Determinants of the use of accounting systems in microenterprises: evidence from Chile

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Abstract

Purpose – The purpose of this research is to contribute to knowledge-building on microenterprises in emerging economies, by assessing the determinants that drive their use of accounting systems.

Design/methodology/approach – A probabilistic model was developed to determine the likelihood that a micro-firm would adopt an accounting registry system as a function of a series of contingencies and personal characteristics of their owners/managers. Data from the Microentrepreneurship Survey (EME), from the National Institute of Statistics of Chile for 2017 was used.

Findings – The findings suggest that access to external funds, the size and the use of technology strongly influence micro-firms' adoption of accounting systems.

Research limitations/implications – Despite the richness and scope of the data, direct measurements of entrepreneurial orientation and environmental uncertainty, both central variables of the contingency theory, were missing. Hence, duly justified proxies were applied. It is also likely that there would be other variables that also influence the probability of using accounting tools.

Practical implications – The study contributes to a better understanding of microenterprises, and the factors that determine the use of accounting systems. The results highlight that public policies aimed at fostering microenterprises should facilitate access to technology and external funds. Consistent with previous studies, the authors' findings highlight the importance of training owner/managers on issues related to their business.

Originality/value – This paper contributes to theory by arguably being the first study to confirm that contingency theory does explain the adoption of accounting systems in microenterprises in emerging countries.

Keywords Accounting, Microenterprises, Emerging economies, Contingency theory

Paper type Research paper

1. Introduction

Microenterprises are very important for the economy, at both the local and national levels (Wiklund and Shepherd, 2005; Alattar *et al.*, 2009; Liberman *et al.*, 2010; Berrone *et al.*, 2014; Shields and Shelleman, 2016), as a relevant source of employment and income (Liberman *et al.*, 2010), representing a large fraction of the economic units (Berrone *et al.*, 2014). However, there is a dearth of research on micro-firms, particularly on their decision-making processes (Liberman *et al.*, 2010; Berrone *et al.*, 2014; Shields and Shelleman, 2016). Usually, microenterprise management is considered to be very simple and intuitive, dependent on the skills, expertise and knowledge of the owner/manager (Liberman *et al.*, 2010), unstable,

inconsistent and very little innovative. However, the very few studies on micro-businesses highlight great heterogeneity on their decision-making processes along with a considerable level of complexity (Greenbank, 2000).

Although there is no universal consensus on the definition of a microenterprise, these firms are generally considered as those with 1 to 10 full-time employees (including the owner) along with an annual revenues figure that depends on each country or region (OECD, 2010; Lavia and Hiebl, 2015).

Microenterprises are considered to neither generate nor use accounting and financial information for reasons other than external reporting (Dyt and Halabi, 2007), which is thought to be one of their main restrictions to grow and survive (Danielson and Scott, 2006). Additionally, most of these organizations are not required to generate financial statements for tax purposes (Dyt and Halabi, 2007; Halabi et al., 2010). When they produce information, it is presumed that it is very basic, limited and inconsistent. On many occasions, owners/ managers have recognized that they do not find useful the information provided by traditional financial reports (Dyt and Halabi, 2007). However, there is arguably a lack of research on the factors that determine their adoption of accounting systems (Alattar et al., 2009; Shield and Shelleman, 2016).

Previous research on SMEs has suggested a relationship on the use of accounting systems and the performance of organizations (Lavia and Hiebl, 2015). Among other factors, it has been found that variables such as company size, the business environment, the use of technology and the personal characteristics of the owners/managers, drive the decision-making processes and the implementation of accounting systems (Hiebl, 2014; Lavia and Hiebl, 2015; Otley, 2016; Plöckinger et al., 2016; Abernethy and Wallis, 2019). Contingency theory, resource-based theory, the upper echelon theory and the manager effects are some of the approaches that have been primarily used to study these relationships. However, this string of research has, systematically, left the smallest businesses out of their scope.

Microenterprises are especially important in emerging markets, as they often account for an employment alternative or the opportunity to generate complementary sources of income (Dyt and Halabi, 2007). Moreover, for some economies, micro-businesses are important players on reducing poverty levels (Santos and Guzman, 2017). Research on microenterprises in emerging economies is therefore considered relevant and timely in order to understand their characteristics and processes, which are unique relative to those in developed economies and larger enterprises (Dyt and Halabi, 2007; Lavia and Hiebl, 2015; Senftlechner and Hiebl, 2015).

The purpose of this research is to contribute to knowledge-building on microenterprises in emerging economies. The objective is to fill the gap and analyze which are the determinants that drive their use of accounting systems. Understanding the variables that increase the probability of using accounting systems by smaller companies is arguably important for several reasons. First, because of their undeniable relevance as a group in the economy, not only by the number and relative weight of economic units (more than 90% of all businesses) but also for the generation of jobs (and self-employment, in the case of many micro-firms) (Liberman et al., 2010; Berrone et al., 2014; Senftlechner and Hiebl, 2015; Shields and Shelleman, 2016). Second, because micro and small businesses are not just smaller versions of larger companies, they are indeed meaningfully unalike (Marriott and Marriott, 2000; Danielson and Scott, 2006; Dyt and Halabi, 2007; Ng et al., 2013). They face very different challenges and have very particular restrictions that most SMEs do not face (Berrone et al., 2014). Third, the study of micro-firms allows us to follow the implementation and evolution of accounting tools from their initial adoption, as companies grow (Mitchell and Reid, 2000; Armitage et al., 2016). Finally, microenterprises may be considered as engines of growth, so policies set to foster them, should be carefully designed (Greenbank, 2000; Gherhes et al., 2016). Given the heterogeneity of micro-firms, contingency theory, which postulates that

there is no unique organizational structure that determines the use of accounting systems, but rather the existence of a series of contingencies (Hall, 2016; Otley, 2016), represents an appropriate theoretical approach to undertake this analysis. Given the high level of dependence on the personal characteristics of their owners/managers, the upper echelon theory is also an appropriate framework to explain the influence of owners/managers-related variables on the use of accounting systems.

Data from the Microentrepreneurship Survey (EME) run by the National Institute of Statistics of Chile for 2017 – the latest available at the time of this research – were used for the analysis. Chile is considered to be an appropriate case to illustrate the determinants of using accounting systems, as an emerging economy with nearly two million microenterprises and 3.3 million jobs generated by them (including self-employment). A rich database with sufficient variability in terms of firms' size, maturity, economic activity and personal characteristics of the owners/managers was obtained. A probabilistic model was developed to determine the likelihood that a micro-firm would adopt an accounting registry system as a function of a series of contingencies and characteristics of the owners/managers.

This study contributes to the research on microenterprises in emerging economies by analyzing the drivers of their accounting choices. This study is unique as one of the very few, to the authors' knowledge, focused exclusively on microenterprises. Additionally, it is innovative by centering on the determination of the factors that drive the use of accounting systems on this type of firms without the possible bias introduced by the effect of larger businesses. Knowing these determinants is arguably relevant for regulators and policymakers in designing policies and programs aimed to strengthen the capacities of these enterprises, such as tailor-made training programs (Greenbank, 2000), or the introduction of legal requirements with respect to the generation of activity and financial reports.

The remainder of the paper is structured as follows: Section 2 presents a literature review and the research hypotheses; Section 3 introduces the methodology, including the data collection and data analysis; Section 4 discusses the findings relative to the theoretical approach and previous research; finally, in Section 5 conclusions and limitations of this paper are presented, as well as directions for further research.

2. Literature review

Since the 1960s, different theoretical approaches have been applied to explain the factors that determine the use of accounting practices in companies. Among those, the most used has been contingency theory (Hall, 2016; Otley, 2016), according to which, firms define their management accounting practices as a function of their specific circumstances, so there are no universal recipes applicable to all organizations (Otley, 1980, 2016; Jones, 1985; Ng et al., 2013). In the beginning, contingency theory tried to relate two groups of variables (contingencies), namely the environment and the use of technology, with the performance of companies. As research based on this theoretical framework has evolved, other variables have been incorporated, grouped under the uncertainty of the environment (Govindarajan, 1984; Gul, 1991; Ng et al., 2013), the use of technology (Daft and Macintosh, 1978; Otley, 2016), the entrepreneur's orientation (Davila and Foster, 2005; Alattar et al., 2009; Halabi et al., 2010; Saeed et al., 2014; Andersen and Samuelsson, 2016) and the size of the company (El-Ebaishi et al., 2003; Davila and Foster, 2005; Alattar et al., 2009; Chand and Dahiya, 2010; Neubauer et al., 2012; Lavia and Hiebl, 2015). However, this type of analysis has not been carried out for the smallest companies, i.e. the microenterprises, which arguably have very different organizational structures compared to those of the larger firms (Liberman et al., 2010; Grande et al., 2011; Lavia and Hiebl, 2015; Shields and Shelleman, 2016).

One string of research has been the use of management accounting (MA) tools, and results have been contradictory and disconnected. Lavia and Hiebl (2015), in their review of the literature on SMEs, find support that the use of MA tools is influenced by the size of the company. Small firms use less MA practices than medium-sized enterprises, but they also report some references that find no difference in MA use among small and medium-sized firms (Chand and Dahiya, 2010). On the other hand, Davila and Foster (2005) and El-Ebaishi *et al.* (2003) also find that mature firms use more MA tools. Additionally, Alattar *et al.* (2009) and El-Ebaishi *et al.* (2003) find a low use of MA tools in micro, small and medium enterprises in Saudi Arabia (El-Ebaishi *et al.*, 2003) and Jordan (Alattar *et al.*, 2009). Lavia and Hiebl (2015) claim that this result can be generalized to developing economies. Microenterprises, which are usually considered within the SMEs group, constitute a special case. They are the most numerous (more than 90% of all economic units), are more dependent on the skills of their owners/managers, and are the most resource-scarce. Although there is some research on SMEs' use of accounting tools, microenterprises have been consistently left out of the researchers' sample (see, e.g., Davila and Foster, 2005; Jankala and Silvola, 2012; Andersen and Samuelsson, 2016; Da Silva *et al.*, 2016; Samuelsson *et al.*, 2016). As a consequence, it is assumed that results for SMEs can be extended to micro-firms (Gherhes *et al.* (2016). Considering the lack of research on the use of accounting systems by micro-firms, the following research question is posed: *What are the determinants of the use of accounting systems by microenterprises in emerging economies?*

According to contingency theory, there is no single organizational structure that applies to all organizations in all circumstances, but it rather depends on a series of "contingencies." The first works of contingency theory define it as the identification and development of functional relationships between three variables (contingencies): environment, administration and performance variables (Luthans and Stewart, 1977). On a different line, Waterhouse and Tiessen (1978) defined two types of contingent variables: technology, which is measured according to the level of routineness, and the environment, that is reduced to predictability. The authors state that administrative functions are based on the environment, while the structure of the organization is determined by technology (Waterhouse and Tiessen, 1978). The accounting systems are seen as mechanisms that depend on the needs of each organizational sub-unit, which in turn are conditional on the organizational structure, which in turn is determined by the environment and technology.

The precepts of contingency theory began to be applied to accounting systems in the seventies (Otley, 1980, 2016). Its objective was to explain the emergence and implementation of MA tools at that time. Like organizational contingency theory, it was strongly based on the interaction of different variables to understand the use of MA tools in companies, and their impact on performance, according to specific circumstances (Otley, 2016).

In line with contingency theory for organizational structure, contingency theory for accounting systems suggests that there is no single set of accounting systems applicable to all companies at all times. On the contrary, contingency theory identifies the use of specific aspects of accounting systems that are determined by a combination of specific circumstances (Otley, 1980, 2016).

Contingency theory states that accounting practices are influenced by the environment in which companies function (Jones, 1985; Ng *et al.*, 2013). The factors (contingencies) that affect operations may be external or internal (Jones, 1985). Originally, only the uncertainty of the environment was considered as an external variable, whereas the organizational structure, the administration and the performance criteria, were factored as internal. However, other contingencies have been incorporated over time, both internal and external, such as the size of the company, its maturity, the market conditions, the culture or the profile of the owner-manager, among others (Jones, 1985; Otley, 2016).

2.1 The use and adoption of technology

This is one of the variables first applied to the analysis of the use of accounting systems (Otley, 1980). The employment of technology in production processes can have effects on efficiency, on costs, on the type of information that is generated and, therefore, on accounting systems and on the use of that information for decision-making. Daft and Macintosh (1978) were among the first to study this variable, when measuring the types of accounting systems based on four categories of technology use.

2.2 Owners/managers

There is evidence that the characteristics of the owners/managers have an impact on the design and use of accounting systems (Malmi and Brown, 2008; Hiebl, 2014; Plöckinger et al., 2016; Abernethy and Wallis, 2019). Hambrick and Mason (1984) and Bertrand and Schoar (2003) state that decision outcomes, and even performance, are strongly based on the characteristics of the top manager. Based on the upper echelon theory, Malmi and Brown (2008), Naranjo-Gil and Hartmann (2007) and Ge et al. (2011), among others, studied CEOs and CFOs and found that their characteristics, such as age, managerial tenure, education level (and background) and the family-relativeness (for family firms), are related to the design and use of management accounting tools. Concretely, they found that CEO's and CFO's age is usually inversely related to the use of accounting systems, and that their educational background also has an important effect. Higher education (especially on business) increases the probability of use of accounting systems. Additionally, Marriott and Marriott (2000), Alattar et al. (2009) and Halabi et al. (2010) found that the lack of training and skills in finance of the owner/manager, reduce the use of these tools, increasing the perception that they only serve to provide information to external stakeholders, rather than to improve decision-making. On the other hand, Plöckinger et al. (2016), on their review of the literature, report that CFOs exert a significant influence on accounting decisions, that older executives are less willing to disclose financial information, as higher tenured managers also do.

2.3 Company size

Ng et al. (2013) argue for the importance of company size in the use of accounting systems – size is usually measured by the number of full-time employees, and sometimes by revenues, or by a combination of both. Smaller companies tend to use fewer and less sophisticated accounting tools (El-Ebaishi et al., 2003; Chand and Dahiya, 2010; Neubauer et al., 2012; Lavia and Hiebl, 2015). There also seems to be consensus that the change in company size affects the use of accounting systems (Davila and Foster, 2005; Alattar et al., 2009).

Previous studies have shown that small companies, and especially microenterprises, use either very little, or no accounting tools at all (Broccardo, 2014; Da Silva et al., 2016), and that their administration is more intuitive and based on the skills, abilities, vision and opinion of the owner/manager (Cassar and Holmes, 2003; Liberman et al., 2010). It has also been pointed out that usually there is no accountant involved in the design and implementation of accounting systems (Marriott and Marriott, 2000; Carey, 2015). One of the most important factors of failure among micro and small firms, is precisely financial mismanagement, which is supported by little or outright misuse of the company's accounting and financial information (McMahon and Holmes, 1991; Dunn and Cheatham, 1993; Dyt and Halabi, 2007) and the lack of clear objectives (Peters and Buhalis, 2004).

The lack of human and financial resources (Lavia and Hiebl, 2015) involved in the company's operations, lack of administrative capacity, and limited financial resources (Broccardo, 2014), poor or null strategic planning, missing administrative systems and process management (Jennings and Beaver, 1997), and the perception that accounting

systems take away managerial flexibility, have been identified as barriers to the adoption of accounting tools in SMEs.

2.3.1 Research hypotheses. Technology in SMEs increases the possibility of firms generating financial information (Marriott and Marriott, 2000). It is considered that firms that rely on technology are more prone to use accounting systems. Access to information systems eases the implementation of IT-based accounting practices (Dyt and Halabi, 2007; Garengo and Bititci, 2007; Özdoğan, 2017), since users may shift from "constricted service opportunities, to cloud information technology, which is flexible and economic and gives opportunity to reach from everywhere" (Allahverdi, 2017, p. 94). Additionally, cloud-based accounting systems are more affordable and provide more advantages to SMEs (Christauskas and Miseviciene, 2012). Agyekum and Singh (2018) propose that changes in accounting practices as a result of adopting new technologies will increase the role of accounting in the organization, the firm's legitimacy and its performance. Fordham and Hamilton (2019) explain that most of the literature on small business assumes these firms have widely adopted computerized applications for their bookkeeping. On their research on 1,625 small business in the USA, they found that 64% of their sample did use some kind of computer-based software for their accounting (either accounting software, spreadsheets or any other kind of information system-based application). From these results the following hypothesis is derived:

H1. Microenterprises showing a higher reliance on technology are more likely to use accounting systems.

Environmental uncertainty has long been incorporated as a contingency to determine the design of accounting systems (see Lavia and Hiebl, 2015 for a list of studies using this variable as "key theme"). The uncertainty generated by the economic environment is one of the main concerns for firms in emerging economies. Gul (1991) and Alattar *et al.* (2009) related the uncertainty of the environment to the use of management accounting systems in SMEs. Both studies found that SMEs facing higher levels of uncertainty used more management accounting tools. Derived from this literature, the following hypothesis is proposed:

H2. Microenterprises perceiving higher economic uncertainty are more likely to use accounting systems.

Companies that have access to external sources of financing, are usually required to keep more formal financial and accounting records, since they have to disclose information to their creditors. Microenterprises are seldom required to disclose financial statements or to file performance reports. Most of them are only asked to submit basic information to tax authorities (Marriott and Marriott, 2000; Dyt and Halabi, 2007; Halabi *et al.*, 2010). Previous research on SMEs has found that firms with access to external financing, use accounting practices to a larger extent (Davila and Foster, 2005; Dyt and Halabi, 2007), while limited access to resources leads to lower accounting tools usage. From these results, the following hypothesis is put forward:

H3. Microenterprises with access to external funds are more likely to use accounting systems.

As companies increase their size, so does the need for accounting systems. Larger business tend to have more transactions and their operation becomes more complex, which requires tools to keep it recorded in an organized and systematic way. Previous research on SMEs has consistently found that the size of the business is a determinant on the use of accounting systems (Lavia and Hiebl, 2015; Andersen and Samuelsson, 2016; Samuelsson *et al.*, 2016). Within the group of SMEs, medium-sized companies make greater use of these practices than smaller enterprises (Davila and Foster, 2005; El-Ebaishi *et al.*, 2003; Chand and Dahiya, 2010).

Although in the case of micro-firms the variation in size is small, it is considered that in these businesses the effect of size will be relevant, since the information needs of a self-employed entrepreneur will not be the same as a business with 9 full-time workers. Considering all of the above, the following hypothesis is raised:

H4. Larger microenterprises are more likely to use accounting systems.

Along with size, Davila and Foster (2005), El-Ebaishi *et al.* (2003) and Da Silva *et al.* (2016), as well as authors reported by Lavia and Hiebl (2015) in their literature review, found that mature firms (company age) usually make more use of accounting tools than younger enterprises. From these results, the following hypothesis is proposed:

H5. Mature microenterprises are more likely to use accounting systems.

Ng *et al.* (2013) state that the life-cycle stage of the firm has an impact on the use of accounting tools. Small businesses on the growing phase may be faced with cash and investment restrictions, which, in turn, may restrict their willingness to invest in the adoption of accounting systems (Ng *et al.*, 2013). On the other hand, Alattar *et al.* (2009) report that in growing microenterprises the owners/managers are less involved in the operations of the firm and allow the possibility of implementing accounting systems. From such evidence, the following hypothesis is derived:

H6. Microenterprises in a growing stage are more likely to use accounting systems.

The entrepreneurial orientation of the owner/manager in start-ups and SMEs influences the type of decisions that are made in the company (Abernethy *et al.*, 2010; Plöckinger *et al.*, 2016; Abernethy and Wallis, 2019). Particularly regarding the implementation of accounting systems (Davila and Foster, 2005; Ng *et al.*, 2013; Plöckinger *et al.*, 2016). Berrone *et al.* (2014) claimed that in Argentinian microenterprises, self-motivation (not related to threats to job security or to being unemployed) has a positive effect on the firm's performance. Accordingly, Ng *et al.* (2013) identify that this type of entrepreneurs "will be attracted to business innovations, such as the adoption of more sophisticated management accounting practices" (Ng *et al.*, 2013, p. 97). On the back of these findings, the following hypothesis is developed:

H7. Microenterprises run by self-motivated microentrepreneurs are more likely to use accounting systems.

Personal characteristics of owners/managers impact the design and implementation of accounting practices (Bertrand and Schoar, 2003; Hiebl, 2014; Plöckinger *et al.*, 2016, Abernethy and Wallis, 2019). In particular, microenterprises are very dependent on their characteristics, skills and attitudes (Marriott and Marriott, 2000; Alattar *et al.*, 2009; Halabi *et al.*, 2010; Gherhes *et al.*, 2016). Companies with less educated owners/managers, especially in accounting and finance, tend to only marginally use accounting tools (Perren and Grant, 2000; Alattar *et al.*, 2009; Halabi *et al.*, 2010; Gherhes *et al.*, 2016), while enterprises with higher educational background (especially in business) use significantly more accounting systems (Naranjo-Gil *et al.*, 2009; Pavlatos, 2012). From these results, the following hypothesis is proposed:

H8. Microenterprises with owners/managers with a higher level of formal education are more likely to use accounting systems.

Hand in hand with education, age is one of the personal characteristics of owners/managers that impact the design and use of accounting systems (Plöckinger *et al.*, 2016; Abernethy and Wallis, 2019). Research based on the upper echelon theory and the manager effects have found that younger, less tenured CFOs are more prone to use accounting tools (Pavlatos, 2012). In the case of CEOs, although evidence is not so solid, it points toward the same

direction (Naranjo-Gil *et al.*, 2009; Abernethy *et al.*, 2010). These findings are consistent with those of Gherhes *et al.* (2016), who report that in many cases the age of the owners/managers is negatively related to growth intentions. For Ng *et al.* (2013), small business' entrepreneurs, once they get "satisficing profit levels," the adoption of (further) accounting practices is not attractive. Microenterprises, given their size, are particularly dependent on the owners/managers' personal traits. Based on previous research on small business and SMEs samples, the following hypothesis is posed:

H9. Microenterprises with younger microentrepreneurs are more likely to use accounting systems.

Gherhes *et al.* (2016) found on their review of the literature, that micro-firms in which the owner/manager is responsible for running and managing the whole organization, her capabilities are critical for the growth of the enterprise. Lower use of accounting practices has been found to be related to lack of training of the decision-makers (Alattar *et al.*, 2009; Halabi *et al.*, 2010). From this evidence, the following hypothesis is raised:

H10. Microenterprises with owners/managers that received training are more likely to use accounting systems.

3. Methodology
3.1 Data collection and sample
Although there is no universal definition of a microenterprise (OECD, 2010; Shields and Shelleman, 2016), since it depends on the different criteria applied in different countries or regions, there are some similarities among them. Most definitions consider microenterprises those economic units which have a combination of 1 to 10 employees (including the owner), and a certain amount of annual sales. There are important differences on the determination of revenues to be considered a microenterprise. This paper follows the Chilean criteria established by the Ministry of Economy, according to which a microenterprise has from 1 to 9 employees (plus the owner), and annual sales of up to 2,400 UF [1] (Ministry of Economy, 2020).

The data used in this study were sourced from the EME of Chile. The survey is conducted by the Chilean National Institute of Statistics (INE) every two years since 2013. The microdata are publicly available through the Institute's Web page (https://www.economia.gob.cl/category/estudios-encuestas-emprendimiento) for the 2013, 2015 and 2017 editions.

This study builds on the 2017 survey, the latest available at the time of this research. The survey has national coverage and is designed to be representative both nationally and regionally. The INE selected its sample following a biphasic methodology. On the first phase, units were selected using a stratified probabilistic and two-staged sampling process using the 2017 Employment National Survey as a reference. On the second phase, households with a microentrepreneur were chosen as the target population. Next, microentrepreneurs were selected randomly by number of workers and different economic activities. The theoretical sample consisted of 8,199 observations, with a 95% of confidence and an expected absolute error of 1.17% proportionately distributed among the 15 regions of the country. The survey was conducted to the entrepreneur, reducing the threat of halo bias (Speklé and Widener, 2018), at her house, with an expected response rate of 88.7%, which is well above the average response rate for survey-based management research (Hiebl and Richter, 2018). In order to compensate for the lack of response, a propensity score methodology was employed (Instituto Nacional de Estadísticas, 2017), and a final sample of 7,493 observations was achieved. High response rates and probabilistic samples increase the representativeness of the sample and

allows for statistical inference to be made (Van der Stede *et al.*, 2005; Hiebl and Richter, 2018) and reduce sampling biases (Speklé and Widener, 2018).

Given that the objective of the EME is to carry out a deep characterization of microenterprises nationwide, providing insight on the limitations and the initiatives that the smallest economic units (limited to 10 employees, including the owner) may undertake to develop further (Instituto Nacional de Estadísticas, 2018), the sample design reflects an appropriate and proportional distribution of the characteristics of the population (Speklé and Widener, 2018).

Once the relevant variables were calculated, the data were cleaned. This process consisted of verifying that all the observations were complete, that is, eliminating those that did not have values for all the variables (i.e. surveys with incomplete responses). The original sample had 7,493 microenterprises, and we ended up with 7,013. Following Chang *et al.* (2014), no significant differences were found between observed means and the expectation-maximization (EM) estimates of missing values means and standard deviations. Therefore, it can be trusted that the deletion of incomplete-case observations does not bias the study.

3.2 Variables

3.2.1 Dependent variable. The use (adoption) of accounting systems was measured using the question "Do you keep any type of accounting registration for your business, company or economic activity?". It was considered as positive if the respondent either declared to use a formal accounting system, or a personal registry of her transactions. Conversely, it was recorded as negative if the respondent declared not to keep any record. Those who declared not to know or did not answer, were eliminated from the sample.

3.2.2 Independent variables. To capture the full dimension of technology use by the microenterprise, we developed an index. Initially, four elements from the survey were considered for its construction: Internet use in the business; use of computers, notebooks, tablets or smartphones; use of machinery or specialized equipment; and use of other type of equipment or tools. The index was constructed using a confirmatory factor analysis. As a result, the use of technology construct was composed only by the internet use in the business and use of computers, notebooks, tablets or smartphones elements. To verify the consistency of the index, the Cronbach's alpha was calculated, with a value of 0.764. The composite reliability was 0.8939 and the average variance extracted was 0.8082. Only 9% of the microentrepreneurs considered in the sample declared to use the 4 types of technology, whereas 14% answered not to use any technology at all in their activities.

Access to external funds was constructed as a dichotomous variable, considering whether the respondents had access, in the last 12 months, to any kind of credit or support program from public or private institutions (bank, mortgage, commercial, particular lender, NGOs, friends, relatives or government institutions).

Training was measured as a dichotomous variable as well, upon the respondent (owner/manager) having received any training relevant for her business, organization or economic activity, during the previous 5 years.

Entrepreneurial motivation was also calculated as a dichotomous variable, in which 1 was given to the entrepreneurs that declared being unemployed (losing their job or not finding a new job) as the main motivation for starting their business, and 0 otherwise (identifying a business opportunity, family tradition, etc.).

Environment uncertainty was likewise calculated as a dichotomous variable, considering those micro entrepreneurs that declared economic uncertainty as the most important feature that restricts their business growth.

Years of operation measures the number of years since the microentrepreneur started her business; number of employees is the total number of full-time employees the microenterprise

had during the last 12 months; the "growing" variable was calculated as a dichotomous variable considering whether the entrepreneur was looking to employ new workers in the 12 months following the survey; the education level of the owner/manager was determined as a scale with a higher value associated to a higher education level; age of the owner/manager is the age reported by the microentrepreneur when she was interviewed.

4. Results

From the sampled microenterprises, 43% have an official tax registry (i.e., are formally constituted); 50% of them utilize some type of accounting system; regarding the location of the economic activity, 20% of the sample carried out their activities in facilities or offices outside their home, 29% at their home, 18% at their clients' home or business, 13% on the street or public highway and the rest in other types of facilities, such as vehicles or construction sites; 29% of the microenterprises belong to the commerce industry, 24% to services, 14% to manufacturing, 11% to construction, and the rest to other activities, such as transportation, storage, and real estate. Most firms can be considered as mature, since 45% are more than 10 years old and 30% are less than 4 years old.

Regarding the characteristics of the owners/managers, 14% have a higher education degree, 16% have a postgraduate degree, while 53% have a basic education or less; 20% declared having received training in the last 5 years on the economic activity they carry out. On the other hand, 24% of the microentrepreneurs are between 45 and 54 years old, and 24% are between 55 and 64 years old. Only 33% are under 45 years of age.

Regarding their funding and relationship with the financial system, 78% of micro-firms do not have access (do not use) to any type of external funds (credits or loans from financial institutions, friends, or other types of lenders neither receive funds from the government or NGOs). Finally, regarding the use of technology, 49% of the micro-firms use some type of computer, notebook, tablet or smartphone, 41% declare to use the internet in their business, 41% use a vehicle for the company, 53% have some type of machinery or specific equipment and 41% other type of valuable equipment or tools. Table 1 shows the descriptive statistics of the variables.

To test the research hypotheses, a logistic regression model was used for the dependent variable and the independent variables as stated above. In order to assess for potential multicollinearity issues, a correlation matrix is introduced in Table 2, since variance inflation factors are usually not observed for logistic regression models. Coefficients shown in Table 2 suggest the absence of multicollinearity conflicts.

	N	Min	Max	Mean	SD
Owner education	7.013	0	13	4.7978	2.235
Owner training	7.013	0	1	0.2120	0.409
Bus maturity	7.013	0	75	14.1035	13.265
Access funds	7.013	0	1	0.2183	0.413
Num employees	7.013	0	10	0.6043	1.320
Bus growing	7.013	0	1	0.1774	0.382
Techno use	7.013	−1.0059	1.2355	−0.0007	1.0005
Eco environment	7.013	0	1	0.1593	0.366
Entre motivation	7.013	0	1	0.1020	0.303
Owner age	7.013	16	90	50.9134	14.015
Acct use	7.013	0	1	0.4808	0.500

Table 1.
Descriptive statistics of the variables

		Owner age	Acct use	Owner education	Owner training	Bus maturity	Access funds	Bus growing	Techno use	Economic environment	Entrepreneurial Motivation	Number of Employees
Owner age	Pearson correlation	1										
	Sig.											
Acct use	Pearson correlation	-0.030*	1									
	Sig.	0.013										
Owner education	Pearson correlation	-0.227**	0.276**	1								
	Sig.	0.000	0.000									
Owner training	Pearson correlation	-0.081**	0.135**	0.139**	1							
	Sig.	0.000	0.000	0.000								
Bus maturity	Pearson correlation	0.518**	-0.038**	-0.152**	-0.056**	1						
	Sig.	0.000	0.000	0.000	0.000							
Access funds	Pearson correlation	-0.041**	0.229**	0.052**	0.076**	-0.030*	1					
	Sig.	0.001	0.000	0.000	0.000	0.015						
Bus growing	Pearson correlation	-0.135**	0.200**	0.127**	0.102**	-0.056**	0.123**	1				
	Sig.	0.000	0.000	0.000	0.000	0.012	0.000					
Techno use	Pearson correlation	-0.312**	0.305**	0.495**	0.163**	-0.187**	0.109**	0.222**	1			
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
Economic environment	Pearson correlation	0.010	0.129**	0.121**	0.031*	0.015	0.087**	0.015	0.091**	1		
	Sig.	0.404	0.000	0.000	0.010	0.219	0.000	0.204	0.000			
Entrepreneurial motivation	Pearson correlation	0.000	-0.087**	0.002	-0.048**	-0.035**	-0.035**	-0.037**	-0.005	-0.006	1	
	Sig.	0.997	0.000	0.894	0.002	0.003	0.003	0.002	0.698	0.599		
Number of employees	Pearson correlation	-0.005	0.300**	0.174**	0.055**	0.031**	0.206**	0.235**	0.239**	0.096**	-0.054**	1
	Sig.	0.666	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	

Note(s): *. Significant to the 0.05 level, **. Significant to the 0.01 level

The results presented in Table 3 show that the contingencies included in the model and the personal characteristics of the owners/managers are all significant for the probability that a microenterprise will use an accounting system. Table 3 presents both the coefficients of the regression and the odds ratios for each variable.

The results show, consistently, that the contingency variables considered are strongly significant ($p < 0.01$). Access to external funds, business size (number of full-time employees), business cycle (business growing), the perception of the economic environment, the use of technology, owner's training, owner's education and owner's age have a positive effect on the use of accounting systems, whereas the entrepreneurial motivation and the business' maturity (years of operation) have a negative effect. Access to external funds and the size of the business have the strongest effect on the probability of a microenterprise using accounting systems (odds ratios are the largest of all variables in the model).

In the case of owner's age and business maturity, the coefficients are significant, but the influence of these variables on the use of accounting systems is almost null (odds ratios are very close to 1). In the case of the entrepreneurial motivation, the coefficient is significant with a negative sign. Being unemployed as a reason to start a microenterprise (negative motivation) increases the probability of not implementing any kind of accounting systems by 1.70 times (odds ratio is 0.5869).

5. Discussion of findings

This paper examined the factors that influence the adoption of accounting systems by microenterprises. Previous research on this topic ignored micro-firms, or when considered, they were bundled together with SMEs, overlooking that microenterprises are not just smaller SMEs, but very different organizations (Dyt and Halabi, 2007; Alattar *et al.*, 2009; Sian and Roberts, 2009; Liberman *et al.*, 2010; Berrone *et al.*, 2014; Shields and Shelleman, 2016). The results of studies on SMEs suggest that the use of accounting tools is very limited and basic (Dyt and Halabi, 2007). Half of the microenterprises in the sample declared to keep some sort of accounting records.

The predictions of hypotheses H1 to H6 confirm the effect of the contingency variables on the probability of using accounting systems in microenterprises. The results indicate that they are not only significant, but also greatly influence the likelihood of a microenterprise using accounting systems. This evidence is in line with contingency theory and previous research on SMEs (Lavia and Hiebl, 2015; Otley, 2016). As expected, relying on technology facilitates the implementation of accounting systems, and this is reflected in the value of the

Variable	Coefficient	Odds-Ratio	z	P > z
Techno use	0.37300	1.45208	11.47	0.000
Eco environment	0.45389	1.57443	5.93	0.000
Access funds	0.89491	2.44712	12.92	0.000
num employees	0.68484	1.98345	16.79	0.000
Bus maturity	−0.00568	0.99434	−2.36	0.000
Bus growing	0.57301	1.77359	7.39	0.000
Entrepr motivation	−0.53283	0.58694	−5.71	0.000
Owner education	0.17589	1.19231	12.04	0.000
Owner age	0.01726	1.01741	7.26	0.000
Owner training	0.32678	1.38650	4.81	0.000
Constant	−2.38545	0.09205	−16.77	0.000
# obs.	7,013			
Pseudo R2	0.1891			

Table 3.
Coefficients of the logit regression

odds ratio. Furthermore, the results suggest that counting more on the use of technology increases the likelihood of implementing accounting systems. This is important, because to our knowledge, this issue has not been addressed before in microenterprises.

On the other hand, the results obtained also support the claim that access to external funds has a very significant influence on the use of accounting systems. This variable has the largest weight on the probability that microenterprises use accounting systems. Dyt and Halabi (2007) indicate that microenterprises do not generate accounting and financial information for decision-making – partly because they do not have to keep accounting books for tax purposes, but to comply with the requirements of external creditors. The notion that the business skills of the owners/managers are influential for the use of accounting systems (Greenbank, 2000; Halabi *et al.*, 2010; Gherhes *et al.*, 2016) is also supported. The findings point at access to training in the last 5 years as an important driver (odds ratio of 1.3865).

The uncertainty of the economic environment also played an important role for the microenterprise to utilize accounting systems. Gul (1991) and Alattar *et al.* (2009) found that higher levels of environmental uncertainty increase the use of accounting systems. The findings are also consistent with previous literature. Firms considering the uncertainty of the economic environment as a threat are more likely to use accounting systems.

Entrepreneurial orientation is deemed relevant for the decision making of SMEs on the use of management accounting tools (Davila and Foster, 2005; Hiebl, 2014). However, there was no data to measure it. Instead, a similar approach to that of Berrone *et al.* (2014), who argued that entrepreneurial motivation was a determinant for Argentinian microenterprises' performance, was used. The results show that motivation is, indeed, a factor that increases the likelihood of using accounting systems for Chilean microenterprises. This supports the notion that the entrepreneurial orientation of the owner-manager is relevant for the implementation of accounting systems.

The notion that company size influences the use of accounting tools (El-Ebaishi *et al.*, 2003; Chand and Dahiya, 2010; Neubauer *et al.*, 2012; Lavia and Hiebl, 2015) is supported, since the coefficient of the number of employees is statistically significant, with an important weight (the second largest odds ratio).

Our results, however, do not support the findings of previous studies regarding the maturity of companies. Lavia and Hiebl (2015) and Da Silva *et al.* (2016) point out that mature companies tend to use, in general, more accounting tools than start-ups. The indicators in Table 3 show that, in the case of microenterprises, the relationship between the maturity of the companies and the use of accounting is negative, which contradicts previous research, even if the influence of this variable is practically null (the odds ratio is 0.9943). One possible explanation is that given by Ng *et al.* (2013), who state that some small business entrepreneurs may be guided by a satisficing profit level. Once that level is reached, there is no attractiveness on implementing further measures/systems to improve the business' efficiency. This is a possibility for the sample used, since the average firm is 14 years old, and only 30% of the enterprises have less than 4 years in business.

The expectation that microenterprises in a growing stage are more likely to use accounting systems (Alattar *et al.*, 2009) to manage that expected growth is supported too. For the sample analyzed, the coefficient is positively related, and the odds ratio also indicates that it has an important weight on the probability of using accounting systems (third largest odds ratio).

On the other hand, the variables related to personal characteristics of the owners/ administrators (education level and age) support partially the results from previous research. In the case of the education level, the variable is relevant to the probability of use of accounting systems. The odds ratio indicates an influence of 19%. This is consistent with findings based on the upper echelon theory (Naranjo-Gil *et al.*, 2009; Pavlatos, 2012). On the other hand, the coefficient of the owner's age variable indicates that older owners/managers

are more likely to use accounting systems. This result is not consistent with previous research on SMEs. Hiebl (2014) report consistent findings based on the upper echelon theory indicating that younger CEOs and CFOs are more prone to implementing accounting practices, while Abernethy and Wallis (2019) report that CEO age is associated to better financial reporting quality. One possible explanation would be that as young microenterprises (and microentrepreneurs) enter a growing stage, daily transactions become more complex and the need for a systematic, organized bookkeeping system arises, increasing the likelihood that accounting practices are adopted.

6. Conclusions, limitations and future research

The importance of microenterprises in the economy, especially in emerging countries, is undeniable. However, they arguably remain under-researched. In this paper we analyzed the determinants of the use of accounting tools. For this, the contingency theory framework, and the upper echelon theory approach were applied, and it was found that the contingencies and the personal characteristics of the owners/managers included in the analysis are not only significant, but also have an important weight in the probability of adopting accounting systems in microenterprises.

Access to external funds, firm's size, business cycle-stage, the perception of the economic environment, the use of technology, owner's training and owner's education have a positive effect on the use of accounting systems and are consistent with previous research on SMEs, whereas the entrepreneurial motivation has a negative sign and coincides with prior findings on microenterprises. On the other hand, owners/managers' age increases the likelihood of using accounting systems, while the firm's maturity reduces it. These last two results are not aligned with previous findings on SMEs, which may be indication that even though microenterprises are usually considered SMEs, they may have different traits. This, to our belief, justifies further research.

This paper contributes to research by arguably being the first study to confirm that contingency theory does explain the adoption of accounting systems in microenterprises in emerging countries, and also the first to include upper echelon theory precepts to analyze the effect of the personal characteristics of owners/managers on microenterprises. This is relevant, since microenterprises are not just a smaller version of larger firms. Their (limited) structure and access to both human and financial resources make them behave differently. The study contributes to a better understanding of microenterprises, and of the factors that determine the use of accounting systems. The results highlight that public policies aimed at fostering microenterprises should facilitate access to external funds, technology (i.e., cloud-based affordable applications) and to increase the capabilities of owners/managers. As claimed in previous studies, this paper highlights the importance of training owners/managers on issues related to their business. This supports the relevance of training programs specifically designed for the particular needs of microenterprises, coupled with monitoring schemes.

This research is not free of limitations. The study was conducted in an emerging economy, which has been highlighted as a research opportunity in prior research. However, it would be interesting to extend this research with comparative studies, either across emerging markets of different latitudes or with developed countries. Moreover, there was no way to fully incorporate a measurement of the entrepreneurial orientation of the owner-managers, which is considered to be relevant for decision-making. Instead, entrepreneurial motivation was used. This may not fully show the effect of the entrepreneur's style and overall orientation and may distort the results. Additionally, this paper incorporated a proxy to measure the importance of environmental uncertainty, which is a central variable of the contingency theory. However, given the limited information available, the data used might not reflect the

real effect of this factor, which may affect the results. It is likely that there are other variables that also influence the probability of using accounting tools. This is suggested by the parameter of the constant term of the regression.

Avenues for future research are also open. First, although contingency theory helps to explain to a large extent the adoption of accounting systems, it would be interesting to extend the analysis to aspects related to the environment, not only external to the company, but also to the microentrepreneur's family, considering many micro-firms may be family businesses. Using a different theoretical approach, such as the socioemotional wealth theory, may complement our findings. Next, given the great heterogeneity of microenterprises, and their dependence on the owner/manager, it would be very illustrative to fully analyze the impact of the entrepreneur's orientation on the use of accounting tools. Furthermore, this study would be greatly complemented by the analysis of the impact of accounting systems on the performance of microenterprises. One possibility to do so would be by using the net margin or return on investment to measure it through labor productivity or using an efficiency approach.

Note

1. UF stands for Unidad de Fomento (Unit of Promotion), which is a non-physical monetary unit that is used to adjust commercial, banking and accounting transactions. This monetary unit is backed by the Chilean peso and is constantly re-valuated according to the inflation rate.

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