**Executive Summary**

Matching the Innovation and Technology Survey 2017-2018 (EDIT, acronym in Spanish) with Annual Manufacturing Survey 2018 (EAM), we analyze the relationship between the performance and management at firm level for Colombia in 2018. The management is a significant driver of variation in productivity, development and innovation (R&Di). Also, a statistically significant relationship is observed for the number of export destinations, products and export revenues.

**Findings**

The Management and Organizational Practices Survey was incorporated for the first time in EDIT 2017-2018 and published with anonymous data on the website of the Colombian Institute of Statistics (DANE). The EDIT included 16 management questions with two basic areas, which are supported on the idea of the continuous improvement. For our regressions, we aggregate those 16 questions into a single measure, which is called the management score. This score is the unweighted average, where the answer to each question is measured on a scale from 0 to 1.

For our regressions, we aggregate those 16 questions into a single measure, which is called the management score. This score is the unweighted average, where the answer to each question is measured on a scale from 0 to 1, where o is the worst option and 1 the best. Table 1 presents the descriptive statistics of the successful merge between EDIT and EAM, and some characteristics at the signature level. In cases where the firm has more than one establishment, the information is added. For our analysis, we use data with at least eleven non-missing responses to the management questions that also have positive values for outcomes and inputs of the firm.

Figure 1 plots the overlapping histogram of firm management scores for Colombia (2018) and the United States (2010) according to Bloom (2019). While the Colombian management score (1-16 questions) was 0.37, for the U.S was 0.61, which implies that the distribution of Colombia is skewed to the left compared to the United States. The table 1 shows the mean firm size is 125 employees, 32,8% of firms sold abroad and 4.4% have more than one establishment.

**Performance measures**

We divide the performance into four groups, a) productivity: production, sales, value added, total factor productivity where we analyze using a production function b) Innovation: investment on research, development and innovation (R&Di) and intellectual properties register, which are inputs and outputs for a firm, c) market competition: management as a dependent variable of external and domestic competition d) trade: exports, imports, number of products sold abroad, destinations, destination-product pairs, exports over product-destination pairs and exports at top destination-product, where we explore the linkages between management and international trade.

We investigate whether management competence is correlated with those measures of performance. We do not attribute a causal interpretation to the results, instead, it replicates the most of regression from Bloom (2019) and Manova (2020), which allows compare coefficients between Colombia and the United States.

**Productivity**

Suppose that the firm production function is:

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We start by running a basic regression of labor productivity (measured as log(output/employee)) on management score, where the first column is calculated with industry fixed effects, the second with location fixed effects and the third without fixed effects. This is repeated for 4-6 and 7-9 columns, with dependent variable log (sales/employees) and profit/sales, respectively. Using the column 1 as the reference to our comparisons, we find a highly significant coefficient of 0,24, suggesting that whether other variables remain constant, every 10 percentage point increase in our management score is associated with a 2.43% percent (= exp(0.024) − 1) increase in labor productivity. The management score has a sample mean of 0.37 and a standard deviation of 0.176, so that a one standard deviation change in management is associated with a 4.31% percent (= exp(0.172\*0.24)) higher level of labor productivity.

Those results are compared with Bloom(2019), where they estimated 0.209 for management coefficient (with industry fixed effects) and indicated that management practices account for 20% of variation in productivity while we got a r2=10,8% by regressing log(output/employee) on management score. Bloom and Van Reenen (2007) estimate the effect of one standard deviation on productivity is 0.040 using WMS data, which seems comparable with this study.

Since sales may be different from production in a given year, in columns 4-6, we run Ln (sales / emp). We find coefficients very similar to columns 1-3. Another important indicator for the firm is the operating profits to sales ratio, so we use it as a performance measure. In this case, the management coefficient is not statistically significant, even that happens with other three controls. The next table shows a regression of value added on management and controls, and the management coefficient 0,64 is significant for industry fixed effects, meanwhile for the U.S is 0.498.

**Innovation**

The table X shows a positive correlation with measures of innovation such as investment on R&Di as well as the intellectual property registers. This reflects that management practices keep a strong link with inputs and outputs of innovation, and it serves a good predictor of those variables.

**Market competition**

We specify the possible links between trade liberalization and plant level productivity. Using the firm level measures of TFP , we estimate a regression where independents variables are two kind of tariffs: Average Output Tariff and Weighted Input Tariff. Further, we estimate a competitive pressure using the China Import Share, where its sign is negative.

**Trade**

We examine the relationship between firms’ management practices and export performance, testing four propositions:

Proposition 1: Better managed firms are more likely to export.

Proposition 2: Better managed firms export more products to more destination markets and earn

higher export revenues

Proposition 3: The management is more important determinant in heterogeneous industries than homogeneous

Proposition 4: Better management exporters reduce the geographic distance.