0.125)	(0.100)	(0.144)	(0.0399)	(0.0316)	(0.0283)	(0.455)	(0.137)
Observations	19,543	19,543	19,543	19,543	19,543	19,543	19,487	15,758	19,543
R-squared	0.913	0.861	0.884	0.890	0.760	0.902	0.630	0.699	0.969
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses clustered at firm level. .*** p<0.01, ** p<0.05, * p<0.1. P*: placebo test. UV: Unit value. [a] TFP (excluding int management component) is the residual of a regression of TFP on international managerial quality. [1]Calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [2]Exported value of goods that compete in the international market by quality relative to total exported value. [3]Operating profit relative to operating income.

Table 4. **International managerial quality (calculated based on liberal Rauch (1999) product classification[1]) impact on firms' performance**

VARIABLES	(1) Log real exported value	(2) Log No. exported products	(3) Log No. destination countries	(4) Log No. products-destination	(5) HHI exports[2]	(6) Quality exports (share)[3]	(7) Profit rate[4]	(8) Log average UV imported inputs	(9) Equity (P*)
International managerial quality 3 (liberal Rauch classification)	0.0764***	0.00906	0.00332	0.00315	-0.00196	0.000530	0.00319*	-0.0320	0.00187
	(0.0278)	(0.0119)	(0.00937)	(0.0134)	(0.00466)	(0.00383)	(0.00179)	(0.0442)	(0.00802)
Log global demand of products exported by firm (product-destination weighted avg, shares t=0)	0.0258***	0.0162***	0.0152***	0.0232***	-0.00493***	-0.000501	6.81e-05	0.00724	-0.000634
	(0.00303)	(0.00151)	(0.00124)	(0.00166)	(0.000510)	(0.000551)	(0.000168)	(0.00443)	(0.00101)
Log real stock property, plant and equipment (USD)	0.217***	0.0485***	0.0545***	0.0804***	-0.00773**	0.000336	0.0112***	0.331***	0.188***
	(0.0235)	(0.0123)	(0.00946)	(0.0136)	(0.00354)	(0.00310)	(0.00218)	(0.0426)	(0.0122)
Log real stock non-tangible assets (USD)	0.00686***	0.00417***	0.00327***	0.00423***	-0.000745*	-0.000382	0.000102	0.00486	0.00666***
	(0.00263)	(0.00150)	(0.00112)	(0.00161)	(0.000436)	(0.000395)	(0.000177)	(0.00447)	(0.00115)
Log real operating expenses (USD)	0.353***	0.132***	0.106***	0.173***	-0.0230***	-0.0130**	-0.0145***	0.219***	0.172***
	(0.0408)	(0.0203)	(0.0165)	(0.0234)	(0.00619)	(0.00506)	(0.00541)	(0.0785)	(0.0235)
TFP (excluding int management component)[a]	3.485***	0.726***	0.598***	1.064***	-0.0543	0.00700	0.173***	1.478***	1.124***
	(0.277)	(0.125)	(0.100)	(0.144)	(0.0399)	(0.0316)	(0.0283)	(0.455)	(0.137)
Observations	19,543	19,543	19,543	19,543	19,543	19,543	19,487	15,758	19,543
R-squared	0.913	0.861	0.884	0.890	0.760	0.902	0.630	0.699	0.969
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. P*: placebo test. [a] TFP (excluding int management component) is the residual of a regression of TFP on international managerial quality. [1]The international managerial quality calculated as the median of the third export unit value regression residuals (column 3 - table 2) multiplied by (-1) for *price competition* products and by the coefficients of the variable "*links*" (dummy variable which takes the value of one if both countries share a language or colonial tie and zero otherwise) on bilateral trade value for each type of product found by Rauch (1999): 0.598 (organized exchange), 0.604 (referenced price), and 0.875 (differentiated commodities). [2]Calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [3]Exported value of goods that compete in the international market by quality relative to total exported value. [4]Operating profit relative to operating income.

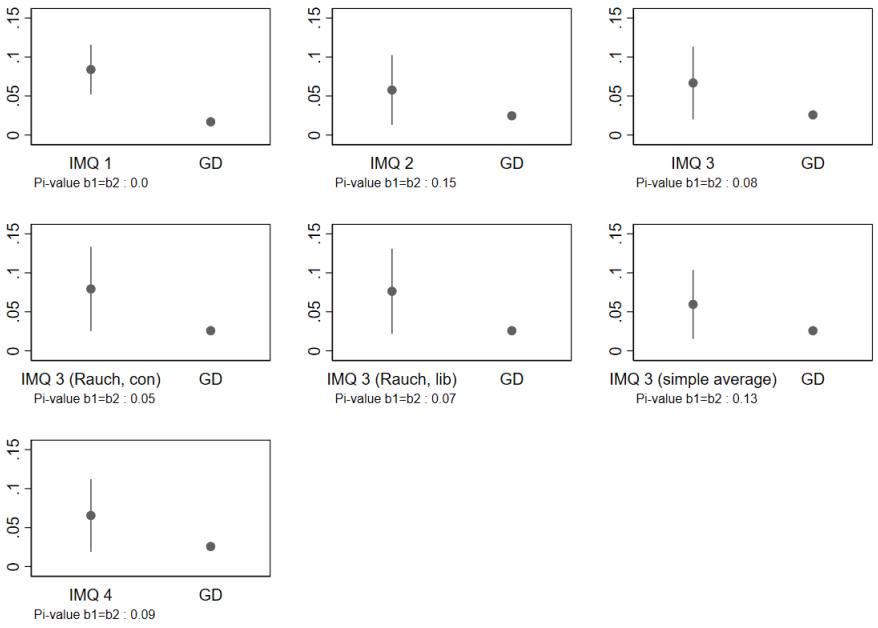
Table 5. **International managerial quality impact on firms' performance. Placebo test: international managerial quality constructed with the residuals of the imported unit value regression (see table 6A)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Log real exported value	Log No. exported products	Log No. destination countries	Log No. products-destination	HHI exports[1]	Quality exports (share)[2]	Profit rate[3]	Log average UV imported inputs	Equity (P*)
International managerial quality 3 (constructed with residuals from imported unit value regression, see table 6A)	-0.0111	-0.0104	-0.0128	-0.00722	0.000908	0.0159***	-0.00366	0.183**	0.000834
	(0.0299)	(0.0171)	(0.0140)	(0.0186)	(0.00629)	(0.00597)	(0.00246)	(0.0725)	(0.0112)
Log global demand of products exported by firm (product-destination weighted avg, shares t=0)	0.0162***	0.0114***	0.00901***	0.0151***	-0.00348***	-0.000324	-0.000165	0.00309	-0.00221***
	(0.00300)	(0.00137)	(0.000940)	(0.00150)	(0.000445)	(0.000517)	(0.000130)	(0.00276)	(0.000719)
Log real stock property, plant and equipment (USD)	0.204***	0.0528***	0.0610***	0.0818***	-0.0114***	-0.000254	0.0113***	0.349***	0.202***
	(0.0289)	(0.0140)	(0.0101)	(0.0156)	(0.00443)	(0.00455)	(0.00227)	(0.0335)	(0.0123)
Log real stock non-tangible assets (USD)	0.00920***	0.00507***	0.00337***	0.00551***	-0.00109**	-0.000801	0.000113	0.00555	0.00590***
	(0.00333)	(0.00159)	(0.00110)	(0.00169)	(0.000475)	(0.000495)	(0.000176)	(0.00391)	(0.00109)
Log real operating expenses (USD)	0.413***	0.176***	0.125***	0.220***	-0.0319***	-0.0200**	-0.0167***	0.144**	0.165***
	(0.0576)	(0.0261)	(0.0184)	(0.0281)	(0.00844)	(0.00813)	(0.00570)	(0.0645)	(0.0212)
TFP (excluding int management component)[a]	3.276***	0.752***	0.599***	0.955***	-0.0887*	-0.0244	0.171***	2.017***	1.391***
	(0.370)	(0.176)	(0.108)	(0.192)	(0.0516)	(0.0569)	(0.0300)	(0.426)	(0.128)
Observations	18,579	18,579	18,579	18,579	18,579	18,579	18,527	18,579	18,579
R-squared	0.880	0.828	0.884	0.876	0.739	0.837	0.667	0.731	0.970
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses clustered at firm level. P*: placebo test. *** p<0.01, ** p<0.05, * p<0.1. [a] TFP (excluding int management component) is the residual of a regression of TFP on international managerial quality. [1]Calculated squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [2]Exported value of goods that compete in the international market by quality relative to total exported value. [3]Operating profit relative to operating income.

Figure 7. **International managerial quality and global demand shocks impact on export performance**

Dependent variable: Log real exported value



Note 1: This graph shows the 95% confidence interval of the international managerial quality and log global demand (GD) of products exported by firm coefficients on log exported value. $\Gamma X_{ft} + \partial_f + \partial_{st}$ are included as other explanatory variables in the regression (see equation 6).

Note 2: Global demand of products exported by firm (GD) is defined as: $Log\ global\ demand\ (GD)_{ft} = \ln(\sum_{kp} ID_{kpt} * share\_exp_{pk,t=0})$, where $share\_exp_{pk,t=0}$ is the share of product p exported to country k in total exports of firm f in its first sample year, and ID_{kpt} is the imported value of country k of product p in year t excluding Colombian exports.

Note 3: IMQ1 is the median of the first unit value regression residuals (column 1 - table 2) multiplied by (-1) for those *price competition* products at firm-year level.

IMQ2 is the median of the second unit value regression residuals (column 2 - table 2) multiplied by (-1) for those *price competition* products at firm-year level.

IMQ3 is the median of the third unit value regression residuals (column 3 - table 2) multiplied by (-1) for those *price competition* products calculated at firm-year level.

IMQ3 (Rauch, con) is the median of the third unit value regression (column 3 - table 2) multiplied by (-1) for those *price competition* products and weighted according to the conservative Rauch (1999) product classification at firm-year level.

IMQ3 (Rauch, lib) is the median of the third unit value regression (column 3 - table 2) multiplied by (-1) for those *price competition* products and weighted according to the liberal Rauch (1999) product classification at firm-year level.

IMQ3 (simple average) is the simple average of the of the third unit value regression residuals (column 4 - table 3) multiplied by (-1) for those *price competition* products at firm-year level.

IMQ4 is the median of the of the fourth unit value regression residuals (column 4 - table 2) multiplied by (-1) for those *price competition* products at firm-year level.

6 Conclusion

Big exporting firms have incentives to implement different managerial practices when selling goods in the international markets versus the local markets. Despite this, specialized surveys of management quality do not include questions about those differences and the academic evidence about them is similarly scarce. This paper proposes a two-step methodology to measure the quality of firm managerial practices specifically geared to the international market and to calculate its impact on firm performance. International managerial quality is measured using the median of detailed export unit value regressions residuals at firm-year level (multiplied by -1 for products that compete on price). This measurement is a proxy variable of the manager's organizational capital contribution to improving the firm's production efficiency and quality capacity mechanisms described by Bloom et al. (2021). In a second step, international managerial quality is included as an explanatory variable in firms' performance regression. Specific econometric issues associated with two-step estimations (model misspecification, measurement error, and sampling bias) are discussed and solved.

Three conclusions emerge from the research. Two are intuitive and the other is counter-intuitive. First, higher international managerial quality impacts positively on the firm's exported value and profit rate, confirming the intuition that better managers in the international market increase the firm's exported value and make the firm more profitable. Also, international managerial quality is around 3 times more relevant than favorable external conditions to boost firms' exports, especially when the IMQ calculation considers product differentiation based on Rauch's (1999) product classification. However, better managers in the international market do not increase either their firms' extensive margin or their share of quality exports. In other words, good managers export better what the firm already sells, independent of product quality. This result challenges traditional policy recommendations that firms should attempt to increase the extensive margin and upgrade the quality of their exports. Also, it highlights that firms can increase their profitability by exporting any product as long as they can produce it efficiently, and that low-quality exports should not be demonized.

It is recommended that future research correlate IMQ with executive compensation data to assess if better managers—measured under the methodology proposed herein—receive higher remuneration. Also, these calculations could be related to globalization market and non-market returns estimates (see Keller & Olney, 2021). Also, it is suggested to deep into the non-traditional intangible assets measurement (such as organizational capital and the firm's culture and structure), which are more relevant determinants of firm performance than traditionally intangible assets measured in the financial statements. Finally, it is suggested that specialized management quality surveys, like WMS and GMOP, include questions about international managerial practices and whether (and how) firms learn by exporting.

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APPENDIX

Table 1A. **Literature review – 16 most influential business export empirical research**

Num	Paper	Title	Country	Sample
1	Bilkey & Tesar (1977)	The export behavior of smaller-sized Wisconsin manufacturing firms	US	423 small and medium-sized Wisconsin manufacturing firms
2	Bonaccorsi (1992)	On the relationship between firm size and export intensity	Italy	Nationwide sample of manufacturing firms
3	Cavusgil (1984a)	Differences among exporting firms based on their degree of internationalization	US	70 midwestern manufacturers(personal interviews with the executives)
4	Cavusgil & Nevin (1981)	Internal determinants of export marketing behavior — An empirical investigation	US	A sample of 816 firms was systematically selected from the 4701 manufacturing firms listed in the classified directory of Wisconsin Manufacture
5	Bello & Gilliland (1997)	The effect of output controls, process controls, and flexibility on export channel performance	US	A series of 20 in-depth field interviews were conducted with export executives (n=375)
6	Reuber & Fischer (1997)	The influence of management team's international experience on internationalization behaviors of SMEs	Canada	Firms to be contacted were identified from a directory of Canada's premier software product firms. The directory listed 164 firms
7	Cooper & Kleinschmidt (1985)	The impact of export strategy on export sales performance	Canada	Managers of 142 firms in the Canadian electronics industry were personally interviewed to obtain data on export strategies and performance
8	Wiedersheim et al. (1978)	Pre-export activity — The first step in internationalization	Australia	The investigation involved a survey of 75 Australian manufacturing firms in five different city locations
9	Cavusgil (1984b)	Organizational characteristics associated with export activity	US	A total of 816 companies had been systematically selected from the 4,701 companies listed in the classified directory of manufacturers in Wisconsin, U.S.A.
10	Cavusgil et al. (1993)	Product and promotion adaptation in export ventures — An empirical investigation	US	In-depth personal interviews were conducted in the midwestern United States (Illinois, Indiana, Michigan, Ohio, and Wisconsin) (n=202)
11	Dichtl et al. (1990)	International orientation as a precondition for export success	Germany	104 firms (interviews with managers)
12	Cavusgil & Naor (1987)	Firm and management characteristics as discriminators of export marketing activity	US	The sampling frame consisted of 795 firms listed in the 1978 Maine Marketing Directory
13	Kujawa & Simpson (1974)	The export decision process: An empirical inquiry	UK	The sample was drawn from the 2047 units selected from UK manufacturing firms through a random stratified procedure
14	Denis & Depelteau (1985)	Market knowledge diversification and export expansion	Canada	The researchers had access to a data bank of 331 small and middle-sized manufacturing firms located in Quebec
15	Madsen (1989)	Successful export marketing management: Some empirical evidence	Denmark	82 manufacturing firms participated in the survey
16	Reid (1984)	Information acquisition and export entry decision in small firms	Canada	89 small indigenous enterprises in Ontario

Source: Leonidou et al. (2010). The "sample" column was added by this paper.

***Table 2A*. Annual average descriptive statistics – big exporting firms and other exporting firms (2006 -2014)**

Variable	Big-exporting firms	Other exporting firms	Pi-value coefficient [a]
Simple average exported value per firm (real USD Dollars)	8,233,714	3,750,304	0.000
Median exported value per firm (real USD Dollars)	201,658	32,189	
Average exports HHI per firm	0.535	0.700	0.000
Median exports HHI per firm	0.481	0.800	
Average number of exported products per firm	7.7	4.161	0.000
Median number of exported products per firm	3.111	1.556	
Average number of country destinations per firm	4.619	2.143	0.000
Median number of country destinations per firm	2	1	
Average number of product - country destinations per firm	17.960	6.732	0.000
Median number of product - country destinations per firm	5	2	
Average number of firms	3,434	4,904	

Source: Colombian National Administrative Statistics Department (DANE by its Spanish acronym), Colombian Companies Superintendence, and authorial calculations. The exported value variable was deflated based on the US GDP deflator. [a] A regression was estimated for each variable on a dummy indicating if the firm is "big exporting" plus year fixed effects. The pi-value of the dummy variable coefficient is reported.

***Table 3A.* Annual average descriptive statistics – big exporting firms and big non-exporting firms (2006 -2014)**

Variable	Big exporting firms	Big non-exporting firms	Pi-value coefficient [a]
Simple average property plant equipment (real USD dollars) per firm	7,210,654	1,251,854	0.000
Median property plant equipment (real USD dollars) per firm	506,531	155,069	
Simple average non-tangible assets (real USD dollars) per firm	936,579	321,977	0.000
Median non-tangible assets (real USD dollars) per firm	0	0	
Simple average operating expenses (real USD dollars) per firm	5,893,036	1,123,319	0.000
Median operating expenses (real USD dollars) per firm	1,090,400	260,321	
Simple average TFP	1.887	1.824	0.000
Median TFP	1.846	1.765	
Average number of firms	3,434	20,490	

Source: Colombian Companies Superintendence and authorial calculations. The variables used in this dataset were deflated using an industry-specific annual Producer Price Index (PPI) reported by the Colombian Central Bank. TFP calculated with Levinsohn & Petrin (2003) methodology using "prodest" Stata command (table 4A).[a] A regression was estimated for each variable on a dummy indicating if the firm is "big exporting" plus industry-year fixed effects. The pi-value of the dummy variable coefficient is reported.

***Table 4A*. TFP estimation**

VARIABLES	(1) Log real operating income (USD)
Log real operating expenses (USD)	0.344***
	(0.00398)
Log real property, plant and equipment (USD)	0.0363***
	(0.00576)
Log real sales cost (USD)	0.556***
	(0.00941)
Observations	159,872
Number of groups	29,656

Source: TFP calculation based on Levinsohn & Petrin (2003) methodology and *prodest* Stata command (Mollisi & Rovigatti, 2017). *Free variable* is operating expenses, *state variable* is property plant and equipment, and *proxy variable* is sales cost. Sample includes the biggest private Colombian firms (exporting and non-exporting).

Table 5A. **Firm-level variables descriptive statistics (baseline regression sample)**

Variable	Mean	p50	SD	Min	Max	N
International managerial quality 1	-0.0021	-0.0064	0.7107	-6.0107	7.2609	19,518
International managerial quality 2	0.0028	0.0000	0.4215	-5.7716	4.6834	19,222
International managerial quality 3	0.0000	-0.0009	0.3909	-5.0236	3.9986	19,543
International managerial quality 4	0.0002	-0.0006	0.3440	-4.3504	3.5079	19,543
International managerial quality 5	0.0003	-0.0005	0.3422	-4.3956	3.5079	19,543
International managerial quality 6	0.0009	-0.0012	0.4013	-5.0236	3.9986	19,543
International managerial quality 7	0.0003	-0.0007	0.3913	-5.0570	4.0122	19,543
Log real exported value (USD)	13.0332	12.9476	2.5034	1.5661	21.9289	19,543
Log No. exported products	1.6408	1.6094	1.1375	0.0000	5.8889	19,543
Log No. country destinations	1.3089	1.3863	0.9607	0.0000	4.0254	19,543
Log No. product-country destinations	2.2732	2.1972	1.3428	0.0000	7.0300	19,543
HHI	0.4243	0.3420	0.2899	0.0138	1.0000	19,543
Quality exports (share)	0.4786	0.4725	0.4073	0.0000	1.0000	19,543
Profit rate	0.0636	0.0657	0.1031	-0.9894	0.8540	19,494
Log global demand of products exported by firm (GD)	14.2742	16.0914	6.8972	-6.4196	26.6964	19,543
Log real stock property, plant and equipment (USD)	13.3924	13.3431	2.1556	3.5266	22.8978	19,543
Log real stock non-tangible assets (USD)	4.6434	0.0000	5.8545	0.0000	19.7101	19,543
Log real operating expenses (USD)	14.2653	14.1074	1.5935	6.4903	19.9465	19,543
TFP	1.9007	1.8602	0.1957	1.6266	3.4609	19,543
TFP 1 (excluding int management component)	0.0088	-0.0315	0.1957	-0.2818	1.5680	19,518
TFP 2 (excluding int management component)	0.0033	-0.0368	0.1947	-0.2707	1.5643	19,222
TFP 3 (excluding int management component)	0.0041	-0.0365	0.1957	-0.2718	1.5642	19,543
TFP 4 (excluding int management component)	0.0041	-0.0366	0.1957	-0.2720	1.5642	19,543
TFP 5 (excluding int management component)	0.0041	-0.0366	0.1957	-0.2720	1.5642	19,543
TFP 6 (excluding int management component)	0.0041	-0.0365	0.1957	-0.2725	1.5642	19,543
TFP 7 (excluding int management component)	0.0042	-0.0365	0.1957	-0.2715	1.5643	19,543

Note 1: Global demand of products exported by firm (GD) is defined as: $Log\ global\ demand\ (GD)_{ft} = \ln(\sum_{kp} ID_{kpt} * share\_exp_{pk,t=0})$, where $share\_exp_{pk,t=0}$ is the share of product *p* exported to country *k* in total exports of firm f in its first firm year sample, and ID_{kpt} is the import demand of country *k* of product *p* in year *t* excluding Colombian exports.

Note 2: International managerial quality 1 is the median of the first unit value regression residuals (column 1 - table 2) multiplied by (-1) for those *price competition* products at firm-year level. International managerial quality 2 is the median of the second unit value regression residuals (column 2 - table 2) multiplied by (-1) for those *price competition* products at firm-year level. International managerial quality 3 is the median of the third unit value regression residuals (column 3 - table 2) multiplied by (-1) for those *price competition* products at firm-year level. International managerial quality 4 is the median of the third unit value regression (column 3 - table 2) multiplied by (-1) for those *price competition* products and weighted according to the type of good (based on Rauch product classification, conservative definition) at firm-year level. International managerial quality 5 is the median of the third unit value regression (column 3 - table 2) multiplied by (-1) for those *price competition* products and weighted according to the type of good (based on Rauch product classification, liberal definition) at firm-year level. International managerial quality 6 is the simple average of the of the third unit value regression residuals (column 4 - table 3) multiplied by (-1) for those *price competition* products at firm-year level. International managerial quality 7 is the median of the of the fourth unit value regression residuals (column 4 - table 2) multiplied by (-1) for those *price competition* products at firm-year level.

Note 3: Methodology to classify markets that compete in the international market by quality is explained in section 4.1.

Note 4: TFP calculation based on Levinsohn & Petrin (2003) methodology and the *prodest* Stata command (Mollisi & Rovigatti, 2017). See table 4A.

Note 5: TFP (excluding int management component) is the residual of a TFP regression on international managerial quality.

Note 6: Firm level variables are defined as Log (x+1) to include firms that report $0 in some variables, particularly non-tangible assets.

***Table 6A*. Import unit value regression**

VARIABLES	(1) Log (import unit value)
Log real stock non-tangible assets (USD)	0.000146
	(0.000325)
Log real stock property, plant and equipment (USD)	0.0220***
	(0.00300)
Log real operating expenses (USD)	-0.00457
	(0.00488)
Mark-up (operating income / sales cost)	-1.16e-08***
	(1.99e-09)
Dummy new product in t	0.0321***
	(0.00539)
Dummy new origin country in t	0.0567***
	(0.0102)
Dummy new product-origin country in t	0.0345***
	(0.0114)
Log number of imp products-origin countries	-0.0453***
	(0.0107)
Log number of origin countries	0.0195***
	(0.00553)
Log number of imported products	-0.0204**
	(0.0100)
TFP, Levinsohn & Petrin (2003)	0.318***
	(0.0302)
Observations	1,665,367
R-squared	0.928
Country origin fixed effects	No^r
Product fixed effects	No^r
Year fixed effects	No^r
Firm fixed effects	No^r
Product-firm fixed effects	No^r
Product-origin fixed effects	No^r
Product-year fixed effects	No^r
Origin-year fixed effects	No^r
Firm-origin fixed effects	No^r
Product-firm-origin fixed effects	Yes
Product-year-origin fixed effects	Yes

Import unit value= Real imported value/quantity. Robust standard errors in parentheses clustered at origin country-year level.
*** p<0.01, ** p<0.05, * p<0.1. No^r: redundant fixed effects

Table 7A. **International managerial quality 1 impact on firms' performance**

VARIABLES	(1) Log real exported value	(2) Log No. exported products	(3) Log No. destination countries	(4) Log No. products-destination	(5) HHI exports[1]	(6) Quality exports (share)[2]	(7) Profit rate[3]	(8) Log average UV imported inputs	(9) Equity (P*)
International managerial quality 1	0.0839***	-0.0138**	0.000905	-0.0132*	0.000381	0.00247	0.00175**	0.0232	0.00408
	(0.0163)	(0.00629)	(0.00407)	(0.00679)	(0.00209)	(0.00238)	(0.000744)	(0.0149)	(0.00363)
Log global demand of products exported by firm (product-destination weighted avg, shares t=0)	0.0169***	0.0104***	0.00852***	0.0144***	-0.00349***	-0.000377	2.79e-05	0.00455	-0.000696
	(0.00247)	(0.00112)	(0.000798)	(0.00122)	(0.000377)	(0.000435)	(0.000119)	(0.00291)	(0.000696)
Log real stock property, plant and equipment (USD)	0.201***	0.0516***	0.0567***	0.0818***	-0.0121***	-0.00176	0.0111***	0.340***	0.185***
	(0.0224)	(0.0109)	(0.00788)	(0.0121)	(0.00342)	(0.00340)	(0.00192)	(0.0344)	(0.0106)
Log real stock non-tangible assets (USD)	0.00846***	0.00368**	0.00296***	0.00421***	-0.000636	-0.000773*	9.27e-05	0.00691*	0.00663***
	(0.00302)	(0.00143)	(0.00103)	(0.00154)	(0.000434)	(0.000458)	(0.000175)	(0.00404)	(0.00107)
Log real operating expenses (USD)	0.402***	0.129***	0.112***	0.178***	-0.0286***	-0.0138**	-0.0143***	0.189***	0.182***
	(0.0424)	(0.0195)	(0.0143)	(0.0219)	(0.00632)	(0.00570)	(0.00476)	(0.0663)	(0.0194)
TFP (excluding int management component)[a]	3.475***	0.746***	0.604***	1.049***	-0.101***	-0.0177	0.168***	1.566***	1.055***
	(0.270)	(0.121)	(0.0863)	(0.138)	(0.0380)	(0.0382)	(0.0252)	(0.421)	(0.119)
Observations	24,546	24,546	24,546	24,546	24,546	24,546	24,442	19,898	24,546
R-squared	0.879	0.829	0.875	0.871	0.736	0.841	0.629	0.705	0.968
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. P*: placebo test. UV: unit value. [a] TFP (excluding int management component) is the residual of a TFP regression on international managerial quality. [1]Calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [2]Exported value of goods that compete in the international market by quality relative to total exported value. [3]Operating profit relative to operating income.

***Table 8A*. International managerial quality 2 impact on firms' performance**

VARIABLES	(1) Log real exported value	(2) Log No. exported products	(3) Log No. destination countries	(4) Log No. products-destination	(5) HHI exports[1]	(6) Quality exports (share)[2]	(7) Profit rate[3]	(8) Log average UV imported inputs	(9) Equity (P*)
International managerial quality 2	0.0577**	-0.00914	0.00205	-0.0101	-0.00249	0.00368	0.00209	0.00252	-0.00108
	(0.0228)	(0.00953)	(0.00668)	(0.0105)	(0.00358)	(0.00323)	(0.00132)	(0.0311)	(0.00566)
Log global demand of products exported by firm (product-destination weighted avg, shares t=0)	0.0247***	0.0154***	0.0144***	0.0221***	-0.00505***	-0.000894*	-1.88e-05	0.00821**	-0.00105
	(0.00289)	(0.00141)	(0.00111)	(0.00155)	(0.000472)	(0.000513)	(0.000152)	(0.00396)	(0.000910)
Log real stock property, plant and equipment (USD)	0.222***	0.0576***	0.0615***	0.0900***	-0.0106***	-0.000698	0.0106***	0.325***	0.191***
	(0.0232)	(0.0116)	(0.00898)	(0.0131)	(0.00349)	(0.00307)	(0.00205)	(0.0401)	(0.0119)
Log real stock non-tangible assets (USD)	0.00631**	0.00347**	0.00273**	0.00370**	-0.000452	-0.000542	0.000168	0.00565	0.00652***
	(0.00263)	(0.00146)	(0.00109)	(0.00158)	(0.000425)	(0.000408)	(0.000181)	(0.00438)	(0.00114)
Log real operating expenses (USD)	0.371***	0.133***	0.112***	0.179***	-0.0267***	-0.0147***	-0.0156***	0.223***	0.175***
	(0.0409)	(0.0197)	(0.0161)	(0.0228)	(0.00621)	(0.00500)	(0.00524)	(0.0727)	(0.0224)
TFP (excluding int management component)[a]	3.655***	0.799***	0.628***	1.143***	-0.0813**	-0.00634	0.171***	1.236**	1.081***
	(0.273)	(0.122)	(0.0995)	(0.144)	(0.0394)	(0.0320)	(0.0276)	(0.483)	(0.133)
Observations	21,009	21,009	21,009	21,009	21,009	21,009	20,943	16,989	21,009
R-squared	0.903	0.850	0.878	0.882	0.746	0.891	0.626	0.699	0.969
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. P*: placebo test. UV: unit value. [a] TFP (excluding int management component) is the residual of a TFP regression on international managerial quality. [1]Calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [2]Exported value of goods that compete in the international market by quality relative to total exported value. [3]Operating profit relative to operating income.

***Table 9A*. International managerial quality (calculated based on conservative Rauch (1999) good classification[1]) impact on firms' performance**

VARIABLES	(1) Log real exported value	(2) Log No. exported products	(3) Log No. destination countries	(4) Log No. products-destination	(5) HHI exports[2]	(6) Quality exports (share)[3]	(7) Profit rate[4]	(8) Log average UV imported inputs	(9) Equity (P*)
International managerial quality 3 (conservative Rauch classification)	0.0794***	0.0100	0.00422	0.00410	-0.00213	0.000199	0.00319*	-0.0307	0.00163
	(0.0276)	(0.0118)	(0.00926)	(0.0132)	(0.00463)	(0.00381)	(0.00177)	(0.0438)	(0.00794)
Log global demand of products exported by firm (product-destination weighted avg, shares t=0)	0.0258***	0.0162***	0.0152***	0.0232***	-0.00493***	-0.000501	6.83e-05	0.00724	-0.000635
	(0.00303)	(0.00151)	(0.00124)	(0.00166)	(0.000510)	(0.000551)	(0.000168)	(0.00443)	(0.00101)
Log real stock property, plant and equipment (USD)	0.217***	0.0485***	0.0545***	0.0804***	-0.00773**	0.000331	0.0112***	0.331***	0.188***
	(0.0235)	(0.0123)	(0.00946)	(0.0136)	(0.00354)	(0.00310)	(0.00218)	(0.0426)	(0.0122)
Log real stock non-tangible assets (USD)	0.00686***	0.00417***	0.00327***	0.00423***	-0.000745*	-0.000382	0.000102	0.00486	0.00666***
	(0.00263)	(0.00150)	(0.00112)	(0.00161)	(0.000436)	(0.000395)	(0.000177)	(0.00447)	(0.00115)
Log real operating expenses (USD)	0.353***	0.132***	0.106***	0.173***	-0.0230***	-0.0130**	-0.0145***	0.219***	0.172***
	(0.0408)	(0.0203)	(0.0165)	(0.0234)	(0.00619)	(0.00506)	(0.00541)	(0.0785)	(0.0235)
TFP (excluding int management component)[a]	3.485***	0.726***	0.598***	1.064***	-0.0543	0.00700	0.173***	1.478***	1.124***
	(0.277)	(0.125)	(0.100)	(0.144)	(0.0399)	(0.0316)	(0.0283)	(0.455)	(0.137)
Observations	19,543	19,543	19,543	19,543	19,543	19,543	19,487	15,758	19,543
R-squared	0.913	0.861	0.884	0.890	0.760	0.902	0.630	0.699	0.969
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses clustered at firm level. P*: placebo test. UV: unit value. *** p<0.01, ** p<0.05, * p<0.1. [a] TFP (excluding int management component) is the residual of a TFP regression on international managerial quality. [1]The international managerial quality is calculated as the median of the third export unit value regression residuals multiplied by (-1) for price competition products and by the coefficients of the variable "links" (dummy variable which takes the value of one if both countries share a language or colonial tie and zero otherwise) on bilateral trade value for each type of good found by Rauch (1999): 0.425 (organized exchange), 0.66 (referenced price), and 0.866 (differentiated commodities). Conservative definition. [2]Calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [3]Exported value of goods that compete in the international market by quality relative to total exported value. [4]Operating profit relative to operating income.

***Table 10A*. International managerial quality 3 impact on firms' performance (EUV residuals aggregated by the simple average)**

VARIABLES	(1) Log real exported value	(2) Log No. exported products	(3) Log No. destination countries	(4) Log No. products-destination	(5) HHI exports[1]	(6) Quality exports (share)[2]	(7) Profit rate[3]	(8) Log average UV imported inputs	(9) Equity (P*)
International managerial quality 3 (simple avg)	0.0595***	0.00643	0.00226	-0.00150	-0.000936	0.000935	0.00298**	-0.0349	-0.00159
	(0.0226)	(0.00978)	(0.00768)	(0.0109)	(0.00381)	(0.00317)	(0.00146)	(0.0387)	(0.00647)
Log global demand of products exported by firm (product-destination weighted avg, shares t=0)	0.0258***	0.0162***	0.0152***	0.0232***	-0.00493***	-0.000500	6.84e-05	0.00723	-0.000639
	(0.00303)	(0.00151)	(0.00124)	(0.00166)	(0.000510)	(0.000551)	(0.000168)	(0.00443)	(0.00101)
Log real stock property, plant and equipment (USD)	0.217***	0.0485***	0.0545***	0.0803***	-0.00772**	0.000342	0.0112***	0.331***	0.188***
	(0.0235)	(0.0123)	(0.00946)	(0.0136)	(0.00354)	(0.00310)	(0.00218)	(0.0426)	(0.0122)
Log real stock non-tangible assets (USD)	0.00685***	0.00417***	0.00327***	0.00423***	-0.000745*	-0.000383	0.000101	0.00486	0.00666***
	(0.00263)	(0.00150)	(0.00112)	(0.00161)	(0.000436)	(0.000395)	(0.000177)	(0.00447)	(0.00115)
Log real operating expenses (USD)	0.353***	0.132***	0.106***	0.173***	-0.0230***	-0.0130**	-0.0145***	0.219***	0.172***
	(0.0408)	(0.0203)	(0.0165)	(0.0234)	(0.00619)	(0.00506)	(0.00541)	(0.0785)	(0.0235)
TFP (excluding int management component)[a]	3.485***	0.726***	0.598***	1.064***	-0.0543	0.00700	0.173***	1.480***	1.124***
	(0.277)	(0.125)	(0.100)	(0.144)	(0.0399)	(0.0316)	(0.0283)	(0.455)	(0.137)
Observations	19,543	19,543	19,543	19,543	19,543	19,543	19,487	15,758	19,543
R-squared	0.912	0.861	0.884	0.890	0.760	0.902	0.630	0.699	0.969
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. P*: placebo test. UV: unit value. [a] TFP (excluding int management component) is the residual of a TFP regression on international managerial quality. [1]Calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [2]Exported value of goods that compete in the international market by quality relative to total exported value. [3]Operating profit relative to operating income.

Table 11A. **International managerial quality 4 impact on firms' performance (excluding TFP from the export unit value regression)**

VARIABLES	(1) Log real exported value	(2) Log No. exported products	(3) Log No. destination countries	(4) Log No. products-destination	(5) HHI exports[1]	(6) Quality exports (share)[2]	(7) Profit rate[3]	(8) Log average UV imported inputs	(9) Equity (P*)
International managerial quality 4	0.0655***	0.00893	0.00376	0.00365	-0.00185	8.41e-05	0.00284*	-0.0265	0.000488
	(0.0238)	(0.0102)	(0.00803)	(0.0113)	(0.00403)	(0.00332)	(0.00152)	(0.0395)	(0.00680)
Log global demand of products exported by firm (product-destination weighted avg, shares t=0)	0.0258***	0.0162***	0.0153***	0.0232***	-0.00494***	-0.000512	6.39e-05	0.00742*	-0.000585
	(0.00302)	(0.00151)	(0.00123)	(0.00166)	(0.000510)	(0.000551)	(0.000168)	(0.00442)	(0.00101)
Log real stock property, plant and equipment (USD)	0.217***	0.0493***	0.0557***	0.0817***	-0.00842**	0.000346	0.0110***	0.329***	0.189***
	(0.0233)	(0.0122)	(0.00946)	(0.0136)	(0.00357)	(0.00308)	(0.00217)	(0.0422)	(0.0122)
Log real stock non-tangible assets (USD)	0.00686***	0.00422***	0.00328***	0.00427***	-0.000773*	-0.000384	9.84e-05	0.00489	0.00668***
	(0.00263)	(0.00150)	(0.00112)	(0.00161)	(0.000437)	(0.000395)	(0.000176)	(0.00447)	(0.00115)
Log real operating expenses (USD)	0.356***	0.133***	0.106***	0.174***	-0.0232***	-0.0131***	-0.0144***	0.220***	0.172***
	(0.0408)	(0.0203)	(0.0165)	(0.0234)	(0.00621)	(0.00506)	(0.00541)	(0.0785)	(0.0234)
TFP (excluding int management component)[a]	3.486***	0.725***	0.596***	1.062***	-0.0537	0.00636	0.173***	1.485***	1.119***
	(0.277)	(0.125)	(0.100)	(0.144)	(0.0400)	(0.0316)	(0.0283)	(0.455)	(0.137)
Observations	19,560	19,560	19,560	19,560	19,560	19,560	19,504	15,768	19,560
R-squared	0.912	0.861	0.884	0.890	0.759	0.902	0.630	0.699	0.969
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses clustered at firm level. P*: placebo test. UV Unit value. *** p<0.01, ** p<0.05, * p<0.1. [a] TFP (excluding int management component) is the residual of a regression of TFP on international managerial. [1]Calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [2]Exported value of goods that compete in the international market by quality relative to total exported value. [3]Operating profit relative to operating income.

Table 12A. **International managerial quality 3 residual impact on firms' performance residual, bootstrap standard errors (number of replications = 1000)**

VARIABLES	(1) Log real exported value (residual)	(2) Log No. exported products (residual)	(3) Log No. destination countries (residual)	(4) Log No. products-destination countries (residual)	(5) HHI exports (residual)[1]	(6) Quality exports (share)[2] (residual)	(7) Profit rate (residual)[3]	(8) Log average unit value imported products (residual)	(9) Equity (P*) (res)
International managerial quality (res)	0.0668***	0.00940	0.00409	0.00420	-0.00188	0.000117	0.00276**	-0.026	0.0003
	(0.0214)	(0.00924)	(0.00711)	(0.0104)	(0.00372)	(0.00317)	(0.00128)	(0.0334)	(0.00622)
Observations	19,543	19,543	19,543	19,543	19,543	19,543	19,487	15,758	19,543
R-squared	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Number of replications	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Note: Bootstrap errors in parentheses. Constant not reported. Dependent variables are the residual of a regression of each Y on $\beta_2 ln\ Ext\ Demand\ exp_{ft} + \Gamma X_{ft} + \partial_f + \partial_{sy} + v_{fy}$, and the independent variable is the residual of a regression of International Managerial Quality 3 on $\beta_2 ln\ Ext\ Demand\ exp_{ft} + \Gamma X_{ft} + \partial_f + \partial_{sy} + v_{fy}$ (see equation 6). *** p<0.01, ** p<0.05, * p<0.1. P*: placebo test. [1]Calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [2]Exported value of goods that compete in the international market by quality relative to total exported value. [3]Operating profit relative to operating income.

Table 13A. **International managerial quality 3 residual impact on firms' performance residual, bootstrap standard errors (number of replications = 5000)**

VARIABLES	(1) Log exported value (residual)	(2) Log No. exported products (residual)	(3) Log No. destination countries (residual)	(4) Log No. products-destination countries (residual)	(5) HHI exports (residual)[1]	(6) Quality exports (share)[2] (residual)	(7) Profit rate (residual)[3]	(8) Log average unit value imported products (residual)	(9) Equity (P*) (res)
International managerial quality (res)	0.0668***	0.00940	0.00409	0.00420	-0.00188	0.000117	0.00276**	-0.026	0.0003
	(0.0214)	(0.00945)	(0.00712)	(0.0105)	(0.00365)	(0.00312)	(0.00128)	(0.0332)	(0.0062)
Observations	19,543	19,543	19,543	19,543	19,543	19,543	19,487	15,758	19,543
R-squared	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Number of replications	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000

Note: Bootstrap errors in parentheses. Constant not reported. Dependent variables are the residual of a regression of each Y on $\beta_2 ln\ Ext\ Demand\ exp_{ft} + \Gamma X_{ft} + \partial_f + \partial_{sy} + v_{fy}$, and the independent variable is the residual of a regression of International Managerial Quality 3 on $\beta_2 ln\ Ext\ Demand\ exp_{ft} + \Gamma X_{ft} + \partial_f + \partial_{sy} + v_{fy}$ (see equation 6). *** p<0.01, ** p<0.05, * p<0.1. [1]Calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [2]Exported value of goods that compete in the international market by quality relative to total exported value. [3]Operating profit relative to operating income.

APPENDIX B

B1. Composed international managerial quality

Managers of firms that export homogeneous goods could face challenges in differentiating the exported price because the good either has a 'reference price' or it is traded in an organized exchange (see Rauch, 1999). Assuming that the international market for the homogeneous goods is perfectly competitive and that all exporters are price takers, managers can impact only the exported quantity and not the price. Thus, quantity regression residuals would be a better proxy variable of the manager's organizational capital contribution to improvements in the firm export process for homogeneous goods. For this reason, a composed international managerial quality is calculated, adding quantity residuals to the baseline international managerial quality calculation already described. In first place, export unit value (EUV) and quantity (Q) regressions are estimated as follows:

$$ln(EUV)_{pfkt} = \beta_o + \Gamma X_{ft} + \theta New_{pfkt} + \varphi Number\_p\_k_{pfkt} + \partial_{pkf} + \partial_{pkt} + \in_{pfkt} \quad (7)$$

$$ln(Q)_{pfkt} = \beta_o + \Gamma X_{ft} + \theta New_{pfkt} + \varphi Number\_p\_k_{pfkt} + \partial_{pkf} + \partial_{pkt} + w_{pfkt} \quad (8)$$

where subscript *p* denotes the HS 10-digit product, *f* the firm, *k* the destination country, and *t* the year. Firm level variables X_{ft} include log fixed assets, log operating expenses, log non-tangible assets, mark-up, and TFP calculated based on the Levinsohn and Petrin (2003) methodology. New_{ftkp} includes three independent and mutually exclusive dummies that identify the new export decisions made by firm *f* in year *t* to control for the adjustment cost of innovating: i) if it is a new product *p* exported to an "old" country destination *k*, ii) if it is an "old" product *p* exported to a new country destination *k,* or iii) if it is a new product *p* exported to a new country destination *k*. $Number\_p\_k_{ftkp}$ includes the number of products that firm *f* exports in year *t*, the number of destination countries to which firm *f* exports in year *t*, and the number of product-destination countries to which firm *f* exports in year *t* (in logs). ∂_{pkf} are product-country destination-firm fixed effects, and ∂_{pkt} are product-country destination-year fixed effects. Finally, robust standard errors are clustered at country destination-year level. Results are shown in table B1.

Then, modified residuals $\hat{v}_{pkft}$ are defined as described in equation 9, based on equation 7 and 8 residuals $(\hat{\in}_{pkft}, \hat{w}_{pkft})$, market classification (section 4.1), and Rauch's (1999) product classification:

$$\hat{v}_{pkft} = \begin{cases} \hat{\in}_{p1kft} * (-1), where\ p1\ are\ differentiated\ products\ that\ compete\ by\ price\ exported\ by\ firm\ f\ in\ year\ t \\ \hat{\in}_{p2kft}, where\ p2\ are\ differentiatied\ products\ that\ compete\ by\ quality\ exported\ by\ firm\ f\ in\ year\ t \\ \hat{w}_{p3kft}, where\ \ p3\ are\ homogeneous\ products\ exported\ by\ firm\ f\ in\ year\ t \end{cases} \quad (9)$$

Once the components of $\hat{v}_{pkft}$ are put in ascending order for each firm-year, the composed international managerial quality is calculated as the median of $\hat{v}_{pkft}$ for each firm *f* in year *t* (equations 10A and 10B):

$$Composed\ IMQ_{ft} = \left(\frac{n+1}{2}\right)^{th} obs\ \left(\hat{v}_{pkft}\right)\ for\ odd\ number\ of\ observations \quad (10A)$$

$$Composed\ IMQ_{ft} = \frac{\frac{n^{th}}{2} + \left(\frac{n}{2}+1\right)^{th}}{2}\ obs\ \left(\hat{v}_{pkft}\right)\ for\ even\ \ number\ of\ observations \quad (10B)$$

Firm performance regression (table B2) indicates that exported value elasticity relative to the composed international managerial quality (0.13) is almost double that of exported value elasticity relative to the baseline international managerial quality (0.07) (see table 3).[39] This result indicates that the more the international market for homogeneous goods behaves in perfectly competitive conditions (price takers), the more it becomes relevant to include the quantity metrics for those goods. However, the limitation of the composed international managerial quality is that residuals from two different regressions (export unit value and quantity) with different standard deviations[40] are aggregated into its calculation.

***Table B1*. Export unit value and quantity regression**

	(1)	(2)
VARIABLES	Log (export unit value)	Log (quantity)
Log real stock non-tangible assets (USD)	0.000380	0.000155
	(0.000846)	(0.00175)
Log real stock property, plant and equipment (USD)	0.00763	0.0885***
	(0.00674)	(0.0119)
Log real operating expenses (USD)	-0.00956	0.142***
	(0.0136)	(0.0223)
Mark-up (operating income / sales cost)	-0.000498	-0.000678
	(0.000626)	(0.000907)
Dummy new product in t	-0.00147	-0.262***
	(0.0130)	(0.0253)
Dummy new destination in t	0.0109	-0.414***
	(0.0191)	(0.0353)
Dummy new product-destination in t	0.0446	-0.568***
	(0.0370)	(0.0670)
Log number of exp products-country destinations	-0.0815***	0.546***
	(0.0175)	(0.0346)
Log number of country destinations	0.0499***	-0.201***
	(0.0149)	(0.0300)
Log number of exported products	0.0260**	-0.128***
	(0.0115)	(0.0232)
TFP, Levinsohn & Petrin (2003)	0.128**	1.549***
	(0.0624)	(0.149)
Observations	276,462	276,462
R-squared	0.938	0.928
Product-firm-destination fixed effects	Yes	Yes
Product-year-destination fixed effects	Yes	Yes

Robust standard errors in parentheses clustered at origin country-year level, *** p<0.01, ** p<0.05, * p<0.1

[39] The results are robust to the Rauch (1999) product classification used (conservative or liberal) and when the residuals defined in equation 9 are aggregated through the simple average for each firm *f* in year *t*.

[40] Standard deviation for unit value (UV) residuals is 0.597 and for quantity (Q) residuals is 1.001. Mean is equal to 0.

Table B3. **Composed international managerial quality impact on firms' performance**

VARIABLES	(1) Log real exported value	(2) Log No. exported products	(3) Log No. destination countries	(4) Log No. products-destination	(5) HHI exports[1]	(6) Quality exports (share)[2]	(7) Profit rate[3]	(8) Log average UV imported inputs	(9) Equity (P*)
Composed international managerial quality 3 (liberal Rauch classification)	0.129***	-0.00740	-0.00158	-0.0113	0.00446	-0.000150	0.00287**	-0.00174	0.00589
	(0.0200)	(0.00816)	(0.00698)	(0.00920)	(0.00344)	(0.00276)	(0.00129)	(0.0364)	(0.00627)
Log global demand of products exported by firm (product-destination weighted avg, shares t=0)	0.0265***	0.0163***	0.0158***	0.0235***	-0.00481***	-0.000746	-1.68e-05	0.00641	-0.000722
	(0.00288)	(0.00156)	(0.00130)	(0.00171)	(0.000515)	(0.000579)	(0.000180)	(0.00482)	(0.00108)
Log real stock property, plant and equipment (USD)	0.230***	0.0512***	0.0564***	0.0856***	-0.00918**	0.000353	0.0118***	0.332***	0.193***
	(0.0242)	(0.0128)	(0.0102)	(0.0143)	(0.00372)	(0.00326)	(0.00226)	(0.0450)	(0.0133)
Log real stock non-tangible assets (USD)	0.00667**	0.00430***	0.00303***	0.00460***	-0.000863*	-0.000201	2.55e-05	0.00319	0.00631***
	(0.00268)	(0.00152)	(0.00117)	(0.00165)	(0.000443)	(0.000401)	(0.000185)	(0.00465)	(0.00118)
Log real operating expenses (USD)	0.334***	0.126***	0.104***	0.168***	-0.0197***	-0.0117**	-0.0137**	0.273***	0.163***
	(0.0427)	(0.0215)	(0.0175)	(0.0249)	(0.00642)	(0.00510)	(0.00571)	(0.0837)	(0.0254)
TFP (excluding int management component)[a]	3.619***	0.800***	0.611***	1.154***	-0.0912**	0.00999	0.166***	1.505***	1.128***
	(0.296)	(0.132)	(0.108)	(0.154)	(0.0408)	(0.0326)	(0.0307)	(0.489)	(0.149)
Observations	17,824	17,824	17,824	17,824	17,824	17,824	17,779	14,522	17,824
R-squared	0.918	0.868	0.888	0.895	0.764	0.905	0.633	0.700	0.970
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. P*: placebo test. [a] TFP (excluding int management component) is the residual of a regression of TFP on international managerial quality. [1]Calculated by squaring the share of each product-destination country observation in total firms' exports and then summing the obtained numbers. [2]Exported value of goods that compete in the international market by quality relative to total exported value. [3]Operating profit relative to operating income.