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PRODUCT MARKET COMPETITION AND MANAGEMENT  
QUALITY AMONG SMALL AND MEDIUM-SIZED ENTERPRISES:  
EVIDENCE FROM BURKINA FASO <sup>\*†</sup>

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**Abstract**

We examine how management quality is related to competition when firms are run by their founders instead of hired managers. While the relationship between competition and managerial incentives is mostly found to be ambiguous in theory, testing it empirically has been challenged by the lack of robust quantitative data. Using a survey on 649 Small and Medium-sized Enterprises (SMEs) from Burkina Faso, we measure management quality, building on the Management and Organizational Practices Survey and find that management quality increases with competition. Our results are robust across a range of measures of competition and management sub-indicators.

Keywords: Product Market Competition, Management Quality, SMEs, Developing Countries, Burkina Faso

JEL Codes: L22, D21

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# I INTRODUCTION

Small and Medium-sized Enterprises (SMEs)<sup>1</sup> are increasingly recognized as an underpinning force driving industrial development and structural transformation of all economies; with an important contribution to private sector employment, job creation and growth. As Ayyagari, Beck and Demirguc-Kunt (2007) reported, SMEs (firms with 250 or less employees) account for more than 60% of Gross Domestic Product and 70% of total labor force employment in low-income countries. Ayyagari, Demirguc-Kunt and Maksimovic (2014) also found that SMEs (firms with 99 or less employees) accounts for about 48% of private sector employment. As such, SMEs emerge as a key instrument of poverty reduction and economic development, particularly for poor-income countries. However, their potential is limited by their low performances. For instance, the results of Ayyagari, Demirguc-Kunt and Maksimovic (2014) showed that while SMEs lead in job creation, productivity growth is led by large firms. In order to tap into the potential of SMEs for income and employment growth, identifying factors that can sustainably raise their performances is critical for policy-makers. Despite, there is scant of research/data, particularly in developing countries to inform policies aiming at fostering the growth of SMEs. The recent emphasis on the role of management quality on firm performances in the literature of Industrial Organization (IO) (Bloom and Van Reenen, 2007; Forth and Bryson, 2019; Broszeit et al., 2019) has aroused an interest in understanding the underlying factors that lead firms to improved managements practices.

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<sup>1</sup>Depending on the country and the source reporting statistics on SMEs, its definition and measurement vary significantly. Most commonly used criteria are based on the number of employees, annual turnovers, net assets and investment level. Even for the same criterion, important variations in the bounds defining the size of SMEs still appear across countries and sources (Ayyagari, Beck and Demirguc-Kunt, 2007; Ayyagari, Demirguc-Kunt and Maksimovic, 2014). For instance, while SMEs are mostly defined with an upper cut-off of 250 employees, SMEs may be considered as firms with less than 100 employees in Burkina Faso (Ayyagari, Demirguc-Kunt and Maksimovic, 2014).

Bloom and Van Reenen (2007) have pointed out the role personal characteristics of managers as an important factor determining the level of observed managerial efforts by showing that poor management is more prevalent in family-owned firms when the manager is chosen by primogeniture<sup>2</sup>. Other factors related to market frictions are also often emphasized. For instance, learning effects may be limited by informational constraints which make best practices to diffuse only slowly across firms (Bloom et al., 2013; Hardy and McCasland, 2016). Also, improving management practices may be costly or risky enough to discourage efforts to improve management quality (Raith, 2003). Another barrier to the adoption of better practices may result from the institutional organization itself which may create disincentives to improvement (Atkin et al., 2017). Finally, market structure is a key determinant of management practices (Hart, 1983; Scharfstein, 1988; Schmidt, 1997; Raith, 2003; Beiner, Schmid and Wanzenried, 2011; Bloom et al., 2015).

The complexity of the relationships between market competition and management quality is emphasized by the discrepancy between theoretical predictions and empirical evidence (Van Reenen, 2011). Although earlier investigations of the question informally argued that higher competitive pressure reduces managerial slacks (Leibenstein, 1966; Machlup, 1967; Hart, 1983), subsequent research showed mixed-conclusions (Scharfstein, 1988; Schmidt, 1997). While the most recent trend of the literature largely supports this idea that there is more than one channel through which competition affects managerial incentives (Raith, 2003;

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<sup>2</sup>These results are from a sample of 732 firms across the United States, France, Germany, and the United Kingdom which are all developed countries.

Cho et al., 2004; Baggs and De Bettignies, 2007; Golan et al., 2011), there still debate on the predictable effect of competition. This thread of literature draws heavily on agency theory and strategic interactions between firms. Within these frameworks, managerial efforts are determined by the incentive schemes provided by principals (firm owners or shareholders) to managers (hired). Such frameworks reflect the organizational structure of SMEs in developed but not in most developing countries. Most SMEs in developing countries are run by their founders or a team including them. In our specific context, more than 90% of the firms are run by their founders or a member of their family.

We examine how competition affects management quality when firms are run by their founders instead of hired managers, both in theory and in the specific context of a developing country – Burkina Faso. We exploit a recent development in the literature which argues that management is akin to a productivity-enhancing factor; i.e. *a technology*, in which firms can invest, allowing the manager to directly choose a level of managerial efforts that maximizes the firm profit (Bloom, Sadun and Van Reenen, 2017). We show that the relationship between product market competition and managerial efforts is ambiguous even without the problem of information between principals and agents or agency cost. We also use firm survey to generate the empirical effect of product market competition on SMEs managerial efforts. We investigate whether 649 SMEs in Burkina Faso improve their management practices as product market competition increases. We consider both objective measurement (competition measured based on the Lerner Index) and subjective measurements (perception of respondents) of competition. Our empirical results show that management quality increases with competition, consistently with the previous empirical literature.

The remaining of the paper is organized as follow. Section II presents the theoretical framework and section III the empirical approach. Results are presented in section IV and section V concludes.

## **II THEORETICAL MODEL OF THE CHOICE MANAGEMENT EFFORTS**

The existing theoretical literature is still unclear about the predictable relationship between product market competition and managerial efforts. The conclusions depend strongly on the assumptions and the conceptualization of the problem. The most insightful models are based on agency theory, showing optimal management efforts as a result of the equilibrium of a game between a principal (owner or shareholders of the firm) and an agent (the hired manager). Such games generally consist of two sub-games: the hiring game and the market game. The aim of hiring a manager, whose efforts are inherently unobservable, is improving input efficiency. If the manager fails to reduce costs, the firm may be liquidated. The managers efforts are determined by the incentive scheme provided by the owner. However, with many respects, the conceptualization of the problem fits less the organizational structure of many SMEs in developing countries.

Many SMEs in developing countries are run by their founders or a team including them,

making agency problem less adequate to generate their behavior. The following model analyzes the choice of the level of management efforts within firms where the manager may be the owner of the firm or one of the shareholders. The firm operates in a fully liberalized market where pricing is entirely guided by the market conditions; and we define competition broadly as any potential source of market power reducing and not only in the number of incumbent firms.

In these settings, the cost function ( $c$ ) of the firm is increasing in both output ( $y$ ) and the efforts ( $e$ ) undertaken by the manager, i.e,  $c = c(y, e)$  with  $c_e = \frac{\partial c}{\partial e} > 0$  and  $c_y = \frac{\partial c}{\partial y} > 0$ . Through its effect on input efficiency, managerial efforts also affect the attainable output for a given level of cost such that we can write  $y = y(e)$ . The runner of the firm then maximizes the following profit function:

$$\pi = py(e) - c(y(e), e) \tag{1}$$

where  $\pi$  is the profit of the firm and  $p$  the unit price of the product. By differentiating  $\pi$  with respect to  $e$  and rearranging, the intensity of efforts is given by:

$$\frac{e}{y} = \frac{1}{c_e(p - c_y)} \eta_e^y(\psi) \tag{2}$$

As it is almost standard, we assume that the elasticity of firm-level demand with respect to managerial efforts ( $\eta_e^y$ ) is increasing with competition ( $\psi$ ), that is,  $\frac{\partial \eta_e^y}{\partial \psi} > 0$ . This is obvious from our definition of competition: since customers can switch more easily to another supplier

in a more competitive market place, a firm with a cost advantage (higher level of efforts) can easily gain more market share. This is similar to the business stealing effects termed by Raith (2003). Also, price-cost margins decreases with competition, that is,  $\frac{\partial(p-c_y)}{\partial\psi} < 0$ . Finally, the marginal cost of efforts is increasing with the efforts such that  $c_e = \frac{\partial c}{\partial e} > 0$ . Then differentiating Equation (2) with respect to  $\psi$  gives:

$$\frac{\partial(e/y)}{\partial\psi} = \frac{1}{c_e} \left[ \left( \frac{\partial(p-c_y)}{\partial\psi} \right) \eta_e^y(\psi) + \frac{\partial\eta_e^y(\psi)}{\partial\psi} (p-c_y) \right] \quad (3)$$

The sign of Equation (3) depends on the relative importance of either component of the sum in the squared brackets since  $\frac{1}{c_e} > 0$ . Because an increase in competition depresses mark-ups,  $\left( \frac{\partial(p-c_y)}{\partial\psi} \right)$  is non-positive. In addition, we have already justified that  $\frac{\partial\eta_e^y(\psi)}{\partial\psi}$  is non-negative. Although the two components within the squared brackets seems to capture respectively the scale and business effects in Raith (2003), we do not have any proof that these two effects would cancel each other. Equation (3) shows that if the profit reduction effect is more important, competition will reduce managerial incentives. On the other hand, if the benefit from increased demand exceeds the fall in profit, then greater competition will be associated with stronger managerial incentives. The overall effect of competition on managerial efforts is ambiguous and this is not due to any agency costs or any presence of moral hazard. This implies that the ambiguous relationship between managerial practices is present without agency cost and hidden behavior. Therefore, it is difficult to predict what would be the empirical effect of increased competition on the management efforts of SMEs. In the next section, we present the strategy to identify the empirical effect of product market competition on the management efforts of SMEs.

## III EMPIRICAL FRAMEWORK

### III.I *Econometric Specification*

To investigate the empirical relationship between competition and management quality, we estimate the following equation:

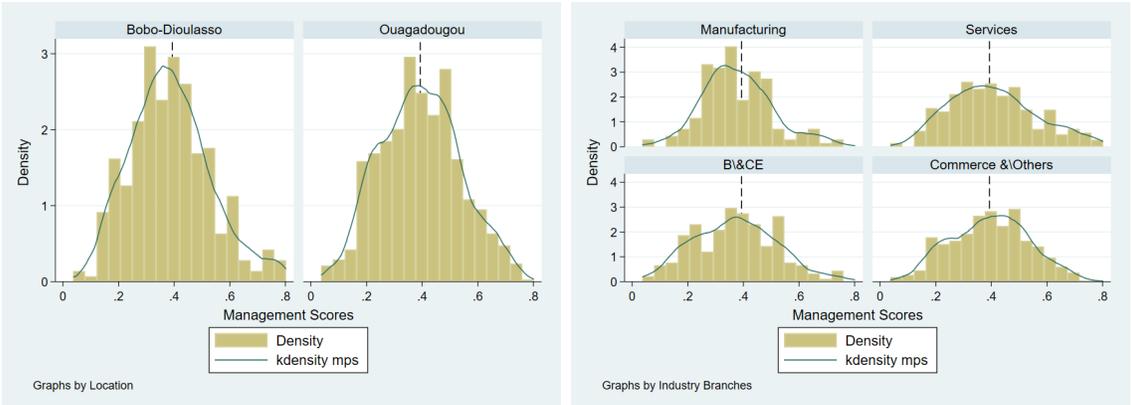
$$M_{it} = \alpha_0 + \alpha_1 comp_{it} + \alpha_2^T X_{it} + \nu_i + \epsilon_{it} \quad (4)$$

where  $M_{it}$  is the management score of firm  $i$  in year  $t$ ;  $comp_{it}$  is the competition index (or the perception of competition or the logarithm of the number of competitors in some specifications).  $X_{it}$  is a vector of firm characteristics that may affect management;  $\nu_i$  are firm-fixed effects; and  $\epsilon_{it}$  is a statistical error term. Consistent estimation of  $\alpha_1$  requires that the unobserved firm fixed-effects ( $\nu_i$ ) are not correlated with any covariate in the vector  $X_{it}$ . As such correlation is more likely, we use panel fixed-effect estimation to handle this potential source of bias. Our expectations are consistent with both  $\alpha_1 \geq 0$  and  $\alpha_1 < 0$ . We are more interested in the sign of  $\alpha_1$  which indicates the nature of the empirical relationship between product market competition and management quality in our context.

### III.II *Measurement of Management Scores*

Management is often seen as more a mix of quality and quantity with many difficult components to measure from most readily available industrial dataset. Some definitions of the concept; the design perspective, are not consistent with meaningful cross-firm or industry

comparison. However, recent development in the IO literature has conciliated many aspects of the concept and an interesting quantitative measurement of management quality has emerged (Bloom and Van Reenen, 2007). That approach we use in this paper to evaluate management quality is based on 16 questions about key management practices of which three are related to target setting, five to monitoring and eight to incentive schemes. Management practices are scored from worst (zero) to best (five). These scores are converted to z-scores by normalizing by practice to mean zero and standard deviation one following Bloom and Van Reenen (2007).



(a) Distribution of Management Scores per Firm Location. (b) Distribution of Management Scores per Industry Branch

Figure 1: Distribution of Management Scores

Figure 4 shows the distribution of management scores per firm location and industry branches. The average management score is 0.40. The distribution is relatively symmetric across firm location (Panel 4a) but exhibit more variability across industry branches (Panel 4b).

### III.III *Measurement of Product Market Competition*

Competition is often captured through trade openness, the magnitude of mark-ups and the number of incumbent firms. First, for firm level analysis, trade openness may be captured by the level of entry cost or the frequency of entries and exits (Karuna, 2007). However, entry costs as well as entry and exit decisions are long-term factors which rates changes less frequently. Their use as a measurement of competition over a short period would be less relevant unless the aim is cross-sector comparison. Second, unless the number of incumbent competitors can be objectively measured by the researcher, it is less reliable to use the number declared by the firms. We rather defined competition using a proxy of the Lerner Index which is the ratio of the price-cost margin to price (Equation 5):

$$L_{it} = \frac{P_{it} - C_{it}}{P_{it}} \quad (5)$$

where  $L_{it}$  is the Lerner Index for firm  $i$  in year  $t$ ; and  $P_{it}$  and  $C_{it}$  are respectively the unit product price and the average production cost of the firm. The index captures the market power of a firm and is better interpreted as a measure of product substitutability. For instance, higher price-cost margins may be associated with higher differentiation or a tendency toward a monopoly situation which enable firms to enjoy rents. A null value of the index therefore reflects perfect competition while the value of unity indicates a monopoly situation. The concern is firm mark-ups being generally hardly observable. Instead, following Aghion, Braun and Fedderke (2008), we proxied the Lerner Index by the difference between output value ( $py$ ) and both wage ( $wl$ ) and capital ( $rk$ ) costs as a proportion of the output

value. For firm  $i$ , the Lerner Index is computed as follow:

$$L_{it} = \frac{P_{it}y_{it} - w_{it}l_{it} - rk_{it}}{P_{it}y_{it}} \quad (6)$$

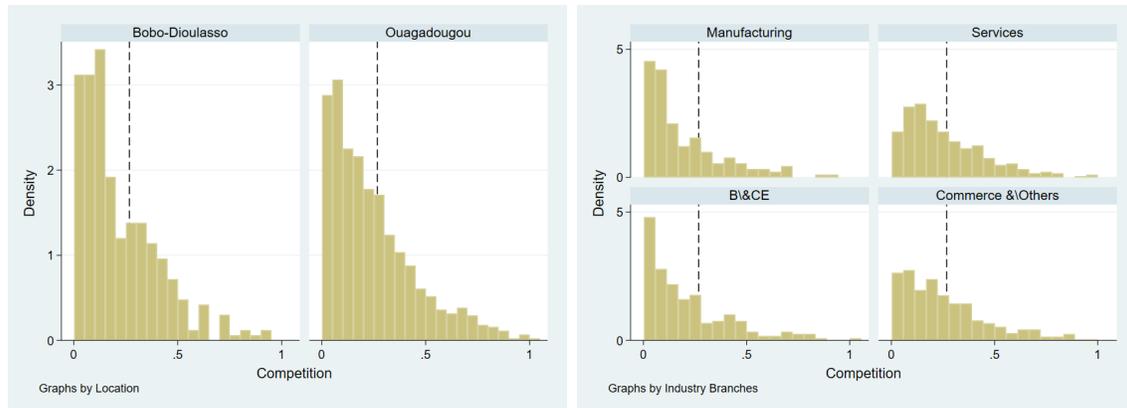
where  $w_{it}$  and  $r$ <sup>3</sup> are respectively the per unit cost of labor ( $l_{it}$ ) and capital ( $k_{it}$ ) respectively.

Our measurement of competition is obtained by subtracting this index from one. Increased product market competition therefore means increased product substitutability.

In addition to this index-based measurement of competition, we consider three alternative measurements of competition based on the respondent assesment during the survey. One measurement is the reported number of competing firms the respondent could identify. Another is the perceived degree of the competition faced by the firm. Here, instead of counting the number of competing firms, respondents were asked to assess the degree competition faced by the firm from the formal (and then from the informal) sector. Five options were available ranging from very low (1) to very high (5). However, we consider those approximations of competition to be less precise than the index-based measurement of competition.

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<sup>3</sup> $r$  is assumed constant and equal 0.08 following Aghion, Braun and Fedderke (2008)



(a) Distribution of competition per City (b) Distribution of Competition per Industry

Figure 2: Distrution of Competition Index

Figure 5 shows the distribution of the competition measured using the Lerner Index respectively per firm location (Panel 5a) and per industry branch (Panel 5b). There is substantial variation in the competition which has a long right tail. Panel 5a shows that competition is similarly distributed across the two locations; that is, firms located in Bobo-Dioulasso face similar level of competition than firms located in the capital city –Ouagadougou. Panel 5b indicates some differences in competition across industry branches. Like the management scores, differences in competition is more inter-branches than inter-cities.

Figure 6 shows the distribution of the perception of competition from both formal sector (Panel 6a) and informal sector (Panel 6b) as indicated by the respondent. While the largest proportion of respondents find competition from the formal sector to be high<sup>4</sup>, most respondents reported facing a relatively low competition from the informal sector.

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<sup>4</sup>Perception of competition: v. low (very low); 1 low; 2 moderate; 3 high and 4 very high

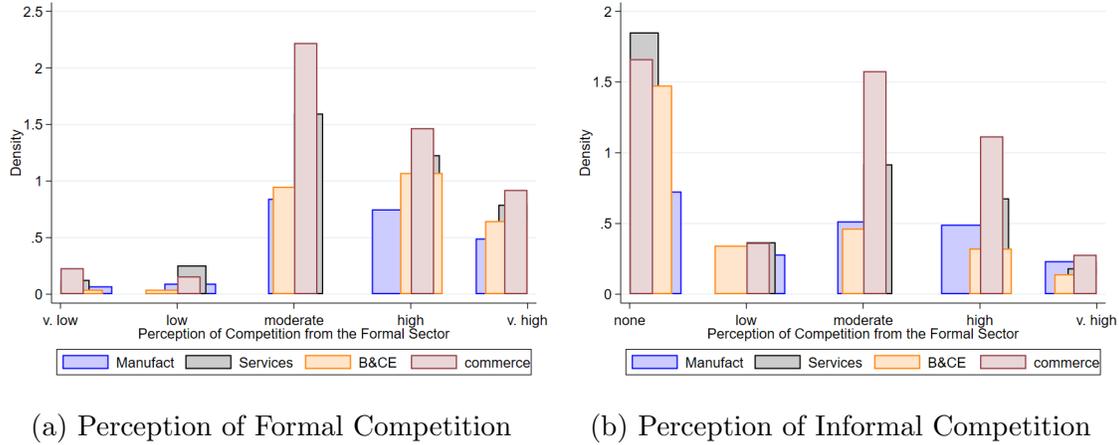


Figure 3: Perception of Competition

### III.IV *Context and Data*

SMEs in Burkina Faso are officially registered firms with less than 100 permanent workers and an annual turnover below a billion FCFA<sup>5</sup>. However, available studies generally define SMEs as firms for which the number of employees ranges between 5 and 99 in this context (Soubeiga and Strauss, 2013; Ayyagari, Demirguc-Kunt and Maksimovic, 2014). Though the lack of up to date data makes it difficult to be specific about figures, their contribution to employment is found to be important. For instance, Ayyagari, Demirguc-Kunt and Maksimovic (2014) reported that SMEs accounts for about 54% of formal private sector employment in Burkina Faso<sup>6</sup>. Most recently, World Bank (2017) showed that large firm accounts for about a third of total employment in the sector<sup>7</sup>.

<sup>5</sup>This is according to a 2017 law (MCIA, MATD and MINFID, 2017). In previous time, African Development Bank and Organisation for Economic Co-operation and Development (2005) reported that SMEs used to be considered as officially registered firms with five to ten employees or less 500 million FCFA. It is then likely that the characteristics of the sampled firms are not better described by dispositions of the current law.

<sup>6</sup>This study considers on the share of the bulk employment of these two types of the sampled enterprises

<sup>7</sup>[www.worldbank.org](http://www.worldbank.org)

According to the Ministry of Industry, Trade and Handicrafts (MICA) the largest share of enterprises of all types is located in the two main cities of the country which are Ouagadougou and Bobo-Dioulasso. These two cities account for about almost 85% of officially registered firms, with Ouagadougou accounting for up to 70% of the them<sup>8</sup>. Based on this, we purposively select these two cities to conduct the survey. The survey was conducted on 849 SMEs of which 649 were in Ouaga and 200 in Bobo. The sampling frame was based on information and listing of the SMEs dataset of the Chamber of Commerce and Industry from 2014<sup>9</sup>. SMEs express across a range of economic activities with a large share of them intervening in trade and service activities which we considered as a criterion for sub-stratification. According to the classification of MICA, SMEs are distributed across activities as follow: Manufacturing (13.5%), Services (27%), Commerce (54%) and others, and Handicrafts (5.6%). Based on this classification, further sub-strata are constructed around Manufacturing, Services, Building and Civil Engineering (B&CE) and Commerce. The distribution of the sample over industry branches is presented in Table 10.

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<sup>8</sup>The distribution at the national level is 73.3% in Ouagadougou and 11.25% in Bobo-Dioulasso in 2013

<sup>9</sup>Our definition of SMEs is based on the definition of MICA. SMEs in this study are therefore firm registered as SMEs.

Table 1: Distribution of the Sample

Strata	SMEs	Proportion
Manufacturing	103	12.13
Services	217	25.56
B&CE	150	17.67
Commerce and Others	379	44.64
Total	849	100

After defining the distribution of the sample per strata, SMEs are randomly selected based on the listing information obtained. Before the field implementation of the interviews, particular care is undertaken to address potential low response. First, though there is no precise information on firm survival rate, it is likely non zero. For instance, from the listing, about 68% of manufacturing firms have less than 10 years of existence while over 99% cumulate less than 20 years of existence. Second, contacts are not continuously updated and locations are not always precise so that some firms may not be always reachable. Instructions are then given to interviewers to look for a replacement firm<sup>10</sup>.

The questionnaire uses recall to collect the information over 2012 and 2017. Although firms generally record information on most operation such as production, costs and finance, some management practices may not be documented over time. For instance, one question is about *actions that were undertaken when a problem occurs*. To limit the recall bias, we proceeded as Lemos et al. (2016) by making reference, when necessary, to the public revolt of 2014

<sup>10</sup>Each interviewer was assigned a list of 20 selected SMEs and and a list of 20 replacement SMEs also selected randomly

which lead to a change in the political regime.

During the data cleaning, we have decided to drop questionnaires without enough information to compute our key variables of interests; in particular the management score and the competition index. This includes firms where the manager was recently employed and could not be specific about the management practices over previous years. But we investigated evidence for selection bias. First, we compared the distributions of both samples (initial and final) and the proportions of sub-strata in the final sample (Table 11) appear to be quite similar.

Table 2: Final Sample

Industry	SMEs	Proportion
Manufacturing	82	12.58
Services	179	27.45
B&CE	108	16.56
Commerce & Others	283	43.4
Total	652	100

Second, we run a probit estimation to investigate whether firms' characteristics influence their participation in the final sample (Table A.1). The results showed no evidence for systematic bias as there is no significant correlation at the 10% level between sample response and any

firm characteristics (including respondent / interviewer and industry – specifics).

## IV RESULTS AND DISCUSSIONS

### IV.I *Descriptive Statistics*

Table 12 displays summary statistics of key variables. Summary statistics are computed for the pooled sample. The average management score is 0.39 while competition index averages to 0.24. This suggests that SMEs do operate in a relatively low competitive environment with relatively low management quality. Firm performances are positive and relatively high on average although with very high standard deviation. This reflects the distribution of our sample which is based on annual turnover rate. Indeed, by defining SMEs over a range of turnover rate, it is likely that significations variation from the mean may be observed.

The average firm age is around 10 years (9.55), close to that reported by MICA, suggesting that our sampling process was good. Table 12 also shows that the average experience of respondents with firms (9.10) is closed to the average years of firm, suggesting that respondents were workers with good knowledge of the firms. Non-managers have about 8 years of schooling which barely cumulates to the second year of junior high school and each manager has on average about 4 employees in charge. For this sample, about 22% introduced some new products (or improved ones) in their main market within the last 5 years while less than 10% exported some part of the product. Contrary the often emphasized issue of access to credit, proportion of loan contracting is up to 43%. In line with our argument that most

Table 3: Summary Statistics

Variables	Mean	SD
Management Scores	0.39	0.14
Competition	0.24	0.20
Number of Competitors	70.10	45.12
Annual Turnover	368.28	1705.64
Full time Employees	14.13	54.31
Profit	268.88	1505.20
Firm Age	9.56	8.62
Experience of Responent	8.90	5.81
Non-managers Education	7.93	3.76
Employees per Manager	4.25	7.81
Manager is hired (1=yes)	0.09	0.29
Obtained a Loan (1=yes)	0.42	0.49
Export dummy (1=yes)	0.10	0.30
Innovation dummy (1=yes)	0.22	0.42
Observations	1224	

SMEs are run by their founders, our sample indicates that just 10% of SMEs are run by hired managers out of the family of the founder.

For comparison, we also ran a *t-test* of the variation of key variables over time and across firm location (Table 13). While the results suggest some improvement in management scores, except incentives, no significant change in competition index is found between 2012 and 2017. However, there was a significant increase in the number of competitors in Ouagadougou. Only the monitoring scores appear to be relatively higher in Ouaga than in Bobo-Dioulasso, on average. All other differences between the two locations are not significant.

Table 4: Variation over Time and across Location

Variables	2012-2017	t-stat	Bobo-Ouaga	t-stat
Management Scores	-0.02**	(-2.85)	-0.01	(-0.99)
Monitoring Scores	-0.04**	(-2.87)	-0.03*	(-2.15)
Targeting Scores	-0.03**	(-3.06)	-0.00	(-0.07)
Incentives Scores	-0.01	(-1.02)	0.00	(0.11)
Competition	0.01	(1.14)	-0.02	(-1.68)
Number of Competitors	-12.09***	(-4.73)	-0.32	(-0.11)
Annual Turnover	-123.77	(-1.27)	-249.26*	(-2.28)
Profit	-97.97	(-1.14)	-184.47	(-1.91)
Observations	1224		1224	

## IV.II *Competition and Management Scores*

Table 14 presents results of a simple version of specification (4). Each regression contains only a constant and a measure of competition as independent variable. In the first column, competition is an index  $(1 - L_{it})$ . The second and third columns are perceptions of competition respectively from the formal and the informal sector by respondents. In the last column, competition is measured by the number of competing firms the manager could identify.

Table 5: Competition and Management Scores: Simple Version

	MPS	MPS	MPS	MPS
Competition	-0.008			
	(-0.511)			
Formal Competition		0.018***		
		(4.697)		
Informal Competition			0.022***	
			(4.121)	
Number of Competitors				0.039***
				(5.961)
Observations	1224	1224	1224	1171
Number of Firms	625	625	625	600
R-Squared	0.00	0.08	0.06	0.12
F-Statistic	0.26	22.06	16.98	35.54

*Notes:* \*\*\* indicates significance at the 1% level; \*\* significance at 5%, \* significance at 10%. Standard errors are clustered at the firm level. Competition is measured based on the Lerner Index. Formal Competition is the perception of the intensity of competition from the formal by the respondent sector ranging from *very low* to *very high*. Informal competition is the perception of the intensity of competition from the informal sector ranging from *none* to *very high*. Finally, Number of competitors (in log) is the number of competing firms the respondent could identify.

For all regressions we have controlled for unobserved firm fixed-effects and standard errors are robust to any arbitrary heteroskedasticity. Because competition is measured at the firm level, robust standard errors are appropriately calculated at the firm level. Table 14 show that management scores are improving with competition. The coefficient estimates are

significant in all except column (1).

Table 6: Competition and Management Scores

	MPS	MPS	MPS	MPS
Competition	0.033** (2.469)			
Formal Competition		0.009** (2.263)		
Informal Competition			0.013** (2.310)	
Number of Competitors				0.024*** (3.073)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.19	0.20	0.20	0.21
F-Statistic	16.14	16.69	16.21	15.99

*Notes:* \*\*\* indicates significance at the 1% level; \*\* significance at 5%, \* significance at 10%. Standard errors are clustered at the firm level. Each column represents a separate regression. Each regression also includes the basic firm level controls. The basic controls include the age of the firm, the education of non-managers, the ratio of employees to managers. We also included interaction between the number of full-time employees and the sector of activity to account for the fact management may efforts may vary across industry branches and firm size. In other regressions (available on request from the authors, we have included interaction between competition and industry branches or interactions with 10 recoded sub-industry branches and found no better outcomes.

Results for specification (4) which includes firm characteristics show the same general pattern of effects (Table 15). Coefficient estimates are positive and significant for all measures of competition, although the coefficient estimates of the subjective measurements are smaller than observed in Table 14. The effect is larger for the measure of competition using the Lerner Index (column 1). In particular, a one standard deviation increase in competition leads to an increase of management score by 0.033 of a standard deviation. The effect of a marginal increase in the number of competing firms on management quality (column 4) is about 0.024 of a standard deviation. The effect of an increase of competition from the informal sector is higher than the effect of an increase of competition from the formal sector. A reason may be that a large number of firms of similar size still operate informally. In this case for instance, firms will still face effect from exogenous changes in both sectors.

A plausible explanation of the larger estimate of associated with the index-based measurement of competition may relate to the problem of measurement errors in the subjective measurements. As indicated Bloom et al. (2015), the number of competitors may be too crude as measures of competition, biasing coefficient downside. Indeed, the number of competitors was not objectively measured and it is unlikely that managers have a good estimation of number of competing firms. This is so for the two other perception-based approximations.

These results are consistent with our theoretical framework and with previous findings in the literature. For instance, Bloom et al. (2015) found that a marginal increase in the number of competing hospitals in the United Kingdom is associated with an increase of management quality of 0.161 standard deviation. Our coefficient estimate associated competition

measured in terms of product substitutability is rather closer to the results of Karuna (2007) who found a coefficient of 0.033 among firms in the United States. It is worth noting that these studies are on developed countries with different economic environment.

To further investigate the effect of competition, we regressed each sub-component of management practices on these measures of competition. Table 16 shows the estimate coefficients associated with competition when we use the scores of target setting as dependent variable. The general tendency of positive effect is observed but the coefficient associated with the index-based measurement of competition is not significant. This suggests that though competition pushes managers to define (or improve the setting of the objectives of the firm) goals and make them known by workers.

Table 7: Competition and Targeting Scores

	Targeting	Targeting	Targeting	Targeting
Competition	0.015 (0.49)			
Formal Competition		0.012* (1.84)		
Informal Competition			0.020* (1.89)	
Number of Competitors				0.036** (2.49)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.12	0.12	0.13	0.13
F-Statistic	10.36	10.58	10.52	10.40

*Notes:* \*\*\* indicates significance at the 1% level; \*\* significance at 5%, \* significance at 10%. Standard errors are clustered at the firm level. Each column represents a separate regression. Each regression also includes the basic firm level controls indicated in Table 15.

Competition rather has higher effect on monitoring efforts (Table 17). Estimate coefficients associated with competition are positive, significant and larger in all but in column (4) as compared to Table 16. Managers invest more in monitoring activities as competition increases to avoid or reduce the burden of production blockage. Indeed, a firm may lose customers in the wake of break down in the production system which could persist over some time. The benefit of increasing monitoring is identifying and solving problems more quickly

or anticipating them. This is also consistent with the efficiency goal of better managerial practices. In particular, an increase in competition index by a standard deviation leads to an increase of monitoring score by 0.071 of a standard deviation while a marginal increase in the number of competing firms rise monitoring scores of about 0.032 of a standard deviation.

Table 8: Competition and Monitoring Scores

	Monitoring	Monitoring	Monitoring	Monitoring
Competition	0.071*** (3.054)			
Formal Competition		0.014*** (2.973)		
Informal Competition			0.029*** (3.986)	
Number of Competitors				0.032*** (2.693)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.19	0.20	0.22	0.20
F-Statistic	16.03	16.02	17.49	15.09

*Notes:* \*\*\* indicates significance at the 1% level; \*\* significance at 5%, \* significance at 10%. Standard errors are clustered at the firm level. Each column represents a separate regression. Each regression also includes the basic firm level controls indicated in Table 15.

Finally, we test whether increased competition leads to better incentive efforts. Although

positives as expected, the estimate coefficients of competition are significant only in the fourth columns of Table 18 and is smaller than the estimate coefficients associated with monitoring and targeting. The intuition is that managers may have incentives to encourage employees that achieve targeted goals with supplementary pay-offs. The evidence is not that strong and this may be explained by the cost associated with incentives which may make managers more reluctant to invest in such managerial activities.

Table 9: Competition and Incentives Scores

	Incentives	Incentives	Incentives	Incentives
Competition	0.016			
	(1.17)			
Formal Competition		0.005		
		(0.94)		
Informal Competition			0.000	
			(0.01)	
Number of Competitors				0.015*
				(1.74)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.04	0.04	0.04	0.05
F-Statistic	3.47	3.80	3.59	3.54

*Notes:* \*\*\* indicates significance at the 1% level; \*\* significance at 5%, \* significance at 10%. Standard errors are clustered at the firm level. Each column represents a separate regression. Each regression also includes the basic firm level controls indicated in Table 15.

This general pattern of the effect of competition is consistent with the prediction of our model and in line with previous empirical literature. Our theoretical model predicts the empirical relationship between management efforts and competition as the net outcome of two opposite effects. This positive effect therefore suggests that firms improve management practices to protect (or gain) their market shares. The highest of competition on monitoring activities is also consistent with the argument of increasing marginal cost of managerial efforts and the input efficiency goal of better management. For defining target generally does not involve substantial cost such managers may improve such activities more easily. On the other, incentive' schemes are expensive are less attractive to managers. Therefore, in the face of tougher competition, manager would invest more in monitoring activities improve cost efficiency.

## V CONCLUSION

Research on the empirical relationship between competition and management practices is a small but emerging area of study. Drawing from agency theory and strategic interactions between firms, this relationship has mostly been presented as ambiguous in theory. At the time, testing it empirically has been challenged by the lack of robust quantitative data. The primary objective of this research was to explore the relationship between product market competition and the quality of management practices among SMEs in developing countries. Our contention was that the settings of the existing models are less adequate to generate the behavior of managers of SMEs in developing countries, which are mostly run by their founders rather than hired managers.

We then developed a theoretical framework to show whether competition drives improvement of management practices when managers are not hired but rather owners or shareholders of their firms. Our model also predicts the effect of competition as a net outcome of two effects. The first channel is the decline in mark-ups which reduces the incentives to undertake higher managerial efforts. The second is the loss of market demand which provides stronger incentives to improve management quality. The relationship between management practices and competition is then more an empirical issue.

To investigate the empirical relationship between competition and management quality we use recall to build a two-point data in the specific context of Burkina Faso. We measure management quality with the Management and Organizational Practices Survey (MOPS) of the U.S Census Bureau, and found increased competition to be associated with increased management scores. Breaking it down to sub-indicators, we found that competition has highest effect on monitoring scores. Our results suggest that firms are improving management quality to protect (or gain) their market shares. Promoting fair competition among SMEs would then improve performances of SMEs through its effect on management quality. Beyond the positive effect on SMEs' growth, public decision-makers should also see the potential benefit on consumers' welfare which generally tends to rise with competition; *ceteris paribus*.

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# I Tables

Table 10: Distribution of the Sample

Strata	SMEs	Proportion
Manufacturing	103	12.13
Services	217	25.56
B&CE	150	17.67
Commerce and Others	379	44.64
Total	849	100

Table 11: Final Sample

Industry	SMEs	Proportion
Manufacturing	82	12.58
Services	179	27.45
B&CE	108	16.56
Commerce & Others	283	43.4
Total	652	100

Table 12: Summary Statistics

Variables	Mean	SD
Management Scores	0.39	0.14
Competition	0.24	0.20
Number of Competitors	70.10	45.12
Annual Turnover	368.28	1705.64
Full time Employees	14.13	54.31
Profit	268.88	1505.20
Firm Age	9.56	8.62
Experience of Responent	8.90	5.81
Non-managers Education	7.93	3.76
Employees per Manager	4.25	7.81
Manager is hired (1=yes)	0.09	0.29
Obtained a Loan (1=yes)	0.42	0.49
Export dummy (1=yes)	0.10	0.30
Innovation dummy (1=yes)	0.22	0.42
Observations	1224	

Table 13: Variation over Time and across Location

Variables	2012-2017	t-stat	Bobo-Ouaga	t-stat
Management Scores	-0.02**	(-2.85)	-0.01	(-0.99)
Monitoring Scores	-0.04**	(-2.87)	-0.03*	(-2.15)
Targeting Scores	-0.03**	(-3.06)	-0.00	(-0.07)
Incentives Scores	-0.01	(-1.02)	0.00	(0.11)
Competition	0.01	(1.14)	-0.02	(-1.68)
Number of Competitors	-12.09***	(-4.73)	-0.32	(-0.11)
Annual Turnover	-123.77	(-1.27)	-249.26*	(-2.28)
Profit	-97.97	(-1.14)	-184.47	(-1.91)
Observations	1224		1224	

Table 14: Competition and Management Scores: Simple Version

	MPS	MPS	MPS	MPS
Competition	-0.008			
	(-0.511)			
Formal Competition		0.018***		
		(4.697)		
Informal Competition			0.022***	
			(4.121)	
Number of Competitors				0.039***
				(5.961)
Observations	1224	1224	1224	1171
Number of Firms	625	625	625	600
R-Squared	0.00	0.08	0.06	0.12
F-Statistic	0.26	22.06	16.98	35.54

*Notes:* \*\*\* indicates significance at the 1% level; \*\* significance at 5%, \* significance at 10%. Standard errors are clustered at the firm level. Competition is measured based on the Lerner Index. Formal Competition is the perception of the intensity of competition from the formal by the respondent sector ranging from *very low* to *very high*. Informal competition is the perception of the intensity of competition from the informal sector ranging from *none* to *very high*. Finally, Number of competitors (in log) is the number of competing firms the respondent could identify.

Table 15: Competition and Management Scores

	MPS	MPS	MPS	MPS
Competition	0.033** (2.469)			
Formal Competition		0.009** (2.263)		
Informal Competition			0.013** (2.310)	
Number of Competitors				0.024*** (3.073)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.19	0.20	0.20	0.21
F-Statistic	16.14	16.69	16.21	15.99

*Notes:* \*\*\* indicates significance at the 1% level; \*\* significance at 5%, \* significance at 10%. Standard errors are clustered at the firm level. Each column represents a separate regression. Each regression also includes the basic firm level controls. The basic controls include the age of the firm, the education of non-managers, the ratio of employees to managers. We also included interaction between the number of full-time employees and the sector of activity to account for the fact management may efforts may vary across industry branches and firm size. In other regressions (available on request from the authors, we have included interaction between competition and industry branches or interactions with 10 recoded sub-industry branches and found no better outcomes.

Table 16: Competition and Targeting Scores

	Targeting	Targeting	Targeting	Targeting
Competition	0.015			
	(0.49)			
Formal Competition		0.012*		
		(1.84)		
Informal Competition			0.020*	
			(1.89)	
Number of Competitors				0.036**
				(2.49)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.12	0.12	0.13	0.13
F-Statistic	10.36	10.58	10.52	10.40

*Notes:* \*\*\* indicates significance at the 1% level; \*\* significance at 5%, \* significance at 10%. Standard errors are clustered at the firm level. Each column represents a separate regression. Each regression also includes the basic firm level controls indicated in Table 15.

Table 17: Competition and Monitoring Scores

	Monitoring	Monitoring	Monitoring	Monitoring
Competition	0.071*** (3.054)			
Formal Competition		0.014*** (2.973)		
Informal Competition			0.029*** (3.986)	
Number of Competitors				0.032*** (2.693)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.19	0.20	0.22	0.20
F-Statistic	16.03	16.02	17.49	15.09

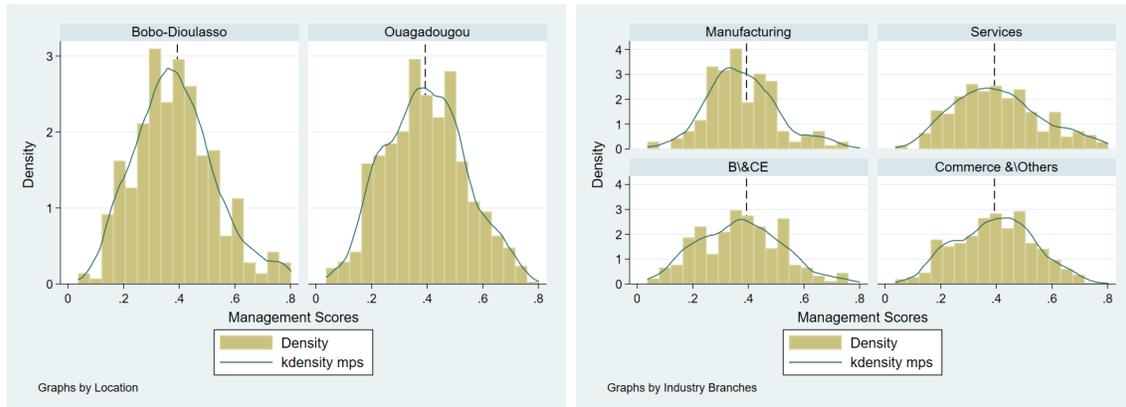
*Notes:* \*\*\* indicates significance at the 1% level; \*\* significance at 5%, \* significance at 10%. Standard errors are clustered at the firm level. Each column represents a separate regression. Each regression also includes the basic firm level controls indicated in Table 15.

Table 18: Competition and Incentives Scores

	Incentives	Incentives	Incentives	Incentives
Competition	0.016 (1.17)			
Formal Competition		0.005 (0.94)		
Informal Competition			0.000 (0.01)	
Number of Competitors				0.015* (1.74)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.04	0.04	0.04	0.05
F-Statistic	3.47	3.80	3.59	3.54

*Notes:* \*\*\* indicates significance at the 1% level; \*\* significance at 5%, \* significance at 10%. Standard errors are clustered at the firm level. Each column represents a separate regression. Each regression also includes the basic firm level controls indicated in Table 15.

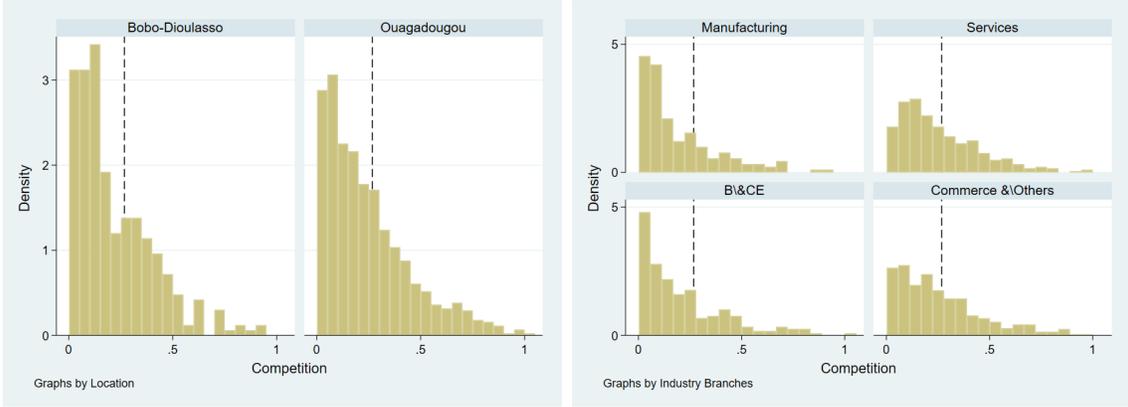
## II Figure



(a) Distribution of Management Scores per Firm Location.

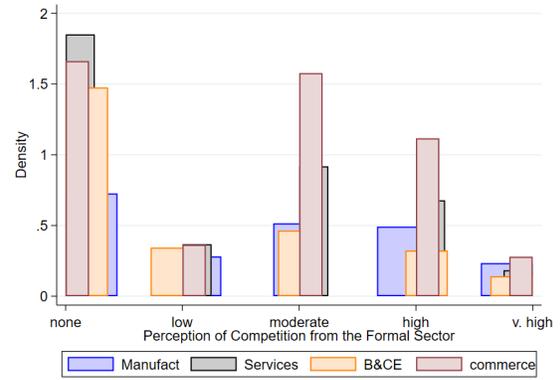
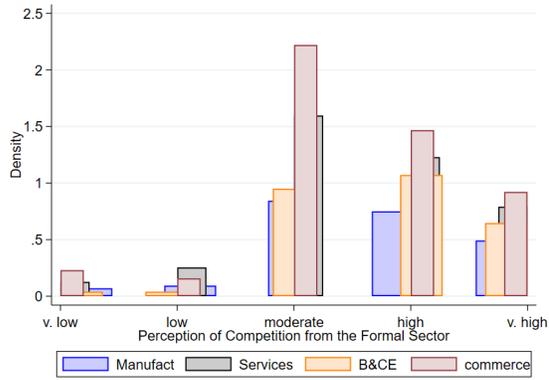
(b) Distribution of Management Scores per Industry Branch

Figure 4: Distribution of Management Scores



(a) Distribution of competition per City (b) Distribution of Competition per Industry

Figure 5: Distribution of Competition Index



(a) Perception of Formal Competition

(b) Perception of Informal Competition

Figure 6: Perception of Competition

## A Testing for selection bias

During the survey 849 SMEs distributed across four industry branches (Manufacturing, Services, Building and Civil Engineering and Commerce) were interviewed. All questionnaires were not enough filled to enable computing our key variables of interest. In most cases, respondent started working in the firms and could not be specific about some managerial practices back to 2012. Only in few case, we had some missing information about production and financial information and those were already cases with missing information on management practices. To test whether we face a sample selection problem, we defined a dichotomous variable taking 1 if an interview has sufficient information to be included in the final sample and 0 otherwise. We ran a probit regression of the likelihood of participating in the final sample. The results presented in Table A.1 showed no evidence of systematic bias in responses.

Table A.1: Test for Selection Bias

Variables	Coefficients
Year Dummy (2017==1)	-0.01 (-0.20)
Firm Location (Ouaga==1)	-0.03 (-0.07)
Juridical Status	-0.28 (-1.18)
> 50% owned by Founder (1==yes)	-0.33 (-0.89)
Appointement of CEO	-0.39* (-1.96)
Gender of the CEO	0.80 (1.27)
gender of the respondant	-0.05 (-0.11)
Age of the Respondent	0.01 (0.13)
Number of Visits	0.05 (0.68)
Industry Branch	0.15 (1.00)
Observations	1346
Number of Firms	675
Log-Likelihood	-178.91

*Notes:* These results are probit regression of the likelihood of participating in the final sample. The dependent variable is dichotomous taking 1 if the interview contains enough information to be included in the empirical analysis and 0 otherwise.

\*\*\* indicates significance at 1% level; \*\* significance at 5%, \* for significance at 10%.

## B Extended Regression Tables

### B.I The Effect of Competition on Management Scores

Table B.2: Competition and Management Scores: Full estimation

Variables	MPS	MPS	MPS	MPS
Competition	0.033** (2.47)			
Formal Competition		0.009** (2.26)		
Informal Competition			0.013** (2.31)	
Number of Competitors				0.024*** (3.07)
Firm Age	0.004*** (9.55)	0.004*** (8.60)	0.004*** (9.43)	0.003*** (5.97)
Non-managers Education	0.001 (0.71)	0.001 (0.76)	0.001 (0.67)	0.001 (0.72)
Manufacturing $\times$ Full time Employees	0.001** (2.20)	0.001* (1.88)	0.001 (1.45)	0.001* (1.95)
Services $\times$ Full time Employees	0.000 (0.60)	0.000 (0.89)	0.000 (0.94)	0.000 (0.73)
B&CE $\times$ Full time Employees	0.001** (2.23)	0.001* (1.75)	0.001* (1.87)	0.001** (2.15)
Commerce &Others $\times$ Full time Employees	0.000 (0.54)	0.000 (0.33)	0.000 (0.34)	0.000 (0.73)
Constant	0.329*** (29.77)	0.320*** (22.99)	0.325*** (26.78)	0.253*** (8.14)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.19	0.20	0.20	0.21
F-Statistic	16.14	16.69	16.21	15.99

*Notes:* These results are the extended version of Table 15. Firm characteristics that affect management scores are firm age and the number of full time employee. \*\*\* indicates significance at 1% level; \*\* significance at 5%, \* for significance at 10%. Standard errors are clustered at the firm level.

## B.II The Effect of Competition on Targeting Scores

Table B.3: Competition and Targeting

Variables	Targeting	Targeting	Targeting	Targeting
Competition	0.015 (0.49)			
Formal Competition		0.012* (1.84)		
Informal Competition			0.020* (1.89)	
Number of Competitors				0.036** (2.49)
Firm Age	0.006*** (7.00)	0.005*** (5.63)	0.006*** (6.65)	0.004*** (4.16)
Non-managers Education	-0.001 (-0.36)	-0.001 (-0.38)	-0.001 (-0.43)	-0.001 (-0.39)
Manufacturing $\times$ Full time Employees	0.002** (2.47)	0.002** (2.16)	0.002* (1.73)	0.002** (2.25)
Services $\times$ Full time Employees	0.001 (0.82)	0.001 (0.89)	0.001 (0.91)	0.001 (0.72)
B&CE $\times$ Full time Employees	0.000 (0.32)	0.000 (0.00)	0.000 (0.11)	0.000 (0.69)
Commerce &Others $\times$ Full time Employees	0.000 (0.55)	0.000 (0.42)	0.000 (0.43)	0.000 (0.31)
Constant	0.572*** (24.61)	0.553*** (21.52)	0.557*** (21.70)	0.454*** (7.82)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.12	0.12	0.13	0.13
F-Statistic	10.36	10.58	10.52	10.40

Notes: \*\*\* indicates significance at 1% level; \*\* significance at 5%, \* for significance at 10%. Standard errors are clustered at the firm level. Firm age has significant effect on targeting scores in all regressions.

### B.III The Effect of Competition on Monitoring Scores

Table B.4: Competition and Monitoring

Variables	Monitoring	Monitoring	Monitoring	Monitoring
Competition	0.071*** (3.05)			
Formal Competition		0.014*** (2.97)		
Informal Competition			0.029*** (3.99)	
Number of Competitors				0.032*** (2.69)
Firm Age	0.007*** (10.25)	0.005*** (8.76)	0.006*** (9.28)	0.005*** (5.84)
Non-managers Education	0.001 (0.52)	0.001 (0.59)	0.001 (0.47)	0.001 (0.70)
Manufacturing $\times$ Full time Employees	0.001 (1.03)	0.000 (0.68)	-0.000 (-0.40)	0.000 (0.80)
Services $\times$ Full time Employees	0.000 (0.14)	0.000 (0.51)	0.000 (0.63)	0.000 (0.34)
B&CE $\times$ Full time Employees	0.002* (1.95)	0.002 (1.63)	0.002 (1.64)	0.002* (1.82)
Commerce &Others $\times$ Full time Employees	0.001 (1.06)	0.001 (0.88)	0.001 (0.81)	0.001 (0.98)
Constant	0.297*** (16.62)	0.289*** (13.54)	0.288*** (15.79)	0.202*** (4.16)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.19	0.20	0.22	0.20
F-Statistic	16.03	16.02	17.49	15.09

Notes: \*\*\* indicates significance at 1% level; \*\* significance at 5%, \* for significance at 10%. Standard errors are clustered at the firm level. Firm characteristics that affect managemet scores are firm age and the number of full time employee.

## B.IV The Effect of Competition on Incentive Scores

Table B.5: Competition and Incentives

Variables	Incentives	Incentives	Incentives	Incentives
Competition	0.016 (1.17)			
Formal Competition		0.005 (0.94)		
Informal Competition			0.000 (0.01)	
Number of Competitors				0.015* (1.74)
Firm Age	0.002*** (3.57)	0.002*** (3.49)	0.002*** (3.87)	0.001** (2.17)
Non-managers Education	0.001 (0.78)	0.001 (0.80)	0.002 (0.81)	0.001 (0.67)
Manufacturing $\times$ Full time Employees	0.001* (1.82)	0.001* (1.67)	0.001* (1.77)	0.001* (1.70)
Services $\times$ Full time Employees	0.000 (0.40)	0.000 (0.69)	0.000 (0.64)	0.000 (0.97)
B&CE $\times$ Full time Employees	0.000 (1.58)	0.000 (1.21)	0.000 (1.42)	0.000 (1.49)
Commerce &Others $\times$ Full time Employees	-0.000 (-0.69)	-0.000 (-0.80)	-0.000 (-0.68)	-0.000 (-0.30)
Constant	0.258*** (16.63)	0.252*** (12.76)	0.262*** (16.02)	0.209*** (5.63)
Observations	1128	1128	1128	1086
Number of Firms	582	582	582	562
R-Squared	0.04	0.04	0.04	0.05
F-Statistic	3.47	3.80	3.59	3.54

Notes: \*\*\* indicates significance at 1% level; \*\* significance at 5%, \* for significance at 10%. Standard errors are clustered at the firm level. Firm age has significant effect on incentive scores