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from a quantile analysis of the Colombian microenterprise sector**  
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# HOW DIFFERENT ARE NECESSITY AND OPPORTUNITY FIRMS? EVIDENCE FROM A QUANTILE ANALYSIS OF THE COLOMBIAN MICROENTERPRISE SECTOR

Omar Rodríguez Torres<sup>1</sup>

## ABSTRACT

This paper explores the relationship between start-up motivation and business performance, by looking into the extent to which start-up motivation (necessity vs. opportunity) influences several business performance indicators. Using the Colombian Small and Microenterprise sector public dataset, we analyse the factors associated with microenterprise performance using a quantile regression approach to model the distribution of different measures of business performance. Among the findings, we present evidence of statistically significant differences among quantiles confirming the heterogeneity of start-up motivation and other firm characteristics of the firms operating in the sector. The results show that start-up motivation is a factor that explains the difference in the distribution of the business performance indicators under study. This findings contributes to the debate around the connection between entrepreneurship and growth in the context of developing economies. Even though firms motivated by necessity show a lower level of profit, in particular for the firms that perform relatively poorly, this is not necessarily associated with null or diminishing growth rates. Necessity is not necessarily a deterrent for growth. It needs to be understood as a means to support families that otherwise would have no income-generating opportunities.

Keywords: Firm performance, entrepreneurship, public policy, new firms, enterprise policy  
JEL Classification codes: L25, L26, J48, M13, L53.

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# 1. INTRODUCTION<sup>\*</sup>

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This paper analyses the relation of start-up motivation on business performance for micro and small enterprises in Colombia. The coexistence of a broad variety of firms characterises the micro and small enterprise sector (MSE) in most developing countries. Heterogeneity is, thus, a distinguishing feature of this sector, evidenced by highly segmented labour markets, informality and poverty. Several dichotomous distinctions have been proposed and studied when analysing entrepreneurship in developing contexts, namely, necessity vs. opportunity (Reynolds et al., 2005), push vs. pull (Amit & Muller, 1995); subsistence vs. transformational (Schoar, 2010); survivalist vs. growth-oriented (Berner et al., 2012). Yet, the study of these distinctions has concentrated mainly on conceptual and psychological studies that attempt to define and identify the specific individual traits that characterise these divides.

From these distinctions, it is the *start-up motivation*<sup>2</sup> (the necessity-opportunity distinction) the characteristic that has a close relation to the labour market structure and that can provide insight to the design of inclusive labour market policies. The *start-up motivation* differentiates entrepreneurs between those that start their businesses in an attempt to take advantage of an identified business opportunity, and those that cannot find a suitable role in the labour market, i.e. they have been excluded from it (Reynolds et al., 2005, p. 217). Understanding how start-up motivation is linked to firm performance has important implications in terms of public policy, for instance, in guiding (young) population in their occupational choice between employment or self-employment, and in the design of active market labour policies.

The study of entrepreneurial start-up motivation has grown in recent years after the recognition of necessity motivation as a deterrent to firm growth, explained by low job satisfaction (Martiarena, 2019; van der Zwan et al., 2016). It has concentrated on the characterisation of the entrepreneurs (Amit & Muller, 1995; Baptista et al., 2014; Margolis, 2014; Martiarena, 2019; Rosa et al., 2006; van der Zwan et al., 2016). Comparatively, there has been less inquiry on the relation between start-up motivation and firm performance (Block & Sandner, 2009; Block & Wagner, 2010). Among the reasons are that surveys asking about start-up motivation do not collect information on business

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<sup>\*</sup> I am grateful to Elisa Calza for detailed discussion, and to Clotilde Mahé for insightful suggestions.

<sup>2</sup> Motivation to entry into entrepreneurship.

performance<sup>3</sup> or do not allow to build growth profiles, i.e. they are commonly cross-sectional surveys, the GEM survey is a case in point.<sup>4</sup> Conversely, surveys that keep track of performance either do not enquire about entrepreneur's motivations. We seek to fill this gap by employing the Colombian microenterprise longitudinal survey that enquires on entrepreneur's start-up motivations and business performance. The contribution of this paper is twofold. Firstly, this paper contributes to the existing literature by presenting empirical evidence on the connection between *start-up motivation* and firm performance over the distribution of firms in the microenterprise sector. Second, it provides evidence on the heterogeneity of the microenterprise sector by analysing the differential in the determinants of firm performance.

I build on the work by Block and Wagner (2010) that study motivation of the self-employed population and their earnings. Given that they use a household survey, their analysis lacks the enterprise perspective. Methodologically, we employ a quantile regression analysis building on the empirical work by Reichstein et al. (2010) and Goedhuys and Sleuwaegen (2010). Whereas these studies focus on high growth firms, we concentrate on a different sample of enterprises, i.e. average or slow-growing type of enterprises.

Estimation results find that necessity motivated firms show lower levels of profit and labour productivity, and that this gap is not homogenous through the distribution of firms. These results are consistent with no signs of catching up between necessity motivated and opportunity motivated firms. Complementarily, we find evidence that the gap is not present when analysing the growth of profit and labour productivity.

The remainder of this paper proceeds as follows, section 2 introduces the microenterprise sector in developing countries and Colombia. Section 3.1 presents dataset and descriptive statistics of firm performance of the sample. The methodological approach is presented in Section 3. Empirical results are presented and discussed in section 4. The final section concludes with a summary of the findings, policy implications and suggestions for further research.

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<sup>3</sup> Sales, revenues, profits, job creation

<sup>4</sup> The Global Entrepreneurship Monitor ask for job growth expectation, question reads: "Not counting owners, how many people will be working for this business five years from now?" This information presents an interesting research question regarding start-up motivation and mid-term or long-term expectation.

## 2. RELEVANT LITERATURE

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### 2.1 Start-up motivation and business performance

The motivational dimension rose as an important factor in the analysis of entrepreneurship after its introduction by the Global Entrepreneurship Monitor in 1999 (Reynolds et al., 2001). Two types of drivers reported by entrepreneurs differentiate between those that start their businesses in an attempt to take advantage of an identified business opportunity, and those that cannot find a suitable role in the labour market (Reynolds et al., 2005, p. 217).

Necessity-driven is commonly associated with subsistence entrepreneurship, conversely, opportunity-driven is associated with accumulative entrepreneurship. These associations are yet to be verified. The necessity-opportunity distinction has also been linked with the push and pull factors that drive entrepreneurial motivation. Van der Zwan et al. (2016) provide a set of characteristics (male, younger, wealthier, proactive, and optimistic) for the probability of becoming an opportunity business owner. Bringing a broader perspective, Amorós et al. (2019) and McMullen et al. (2008) discuss the macroeconomic and contextual factors associated to the prevalence of necessity and opportunity entrepreneurship. Their findings advise to keep in mind the conditions where entrepreneurs operate in order to realise that the necessity-opportunity distinction involves several dimensions. For instance, Williams (2009) points at the dynamic nature of start-up motivation that is not necessarily static, and that can change over time.

Block and Wagner (2010) present evidence of the differential success determinants for necessity and opportunity entrepreneurs. Theoretically, these authors introduce the concept of '*planning advantage*' that explains that opportunity entrepreneurs prepare through their job experience –via different jobs or changing position within the same firm- before starting up their initiative, whereas necessity ones have less time to do so, given that they leave their previous jobs involuntarily. From this perspective, motivation can be seen as a labour market outcome.

Connected to this, Vivarelli and Audretsch (1998) and Vivarelli (2004) present evidence on the link between entry decision and post-entry performance, finding that an innovative motivation tends to be linked to higher post-entry performance –also economic reasons such as profit expectations and potential demand evolution; whereas a defensive motivation like the prevention of possible or actual unemployment seems to be a predictor of lower post-entry performance. Nonetheless, this

analysis is carried out in developed countries' markets. The characteristics of the micro and small enterprise sector in developing countries present a challenge because of its higher heterogeneity.

## 2.2 The micro and small enterprise sector in developing countries

As a consequence of imbalanced growth processes, developing countries ended up with segmented labour markets with high levels of informality and poverty. The pivotal works by Lewis (1954), and Harris and Todaro (1970) demarcated this phenomenon and characterised it as a process of industrialization and urbanisation via rural migration, due mainly to insufficient labour demand and limited expansion of internal markets. These uneven patterns of development are evident in the MSE sector in developing countries, comprising self-employment and microentrepreneurship.<sup>5</sup>

The MSE sector comprises a broad variety of enterprises and entrepreneurs sharing some commonalities, such as liquidity constraints (Evans & Jovanovic, 1989) or scale issues (Lucas Jr, 1978); as well as salient differences such as entry motivation, growth orientation, scale of investment and production, export orientation, innovation, and technology usage. Coexistence of high growth firms (*gazelles*) with average and slow-growing firms and survivalist firms, engaged in both productive and unproductive activities define the type of enterprises. Diversity of human capital ranging from illiteracy and innumeracy to post-tertiary education defines its entrepreneurs. Export vs. local – *barrio*- orientation defines its projection to the market. Reselling and copying vs. innovation define its technological approach. These are, just to mention a few, the factors that characterise the heterogeneity of the MSE sector in developing countries.

In developed economies, this sector is seen as a thriving, pivotal component of economic growth (Audretsch & Thurik, 2000; Lingelbach et al., 2005; W. Naudé, 2010). Through the lenses of efficiency, efficient firms grow and survive; inefficient ones decline and fail (Jovanovic, 1982, p. 649), hence it is a success-failure process where entrepreneurs contribute to economic growth. In contrast, in developing economies, the MSE sector shows a different dynamic seen as either stepping stone –part of the success process- or consolation prize –part of the failure process- (Bennett, 2010). Failure represents not necessarily exit but survival at a very low productive level, hence its close relation to informality (De Soto, 1990; Perry, 2007).

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<sup>5</sup> Self-employed population with employees.

This survivalist character of a considerable proportion of entrepreneurs is a key element in understanding the MSE sector. Yet again, it has different implications given the particular context. For developed economies, survival means overcoming issues and setbacks associated with the start-up process (Acs & Amorós, 2008; Arenius & Ehrstedt, 2008; Reynolds et al., 2005). Whereas for developing economies, apart from this start-up process, surviving is also associated to informality and/or coping strategies against poverty, sometimes even against total destitution (Banerjee & Duflo, 2007, 2011; Banerjee & Mullainathan, 2010; W. Naudé, 2010; Schoar, 2010).

The intertwined dynamics of microentrepreneurship and informality makes the analysis of these two phenomena fuzzy, especially for developing countries. When trying to fit the analysis to the mainstream usually based on evidence from developed economies, some studies have found that only a part of the MSE sector fits to the conclusions reached in these more homogeneous MSE sectors (Fajnzylber et al., 2006; Mandelman & Montes-Rojas, 2009; Nichter & Goldmark, 2009).

For instance, Mandelman and Montes-Rojas (2009) and Fajnzylber et al. (2006) discuss the countercyclical nature of entrepreneurship and economic growth, while in periods of contraction existing businesses layoff and self-employment expand both as a response to demand reduction and unemployment. In periods of expansion, existing businesses hire as a response to the increasing demand and self-employment decreases as a response to job openings. Fajnzylber et al. (2006) also find a sharp difference between own-account workers and the rest of microentrepreneurs (self-employed with employees) confirming the heterogeneity of the MSE sector.

Entrepreneurship in developing countries faces particular issues. Lingelbach et al. (2005) find as a recurrent reason that the starting point of the businesses in developing countries is generally downsized due to lack of capital, segmented markets and fragmented retail and distribution channels, concurring with Evans and Jovanovic (1989) and Lucas (1978) models. Mead and Liedholm (1998) find that microenterprises that do not expand in terms of employment are generally associated to survival-type activities; and Naudé (2010) argues that enterprises in developing countries are driven by necessity (for survival) and offer meagre returns, linking these two factors to the informal sector.

Largely studied from the labour market perspective, the analysis of microenterprises has had as its main source of information household surveys limiting the study of this sector to this perspective. The study of the MSE sector has been largely associated with the study of self-employment and, in



the case of developing countries, informality. Guataquí et al. (2010) call attention to this issue as a rather limiting approach to analyse this sector. They argue for a broader perspective that goes beyond the workers and focuses also on employers.

### 2.2.1 The Colombian microenterprise sector

The microenterprise sector is a large part of the Colombian productive map. According to the last 2005 Census data, the sector absorbs around 53% of the occupied population; and represents 96% of the total number of firms; where 55% are own-account workers<sup>6</sup>; 40.6% are firms with 2 to 5 employees, and the remaining 4.4% are firms with 6 to 10 employees. According to the Colombian microenterprise survey,<sup>7</sup> on average 56.3% concentrates on trade activities, 30.1% on services, and 13.7% on manufacturing for the period 2007 – 2010.<sup>8</sup> Unregistered firms amount for an average of 51.6% for the same period, close to the figure of informal employment that is around 60%.<sup>9</sup>

The study of micro-entrepreneurship in Colombia has been largely associated to MSE policy studies, mainly because of the government interest in reducing a large informal sector that has historically characterised its labour market. Another reason is that according to the definition applied by DANE the microenterprise sector equates to a great extent to the informal sector.<sup>10</sup> These facts have led to an assimilation of the latter as the former.

Concentrating mainly on the informality perspective, several studies have used alternative sources of information to depict the microenterprise sector in Colombia. Using an economic census of Cali and Yumbo<sup>11</sup> conducted in 2005, SantaMaría and Rozo (2009) and Cárdenas and Rozo (2009) show that micro and small firms are a major proportion of the total of informal firms and that the incidence of informality among those firms is large and tends to decrease as firms grow. They show

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<sup>6</sup> Self-employed without employees.

<sup>7</sup> Colombian's National Administrative Statistics Bureau, DANE for its initials in Spanish (Departamento Administrativo Nacional de Estadística)

<sup>8</sup> In the 2005 Census data, these figures were 56.1% for trade activities, 32.8% services and 11.0% manufacturing.

<sup>9</sup> Workers not covered by health care and not enrolled in any pension plan. This includes not only self-employed but employees in registered enterprises with neither health coverage nor pension plan.

<sup>10</sup> DANE defines a microenterprise as an economic unit with no more than 10 employees, with total assets not exceeding 501 monthly minimum wages (For 2013, the monthly minimum wage is set at around USD 310). DANE uses ILO definition of informal firms as those having less than 10 employees.

<sup>11</sup> Cali and Yumbo is the main metropolitan area located in the south west of Colombia. Cali is one of the main cities of Colombia.

that informal firms in their sample face on average lower access to credit and training programs, technological problems and lower profits per worker than formal firms with similar characteristics.

Cárdenas and Mejía (2007) find that non-registry explains firm informality for the Colombian case. They test the probability of being informal -unregistered firm- finding that location (within the household dwelling or a fixed spot on the street) increases the probability of firm informality. They also confirm the divide in terms of registry between own-account workers and microentrepreneurs; and that the service sector shows a higher proportion of informality compared to other sectors.

Applying a typology based on compliance to institutional arrangements, i.e. bookkeeping, registry, and payroll payments, Hamann and Mejía (2011) find that on a very restrictive definition<sup>12</sup> informality accounts for 87% of firms in the ME sector. In contrast, under a least restrictive definition<sup>13</sup> there would be 39% of informal enterprises. Additionally, this study finds that formal firms perform much better on four business indicators –assets, production, value-added, and product by worker- when compared to informal firms. These results highlight the need to understand the microenterprise sector beyond ILO's approach, based solely on firm size.

### 3. METHODOLOGY

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The dataset to be used is presented in subsection 3.1 and the estimation strategy is set out in subsection 3.2.

#### 3.1 Data Overview

This analysis uses data from the Microenterprise Survey conducted by the National Administrative Statistics Bureau (DANE). It is a multi-topic longitudinal face-to-face survey conducted annually<sup>14</sup> from 2011 to 2016 tracking urban enterprises with up to 10 employees (including the owner), operating in the trade, services and manufacturing sectors. Although it is no representative at the

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<sup>12</sup> The most restrictive definition implies compliance to all of the institutional arrangements mentioned.

<sup>13</sup> The firm complies with at least one of the three institutional arrangements.

<sup>14</sup> The survey is conducted regularly on the same couple of months (September, and October).

national level, its coverage is nationwide.<sup>15 16</sup> Therefore, it can help to identify overall trends of the MSE sector.<sup>17</sup>

One main advantage of this dataset is the longitudinal structure that allows constructing firm profiles. The survey collects information on several topics related to business operation, namely, time of operation, bookkeeping, tax registry, place of operation, legal structure, number of employees, production –mainly monthly and yearly sales–, sector, and use of technology and internet. The longitudinal structure allows including at each wave different topics, so it is possible to build more complete profiles mainly for enterprises. The 2012 wave included questions about gender, motivation, source of financing, and cost structure. The 2013 wave included questions on tax declaration and human capital requirements.<sup>18</sup> The 2014 wave delves into time use of employees, suppliers (channels and ways of input payments), sales channels, credit (application, type, source), and source of difficulties for operation (financial, workplace, staff, merchandising and marketing, security, and inspections and legal requirements). The 2015 wave collects information on the type of employee contracting, accepted payment methods, and cost of production. Finally, the 2016 wave collects information on asset investment, and cost of production and cost structure. We employ five waves from 2012 to 2016 to run this analysis.

The unit of analysis is a sampled firm (with up to 10 employees) that appear in all five waves and that have kept their main economic activity.<sup>19</sup> To construct the estimation sample, we make use of the entire 2012 – 2016 period. A total of 36,954 firms compose the 2012 wave sample. The final analytical sample of 21,739 firms is composed by those firms. Table 0.2 in Appendix A presents the distribution of sample attrition over the period of analysis.

### 3.1.1 Variables

For the analysis, we use several outcome variables to capture firm performance. Firm performance limits to the subset of financial outcomes, recognising that the concept can be associated with a

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<sup>15</sup> This survey started as an investigation to shed light on the informal sector in 2001; different versions testing frequency, coverage, and topics were run up to 2006. During the 2007 – 2010 period, the coverage is nationwide. During 2010 the Bureau determined to stop the survey to go through a methodological assessment of the whole statistical process. It is finally redesigned into a panel study from the sample used in the 2010 and 2011 waves.

<sup>16</sup> The sample includes the 24 main cities and their metropolitan areas.

<sup>17</sup> The sample includes the 24 main cities and their metropolitan areas.

<sup>18</sup> Number of job openings and level of education required.

<sup>19</sup> Enterprise traceability is ensured using the following checklist: i) operating on the same location; ii) same legal representation (registry, ID, company name); and iii) still in operation.

broader definition of organizational effectiveness (Santos & Brito, 2012; Selvam et al., 2016). The first set of variables are five measures of financial outcomes: Revenue (reported sales), gross profits, operating profits, labour productivity, and return on sales. The second set of measures are proxies for firm growth (see Table 3.1 for definitions).

All these measures are to be interpreted cautiously. Reasons such as lack of bookkeeping make revenue reporting prone to recall error, considering that around 22% of this sample does not keep any sort of accounting -as is common in the microenterprise sector-, so in these cases reported revenues and costs provide but proxies for business volume.<sup>20</sup>

The main covariate of interest is start-up motivation. This variable capture entrepreneurs' reason for starting their business. The question reads: *"What was your motivation for starting or establishing this enterprise?"* The possible answer options are: *"1. No other income alternatives"; "2. Identified it as a business opportunity in the market"; and "3. Other"*. This definition is consistent with the necessity-opportunity distinction introduced by GEM (Reynolds et al., 2005) and employed by the literature inspired by this project (Bosma, 2013 and references therein) and employed in other studies (Calderon et al., 2017; Fairlie & Fossen, 2019 and references therein). It is important to differentiate this definition, from the job satisfaction analysis that understands necessity as a permanence condition where entrepreneurs have no outside choice but a preference for changing activity (these entrepreneurs would prefer to be a paid employee) (Günther & Launov, 2012). It must be highlighted that this is a retrospective question inquiring about the business gestation process, that is, the business idea development process, thus motivation is taken as an external factor not affected by posterior business results. This assumption relies on the elicitation of the decision made at moment of the business start-up. In the case of reporting the necessity state, it would be expected a true report because there are no actual incentives in reporting a push motivation. In the case of the opportunity state, it must be recognised that this could include some necessity entrepreneurs not willing to provide their true state. In absence of a better indicator, our results need to be considered with caution, understanding that comparison between the two states may provide a lower bound.

The additional covariates include entrepreneur and firm characteristics: female; average number of employees (firm size) measured by the reported number of employees (from 1 up to 10) averaged

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<sup>20</sup> 22% appears to be a rather low percentage compared to other developing countries, see de Mel et al. (2009) for reference.

for the 2012-2016 period; accounting, defined as a binary variable taking value 0 if not keep records at all; formalization; firm age; founder, defined as a binary variable taking value 1 if the firm was started exclusively by the entrepreneur; funding, dummy taking value 1 if funded by personal savings; use of technologies, defined as the use of any kind of digital technology (pc, laptop, tablet or smartphone) for the business operation; sector, manufacturing, trade, and services; and Regional unemployment rate (Table 0.1 in Appendix A presents in detail definitions).

Regarding the limitations of this dataset: It is not representative of the population of entrepreneurs in the whole country, resting some external validity to the conclusions at the country level. The survey fail to capture characteristics of the enterprises, particularly of the start-up process such as initial level of capital; initial investment made; time before reaching equilibrium point; and initial number of employees. It also misses capturing information of the entrepreneurs, such as education, managerial skills, risk aversion, personality traits, and job trajectories (unemployment spells, previous salaries and job experience, this latter would allow modelling start-up motivation for our empirical analysis.

Table 3.1 Outcome Variables

Outcome variable	Definition
<i>Financial outcomes</i>	
<i>Yearly revenue</i>	Five-year average over the 2012-2016 period of reported yearly sales. It is calculated as logarithm of the 2012-2016 average of yearly reported sales.
<i>Gross profits</i>	It is calculated as the logarithm of gross profits. The gross profits are calculated as the reported yearly revenues minus reported input/production yearly expenses for 2016.
<i>Operating profits</i>	It is calculated as the logarithm of the operating profits. The operating profits are calculated as gross profits minus fixed costs for 2016. <sup>21</sup>
<i>Labour productivity</i>	Average of reported revenue (2012-2016) divided by the number of employees. It is a measure of revenue per employee. It is calculated as the logarithm of this average.
<i>Return on sales</i>	Calculated to measure how much profit is produced from its revenue activity, alongside labour productivity it allows explaining efficiency.
<i>Firm Growth</i>	

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<sup>21</sup> Cost structure questions include one question enquiring about yearly input / production costs, and a full set of questions asking about detailed fixed costs, namely, lease of real estate and furniture; purchased energy (electricity, gas, firewood, etc.); telephone service; water service; maintenance and repairing; transportation; advertising, propaganda and promotion; operating licenses, commercial registration or fees of trade associations; payments to job-seeking agencies. Although the fixed cost is reported for the month of the survey; one assumption is that it does not change through the year. Thus, for calculations this calculated fixed cost is multiplied by a factor of 12 to calculated yearly operating profits.

<i>Revenue growth</i>	Calculated as the average rate growth of reported revenue for the 2012-2016 period. First, it is calculated the annual rate growth of revenues $((x_1 - x_0)/x_0)$ . Then, the five-year average of this rate growth is calculated.
<i>Labour productivity growth</i>	Calculated as the average rate growth of calculated labour productivity for the same period. First, it is calculated the annual rate growth of revenue per employee $((x_1 - x_0)/x_0)$ . Then, the five-year average of this rate growth is calculated.

Notes: All the variables are adjusted for 2012 price level using the consumer price index (base year 2008) as deflator and trimmed at 1% to limit the effect of extreme outliers (for the linear regression). Yearly measures are chosen because they capture better the whole productive year compared to monthly measures, which do not account for variability or seasonality throughout the year.

## 3.2 Estimation Strategy

The estimation strategy proceeds by running a quantile regression model, in which the outcome variables are the performance indicators defined in section 3.1. This method allows studying the different correlates affecting the distribution of profits, and the growth of microenterprises. Least squares (LS) regression summarizes the relationship between the response variable and predictor variables by describing the mean of the response for each fixed value of the predictors. In our case, LS regression helps understand the behaviour of the average firm. Nonetheless, the conditional mean framework cannot be readily extended to noncentral location, which is precisely where the interests of social science research often reside (Hao & Naiman, 2007, p. 2). Instead of limiting the analysis to a central moment of the distribution we look at the full shape of the distribution. Conditional quantile model offers the flexibility to focus on different positions of the distribution. Following Koenker (2005) and Hao and Naiman (2007), we calculate five quantiles for each outcome variable<sup>22</sup>. In summary, two different estimation techniques are applied in testing the model: least squares (LS) regression and quantile regression (QR).

Quantile regression (QR) analysis seems to fit more appropriately to the study of the microenterprise sector, agreeing with Goedhuys and Sleuwaegen (2010, p. 33) demand for a more appropriate “examination of firm growth distribution that is contingent on the different firm characteristics” (although their interest lies on the High Growth Firms sector mainly). The presence of outliers can also justify the use of quantile regression, given the fact that outliers can represent heavy-tailed distributions, as Reichstein et al. (2010) conclude for the growth distribution of firms (see Reichstein et al. (2010) for additional references on firm growth distribution).

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<sup>22</sup> The quantiles are the bottom 10% (0.1), the 25% (0.25), the median (0.5), the 75%(0.75), and the upper 10% (0.9).

Formally, we model the conditional quantiles by:

$$Q_{\theta}(y|x) = x'\beta(\theta)$$

where the dependent variable,  $y_i$ , corresponds to the proxies for firm performance (explained in section 3.1), and the vector,  $x_i$ , includes our variable of interest, start-up motivation, and additional firm characteristics. From the interest of this study, the estimated QR coefficients are informative as they can be interpreted as rates of return of the firm characteristics, in this particular case of start-up motivation at different points of the conditional performance distribution. Machado and Mata (2005) also highlight that the conditional quantile process provides a full characterization of the conditional distribution of outcome variable in a similar fashion than the ordinary sample quantiles characterize a marginal distribution.

The specification of the empirical model (QR plus dummy variables) allows delving into different configurations of firms within each quantile (intra-quantile comparisons) as well as compare amongst firms from different quantiles (inter-quantile comparisons).

An important assumption is the linearity of the quantile regression model. The inclusion of the start-up motivation into the analysis should solve partially an omitted bias variable as this variable is usually unobserved. Nonetheless, the model is not saturated as it misses an important set of covariates related to the characteristics of the entrepreneur. As aforementioned, ideally this dataset should include at least: previous job experience, employment-unemployment spells, education, skills, previous experience as entrepreneur.

## 4. RESULTS

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This section presents the descriptive and estimation results of the coefficients of the variable of interest, its interactions with female entrepreneur; and with firm age dummies. Interacting firm age with motivation captures if the effect of motivation changes as firms operate longer as a characteristic of the start-up process.

### 4.1 Descriptive Results

Table 4.1 presents descriptive statistics by start-up motivation. From the analytical sample, the proportion of necessity entrepreneurs is 30.42% for 2012. This figure is consistent with the proportion that GEM estimates for Colombia that averages around 31.7% for the 2006-2015 period.

Table 4.1 Descriptive Statistics by Motivation (Necessity vs. Opportunity)

	<b>Opportunity</b>	<b>Necessity</b>	<b>Diff.<sup>a</sup></b>
<b>Financial Outcomes</b>			
Yearly Revenue (Avg. 2012-2016)	75,081 (80121)	48,714 (60843)	27,017*** (26.33)
Labour Prod. (Avg. 2012-2016)	33,484 (26613.4)	25,700 (23625.4)	8,039*** (21.66)
Yearly Gross Profit 2016	36,105 (55279.5)	21,753 (33407.5)	15,156*** (21.08)
Yearly Operating Profit 2016	24,675 (51121.3)	14,888 (29573.3)	10,458*** (15.75)
Return on Sales 2016	0.281 (0.330)	0.284 (0.317)	-0.00220 (-0.46)
<b>Firm Growth</b>			
Revenue (Avg. Growth 2012-2016)	0.487 (0.857)	0.575 (0.980)	-0.112*** (-7.08)
Labour Prod. (Avg. Growth 2012-2016)	0.506 (0.804)	0.596 (0.921)	-0.0863*** (-6.59)
<b>Observations</b>	<b>15,014</b>	<b>6,725</b>	

Source: DANE, Microenterprise survey 2012-2016. Notes: Mean coefficients; standard deviation in parentheses. All data trimmed at 1/99%. Outcomes in levels in thousands of 2012 COP. <sup>a</sup> t statistics in parentheses \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Figure 1 depicts the estimated kernel densities of the different financial outcomes of necessity and opportunity motivated enterprises. The gap between the two types of enterprises is visible, necessity motivated enterprises show consistently lower financial outcomes, except for the return on sales measurement. This last measure is a remarkable finding that might explain the distribution of efficiency in the whole MSE sector. Interestingly, necessity motivated enterprises show higher average growth rates for revenue, and labour productivity (see Figure 2).



Figure 1 Financial outcomes by Motivation (Necessity vs. Opportunity)

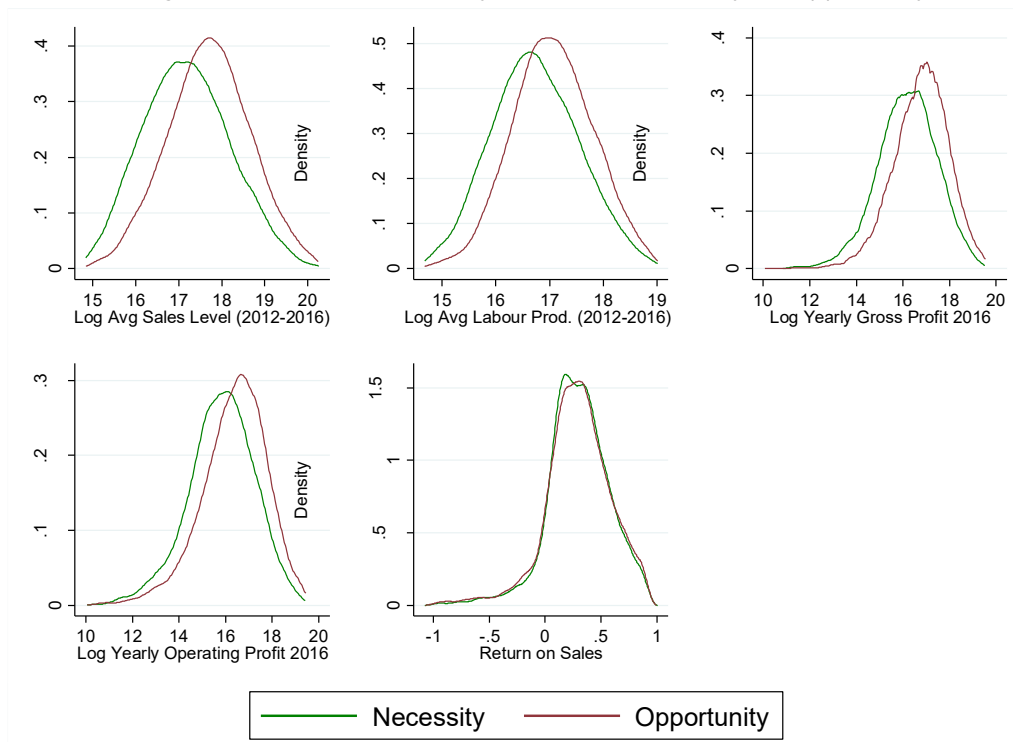


Figure 2 Growth Outcomes by Motivation (Necessity vs. Opportunity)

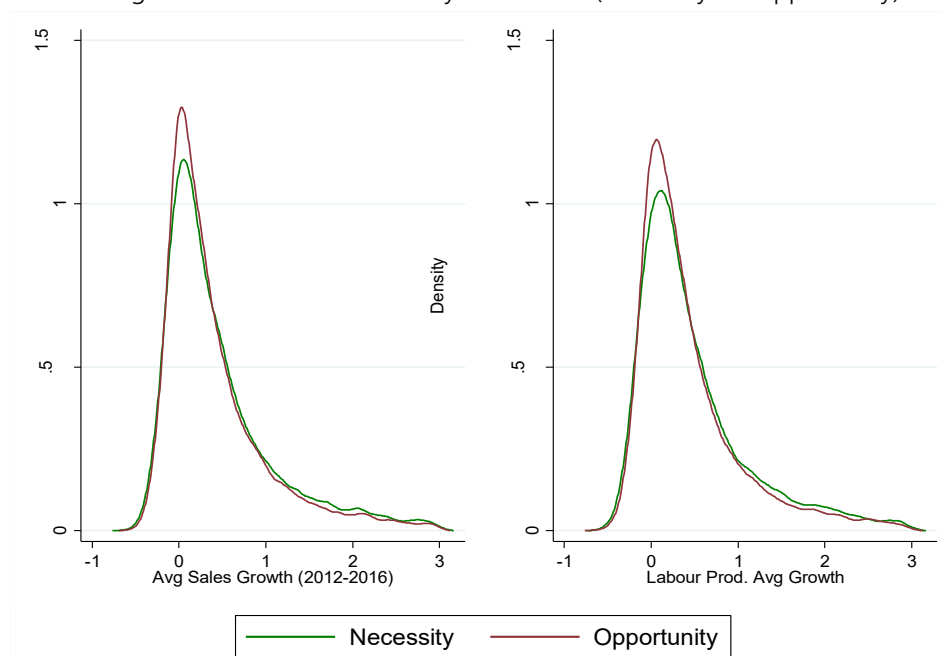


Figure 3 and Figure 4 plot the distribution of necessity and opportunity financial and growth outcomes at each quantile of their respective distributions. Again, the difference between necessity

and opportunity is evident, particularly for the financial outcomes. Regarding return on sales, the lines are practically overlapping apart from a slight difference at the upper quantile. Growth measures show a similar overlapping picture with the necessity entrepreneurs showing a slightly higher measure at the upper quantile in this case.

Figure 3 Quantile Plots: Financial Outcomes (Necessity vs. Opportunity)

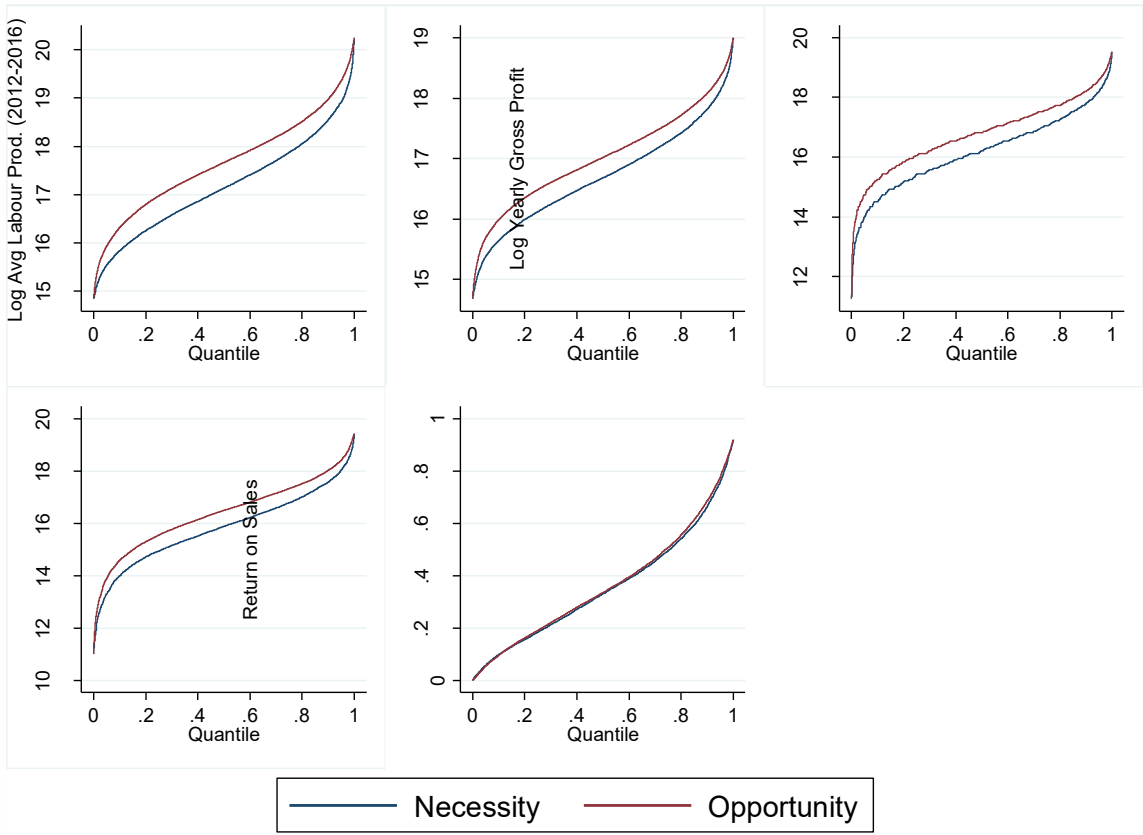


Figure 4 Quantile Plots: Growth Outcomes Necessity and Opportunity Entrepreneurs

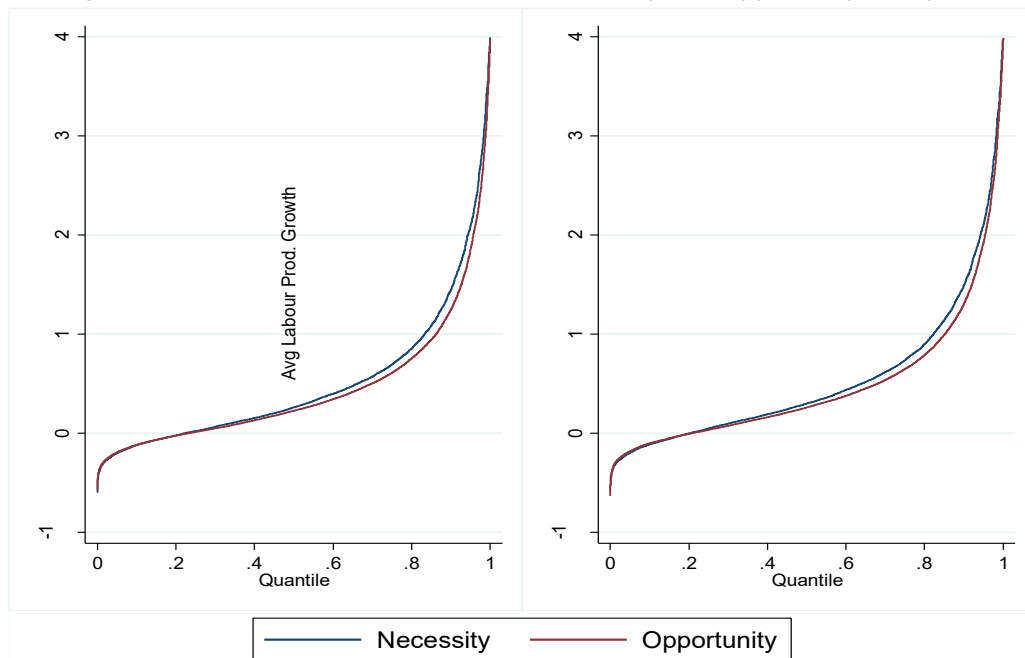


Table 4.2 shows that the opportunity-necessity entrepreneurs are essentially different in every characteristic, as the majority of differences are statistically significant, similar to the results of Block and Wagner (2010). Necessity entrepreneurs show a higher proportion of female entrepreneurs (50.7% vs. 43.2%) this finding is similar to several studies in developing countries, as women tend to become entrepreneurs looking for a complementary source of household income or to share time alongside family care, either childcare or the elderly.

Bookkeeping, formalization (registry), and use of digital technologies are higher in more than 20 p.p. for opportunity entrepreneurs. Although statistically significant the two groups show slight differences in: Firm age, necessity entrepreneurs show a lower proportion in the 3 to 10 years categories, and a higher proportion in the group older than 10 years of operation; and a lower proportion of self-funded firms. Opportunity firms appear to be in a slightly higher proportion in the Trade sector.

Table 4.2: Summary Statistics by Start-up Motivation

	Opportunity	Necessity	Full Sample	Diff <sup>a</sup>
Female*	0.432	0.507	0.455	-0.0754***
	(0.495)	(0.500)	(0.498)	(-10.31)
Accounts*	0.735	0.531	0.672	0.204***
	(0.441)	(0.499)	(0.469)	(28.87)
Formalization*	0.775	0.559	0.708	0.216***

	(0.417)	(0.497)	(0.454)	(31.11)
>1yr - <3yr	0.0780	0.0654	0.0741	0.0126***
	(0.268)	(0.247)	(0.262)	(3.37)
>3yr - <5yr	0.121	0.104	0.116	0.0167***
	(0.326)	(0.306)	(0.320)	(3.64)
>5yr - <10yr	0.272	0.264	0.270	0.00847
	(0.445)	(0.441)	(0.444)	(1.31)
>10yr	0.529	0.566	0.540	-0.0377***
	(0.499)	(0.496)	(0.498)	(-5.18)
Alone*	0.721	0.743	0.728	-0.0224***
	(0.448)	(0.437)	(0.445)	(-3.47)
Finance*	0.685	0.653	0.675	0.0328***
	(0.464)	(0.476)	(0.468)	(4.73)
Use of technologies	0.432	0.226	0.368	0.206***
	(0.673)	(0.520)	(0.637)	(24.56)
Firm size in 2012	2.294	1.832	2.151	0.462***
	(1.403)	(1.108)	(1.336)	(26.10)
Sector	2.190	2.171	2.184	0.0189**
	(0.617)	(0.560)	(0.600)	(2.23)
Regional unemployment rate	9.459	9.245	9.393	0.214***
	(1.838)	(1.916)	(1.865)	(7.71)
<b>Observations</b>	<b>15,014</b>	<b>6,725</b>	<b>21,739</b>	<b>21,739</b>

Source: DANE, Microenterprise survey 2012-2016. Note: Dummy variables are marked with an asterisk (\*) and represent the proportion of firms. Standard deviation in parentheses. <sup>a</sup> Column of differences t-statistics in parentheses \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01)

## 4.2 Estimation Results

To control for attrition, we run regressions on both balanced and unbalanced panel, the estimates do not change significantly, then we can rule out attrition as a source of bias for the analysis.

The first column gives the results of the LS estimation, that is, the estimation of the mean effect conditional on the independent variables. The results of the LS regression serve as a reference point to show the explanatory advantage of the quantile regression for the analysis. Columns 2–6 present the results of the quantile regression: the QR coefficient estimates at five quantiles (0.1, 0.25, 0.5, 0.75 and 0.9) of each distribution. The reference group consists of male-operated young firms (less than a year) in the manufacturing sector, motivated by opportunity, unregistered, not keeping records, started by the entrepreneur with someone, and financed by loans or seed capital. Here we present the estimation results of financial and growth outcomes.<sup>23</sup>

<sup>23</sup> Quantile regression estimation results with the full set of covariates for each quantile, and F-tests of coefficients equality over quantiles are available on request.

## 4.2.1 Financial outcomes

### 4.2.1.1 Yearly Revenue

The results show a negative impact of necessity motivation through various channels depending on the quantile of the distribution. Table 4.3 shows that necessity motivation is negatively associated with revenue at the low quantiles but not at the top half of the distribution. Being a female entrepreneur is correlated with lower revenue. There is a combined negative significant effect of being a necessity female entrepreneur over the distribution excepting the lowest quantile.

Time of operation shows a positive coefficient for older operating firms at the top tiers of the distribution (quantiles 0.50, 0.75, and 0.90), this evidences the effect of business maturation, suggesting a learning curve as the time of operation increases. Nevertheless, for the 0.75 quantile, there is an additional, negative effect for necessity motivated enterprises when interacted with firm's age, so this experience premium is lost for necessity motivated entrepreneurs operating at this quantile.

Regarding other firm characteristics, estimation results confirm standard findings in the analysis of entrepreneurship. Being an individual entrepreneur and using personal savings for start-up financing are associated with lower revenues over the distribution; these effects decrease over the distribution.

Table 4.3 Estimation results: Log Yearly Revenue (Avg. 2012-2016)

<b>Dependent: Log. Year Revenue (avg. 2012-2016)</b>	<b>LS</b>	<b>Q0.1</b>	<b>Q0.25</b>	<b>Q0.5</b>	<b>Q0.75</b>	<b>Q0.9</b>
Necessity	<b>-0.089**</b> (-2.256)	<b>-0.172***</b> (-3.698)	<b>-0.162**</b> (-2.938)	-0.081 (-1.370)	-0.007 (-0.192)	-0.042 (-0.648)
Female	<b>-0.145***</b> (-13.653)	<b>-0.113***</b> (-6.429)	<b>-0.106***</b> (-8.488)	<b>-0.137***</b> (-11.018)	<b>-0.145***</b> (-10.752)	<b>-0.173***</b> (-10.179)
Necessity # Female	<b>-0.036*</b> (-1.848)	-0.014 (-0.495)	<b>-0.041*</b> (-1.730)	<b>-0.048**</b> (-2.015)	<b>-0.055**</b> (-2.340)	<b>-0.058*</b> (-1.768)
Firm age [>3yr - <5yr]	0.005 (0.211)	-0.012 (-0.349)	-0.010 (-0.353)	0.010 (0.387)	0.025 (0.897)	0.023 (0.781)
Firm age [>5yr - <10yr]	0.031 (1.524)	0.013 (0.492)	0.011 (0.422)	0.016 (0.699)	<b>0.067***</b> (2.599)	<b>0.051**</b> (2.208)
Firm age [>10yr]	<b>0.045**</b> (2.308)	-0.012 (-0.437)	0.017 (0.666)	<b>0.035*</b> (1.670)	<b>0.086***</b> (3.533)	<b>0.072***</b> (3.440)
Necessity #Firm age [>3yr - <5yr]	-0.076 (-1.595)	-0.052 (-0.857)	0.008 (0.113)	-0.042 (-0.631)	<b>-0.112**</b> (-2.035)	-0.107 (-1.282)
Necessity #Firm age [>5yr - <10yr]	-0.057 (-1.367)	0.003 (0.064)	0.011 (0.193)	-0.047 (-0.750)	<b>-0.123***</b> (-2.921)	-0.067 (-0.962)
Necessity #Firm age [>10yr]	-0.038	0.048	0.023	-0.037	<b>-0.111***</b>	-0.047

	(-0.947)	(0.992)	(0.412)	(-0.626)	<b>(-2.822)</b>	(-0.712)
Only founder	-0.049***	-0.067***	-0.060***	-0.054***	-0.027**	-0.037**
	(-4.723)	(-4.061)	(-4.905)	(-4.552)	(-2.264)	(-2.450)
Self-funding	-0.053***	-0.074***	-0.057***	-0.053***	-0.048***	-0.021
	(-5.411)	(-4.999)	(-4.822)	(-4.696)	(-3.937)	(-1.445)
Accounts	0.305***	0.330***	0.335***	0.295***	0.287***	0.279***
	(27.139)	(19.527)	(25.284)	(21.705)	(19.643)	(15.485)
Registry (strict def.)	0.137***	0.208***	0.187***	0.135***	0.074***	0.058***
	(11.622)	(10.909)	(13.745)	(9.607)	(4.586)	(2.968)
Avg. # of Employees	1.007***	1.038***	1.025***	1.020***	0.972***	0.918***
	(63.899)	(49.709)	(60.597)	(60.203)	(51.994)	(44.348)
Avg. # of Employees (sqrt)	-0.086***	-0.094***	-0.089***	-0.087***	-0.081***	-0.075***
	(-36.031)	(-32.475)	(-35.827)	(-35.587)	(-29.408)	(-26.572)
Avg. Job Growth	-0.124***	-0.125***	-0.105***	-0.094***	-0.157***	-0.161***
	(-5.219)	(-3.243)	(-3.939)	(-4.075)	(-6.821)	(-4.290)
Use of Tech.	0.140***	0.112***	0.118***	0.137***	0.149***	0.169***
	(17.586)	(10.365)	(13.118)	(14.707)	(15.105)	(14.469)
Use of Tech Avg. Growth	-0.076***	-0.127***	-0.120***	-0.101***	-0.061**	0.032
	(-2.818)	(-3.355)	(-3.740)	(-3.254)	(-2.217)	(0.765)
Reg. Unemployment rate	-0.043***	-0.076***	-0.061***	-0.038***	-0.024**	-0.020*
	(-6.961)	(-6.564)	(-4.133)	(-4.362)	(-2.293)	(-1.877)
Trade Sector (sector=2)	0.606***	0.373***	0.514***	0.632***	0.716***	0.738***
	(44.537)	(20.140)	(31.099)	(37.638)	(45.947)	(35.870)
Services Sector (sector=3)	0.065***	0.033*	0.058***	0.062***	0.075***	0.049**
	(4.689)	(1.759)	(3.604)	(3.750)	(4.584)	(2.422)
<b>Observations</b>	21.510	21.510	21.510	21.510	21.510	21.510
<b>R-squared</b>	0.590	0.369	0.377	0.373	0.368	0.357

Note(s): t statistics in parentheses \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Bookkeeping is associated with higher revenues, although there is a marginal higher effect at the lower quantiles. Formalization coefficients present evidence of a positive, expected effect; interestingly, it shows a decreasing effect over the quantiles, which means that complying with both tax and chamber of commerce registry is positively correlated with revenue and that low quantiles benefit more than top quantiles for this compliance. The effect of the number of employees is positive and similar over the distribution. Use of technologies is associated with positive revenues, this effect is increasing over the quantiles, yet it is combined with a negative coefficient for the first four quantiles (0.10 to 0.75) of the change in technology use. This last finding is possibly explained by the cost of the tech devices and its actual incorporation to the value generation activity of the firm.

Regional unemployment rate shows a negative correlation with revenues, as the unemployment rate increases, revenue tend to decrease in a greater proportion for low performing enterprises. This evidences the influence of local labour market conditions on microentrepreneurship. It might

also be connected to subsistence entrepreneurs, characterised by low performance, low differentiated products competing in saturated local markets. Finally, enterprises in the trade and services sectors show a positive coefficient compared to the reference, manufacturing group of microenterprises.

#### *4.2.1.2 Labour Productivity (Revenue per Employee)*

The results show a picture similar to the results of revenue. In general, motivation by necessity represents a cost to entrepreneurs and their enterprises. In this instance, for the first three quantiles is directly related to the reported motivation; with the higher negative effect on the 0.25 quantile of the distribution. For the quantile 0.75, the effect of necessity motivation comes via time of operation, reducing the positive effect of time of operation (for enterprises with more than ten years of operation). For the top tier of the distribution, there is no evidence of a negative effect for necessity entrepreneurs. For females, there is a reduction over the whole distribution, and an extra reduction if motivated by necessity at the median and 0.75 quantiles.

Regarding firm characteristics, estimation results reinforce the results for revenue. Being an individual entrepreneur and using personal savings for start-up financing are associated with lower labour productivity over the distribution. For the former, the bottom tier quantiles (0.10, 0.25, and 0.50) show a higher negative coefficient; for the latter, there is a decreasing effect over the distribution. Both coefficients are no statistically significant for the top quantile. Bookkeeping is associated with higher revenue per employee. Formalization coefficients suggest the same effect than for revenue results, compliance presents a positive correlation, and it benefits more the lower tier quantiles.

Table 4.4 Estimation results: Log. Labour Productivity (avg. 2012-2016)

<b>Dependent: Log. Labour Productivity (avg. 2012-2016)</b>						
	<b>LS</b>	<b>Q0.1</b>	<b>Q0.25</b>	<b>Q0.5</b>	<b>Q0.75</b>	<b>Q0.9</b>
Necessity	<b>-0.095**</b> (-2.412)	<b>-0.137***</b> (-3.923)	<b>-0.164***</b> (-3.017)	<b>-0.118**</b> (-2.318)	0.001 (0.012)	-0.063 (-0.984)
Female	<b>-0.140***</b> (-13.346)	<b>-0.109***</b> (-6.677)	<b>-0.115***</b> (-8.928)	<b>-0.136***</b> (-10.729)	<b>-0.146***</b> (-11.142)	<b>-0.174***</b> (-9.935)
Necessity # Female	<b>-0.033*</b> (-1.696)	-0.013 (-0.511)	-0.008 (-0.337)	<b>-0.042*</b> (-1.753)	<b>-0.058**</b> (-2.063)	-0.035 (-1.193)
Firm age [>3yr - <5yr]	0.009 (0.382)	-0.005 (-0.157)	-0.009 (-0.274)	0.015 (0.560)	-0.003 (-0.111)	0.007 (0.174)
Firm age [>5yr - <10yr]	<b>0.038*</b> (1.863)	0.031 (1.088)	0.015 (0.501)	0.025 (1.080)	0.060** (2.507)	0.051 (1.279)
Firm age [>10yr]	<b>0.044**</b> (2.289)	0.013 (0.480)	0.013 (0.455)	0.035 (1.569)	<b>0.067***</b> (3.062)	<b>0.074*</b> (1.892)
Necessity #Firm age [>3yr - <5yr]	-0.072 (-1.522)	-0.067 (-1.545)	-0.032 (-0.473)	-0.036 (-0.616)	-0.091 (-1.266)	-0.089 (-1.303)
Necessity #Firm age [>5yr - <10yr]	-0.060 (-1.428)	-0.046 (-1.063)	-0.001 (-0.022)	-0.023 (-0.429)	<b>-0.139**</b> (-2.219)	-0.055 (-0.826)
Necessity #Firm age [>10yr]	-0.026 (-0.662)	0.021 (0.594)	0.015 (0.280)	0.000 (0.007)	<b>-0.099*</b> (-1.683)	-0.035 (-0.541)
Only founder	<b>-0.047***</b> (-4.600)	<b>-0.056***</b> (-3.784)	<b>-0.049***</b> (-3.876)	<b>-0.054***</b> (-4.455)	<b>-0.024*</b> (-1.901)	-0.021 (-1.405)
Startup Financing	<b>-0.055***</b> (-5.676)	<b>-0.071***</b> (-5.195)	<b>-0.060***</b> (-4.829)	<b>-0.050***</b> (-4.301)	<b>-0.047***</b> (-3.847)	-0.024 (-1.622)
Accounts	0.298*** (26.814)	0.320*** (21.785)	0.329*** (23.213)	0.300*** (21.503)	0.286*** (19.744)	0.273*** (14.687)
Registry (strict def.)	0.136*** (11.708)	0.203*** (13.507)	0.183*** (13.039)	0.134*** (9.411)	0.068*** (4.130)	0.057*** (3.285)
Avg. # of Employees	0.259*** (17.984)	0.285*** (12.550)	0.267*** (15.908)	0.267*** (15.272)	0.232*** (11.633)	0.188*** (7.692)
Avg. # of Employees (sqrt)	-0.027*** (-12.612)	-0.032*** (-8.715)	-0.028*** (-11.913)	-0.027*** (-10.601)	-0.022*** (-7.035)	-0.018*** (-4.933)
Avg. Job Growth	-0.009 (-0.362)	-0.025 (-0.767)	0.006 (0.235)	-0.001 (-0.022)	-0.063*** (-2.738)	0.012 (0.292)
Use of Tech.	0.137*** (17.487)	0.115*** (11.098)	0.112*** (11.571)	0.140*** (14.855)	0.153*** (15.209)	0.156*** (13.267)
Use of Tech Avg. Growth	-0.076*** (-2.864)	-0.138*** (-3.524)	-0.114*** (-3.123)	-0.080** (-2.559)	-0.052* (-1.749)	-0.003 (-0.065)
Reg. Unemployment rate	-0.043*** (-7.348)	-0.076*** (-8.601)	-0.065*** (-6.179)	-0.039*** (-7.009)	-0.029*** (-3.149)	-0.022 (-1.565)
Trade Sector (sector=2)	0.619*** (45.508)	0.392*** (22.414)	0.518*** (31.103)	0.651*** (38.329)	0.740*** (44.327)	0.761*** (35.265)
Service Sector (sector=3)	0.080*** (5.825)	0.051*** (2.964)	0.068*** (4.243)	0.087*** (5.142)	0.084*** (4.914)	0.087*** (4.078)
<b>Observations</b>	21.506	21.506	21.506	21.506	21.506	21.506
<b>R-squared</b>	0.344	0.203	0.201	0.203	0.203	0.191

Note(s): t statistics in parentheses \* p &lt; 0.1, \*\* p &lt; 0.05, \*\*\* p &lt; 0.01



The effect of the number of employees is positive and increasing over the distribution. Use of technologies is associated with positive revenue per employee, and also increasing over the quantiles. Regional unemployment rate shows a negative correlation with labour productivity, as the unemployment rate increases, revenue per employee tend to decrease in a higher proportion for low performing enterprises. Enterprises in the trade and services sectors show a positive coefficient compared to the reference, manufacturing group of microenterprises.

#### *4.2.1.3 Gross and Operating Profits*

Estimation results (Table 4.5) show that motivation is a negative determinant factor in gross profits for the group of women entrepreneurs at the median and 0.75 quantiles, it appears to be the only group affected by necessity motivation for this performance measure.

Comparing the results of revenue and revenue per employee with the results of gross profits it could be argued that entrepreneurs adjust to their performing scale through production costs, hence no significant differences between necessity and opportunity motivation are evidenced for gross profit performance.

One possible explanation is connected with Levy's approach to informality affirming that informal firms avoid tax payments and regulations leaving formal ones bear these costs (La Porta & Shleifer, 2014; Levy, 2008). In this sense, necessity firms save on costs allowing them to compensate the reported difference in revenue (section 4.2.1.1).

Table 4.5 Estimation results: Log. Yearly Gross Profit 2016

<b>Dependent: Log. Yearly Gross Profit 2016</b>						
	<b>LS</b>	<b>Q0.1</b>	<b>Q0.25</b>	<b>Q0.5</b>	<b>Q0.75</b>	<b>Q0.9</b>
Necessity	-0.084 (-1.548)	-0.142 (-1.280)	-0.077 (-1.056)	-0.020 (-0.353)	-0.094 (-1.256)	-0.111 (-1.347)
Female	<b>-0.138***</b> <b>(-8.964)</b>	<b>-0.186***</b> <b>(-6.319)</b>	<b>-0.126***</b> <b>(-5.761)</b>	<b>-0.118***</b> <b>(-7.335)</b>	<b>-0.114***</b> <b>(-6.254)</b>	<b>-0.091***</b> <b>(-4.931)</b>
Necessity # Female	<b>-0.051*</b> <b>(-1.828)</b>	-0.021 (-0.372)	-0.018 (-0.478)	<b>-0.080***</b> <b>(-2.896)</b>	<b>-0.070**</b> <b>(-2.096)</b>	-0.051 (-1.340)
Firm age [>3yr - <5yr]	0.043 (1.252)	0.051 (1.252)	0.061 (1.245)	<b>0.077**</b> <b>(2.260)</b>	0.042 (1.059)	0.014 (0.432)
Firm age [>5yr - <10yr]	<b>0.061**</b> <b>(2.013)</b>	0.059 (1.533)	<b>0.091**</b> <b>(2.123)</b>	<b>0.080***</b> <b>(2.696)</b>	<b>0.065*</b> <b>(1.748)</b>	<b>0.080***</b> <b>(2.604)</b>
Firm age [>10yr]	<b>0.055*</b> <b>(1.891)</b>	0.024 (0.676)	<b>0.070*</b> <b>(1.706)</b>	<b>0.067**</b> <b>(2.373)</b>	<b>0.072**</b> <b>(2.036)</b>	<b>0.107***</b> <b>(3.628)</b>
Necessity #Firm age [>3yr - <5yr]	0.000 (0.004)	0.112 (0.831)	-0.036 (-0.414)	-0.079 (-1.099)	0.070 (0.823)	0.099 (1.097)
Necessity #Firm age [>5yr - <10yr]	-0.042 (-0.726)	-0.014 (-0.118)	-0.068 (-0.852)	-0.082 (-1.358)	-0.024 (-0.306)	0.015 (0.180)
Necessity #Firm age [>10yr]	-0.041 (-0.751)	0.026 (0.221)	-0.059 (-0.796)	-0.080 (-1.386)	-0.014 (-0.189)	0.022 (0.266)
Only founder	-0.001 (-0.065)	0.022 (0.818)	0.015 (0.717)	0.003 (0.172)	-0.008 (-0.463)	-0.019 (-0.894)
Startup Financing	-0.058*** (-4.161)	-0.061** (-2.271)	-0.058*** (-3.005)	-0.047*** (-3.244)	-0.063*** (-3.639)	-0.075*** (-4.263)
Accounts	0.401*** (24.537)	0.474*** (15.984)	0.432*** (18.019)	0.394*** (23.313)	0.347*** (18.434)	0.353*** (18.683)
Registry (strict def.)	0.244*** (14.420)	0.353*** (10.996)	0.297*** (12.555)	0.258*** (14.363)	0.189*** (9.559)	0.114*** (5.214)
Avg. # of Employees	0.877*** (41.916)	0.917*** (26.003)	0.887*** (32.269)	0.850*** (38.628)	0.845*** (39.216)	0.823*** (31.148)
Avg. # of Employees (sqrt)	-0.074*** (-23.580)	-0.077*** (-15.765)	-0.072*** (-18.629)	-0.069*** (-20.896)	-0.071*** (-24.133)	-0.069*** (-17.415)
Avg. Job Growth	0.194*** (5.484)	0.076 (1.118)	0.164*** (3.354)	0.267*** (8.399)	0.276*** (7.230)	0.189*** (6.511)
Use of Tech.	0.216*** (19.202)	0.173*** (7.614)	0.183*** (12.431)	0.196*** (15.929)	0.233*** (17.413)	0.259*** (18.258)
Use of Tech Avg. Growth	-0.078** (-2.092)	-0.090 (-1.283)	-0.154*** (-3.525)	-0.028 (-0.690)	0.011 (0.242)	-0.062 (-1.202)
Reg. Unemployment rate	-0.040*** (-4.869)	-0.058*** (-2.715)	-0.061*** (-4.156)	-0.033*** (-3.747)	-0.030*** (-2.654)	-0.013* (-1.831)
Trade Sector (sector=2)	0.288*** (14.040)	0.223*** (5.682)	0.227*** (8.271)	0.262*** (11.979)	0.340*** (14.794)	0.382*** (13.897)
Service Sector (sector=3)	0.256*** (12.030)	0.291*** (7.130)	0.234*** (7.989)	0.217*** (9.640)	0.247*** (10.267)	0.246*** (8.981)
<b>Observations</b>	21.340	21.340	21.340	21.340	21.340	21.340
<b>R-squared</b>	0.453	0.253	0.272	0.286	0.279	0.266

Note(s): t statistics in parentheses \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Table 4.6 presents the estimation results of the determinants of operating profits for the microenterprise sector. For this measure of performance, start-up motivation appears to be a negative determinant factor, in particular for the group of women entrepreneurs at top tiers of the distribution (0.75 and 0.90 quantiles).

Table 4.6 Estimation results: Log. Yearly Operating Profits 2016

<b>Dependent: Log. Yearly Operating Profit 2016</b>						
	<b>LS</b>	<b>Q0.1</b>	<b>Q0.25</b>	<b>Q0.5</b>	<b>Q0.75</b>	<b>Q0.9</b>
Necessity	0.003 (0.040)	0.034 (0.220)	0.076 (0.792)	0.016 (0.199)	-0.075 (-0.941)	-0.093 (-0.908)
Female	<b>-0.157***</b> <b>(-6.501)</b>	<b>-0.175***</b> <b>(-3.708)</b>	<b>-0.146***</b> <b>(-4.932)</b>	<b>-0.138***</b> <b>(-6.538)</b>	<b>-0.144***</b> <b>(-6.793)</b>	<b>-0.095***</b> <b>(-3.782)</b>
Necessity # Female	<b>-0.087**</b> <b>(-2.064)</b>	-0.071 (-0.904)	-0.068 (-1.305)	-0.061 (-1.562)	<b>-0.091**</b> <b>(-2.334)</b>	<b>-0.107**</b> <b>(-2.405)</b>
Firm age [>3yr - <5yr]	<b>0.126**</b> <b>(2.369)</b>	<b>0.263**</b> <b>(2.112)</b>	<b>0.175**</b> <b>(2.227)</b>	<b>0.112*</b> <b>(1.862)</b>	-0.001 (-0.016)	-0.003 (-0.037)
Firm age [>5yr - <10yr]	<b>0.150***</b> <b>(3.054)</b>	<b>0.301**</b> <b>(2.403)</b>	<b>0.245***</b> <b>(3.454)</b>	<b>0.128**</b> <b>(2.420)</b>	0.054 (1.261)	0.100 (1.556)
Firm age [>10yr]	<b>0.172***</b> <b>(3.651)</b>	<b>0.317**</b> <b>(2.566)</b>	<b>0.255***</b> <b>(3.774)</b>	<b>0.166***</b> <b>(3.227)</b>	<b>0.095**</b> <b>(2.353)</b>	<b>0.118*</b> <b>(1.901)</b>
Necessity #Firm age [>3yr - <5yr]	-0.106 (-1.022)	-0.271 (-1.508)	<b>-0.259*</b> <b>(-1.944)</b>	<b>-0.172*</b> <b>(-1.766)</b>	0.026 (0.264)	0.100 (0.903)
Necessity #Firm age [>5yr - <10yr]	-0.073 (-0.773)	-0.076 (-0.452)	<b>-0.211**</b> <b>(-2.009)</b>	-0.117 (-1.373)	-0.025 (-0.288)	-0.026 (-0.247)
Necessity #Firm age [>10yr]	-0.083 (-0.912)	-0.178 (-1.101)	<b>-0.209**</b> <b>(-2.107)</b>	<b>-0.151*</b> <b>(-1.870)</b>	-0.015 (-0.183)	0.060 (0.570)
Only founder	0.036 (1.564)	0.040 (0.938)	0.039 (1.416)	0.025 (1.235)	0.017 (0.849)	0.004 (0.181)
Startup Financing	-0.032 (-1.483)	0.042 (0.968)	-0.028 (-1.016)	-0.041** (-2.071)	-0.064*** (-3.334)	-0.084*** (-3.941)
Accounts	0.423*** (16.782)	0.502*** (10.563)	0.459*** (14.581)	0.393*** (17.493)	0.330*** (14.650)	0.331*** (12.826)
Registry (strict def.)	0.099*** (3.883)	0.137*** (2.776)	0.122*** (3.950)	0.093*** (4.009)	0.094*** (3.985)	0.064** (2.299)
Avg. # of Employees	0.926*** (30.021)	0.950*** (15.478)	0.910*** (22.421)	0.883*** (33.596)	0.860*** (33.177)	0.829*** (26.541)
Avg. # of Employees (sqrt)	-0.076*** (-17.159)	-0.076*** (-8.578)	-0.071*** (-11.608)	-0.070*** (-19.418)	-0.070*** (-19.985)	-0.070*** (-16.367)
Avg. Job Growth	0.185*** (3.678)	0.078 (0.662)	0.231*** (3.892)	0.342*** (7.891)	0.290*** (6.411)	0.173*** (4.829)
Use of Tech.	0.245*** (14.779)	0.218*** (6.440)	0.190*** (9.580)	0.212*** (12.901)	0.258*** (16.411)	0.295*** (15.982)
Use of Tech Avg. Growth	0.011 (0.195)	-0.109 (-1.241)	0.044 (0.664)	0.063 (1.125)	0.061 (1.103)	-0.010 (-0.159)
Reg. Unemployment rate	-0.028** (-2.533)	-0.031 (-1.529)	-0.044*** (-2.688)	-0.020** (-2.419)	-0.030*** (-2.968)	-0.017*** (-2.663)
Trade Sector (sector=2)	0.375*** (11.573)	0.397*** (5.479)	0.346*** (7.385)	0.306*** (11.308)	0.385*** (16.293)	0.464*** (14.555)
Service Sector (sector=3)	0.241*** (7.092)	0.298*** (3.962)	0.269*** (5.576)	0.196*** (7.056)	0.235*** (9.382)	0.263*** (8.085)
<b>Observations</b>	18.946	18.946	18.946	18.946	18.946	18.946
<b>R-squared</b>	0.295	0.148	0.188	0.222	0.231	0.222

Note(s): t statistics in parentheses \* p &lt; 0.1, \*\* p &lt; 0.05, \*\*\* p &lt; 0.01

The results suggest a positive relation of operating profits to the firm's age for the first three quantiles, business maturation is thus correlated to this outcome. Nevertheless, for quantiles 0.25

and the median, there is an associated cost of necessity that offsets the time of operation premium. It could be argued that low performing necessity enterprises adjust both their production and fixed costs structure, so no difference is presented between necessity and opportunity enterprises considering the results of revenue and revenue per employee (presented above) at the bottom quantile. Again, this could be explained by necessity enterprises operating under informality saving on operation costs.

#### 4.2.1.4 Return on Sales

Table 4.7 presents the estimation results for the return-on-sales measurement that serves as a proxy for efficiency.

Table 4.7 Estimation results: Return on Sales 2016

<b>Dependent: Return on Sales 2016</b>	<b>LS</b>	<b>Q0.1</b>	<b>Q0.25</b>	<b>Q0.5</b>	<b>Q0.75</b>	<b>Q0.9</b>
Necessity	<b>-0.038*</b> (-1.732)	<b>-0.083*</b> (-1.690)	-0.021 (-0.875)	-0.010 (-0.646)	0.011 (0.511)	-0.018 (-0.741)
Female	<b>-0.021***</b> (-3.755)	-0.017 (-1.579)	<b>-0.012**</b> (-2.396)	<b>-0.010**</b> (-2.323)	<b>-0.017***</b> (-3.349)	<b>-0.030***</b> (-4.867)
Necessity # Female	0.006 (0.616)	0.017 (1.128)	0.006 (0.730)	-0.008 (-1.048)	0.001 (0.159)	0.011 (1.032)
Firm age [>3yr - <5yr]	<b>0.028**</b> (2.280)	0.021 (0.876)	<b>0.045***</b> (4.007)	<b>0.031***</b> (3.215)	<b>0.033***</b> (2.655)	0.010 (0.738)
Firm age [>5yr - <10yr]	<b>0.031***</b> (2.842)	0.029 (1.259)	<b>0.043***</b> (4.448)	<b>0.035***</b> (3.933)	<b>0.040***</b> (3.489)	0.014 (1.215)
Firm age [>10yr]	<b>0.053***</b> (5.081)	<b>0.046**</b> (2.084)	<b>0.055***</b> (6.032)	<b>0.046***</b> (5.536)	<b>0.062***</b> (5.558)	<b>0.051***</b> (4.571)
Necessity #Firm age [>3yr - <5yr]	0.032 (1.239)	0.090 (1.589)	0.009 (0.333)	0.002 (0.081)	-0.019 (-0.820)	0.003 (0.129)
Necessity #Firm age [>5yr - <10yr]	0.053** (2.309)	<b>0.088*</b> (1.746)	0.028 (1.102)	0.026 (1.576)	0.006 (0.288)	0.023 (0.857)
Necessity #Firm age [>10yr]	0.038* (1.731)	<b>0.093*</b> (1.875)	0.020 (0.800)	0.010 (0.627)	-0.010 (-0.462)	0.005 (0.209)
Only founder	0.012** (2.407)	0.001 (0.065)	0.003 (0.800)	0.016*** (4.039)	0.024*** (4.771)	0.017** (2.469)
Startup Financing	0.003 (0.543)	-0.003 (-0.396)	0.004 (0.882)	0.000 (0.108)	0.007 (1.478)	-0.001 (-0.151)
Accounts	0.006 (0.999)	0.011 (1.189)	0.011** (2.243)	0.010** (2.269)	-0.006 (-1.215)	-0.023*** (-3.528)
Registry (strict def.)	-0.070*** (-11.811)	-0.077*** (-8.641)	-0.056*** (-10.956)	-0.065*** (-14.475)	-0.064*** (-12.252)	-0.049*** (-7.865)
Avg. # of Employees	0.004 (0.594)	0.032*** (2.964)	-0.002 (-0.364)	-0.015** (-2.514)	-0.014* (-1.807)	-0.007 (-0.782)
Avg. # of Employees (sqrt)	0.001 (0.571)	-0.002 (-1.194)	0.001 (1.363)	0.002*** (2.826)	0.002* (1.791)	0.001 (0.876)
Avg. Job Growth	0.009 (0.703)	0.018 (0.894)	0.020** (1.980)	0.016* (1.853)	0.012 (1.019)	-0.012 (-0.900)
Use of Tech.	0.027*** (6.547)	0.005 (0.702)	0.012*** (3.025)	0.022*** (6.205)	0.039*** (8.968)	0.033*** (8.201)
Use of Tech Avg. Growth	0.031*** (2.263)	0.053* (1.842)	0.021 (1.501)	0.012 (1.030)	0.014 (0.902)	0.039*** (2.667)
Reg. Unemployment rate	-0.004	-0.026**	-0.003	0.001	0.000	0.007***

Trade Sector (sector=2)	(-1.226) -0.039***	(-2.329) 0.026**	(-1.186) -0.036***	(0.416) -0.069***	(0.125) -0.084***	(3.355) -0.069***
Service Sector (sector=3)	(-5.100) 0.045***	(1.974) 0.008	(-3.705) 0.013	(-11.784) 0.047***	(-11.321) 0.077***	(-8.252) 0.097***
	(5.374)	(0.558)	(1.165)	(6.738)	(9.385)	(12.067)
<b>Observations</b>	21.341	21.341	21.341	21.341	21.341	21.341
<b>R-squared</b>	0.059	0.036	0.035	0.058	0.072	0.076

Note(s): t statistics in parentheses \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

It reinforces the negative pattern for women entrepreneurs evidenced in all the previous measures analysed. Regarding start-up motivation, it only appears to be significant for enterprises at the bottom of the distribution. The coefficient shows a negative correlation between necessity motivation and return on sales; nevertheless, it is offset by a positive, significant effect for necessity motivated enterprises that have surpassed the five years threshold of operation. This finding shows that necessity enterprises at the bottom of the distribution on return on sales are comparatively more efficient than opportunity-motivated ones operating also at the bottom.

Regarding standard determinants analysed, registry appears negatively associated and decreasing over the quantiles. Being a sole entrepreneur is only significant for top tier quantiles including the median enterprise, this result might be explained by the fact that decisions are made only by one person. Source of funding appears to have no association with efficiency. Use of technology remains positively correlated for enterprises above the bottom quantile, suggesting that more efficient firms benefit more from the use of technology.

## 4.2.2 Firm growth

### 4.2.2.1 Yearly Revenue Growth

Reported in Table 4.8, estimation results of the average rate growth of yearly sales for the 2012 – 2016 period. Results show that motivation by necessity is not associated with this measure, neither via female nor time of operation. Estimates of firm age confirm Jovanovic's (1982) learning model hypothesis stating that over time inefficient firms growth decline, nevertheless within a range of 10 years it could be argued that inefficient firms require a longer period to definitely fail, or these findings could inform those of Jovanovic, in the sense of Bennet (2010) of small scale enterprise as a consolation prize. This is also supported by the characterisation of the subsistence and lifestyle ventures set out by Morris, Neumeyer, and Kuratko (2015).

Regarding other firm characteristics, different patterns are evident when comparing with results of revenue estimation. Bookkeeping is only positive for low performing enterprises; it becomes

negative for high growth firms at the top quantile. Formalization has a negative effect on growth that increases toward the high-growing segment. Being an individual entrepreneur is associated with positive growth rates for low performing enterprises. Use of tech maintains its pattern of positive association with growth along quantiles.

Table 4.8 Estimation results: Yearly Revenue (Avg. Growth Rate 2012-2016)

<b>Dependent: Yearly Revenue (Avg. Growth Rate 2012-2016)</b>						
	<b>LS</b>	<b>Q0.1</b>	<b>Q0.25</b>	<b>Q0.5</b>	<b>Q0.75</b>	<b>Q0.9</b>
Necessity	0.055 (0.801)	0.029 (1.009)	0.022 (0.940)	0.031 (0.959)	0.013 (0.184)	-0.004 (-0.020)
Female	<b>0.026*</b> <b>(1.669)</b>	0.005 (0.962)	-0.002 (-0.450)	0.011 (1.473)	0.008 (0.497)	<b>0.088**</b> <b>(2.019)</b>
Necessity # Female	0.008 (0.263)	-0.010 (-1.042)	0.003 (0.284)	-0.019 (-1.272)	0.043 (1.344)	-0.056 (-0.751)
Firm age [>3yr - <5yr]	-0.012 (-0.304)	0.013 (0.977)	0.013 (0.939)	0.013 (0.510)	-0.020 (-0.402)	<b>-0.228*</b> <b>(-1.723)</b>
Firm age [>5yr - <10yr]	<b>-0.132***</b> <b>(-3.773)</b>	0.008 (0.662)	-0.017 (-1.491)	<b>-0.070***</b> <b>(-3.139)</b>	<b>-0.176***</b> <b>(-3.863)</b>	<b>-0.470***</b> <b>(-3.888)</b>
Firm age [>10yr]	<b>-0.166***</b> <b>(-4.952)</b>	-0.004 (-0.360)	<b>-0.032***</b> <b>(-2.982)</b>	<b>-0.081***</b> <b>(-3.656)</b>	<b>-0.217***</b> <b>(-5.067)</b>	<b>-0.556***</b> <b>(-4.757)</b>
Necessity #Firm age [>3yr - <5yr]	-0.012 (-0.143)	-0.037 (-1.138)	-0.034 (-1.167)	-0.042 (-1.003)	-0.048 (-0.457)	0.077 (0.336)
Necessity #Firm age [>5yr - <10yr]	0.048 (0.652)	-0.019 (-0.627)	-0.004 (-0.172)	0.023 (0.665)	0.057 (0.711)	0.248 (1.166)
Necessity #Firm age [>10yr]	0.052 (0.745)	-0.018 (-0.619)	-0.011 (-0.452)	0.021 (0.635)	0.078 (1.073)	0.266 (1.312)
Only founder	-0.000 (-0.021)	0.012** (2.433)	0.003 (0.651)	-0.000 (-0.066)	-0.013 (-0.830)	-0.050 (-1.287)
Startup Financing	0.028** (1.966)	0.002 (0.370)	0.002 (0.377)	0.001 (0.199)	0.015 (1.046)	0.039 (1.104)
Accounts	-0.020 (-1.233)	0.010* (1.939)	0.005 (0.873)	-0.003 (-0.340)	-0.029 (-1.640)	-0.071* (-1.780)
Registry (strict def.)	-0.061*** (-3.559)	0.004 (0.812)	-0.009* (-1.646)	-0.038*** (-4.355)	-0.088*** (-4.255)	-0.142*** (-3.274)
Avg. # of Employees	0.005 (0.214)	-0.002 (-0.290)	0.007 (0.993)	0.019* (1.846)	0.008 (0.315)	-0.044 (-0.817)
Avg. # of Employees (sqrt)	0.002 (0.440)	0.001 (0.690)	0.000 (0.147)	-0.001 (-0.945)	0.001 (0.308)	0.010 (1.228)
Avg. Job Growth	0.497*** (11.215)	0.148*** (11.079)	0.216*** (14.361)	0.352*** (15.464)	0.583*** (12.499)	1.084*** (9.775)
Use of Tech.	0.037*** (3.089)	0.010*** (3.074)	0.010** (2.346)	0.005 (0.813)	0.028* (1.952)	0.105*** (3.615)
Use of Tech Avg. Growth	0.036 (0.851)	0.010 (0.822)	0.003 (0.210)	0.022 (1.083)	0.028 (0.756)	0.092 (1.037)
Reg. Unemployment rate	0.042*** (3.883)	0.003 (1.515)	0.003 (0.750)	0.023*** (3.209)	0.071*** (6.331)	0.125*** (3.428)
Trade Sector (sector=2)	0.130*** (5.887)	0.004 (0.587)	0.036*** (5.844)	0.065*** (6.691)	0.162*** (9.617)	0.286*** (5.293)
Service Sector (sector=3)	0.020 (0.877)	0.006 (0.842)	0.024*** (3.667)	0.018* (1.919)	0.031* (1.822)	0.035 (0.655)
<b>Observations</b>	21.669	21.669	21.669	21.669	21.669	21.669
<b>R-squared</b>	0.051	0.020	0.023	0.031	0.042	0.061

Note(s): t statistics in parentheses \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

#### 4.2.2.2 Labour Productivity Growth

Regarding labour productivity growth, the results point at a no systematic difference between necessity and opportunity motivation, only for a positive significant coefficient at 0.25 quantile, and an equally positive coefficient for necessity motivated enterprises operating longer than ten years at the 0.75 quantile. As noted above, the increasing estimates of firm age suggest Jovanovic's hypothesis, labour productivity growth diminishes over time, this finding is in line with findings by Goedhuys and Sleuwaegen (2010).

Table 4.9 Estimation results: Yearly Labour Productivity (Average Growth 2012-2016)

<b>Dependent: Yearly Production per Employee (Average Growth 2012-2016)</b>						
	<b>LS</b>	<b>Q0.1</b>	<b>Q0.25</b>	<b>Q0.5</b>	<b>Q0.75</b>	<b>Q0.9</b>
Necessity	-0.010 (-0.191)	0.015 (0.562)	<b>0.039*</b> <b>(1.710)</b>	0.017 (0.569)	-0.058 (-0.758)	-0.054 (-0.213)
Female	0.014 (1.050)	0.001 (0.200)	-0.009 (-1.561)	-0.006 (-0.661)	0.009 (0.535)	0.055 (1.374)
Necessity # Female	-0.025 (-0.950)	-0.007 (-0.643)	-0.006 (-0.530)	-0.013 (-0.827)	0.020 (0.603)	-0.037 (-0.498)
Firm age [>3yr - <5yr]	-0.022 (-0.652)	0.011 (0.627)	0.014 (0.776)	-0.002 (-0.094)	-0.031 (-0.660)	-0.139 (-1.378)
Firm age [>5yr - <10yr]	<b>-0.095***</b> <b>(-3.158)</b>	0.007 (0.443)	-0.011 (-0.699)	<b>-0.053***</b> <b>(-2.966)</b>	<b>-0.159***</b> <b>(-3.875)</b>	<b>-0.322***</b> <b>(-3.171)</b>
Firm age [>10yr]	<b>-0.129***</b> <b>(-4.518)</b>	-0.006 (-0.393)	<b>-0.029*</b> <b>(-1.940)</b>	<b>-0.064***</b> <b>(-3.705)</b>	<b>-0.186***</b> <b>(-4.821)</b>	<b>-0.397***</b> <b>(-4.128)</b>
Necessity #Firm age [>3yr - <5yr]	0.061 (0.925)	-0.012 (-0.416)	-0.034 (-1.164)	-0.007 (-0.181)	0.096 (0.910)	0.153 (0.553)
Necessity #Firm age [>5yr - <10yr]	0.079 (1.396)	-0.028 (-1.014)	-0.027 (-1.102)	0.022 (0.689)	0.118 (1.402)	0.246 (0.952)
Necessity #Firm age [>10yr]	<b>0.111**</b> <b>(2.074)</b>	-0.017 (-0.645)	-0.017 (-0.746)	0.022 (0.706)	<b>0.141*</b> <b>(1.823)</b>	0.336 (1.316)
Only founder	-0.031** (-2.265)	-0.004 (-0.629)	-0.002 (-0.358)	-0.016* (-1.828)	-0.034** (-2.000)	-0.126*** (-3.018)
Startup Financing	0.007 (0.561)	0.000 (0.018)	-0.008 (-1.469)	-0.006 (-0.844)	0.010 (0.653)	0.027 (0.732)
Accounts	-0.029** (-2.081)	0.009 (1.423)	0.000 (0.054)	-0.013 (-1.345)	-0.018 (-0.997)	-0.095** (-2.426)
Registry (strict def.)	-0.038** (-2.540)	0.003 (0.544)	-0.003 (-0.520)	-0.031*** (-3.100)	-0.083*** (-4.106)	-0.084** (-2.169)
Avg. # of Employees	0.067*** (3.654)	0.020** (2.335)	0.032*** (4.169)	0.058*** (5.887)	0.051** (2.087)	0.095** (2.039)
Avg. # of Employees (sqrt)	-0.010*** (-3.745)	-0.003** (-2.061)	-0.004*** (-3.799)	-0.008*** (-6.556)	-0.009** (-2.425)	-0.015** (-2.531)
Avg. Job Growth	-0.160*** (-4.941)	-0.215*** (-15.034)	-0.181*** (-13.436)	-0.191*** (-9.655)	-0.080* (-1.868)	-0.070 (-0.726)
Use of Tech.	0.024** (2.333)	0.006 (1.339)	0.006 (1.524)	0.012* (1.881)	0.012 (0.956)	0.049 (1.515)

Use of Tech Avg. Growth	0.038 (1.110)	-0.004 (-0.260)	-0.018 (-1.132)	0.002 (0.104)	-0.014 (-0.332)	0.011 (0.104)
Reg. Unemployment rate	0.038*** (4.280)	0.003 (0.817)	0.006 (1.430)	0.026*** (2.851)	0.068*** (3.225)	0.075*** (2.995)
Trade Sector (sector=2)	0.144*** (7.984)	0.006 (0.864)	0.036*** (5.224)	0.075*** (6.493)	0.188*** (9.170)	0.354*** (7.371)
Service Sector (sector=3)	0.067*** (3.547)	0.013* (1.795)	0.033*** (4.607)	0.033*** (2.777)	0.085*** (4.123)	0.130*** (2.666)
<b>Observations</b>	21.542	21.542	21.542	21.542	21.542	21.542
<b>R-squared</b>	0.041	0.019	0.019	0.021	0.032	0.050

Note(s): t statistics in parentheses \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Other factors weigh in and have differential effects on productivity growth. For instance, individual entrepreneurs are correlated with lower growth rates at the top tier of the distribution. Formalization is associated with lower productivity growth rates, the higher the quantile, the lower the growth rate. Number of employees remain positive with decreasing marginal returns. Use of technologies remains positive, but the estimates are only significant at the median (see Table 4.9).

## 5. CONCLUDING REMARKS

This paper studied the relation between start-up motivation and firm performance. It explored this relationship for different measures of firm performance, i.e. yearly revenue, revenue per employee, gross and operating profits, and growth of revenue and of labour productivity. The findings also inform about the potential channel through which start-up motivation affects performance, for instance, necessity-motivated women entrepreneurs, or time of operation.

The quantile analysis provides powerful insight that widens the perception of the microenterprise sector through the recognition of its heterogeneity. This raises awareness of the need to incorporate this heterogeneity in the design of entrepreneurship support policies. For instance, knowledge of the factors affecting the operation and dynamics of firms should lead to better design and targeting of productive policies over a wide range and types of enterprises.

These findings inform the design of public policies oriented at both improving insertion of the population into the labour market and fostering entrepreneurship. For the first objective, as necessity entrepreneurship can be seen as a product of constrained labour markets with limited opportunities that push individuals into low performing activities, labour market policies need



incorporating this insight to the job orientation process, for instance, in unemployment benefit systems. As involuntary unemployment is essentially unavoidable, better equipping job-seekers with training, skills, capital and specific knowledge may boost their perspectives, whenever they choose to become entrepreneurs.

For the objective of fostering entrepreneurship, this analysis provides information on the different gaps related to motivation and each specific performance measure. So, for any particular policy objective, e.g. boosting revenues, productivity or profits, different courses of action can be proposed. Notwithstanding this, entrepreneurship policies require to encourage detection and exploitation of opportunities, one possible strategy for governments is to foster an entrepreneurial culture, the Colombian government is moving along this direction by the consolidation of an entrepreneurial system that brings together public and private actors.

In practice, this should lead to better tailoring policy instruments to support the markedly different segments of firms and address more effectively their particularities. For instance, recognising that business practices such as bookkeeping have a differential effect on different types of firms call for specific approaches to motivate firms to adopt it. Even with general practices such as registration or tax payment, related to formalization, specific incentives can be designed to motivate firm owners to comply with regulations.

The results corroborate the dual economy hypothesis of firms operating at differential levels (revenue, productivity gaps) in line with La Porta and Shleifer (2014), Lewis (1954), and Harris and Todaro (1970). This finding contributes to the debate about the connection between entrepreneurship and growth in the context of developing economies. Even though, necessity-motivated firms show a lower level of profits, in particular for the lower segment of performing firms this is not necessarily associated with null or diminishing growth rates. It is also important to highlight that necessity is not necessarily a deterrent for growth, it needs to be understood as a means to support families that otherwise would have no income generating opportunities.

Among the limitations of this study, we highlight the limited scope of the dataset. Even though it is a panel survey, it is not representative of the population of entrepreneurs in the whole territory. Besides, not only could the survey explore more deeply into the characteristics of the enterprises, but also those of the entrepreneurs, as a factor decisive to business performance in the MSE sector. For instance, capturing conditions of the start-up process such as initial level of capital; initial

investment made; time before reaching equilibrium point; and initial number of employees could enrich the array of analyses to perform. Another limitation also related to the dataset is attrition. Although by construction, we keep all the business units that information on all five years of the 2012-2016 period. It is noteworthy that necessity-motivated firms would tend to get out of sample as they fail. Nonetheless, it is also true that opportunity-motivated firms would tend to get out of the sample as they grow. An additional limitation is that motivation is only asked in the 2012 wave. So, in-and-out of sample analysis is only possible for this year.

Concerning entrepreneurs' characteristics, job profile, i.e. previous experience, employment spells; educational attainment is still not included in the enquiry yet it is a widely identified factor affecting performance. In addition, psychometric and soft-skills measures, which are becoming progressively important in the analysis of entrepreneurship, could improve entrepreneurial profiling, thence allowing to design more effective behavioural devices to encourage and foster entrepreneurial endeavours. All these could also be applied to employees, to widen the understanding of the human capital working in the MSE sector beyond school attainment and occupational profile.

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## Appendix A

Table 0.1 Firm Covariates

Variable Name	Coding	Question in Questionnaire
Female	Female =1	"What is the gender of the person taking most decisions of this economic unit?"
Firm size	<i>Average number of employees</i> is measured by the reported number of employees (from 1 up to 10) averaged for the 2012-2016 period	
Accounts	It captures whether the entrepreneur keeps record of business operation (=0 if not keep records at all).	Type of accountancy options are: ledgers, balance sheets, or other kind of accounts.
Formalization	It captures if the firm has registered both to Tax Registry and the Chamber of Commerce (=1).	
Firm age	It is captured in four categories: firms younger than a year; between one and less than three years; between three and less than five years; between five and less than ten years and ten years or more	
Founder	It defines whether the firm was started exclusively by the entrepreneur. Variable is a dummy =1 if the firm was started exclusively by the entrepreneur and =0 otherwise.	"Who started or constituted this enterprise?" Answer options: "1. Yourself only"; "2. You with another family member(s)"; "3. You and other non-family person (s)"; "4. Other people"; "5. One or more companies"; and "6. Non-profit organizations (universities or others)".
Self-funding	It asks for the main source that financed the start-up process (=1 if personal savings; 0 otherwise). Dummy variable coded as 1 if the firm start-up was financed with personal savings, and 0 otherwise.	"What was the main source of funding for the establishment or establishment of this establishment?" Answer options: "1. Personal Savings"; "2. Family loans"; "3. Bank Loans"; "4. Loans from lenders"; "5. Seed Capital"; and "6. Another".
Use of technology	It is defined as the use of any kind of digital technology (pc, laptop, tablet or smartphone) for the business operation (1 if any device is used and 4 if all four are used; the higher the number the more variety of technology the entrepreneur uses)	
Sector	Manufacturing (=1), trade (=2), and services (=3)	

Table 0.2 Sample Attrition

Year	Opportunity	Necessity	Observations
2012	70.46	29.54	17,334
2013	78.90	21.10	16,911
2014	87.09	12.91	17,043
2015	90.18	9.82	15,295
2016	93.03	6.97	11,274
TOTAL	83.07	16.93	77,857

Some notes on attrition. By construction, the analytical sample keep the business units that have information on all years of the 2012-2016 period. So, there is no attrition in this sample. Then, attrition is not a concern for our results.

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