

Demystifying small and medium enterprises' (SMEs) performance in emerging and developing economies

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Abstract

Applying the General-to-Specific modelling on World Bank Enterprise Survey data for 266 economies, this paper models five performance indicators based on 80 potential factors derived from firm characteristics, finance, informality, infrastructure, innovation, technology, regulation, taxes, trade and workforce concerning small and medium enterprises (SMEs). We find that the factors vary regarding statistical significance and magnitude between small and medium enterprises. For example, the percent of firms using e-mail to interact with clients/suppliers has a positive effect on the annual employment growth of medium enterprises, but not the case of small enterprises. The proportion of investments financed by equity or stock sales has an adverse impact on small enterprises, while there is no such effect on medium enterprises. We find that more drivers explained the annual employment growth and the percent of firms buying fixed assets compared to capacity utilization, annual labor productivity growth, and real annual sales growth.

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1. Introduction

SMEs are vital to most economies across the world, especially developing and emerging economies. The World Bank states that formal SMEs contribute up to 60% of total employment and up to 40% of national income (GDP) in emerging economies, and these statistics would be significantly higher if it took into account informal SMEs. Moreover, the World Bank also estimates that 600 million workers will enter the global workforce over the next 15 years, mainly in Asia and Sub-Saharan Africa. From this projected estimate, four out of five new jobs are expected to be generated by SMEs. Furthermore, a World Bank Group study suggests that there exist approximately 400 million MSMEs

(microenterprises and SMEs) in emerging economies; the vast majority of which are informal. This estimation illustrates the importance of SMEs in shaping emerging economies' economic landscape. Given the paramount role of SMEs in developing and emerging economies' growth and future, governments in these countries are looking for ways to strengthen SMEs and make them more successful.

However, despite the initiatives by policymakers to boost SMEs' growth, Dalberg Global Development Advisors report that SMEs' role in private sector growth is often underrated. Their report demonstrates how SMEs' growth in emerging economies is often hindered by an inability to obtain financial capital for growth and expansion. Additionally, they argue that local financial systems do not sufficiently cater to the needs of SMEs which dampens economic development. There is scope for government interventions to close the gap in financing and to play contributing roles to enhance SMEs operating environment (Bouri et al., 2011). Inadequate or lack of support for

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SMEs hampers their performance. Indeed, they won't reach their desired economic potential, and due to issues like informality, they won't be able to benefit from infrastructures and regulatory support catered for them. In addition, there is the issue of unfavorable lending conditions. In fact, the lack of lender information keeps banks away from lending to SMEs. As a consequence, there is an absence of a well-functioning SME lending market which inhibits their growth. This negatively affects innovation, economic growth and macroeconomic resilience in developing countries (Bouri et al., 2011). Furthermore, owing to informality, a significant number of SMEs in developing countries are not paying taxes which is a loss to governments.

For an effective supply-side support, it is essential to investigate the drivers of SMEs' performance. However, despite the flurry of research on SMEs' performance, there is no consensus on the factors that drive SME's performance. Various scholarly and peer-reviewed articles investigated the performance of SMEs across different settings, from developed to least-developed countries, and utilized different methodologies, i.e. Wang, 2016. However, the academic literature on SMEs disproportionately focuses more on developed economies, i.e. Rosenbusch, Brinckmann, and Bausch (2011). Moreover, most studies are focused on one or a few specific variables as potential determinants of SME performance. Despite the extensive studies on SMEs, a search of the literature shows a gap in previous research on SMEs' performance. There exists more scope for empirical analysis in this area, particularly for developing and emerging countries. Not much is known about the combined effects of internal and external drivers of SMEs' performance (Venkatraman, 1989; Gnizy et al., 2014; Ipinnaiye et al., 2017). Thus, there is a need to take a more comprehensive look at the drivers of SMEs. Furthermore, many studies on SMEs have treated the companies as a homogenous group (e.g. Wang, 2016), despite increasing evidence that firm size has diverse causes and consequences (e.g. Beck, Demirgüç-Kunt, & Maksimovic, 2005, 2008). Therefore, it is also instructive to differentiate between the drivers of small firms from those of medium companies.

The main objective of this study is to develop an evidence-based understanding of the factors that drive SMEs' performance in emerging and developing economies so that policymakers can have a better grasp on how to support SMEs. Moreover, we are examining different aspects of performance notably capacity utilization, annual employment growth, the percentage of firms buying fixed assets, annual labor productivity growth, and real annual sales growth. A value-added feature in this study is our attempt at separating small from medium firms, as the problems and challenges faced by the small businesses differ from that of the medium counterparts. Therefore, this study seeks to answer the problem identified in the problem statement and the survey of the literature. A fresh look at SMEs' performance is taken, given the mixed results and inconclusive outcomes found in the previous studies.

We find that the factors affecting the performance of medium enterprises differ from those of small enterprises. In addition, we see that the drivers of performance vary

depending on the performance measure. However, there are still common stimulus to both small and medium firms' performance. We find that more drivers can explain the annual employment growth (%) and the percent of firms buying fixed assets, as compared to capacity utilization (%), annual labor productivity growth (%), and real annual sales growth (%). Moreover, the results provide support to the proposition that external factors should be recognized as drivers of SMEs' performance. The findings suggest a potential role for policies to improve infrastructure and energy services to encourage SMEs' growth. Policies should also be put in place to incentivize formal registrations of SMEs, simplify regulations and taxes, and encourage the knowledge of the taxes and the legal system. Investing the drivers of SMEs' performance is crucial for emerging countries for the reason that the policy implications are of great significance to governments working to promote financial access for SMEs as they understand the paramount role that SMEs play in their nations' economic development. Policymakers can stimulate these drivers to either boost the performance of small or medium firms. Also, common stimuli can be used to target both small and medium companies. Policymakers need to go beyond basic measures to improve access to finance but enhance the institutional support that would allow small and medium businesses to thrive sustainably.

The remainder of this research paper is organized as follows. In section 2, we briefly provide an overview of the related literature in the context of developing and emerging economies, which sets out the theoretical underpinnings of the potential drivers of SME performance. Then in section 3, we describe the data and the general-to-specific methodology employed. Section 4 presents the empirical results and discuss the findings. Finally, in section 5 we conclude and provide policy recommendations that would further enhance SME supply-side support and their growth potential.

2. Literature review

This section will provide a brief literature review of the various factors that can affect SME performance, particularly in the context of developing and emerging economies.

2.1. Finance

Finance is a major constraint facing SMEs and it can have a considerable impact on their performance. SMEs do not, and are typically not required, to have detailed financial records and are classed as being 'informationally opaque'. As such, SMEs are deemed to be a riskier prospect compared to their large counterparts and tend to face higher premiums or onerous collateral requirements from lending institutions. Based on the World Bank Enterprise Survey database covering 119 developing countries, Wang (2016) found that 'access to finance' is the most significant obstacle that hinders growth, particularly for high growth firms. This is consistent with the broader literature, which finds access to finance to be a major growth constraint for SMEs (Beck & Demirgüç-Kunt, 2006).

External and government intervention into SME access to finance is commonplace among developing countries. Wang (2016) found that SMEs with connections to the state appear to have fewer financing difficulties. In addition, Quartey, Turkson, Abor, and Iddrisu (2017) noted the existence of comprehensive SME finance programs in many developing West African countries, several of which can be traced back to the 1960s. Although these programs are designed to fulfil SMEs financing needs, it does not necessarily translate automatically to better performance. In their meta-analysis of low- and middle-income countries, Kersten (2017) found that SME finance programs have a positive and significant impact on performance measures, such as capital investment and employment, but an insignificant effect on profitability and wages.

Beck and Demirgüç-Kunt (2006) warned that the provision of subsidies to alleviate SMEs access to finance might be ineffective or even counterproductive, particularly in a weak business environment which is prevalent in many developing economies. Beck and Demirgüç-Kunt (2006) suggest that innovative lending strategies, such as factoring, credit-scoring and leasing are better alternatives to traditional debt financing in the absence of developed institutions. Hence, it is not only access to finance, but the type of finance also matters to SME performance, particularly for developing economies.

2.2. Firms characteristics

Sutton (1997) examined the effect of firm characteristics on performance. This type of literature, which explore the effect of firm characteristics on performance, predominantly stems from Gibrat's Law or the law of proportionate effect, which is the probability that the next opportunity taken up by any particular active firm is proportional to the current size of the company (Sutton, 1997). Ayyagari et al. (2014), Dong and Men (2014), and Quartey et al. (2017), among others, researched the effects of firm characteristics, such as firm size and age. The literature has largely focused on developed economies but has not reached consensus. However, recently Ayyagari et al. (2014) found significant evidence to suggest that small firms are important sources of employment growth and job creation. In addition, using the World Bank Enterprise Survey, Dong and Men (2014) found that younger and smaller firms in emerging economies face severe financial constraints, which in turn can have a detrimental effect on productivity, survival and profitability. Similarly, Quartey et al. (2017) find evidence suggesting that firm size is a major determinant of access to finance in the Economic Community of West African States (ECOWAS) region, which in turn may affect SME performance. Besides size and age, there are other aspects of firm characteristics that may have an effect on SME performance such as ownership type and legal status.

2.3. Informality

In developing countries, informal firms tend to make up a substantial proportion of overall employment and economic

activity. However, La Porta and Shleifer (2008, pp. 275–352) found that informal firms are typically small and extremely unproductive when compared to small formal firms. Although informal SMEs can be a significant source of job creation, informality can impact productivity negatively. Hence, the formalization of small businesses is often associated with better performance.

Rand and Torm (2012) studied the effects of formalization on firm level outcomes in micro, small and medium enterprises in Vietnam using a panel data set from 2007 to 2009 covering both formal and informal firms. They found that formalization leads to an increase in firm gross profits and investment, as well as in the empowerment of workers. However, they found no evidence that formalizing leads to a higher share of wages in total value added. They attribute this to the weakness of trade unions and collective bargaining system among Vietnamese SMEs. Amin and Islam (2015) cautioned against making the conclusion that as informal business become larger, they necessarily become more efficient like formal firms. Using a sample of informal firms in seven African countries, Amin and Islam (2015) found that relatively smaller firms in the informal sector have higher labour productivity. The authors also suggested that this could be due to higher costs of transformation or evasion for larger informal companies.

2.4. Infrastructure

The availability, or lack thereof, of infrastructure, can also have a significant impact on firm performance. This is particularly important in the case of emerging economies, where rural or regional infrastructure may be undeveloped or underdeveloped. For example, Mambula (2002) explained that poor infrastructure which includes bad roads, inadequate water shortage, erratic electric supply, and poor telecommunications system are obstacles to SME growth. The lack of adequate facilities means that firms would have to bear the cost of obtaining such services. To support SME performance in Bangladesh, Ahmed and Chowdhury (2009) also called upon the government to ensure an adequate supply of necessary utilities such as electricity, water, roads, and highways.

Using a case study of infrastructure provision in Pakistan, Anwar (2010) illustrated how state initiatives combined with local SMEs efforts helped to bring about a group-based co-ordination process for an endogenous solution to upgrade infrastructure. This process generated social benefits for the entire industrial district. In addition, Saqib (2014) argued that infrastructure provision for SMEs industrial development is a process embedded in place-based institutional architectures and the successful outcome of this process is predicated on leadership capacity where actors (individuals, organizations, teams) have the power to mobilize resources, influence peers, and recalibrate state strategies. Similarly, Akuru and Okoro (2014) highlighted that SME villages or clusters can be built in Nigeria to promote industrial activities. Such strategic development would enable the provision of basic infrastructures, such as electricity, needed for spin-off, as well as

operations, in a more affordable. Conversely, the lack or decay of infrastructure can lead to the failure of SMEs.

2.5. Innovation and technology

Innovation is often cited as a key element for entrepreneurial success. For example, [Subrahmanya, Mathirajan, and Krishaswamy \(2010\)](#) found that innovative SMEs registered higher growth relative to non-innovative SMEs regarding sales turnover, employment and investment in the auto components, electronics, and machine tool sectors of Bangalore in India. Furthermore, among 1000 manufacturing SMEs in Cambodia, [Sok, O'Cass, and Sok \(2013\)](#) found significant complementary effects between innovation, marketing and learning capability, as well as substantial individual effects.

However, the overall empirical evidence on the innovation-performance relationship in SMEs has not been clear cut. To address this, [Rosenbusch et al. \(2011\)](#) utilized a meta-analysis approach which aggregates 42 empirical studies on 21,270 firms, mostly from developed economies, to determine whether moderators impact the innovation-performance relationship. [Rosenbusch et al. \(2011\)](#) found that the innovation-performance relationship is context-specific, and depends on the type of innovation and cultural context. The authors also found that innovation process outcomes lead to increased SME performance compared to innovation process inputs such as R&D expenditure. Furthermore, the authors found that innovation has the strongest impact in cultural environments characterised by collectivism, especially in many Asian countries; whereas in more individualistic cultures, such as the US, the relationship between innovation and performance is weaker.

2.6. Regulation and taxes

Regulation and taxes can contribute towards a conducive, business-friendly environment for SMEs to thrive. Laws and regulations that effectively assign and protect property rights, as well as their effective enforcement are imperative for financial transactions. Conversely, regulations and taxes can also have a negative impact on firm performance. Using a firm-level survey database covering 54 developed and developing countries, [Beck et al. \(2005\)](#) found that small firms, in particular, benefit from lower financing obstacles under more efficient and more adaptable legal systems. However, this does not necessarily translate to firm growth and the mechanism through which the legal system affects firm performance is unclear.

Using a firm-level database of developed and developing European countries, [Klapper et al. \(2006\)](#) found that costly regulations hamper the creation of new industries. The authors argued that in developing countries or countries where corruption is a severe problem, entry regulations are unlikely to help screen out cheats. The study concluded that poor business environment might affect SME performance because restrictions and market imperfections dampen competition and slow firm growth. [Troilo \(2011\)](#) tested the impact of property rights institutions and contracting institutions on high-growth-aspiration (HGA) firms using the Global Entrepreneurship

Monitor (GEM) survey data for developed and developing economies from 2000 to 2005. He found that property rights are more significant for profound market expansion, whereas rule of law is more significant for high job growth. Finally, using a general equilibrium endogenous growth model, [Wieneke and Gries \(2011\)](#) theoretically explained the under-performance amongst SMEs in transition economies as an effect of corruption and non-competitive banking. The study also posited that the persistence of non-competitive banking is a result of governments' regulatory choice in restricting the entry of foreign banks.

2.7. Trade

Although internationalization has traditionally been associated with large multinational companies, as a result of increasing globalization SMEs have also been able to benefit from cross-border ventures. However, [Schulz, Borghoff, and Kraus \(2009\)](#) observed that empirical findings across the world show that SME internationalization modes are neither path-dependent, emergent, nor incremental. Therefore the study highlights the need to develop internationalization theory for SMEs.

Nevertheless, the available evidence regarding the nature of the relationship from studies for developing economies is generally positive. For example, [Chelliah, Sulaiman, and Yusoff \(2010\)](#) demonstrated that there is a positive relationship between internationalization and performance for a sample of 77 manufacturing firms in Malaysia. However, in examining a 1996 sample of 1419 Taiwanese SMEs, [Chiao, Yang, and Yu \(2006\)](#) found that the relationship between internationalization and performance followed an inverted U-shape which suggests that there exists an optimal level of internationalization for maximum profitability. Using panel data of 189 Taiwanese SMEs, [Hsu et al. \(2013\)](#) found that CEO attributes such as age, educational level, international experience, and duality of the CEO have moderating effects on the relationship between internationalization and firm performance.

2.8. Workforce

Human capital is another factor that is often positively associated with firm performance. Some studies tend to focus on large firms in developed economies, with much less attention paid to SMEs and developing economies. Nevertheless, there are several studies which have examined the importance of workforce on SME performance in developing economies. For example, [Islam and Siengthai \(2010\)](#) found that among a sample of 52 companies in the Dhaka Export Processing Zone (DEPZ) in Bangladesh, human resource management (HRM) practices had a significant and positive association with firm performance. [Ogunyomi and Bruning \(2015\)](#) found that HRM practices accounted for 16% of the variance in non-financial performance and 12% of the variance in financial performance, based on a survey with 236 SME respondents in Nigeria. Furthermore, the study showed that human capital development and occupational health and safety

had a direct relationship with non-financial performance of SMEs, whereas employee performance management and non-financial performance translated into better financial performance of SMEs.

Despite extensive studies on SMEs, a search of the literature shows a gap in previous research on SMEs' performance. There exists more scope for empirical analysis in this area, particularly for developing and emerging countries. Not much is known about the combined effects of internal and external drivers of SMEs' performance (Venkatraman, 1989; Gnizy et al., 2014; Ipinnaiye et al., 2017). Most studies focused on one or a few specific variables as determinants of SME performance. Our research will fill the gap and add value as we offer a more comprehensive approach to determine the drivers of SME performance in emerging and developing economies. Our research highlights organizational, institutional, commercial factors, and managerial practices which strategically drive the performance of SMEs. In addition, similar studies have focused on particular industries or a specific country, our research is extended to emerging and developing countries and is open to all industries to generalize the findings. We generalize our research to developing and emerging countries for the essential role that they play in these countries and the need for these countries to know the main factors that affect the performance of SMEs for their economies' growth. Furthermore, there is also a need to differentiate between the drivers of small firms from those of medium firms.

3. Data and empirical estimation

The dataset to be used as well as the methodology to be employed will be described in this section. Although SMEs are widely recognized to be the backbone of the economy, there is no single definition that is accepted universally. For consistency purposes, we adopt the definition of SMEs used by the World Bank Enterprise Survey. Small firms are defined as those that have 5–19 employees; medium-size firms employ 20–99 employees; and large firms employ 100 or more employees. The survey is primarily concerned with the formal economy by limiting the sample frame for each country to include a minimum of at least five employees.

3.1. Data

The World Bank Enterprise Survey is a firm-level survey of a representative sample of an economy's private sector. The survey covers a broad range of business environment topics including access to finance, corruption, infrastructure, crime, competition, and performance measures. An important advantage of the survey is its wide coverage of small and medium-sized firms. The dataset is one of the few comprehensive cross-country datasets with consistent information on SMEs, and has been cited in several reputable academic publications (e.g. Dong & Men, 2014; Eifert, Gelb, & Ramachandran, 2008; La Porta & Shleifer, 2014; Wang, 2016).

The sampling methodology for the Enterprise Survey is stratified random sampling. To ensure representativeness, the

Enterprise Surveys are stratified following 3 criteria: sector of activity, firm size, and geographical location. The respondents of the Enterprise Survey are primarily business owners and top managers, but company accountants and human resource managers are interviewed as well. There would typically be 1200–1800 interviews conducted in larger economies, 360 interviews in medium-sized economies, and 150 interviews in smaller economies. Due to the sensitive nature of certain survey questions, private contractors are hired by the World Bank for data collection. These surveys are usually carried out in cooperation with business organizations and government agencies promoting job creation and economic growth, with utmost effort made to ensure that the respondents' confidentiality would not be compromised.

Our research models 5 performance indicators based on 80 potential factors derived from firm characteristics, finance, informality, infrastructure, innovation and technology, regulation and taxes, trade and workforce concerning SMEs. We proxy SME performance using the following indicators: capacity utilization, annual employment growth, percentage of firms buying fixed assets, annual labor productivity growth, and real annual sales growth. We model these five performance indicators based on 80 potential factors derived from firm characteristics, finance, informality, infrastructure, innovation and technology, regulation and taxes, trade and workforce concerning SMEs. For each of these variables, we take an average of two data points (years) for the 266 economies in order to apply a cross-sectional estimation. From the available factors, we have excluded corruption, crime and gender due to lack of data and as our focus on commercial and trade related indicators. The full list of 5 independent variables and 80 dependent variables is provided in [Appendix Table A1](#).

3.2. Methodology

To blend the theories on SMEs' performance with empirical evidence, we applied the general-to-specific modelling approach on the World Bank Enterprise Survey data of 266 economies. This approach is a central method for selecting useful empirical models (e.g. Bos & Kool, 2006; Choi, 2013; Engle & Gallo, 2006; Kumar, 2015). In this method, the modeller simplifies an initially general model that adequately characterizes the empirical evidence within his or her theoretical framework. Hoover and Perez (1999) first developed a computer algorithm for general-to-specific modelling, which was an improvement on earlier methods. Hoover and Perez (2004) showed how their algorithm could be successfully modified for analysing cross-section data. Genspec is an algorithm for general-to-specific model prediction which has been included in Stata. It is designed to search and select from a large number of variables, the 'best' model based upon a criteria of relevance and explanatory power. From a user-defined general unrestricted model, or 'GUM', (often comprised of all independent variables the user considers potentially important, plus nonlinearities and lags), Genspec searches for the best possible final model among optimal subsets of the general model, while remaining agnostic or

placing few restrictions on their general theory. The allure of this modelling technique is that it provides a data-driven way to resolve the issue of model selection. For cross-sectional models, this includes five tests: a test for normality of errors; a test for homoscedasticity of errors; a regression equation specification error test for the linearity of coefficients; an in-sample stability F-test and an out-of-sample stability F-test (Clarke, 2014). Based on ordinary least squares, a final model is then determined based on information criteria.

Our research models 5 performance indicators based on 80 potential factors derived from firm characteristics, finance, informality, infrastructure, innovation and technology, regulation and taxes, trade and workforce concerning SMEs. Our estimated model can be written as:

$$PERF = f(FIN, FIRM, INFT, INFRA, INTEC, REGT, OPEN, HR, \epsilon)$$

where: PERF is SME performance, FIN is finance, FIRM is firm characteristics, INFT is informality, INFRA is infrastructure, INTEC is innovation and technology, REGT is regulation and taxes, OPEN is trade, HR workforce, and ϵ is the general error term. The model given in equation above can be rewritten as:

$$PERF_i = \beta_0 + \beta_1 FIN_i + \beta_2 FIRM_i + \beta_3 INFT_i + \beta_4 INFRA_i + \beta_5 INTEC_i + \beta_6 REGT_i + \beta_7 OPEN_i + \beta_8 HR_i + \epsilon_i$$

We draw our primary conclusions from the full sample of countries available from the Enterprise Survey. In addition, we also perform subsample analysis by country income group. We hypothesize that:

- **H1: Small and medium firms behave and perform differently.** We expect the extent to which any indicator affects SME's performance to depend on firm size, based on the importance of internal resources and capabilities on SMEs' performance (Prange and Pinho, 2017).
- **H2: Despite their differences there are common stimulus to both small and medium enterprises.** We expect enough commonality to warrant similar stimulus of both small and medium enterprises.

4. Findings and interpretations

Using the general-to-specific approach, we find that only 37 out of the 80 factors had significant influence in modelling one or all of the five performance measures considered. Generally, we find that the factors affecting the performance of medium enterprises differ from those of small enterprises. Furthermore, the variation depends on which performance measure is used. This implies that there should be separate policy measures for enterprises of different sizes. The results of our general-to-specific modelling approach are summarized in Table 1 below.

For SMEs (Table 1a), we find that the percentage of firms buying fixed assets (PERF3) can be modelled significantly by 12 factors, while annual employment growth (PERF2) and real annual sales growth (PERF5) can be explained by 4 and 5

Table 1

Number of significant factors that affect performance of small and medium enterprises using general-to-specific modelling.

(a) Small and medium enterprises					
	PERF1	PERF2	PERF3	PERF4	PERF5
FIN (15)	0	0	3	0	2
FIRM (10)	0	1	2	0	1
INFT (4)	0	1	1	0	1
INFRA (13)	0	1	0	0	1
INTEC (5)	0	0	0	0	0
REGT (9)	0	0	2	0	0
OPEN (12)	0	0	2	0	0
HR (12)	0	1	2	0	0
Total (80)	0	4	12	0	5
(b) Medium enterprises					
	PERF1	PERF2	PERF3	PERF4	PERF5
FIN (15)	0	4	1	0	0
FIRM (10)	0	3	4	0	0
INFT (4)	0	2	0	0	0
INFRA (13)	0	2	0	0	0
INTEC (5)	0	3	0	0	0
REGT (9)	0	1	0	0	0
OPEN (12)	0	0	1	0	0
HR (12)	0	0	2	1	0
Total (80)	0	15	8	1	0
(c) Small enterprises					
	PERF1	PERF2	PERF3	PERF4	PERF5
FIN (15)	1	3	2	0	0
FIRM (10)	0	1	0	0	1
INFT (4)	1	0	1	0	0
INFRA (13)	0	2	2	0	0
INTEC (5)	0	0	1	0	0
REGT (9)	0	0	1	0	0
OPEN (12)	1	0	2	0	1
HR (12)	0	0	1	0	0
Total (80)	3	6	10	0	2

factors respectively. However, we do not find any significant factors that can explain capacity utilization (PERF1) or labour productivity growth (PERF4).

For medium enterprises (Table 1b), we find that annual employment growth (PERF2) and the percentage of firms buying fixed assets (PERF3) can be modelled significantly by 10 and 8 factors respectively, whereas labour productivity growth can be modelled significantly by 1 factor. However, we do not find any significant factors that can explain capacity utilization (PERF1) or real annual sales growth (PERF5).

For small enterprises (Table 1c), we find that the percentage of firms buying fixed assets (PERF3) and annual employment growth (PERF2) can be modelled significantly by 10 and 6 factors respectively. Capacity utilization (PERF1) and real annual sales growth can be explained by only 3 and 2 factors respectively, but we do not find any significant factors to explain labour productivity growth (PERF4).

We now analyse our findings for each performance measure: capacity utilization, annual employment growth, percentage of firms buying fixed assets, annual labour productivity growth and real annual sales growth. The estimation results are provided in the Supplemental Appendix online, see Table S1.

4.1. Capacity utilization

For small firms, the results suggest that three factors can significantly model capacity utilization. The longer firms operated without formal registration, the lower the capacity utilization. This is in line with [La Porta and Shleifer \(2008, pp. 275–352\)](#), who found that informal firms are typically small and extremely unproductive. Similarly, a higher percentage of firms using material inputs and/or supplies of foreign origin and a higher percentage of firms identifying access to finance as a major constraint is associated with lower capacity utilization for small firms. Firms importing their material input or supplies may not be able to charge more to recover their expenses, this may hinder their performance. Without formal registration firms may not be able to get financing from financial institutions so as to work on higher capacity. This could be the reason why the years firms operated without formal registration is negatively affecting performance. Understandably, firms identifying access to finance as a major constraint will then have suboptimal capacity utilization. For medium enterprises, the results show that none of the 80 indicators can significantly model capacity utilization.

For both small and medium firms combined, the results show that none of the 80 indicators can significantly model capacity utilization. The factors are pertinent to model capacity utilization for smaller firms. However, the low R-squared means that there could be other relevant factors not considered, or it could be that there is too much heterogeneity among small firms for the model to adequately capture. Indeed as [Pidani et al. \(2016\)](#) state, the most direct and common means of obtaining numerical capacity utilization has been most directly and commonly been assessed by asking firms based on their own assessment the extent to which they are using available capacity in their various plants. Our use of secondary data (World Bank Enterprise Survey Data) may explain why any of the indicators couldn't significantly model capacity utilization. The significant determinants of capacity utilization were not present in our sample data.

4.2. Annual employment growth

We find that the following factors significantly model annual employment growth of small enterprises: the percentage of firms whose recent loan application was rejected; and the age of the establishment. Additionally, we also find the following factors to be associated with higher annual employment growth rate for small enterprises: the proportion of investments financed by equity or stock sales; percentage of working capital financed by banks; percentage of firms owning or sharing a generator; and, the number of water insufficiencies in a typical month. The latter is in contrast with [Mambula \(2002\)](#) who found that poor infrastructure hinders SME growth.

For medium firms, we find that fifteen factors significantly model annual employment growth with adjusted R-squared of 62%. The positive relationship between annual employment

growth and the duration of typical electrical outage is also observed for medium enterprises, but not for small enterprises. We also find that the following factors significantly model annual employment growth of medium enterprises: the percentage of firms whose recent loan application was rejected; and the age of the establishment.

In addition we find the following factors also to be associated with a higher annual employment growth rate for medium enterprises, but not for small enterprises: the share of firms with a bank loan/line of credit; the proportion of loans requiring collateral; the proportion of investments financed by supplier credit; the proportion of a firm held by the largest owner(s); the percentage of firms with legal status of partnership; the share of firms competing against unregistered or informal firms; the percentage of firms formally registered when they started operations in the country; the percentage of firms identifying electricity as a major constraint; percentage of firms having their own web sites; the percentage of firms using e-mail to interact with clients/suppliers, and; the percentage of firms with an annual financial statement reviewed by external auditor.

For both small and medium enterprises combined, we found that there are four factors that can model annual employment growth with an adjusted R-squared of only 25%. Two have a positive relationship with SMEs' performance while the other have a negative correlation with performance. Indeed our results suggest that a higher share of private domestic ownership in a firm, and the number of years a firm has been in operation without formal registration, is associated with a lower annual employment growth rate. We also find that the number of temporary workers and the duration of typical electrical outage has a positive relationship with annual employment growth rate. This suggests that more outages lead to more job creation. Firms may need to hire more labour to do jobs that can otherwise be done mechanically, indicating a substitution of capital or technology for labour.

4.3. Percentage of firms buying fixed assets

We only find ten significant factors that model small enterprises with an adjusted R-squared of 61%. In fact we find that, for small enterprises, there is a positive association between the average number of visits or required meetings with tax officer (if there were visits) and performance. We also find that there is also a positive relationship between the percentage of firms with a bank loan or line of credit and the percentage of firms buying fixed assets. Furthermore, we find that the following factors are significant to model the percentage of firms buying fixed assets for small firms: the percentage of firms identifying access to finance as a major constraint; the number of years firm operated without formal registration; the number of electrical outages in a month; the duration of electrical outage; the percentage of firms with annual financial statement reviewed by an external auditor; and the percentage of firms exporting directly (at least 1% of sales).

For medium firms, the following factors are found to be associated with higher percentage of firms buying fixed assets, but not small enterprises: percentage of firms identifying labour regulations as a major constraint and the percentage of firms buying fixed assets. There is also a positive relationship between the percentage of firms with a bank loan or line of credit and the percentage of firms buying fixed assets. In addition, these factors are significant to model the percentage of firms buying fixed assets for medium enterprises only: the proportion of private domestic ownership in a firm; the proportion of private foreign ownership in a firm; the proportion of government or state ownership in a firm; and the proportion of firm held by largest owner.

For both small and medium enterprises combined, we find that twelve factors significantly model the percentage of firms buying fixed assets with an adjusted R-squared of 66%. These common factors are: the percentage of firms using material inputs and/or supplies of foreign origin; and the percentage of firms offering formal training. This indicates the importance of internationalization, particularly by having a global supply chain, and workforce quality for better firm performance. In addition, we find the following factors to be associated with higher percentage of firms buying fixed assets for SMEs: the percentage of firms with checking or savings accounts; the proportion of investments financed by supplier credit; the percentage of firms using banks to finance working capital; age of the establishment; percentage of firms with the legal status of sole proprietorship; the percentage of firms formally registered when they started operation in the country; the percentage of firms identifying tax administration as a major constraint; and the percentage of permanent full-time workers. There is also a positive association between the percentage of firms identifying labour regulations as a major constraint, there is a positive association between the average number of visits or required meetings with tax officer (if there were visits), and the percentage of firms buying fixed assets.

4.4. Annual labour productivity growth

For small enterprises, none of the 80 factors are able to significantly model annual labour productivity growth. For medium enterprises, only the number of permanent production workers is positively related to annual labour productivity growth, which is associated with an adjusted R-squared value of only 8%. Harvie (2010) determined that participating in productions networks stimulate SMEs' performance by mimicking the characteristics of exporting firms. None of the 80 factors are able to significantly model annual labour productivity growth for both small and medium firms combined.

4.5. Real annual sales growth

Only two factors are found to significantly model real annual sales growth for small enterprises. Indeed countries with higher percentage of firms using material inputs and/or supplies of

foreign origin have a higher annual real annual sales growth rate. However, those with higher percentage of firms with legal status of partnership have a lower annual real annual sales growth rate. For medium enterprises, none of the 80 factors are able to significantly model real annual sales growth. However, we find five factors that significantly model real annual sales growth for both small and medium enterprises combined, with an adjusted R-squared of 42%. The results suggest that countries with higher percentage of firms formally registered when they started operations in the country, percentage of firms identifying access to finance as a major constraint, have a higher annual real annual sales growth (for aggregated small and medium firms). Meanwhile, in countries with higher share of private domestic ownership in a firm, longer duration of a typical electrical outage, percent of firms whose recent loan application was rejected, have a lower annual real annual sales growth rate. This is in line with Obokoh and Goldman (2016) which argue that the deficiency in infrastructure negatively affects the profitability and performance of SMEs, due to the high cost incurred by SMEs in the self-provision of infrastructure and distribution of finished goods.

4.6. Subsample analysis

Additionally, we conduct a series of subsample estimations based on country income groups, using real GDP per capita (USD) from the World Bank's World Development Indicators (WDI). We separated the economies into three country income groups: below USD2,000; between US2,000 and USD7,000; and, above USD7,000. For each country income group, the same methodology is applied as before. A summary table, which calculates the number of significant factors that affect the performance of SMEs by income group, is provided in Appendix Table A2. The full empirical results are not reported in this paper for brevity purposes, but are available upon request.

From our subsample estimations, the general-to-specific approach is able to capture more relevant factors for determining the performance of SMEs, across all five performance measures. This is to be expected, and it suggests that the country's income level or its stage of economic development affects the appropriate set of SME performance determinants. Similar to our primary analysis, we find that the factors affecting the performance of medium enterprises differ from those of small enterprises. This corroborates our earlier finding that small and medium enterprises should not be treated as homogenous entities. Nevertheless, there exists commonalities that affect both small and medium-size enterprise performance.

5. Conclusion and policy implications

This paper analyses the determinants of SME performance, using a cross section estimation by taking an average of two years of data points on the World Bank Enterprise Survey data for 266 economies. Our study is a novel addition to the literature on SME performance drivers as we utilize a

multivariate modelling approach which relates SME performance to firm characteristics, finance, informality, infrastructure, innovation and technology, regulation and taxes, trade and workforce. We provide empirical evidence on the multidimensional nature of firm performance through the use of multiple, rather than single performance measures, in assessing performance outcomes of firms. The five performance measures used were capacity utilization, annual employment growth, percentage of firms buying fixed assets, annual labour productivity growth and real annual sales growth. We also examined the effects of small and medium enterprises separately, based on the World Banks' Enterprise Survey classification, rather than just as a homogenous group.

Using the general-to-specific approach, we find that only 37 out of the 80 factors had significant influence in modelling the five performance measures considered. Consistent with our first hypothesis, we find that the factors affecting the performance of medium enterprises differ from those of small enterprises. In fact, the variation depends on which performance measure is used. This implies that there should be separate policy measures for small and for medium enterprises of different sizes. However, we still found common stimulus to both small and medium firms' performance as we expected from our second hypothesis. By targeting such common factors, policymakers can still boost the growth of SMEs. While we have identified several key drivers, SME performance remains undetermined for certain performance indicators, such as labour productivity and capacity utilization. It could be that SMEs are heterogeneous and have varied objectives that may not be related to being more productive or maximizing capacity. Our subsample analysis based on country income group, suggests that SME performance determinants are affected by the stage of economic development. Thus, policymakers should be wary of a 'one-size-fits-all' approach to SMEs.

For small firms, we find that better access to finance, operating with a formal status, use of domestic supplies/inputs, access to newer equipment/technologies, lesser proportion of investments financed by equity or stock sales, better infrastructures (shorter duration of electrical outages, ownership of a generator, etc.), no external audit, formal training, and access to international markets stimulate performance. For medium firms, better infrastructures and access to electric power, having a formal status, better access to finance, firm characteristics (legal status of partnership), competing against unregistered or informal firms, using e-mail to interact with clients/suppliers (innovation and technology), annual financial statement reviewed by external auditor, having their own Web site, lower proportion of loans requiring collateral, shorter days to obtain a construction-related permit (regulations and taxes), access to newer equipment/technologies, lower proportion of investments financed by supplier credit, using material inputs and/or supplies of foreign origin (domestic trade), formal training, better labor regulations, higher proportion of private foreign ownership (firm characteristics), higher proportion of government/state ownership, and higher number of

permanent production workers drive performance. For small and medium enterprises combined, a lower share of private domestic ownership in a firm (firm characteristics), formal registration, higher number of temporary workers, use of material inputs and/or supplies of foreign origin (trade), formal training, using banks to finance working capital, legal status of sole proprietorship, higher number of permanent full-time workers, better labour regulations, higher number of visits or required meetings with tax officers, better tax administration, and lower share of private domestic ownership boost performance.

For small firms, we recommend that policymakers implement policies to facilitate and motivate formal registration, consultation with tax officers, use of domestic inputs/supplies, and access to finance (bank loan/line of credit) seem to stimulate their growth. However as the proportion of investments financed by equity or stock sales is negatively correlated with performance, it is logically recommended as our results show that small firms increase their percentage of working capital financed by banks and other financial institutions. The age of the establishment being negatively associated with performance could be due to obsolete equipment and infrastructure. Policymakers should facilitate small firms' access to newer and more efficient technologies and machineries to boost their productivity. Better infrastructures is also a must for small companies to perform better. In addition we recommend governments to facilitate small firms' access to international markets. Indeed, [OECD \(2004\)](#) states accessing international markets and internationalization is a strategic instrument for SMEs' competitiveness and their further development. Formal training is also proved to help small enterprises' performance. Policymakers can create human resources development schemes to help small businesses train their employees. An example is the Human Resources Development Fund (HRDF) in Malaysia which is a scheme to help identify their own training needs and to implement their training programmes to retrain and upgrade their employees' skills in line with their operational and business requirements.

For medium-sized companies, one of the means to boost performance is through facilitating formality with a legal status of partnership. In addition, access to finance needs (bank loan/line of credit) should be eased by encouraging banks and other financial institutions to lend to medium corporations. Furthermore our results show that asking medium firms to provide collateral hinder their growth. Policymakers can help by creating organizations that can act as credit enhancers and offer government-backed guarantees to medium businesses to get loans. Audit of financial statement by an entity external to the company is also proven to enhance medium firms' performance. This is most likely has to do with how audit promote transparency and consequently financial institutions will be more willing to lend to the medium firm. Lack or poor infrastructure is negatively affecting medium companies' performance. The government has a role to play and should

improve infrastructures to stimulate medium firms' growth and cut the time it takes to obtain official documentations like construction-related permit. Another essential point, not surprisingly with the current world dynamic is the use of e-mail to interact with clients/suppliers and having their own Web site boost medium firms' performance. Soft infrastructures like a wider internet access by countries and cheaper web hosting services for medium firms to boost their sales and performance. As in the case with small firms, medium firms can also be included in the human resources development schemes to help businesses train their employees and incentives like tax deduction could be used to encourage medium firms to hire permanent workers as this improve their performance.

Small and medium enterprises differ by their size but also by their structures and business operations. Therefore, it is unsurprising that we observe SME performance as well as its drivers, to be diverse and multifaceted. Our results provide support to the proposition that external factors should be recognized as drivers of SMEs' performance. Indeed, both internal factors and the macroeconomic environment have a significant role in the success of SMEs. Furthermore, our findings suggest a potential role for policies to improve infrastructure and energy services that would encourage SMEs' growth. Indeed reducing the duration of electrical outages will boost SMEs performance through increased productivity. Policymakers need to go beyond basic measures to improve access to finance but enhance the institutional support that would allow small businesses and local economies to thrive independently. Furthermore, policies should be put in place to incentivize formal registrations of SMEs as our results suggest that this stimulate SMEs performance. SMEs by becoming formal will gain market share and this leads to their real annual sales growth. Our approach corroborates the importance for policymakers to simplify regulations and taxes. Additionally, our approach corroborates the importance for policymakers to encourage the knowledge of the taxes and the legal system. Training on the tax laws and regulations can be conducted to enlighten entrepreneurs and therefore boost performance. Governments should also promote the use of technology and innovation to stimulate SMEs' performance by encouraging increased investments in R&D. Also, each country can conduct a study to identify any additional information and support mechanisms that can be targeted toward SMEs to encourage their growth. This will help fit the policies to the countries' business environment. Unnecessary regulations concerning international trade and investment should be dropped. Centres can be created to help identify and access the full range of financial support available for international and local activities. Additional targeted tax breaks could use to encourage SME growth particularly in the aftermath of the global financial crisis when recovery is proving slow.

Nevertheless, we recognise the data limitations of the Enterprise Survey in our study. Once data becomes available, further research could utilize the general-to-specific approach in a panel data context. In addition, the use alternative datasets or even primary data could also widen the range of variables to be explored. Thus, we suggest that further research look into

case studies for specific developing and emerging economies to further demystify SME performance drivers.¹

Conflicts of interest

None.

Appendix Table A1. Dependent and independent variables

Dependent variables		
Performance	PERF1	1. Capacity utilization (%)
	PERF2	2. Annual employment growth (%)
	PERF3	3. Percent of firms buying fixed assets
	PERF4	4. Annual labor productivity growth (%)
	PERF5	5. Real annual sales growth (%)
Independent variables		
Finance	FIN1	1. Percent of firms with a checking or savings account
	FIN2	2. Percent of firms with a bank loan/line of credit
	FIN3	3. Proportion of loans requiring collateral (%)
	FIN4	4. Value of collateral needed for a loan (% of the loan amount)
	FIN5	5. Percent of firms not needing a loan
	FIN6	6. Percent of firms whose recent loan application was rejected
	FIN7	7. Percent of firms using banks to finance investments
	FIN8	8. Proportion of investments financed internally (%)
	FIN9	9. Proportion of investments financed by banks (%)
	FIN10	10. Proportion of investments financed by supplier credit (%)
	FIN11	11. Proportion of investments financed by equity or stock sales (%)
	FIN12	12. Percent of firms using banks to finance working capital
	FIN13	13. Proportion of working capital financed by banks (%)
	FIN14	14. Proportion of working capital financed by supplier credit (%)
	FIN15	15. Percent of firms identifying access to finance as a major constraint
Firm Characteristics	FIRM1	1. Age of the establishment (years)
	FIRM2	2. Proportion of private domestic ownership in a firm (%)
	FIRM3	3. Proportion of private foreign ownership in a firm (%)
	FIRM4	4. Proportion of government/state ownership in a firm (%)
	FIRM5	5. Proportion of a firm held by the largest owner(s) (%)
	FIRM6	6. Percent of firms with legal status of publicly listed company

¹ See also Aysan, Disli, Ng & Ozturk (2016), Mirakhor, Ng, Dewandaru, and Hamid (2017) Nagayev, Disli, Inghelbrecht, and Ng (2016), Ng, Ibrahim and Mirakhor (2015a), Ng, Ibrahim and Mirakhor (2015b), Ng, Dewandaru, and Ibrahim (2015), Ng, Ibrahim, and Mirakhor (2016).

Informality	FIRM7	7. Percent of firms with legal status of privately held Limited Liability Company	Trade	REGT3	3. If there were visits, average number of visits or required meetings with tax officials
	FIRM8	8. Percent of firms with legal status of Sole Proprietorship		REGT4	4. Days to obtain an operating license
	FIRM9	9. Percent of firms with legal status of Partnership		REGT5	5. Days to obtain a construction-related permit
	FIRM10	10. Percent of firms with legal status of Limited Partnership		REGT6	6. Days to obtain an import license
	INFT1	1. Percent of firms competing against unregistered or informal firms		REGT7	7. Percent of firms identifying tax rates as a major constraint
	INFT2	2. Percent of firms formally registered when they started operations in the country		REGT8	8. Percent of firms identifying tax administration as a major constraint
	INFT3	3. Number of years firm operated without formal registration		REGT9	9. Percent of firms identifying business licensing and permits as a major constraint
	INFT4	4. Percent of firms identifying practices of competitors in the informal sector as a major constraint		OPEN1	1. Days to clear direct exports through customs
	INFRA1	1. Number of electrical outages in a typical month		OPEN2	2. Percent of firms exporting directly or indirectly (at least 1% of sales)
	INFRA2	2. Duration of a typical electrical outage (hours)		OPEN3	3. Percent of firms exporting directly (at least 1% of sales)
Infrastructure	INFRA3	3. If there were outages, average duration of a typical electrical outage (hours)	Workforce	OPEN4	4. Proportion of total sales that are domestic sales (%)
	INFRA4	4. Losses due to electrical outages (% of annual sales)		OPEN5	5. Proportion of total sales that are exported directly (%)
	INFRA5	5. If there were outages, average losses due to electrical outages (% of annual sales)		OPEN6	6. Proportion of total sales that are exported indirectly (%)
	INFRA6	6. Percent of firms owning or sharing a generator		OPEN7	7. Days to clear imports from customs
	INFRA7	7. Proportion of electricity from a generator (%)		OPEN8	8. Percent of firms using material inputs and/or supplies of foreign origin
	INFRA8	8. If a generator is used, average proportion of electricity from a generator (%)		OPEN9	9. Proportion of total inputs that are of domestic origin (%)
	INFRA9	9. Days to obtain an electrical connection (upon application)		OPEN10	10. Proportion of total inputs that are of foreign origin (%)
	INFRA10	10. Percent of firms identifying electricity as a major constraint		OPEN11	11. Days of inventory of main input
	INFRA11	11. Number of water insufficiencies in a typical month		OPEN12	12. Percent of firms identifying customs and trade regulations as a major constraint
	INFRA12	12. Proportion of products lost to breakage or spoilage during shipping to domestic markets (%)		HR1	1. Percent of firms offering formal training
Innovation and Technology	INFRA13	13. Percent of firms identifying transportation as a major constraint		HR2	2. Proportion of workers offered formal training (%)
	INTEC1	1. Percent of firms with an internationally-recognized quality certification		HR3	3. Years of the top manager's experience working in the firm's sector
	INTEC2	2. Percent of firms using technology licensed from foreign companies		HR4	4. Number of permanent full-time workers
	INTEC3	3. Percent of firms having their own Web site		HR5	5. Number of temporary workers
	INTEC4	4. Percent of firms using e-mail to interact with clients/suppliers		HR6	6. Number of permanent production workers
Regulation and Taxes	INTEC5	5. Percent of firms with an annual financial statement reviewed by external auditors		HR7	7. Number of permanent non-production workers
	REGT1	1. Senior management time spent dealing with the requirements of government regulation (%)		HR8	8. Number of permanent skilled production workers
	REGT2	2. Number of visits or required meetings with tax officials		HR9	9. Number of permanent unskilled production workers
				HR10	10. Proportion of unskilled workers (out of all production workers) (%)
				HR11	11. Percent of firms identifying labor regulations as a major constraint
				HR12	12. Percent of firms identifying an inadequately educated workforce as a major constraint

Appendix Table A2. Subsample analysis

Number of significant factors that affect performance of small and medium enterprises using general-to-specific modelling, By Income Group (GDP per capita).

(a) Small and medium enterprises																
	PERF1			PERF2			PERF3			PERF4			PERF5			
	SM1	SM2	SM3	SM1	SM2	SM3	SM1	SM2	SM3	SM1	SM2	SM3	SM1	SM2	SM3	
FIN (15)	8	2	0	2	1	0	0	3	9	7	9	3	5	8	7	
FIRM (10)	2	6	8	3	2	2	2	1	0	2	3	2	1	3	2	
INFT (4)	2	1	1	1	1	1	1	2	1	1	0	2	1	1	2	
INFRA (13)	4	3	0	3	1	4	3	5	5	3	4	3	4	3	0	
INTEC (5)	2	1	1	1	2	2	2	1	1	1	1	2	1	1	1	
REGT (9)	1	0	0	1	4	3	0	3	1	1	0	3	1	0	1	
OPEN (12)	1	3	3	1	0	5	0	2	8	2	1	1	1	1	3	
HR (12)	4	3	5	2	2	9	2	6	4	3	2	4	1	1	3	
Total (80)	24	19	18	14	13	26	10	23	29	20	20	20	15	18	19	
Observations	59	79	43	66	56	20	59	80	41	66	56	19	91	59	19	
Adj. R-sq.	65%	46%	77%	39%	78%	.	47%	35%	72%	60%	79%	.	55%	83%	.	

(b) Medium enterprises																
	PERF1			PERF2			PERF3			PERF4			PERF5			
	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3	
FIN (15)	6	1	3	2	0	3	5	1	5	12	9	2	2	0	8	
FIRM (10)	3	0	0	2	6	6	2	4	6	5	0	7	4	0	2	
INFT (4)	2	1	1	1	1	2	1	2	1	1	1	1	1	1	1	
INFRA (13)	0	1	0	8	1	5	3	2	4	1	5	0	4	3	0	
INTEC (5)	2	0	1	1	2	1	1	1	0	1	1	1	1	1	1	
REGT (9)	0	0	0	0	0	3	1	1	2	2	1	0	1	1	1	
OPEN (12)	1	1	4	1	4	1	0	0	0	1	0	1	1	0	1	
HR (12)	6	3	0	3	2	6	5	0	1	1	1	4	1	1	4	
Total (80)	20	7	9	18	16	27	18	11	19	24	18	16	15	7	18	
Observations	32	38	22	37	33	9	41	47	20	32	25	22	40	42	9	
Adj. R-sq.	70%	43%	72%	28%	83%	.	47%	52%	.	39%	91%	−10%	47%	59%	.	

(c) Small enterprises																
	PERF1			PERF2			PERF3			PERF4			PERF5			
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	
FIN (15)	4	0	5	2	1	3	3	4	4	3	5	6	0	4	6	
FIRM (10)	1	1	0	4	2	1	2	0	3	1	0	5	2	1	5	
INFT (4)	1	1	1	1	2	2	1	2	1	1	1	2	1	1	1	
INFRA (13)	3	5	6	0	3	3	1	6	4	6	0	0	3	0	4	
INTEC (5)	1	1	1	3	1	1	3	2	1	1	1	3	0	1	1	
REGT (9)	0	5	7	1	3	7	2	2	2	0	0	3	0	5	0	
OPEN (12)	0	4	3	0	1	6	4	2	1	0	0	5	2	1	7	
HR (12)	0	6	1	0	6	0	1	1	0	1	1	0	2	3	0	
Total (80)	10	23	24	11	19	23	17	19	16	13	8	24	10	16	24	
Observations	34	38	16	32	20	10	38	24	16	36	28	10	28	23	23	
Adj. R-sq.	37%	47%	.	32%	86%	.	58%	60%	.	−5%	66%	.	69%	67%	92%	

Appendix B. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.bir.2018.04.003>.

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