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This research was partly or entirely supported by funding from the research initiative Private Enterprise Development in Low-Income Countries (PEDL), a Foreign, Commonwealth & Development Office (FCDO) funded programme run by the Centre for Economic Policy Research (CEPR).

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To cite this article: Soumaïla Gansonré & Sugrinoma Aristide Ouédraogo (2022): Product market competition and management quality among small and medium-sized enterprises: Evidence from Burkina Faso, *International Journal of the Economics of Business*, DOI: [10.1080/13571516.2022.2088987](https://doi.org/10.1080/13571516.2022.2088987)

To link to this article: <https://doi.org/10.1080/13571516.2022.2088987>



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Published online: 27 Jun 2022.



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Product market competition and management quality among small and medium-sized enterprises: Evidence from Burkina Faso

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ABSTRACT

We examine how management quality is related to product market competition when firms are managed 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 Small and Medium-sized Enterprises from Burkina Faso, we measure management quality, building on the Management and Organizational Practices Survey, and find suggestive evidence that management quality increases with competition. Although the results are robust across a range of measures of competition and sub-indicators of management quality, no significant association is observed in larger firms.

KEYWORDS

Product market competition; management quality; SMEs; developing countries; Burkina Faso

JEL CODES

L22; D21

1. Introduction

Small and Medium-sized Enterprises (SMEs)¹ 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 (GDP) 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, according to Ayyagari, Demirguc-Kunt, and Maksimovic

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 Supplemental data for this article is available online at <https://doi.org/10.1080/13571516.2022.2088987>.

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(2014), 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, empirical evidence about factors that can sustainably raise their performances is critical for policymakers. Despite, there is scant of research and data, particularly in developing countries to inform policies aiming at fostering growth of SMEs. The recent emphasis on the role of management quality on firm performances in the literature on 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 push firms to improve management practices.

Bloom and Van Reenen (2007) found that personal characteristics of managers matter in the level of observed managerial efforts as poor management is more prevalent in family-owned and family-managed firms when the manager is chosen by primogeniture². Other factors related to market frictions are also often emphasized. For instance, learning effects may be limited by informational constraints which make best practices diffuse 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 relationship between 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 support the idea that there is more than one channel through which competition affects managerial incentives (Raith 2003; Cho 2004; Baggs and De Bettignies 2007; Golan *et al.* 2011), there is still debate on the predictable effect of competition. This thread of the 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 (owners of firm or shareholders) to managers (hired). Such frameworks reflect less the organizational structure of SMEs in most developing countries. Most SMEs in developing countries are run by their founders or their heirs. In our specific context, about 90% of the surveyed SMEs are run by their founders or a family member.

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 is profit maximizing (Bloom, Sadun, and Van Reenen 2017). We show that, in theory, 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 examine the empirical association of managerial efforts with product market competition. We examine whether 649 SMEs in Burkina Faso improve their management practices as product market competition increases. We consider both objective (inverse Lerner Index) and subjective (perception of respondents) measures of competition. Our empirical results show suggestive evidence that management quality increases with product market competition, consistently with the previous empirical literature.

Our study makes two main contributions. First, we contribute to the literature on quantitative measurement of management practices (Bloom and Van Reenen 2007; Bloom *et al.* 2012; Lemos *et al.* 2016; Buffington *et al.* 2017; Bloom, Sadun, and Van Reenen 2017). The existing literature emphasizes manufacturing firms in developed countries with little application to developing countries. This study applies the Management Practice Survey (MOPS) across a range of firms, including non-manufacturing, in Africa sub of the Sahara.

Second, we contribute to the literature on the drivers of managerial incentives, both in theory and empirically. Existing theoretical models are based on agency theory where owners of firms generally delegate managerial decisions to hired agents, or strategic interaction between firms (Schmidt 1997; Raith 2003; Cho 2004; Baggs and De Bettignies 2007; Golan *et al.* 2011; Beiner, Schmid, and Wanzenried 2011). We propose a framework to analyze managerial decisions of firms for which owners play the role of managers. For such managers, the level of managerial effort is chosen to maximize profit. Our model highlights that the relationship between product market competition and managerial effort cannot be predicted, emphasizing the need of empirical results. The empirical results of the study are consistent with the growing literature on the subject (Bloom and Van Reenen 2007; Karuna 2007; Bloom *et al.* 2012, 2015, 2019). They are also consistent with a small literature that presents competition as a driver of innovation (Aghion *et al.* 2005; Tang 2006; Hashmi 2013; Aghion *et al.* 2018; Mulkay 2019).

The remaining of the paper is organized as follows. [Section II](#) presents the theoretical framework and [section III](#) the empirical approach. In [section IV](#), we present details of the study area and the data collection strategy. Results are presented and discussed in [section V](#) and [section VI](#) concludes.

2. 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, determining optimal management efforts as a result of the equilibrium of a game between a principal (owner or shareholders of the firm) and an agent (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 manager's efforts are determined by the incentive scheme provided by the owner. However, with many respects,

this 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 their heirs (Burkart, Panunzi, and Shleifer 2003; Carsrud and Cucculelli 2014), making agency theory less adequate to analyze their managerial decisions. Indeed, when the manager is the owner of the firm, there is no more *hiring game* and therefore no issue associated with hidden information. This suggests that the optimal management effort is fully determined in a market game where the level of efforts is chosen based on information that are available to the manager. 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.

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:

$$\pi = py(e) - c(y(e), e) \quad (1)$$

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

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

As it is almost standard, we assume that the elasticity of firm-level demand with respect to managerial efforts (η_e^y) is increasing with competition (ψ), *i.e.* $\frac{\partial \eta_e^y}{\partial \psi} > 0$. 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 effect termed by Raith (2003). Also, price-cost margins decreases with competition, *i.e.* $\frac{\partial(p - c_y)}{\partial \psi} < 0$. 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 ψ 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, $\frac{\partial(p - c_y)}{\partial \psi}$ 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 decline in profit, then greater competition will be associated with stronger managerial incentives. The overall effect of competition on managerial efforts is therefore ambiguous; and this is not due to any agency costs or any presence of moral hazard. This implies that the ambiguous relationship between managerial incentives and competition is present without agency problem or hidden behavior. Therefore, it is difficult to predict what would be the empirical effect of increased competition on the managerial efforts of SMEs.

In the next section, we present the strategy to estimate the empirical effect of product market competition on the managerial efforts of SMEs.

3. Empirical framework

3.1. Econometric specification

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

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

where M_{it} denotes the management score of firm i in year t and $comp_{it}$ a measure of competition of firm i in year t . The vector of covariates X_{it} includes the age of the firm, the number of full time employees and the average education of non-manager workers. The model also includes firm fixed effects (ν_i) that absorb any time-constant unobservable factors, including initial conditions and persistent firm characteristics such as location. ε_{it} is a statistical error term.

The parameter α_1 is the estimated influence of competition on managerial efforts. Consistent estimation of α_1 may be challenged by the presence of unobservable factors affecting management decisions and are correlated with competition and other observable firm characteristics. As far as these unobservable factors are not varying over time, our fixed effect estimation addresses this issue. Unfortunately, fixed effect estimation does not address the risk of unobservable factors that are correlated with competition and management and vary over time. For example, one may be concerned that firms respond to increased competition by employing more talented managers. Indeed, as the spread of managerial innovations is slow like all other forms of technologies (Van Reenen 2011), transfers of best practices may occur by managers moving across firms as argues Lucas (1978). This is unlikely to be an important issue in this study as all firms which had the founder as the manager in 2012 also had the founder as manager in 2017. Furthermore, almost all family-managed firms (99.8%) in 2012 are also managed by family in 2017. In order to reduce the likelihood that the estimated parameter α_1 be confounded with the influence of other factors, we test the robustness of our findings to alternative specifications of equation (4), alternative measures of competition and sub-indicators of management practice scores.

3.2. 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 for example, 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 measure of management quality has emerged (Bloom and Van Reenen 2007; Buffington *et al.* 2017). In this study, we build on the Management and Organizational Practices Survey (MOPS) used by Lemos *et al.* (2016). Although the survey by Lemos *et al.* (2016) is similar to other surveys on managerial practices like by Bloom and Van Reenen (2007), it does not include questions on firm operations. This makes it applicable to a wide range of firms beyond manufacturing. This approach uses 16 questions to evaluate structured management practices: monitoring of activity, target setting for production and performance indicators, and incentives' scheme to achieve targets. Five questions concern monitoring aspects and aim to assess how firms collect and use information to monitor and improve production processes. Next, three questions concern the setting of targets. They assess the accuracy, the realism and the transparency of targets set by firms. Finally, eight questions cover the practice of bonus, promotion, reassignment and dismissal in the firms (see Section C.IV). Responses of each question are normalized to be on a scale of 0 and 1 and the results are aggregated into a single score. The structural management score is computed as the unweighted average of the scores of the 16 questions, with 0 representing the lowest quality of management and 1 the best.

Figure 1 shows the distribution of management scores. Panel (1a) shows the distribution management scores across all firms, Panel (1b) the distribution per firm location, Panel (1c) the distribution across industry and Panel (1d) across firm size. The distributions are relatively symmetrical around the sample mean (0.39) except for larger firms where an important share of firms are located below the sample mean.

3.3. 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 change less frequently. Their use as a measure 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 define competition using a proxy of the Lerner Index which is the ratio of the price-cost margin to price as presented in equation (5):

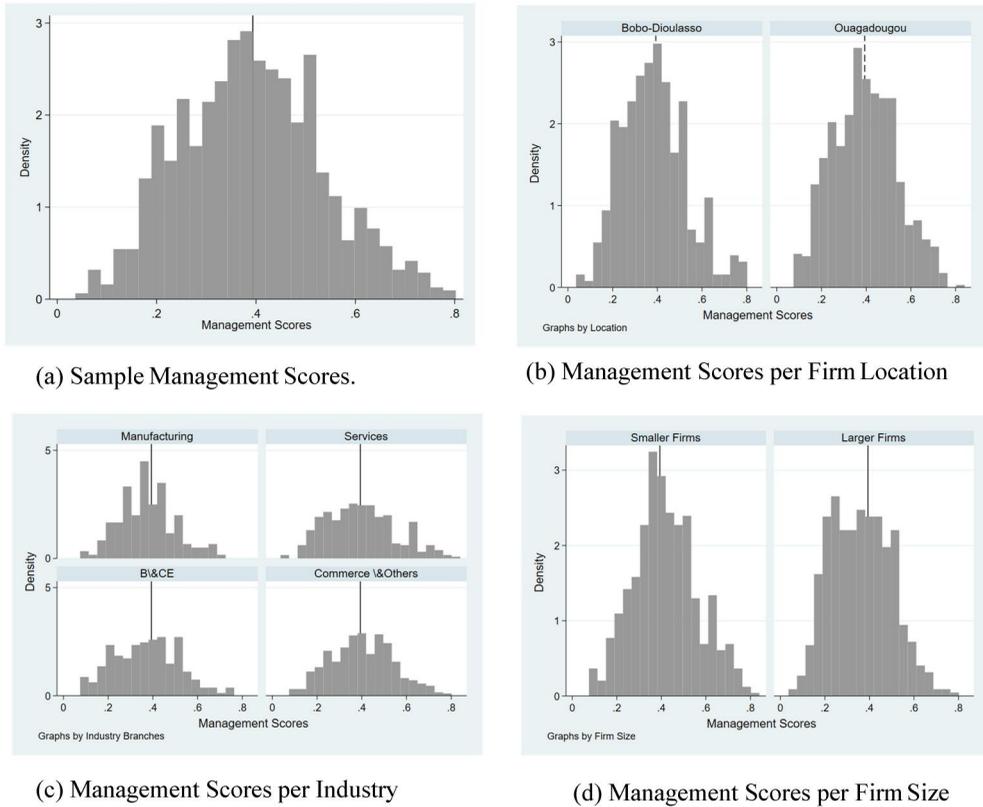


Figure 1 Distribution of management scores. (a) Sample management scores. (b) Management scores per firm location. (c) Management scores per industry branch. (d) Management scores per firm size.

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

In [equation \(5\)](#), L_{it} is the Lerner Index for firm i in year t , 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. From [equation \(5\)](#), higher price-cost margins may be associated with higher differentiation or a tendency toward a monopoly situation which enables firms to enjoy rents. On the other hand, a null value of the index reflects perfect competition. 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 in year t , the Lerner Index is computed as follows:

$$L_{it} = \frac{P_{it}Y_{it} - w_{it}L_{it} - rK_{it}}{P_{it}Y_{it}} \quad (6)$$

where w_{it} and r^3 are respectively the per unit cost of labor (L_{it}) and capital (K_{it}). Our measure of competition is obtained by subtracting this index from one.

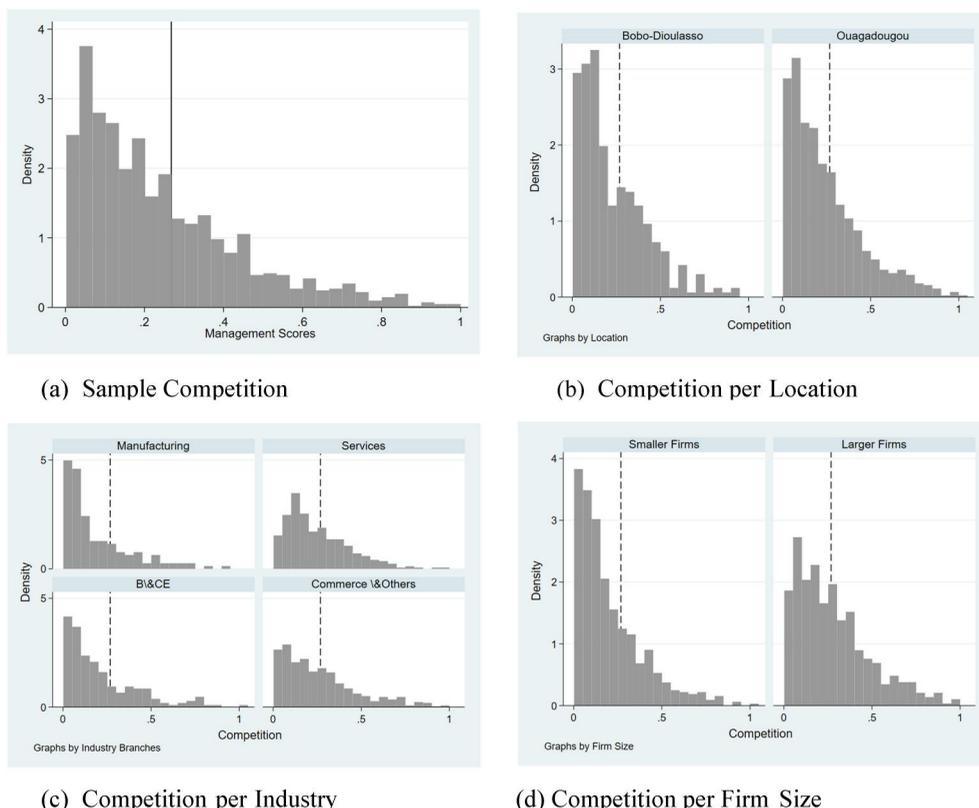
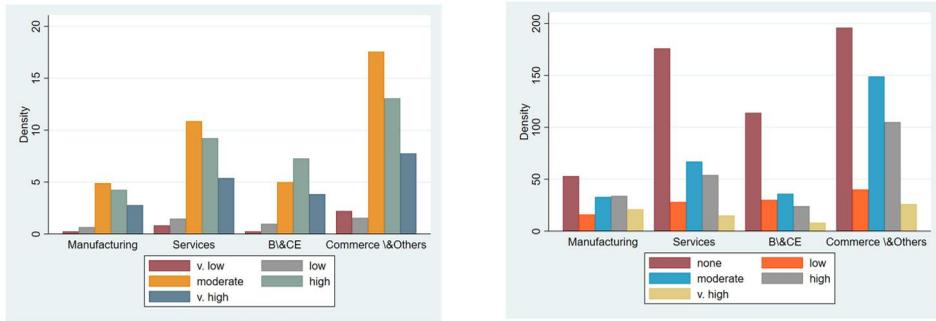


Figure 2. Distribution of competition. (a) Sample of competition. (b) Competition per firm location. (c) Competition per industry branch. (d) Competition per firm size.

Figure 2 shows the distribution of the inverse Lerner Index across the sample firms (Panel 2a), location (Panel 2b), industry branch (Panel 2c) and firm size (Panel 2d). There is substantial variation in competition which shows a longer right tail. Panel 2b shows that competition is similarly distributed across the two locations, *i.e.* firms located in Bobo-Dioulasso face similar level of competition as firms located in the capital city – Ouagadougou. Panel 2c shows some differences in competition across industry branches. Like the management scores, variations in competition are more inter-branches (and to a certain extent across firm size) than inter-cities.

In addition to the inverse Lerner Index, we consider three alternative measures of competition based on the respondents' assessment during the survey. One measure is the reported number of competing firms respondents could identify. Another is the perceived degree of the competition faced by firms. As this is concerned, 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 (0) to very high (5). We consider those approximations of competition to be less precise than the inverse Lerner Index and use them to probe the robustness of our results.

Figure 3 shows the distribution of the perception of competition from the formal sector (Panel 3a) and the informal sector (Panel 3b) as reported by respondents. While the largest proportion of respondents in all sectors find competition from the formal



(a) Perception of Competition from the Formal Sector (b) Perception of Competition from the Informal Sector

Figure 3. Perception of competition. (a) Perception of competition from the formal sector (b) Perception of competition from the informal sector.

sector to be moderate⁴, most of them do not see competition from the informal sector as a major challenge.

4. Context and data

4.1. Context

Most businesses across developing countries are family-owned firms and characterized by a prevalence of an ownership-management structure (Burkart, Panunzi, and Shleifer 2003; Carsrud and Cucculelli 2014). The predominance of family controlled firms is even met in the developed world (Burkart, Panunzi, and Shleifer 2003). A particularity of developing countries relates to the size of the informal sector and the distribution of firms across space and industry branches. Developing countries are also characterized by a relatively high dependence on the primary sector and are less diversified.

In Burkina Faso, agriculture continues to play a major role in employment and GDP – about 60% of total labor employment and about 30% of GDP. Although public investment remains important (more than one third of GDP), public monopolies are restricted to few economic activities such as imports of hydrocarbons, distribution of electricity, water utilities and the national lotteries (International Finance Corporation and IFC 2019). This is a result of a long process of liberalization rooting from the structural adjustment programs of the 1990s. With the Industrial Development Strategy adopted in 1998, the government aimed to promote competitive industries, especially SMEs, for a private sector-led economic development strategy to reduce poverty. However, private sector development continues to be hampered by poor economic infrastructure, scarcity and substantial cost of energy and financing, and the prevalence of high level of corruption. As a result, the private sector remains dominated by less productive informal firms which accounts for about 60% of non-agricultural employment (International Finance Corporation and IFC 2019). According the 7th industrial and commercial census, barely one in ten firms are formal. Most firms, both formal and informal, operate in the commerce and services which make the highest contribution to GDP (up to 50%).

Firms are mostly located in few cities – the capital and the second biggest city account for more than 85% of formally registered enterprises. Most firms tend to be small and controlled by their founders' families. According to International Finance Corporation and IFC (2019), the majority of SMEs have less than 10 employees and a turnover of less than 15 million FCFA (\approx 30 000 USD) and more 98% of firms are owned by nationals even though there is no restrictions on foreign ownership. Although trade regime is one of free competition, the private sector remains highly concentrated⁵ such that private competition remains a challenge. In order to harmonize national and regional regulation rules, Burkina Faso has adopted a new law on competition in 2017, increasing penalties applicable to transgressing violation of competition law. This aligns Burkina Faso's legislation to the regulations of the regional economic communities –the Economic Community of West African States (ECOWAS) and West African Economic and Monetary Union (WAEMU) it belongs to (World Trade Organization and WTO 2018). However, implementation has been slow and, overall, the enabling business is thus weak. As such Burkina Faso offers an interesting empirical setting to analyze the interrelations between market structure and managerial decisions by SMEs in developing countries.

4.2. Sampling

SMEs in Burkina Faso are officially registered firms with less than 100 permanent workers and an annual turnover below a billion FCFA (\approx 2 million USD)⁶. 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). Although 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 Faso⁷. Most recently, World Bank (2017; <https://www.jobsanddevelopment.org/wp-content/uploads/2019/03/BFA-JD-Firms-and-Jobs.pdf>) showed that large firm accounts for about a third of total employment in the sector⁸.

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 them⁹. 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 Ouagadougou and 200 in Bobo-Dioulasso. The sampling frame is based on information and listing of the SMEs dataset of the Chamber of Commerce and Industry from 2014¹⁰. SMEs express across a range of economic activities with a large share of them intervening in trade and service activities which we consider 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 and Others (54%), and Handicrafts (5.6%). Based on this classification, further sub-strata are constructed around Manufacturing, Services,

Table 1. Initial 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

Building and Civil Engineering (B&CE), and Commerce and others. The distribution of the sample over industry branches is presented in [Table 1](#).

After defining the distribution of the sample per strata, formally registered 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, although 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 such that some firms may not be always reachable. Instructions are then given to interviewers to look for a replacement firm. Each interviewer was assigned a list of 20 selected SMEs and a list of 20 replacement SMEs also selected randomly. Questionnaires were administrated on site through face-to-face interviews.

The questionnaire uses recall to collect the information over 2012 and 2017. Although firms generally record information on most operations 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 recall bias, we proceed as Lemos *et al.* (2016). In particular, we make reference, when necessary, to the public revolt of 2014 which led to a change in the political regime¹¹. The reliability of recall information is also documented by Bloom *et al.* (2019). For example, they found that the correlation between actual and recall management scores are similar to the correlation between management scores collected at the same time from two managers in the same plant.

During the data cleaning, we have decide 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 investigate evidence for selection bias. First, we compare the distributions of both samples (initial and final) and find the proportions of sub-strata in the final sample ([Table 2](#)) to be quite similar that in the initial sample.

Second, we run a probit estimation to investigate whether firms' characteristics affect their participation in the final sample ([Table A.1](#)). The results showed no

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

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).

5. Results and discussions

5.1. Descriptive statistics

Table 3 displays summary statistics of key variables. For the pooled sample, the average management score is 0.39 while competition index averages to 0.24. This suggests that SMEs 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 turnover, it is likely that we observe significant variations from the mean.

The average firm age is around 10 years (9.6), close to that reported by MICA, suggesting that our sampling process is good. Table 3 also shows that the average experience of respondents with firms (8.94) is closed to the average firm age, suggesting that respondents are workers with good knowledge of the firms. Non-managers have about 8 years of schooling which barely cumulate to the second year after primary 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 during the previous five years and about 10% exported some part of their product. While access to credit is often mentioned as one of the major issues facing SMEs in developing countries, Table 3 indicates that up to 42% of the firms obtained a loan. In line with our argument that most SMEs are run by their founders, our sample indicates that less than 10% of SMEs are run by hired managers (out of the family of the founder) and that founders themselves are managers in 84% of firms.

For comparison, we also run a t-test of the variation of key variables over time and across firm location (Table 4). 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 Ouagadougou than in Bobo-Dioulasso, on average. All other differences between the two locations are not significant.

5.2. Competition and management scores

In this section, we explore the empirical relationship between product market competition and managerial quality. As indicated in section II, whether managerial efforts are increasing with competition depends on whether the benefits from attracting more demand outweigh reduction of mark-ups associated with tougher competition. On the other hand, if the decline in profits exceeds the benefits associated with attracting more demand, then higher competition results in reduced managerial efforts. Results for alternative specifications of equation (4) are presented in Table 5. For the sake of

Table 3. Summary statistics.

Variables	All SMES		Externally Managed		Family Managed	
	Mean	SD	Mean	SD	Mean	SD
Management Scores	0.39	0.14	0.46	0.15	0.38	0.14
Targeting Scores	0.64	0.20	0.66	0.21	0.63	0.19
Monitoring Scores	0.40	0.22	0.46	0.21	0.39	0.22
Incentives Scores	0.30	0.19	0.37	0.22	0.29	0.19
Competition	0.24	0.20	0.24	0.21	0.24	0.20
Number of Competitors	69.84	45.16	61.81	43.54	70.65	45.26
Annual Turnover	369.10	1707.17	931.10	2028.82	312.54	1661.95
Full time Employees	14.06	54.23	45.68	158.83	10.88	24.66
Part time Employees	9.11	24.44	10.47	17.01	8.97	25.06
Profit	270.66	1507.73	525.60	1314.42	245.01	1523.99
Firm Age	9.60	8.81	9.87	10.08	9.58	8.68
Experience of Respondent	8.94	5.91	7.15	4.94	9.13	5.97
Non-managers Education	7.92	3.76	10.26	4.03	7.70	3.65
Employees per Manager	4.27	7.82	7.24	15.79	3.97	6.40
Manager is Hired (1 = yes)	0.09	0.29	1.00	0.00	0.00	0.00
Founder is Manager (1 = yes)	0.84	0.37	0.00	0.00	0.92	0.26
Obtained a Loan (1 = yes)	0.42	0.49	0.29	0.45	0.44	0.50
Export (1 = yes)	0.10	0.30	0.24	0.43	0.08	0.28
Innovation (1 = yes)	0.22	0.41	0.22	0.42	0.22	0.41

Notes: SD stands for Standard Deviation. In 1225 observations, 112 represent firms managed by hired managers (external management). The results show that management scores and performance indicators are higher in externally managed firms.

convenience, we focus on the estimated coefficients associated with competition with management quality and provide full tables of results in [Appendix B](#).

In column (1), we use competition and basic firm-level controls as regressors. In column (2), we add an interaction term between competition and innovation to regressors in column (1). Innovation is a binary variable taking the value 1 if, during the previous five years, the firm has introduced a new product in its main market (or involved in other innovation related activities such as redesigning or substantially improving its products) and 0 otherwise. Controlling for innovation will therefore account for (at least partially) product quality. In column (3), we add an interaction term between competition and export status to regressors in column (1). Export status is also a binary variable taking the value 1 if the firm exports some part of its product to the international market and 0 otherwise. In the last column, we include regressors in column (1) and an interaction term between competition and a dummy variable indicating whether the manager is hired or appointed from the founding family.

[Table 5](#) shows that management scores are positively and significantly associated with competition in all regressions. In particular, a one standard deviation increase in competition is associated with an increase of management scores by 0.0064 to 0.0074 points. For a firm with the average management score, this corresponds to an increase of about 1.64% to 2%. Consistently with expectation from our theoretical framework and in line with the previous empirical literature, this suggests that firms tend to adopt more structured management practices in response to increase in product market competition (Bloom and Van Reenen 2007; Karuna 2007; Bloom *et al.* 2015). However, we find no evidence of interaction effects as external management, innovation and export market participation are concerned.

These remain conditional correlations as the lack of instrumental variable for product market competition makes it difficult to identify any positive impact of competition. As

Table 4. Variation over time and across location.

Variables	2012-2017	t-stat	Bobo-Ouaga	t-stat
Management Scores	-0.02**	(-2.86)	-0.01	(-1.07)
Monitoring Scores	-0.04**	(-2.86)	-0.03*	(-2.44)
Targeting Scores	-0.03**	(-3.06)	-0.01	(-0.40)
Incentives Scores	-0.01	(-1.02)	0.00	(0.34)
Competition	0.01	(1.20)	-0.01	(-1.00)
Number of Competitors	-12.18***	(-4.76)	0.15	(0.05)
Annual Turnover	-124.02	(-1.27)	-252.90*	(-2.31)
Profit	-98.87	(-1.15)	-189.39	(-1.96)
Full time Employees	-4.38	(-1.41)	-7.28*	(-2.09)
Observations	1225		1225	

Bloom and Van Reenen (2007) indicated, using the inverse Lerner Index to proxy product market competition implies that exogenous shocks that raise (lower) management quality also increase (reduce) the inverse Lerner Index. In addition, as badly managed firms may be driven out by well managed firms, higher management scores could result in less competition (Bloom *et al.* 2012). We are therefore likely to have underestimated the positive impact of product market competition on managerial efforts.

From the perspective of our theoretical framework, this positive relationship arises through increased incentives to supply more managerial efforts. Equation (3) shows that, similar to the business effect in Raith (2003), as competition increases, there is a cost advantage associated with efficiency improvement because of the elastic firm-level demand function. With more elastic demand function, increased product market competition raises the stake of cost reduction because firms have less influence on prices. Therefore, managers run the risk of getting their firms liquidated if they fail to reduce costs. This positive relationship could also work through a selection process with better managed (then more efficient) firms capturing more and more market share and increasing the speed of exit of poorly managed (then less efficient) firms.

Management scores reflect the way firms set production goals, monitor people, production process and progress towards achievement of targets; and use reward' schemes to incentivize efforts towards achieving those goals. It is therefore possible that firms respond to changes in the market structure by investing in different types of managerial activities. We assess this by estimating Equation (4) using the sub-components of management scores as dependent variables. Results are presented in Table 6. In Panel (a), we use targeting scores as dependent variable. In Panel (b), we use monitoring scores; and in Panel (c), we use incentive scores. In all columns, regressors are as described in Table 5. Additional regressions with alternative measures of competition and sub-indicators of management scores can be found in the Appendix (Section C).

The general tendency of positive relationship is observed but there is no statistically significant association between competition and targeting scores. Rather, we find significant and stronger association with monitoring scores, and weak evidence of positive association between competition and incentive scores. This suggests that firms invest more in monitoring activities in response to increased product market competition.

These results are consistent with the prevalence of family managed firms. When firms are managed by their founders or their heirs, there is less space for firing

Table 5. Competition and management scores.

Variables	(1)	(2)	(3)	(4)
Competition	0.032** (2.489)	0.036* (1.920)	0.037*** (2.660)	0.033*** (2.617)
× Innovation		-0.008 (-0.374)		
× Export			-0.100 (-1.337)	
× Appointment				-0.019 (-0.250)
Number of Firms	583	583	583	583
R-Squared	0.191	0.191	0.197	0.191

Notes: *** indicates significance at the 1% level; ** significance at 5%, * significance at 10%. Standard errors are clustered at the firm level. In all regressions, the dependent variable is management practice score; competition is measured by the inverse Lerner Index. Each column represents a separate regression. Each regression includes the following basic firm level controls: firm age, firm size, average education of non-managers and interaction between firm size and industry branches.

mechanisms and less competition for senior positions (Bloom and Van Reenen 2007). Managers may rather struggle to survive with basic shop-floor management. Nevertheless, investment in monitoring activities would be necessary. For instance, a firm may lose substantial market shares in the wake of break down in the production system even over a very short period. Therefore, identifying and preventing or solving problems more quickly seems necessary to survive.

5.3. Robustness check

Results reported in Table 5 are based on competition measured by the inverse Lerner index. In this section, we test the robustness of our results to alternative measures of competition. We also assess whether the positive association in Table 5 is observed across different firm size. Finally we explore the sensitivity of our results to potential outliers in the data.

Table 6. Competition and sub-indicators of management scores.

Variables	Panel (a): Competition and Targeting Scores			
	(1)	(2)	(3)	(4)
Competition	0.012 (0.379)	0.009 (0.247)	0.012 (0.370)	0.023 (0.737)
× Innovation		0.006 (0.103)		
× Export			-0.002 (-0.021)	
× Appointment				-0.229 (-1.502)
Number of Firms	583	583	583	583
R-Squared	0.116	0.116	0.116	0.119
	Panel (b): Competition and Monitoring Scores			
Competition	0.067*** (2.996)	0.063* (1.938)	0.068*** (2.992)	0.077*** (3.515)
× Innovation		0.011 (0.285)		
× Export			-0.029 (-0.507)	
× Appointment				-0.196* (-1.745)
Number of Firms	583	583	583	583
R-Squared	0.193	0.193	0.193	0.197
	Panel (c): Competition and Incentive Scores			
Competition	0.019 (1.358)	0.028 (1.567)	0.027* (1.724)	0.010 (0.869)
× Innovation		-0.026 (-1.054)		
× Export			-0.182 (-1.433)	
× Appointment				0.171 (1.358)
Number of Firms	583	583	583	583
R-Squared	0.042	0.043	0.057	0.048

Notes: *** indicates significance at the 1% level; ** significance at 5%, * significance at 10%. Standard errors are clustered at the firm level. The dependent variable is targeting (respectively monitoring and incentive) scores in Panel (a) (respectively in (b) and (c)). Competition is measured by the inverse Lerner Index. Each column represents a separate regression. Each regression includes the following basic firm level controls: firm age, firm size, average education of non-managers and interaction between firm size and industry branches.

Table 7. Alternative measures of competition and management scores.

Variables	Panel (a): Number of Competitors			
	(1)	(2)	(3)	(4)
Number of Competitors	0.020*** (3.186)	0.019*** (2.599)	0.020*** (3.353)	0.019*** (3.096)
× Innovation		0.004 (0.339)		
× Export			−0.004 (−0.818)	
× Appointment				0.006 (0.514)
Number of Firms	583	583	583	583
R-Squared	0.214	0.214	0.217	0.215
	Panel (b): Perception of Competition from the Formal Sector			
Formal Competition	0.010** (2.448)	0.010** (2.188)	0.010*** (2.818)	0.010** (2.341)
× Innovation		−0.003 (−0.319)		
× Export			−0.004 (−0.709)	
× Appointment				0.000 (0.002)
Number of Firms	583	583	583	583
R-Squared	0.206	0.206	0.208	0.206
	Panel (c): Perception of Competition from the Informal Sector			
Informal Competition	0.013** (2.293)	0.012* (1.723)	0.013*** (2.882)	0.012** (2.193)
× Innovation		0.004 (0.373)		
× Export			−0.003 (−0.258)	
× Appointment				0.008 (1.214)
Number of Firms	583	583	583	583
R-Squared	0.204	0.205	0.205	0.205

Notes: *** indicates significance at the 1% level, ** significance at 5%, * significance at 10%. Standard errors are clustered at the firm level. In all regressions, the dependent variable is management practice score. Competition is measured by: the number of competitors in Panel (a), the perception of the degree of competition from the formal (respectively the informal) sector in Panel (b) (respectively in Panel (c)). Each column represents a separate regression. Each regression includes the following basic firm level controls: firm age, firm size, average education of non-managers and interaction between firm size and industry branches.

Table 7 replicates the estimations of Equation (4) with alternative measures of competition. We consider the subjective count of the number of competing firms the respondent could identify and the respondent's perception of competition from both formal and informal sectors. In Panel (a), competition is measured by the number of competitors. In Panel (b) and (c), competition is captured by the perception of the respondent about the degree of competition from the formal and informal sector respectively. The results show that management quality is positively and significantly associated with competition. Yet, we find no evidence of interaction effects. The magnitudes are similar across perceived competition from the formal and informal sectors. This suggests that a large number of firms of similar size still operate informally. In such a case, firms will still have to deal with exogenous changes from both formal and informal sectors

By using a listing of SMEs defined over turnover, our sample is likely to exhibit some heterogeneity. In Table 8, we repeat the mean analysis over different firm size. In particular, we split the regression sample into two sub-samples: firms with less employees than the median and those with more employees. We find stronger and significant association between management scores and product market competition among smaller firms but no statistical association concerning larger firms¹².

Structured management practices may be already prevalent among larger firms in the sense that they might already have effective and appropriate targets, good monitoring of people, and production process and good incentive schemes. But this also highlights a limitation in our approach to evaluate management practices: -limited chance to capture potential competition induced increase in managerial efforts in well managed firms. For example, as targeting are concerned, one question was about the

Table 8. By firm size.

Panel (a): Firms below Median Number of employees				
Variables	(1)	(2)	(3)	(4)
Competition	0.049*** (2.882)	0.051** (2.133)	0.057*** (3.281)	0.042*** (2.750)
× Innovation		-0.005 (-0.171)		
× Export			-0.234** (-2.054)	
× Appointment				0.374 (1.488)
Number of Firms	322	322	322	322
R-Squared	0.144	0.145	0.186	0.171
Panel (b): Firms above Median Number of employees				
Competition	-0.023 (-0.801)	-0.024 (-0.675)	-0.023 (-0.748)	-0.010 (-0.309)
× Innovation		0.002 (0.040)		
× Export			-0.004 (-0.087)	
× Appointment				-0.098* (-1.856)
Number of Firms	261	261	261	261
R-Squared	0.191	0.191	0.191	0.194

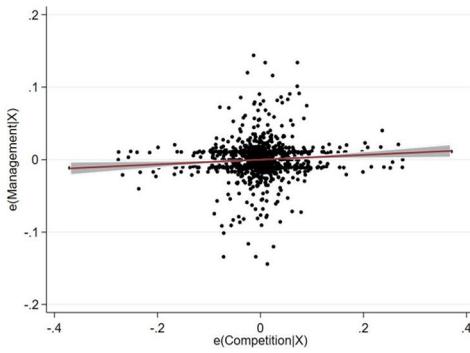
Notes: *** indicates significance at the 1% level; ** significance at 5%, * significance at 10%. Standard errors are clustered at the firm level. In all regressions, the dependent variable is management practice score, competition is measured by the inverse Lerner Index. Each column represents a separate regression. Each regression includes the following basic firm level controls: firm age and average education of non-managers. Firms in Panel (a) have employees strictly less than the median and firms in Panel (b) have employees more or equal the median number of employees.

temporal horizon over which production goals are defined, *i.e.* over shorter or longer term. In this case, a firm with weekly production targets gets the same score as a firm with any target within the scope of a year. This is also the case as incentive schemes are concerned. For example, we asked about the proportion of employees receiving a bonus when production targets are achieved. But for firms that have already adopted such practices, there might be increase in the level of bonuses which we do not capture appropriately. It is therefore possible that larger firms also respond to increase in product market competition by increasing managerial efforts.

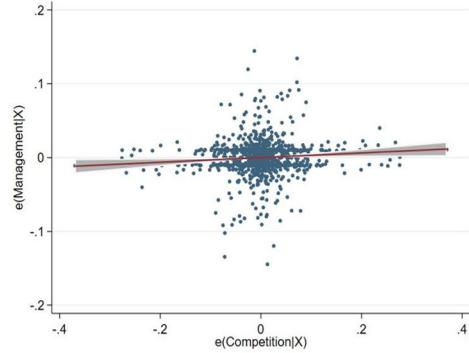
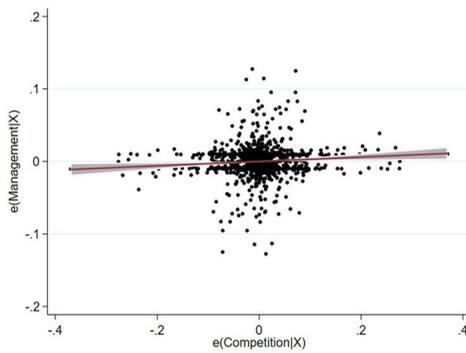
We further assess whether results presented in Table 5 are not driven by outliers in the data, using added-variable plots. We start with the conditional plot of the relationship between competition and management scores using column (1) of Table 5. The result (Figure 4a) suggests that the linear fit heavily depends on few plot points in the left and right sides of the graph. We then trimmed out extreme values of the independent variable of interest, *i.e.* competition. Figure 4b presents the added-variable plot when we trim out the lower 1% and the upper 1% values of competition. The graph is quite similar to Figure 4a. Furthermore, looking at Figure 2a, it is obvious that competition is a right-skewed variable. We have therefore used the logarithm of competition in a regression. The resulting plot (Figure 4c) is also similar. Finally, even though the dependent variable have a quite normal look (Figure 1a), we tried a regression using its logged values and obtained a quite similar plot (Figure 4d). This suggests that our main results are less likely to be driven by outliers in the data.

6. Conclusion

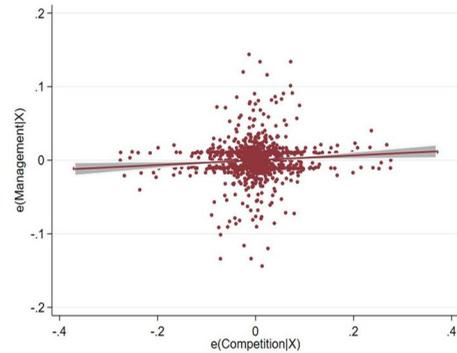
Research on the empirical relationship between competition and management managerial incentives is a small but growing area of study. Drawing on agency theory and strategic interactions between firms, this relationship has mostly been presented as ambiguous in theory. At the same time, testing it empirically has been challenged by



(a) Sample regression

(b) $[r(p1); r(p99)]$ of competition

(c) Log of competition



(d) Log of management score

Figure 4. Partial correlation between competition and management scores. (a) Sample regression. (b) $[r(p1); r(p99)]$ of competition. (c) Log of competition. (d) Log of management scores.

the lack of robust quantitative data. The primary objective of this research was to explore the relationship between product market competition and the level of managerial efforts among SMEs in developing countries. Our contention was that the existing models are less adequate to analyze the behavior of managers of SMEs in developing countries who are mostly by their founders rather than hired managers.

We therefore developed a theoretical framework to show whether increased competition provides incentives to improve management practices when managers are not hired but rather owners of firms. Our model 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 managerial efforts. This suggests that the relationship between management practices and competition is more an empirical issue.

To examine the empirical relationship between competition and managerial efforts, we use recall to build a two-point panel data in the specific context of Burkina Faso. We measure managerial efforts building on the MOPS of the U.S Census Bureau, and

found increased competition to be associated with higher managerial efforts. We further found that competition particularly affects investment in monitoring activities. These results suggest that firms are improving management quality to protect (or gain) market shares. Promoting fair competition among SMEs would then improve performances of SMEs through increased managerial efforts. Beyond the positive influence on SMEs' growth, public decision-makers should also see the potential benefit on consumers' welfare which generally tends to rise with competition, *ceteris paribus*.

Acknowledgments

The authors are grateful to Kevin Amess and two anonymous referees for their helpful thoughts, comments and guidance that helped to significantly improve the first version of the manuscript. The authors are also grateful to Ramatu Al-Hassane and Denis AKouwerabou for assistance in the early stage of the project. Finally, the authors thank Stephan Dercon, Pramila Khrisnan, Lizzie Dipple, Joshua Deustchmann, Louise Guillouët, participants at the CSAE conference, Economic Development in Africa 2019 and participants at a dissemination conference in Ouagadougou for multiple talks, discussions and comments. Any errors are the authors' responsibility.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes

1. Depending on the country and the source reporting statistics on SMEs, their 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 Demircuc-Kunt, 2007; Ayyagari, Demircuc-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, Demircuc-Kunt and Maksimovic, 2014).
2. These results are based on a sample of 732 firms across the United States, France, Germany, and the United Kingdom which are all developed countries
3. r is assumed constant and equal 0.08 following Aghion, Braun, and Fedderke (2008).
4. Perception of competition: 0 v. low (very low); 1 low; 2 moderate; 3 high and 4 very high
5. For instance, International Finance Corporation (2019) reported that, as a results of limited competition as well as high barriers to entry and factor costs, across export and non-tradable sectors, the four largest firms account for more than 95% of total sales. Concentration is even higher among exporting firms as the top 25% of exporters account for more 99% of export value.
6. This is according to a 2017 law (MCIA, MATD and MINFID, 2017). In previous time, African Development Bank and Organization 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 therefore likely that the characteristics of the sampled firms are not better described by dispositions of the current law.
7. This study considers the share of the bulk employment of these two types of the sampled enterprises
8. www.worldbank.org

9. The distribution at the national level is 73.3% in Ouagadougou and 11.25% in Bobo-Dioulasso in 2013
10. Our definition of SMEs is based on the definition of MICA. SMEs in this study are therefore firm registered as SMEs
11. Burkina Faso has been rule by President Blaise Compaoré between October 1987 and October 2014. His regime was put to an end by an insurrection late in October 2014. The country was governed by a political transition until the election of a new president who started serving in January 2016. So when asking questions about management practices in 2012, enumerators were instructed to refer to the last years of the rein of Blaise Compaoré.
12. We undertook the same exercise, dividing the sample based on the median annual turnover and find similar results."

Funding

This research is funded by the research initiative "Private Enterprise Development in Low-Income Countries" (PEDL), a program funded jointly by the Centre for Economic Policy Research (CEPR) and the Department for International Development (DFID), contract reference PEDL_LOA_5449_ouedraogo. The views expressed are not necessarily those of CEPR or DFID.

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