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Correlates of business survival: empirical evidence on youth-owned micro and small enterprises in Urban Ethiopia

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Abstract

This paper investigates the effects of person-, firm-, industry-, and business strategy-specific characteristics on the survival of youth-owned urban micro and small enterprises in Ethiopia. It employs nonparametric and semi-parametric methodologies using a retrospective data. The hazard rate reaches the highest point at business 2 years for micro enterprises and 4 years for small enterprises. Owner-, firm-, and industry-specific characteristics are important factors for micro and small enterprises' (MSEs') survival. Marketing and financial management strategies are playing a crucial role on extending MSEs' survival duration. The study implies there should be more effective and longer period of support for micro than small enterprises.

JEL classification: C14, C41, D21, J23, L26, M21

Keywords: Youth self-employment, Micro- and small-scale enterprises, Hazard model

1 Introduction

The co-existence of micro and small enterprises (MSEs) can be interesting; concomitantly, the performance of MSEs in terms of survival and growth needs to be assessed in detail. Identifying the growth and survival factors of MSEs is important as it establishes the base for preparing a policy framework and strategy that safeguards the success of MSE operators. However, there are few detailed studies, particularly survival analysis, which identify the factors influencing the survival of MSEs, in general, and youth-owned MSEs, in particular. Moreover, there are hardly research outputs intended to identify factors influencing the survival of MSEs in Ethiopia using firm-specific data. Thus, the existed knowledge gap and the focus for the sectoral development motivated us to empirically analyze the factors associated with the risk of dropout of MSEs in Ethiopia.

The paper intends to identify how the socio-demographic and economic characteristics of the owner- and firm-level attributes at start-up phase are associated with the survival of youth-owned MSEs. Specifically, the objectives of the paper are (1) to investigate the effect of owner- and firm-specific attributes on MSEs' survival, (2) to analyze how strategic thinking and systematic decision-making are partly responsible for the failure or success of entrepreneurs, and (3) to identify owner, firm, industry,

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and business strategy characteristics that can explain the difference among micro and small enterprises' survival rate.

The present paper uses a nationwide but urban-based representative cross-sectional survey data which is rich with retrospective information. We apply nonparametric and semi-parametric survival models to study and assess the relative strength of the associated factors with survival of the MSEs and estimate the survival rate.

There are major concerns why firms eventually fail to become established firms. Extensive theoretical and empirical literature in developed economies have identified micro-level factors, determining the emergence and success of enterprises. Most of the studies have shown that owner- and firm-related characteristics are the basic factors that determine the success of a firm (see, e.g., Bruderl et al. 1992; Storey 1994; Coleman et al. 2010). These characteristics are typically identifiable prior to the start-up and comprise personal and psychological characteristics, such as gender, education and training, entrepreneur's mind setup, previous work experience, and ethnicity.

Most studies indicated that women-owned firms perform less in terms of different performance measures, such as number of employees (Rosa et al. 1996), revenue (Rosa et al. 1996; and Brush et al. 2003), and profitability and survival (Fairlie and Robb 2008). Some empirical analyses suggested that owner's/manager's age tends to be negatively related to risk of dropout (see Bates 1998; van Praag 2003). In contrast, there are empirical evidences that prove the negative association of owner's/manager's age with the growth of small firms (see Boswell 1973; Davidsson 1991; Amran 2011).

The owner's human capital quality, which can be measured by education, prior work, and managerial experience, is also pointed out as a positive factor for the performance of firms (see, e.g., Schiller and Crewson 1997; Honig 1998; Chandler and Hanks 1998; Kangasharju and Pekkala 2002; Pena 2002). Cowling (2009) has found a positive effect of school-based entrepreneurial training on job creation by small firms in the UK. He also found a positive relation between entrepreneurs who received government-backed entrepreneurial training and exporting intensity of small firms.

The size of a start-up has been considered as a key factor for self-employment survival, and it is widely documented that larger size entry is a signal of commitment and self-confidence, which reduces the occurrence of an entry mistake and the risk of a failure due to diseconomies of scale (Mata et al. 1995; Agarval and Audretsch 2001). Extensive empirical works also focus on assessing the impact of industry-specific features on start-up success and reveal the presence of relationship between firm's success and the type of the sector the firm is operating, level of competition within the industry, linkage, market, and technological change and innovation (see Bruderl et al. 1992; Audretsch and Mahmoud 1995; Mata and Machado 1996; Headd 2000; Bates 2005; Carter and Van Auken 2006). For example, Coleman et al. (2010) indicated that firms involved in retail and service sectors are more prone to failure due to low barriers to entry and high levels of competition.

In the contemporary, global, dynamic business environment, strategic thinking and systematic decision-making are also important for the growth and survival of small enterprises (see Dobbs and Hamilton 2007; Skrt and Antoncic 2004). The characteristics of business management strategies, including marketing and financial management, are found to have a strong positive relationship with business performance (O'Dwyer et al. 2009).

A small business in which the owner reinvests retained earnings has the propensity to grow more than businesses that are not willing to reinvest (Fadahunsi 2012). Consistently, internal financing is presumed as the main reason for the success of most firms in the USA (Carpenter and Petersen 2002). The study by Read (1998) showed that over half of her total sample of small firms in the UK suffered from being undercapitalized. Moreover, evidences highlighted that internal control, including financial report and inventory management, allows a business to enhance effectiveness and gain competitive advantage (see Moores and Mula 1993; Mongare and Nasidai 2014).

Currently, MSEs in Ethiopia are becoming important vehicles to create new jobs for millions of unemployed youth (FeMSEDA 2014). Despite the focus given to the sector, a large number of MSEs are expected to eventually close or stagnated at starting phase. As reports and studies documented, there are internal and external factors which pervasively hamper the productivity improvement and survival of the MSEs; shortage of working capital, a lack of marketing skills, poor location of business sites, failure to take risk, and over emphasis on short-term profit are internal factors affecting the survival rate of MSEs. In addition, a lack of access to efficient infrastructure and factor of production, a nontransparent regulatory environment, bureaucracy burden, high incidence of bribing, and a lack of appropriate skills and training are also documented as external factors hindering the success of MSEs (see World Bank 2014; Dayanandan 2012; Bigsten et al. 2010 and FeMSEDA 2014). Hence, it is worth to investigate the explanatory factors that influenced the survival and exit of businesses using a micro dataset which is representative. The paper is organized as follows: Section 2 presents the econometric model specification employed in the paper. Section 3 presents the data and descriptive statistics. Section 4 reports the empirical results and interprets the estimated parameters. Section 5 presents the conclusion remark and the policy implications.

2 Empirical model specification: survival models

Survival rate is often the most practical index to measure the success of a firm. The analysis examines the elapsed time since the entry to the state at time $t = 0$. The present paper specifies a survival model that accounts for the sequential nature of the data and is able to handle censoring.

Let T represents survival time and is a random variable with a cumulative distribution function $F(t) = \Pr(T \leq t)$ and a probability density function $f(t) = dF(t)/dt$. The reverse cumulative distribution function of T provides a new function called survival function $S(t)$, and it is defined as

$$S(t) = \Pr(T > t) = 1 - F(t). \tag{1}$$

The hazard rate, the instantaneous risk of demise at time t conditional on the firm having survived up to that point in time, is the motive to be estimated in our survival analysis. The hazard function is an absolute slope of log survival function and it is defined as follows

$$h(t) = \frac{f(t)}{1 - F(t)} = -\frac{d \ \ln S(t)}{dt} \tag{2}$$

and the cumulative hazard function $H(t)$ is

$$H(t) = -\ \ln S(t). \tag{3}$$

The survival function describes the probability of surviving past time t. The hazard function describes the relative likelihood of the event occurring at time t, conditional on the subject's survival up to time t. The hazard rate shows the instantaneous rate of failure at time t and ignores the accumulation of hazard up to time t (see Jenkins 2004 for details).

The present paper utilizes both nonparametric and parametric models to analyze the survival rate of MSEs in urban Ethiopia. We estimate the nonparametric survival and cumulative hazard analysis using the Kaplan-Meier method. The paper uses the Kernel-smoothed hazard estimation method for smoothed hazard analysis, as it efficiently detects the times where the most rapid changes of the hazard function occur.

2.1 Nonparametric approach

The above modeled survival and hazard functions can be estimated without making assumptions about the shape of the relevant functions. The Kaplan-Meier estimator is a nonparametric estimator that does not make any assumptions about the distribution of exit times and how covariates shift the hazard functions (Jenkins 2004). Hence, the proportion of surviving to survival time t_j and the corresponding integrated hazard function is estimated by

$$\hat{S}(t_j) = \prod_{j|t_j \le t} \left(1 - \frac{d_j}{n_j}\right) \tag{4}$$

$$\hat{H}(t_j) = -\ \ln \hat{S}(t_j) \tag{5}$$

where d_j denotes the number of failed enterprises at t_j and n_j is the number of enterprises at risk of failure immediately prior to t_j and defines as the sum of those who have a censored or completed spell of length t_j or longer. The Kernel-smoothed estimator is a weighted average of $\Delta H^{\wedge}(t)$ over event times that are within a bandwidth distance b of t. The Kernel-smoothed estimator considers the jumps of $H^{\wedge}(t)$ and variance of $H^{\wedge}(t)$ at the event times as follows:

$$\begin{aligned} \Delta \hat{H}(t_j) &= \hat{H}(t_j) - \hat{H}(t_{j-1}) \\ \hat{V}\left(\hat{H}(t_j)\right) &= \hat{V}\left(\hat{H}(t_j)\right) - \hat{V}\left(\hat{H}(t_{j-1})\right) \end{aligned} \tag{6}$$

where $t_0 = 0$.

As the effect of an enterprise's initial size on its survival probability is one major objective of our paper, we grouped the dataset into micro and small enterprises. Accordingly, for ease of interpretation, we grouped enterprises into 6-month intervals and execute the so-called Lifetable estimator. In essence, the Lifetable estimator processes the same idea as the Kaplan-Meier method, but it was explicitly designed to handle situations where there is grouped survival time data.

2.2 Semi-parametric hazard model

The focal point in our survival analysis is the hazard function, allowing for time invariant covariate effects as an econometric framework. The Cox proportional hazard model

has considerable flexibility and is the most widely used hazard regression model in empirical studies. This model, proposed by Cox (1972), enables us to estimate the relationship between the hazard rate and covariates without having to make any assumptions about the shape of the baseline hazard function, referring to the model as a semi-parametric model.

A survival model examines the relationship between the survival distribution and the covariates and mostly entails the specification of a linear-like model for the log hazard.

$$\begin{aligned} \log h_j(t) &= \alpha + \beta_1 x_{j1} + \beta_2 x_{j2} + \ldots + \beta_k x_{jk} \\ h_j(t) &= e\left(\alpha + \beta_1 x_{j1} + \beta_2 x_{j2} + \ldots + \beta_k x_{jk}\right) \end{aligned} \tag{7}$$

where x's are the covariates and α represents a log-baseline hazard because if all x's are zero, then $h_j(t) = e^{\alpha}$. The Cox model leaves the baseline hazard function $\alpha(t) = \log h_0(t)$ unspecified. Thus, the hazard function is parameterized as follows:

$$h_j(t) = h_0(t) e^{\left(\beta_1 x_{j1} + \beta_2 x_{j2} + \ldots + \beta_k x_{jk}\right)} \tag{8}$$

where $h_0(t)$ is the so-called baseline hazard which depends only on t. The change in the explanatory variables, therefore, induces multiplicatively proportional shift in the hazard rate relative to the baseline hazard. This implies that the model assumes that the hazard functions of any individuals with different values on one or more covariates differ only by a factor of proportionality.

Based on Eq. (8), the hazard ratio for two individuals, j and i, is defined as follows:

$$\frac{h_j(t)}{h_i(t)} = \exp\left\{\beta_1\left(x_{j1} - x_{i1}\right) + \beta_2\left(x_{j2} - x_{i2}\right) + \ldots + \beta_k\left(x_{jk} - x_{ik}\right)\right\} \tag{9}$$

where the hazard ratio is independent of time t. In the way to compute the hazard ratio, the baseline hazard h_0 cancels out of the computation, implying that the relationship between the hazard rate and the explanatory variables is estimated without taking h_0 into account. Consequently, the Cox model becomes a proportional hazard model, but the proportional hazard assumption should be tested.

Instead of the maximum-likelihood method, the Cox model can be estimated by the method of partial likelihood (PL), because it requires less assumption and so is more robust (Fox 2002). The Cox PH estimation function is "partial" likelihood function because it only considers probabilities for failed events explicitly, referring that the baseline hazard function is removed from the estimation process. The estimation process started by sorting the ordered failure times and PL is derived from the product of the conditional probability of a failure time, given the risk set at that time and that one failure is to happen. Hence, the PL only considers the contribution from failure times, not from the right-censored times (we are referring the cases). This implies that the Cox model is conspicuously ignoring all information available at times when no failure occurs. Cox (1972) has found little efficiency loss due to ignoring spells in which no failure occurs.

3 Data and descriptive statistics

3.1 Data

The dataset of many empirical studies on the survival of enterprises is derived from panel and cohort surveys and/or a database administered by a recognized office, usually

government offices. However, there are two basic problems using the formal registration database of MSEs collected by the Federal Micro and Small Enterprises Development Agency (FeMSEDA) in this particular study. Firstly, the existing registry of MSEs is based on information obtained during the formal registration of the enterprises, and yet most of the enterprises are informal and/or not registered by the agency. Secondly, it mainly provides details of the business, such as registered address, setup date, industry type, ownership type, start-up capital, to date capital, and firm size during the start-up. Thus, it was found to be inadequate in terms of providing all the required information and current status of the MSEs to undertake a survival analysis.

To this end, this study employs information from the "youth self-employment" survey collected by the Association of Ethiopian Microfinances Institutions (AEMFI), which has details on the parameters required for a survival analysis of MSEs in Ethiopia. The youth self-employment research project primary concern was to obtain fresh information and evidence on strategies and policies that enhance youth self-employment within the framework of MSE development in Ethiopia. The survey collected quantitative information of the sampled MSEs on their current status; profiles; retrospective information about the initial start-up data, including owner- and firm-level characteristics; and ongoing and past business strategies since start-up.

The stratum was regions (Tigray, Amehara, Oromia, SNNP, and Hareri) and two city administrators (Addis Ababa and Dire Dawa). The survey focused on all regional capital cities and the two city administratives (Addis Ababa and Dire Dawa). In addition, two towns from each big-four region were selected based on their economic activity and population size that they had proportion to the total urban population. Hence, 15 major urban centers were included directly in the sampling strategy given that they constitute about 91% of the Ethiopian urban population, and these are the major private sector hubs throughout the country.

Regional sample size was disaggregated to the urban areas by purposeful proportion allocation; regional capital cities had 50% of the total sample size allocated for the region while the two towns accounted for 25% each. We hypothetically drew a 200-m-radius grid, which was an enumeration area (EA) for the survey, from the city midpoint. We preferred urban centers based on a mere assumption that household members in these areas are engrossed in self-employment. Hence, households within the EA were the data frame from this particular survey.

Randomly selected households were screened through listing questionnaire before a member is selected for the main survey. The listing questionnaire had a filter question to classify the members for existed or closed enterprise sampling. The key filter questions included the following: whether there is a member who is currently operating a micro or small enterprise and whether there is a member who had started but closed a business for any reason but due to business challenges before today. In case of multiple MSE operators and/or dropouts within a selected household, only one household member was selected for the interview.

The survey employed a population sampling process, implying both existing enterprises—the start-ups observed at the time of the survey—and closed enterprises—the start-ups that have been already dropped out at the time of the survey—were interviewed. Closed firms, in this particular study, refer to those that have discontinued their operations, which included enterprises sold, bankrupted, and merged with other enterprises due to business challenges.

A multi-stage sampling technique (with stratification by gender, enterprise size, and industry type) was applied to randomly selected 1109 enterprises from existing and closed MSEs owned by the youth (ages ranging from 18 to 34 years). The enterprises operating during the survey were 909, and the already closed were 200. Sampled enterprises were distributed across different industries such as agriculture, manufacturing, and services. To make the sample representative of all sectors, attempts were made to take proportional samples from enterprises who are engaged in manufacturing, service, trade, and urban agriculture. Moreover, stratification was made by gender of the owner and the enterprise size (micro and small). The federal and regional MSE development agency/bureaus played a key role in facilitating the entire sampling strategy.

Existing enterprise owners and those who closed their business were asked about the specific date of business start-up and exist date, in case the start-up had already closed. This information allowed the researchers to establish a business operation spell for each firm, and the spell might be either completed or right-censored at the time of survey. The established spell is the dependent variable with a value of 1, if the spell is right-censored, and 0, if the spell is completed. The survey had also detailed information on the socio-demographic and economic background of the owner/manager, as well as firm, industry, and business strategy characteristics. Moreover, the sample survey had detailed information regarding the feature of the owner as well as the firm during the setting up of the business, the quality of the support program, the respective gaps and challenges experienced by MSE operators, and the labor market status of the youth before and after self-employment, which are important variables in the survival analysis.

Retrospective information determines the validity of a research, since it can be subscribed to self-justification bias easily. To account for potential survey bias and retrospective bias, the data used in this paper consists 941 enterprises which were established from 2008, and thereafter, expecting the start-ups' owners can remind and provide information with less inaccuracy later than this period. Thus, the sample includes 941 enterprises; 569 enterprises are grouped as micro and 372 are as small enterprises. The group classification is based on registration certificate[1] and their number of workers[2]. Moreover, out of the total sample, we observe 18% completed business operation spell and the remaining 82% is right-censored at time of interview.

3.2 Descriptive analysis

Table 1 presents the hypothesized variables that were identified at the time of start-up and on business activity, along with their description using summery statistics. Part A and part B of the table describe the socio-demographic and economic characteristics of the owner, and firm- and industry-specific characteristics, respectively. Part C of the table highlights the description of business strategy variables.

About 26% of the enterprises were owned by female (i.e., as a solo and group) entrepreneurs, implying the dominance of male entrepreneurs in MSEs in Ethiopia. The average age of the owners at the time of the start-up was 24. The owners' human capital quality is measured by formal education attainment and work and business experience prior to the start-up. Accordingly, during the start-up period, 25% of the entrepreneurs had only elementary school attainment, while about 17% of the

Table 1 Definition of variables and their corresponding mean and standard deviation value

Covariates	Mean	Std.dev
Part A: owner-specific characteristics		
Dummy for female	0.255	0.436
Age of the firm owner at the time of establishment	24	4.42
Dummy for elementary education attainment	0.249	0.432
Dummy for college diploma and above attainment	0.166	0.372
Dummy for TVET education	0.001	0.300
Dummy for active in a labor market prior to the new business	0.514	0.500
Dummy for self-employment experience prior to the new business	0.122	0.328
Dummy for apprentice experience prior to the new business	0.329	0.154
Dummy for business experience prior to the new business	0.501	0.500
Dummy for entrepreneurship training prior to the new business	0.143	0.351
Dummy for short-term training prior to the new business	0.350	0.477
Dummy for opportunity motivation	0.690	0.463
Part B: firm and industry specific characteristics		
Firm size (initial number of workers)	8	10.6
Dummy for large start-up capital (more than 100,000)	0.055	0.229
Dummy for micro start-up capital (less than 25,000)	0.833	0.373
Dummy for sole proprietorship start-up	0.383	0.486
Dummy for cooperative start-up	0.262	0.440
Dummy for metal and wood work	0.258	0.438
Dummy for leather products	0.015	0.121
Dummy for textile and cloth	0.048	0.214
Dummy for construction	0.197	0.398
Dummy for service	0.114	0.318
Dummy for product provider	0.705	0.456
Dummy for support beneficiary	0.661	0.474
Dummy for registered during establishment	0.810	0.393
Part C: business strategy-specific characteristics		
Marketing management		
Dummy for competitive pricing strategy	0.718	0.450
Dummy for mark-up pricing strategy	0.426	0.016
Dummy for at home placing strategy	0.238	0.426
Dummy for at industrial site placing strategy	0.084	0.277
Dummy for salesmanship promotion strategy	0.258	0.438
Dummy for product innovation strategy	0.733	0.442
Dummy for market place innovation strategy	0.228	0.420
Dummy for niche market strategy	0.734	0,442
Dummy for high degree of competition	0.758	0.429
Dummy for external market linkage (proxied by siting cluster areas)	0.104	0.306
Financial management		
Capital investment (in Birr)	22,280	10,205
Dummy for retained earning investment	0.875	0.331
Dummy for internal financing (proxied by working capital financing from internal source)	0.693	0.462

Table 1 Definition of variables and their corresponding mean and standard deviation value *(Continued)*

Covariates	Mean	Std.dev
Dummy for business financing (proxied by working capital financing from suppliers)	0.058	0.008
Dummy for external financing (proxied by investment financing from external source)	0.319	0.466
Dummy for undercapitalization challenge	0.366	0.482
Internal control management		
Dummy for inventory system (proxied by using detail and modern list of input stocks at any time)	0.244	0.430
Dummy for annual budget	0.079	0.269
Dummy for poor accounting system (proxied by a significant difference between the book value and the actual value of revenue, cost, and profit)	0.188	0.391
Human capital management		
Dummy for owners training after establishment	0.363	0.481
Dummy for workers training while they are on duty	0.169	0.012
Internet technology		
Dummy for Internet connection in the premises	0.029	0.170
Number of observation	941	

Note: The left side for the owner's education covariate is the secondary school attainment; for start-up capital, covariate is small-sized capital (between 25,000 and 100,000); for the legal form of the firm, covariate is partnership; for pricing strategy, covariate is negotiation with the customer; and for placing strategy, covariate is shopping district

entrepreneurs had at least a college diploma and only 10% of the entrepreneurs had Technical and Vocational Education and Training (TVET). There were few owners who had self-employment experience prior to the start-up. Regarding previous experience, 33 and 50% of the owners had apprenticeship and business experience prior to the start-up, respectively.

The entrepreneurs who started the business out of push factor, such as to escape from being unemployed, lack of skill and proper education, and those who are forced by friends and family factors, are categorized as necessity-driven enterprises. On the other hand, those owners who started business as result of observing the enabling business environment and believe that self-employment is better than being employed by others are classified as opportunity-driven enterprises. Accordingly, the motivation behind being self-employed for about 69% of the owners was opportunity driven.

The average initial number of workers, which is a proxy for initial size of the firm, was eight, implying the dominance of micro-level enterprises in our sample. About 83% raised a start-up capital of less than or equal to Birr 25,000 (USD 925), while only 6% raised a start-up capital of more than Birr 100,000 (USD 3700) during establishment. Regarding industry type, most of the enterprises are product providers (almost 71%), of which about 37 and 28% of the enterprises were engaged in metal and woodwork and construction sector, respectively.

Part C of the table shows that about 72% of the firms set price for their product and service conditioning on the competitors' position. This suggests that the firms' pricing objective is status quo; MSEs seek to keep their product prices consistent with or conditioned on the competitors' position. With respect to production innovation, about 73% of the owners/managers undertook screening and evaluation of the existing product mix line and made improvements and/or developed new products. Most enterprises, about 76% of enterprises, were experiencing a high degree of competition in

recent times due to the expansion of similar businesses. Niche marketing is found to be a significant marketing strategy in the sector, as 73% of the owners/managers focused their marketing on serving a preferably small niche market.

The average value of capital investment made by the enterprises since establishment was less than Birr 25,000 (USD 925). Most owners/managers, 88%, opted to reinvest their earnings in the business. Not few, almost 37%, enterprises experienced a shortage of capital investment funds during their business operations.

It turns out that 36% of the owners improved themselves through attaining short-term trainings after establishment. Moreover, almost 14% of the enterprises arranged skills training for their workers. Last but not the least, for adoption of information and Internet technology, only 3% of the enterprises had an Internet connection in their business premises.

3.3 Differences between micro and small enterprises

In order to reveal differences between owner- and firm-related characteristics among micro and small enterprises, a *t* test mean equality is conducted. The reported *P* values show whether the means were equal at a significance level of 5%.

Table 2 compares micro- and small-sized firms using business operation survivors and dropout samples. The result indicates that the majority of female entrepreneurs were apt at establishing a micro-sized enterprise. The share of female entrepreneurs was significantly higher among the micro enterprises (almost 47%) within the dropout MSE groups. The share of owners with apprentice experience within the dropout sample was significantly higher among the micro enterprises (almost 37%) than the small enterprises (almost 20%).

In the survivor sample, a significantly higher share of owners with entrepreneurship training at the start-up period found among the small (almost 18%) than the micro enterprises (almost 13%). Opportunity-driven entrepreneur's share is significantly lower among the small (almost 38%) than the micro enterprises (almost 61%) in the dropout sample.

In the survivor sample, small business owners were likely to invest, on average, higher amounts compared to the micro enterprises. In contrast, the share of owners who invested less than Birr 25,001 was significantly higher among the micro enterprises than the small enterprises in the dropout sample. About 70% of start-ups were engaged in the manufacturing sector (product providers). This share was significantly higher among small than micro enterprises in the business operation survivor group and lower in the dropout group. The proportion of micro enterprises engaged in the service sector was higher compared to small enterprises in both survivor and dropout samples.

4 Estimation results

4.1 The nonparametric estimation results

Figure 1 shows the estimated survival and hazard rates. Figure 1a shows that survival rates declined over time. On average, almost 88% of MSEs survived their first 2 years in business. However, the survival function sloped downward strongly after and the probability of survival reached almost 68% after 6 years of business operation. As indicated

Table 2 Mean separation test in the survival rate of firms between micro and small enterprises

Variable	All MSEs	Survival			Drop-out		
		Micro	Small	*P* value	Micro	Small	*P* value
Socio-demographic and economic							
Dummy for female	0.255	0.279	0.157	0.0000	0.466	0.212	0.0004
Age of the firm owner at the time of establishment	24	24	24	0.4566	26	26	0.2673
Dummy for elementary education attainment	0.249	0.247	0.231	0.3198	0.291	0.273	0.3979
Dummy for college diploma and above attainment	0.166	0.172	0.170	0.4750	0.0126	0.167	0.2327
Dummy for TVET education	0.100	0.109	0.118	0.3624	0.029	0.030	0.4826
Dummy for active in a labor market prior to the new business	0.514	0.543	0.502	0.1405	0.447	0.470	0.3852
Dummy for self-employment experience prior to the new business	0.122	0.105	0.134	0.1113	0.155	0.136	0.3682
Dummy for apprentice experience prior to the new business	0.024	0.350	0.314	0.1500	0.370	0.200	0.0087
Dummy for business experience prior to the new business	0.501	0.521	0.471	0.0836	0.485	0.515	0.3541
Dummy for entrepreneurship training prior to the new business	0.143	0.131	0.183	0.0242	0.126	0.076	0.1512
Dummy for short-term training prior to the new business	0.350	0.264	0.418	0.0000	0.398	0.561	0.0194
Dummy for opportunity motivation	0.690	0.781	0.644	0.0000	0.612	0.379	0.0015
Firm specific							
Dummy for large start-up capital (more than 100,000)	0.055	0.024	0.111	0.0000	0.039	0.045	0.4172
Dummy for micro start-up capital (less than 25,000)	0.833	0.906	0.729	0.0000	0.874	0.742	0.0146
Dummy for sole proprietorship start-up	0.383	0.541	0.183	0.0000	0.466	0.061	0.0000
Dummy for cooperative start-up	0.262	0.122	0.418	0.0000	0.175	0.667	0.0000
Dummy for metal and wood work	0.258	0.294	0.271	0.2470	0.155	0.106	0.1825
Dummy for leather products	0.015	0.017	0.013	0.3266	0.000	0.03	0.0382
Dummy for textile and cloth	0.048	0.051	0.059	0.3307	0.000	0.045	0.0145
Dummy for construction	0.197	0.146	0.271	0.0000	0.136	0.303	0.0040
Dummy for service	0.114	0.127	0.069	0.0048	0.204	0.091	0.0255
Dummy for product provider	0.705	0.670	0.807	0.0000	0.544	0.727	0.0083
Dummy for support beneficiary	0.661	0.556	0.794	0.0000	0.592	0.894	0.0000
Dummy for registered during establishment	0.81	0.755	0.912	0.0000	0.718	0.864	0.0137
Number of observation		466	306		103	66	

Backgrounds are found from the retrospective information. Numbers are shares unless stated otherwise. *P* value is the lowest level of significance at which the null hypothesis (the difference in mean is equal to zero) is rejected

in Fig. 1b, there was a sharp rise in cumulative hazard at the beginning of the establishment time and then decelerated, reflecting higher hazard rate during the start-up period. As Fig. 1c highlights, the risk of dropout increased during the start-up phase of the enterprise and reached its peak at 24 months of business operation duration.

For group analysis, the paper employs Lifetable estimator for survival function estimation. Figure 2 presents the nonparametric survival and hazard rates. Figure 2a shows that the survival probability among micro enterprises decreased rapidly after the first 6 months of business operation. The estimate for micro/small groups shows that about 92% of the small enterprises and about 90% of the micro enterprises survived the first

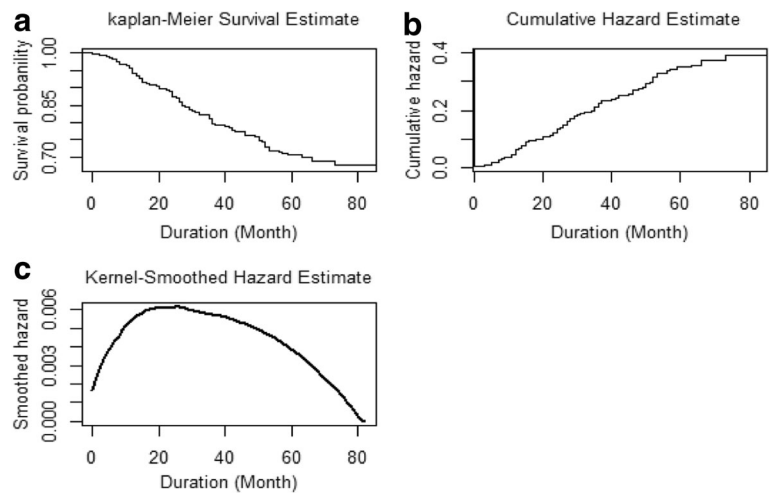

Fig. 1 The nonparametric survival and hazard rate estimation. **a** Kaplan-Meier survival estimate. **b** Cumulative hazard estimate. **c** Kernel-smoothed hazard estimate

2 years of business operation, which is almost the same. However, after 4 years of business duration, the survival rates among the groups were notably growing apart: 77% for the small enterprises and 66% for the micro enterprises (see Appendix 1: Table 4).

Thus, the results reveal strong evidence that a start-up's initial firm size affects survival probability. Entrepreneurs who establish new small-sized firms survive more compared to those who set up micro-sized enterprise in Ethiopia. To test for equality of the survival functions, we run the log rank test. The null hypothesis of no survival difference between the groups was rejected at a 10% level of significance ($P = 0.0707$). Figure 2b depicts that dropout risk was higher among micro than small enterprises at a given business operation duration. Moreover, it has an inverted U shape for the micro enterprises. Initially, there was an increased risk of dropout during the first 2 years of business operation, and then, the level of the risk remained high for the next two consecutive years before it declined over time. In contrast, we observed an increased dropout risk only during the first business operation year, which then decreased among small-sized enterprises.

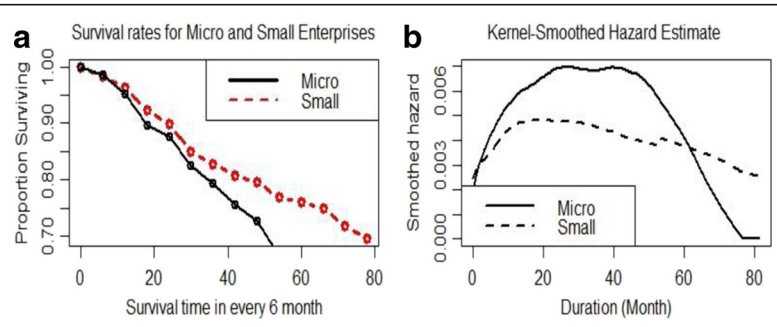

Fig. 2 The survival and hazard rate deferential between micro and small enterprises. **a** Survival rates for micro and small enterprises. **b** Kernel-smoothed hazard estimate

Overall, the nonparametric survival analysis suggests two basic facts on MSEs' operation in Ethiopia: (i) there is a survival differential among micro and small enterprises; (ii) the risk of dropout is high during the first two business operation years, particularly for micro enterprises. This implies that there is dire need to develop efficient and inclusive support interventions for micro business founders and mostly during the start-up phase of MSEs in Ethiopia. However, there is also a need to investigate the factors underpinning the survival of MSEs and what factors account for the deferential in survival rates among micro/small enterprise.

4.2 The Cox proportional hazard estimation

To find out what factors derive the survival of MSEs and the associated factors for the deferential in survival rates between micro and small enterprises, we employ semi-parametric analysis using the Cox proportional hazard estimation. The tests for the assumption of proportional hazard reveal strong evidence of proportional hazard for each covariate and for the global test (see Appendix 1: Tables 5 and 6). The chi-square statistics soundly failed to reject accommodating proportional hazard for model A and model B as a whole; P values are equal to 0.988 and 0.374, respectively. Similarly, the graphical diagnostic tests of the Schoenfeld residuals also supported the assumption of proportional hazard for all covariates as there was non-systematic departure of covariates from their smoothing-spline fitted line over time. We observe non-trend pattern with time in the plots for all covariates (see Appendix 2: Figures 3 and 4).

The survival rate of an enterprise may be influenced by various factors, such as owner, firm, and business strategy characteristics and the overall socio-business environment the enterprise is operating. Hence, the present paper specifies three different models to consider the effect of each category, separately. The first specification (model A) only presents and discusses the effect of the characteristics that are typically identifiable at the time of establishing the enterprise on MSEs' survival. We re-estimate the semi-parametric Cox proportional model (model B) which focuses on whether the business strategic characteristics of the MSEs are associated with the survival or failure of the enterprises. In order to control the effects of person-, firm-, and industry-specific background characteristics, we include three covariates in model B as a control variable, namely female, sole proprietorship, and manufacturing. The last specification (model C) estimates all the hypothesized variables using a Cox analysis.

Table 3 illustrates the estimated coefficients from the Cox proportional models and has three parts with sub-columns. Section A constitutes three sub-columns that present estimates of model A from the pooled sample and the grouped samples. Section B constitutes the next three sub-columns of the table, and they present estimates of model B from the pooled sample and the grouped samples. Section C is the last column of the table, and it highlights the estimates of all the hypothesized variables.

The results reveal that gender has a significant positive association with risk of dropout. Enterprises owned by women had a higher risk of dropout than men entrepreneurs, which is consistent with the results from Coad and Tamvada (2008).

Table 3 Partial likelihood estimates for the Cox proportional hazard models

	Model A			Model B			Model C
Covariates	MSEs	Micro	Small	MSEs	Micro	Small	MSEs
Dummy for female	0.683***	0.907***	0.370	0.610***	0.882***	0.381	0.493*
	(3.838)	(3.916)	(1.142)	(3.510)	(3.925)	(1.119)	(2.566)
Age of the owner	3.244***	3.635***	2.714**				3.073***
	(6.426)	(5.705)	(3.256)				(5.968)
Dummy for elementary education attainment	− 0.111	− 0.065	− 0.034				− 0.255
	(− 0.608)	(− 0.261)	(− 0.109)				(− 1.332)
Dummy for college diploma and above attainment	0.037	− 0.025	0.252				0.456†
	(0.154)	(− 0.078)	(0.689)				(1.802)
Dummy for TVET education	− 0.523	− 0.462	− 0.612				− 0.481
	(− 1.121)	(− 0.764)	(− 0.827)				(− 1.004)
Dummy for active in a labor market prior to the new business	− 0.388*	− 0.400	− 0.332				− 0.346†
	(− 2.014)	(− 1.557)	(− 1.043)				(− 1.656)
Dummy for self-employment experience prior to the new business	0.309	0.494	0.047				0.316
	(1.169)	(1.485)	(0.099)				(1.142)
Dummy for business experience prior to the new business	0.191	− 0.042	0.625†				0.242
	(1.053)	(− 0.180)	(1.951)				(1.256)
Dummy for apprentice experience prior to the new business	0.306	0.574*	− 0.281				0.639**
	(1.582)	(2.417)	(− 0.749)				(2.950)
Dummy for opportunity motivation	− 0.837***	− 0.712**	− 0.974**				− 0.776***
	(− 4.583)	(− 3.002)	(− 3.192)				(− 3.785)
Dummy for entrepreneurship training prior to the new business	− 0.543*	− 0.178	− 1.210*				0.032
	(− 2.112)	(− 0.577)	(− 2.440)				(0.110)
Firm size (initial number of workers)	− 0.198*						− 0.029
	(− 2.073)						(− 0.293)
Large start-up capital (more than 100,000)	− 0.824†	0.358	− 1.433*				− 0.485
	(− 1.866)	(0.556)	(−2.177)				(− 1.013)
Micro start-up capital (less than 25,000)	− 0.272	− 0.134	− 0.377				− 0.016
	(− 1.162)	(− 0.360)	(− 0.935)				(− 0.061)
Dummy for sole proprietorship start-up	− 0.898***	− 1.016***	− 1.026†	− 1.079***	− 1.014***	− 1.961**	− 1.187***
	(− 3.771)	(− 3.880)	(− 1.687)	(− 5.220)	(− 4.063)	(− 3.260)	(− 4.542)
Dummy for cooperative start-up	0.312	0.055	0.478				− 0.196
	(1.483)	(0.177)	(1.487)				(− 0.796)
Dummy for product provider	− 0.598***	− 0.712**	− 0.470	− 0.627***	− 0.674**	− 0.539†	− 0.643***
	(− 3.445)	(− 3.295)	(− 1.433)	(− 3.506)	(− 2.939)	(− 1.738)	(− 3.411)
Dummy for support beneficiary	− 0.092	− 0.219	0.238				0.040
	(− 0.466)	(− 0.960)	(0.544)				(0.189)
Dummy for registered during establishment	− 0.503*	− 0.485*	− 0.411				− 0.101
	(− 2.495)	(− 2.005)	(− 1.048)				(− 0.446)
Dummy for competitive pricing strategy				− 0.337*	− 0.145	− 0.582*	− 0.421*
				(− 1.994)	(− 0.630)	(− 2.035)	(− 2.353)
Dummy for mark-up pricing strategy				− 0.090	− 0.036	0.031	− 0.040
				(− 0.514)	(− 0.157)	(0.110)	(− 0.218)
Dummy for at home placing strategy				− 0.245	− 0.019	− 0.822*	− 0.213
				(− 1.149)	(− 0.078)	(− 1.515)	(− 0.963)

Table 3 Partial likelihood estimates for the Cox proportional hazard models *(Continued)*

	Model A			Model B			Model C
Covariates	MSEs	Micro	Small	MSEs	Micro	Small	MSEs
Dummy for at industrial site placing strategy				– 0.960*	– 0.234	– 2.091**	– 0.980*
				(– 2.554)	(– 0.510)	(– 2.801)	(– 2.433)
Dummy for salesmanship promotion strategy				– 0.221	– 0.228	– 0.080	– 0.138
				(– 0.970)	(– 0.724)	(– 0.230)	(– 0.581)
Dummy for product innovation strategy				– 0.258	– 0.102	– 0.664*	– 0.261
				(– 1.470)	(– 0.446)	(– 2.187)	(– 1.452)
Dummy for market place innovation strategy				– 0.407†	– 0.292	– 0.754*	– 0.424†
				(– 1.844)	(– 0.981)	(– 2.143)	(– 1.887)
Dummy for high degree of competition				– 0.223	– 0.095	– 0.575†	– 0.099
				(– 1.244)	(– 0.396)	(– 1.946)	(– 0.530)
Dummy for niche market strategy				– 0.149	– 0.134	0.004	– 0.143
				(– 0.818)	(– 0.579)	(0.011)	(– 0.724)
Dummy for external market linkage				– 0.997*	– 0.468	– 1.455*	– 1.168**
				(– 2.454)	(– 0.755)	(– 2.509)	(– 2.776)
Log capital investment				– 0.150***	– 0.146***	– 0.170***	– 0.158***
				(– 7.936)	(– 5.651)	(– 5.613)	(– 7.824)
Dummy for retained earnings investment				– 0.738***	– 0.861**	– 0.472	– 0.688***
				(– 3.779)	(– 3.102)	(– 1.546)	(– 3.292)
Dummy for internal financing				– 0.850*	– 1.009*	– 0.873	– 1.001**
				(– 2.520)	(– 2.403)	(– 1.259)	(– 2.810)
Dummy for business financing				– 0.328	– 0.596	– 0.254	– 0.294
				(– 1.105)	(– 1.509)	(– 0.481)	(– 0.973)
Dummy for external financing				– 0.577*	– 0.716*	– 0.426	– 0.642*
				(– 2.124)	(– 2.124)	(– 0.802)	(– 2.245)
Dummy for undercapitalization challenge				0.392*	0.583*	0.162	0.220
				(2.189)	(2.471)	(0.527)	(1.151)
Dummy for inventory system				– 0.670**	– 0.768*	– 0.614†	– 0.752**
				(– 2.695)	(– 1.998)	(– 1.731)	(– 2.869)
Dummy for annual budget				– 0.708	– 1.398	– 0.743	– 0.703
				(– 1.513)	(– 1.369)	(– 1.345)	(1.459)
Dummy for poor accounting system				0.160	0.313	– 0.097	0.074
				(0.675)	(1.034)	(– 0.235)	(0.310)
Dummy for owners training after establishment				0.423*	0.415	0.378	0.203
				(2.035)	(1.551)	(0.982)	(0.884)
Dummy for workers training while they are on duty				– 0.644*	– 0.992*	– 0.625	– 0.534†
				(– 2.459)	(– 2.155)	(– 1.570)	(– 1.955)
Dummy for Internet connection in the premises				– 1.760†			– 2.011†
				(– 1.732)			(– 1.952)
LHR test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log rank test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: Figures in parentheses are *P* values, and †, *, **, and *** indicate statistically significant at the 10, 5, 1, and 0.1% level, respectively. Values in parentheses are the *Z* values

The log form of the owner's age was applied in the model. As Davidsson (1991) and Amran (2011) found, there was a significant negative relationship between the business founders' age and business survival. This suggests that entering a self-employment at matured age is associated with a higher dropout rate than younger entrepreneurs.

Education qualification does not appear to be a significant for a survival of MSEs. As Taylor (1999) argued, this suggests that to enter self-employment and survive, entrepreneurs do not need to have a high level of formal education. Moreover, there is no significant positive effect of TVET on the probability of a firm's survival.

The fitted model proves that previous labor market experience was an important factor for survival. Consistent with the result of Taylor (1999), active labor market participation prior to the start-up reduced the risk of dropout. But, as Kalleberg and Leicht (1991) found, there was no significant relationship between self-employment experience prior to the start-up and business survival. Previous general business and apprentice experience did not have a significant impact on a firm's survival.

In line with Caliendo and Kritikos (2009), opportunity motivation significantly reduced the risk of dropout, implying that the opportunity-driven entrepreneur's probability of survival was significantly higher than the necessity entrepreneurs. Entrepreneurial education and training prior to start-up appear to be important factor to stimulate entrepreneurial activity and business survival, as it had a significant negative effect on dropout rate.

Concerning firm and industry characteristics, start-up size has the expected positive effect on MSEs' survival, implying the larger the size of the setup, the lower is the probability of dropout. We capture the impact of financial resource at the time of start-up using the size of the start-up capital, and it turns out that larger amount of start-up capital reduced the risk of dropout. Entrepreneurs, who invested more than Birr 100,000 (USD 3700), had a significantly higher probability of survival than the others, suggesting that an adequate amount of start-up capital is a key factor for a firm's survival. Unlike Kalleberg and Leicht (1991), a solo type of business setup had a significant positive effect on MSEs' survival than cooperatives. This might be associated with the complete control and decision-making power that the owner enjoys, as well as being free from corporate tax.

Youth-owned MSEs engaged in the manufacturing sector had a lower risk of dropout. This is consistent with Taylor's (1999) results, implying that the service sector was exposed to a higher risk of dropout. Unpredictably, supports obtained by the owner at time of start-up did not appear to have significant association with the survival of MSEs. Last but not the least, our analysis proves that formal system is a significant determinant of MSEs' survival, and registration during the start-up phase reduced the probability of dropout.

Overall, gender, age, previous labor experience, motivation, entrepreneurial education and training, initial size, legal form, size of start-up capital, industry type, and formal system, therefore, are important factors in determining the probability of MSEs' survival in Ethiopia.

As section B of Table 3 presents, in line with the results of Chittithaworn et al. (2011), marketing strategy was an important factor in explaining MSEs' survival rate in

Ethiopia. Concerning marketing mix strategy, the pricing and place strategies appeared to be significant factors in explaining the probability of MSEs' survival. Competitive pricing strategy had a significant negative association with MSEs' dropout rate. This reflects that it is better to develop status quo pricing objective for MSEs to survive and be successful since most of them are operating under high degree of competition emanating from similar business; about 76% of the MSEs reported that they were experiencing high competition due to an increase in the number of similar businesses.

The location of enterprises is one of the elements of a business strategy that can address the challenges of competition by delivering the right product to the right customer at the right time. The study reveals that an enterprise which was based in an industrial area was more likely survive than those at residential places. This reflects that industrial areas offer better access to customers, raw materials, labor, and transportation. Marketing place innovation was statistically significant at the 10% level and had a positive association with survival rate, suggesting that reallocating for innovative marketing places was an important factor for attracting new customers and expanding market shares. Moreover, external market linkages had a significant positive association with the probability of business survival, suggesting that operating under linked marketing environment significantly reduced the risk of dropout.

In line with the results from McMahon (2001b), our fitted model proves that financial management does appear to be an important factor for MSEs' survival. There was a negative association between capital investment and a risk of dropout, implying that the more the manager/owner invests in capital equipment, the higher the probability of survival the business had. Consistent with the results of Fadahunsi (2012), a manager/owner who is willing to reinvest retained earnings had a propensity to survive more than businesses that were not willing. This suggests that a less costly and internal source of financing (retained earnings) is a key factor of MSEs' survival since access to external formal sources of financing was a major challenge for MSEs in Ethiopia; almost 32 and 26% of managers/owners reported that a lack of access to finance was a major constraint to revenue growth and business improvement, respectively.

Like Carpenter and Petersen (2002), the present paper proves that the MSEs which used retained earnings to finance their working capital had a propensity to survive more compared to the MSEs which used other type of sources. The study also proves that there existed a positive association between external source of financing capital investment and MSEs' survival, implying that those firms which finance their capital investment from external source had higher survival rate. Consistent with the results from Read (1998), the study shows that undercapitalization increased the risk of dropout, reflecting that MSEs which suffered from a shortage of funds to finance their investment survived less than those which did not. Like Mongare and Nasidai (2014), the study proves that the survival of MSEs was highly associated with the inventory system of the business, reflecting that efficient and modern inventory systems reduced risk of demise.

As Savery and Luks (2004) found, the study reveals that training for workers was an important factor for MSEs' survival, suggesting that building human capital had a propensity to reduce the risk of dropout. In contrast, there exist inconsistent results

concerning the effect of owners' training on business survival, as it appeared to be positively associated with dropout rate. Moreover, the fitted model attests that business survival was positively associated with Internet technology adoption, which is consistent with the result of Warren (2004). This suggests that MSEs with Internet connection in their business premises had a higher probability of survival as they were more connected with the world and had better access to information.

Overall, the study confirms that the survival of an enterprise is also highly associated with business strategy characteristics of MSEs. Marketing management and financial management strategies play a significant role on reducing the risk of dropout of MSEs in Ethiopia. Moreover, human capital development and access to Internet are also important elements to increase the MSEs' probability of survival.

So far, the Cox proportional hazard model is estimated for two different data setups; model C estimates all the hypothesized variables to see if there is a significant discrepancy on the covariate effect on the hazard rate. As section C highlights consistent with the first model, gender, age, labor market experience, motivation, legal form, and industry type appeared to be significant factors for business survival. Moreover, unlike the first part model, entrepreneurship education, size of the enterprise, level of the start-up capital, and legal registration appeared to be insignificant factors in this model for the survival of enterprises. In line with the results from the second model, this fitted model proves that marketing management, financial management, controlling system, human capital development, and Internet technology appeared to be important factors for micro- and small-scale enterprises' survival.

4.3 The group survival rate analysis

The second and third column of section A highlights the results from group analysis with model A specification. As the descriptive analyses highlight, female entrepreneurs were apt at establishing a micro-sized enterprise, but the results from the survival estimates show that female entrepreneurs who owned micro enterprises experienced a significant higher dropout rate. This suggests that gender is one of the factors behind less survival rate among the micro-level enterprises compared to small enterprises. Unexpectedly, apprenticeship experience prior to start-up had a significant positive effect on the dropout rates for micro enterprises. The justification for this result demands further study on the subject matter, but the probable explanation could be the gap between the level and quality of apprenticeship experience with respect to the nature of and demand for micro enterprises.

Entrepreneurship training drives small enterprise owners to experience low level of dropout risk compared to micro enterprise founders. This confirms that entrepreneurial training is one of the explanations for survival deferential between micro and small enterprises. The analysis also depicts that large value of start-up capital had a significant and pronounced negative effect on the risk of dropout from the small enterprises' sample. This implies that it is an important factor accounted for survival rate deferential between micro and small enterprises. The relationship between engaging in a manufacturing sector and the risk of dropout is significant

and negative for micro enterprises. We also found that formality had a significant negative association with the risk of dropout for micro enterprises.

The model estimation identifies what owner, firm, and industry characteristics identifiable at start-up period explained deferential of survival rate between micro and small enterprises. Accordingly, we found that gender, entrepreneurial training, and size of start-up capital were the major factors accounted for the better success of small enterprises compared to micro enterprises.

From sub-columns 2 and 3 of model B section, the estimation for group analysis shows that pricing and placing strategy, product and marketplace innovation, competition, and market linkage appeared to be the majors accounting for the better success of small enterprises compared to micro enterprises. Status quo pricing objective led small firms to survive more compared to micro enterprises. Locating a business at residential and industrial place reduced the risk of dropout for small enterprises. Like Ibidunni et al. (2014), the paper depicts that product innovation reduced the risk of dropout for small enterprises, calling the firms to undertake a progressive product innovation process to meet the demand of their customers and expand their market.

Moreover, high degree of competition had a significant positive association with the survival of small enterprises. This suggests two things: (i) during a high competition period, managers/owners probably pressured from their competitors to enter new markets, renovate their products, or introduce new products so that their market increases; (ii) high degree of competition in a specific product line might imply the high demand for the product. External market linkage had a negative association with the risk of dropout for the small enterprises. Overall, our study proves that marketing management strategy was one of the explanations for survival deferential between micro and small enterprises.

Regarding financial management characteristics, capital investment, retained earnings investment, external financing, and inventory system had a significant negative association with the probability of dropout for micro enterprises. Like the results from the pooled sample, shortage of investment funds had a significant positive effect on micro enterprises' dropout rate. The fitted model also confirmed that workers' training played a key role on reducing the probability of dropout for micro enterprises.

The results from model B specification identify what business strategy characteristics explained why the survival rate deferred between micro and small enterprises. Pricing and placing strategy, innovation, competition, and external market linkage were the probable major factors accounted for the better success of small enterprises compared to micro enterprises.

5 Conclusions

This paper examines the survival of youth-owned MSEs and the associated factors based on a data obtained from 941 youth-owned MSEs in urban Ethiopia. The study uses nonparametric and semi-parametric hazard models to estimate the survival rate and its associated factors.

The nonparametric estimation results reveal that MSEs' risk of dropout was high during the first two to four business operation years in Ethiopia. The analysis also confirms that there was survival differential between micro and small enterprises. Particularly, the risk of dropout reached its maximum at 4 years after

establishment for micro enterprises while it was after 2 years for small enterprises. This could be due to inclination of most support programs towards small enterprises or overlooking of the importance of micro enterprises in the process of creating viable and sustainable medium and large industries from both sides—the MSE promoters and micro scale enterprise owners.

Gender, age, previous work experience, motivation, entrepreneurship training, initial size, ownership type, type of industry, and legal status (registration) were important factors in explaining the probability of MSEs' survival in Ethiopia. The survival of MSEs was also highly influenced by business strategy features. Marketing and financial management strategies played a significant role on reducing the risk of dropout. Moreover, human capital development and use of Internet technology were also important elements to increase the probability of MSEs' survival.

The group-based survival analysis (micro vs. small enterprises) reveals that gender, entrepreneurial training, start-up capital size, pricing and placing strategy, product and market place innovation, and external market linkage appeared to increase small enterprises' survival rate compared to micro enterprises.

Endnotes

[1]Regional government offices provide a certificate for new startups upon registration, and it includes information about the initial size of the business.

[2]Micro enterprise is define as an enterprise employing less than five workers, while small is defined as an enterprise employing more than five but less than 30 workers.

Appendix 1

Table 4 Survival and hazard rate from the Lifetable estimator for small/micro enterprises

Duration	Small			Micro			Survival rate difference (%)
	At risk	Survival	Hazard	At risk	Survival	Hazard	
0–6	372	1	0.0027	569	1	0.0024	0
6–12	358	0.9837	0.0034	533	0.9856	0.0055	− 0.19
12–18	320	0.9636	0.0072	430	0.9534	0.0103	1.02
18–24	280	0.9227	0.0044	348	0.8963	0.0037	2.64
24–30	251	0.8987	0.0094	286	0.8767	0.0103	2.20
30–36	210	0.8494	0.0043	233	0.8243	0.0064	2.51
36–42	181	0.8280	0.0040	183	0.7932	0.008	3.48
42–48	152	0.8083	0.0024	151	0.7561	0.0063	5.22
48–54	124	0.7967	0.0059	113	0.728	0.0153	6.87
54–60	103	0.7691	0.0018	83	0.6641	0.0046	10.5
60–66	80	0.7607	0.0024	63	0.6461	0.0000	11.46
66–72	60	0.7499	0.007	47	0.6461	0.0000	10.38
72–78	35	0.7190	0.0056	30	0.6461	0.0000	7.29
78–NA	25	0.6954	0.0000	19	0.6461	0.0000	4.93

Note: The survival rate difference is the difference of cumulative proportion of small and micro entrepreneurs' survival rate up to specific time interval
NA not applicable

Table 5 Proportional hazard test using chi-square statistics: Cox model analysis—model A

Covariates	*P* value
Female	0.112
Age (at start-up)	0.559
Elementary school	0.523
College diploma and above	0.347
TVET	0.967
Active in labor market	0.959
Self-employment experience	0.333
Business experience	0.487
Apprentice experience	0.552
Opportunity	0.824
Entrepreneurship training	0.988
Initial number of workers	0.471
Sole proprietorship	0.329
Cooperative	0.731
Large start-up capital	0.954
Micro start-up capital	0.286
Product provider	0.611
Support	0.985
Registered	0.591
Global	0.951

Table 6 Proportional hazard test using chi-square statistics: Cox model analysis—model B

Covariates	*P* value
Female	0.193
Manufacturing	0.554
Sole proprietorship	0.378
Competitive pricing strategy	0.373
Mark-up pricing strategy	0.376
Place at home (shop)	0.351
Place at industrial place (shop)	0.328
Salesmanship promotion	0.476
Product innovation	0.326
Market place innovation	0.825
Degree of competition	0.385
Niche market	0.288
Market linkage	0.481
Capital investment	0.069
Retained earnings investment	0.290
Internal financing (working capital)	0.260
Business financing (working capital)	0.375
External financing (investment)	0.021
Undercapitalization	0.713
Inventory system	0.906
Annual budget	0.508
Poor accounting system	0.492
Owners training	0.155
Workers training	0.516
Internet	0.790
GLOBAL	0.378

Appendix 2

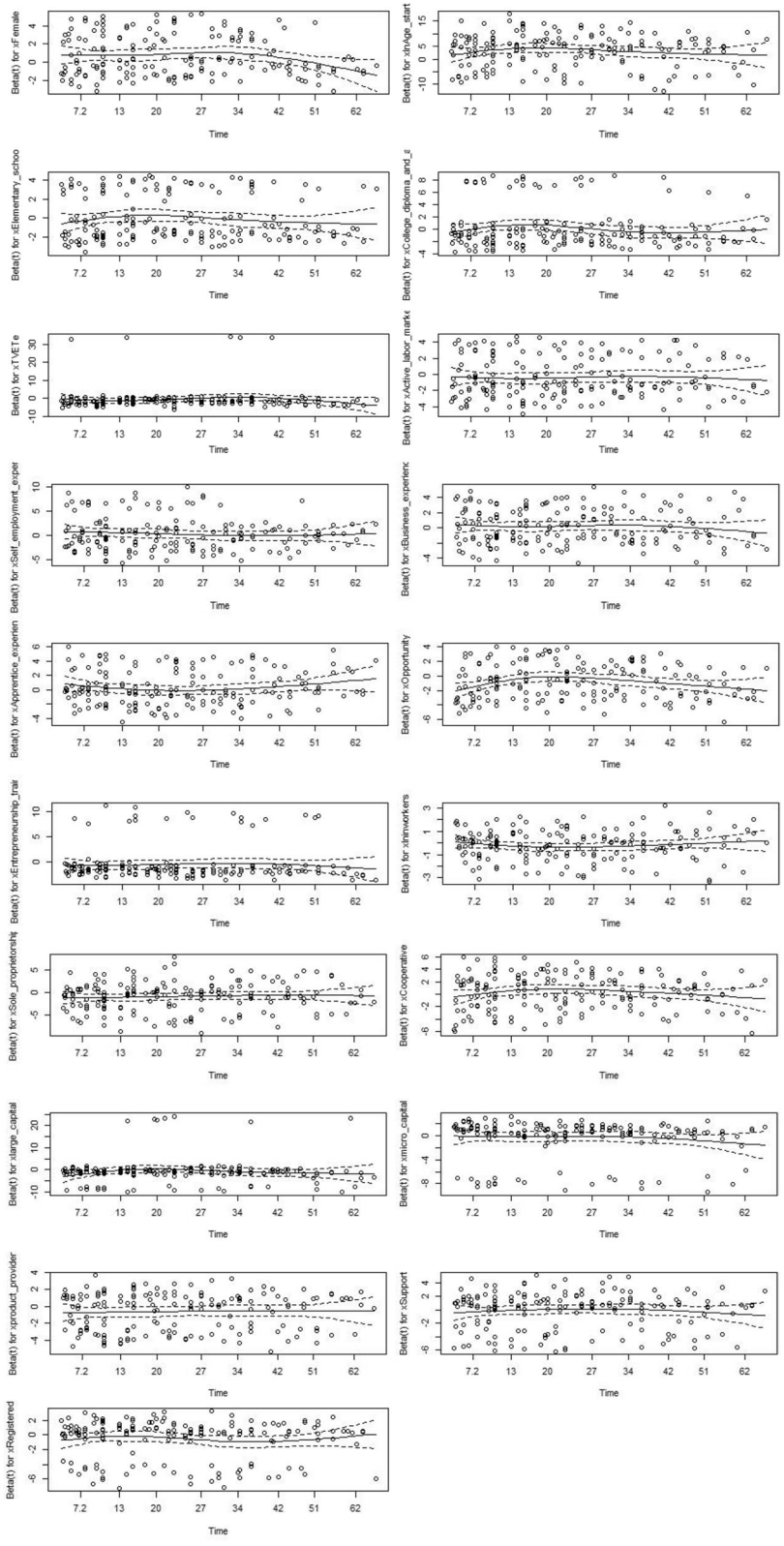

Fig. 3 Graphical diagnostic Schoenfeld residual test: model A

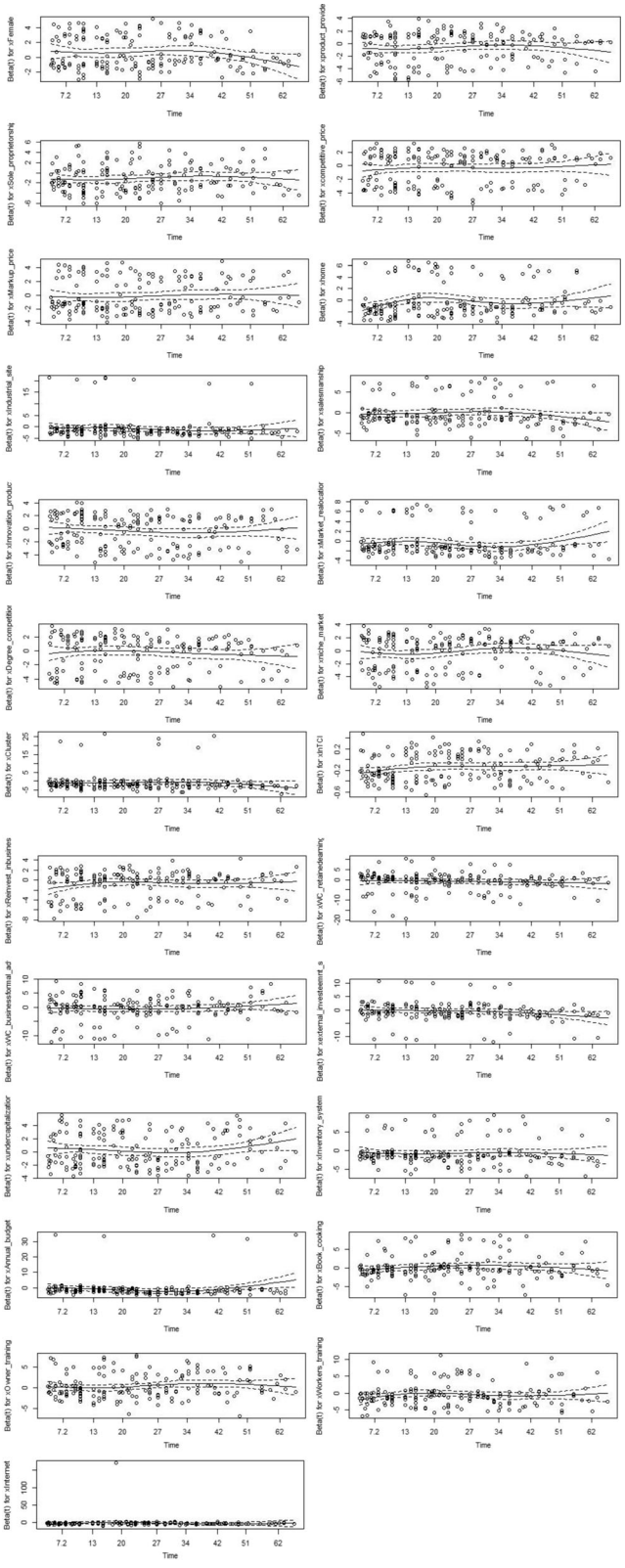

Fig. 4 Graphical diagnostic Schoenfeld residual test: model B

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